



FLORA OF AUSTRALIA

Volume 37 Asteraceae 1



© Commonwealth of Australia 2015.

This work is copyright. You may download, display, print and reproduce this material in unaltered form only (retaining this notice) for your personal, non-commercial use or use within your organisation. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced or distributed by any process or stored in any retrieval system or data base without prior written permission from the copyright holder. Requests and inquiries concerning reproduction and rights should be addressed to: abrs@environment.gov.au

FLORA OF AUSTRALIA

Volume 37 of the *Flora of Australia* is the first of three volumes covering the family Asteraceae. This volume presents an introduction to the family in Australia, including a synoptic classification and keys, and treatments of all the tribes represented in Australia, with the exception of the large tribes Gnaphalieae and Astereae, which will each be the subject of a future volume of the Flora.

Nineteen tribes, 233 genera and 518 species are treated in this volume, of which the majority are introduced (only 47 genera include native species).

Asteraceae is the largest family of flowering plants, with over 1600 genera and 24,000 species found on all continents except Antarctica, and also one of the largest families in Australia, with an estimated 290 genera and 1430 species. The family is found throughout Australia, in all habitats, although scarce in rainforest.

Twenty seven authors, illustrators and photographers have contributed to this volume.

Cover:

Bedfordia salicina (Labill.) DC.

Painting by Nilavan Adams.

**Contents of volumes in the *Flora of Australia*, the families (current at November 2014)
arranged according to the system of A.Cronquist (1981)**

Volume 1	Cannabaceae Moraceae Urticaceae	Volume 7	Volume 10	Haloragales Haloragaceae Gunneraceae
Introduction		Malvales Elaeocarpaceae Tiliaceae Sterculiaceae Bombacaceae Malvaceae	Ebenales Sapotaceae Ebenaceae Symplocaceae	
<hr/>	Fagales Balanopaceae Betulaceae Fagaceae	<hr/>	Primulales Myrsinaceae Primulaceae	Myrtales Sonneratiaceae Lythraceae Thymelaeaceae Onagraceae Melastomataceae Combretaceae
Volume 2		Volume 8	Rosales Connaraceae Eucryphiaceae Cunoniaceae Davidsoniaceae Pittosporaceae Byblidaceae Grossulariaceae Alseuosmiaceae Crassulaceae Cephalotaceae Saxifragaceae Rosaceae Chrysobalanaceae Surianaceae	<hr/>
Magnoliales Winteraceae Himantandraceae Eupomatiaceae Austrobaileyaceae Annonaceae Myristicaceae	Casuarinales Casuarinaceae	Lecythidales Lecythidaceae		Volumes 19–21
	<hr/>	Nepenthales Nepenthaceae Droseraceae		Myrtaceae
Laurales Trimeniaceae Monimiaceae Atherospermataceae Idiospermaceae Lauraceae Hernandiaceae	Caryophyllales Phytolaccaceae Nyctaginaceae Aizoaceae Cactaceae Chenopodiaceae	Violales Flacourtiaceae Bixaceae Cistaceae Violaceae Tamaricaceae Frankeniaceae Passifloraceae Cucurbitaceae Datiscaceae		<hr/>
	<hr/>	Salicales Salicaceae	Volumes 11, 12	Volume 22
Piperales Piperaceae	Volume 5	Capparales Capparaceae Brassicaceae Moringaceae Resedaceae	Fabales Mimosaceae Caesalpinjiaceae	Rhizophorales Rhizophoraceae
Aristolochiales Aristolochiaceae	Amaranthaceae Portulacaceae Basellaceae Molluginaceae Caryophyllaceae		<hr/>	Cornales Alangiaceae
Nymphaeales Nelumbonaceae Nymphaeaceae Cabombaceae Ceratophyllaceae	Polygonales Polygonaceae		Volumes 13–15	Santalales Olacaceae Opiliaceae Santalaceae Loranthaceae Viscaceae Balanophoraceae
Ranunculales Ranunculaceae Berberidaceae Menispermaceae	Plumbaginales Plumbaginaceae	Batales Gyrostemonaceae Bataceae	<hr/>	Rafflesiales Rafflesiaceae
	<hr/>		Volumes 16, 17	
Papaverales Papaveraceae Fumariaceae	Volume 6	Volume 9	Fabaceae	Celastrales Celastraceae Hippocrateaceae Stackhousiaceae Aquifoliaceae Icacinaceae Cardiopteridaceae Corynocarpaceae Dichapetalaceae
Hamamelidales Platanaceae	Dilleniales Dilleniaceae	Ericales Epacridaceae Ericaceae	<hr/>	<hr/>
<hr/>	Theales Ochnaceae Theaceae Actinidiaceae Elatinaceae Clusiaceae	<hr/>	Proteales Elaeagnaceae Proteaceae	Volume 23
Volume 3			<hr/>	Euphorbiales Euphorbiaceae
Hamamelidaceae	<hr/>		Volume 18	
Urticales Ulmaceae			Podostemales Podostemaceae	

Volume 24

Rhamnales
Rhamnaceae
Leeaceae
Vitaceae

Linales
Erythroxylaceae
Hugoniaceae
Linaceae

Polygalales
Malpighiaceae
Tremandraceae
Polygalaceae
Xanthophyllaceae

Volume 25

Sapindales
Melianthaceae
Akaniaceae
Sapindaceae
Aceraceae
Burseraceae
Anacardiaceae
Simaroubaceae

Volume 26

Meliaceae
Rutaceae
Zygophyllaceae

Volume 27

Geraniales
Oxalidaceae
Geraniaceae
Tropaeolaceae
Balsaminaceae

Apiales
Araliaceae
Apiaceae

Volume 28

Gentianales
Loganiaceae
Gentianaceae

Apocynaceae
Asclepiadaceae

Volume 29

Solanales
Solanaceae

Volume 30

Convolvulaceae
Cuscutaceae
Menyanthaceae
Polemoniaceae
Hydrophyllaceae

Lamiales
Boraginaceae
Verbenaceae
Avicenniaceae

Volume 31

Lamiaceae

Volume 32

Callitrichales
Callitrichaceae

Plantaginales
Plantaginaceae

Scrophulariales
Buddlejaceae
Oleaceae
Scrophulariaceae
Orobanchaceae
Globulariaceae

Volume 33

Myoporaceae
Gesneriaceae
Acanthaceae
Pedaliaceae
Bignoniaceae
Lentibulariaceae

Volume 34

Campanulales
Sphenocleaceae
Campanulaceae
Stylidiaceae
Donatiaceae

Volume 35

Brunoniaceae
Goodeniaceae

Volume 36

Rubiales
Rubiaceae

Dipsacales
Caprifoliaceae
Valerianaceae
Dipsacaceae

Volumes 37, 38

Asterales
Asteraceae

Volume 39

Alismatales
Limnocharitaceae
Alismataceae

Hydrocharitales
Hydrocharitaceae

Najadales
Aponogetonaceae
Juncaginaceae
Potamogetonaceae
Ruppiaceae
Najadaceae
Zannichelliaceae
Posidoniaceae
Cymodoceaceae
Zosteraceae

Triuridales
Triuridaceae

Arecales
Arecaceae

Pandanales
Pandanaceae

Arales
Araceae
Lemnaceae

Volume 40

Commelinales
Xyridaceae
Commelinaceae

Eriocaulales
Eriocaulaceae

Restionales
Flagellariaceae
Restionaceae
Centrolepidaceae

Juncals
Juncaceae

Volumes 41, 42

Cyperales
Cyperaceae

Volumes 43, 44

Poaceae

Volume 45

Hydatellales
Hydatellaceae

Typhales
Sparganiaceae
Typhaceae

Bromeliales
Bromeliaceae

Zingiberales
Musaceae
Zingiberaceae
Costaceae
Cannaceae

Liliales
Philydraceae
Pontederiaceae
Haemodoraceae
Liliaceae

Volume 46

Iridaceae
Aloeaceae
Agavaceae
Xanthorrhoeaceae
Hanguanaceae
Taccaceae
Stemonaceae
Smilacaceae
Dioscoreaceae

Volume 47

Orchidales
Burmanniaceae
Corsiaceae
Orchidaceae

Volume 48

Gymnospermae
Pteridophyta

Volume 49

Oceanic Islands 1

Volume 50

Oceanic Islands 2

Volumes 51–53

Bryophyta

Volumes 54–59

Lichens

FLORA OF AUSTRALIA



Bedfordia salicina (Labill.) DC.
Painting by Nilavan Adams.

A publication of the
AUSTRALIAN BIOLOGICAL RESOURCES STUDY, CANBERRA



FLORA OF AUSTRALIA

Volume 37
Asteraceae 1



Australian Government

Department of the Environment



PUBLISHING

© Commonwealth of Australia 2015

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced or distributed by any process or stored in any retrieval system or data base without prior written permission from the copyright holder. Requests and inquiries concerning reproduction and rights should be addressed to the Director, Australian Biological Resources Study, GPO Box 787, Canberra, ACT 2601, Australia.

EDITOR
Annette Wilson

EDITORIAL ASSISTANCE
Brigitte Kuchlmayr Helen Thompson
Tony Orchard

This work may be cited as:

Flora of Australia Volume 37, Asteraceae 1.
Melbourne : ABRS/CSIRO Australia (2015).

Individual contributions may be cited as:

Bedfordia A.E.Orchard, *Flora of Australia*
37: 198–203 (2015).

This book is available from:

CSIRO PUBLISHING
PO Box 1139 (150 Oxford Street)
Collingwood VIC 3066
Australia

Tel: (03) 9662 7666 Int: +(61 3) 9662 7666
Fax: (03) 9662 7555 Int: +(61 3) 9662 7555

Email: publishing.sales@csiro.au

**National Library of Australia
Cataloguing-in-Publication entry**

Flora of Australia. Volume 37, Asteraceae 1.

Bibliography.

Includes index.

ISBN 978 1 4863 0415 8 (hard cover).

ISBN 978 1 4863 0416 5 (soft cover).

ISBN 978 0 643 05702 9 (hard cover set).

ISBN 978 0 643 05695 4 (soft cover set).

1. Botany – Australia – Classification. I. Wilson, Annette. II. Australian Biological Resources Study. (Series : *Flora of Australia* : v. 37).

584.90994

Published by ABRS, Canberra/CSIRO Publishing, Melbourne
Printed in Australia

CONTENTS

Contributors to Volume 37	x
Illustrators	x
Photographers	xi
Introduction	xii
 Asteraceae [family description] <i>A.E.Orchard</i>	 1
Introduction to the Family <i>A.E.Orchard</i>	2
Synoptic Classification <i>A.E.Orchard</i>	11
Key to genera <i>A.E.Orchard</i>	18
Subfam. Mutisoideae	45
<i>Trichocline</i> <i>N.S.Lander</i>	45
Subfam. Carduoideae	48
Trib. Cardueae	48
Hemisteptia <i>A.R.Bean</i>	50
Carduus <i>A.R.Bean</i>	51
Silybum <i>A.R.Bean</i>	56
Picnomon <i>A.R.Bean</i>	57
Cirsium <i>A.R.Bean</i>	58
Notobasis <i>A.R.Bean</i>	60
Cynara <i>A.R.Bean</i>	61
Onopordum <i>A.R.Bean</i>	62
Arctium <i>A.R.Bean</i>	66
Carthamus <i>A.R.Bean</i>	67
Rhapontium <i>A.R.Bean</i>	70
Mantiscalca <i>A.R.Bean</i>	73
Centaurea <i>A.R.Bean</i>	74
Subfam. Cichorioideae	84
Trib. Cichorieae	84
Scolymus <i>I.R.Thompson</i>	87
Cichorium <i>I.R.Thompson</i>	89
Chondrilla <i>I.R.Thompson</i>	90
Crepis <i>I.R.Thompson</i>	92
Taraxacum <i>N.H.Scarlett</i>	95
Youngia <i>I.R.Thompson</i>	113
Lapsana <i>I.R.Thompson</i>	114
Lactuca <i>I.R.Thompson</i>	115
Sonchus <i>I.R.Thompson</i>	117
Actites <i>I.R.Thompson</i>	122
Launaea <i>I.R.Thompson</i>	123

CONTENTS

Reichardia	<i>I.R.Thompson</i>	124
Microseris	<i>B.V.Sneddon</i>	125
Hieracium	<i>I.R.Thompson</i>	128
Tolpis	<i>I.R.Thompson</i>	129
Hedypnois	<i>I.R.Thompson</i>	132
Urospermum	<i>I.R.Thompson</i>	134
Hypochaeris	<i>I.R.Thompson</i>	135
Leontodon	<i>I.R.Thompson</i>	140
Helminthotheca	<i>S.Holzappel</i>	141
Picris	<i>S.Holzappel</i>	143
Scorzonera	<i>I.R.Thompson</i>	155
Tragopogon	<i>I.R.Thompson</i>	156
Trib. Arctotideae		159
Arctotheca	<i>A.Ghafoor</i>	160
Arctotis	<i>A.Ghafoor</i>	163
Cymbonotus	<i>A.R.Bean</i>	165
Gorteria	<i>A.Ghafoor</i>	167
Berkheya	<i>A.Ghafoor</i>	168
Gazania	<i>A.Ghafoor</i>	170
Trib. Vernonieae		172
Elephantopus	<i>A.Ghafoor</i>	173
Pseudelephantopus	<i>A.Ghafoor</i>	175
Ethulia	<i>A.Ghafoor</i>	176
Centratherum	<i>A.Ghafoor</i>	177
Pleurocarpaea	<i>A.Ghafoor</i>	180
Cyanthillium	<i>A.Ghafoor</i>	183
Tarlmounia	<i>A.Ghafoor</i>	187
Vernonia	<i>A.Ghafoor</i>	188
Decaneuropsis	<i>A.Ghafoor</i>	189
Subfam. Asteroideae		192
Trib. Senecioneae		192
Abrotanella	<i>I.R.Thompson</i>	194
Centropappus	<i>I.R.Thompson</i>	196
Bedfordia	<i>A.E.Orchard</i>	198
Petasites	<i>I.R.Thompson</i>	203
Roldana	<i>I.R.Thompson</i>	204
Delairea	<i>I.R.Thompson</i>	206
Euryops	<i>I.R.Thompson</i>	207
Cineraria	<i>I.R.Thompson</i>	208
Senecio	<i>I.R.Thompson</i>	209
Erechtites	<i>I.R.Thompson</i>	307

CONTENTS

Arrhenechthites	<i>I.R.Thompson</i>	309
Crassocephalum	<i>I.R.Thompson</i>	311
Emilia	<i>I.R.Thompson</i>	312
Gynura	<i>I.R.Thompson</i>	314
Trib. Calenduleae		316
Calendula	<i>A.Ghafoor</i>	317
Chrysanthemoides	<i>A.Ghafoor</i>	320
Dimorphotheca	<i>A.Ghafoor</i>	321
Monoculus	<i>A.Ghafoor</i>	324
Oligocarpus	<i>A.Ghafoor</i>	325
Osteospermum	<i>A.Ghafoor</i>	325
Trib. Anthemideae		330
Ursinia	<i>I.R.Thompson</i>	332
Tanacetum	<i>I.R.Thompson</i>	335
Artemisia	<i>I.R.Thompson</i>	336
Achillea	<i>I.R.Thompson</i>	338
Lasiospermum	<i>I.R.Thompson</i>	342
Chamaemelum	<i>I.R.Thompson</i>	342
Anthemis	<i>I.R.Thompson</i>	343
Argyranthemum	<i>I.R.Thompson</i>	345
Glebionis	<i>I.R.Thompson</i>	348
Mauranthemum	<i>I.R.Thompson</i>	350
Leucanthemum	<i>I.R.Thompson</i>	351
Tripleurospermum	<i>I.R.Thompson</i>	352
Matricaria	<i>I.R.Thompson</i>	353
Erioccephalus	<i>I.R.Thompson</i>	356
Oncosiphon	<i>I.R.Thompson</i>	356
Pentzia	<i>I.R.Thompson</i>	358
Cotula	<i>I.R.Thompson</i>	359
Leptinella	<i>I.R.Thompson</i>	364
Soliva	<i>I.R.Thompson</i>	368
Trib. Inuleae		371
Blumea	<i>C.R.Dunlop & A.E.Orchard</i>	372
Dittrichia	<i>P.G.Wilson</i>	383
Asteriscus	<i>P.G.Wilson</i>	385
Carpesium	<i>P.G.Wilson</i>	387
Cratystylis	<i>P.G.Wilson</i>	388
Pterocaulon	<i>A.R.Bean</i>	392
Sphaeromorphea	<i>A.R.Bean</i>	402
Ethuliopsis	<i>A.R.Bean</i>	407
Pluchea	<i>A.R.Bean</i>	408

CONTENTS

Thespidium	<i>A.E.Orchard</i>	418
Coleocoma	<i>C.R.Dunlop & A.E.Orchard</i>	419
Sphaeranthus	<i>A.R.Bean</i>	421
Streptoglossa	<i>C.R.Dunlop & A.E.Orchard</i>	422
Allopterigeron	<i>A.R.Bean</i>	429
Trib. Arthroismeae		430
Centipeda	<i>N.G.Walsh</i>	430
Trib. Helenieae		442
Gaillardia	<i>A.R.Bean</i>	443
Helenium	<i>A.R.Bean</i>	445
Trib. Coreopsideae		446
Trioncinia	<i>A.E.Orchard</i>	447
Diodontium	<i>A.E.Orchard</i>	449
Glossocardia	<i>A.E.Orchard</i>	451
Cosmos	<i>A.E.Orchard</i>	454
Coreopsis	<i>A.E.Orchard</i>	456
Bidens	<i>A.E.Orchard</i>	458
Dahlia	<i>A.E.Orchard</i>	468
Trib. Neurolaeneae		470
Enydra	<i>A.E.Orchard</i>	481
Trib. Tageteae		483
Flaveria	<i>A.R.Bean</i>	484
Tagetes	<i>A.R.Bean</i>	486
Thymophylla	<i>A.R.Bean</i>	488
Trib. Bahieae		488
Schkuhria	<i>A.R.Bean</i>	489
Florestina	<i>A.R.Bean</i>	490
Trib. Heliantheae		491
Synedrella	<i>E.W.Cross & A.E.Orchard</i>	493
Synedrellopsis	<i>E.W.Cross & A.E.Orchard</i>	495
Blainvillea	<i>A.E.Orchard</i>	496
Calyplocarpus	<i>A.E.Orchard & E.W.Cross</i>	501
Eleutheranthera	<i>A.E.Orchard</i>	503
Pentalepis	<i>E.W.Cross & A.E.Orchard</i>	504
Eclipta	<i>A.E.Orchard & E.W.Cross</i>	513
Sphagneticola	<i>A.E.Orchard</i>	518
Wollastonia	<i>A.E.Orchard</i>	521
Apowollastonia	<i>A.E.Orchard</i>	524
Acunniana	<i>A.E.Orchard</i>	534
Pascalialia	<i>A.E.Orchard</i>	536
Montanoa	<i>A.E.Orchard</i>	539

CONTENTS

Verbesina	<i>A.E.Orchard</i>	542
Acmeilla	<i>A.E.Orchard</i>	543
Spilanthes	<i>A.E.Orchard</i>	546
Zinnia	<i>A.E.Orchard</i>	548
Tithonia	<i>A.E.Orchard, E.W.Cross & R.J.Bayer</i>	551
Helianthus	<i>A.E.Orchard, E.W.Cross & R.J.Bayer</i>	553
Ambrosia	<i>A.E.Orchard</i>	559
Iva	<i>A.E.Orchard</i>	562
Parthenium	<i>A.E.Orchard</i>	564
Xanthium	<i>A.E.Orchard</i>	566
Trib. Millerieae		572
Tridax	<i>A.E.Orchard</i>	573
Galinsoga	<i>A.E.Orchard</i>	574
Acanthospermum	<i>A.E.Orchard</i>	576
Guizotia	<i>A.E.Orchard</i>	578
Sigesbeckia	<i>A.E.Orchard</i>	581
Trib. Madieae		584
Centromadia	<i>A.R.Bean</i>	584
Madia	<i>A.R.Bean</i>	585
Trib. Eupatorieae		586
Ageratina	<i>A.E.Orchard, E.W.Cross & R.J.Bayer</i>	587
Stevia	<i>A.E.Orchard, E.W.Cross & R.J.Bayer</i>	590
Mikania	<i>A.E.Orchard</i>	592
Ageratum	<i>A.E.Orchard, E.W.Cross & R.J.Bayer</i>	593
Chromolaena	<i>A.E.Orchard, E.W.Cross & R.J.Bayer</i>	595
Praxelis	<i>A.E.Orchard, E.W.Cross & R.J.Bayer</i>	597
Eupatorium	<i>A.E.Orchard, E.W.Cross & R.J.Bayer</i>	598
Adenostemma	<i>A.E.Orchard</i>	600
Gymnocoronis	<i>A.E.Orchard</i>	604
Appendix: new taxa, lectotypifications, etc.		606
Supplementary Glossary		611
Abbreviations & Contractions		612
Publication date of previous volumes		616
Index		617
Endpapers		
Front: Contents of volumes in the <i>Flora of Australia</i> , the families arranged according to the system of A.Cronquist, <i>An Integrated System of Classification of Flowering Plants</i> (1981).		
Back: <i>Flora of Australia</i> : Index to families of flowering plants.		

CONTRIBUTORS TO VOLUME 37

Prof. R.J.Bayer, Department of Biological Sciences, University of Memphis, 3700 Walker Avenue, Memphis, Tennessee 38152, United States of America.

Mr A.R.Bean, Queensland Herbarium, Brisbane Botanic Gardens Mt Coot-tha, Mt Coot-tha Road, Toowong, Queensland 4066.

Dr E.W.Cross (deceased), c/- Australian Biological Resources Study, GPO Box 787, Australian Capital Territory 2601.

Mr C.R.Dunlop, c/- Australian Biological Resources Study, GPO Box 787, Australian Capital Territory 2601.

Dr A.Ghafoor, Don McNair Herbarium, LS 1.02, School of Environmental & Life Sciences, The University of Newcastle, Callaghan, New South Wales 2308.

Dr S.Holzapfel, Department of Conservation, Private Bag 3072, Hamilton 3240, New Zealand.

Mr N.S.Lander, Western Australian Herbarium, Locked Bag 104, Bentley Delivery Centre, Western Australia 6983.

Dr A.E.Orchard, c/- Australian Biological Resources Study, GPO Box 787, Australian Capital Territory 2601.

Mr N.H.Scarlett, c/- Botany Department, La Trobe University, Melbourne, Victoria 3086.

Dr B.V.Sneddon, 63 Donald Street, Karori, Wellington 6012, New Zealand.

Dr I.R.Thompson, 1904 Malvern Road, Malvern East, Victoria 3145.

Mr N.G.Walsh, National Herbarium of Victoria, Royal Botanic Gardens, Birdwood Avenue, South Yarra, Victoria 3141.

Mr P.G.Wilson, Western Australian Herbarium, Locked Bag 104, Bentley Delivery Centre, Western Australia 6983.

ILLUSTRATORS

Mr Thomas Brosch, c/- National Herbarium of Victoria, Royal Botanic Gardens, Birdwood Avenue, South Yarra, Victoria 3141.

Dr S.Holzapfel, Department of Conservation, Private Bag 3072, Hamilton 3240 New Zealand.

Mrs E.Mayfield, 12 Manor Crescent, Highton, Victoria 3216.

Ms A.Menadue, Audit and Risk Management, Landgate, 1 Midland Square, Midland, Western Australia 6056.

Ms M.Moir, 66 Aintree Road, Glen Iris, Victoria 3146.

CONTRIBUTORS

Dr A.E.Orchard, c/- Australian Biological Resources Study, GPO Box 787, Australian Capital Territory 2601.

Mr W.A.Smith, Queensland Herbarium, Brisbane Botanic Gardens Mt Coot-tha, Mt Coot-tha Road, Toowong, Queensland 4066.

Ms L.Waters, c/- State Herbarium of South Australia, Plant Biodiversity Centre, Hackney Road, Hackney, South Australia 5069.

Mrs M.A.Wilson, c/- Western Australian Herbarium, Locked Bag 104, Bentley Delivery Centre, Western Australia 6983.

PHOTOGRAPHERS

Mr M.Fagg, c/- Australian National Botanic Gardens, GPO Box 1777, Canberra, Australian Capital Territory 2601.

Mr B.Gray, PO Box 1161, Atherton, Queensland 4883.

Mr B.Jago, 56 Jago Street, Babinda, Queensland 4861.

Mr T.Low, 6 Henry Street, Chapel Hill, Queensland 4069.

Dr A.E.Orchard, c/- Australian Biological Resources Study, GPO Box 787, Australian Capital Territory 2601.

Dr A.Schmidt-Lebuhn, Australian National Herbarium, GPO Box 1600, Canberra, Australian Capital Territory 2601.

Mr C.Totterdell, c/- Australian National Botanic Gardens, GPO Box 1777, Canberra, Australian Capital Territory 2601.

Mr N.G.Walsh, National Herbarium of Victoria, Royal Botanic Gardens, Birdwood Avenue, South Yarra, Victoria 3141.

INTRODUCTION

Volume 37 of the *Flora of Australia* is the first of three volumes covering the family Asteraceae. This volume presents an introduction to the family in Australia, including a synoptic classification and keys, and treatments of all the tribes represented in Australia, with the exception of the large tribes Gnaphalieae and Astereae, which will each be the subject of a future volume of the Flora. Nineteen tribes, 233 genera and 518 species are treated in this volume, of which the majority are introduced (only 47 genera include native species).

Asteraceae are the largest family of flowering plants, with over 1600 genera and 24,000 species found on all continents except Antarctica, and also one of the largest families in Australia, with an estimated 290 genera and 1430 species. The family is found throughout Australia, in all habitats, although scarce in rainforest.

The naturalised species which make up most of this volume are of course concentrated in urban and agricultural areas, although some, such as *Ageratina*, *Mikania* and *Praxelis*, can be serious environmental weeds. Others, such as *Hieracium*, *Parthenium*, *Chromolaena*, *Gymnocoronis*, *Chondrilla*, *Chrysanthemoides* and *Xanthium*, are declared noxious weeds, and subject to eradication programs in various States and Territories.

The native species of Asteraceae are a major component of springtime native wildflower displays, particularly in desert areas and in southwestern Western Australia.

Scope and Presentation of the *Flora*

The geographical area covered by the *Flora* includes the six Australian States, the Northern Territory, the Australian Capital Territory and immediate offshore islands. Other Australian and State-administered territories such as Christmas Is. and Lord Howe Is. are excluded, but the occurrence in those territories of species included in the *Flora* is added to the notes on distribution. Complete Floras of the oceanic islands are in Volumes 49 and 50.

Descriptions and discussion in the *Flora* are concise and supplemented by important references, synonymy, and information on type collections, chromosome numbers, distribution, habitat, and published illustrations. Descriptions are based on Australian material except for some taxa not confined to Australia for which the collections in Australian herbaria are inadequate. Synonymy is restricted to names based on Australian types or used in Australian literature. Misapplied names are given in square brackets together with an example of the misapplication. Alien taxa established in one or more localities, other than under cultivation, are considered naturalised and are included and asterisked (*).

Where a taxon is listed under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) this is indicated in a note. State and Territory listings of taxa of conservation concern are not indicated, but may be found through the relevant herbarium.

Families are arranged in the system of A.Cronquist, *An Integrated System of Classification of Flowering Plants* (Columbia University Press, New York, 1981). Within families, genera and species are arranged to show natural relationships as interpreted by contributors. Although relationships cannot be shown adequately in a linear sequence, such an arrangement in a *Flora* assists comparison of related taxa. Intraspecific taxa are keyed out under relevant species. Up to seven collections are cited for each species and infraspecific taxon.

Maps showing distribution in Australia are included on the same page as each taxon. The term 'Malesia' is sometimes used in the notes on geographical distribution for species with

INTRODUCTION

occur widely in the region covered by *Flora Malesiana*, i.e. Malaysia, Singapore, Indonesia, the Philippines, New Guinea and adjacent islands.

Type citations under taxa in the main body of the text reflect the authors' belief in their current status (holotype, isotype, syntype, etc) and where they are held. In cases where the type specimen has not been examined, this is indicated by *n.v.* These type statements are not to be interpreted as lectotypifications. Where lectotypifications have been made previously, these are cited with *fide*, followed by a reference to the author and place of publication (or, sometimes, to a secondary reference). Any formal lectotypifications required for this volume, as in previous parts of the *Flora*, are confined to the Appendix.

New taxa and lectotypifications are included in an Appendix where they are formally published in accordance with the *International Code of Nomenclature for algae, fungi and plants* (Koeltz Scientific Books, Königstein, 2012). Abbreviations, contractions and notes on format are listed after the Appendix.

A key to families of flowering plants and a glossary of technical terms are provided in Volume 1 of the *Flora*. Supplementary glossaries are included in each volume as necessary.

Acknowledgments

There are 27 contributors, illustrators and photographers to Volume 37. Their co-operation is gratefully acknowledged.

The Australian National Botanic Gardens slide collection provided many of the colour photographs used in this volume.

The Librarian at the Australian National Botanic Gardens was ever cheerful in assisting to locate references.

The co-operation of referees, usually working to tight deadlines, is also acknowledged.

The production of this volume would not have been possible without the substantial assistance of the Australian Commonwealth, State and University Herbaria. Their willingness to provide staff time and resources for this project of national importance is an outstanding example of co-operation between the States and the Commonwealth. Overseas institutions have also assisted preparation of the Volume with loans of specimens and by making facilities available to contributors and illustrators.

The Director, ABRS, acknowledges with great pleasure the input by staff of the Australian Biological Resources Study.

The co-operation of CSIRO Publishing in bringing this book to press is gratefully acknowledged.

The following herbaria are acknowledged for their kind permission to reuse previously-published illustrations:

Western Australian Herbarium for illustrations previously published in N.G.Marchant *et al.*, *Flora of the Perth Region* volume 2 (1987).

Queensland Herbarium for illustrations previously published in their journal *Austrobaileya*.

National Herbarium of Victoria for illustrations previously published in their journal *Muelleria* and in N.G.Walsh & T.J.Entwistle (eds), *Flora of Victoria* volume 4 (1999).



Plate 1. *Carduus nutans*.
 Photograph — M.Fagg.



Plate 2. *Silybum marianum*.
 Photograph — T.Low.



Plate 3. *Cirsium vulgare*.
 Photograph — M.Fagg.



Plate 4. *Onopordum acaulon*.
 Photograph — M.Fagg.



Plate 5. *Carthamus lanatus*.
 Photograph — M.Fagg.



Plate 6. *Centaurea melitensis*.
 Photograph — M.Fagg.

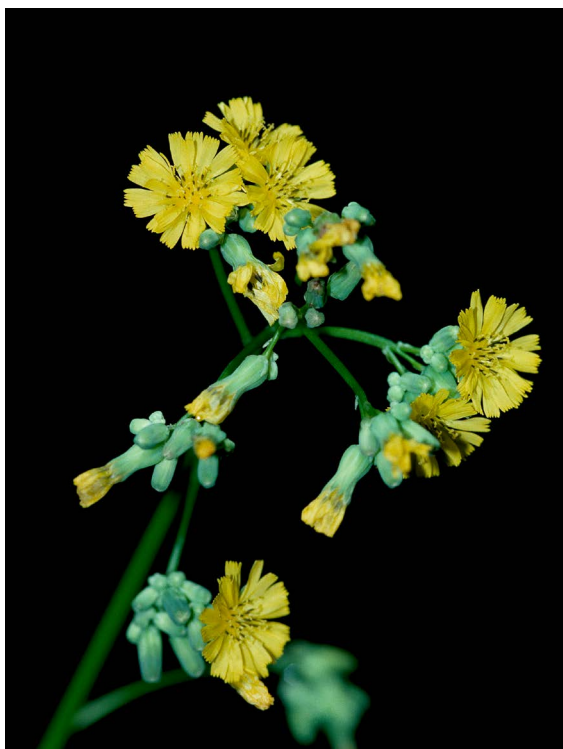


Plate 7. *Youngia japonica*.
 Photograph — B.Gray © CSIRO.



Plate 8. *Chondrilla juncea*.
 Photograph — M.Fagg.



Plate 9. *Sonchus hydrophilus*.
 Photograph — M.Fagg.



Plate 10. *Lactuca serriola*.
 Photograph — M.Fagg.



Plate 11. *Reichardia tingitana*.
 Photograph — M.Fagg.



Plate 12. *Actites megalocarpus*.
 Photograph — M.Fagg.



Plate 13. *Microseris lanceolata*.
 Photograph — C.Totterdell.

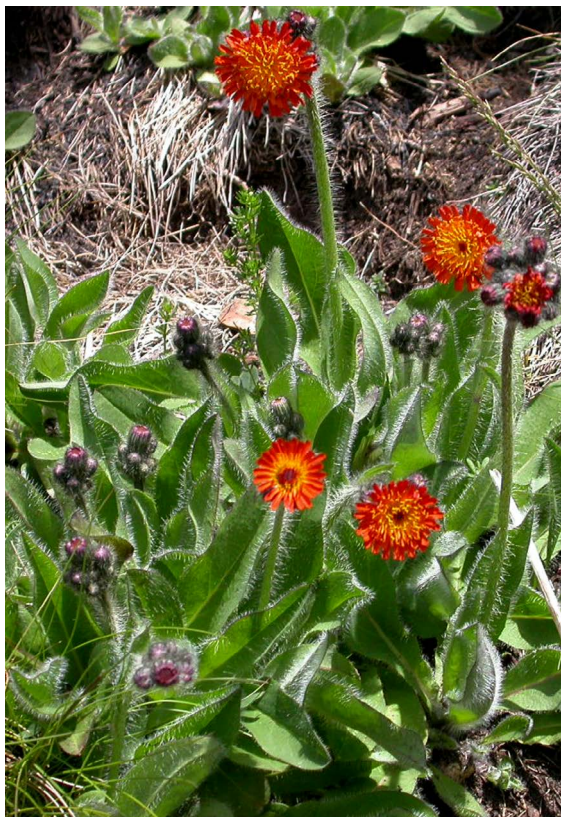


Plate 14. *Hieracium aurantiacum* subsp. *carpathicola*.
 Photograph — N.Walsh.



Plate 15. *Helminthotheca echioides*.
 Photograph — M.Fagg.



Plate 16. *Hypochaeris radicata*.
 Photograph — M.Fagg.



Plate 17. *Picris squarrosa*.
 Photograph — M.Fagg.

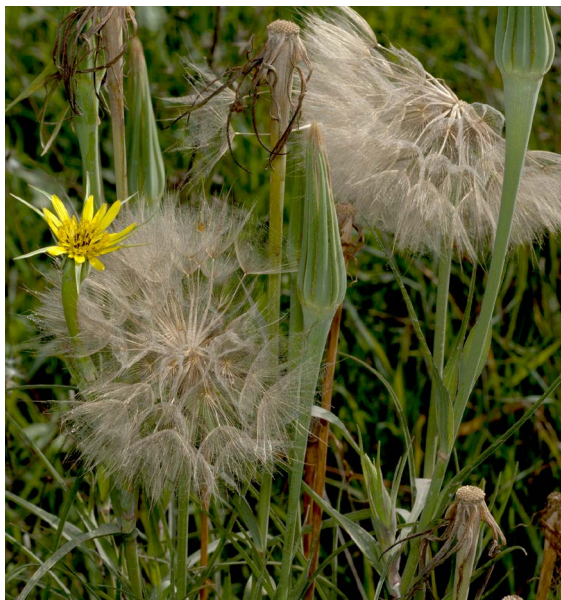


Plate 18. *Tragopogon dubius*.
 Photograph — M.Fagg.



Plate 19. *Gazania linearis*.
 Photograph — M.Fagg.

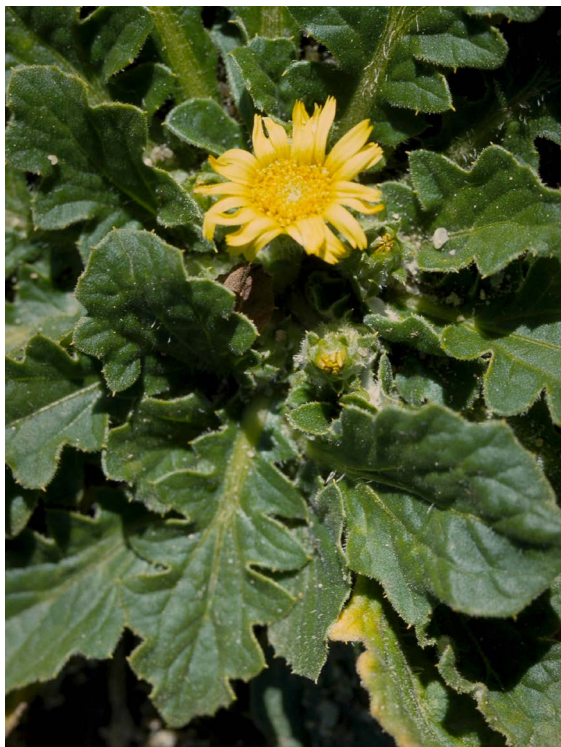


Plate 20. *Cymbonotus preissianus*.
 Photograph — M.Fagg.



Plate 21. *Pseudelephantopus spicatus*.
 Photograph — B.Jago.



Plate 22. *Bedfordia arborescens*.
 Photograph — M.Fagg.



Plate 23. *Abrotanella nivigena*.
 Photograph — C.Totterdell.



Plate 24. *Centratherum punctatum*.
 Photograph — B.Gray © CSIRO.



Plate 25. *Delairea odorata*.
Photograph — M.Fagg.



Plate 27. *Senecio macranthus*.
Photograph — M.Fagg.



Plate 26. *Senecio lanibracteus*.
Photograph — M.Fagg.



Plate 28. *Erechites valerianifolius* f. *valerianifolius*.
Photograph — B.Gray © CSIRO.



Plate 29. *Emilia sonchifolia* var. *sonchifolia*.
 Photograph — M.Fagg.



Plate 30. *Gynura drymophila* var. *drymophila*.
 Photograph — B.Gray © CSIRO.



Plate 31. *Calendula palaestina*.
 Photograph — M.Fagg.

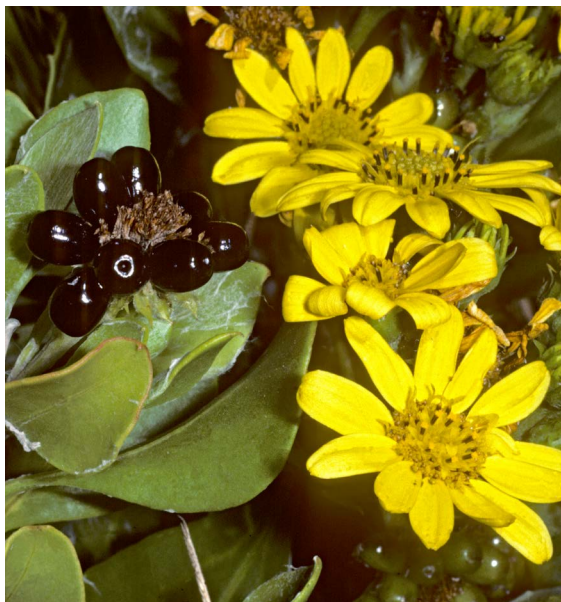


Plate 32. *Chrysanthemoides monilifera* subsp. *rotundata*.
 Photograph — T.Low.

ASTERACEAE (COMPOSITAE)

Family description by A.E.Orchard

Annual or perennial herbs, subshrubs, shrubs or rarely small trees or lianes, usually terrestrial, rarely facultatively aquatic. Leaves alternate, opposite or rosulate, usually simple but often lobed or divided, exstipulate, sometimes succulent. Inflorescence of one or more capitula; capitula terminal and/or axillary, solitary or often numerous in corymbiform cymose synflorescences, sometimes aggregated into compound glomerules, and then often with an outer common involucre of bracts; homogamous or heterogamous, of 4 main types: ligulate (with all ray florets); radiate (with outer ray florets and inner disc florets); discoid (homogamous with disc florets only) or disciform (heterogamous with combinations of disc, filiform and sterile florets, but no ray florets). Capitula usually surrounded by involucre bracts in 1–several series, enclosing 1–many florets. Receptacle often paleate, with vascularised scales (paleae) subtending florets, or paleae absent, and then receptacle setulose or naked, with florets seated in shallow areoles or alveoles. Florets small, 1–500 or more per capitulum, sessile or subsessile, variously bisexual, functionally male (staminate) or female (pistillate) or sterile. Sepals represented by a pappus of 1–several series of awns, scales, or simple or plumose hairs, homomorphic or heteromorphic, sometimes absent, but never herbaceous. Corolla of (3–) 5 (–6) united petals, of 3 main types: disc florets with actinomorphic (3–) 5 (–6)-lobed corollas with valvate teeth or lobes; filiform florets with lobes reduced or absent; or ray florets with zygomorphic corollas variously lobed. Stamens with filaments inserted on corolla tube, equalling in number and alternating with corolla lobes; filaments free; anthers usually united in a tube around the style, often with a sterile appendage apically. Ovary inferior, of usually 2 united carpels; style solitary, usually 2-branched, sometimes fused. Fruit unilocular, 1-seeded, indehiscent, usually an achene (cypsela), very rarely a drupe.

The largest family of flowering plants, with an estimated 1600+ genera and 24,000 species (plus many more apomictic microspecies) found worldwide (except Antarctica), and growing in most habitats. In Australia about 288 genera and 1417 species, the native taxa mainly in subfamilies Asteroideae (Tribes Astereae and Gnaphalieae). Asteraceae is the second most speciose family in Australia, exceeded only by the Myrtaceae (c. 89 genera and c. 1858 species) and rivalled only by the pea-flowered legumes (c. 140/1402) and Poaceae (c. 230/1300).

Recent treatments of the family recognise between 5 and 12 subfamilies. It is notable that neither Anderberg *et al.* (2007) (who recognise 5 subfamilies) nor Funk *et al.* (2009) (who recognise 12 subfamilies) provide a key to subfamilies. In both works the subfamilies are defined principally in terms of molecular phylogeny. Descriptions of subfamilies recognised by both indicate that the number of unusual taxa in each subgroup is such that no unequivocal and simple key based on morphology is possible. In this work we have chosen to follow the more conservative subfamilial structure of Anderberg *et al.* (2007).

Elsewhere in this work several keys are provided. The key to subfamilies (p. 18) should serve to distinguish most Australian taxa to subfamily, but may not work for a small number of unusual taxa. Following the key to subfamilies is a key that leads straight to genera, for the taxa of subfamilies Mutisoideae, Carduoideae, Cichorioideae, and Asteroideae (excluding Astereae and Gnaphalieae). Tribes Astereae and Gnaphalieae will each comprise a separate volume of the *Flora of Australia*, and in the key, taxa in these tribes are only distinguished at tribal level. Separate keys to the genera of tribes Gnaphalieae and Astereae are provided starting on pages 35 and 42 respectively.

G.Bentham, *Compositae*, in *Fl. Austral.* 3: 447–680 (1866); H.R.Toelken, *Compositae*, in B.D.Morley & H.R.Toelken (eds), *Fl. Pl. Australia* 300–314 (1983); K.Bremer, *Asteraceae, Cladistics & Classification* (1994); A.A.Anderberg *et al.*, *Compositae*, in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 61–588 (2007); V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* (2009).

ASTERACEAE

INTRODUCTION TO ASTERACEAE

A.E.Orchard

Asteraceae, with over 1600 genera and 24,000 species, are the largest family of flowering plants, rivalled only by Orchidaceae. They are almost ubiquitous, being found in all vegetation types, on every continent except Antarctica, although relatively scarce in lowland rainforest communities. They are best represented in grasslands, open grassy woodlands and alpine habitats. The plants are most commonly annual or perennial terrestrial herbs, but some are lianes, aquatic herbs, shrubs or even trees, and some develop bizarre growth forms, like the cushion plants of alpine New Zealand and Tasmania. The characteristic ‘daisy’ inflorescences of the family ensured that it was one of the earliest natural assemblages to be recognised, but its relationships to other families, and its internal relationships, have taken longer to untangle.

Asteraceae (alt. Compositae) are characterised by florets (often numerous) arranged on a common receptacle in centripetally developing heads surrounded by bracts. The florets typically have petaloid corollas (basically 5-merous, but often reduced), either actinomorphic (tubular, sometimes reduced and filiform) or zygomorphic (ray), usually lobed or toothed, with a calyx represented by a pappus of hairs, bristles, awns or scales, which may be free or variously fused, sometimes absent, an inferior bicarpellate ovary, which develops into a dry single-seeded achene (strictly a cypsela), five stamens with usually free filaments often attached to the corolla wall, and anthers which are usually fused into a tube. There is a single style, usually bilobed, with external hairs, which in the process of elongating sweeps the pollen from the anther tube, before expanding its two linear stylar lobes above the anthers. In such a large family it is to be expected that there will be minor exceptions to the above general plan, but all species have most of the above features.

The family also has a distinctive and varied secondary chemistry, and this feature has not only assisted in confirming the monophyletic status of the family, but has also provided chemical signatures for many of the tribes and other groups. This subject is discussed in detail in Calabria *et al.* (2009).

History of Classification

No attempt will be made here to trace the history of classification in Asteraceae in detail. Excellent and recent comprehensive accounts are available elsewhere, particularly those of Jeffrey (2007), Kadereit (2007), Mauricio Bonifacino *et al.* (2009), Heywood (2009), Lundberg (2009) and Funk *et al.* (2009a).

Mauricio Bonifacino *et al.* (2009) pointed out that even as early as the time of Theophrastus (c. 371–287 BC) there was recognition that the Asteraceae constituted a distinct group of plants, and by the early 16th century the French botanist Ruel had recognised that the head of some Asteraceae was in fact composed of small individual flowers or florets. Adanson (1763) in publishing his *Familles des Plantes*, recognised, among others, the Compositae, although when the starting point for family names was moved to 1789 after the Vienna International Botanical Congress of 2005, the authority for the name shifted to Giseke (1792). The alternative name Asteraceae was formally published by Martynov (1820), and use of either is sanctioned by the International Code of Nomenclature. Tournefort (1700) recognised subdivisions within the Asteraceae, dividing them into three groups, those with tubular florets only, those with ray florets only and those with a mixture of both. The first to recognise and use floret sexuality in his classification was Vaillant (1719–1723), who recognised three subgroups ‘familles ou classes’ within the Asteraceae.

It was left to Cassini to prepare the first definitive account of the diversity of the family. Over a period of more than 20 years (1813–1834) Cassini published a series of extremely detailed papers, examining the species of Asteraceae and the characteristics of their individual parts (styles, stigmas, anthers, corollas, achenes and pappus). Based on this exhaustive analysis he published a classification of the family embracing the recognition of

20 tribes (Cassini 1819). Most of these tribes are still recognised, and defined in much the same way. Cassini also recognised that Calyceraceae, Campanulaceae and Goodeniaceae were three of the families most closely related to Asteraceae. Cassini's seminal papers, published in a scattered fashion, were brought together by King & Dawson (1975), and King *et al.* (1995a, 1995b).

A second conspectus of the family, incorporating a broader suite of observations on plants from South America, in particular, was published by Lessing (1832). Although based in part on Cassini's work, Lessing's system incorporated many original observations, with elaborate plates illustrating detailed morphology of styles and other organs, and for the first time included some dichotomous keys.

In 1873 Bentham (1873a, 1873b) published two major contributions to understanding of the family, which underpinned work on the family for the next 100 years. These were a discussion of the classification and biogeography of the family (Bentham 1873a), and a detailed description of the genera and family infrastructure in *Genera Plantarum* (Bentham 1873b), written jointly with J.D.Hooker. At almost the same time Bentham was writing the *Flora Australiensis*, and his treatment of Asteraceae, providing the first comprehensive account of the family for Australia, appeared in volume 3 (Bentham 1866). In this work Bentham incorporated the large number of new Australian species described 30 years earlier by Candolle (1836). Candolle had had the benefit of large suites of Australian Asteraceae sent to him by Allan Cunningham, and these had established the outline of the major Australian genera. Bentham built on this with specimens collected by other explorers and collectors, including Labillardière, Brown, Preiss, Baxter, Drummond, Oldfield, Fraser, Huegel, Dietrich and many others, as well as material assembled in the Melbourne Herbarium by Ferdinand Mueller. Bentham's views on the family were very similar to those of Cassini, although arrived at independently.

Hoffmann (1890–1894) published a monumental classification, similar to that of Bentham, which was the last overview of the family at generic level for the next 100 years. The first half of the 20th century yielded a rapid increase in the numbers of species and genera in the family, and for the most part these were placed with the broadly Benthamian framework. During the 1970s advances in anatomy and developmental morphology (particularly as revealed by the electron microscope), phytochemistry, palynology and genetics all contributed additional data towards understanding the infrastructure of the family, and the development of phenetic taxonomy and phylogenetic cladistics provided new tools to manipulate this data.

Bremer (1994) published the first cladistic overview of Asteraceae at the generic level, based on morphological characters. This work recognised three subfamilies and 16 tribes within Asteraceae, divided into 1535 genera and an estimated 23,000 species. The tribes did not differ substantially from those of Cassini, but the three subfamilies, Barnadesioideae, Asteroideae and Cichorioideae were new. Tribe Liabeae (not in Australia) was separated from Senecioneae. More importantly for Australian taxonomists, the formerly monolithic tribe Inuleae was divided into Inuleae *s. str.*, Gnaphalieae and Plucheeae. The widespread and characteristic Australian 'paper daisies' moved to Gnaphalieae from Inuleae.

Following closely on the Bremer book, a conference held at Kew yielded a set of important papers on the taxonomy, biology and economic botany of the family, which were published in two volumes, Hind & Beentje (1995) and Caligari & Hind (1996). This conference contained some of the first results from a new emerging technology, genetic sequencing, and the rapid embracing of this technology, allied to more sophisticated mathematical modelling, has resulted in substantial changes to infrafamilial arrangements of the Asteraceae. The most important of these has been the reversal of previous ideas on the direction of evolutionary change within the family. Previously it had been believed that the original asteraceous condition had been similar to the helianthoid radiate capitulum. In the last 20 years it has been shown that the helianthoid group is placed near the crown of the phylogenetic tree, and that the the mutisoid groups are in fact basal. Publication of a new classification of the family by Panero & Funk (2002) established a new starting point for taxonomic and

phylogenetic studies. It recognised 10 subfamilies and 35 tribes, but many of the latter are still largely as delimited by Cassini.

The cascade of molecular phylogeny papers before and after the Panero & Funk paper has contributed to incremental fine-tuning of the classification of Asteraceae. Two major books have been published on the subject recently, and these have been used as the framework for the classification adopted in this volume, and in *Flora of Australia* vol. 38A & B (still in preparation); they are Kadereit & Jeffrey (2007) and Funk *et al.* (2009b).

In Lundberg (2009) evidence is presented to show that the closest relative to the family Asteraceae is Calyceraceae, and that these two families are sister to Goodeniaceae (including Brunoniaceae). The sister group to these three is the small aquatic family Menyanthaceae. Beyond that relationships are less well defined, but probably include Styliidiaceae, Alseuosmiaceae, Phellinaceae and Argophyllaceae.

Economic importance of Asteraceae

Despite its size, the family Asteraceae has yielded a comparatively small number of economically important crop plants. None yield timber, fibre or building products. Their main products are oil seeds, leaf, stem and tuber food plants, a small number of medicinal, insecticidal and flavouring compounds, and a large number of ornamental horticultural plants. Some are weeds of agriculture. Much of the information on economic uses below is summarised from Simpson (2009), a paper that should be consulted for primary references and further details.

Edible plants

The principal edible Asteraceous plant is Lettuce, *Lactuca sativa* L., which is a selection from the wild *Lactuca serriola* L., and has a history of cultivation dating back to c. 4500 BC in Egypt, and may originally have been grown for seed oil as well as for its edible leaves. Chicory (*Cichorium intybus* L.), grown as Belgian endive, witloof, raddichio, chioggia and coffee chicory, is also used in salads, as is *Cichorium endivia* L. (endive, escarole, frisée or curly endive). *Launaea sarmentosa* (Willd.) Kuntze, native on the NW Western Australian coast, has been used as a salad vegetable in a number of countries. Minor Asteraceous leaf crops are listed by Simpson (2009).

Artichoke (*Cynara scolymus* L.) is grown for its edible involucre bracts and receptacle, as is its wild relative Cardoon (*Cynara cardunculus* L.), although the latter also yields edible leaf petioles. *Cynara cardunculus* can be invasive, and has become a noxious weed in parts of Australia, and other countries with similar hot dry climates, such as Argentina and the U.S.A.

A small number of species are grown for their edible roots, although as the storage product is not starch, but inulin, which is broken down in the large intestine into fructose and glucose, with production of large quantities of gas, the nutritional value of these foods is not as high as that of potatoes, taro and yams. The most significant tuberous crop is Jerusalem artichoke (*Helianthus tuberosus* L.), a native of North America. Burdock or gobo root (*Arctium lappa* L.) is a native of Asia, and used to a small extent in soups, or pickled, and in sushi where it provides a crunchy texture. Salsify (*Tragopogon porrifolius* L.) has an edible root said to taste like oysters, hence its other common name Oyster plant. The related *Scorzonera hispanica* L. (salsify, scorzonera, black oyster plant) is cultivated to a small extent, mainly in Spain, and has a similar taste. In the Andes Yacon (*Polymnia sonchifolia* Poepp. & Endl.) is grown on a very small scale for its crisp roots which are eaten fresh or cooked. The fleshy roots, 'yams', of *Microseris lanceolata* (Walp.) Sch.Bip. were an important food source for native people in Victoria and New South Wales (Maiden 1889; Low 1991). Virtually no other Australian Asteraceous plants are edible. Notes on a few herbarium sheets record that the fragrant leaves of *Wollastonia biflora* (L.) DC. are used to flavour food in earth ovens in some Torres Straits communities.

The leaves of *Chrysanthemum* spp. are used in Asia as a flavouring for salads, soups, and other dishes, either raw or lightly blanched. The leaves and ray florets of Marigold (*Calendula officinalis* L.) are sometimes used in Australia as an aromatic salad vegetable.

Seed oils

Sunflower (*Helianthus annuus* L.) is a native of Central and southern North America, and has been cultivated for at least 2000 years (perhaps longer) as a food and oilseed crop. It is now grown worldwide as an oilseed crop, valued for its bland unsaturated oils with high smoke point and light colour. The large-headed oilseed varieties were developed in the U.S.S.R., and were crossed with Jerusalem artichoke to improve disease resistance. As well as being used in cooking, sunflower oil is utilised in paints, varnishes and plastics, and to a small extent as a biofuel. The meal left behind after oil extraction from the seeds is used as a stockfeed. The seeds of other selections (grey striped) can be eaten as snacks.

Safflower oil from the Mediterranean species *Carthamus tinctorius* L. has been extracted since Roman times, but enjoyed a period of popularity in the 1980s in the first wave of enthusiasm for unsaturated food oils. Its use declined when research showed that mono-unsaturated fats were healthier than polyunsaturated fats. Varieties with high oleic oils are extensively used for deep frying fast foods because they are non-scum forming. Varieties with high linoleic oil content are used in margarines and salad oils. Like Sunflower oil, Safflower oil is non-yellowing, and finds a use in paints and varnishes.

Niger oil from *Guizotia abyssinica* Cass. is traditionally produced in Ethiopia (where it is probably native, derived from the weedy *G. scabra* Choiv.) and other parts of Africa and India. It will tolerate waterlogged or saline soils. The species was trialled in Australia, but no commercial production seems to have been undertaken (Francis & Campbell 2003). The species is a minor weed in Queensland and New South Wales.

Beverages

The two best-known beverages made from the Asteraceae are *Absinthe* and chamomile tea.

Details of the history and method of production of Absinthe are given in Simpson (2009). The main flavouring species is Wormwood (*Artemisia absinthum* L.), although the green colour comes from Petite wormwood (*Artemisia pontica* L.) and other herbs. *Artemisia absinthum* was also used traditionally to flavour vermouth.

Chamomile teas are made from several species of daisies. English chamomile is *Chamaemelum nobile* (L.) All., German chamomile is *Matricaria recutita* L., and other 'Chamomiles' are Dog fennel (*Anthemis cotula* L.) and Pineapple weed (*Matricaria matricarioides* (Less.) Porter). All were long used as herbal remedies, in some cases by the ancient Egyptians and Anglo Saxons, before being transformed into everyday beverages. Teas were also used to heighten blond highlights in hair, and are still used in some shampoos.

Juice from Chicory root (*Cichorium intybus* var. *sativum* Bisch.), traditionally provided a herbal remedy for intestinal disorders, and the dried, roasted and pulverised root has been used as a coffee substitute or adulterant.

In Sicily Artichoke (*Cynara scolymus* L.) is a major ingredient of Cynar, a bitter aperitif.

Spices

The only substantial use of Asteraceous plants as spices is Tarragon. Distillation of *Artemisia dracunculus* L., a native of southern Russia and western Asia, yields an anise-flavoured oil. The leaves are used as a herb to flavour food, and tarragon oil is also used in perfumery and to flavour vinegars. Russian tarragon (*Artemisia dracunculoides* Pursch.) is sometimes used in a similar way, but is inferior in flavour.

Sweeteners

Stevia rebaudiana (Bertoni) Bertoni from Paraguay has been used as a sweetener for centuries. The leaves contain *ent*-kaurene glycosides, stevioside and several rebaudiosides, which are 100–450 times as sweet as sucrose, but are not metabolised. It is widely used as a sugar substitute in Asia and South America, and has been cultivated in Europe since 1909.

Many Asteraceous species store the fructan inulin in their roots and tubers, and this compound is used in commerce as a sweetener because it can be converted to fructose and glucose by hydrolysis. Inulin can thus potentially be extracted from the roots of such plants as *Taraxacum officinale* L., *Helianthus tuberosus* L., *Microseris lanceolata* (Walp.) Sch.Bip., *Tragopogon porrifolius* L., *Scorzonera hispanica* L. and *Polymnia sonchifolia* Poepp. & Endl. The main commercial source of inulin is from Chicory root (*Cichorium intybus* L.), of which selected commercial strains can yield as much as 30% inulin.

Insecticides

Rythrin insecticides, a mixture of pyrethrin I & II and cinerin I & II, are kerosene-extracted from *Tanacetum cinerariifolium* (Trev.) Sch.Bip. and are very effective against insects such as flies, mosquitoes, fleas and lice. Resistance to the insecticide is low, and it has low toxicity for birds and mammals. Tasmania is a major source for the commercial production of this crop. Other chrysanthemoid species also yield pyrethrins, but are not used commercially.

Medicines

Artemisia annua L. is the source of artemisinin, a compound found to be effective in the treatment of malaria. It apparently works by entering red blood cells and, in contact with iron, releases peroxides which kill the malarial plasmodium. Artemisinin and its derivatives offer the main hope of continued control of malaria, as resistance to traditional treatments grows.

A very large number of species have been used, with varied effectiveness and/or documentation of effectiveness, in herbal remedies. Some of the more commonly used species are listed in Simpson (2009). They include *Arnica* spp. used to relieve bruising and inflammation, Burdock (*Arctium lappa* L.) for intestinal complaints, Echinacea (*Echinacea pallida* (Nutt.) Nutt. for relief of flu-like symptoms, and *E. purpurea* (L.) Moench. and *E. angustifolia* DC. for prevention of colds and urinary infections), Feverfew (*Tanacetum parthenium* (L.) Sch.Bip.) for fevers migraines and rheumatism, and Yarrow (*Achillea millefolium* L.) for baths for cramps.

Rubber

Many Asteraceae produce latex, and its presence or absence can help define major taxonomic groups. Latex also appears sporadically in otherwise latex-free genera. A notable example of this is Guayule rubber (*Parthenium argentatum* A.Gray), native to Mexico and south-western U.S.A. The Olmecs and Aztecs extracted the latex to make rubber, and small scale plantations have been established to produce rubber from the plant commercially. The latex produces isoprene polymers virtually indistinguishable from that of the Rubber tree (*Hevea*), but lacking the proteinaceous compounds that can cause allergic reactions in *Hevea* rubber. It also has the advantage of being a dryland species requiring little or no supplementary water. Yields, however, are submarginal for commercial purposes. *Taraxacum koksaghyz* Rodin was trialled in Western Australia and Tasmania for rubber production during World War 2.

Dyes

Safflower (*Carthamus tinctorius* L.) yields a red dye, still used in India in some ceremonies and as a colorant for food stuffs and rouge, although it has largely been supplanted by aniline

dyes. Marigold (*Tagetes* sp.) heads are used in India as a dye, and in Mexico they are fed to chickens to improve egg yolk coloration.

Ornamental plants

Exotic daisy species are commonly grown in Australia as ornamental species. *Chrysanthemum indicum* L. and its hybrids have been grown in China for over 2000 years, and it was adopted as the crest of the royal family in Japan. Other commonly cultivated exotics are *Ageratum houstonianum* Mill., *Aster* spp., *Cosmos* spp., *Bellis perennis* L., *Calendula* spp., *Cineraria* spp., *Dahlia* spp., *Gaillardia pulchella* Foug., *Gerbera* spp., *Helianthus* spp., *Tagetes* spp. and *Zinnia* spp. Many of these have escaped from cultivation in Australia, some becoming troublesome (*Ageratum*), others only minor weeds.

In the last 50 years an increasing number of Australian native Asteraceae have entered cultivation as ornamentals. Perhaps the best-known are those of the old 'Helichrysum' and 'Helipterum' groups of the 'paper daisies', now found as species or hybrids of *Chrysocephalum*, *Coronidium*, *Leucochrysum*, *Hyalosperma*, *Rhodanthe* and *Xerochrysum* and other segregate genera. Others are grown to a lesser extent, including *Ammobium alatum* R.Br., *Angianthus* spp., *Brachyscome* spp., *Calomeria amaranthoides* Vent., *Cassinia* spp., *Craspedia* spp., *Leptorhynchus* spp., *Olearia* spp. (particularly *O. phlogopappa* (Labill.) DC. and its allies), and *Ozothamnus* spp.

Weeds

Many Asteraceae listed above as useful plants in commerce have also escaped from cultivation to become minor or major weeds of agriculture, horticulture, of amenity areas or the natural environment. Others have been introduced as seed contaminants or as hitchhikers on clothes or goods. The number of species involved is too large to list all of them here individually. In the descriptive text, introduced species are marked with an asterisk, and those that are particularly troublesome are usually identified in notes. Just a few notable weeds are discussed below. Many are listed as noxious in various States and Territories.

Capeweed (*Arctotheca calendula* (L.) Levyns) is widespread in temperate Australia, particularly in waste ground, footpaths, and playing fields in suburban areas. It can become abundant in pastures, and impart a taint to milk.

Cultivars of *Bellis perennis* L. are grown as an ornamental bedding plant, but its wild form is a common weed of wasteland, grassland, and particularly suburban lawns and street verges. Its rosettes of leaves are closely ground-hugging and escape mowing, and it thrives in damp, intermittently waterlogged lawns and waste ground.

Spiny thistles of the genera *Carduus*, *Silybum*, *Picnomon*, *Cirsium*, *Cynara*, *Onopordum*, *Carthamus*, *Centaurea*, and their allies in tribe Cardueae, are widespread weeds of temperate and dryland habitats, invading grassland, roadsides and open woodland, and degrading pastures. They range from freely seeding annuals to perennial herbs, sometimes rhizomatous. Many are declared noxious weeds.

A common roadside weed is the subglabrous perennial Ox-eye daisy, *Leucanthemum vulgare* Lam. It grows up to 1 m tall, and is found commonly on roadsides in higher rainfall areas of the southern States. Around the margins of lakes and on boggy riverbanks, the introduced *Cotula coronopifolia* L. is frequently common, crowding out smaller plants with its fleshy stems and yellow buttonheaded capitula. The Fleabanes, *Conyza bonariensis* (L.) Cronquist, *C. canadensis* (L.) Cronquist and their relatives, are common in suburban wasteground.

The yellow-flowered Ragwort (*Senecio jacobaea* L.) is one of several herbaceous senecioid weeds found extensively in the southern States. It is particularly invasive of grassland, pastures and woodland, producing prodigious amounts of seed, and has a perennial rootstock from which annual stems to 1.5 m tall are produced. It is poisonous to stock, and a listed noxious weed throughout its range.

Common Sow thistle (*Sonchus oleraceus* L.) and its congeners are familiar to suburban gardeners, and are widespread in cultivated ground and waste ground, in relatively damp temperate regions. Dandelion (*Taraxacum officinale* L. s. lat., see this volume), a group of apomictic microspecies, frequently accompanies Sow thistles. The weedy dandelions should not be confused with a number of native taxa – see this volume for descriptions and keys.

Noogoora burr (*Xanthium occidentale* Bertol.) and Bathurst burr (*X. spinosum* L.) are two troublesome weeds, particularly of agricultural and grazing areas, where their hooked burrs become entangled in wool and animal hair, causing degradation of animal health and value of fleeces. They are particularly common around stock watering points, in stockyards, and in overgrazed paddocks. The taxonomy of *Xanthium* spp. is complex, but is discussed in some detail in this volume.

The shrubby Boneseed (*Chrysanthemoides monilifera* (L.) T.Norl.) is widely adventive in coastal SE Australia and inland in sandy areas of western Victoria. It was originally introduced as a garden plant, but from the 1940s to the 1970s it was planted to stabilise sand drift in coastal and some inland areas. Its fleshy pericarps are attractive to birds, and its spread by seed and by layering of buried stems has led to *Chrysanthemoides* becoming a serious pest, particularly in coastal dune communities, where it smothers other vegetation (Weiss *et al.* 1998; Richardson *et al.* 2006).

One of the most serious weeds of cereal crops in southern Australia is Skeleton weed (*Chondrilla juncea* L.), a parthenogenetic, perennial triploid species, with a rosette of leaves and a characteristic leafless branched inflorescence to a metre tall. Accidentally introduced to Australia before 1918, it has spread throughout the cereal growing areas of SE Australia (with minor infestations in Tasmania and Western Australia subject to eradication programs), and has at times become so prolific as to prevent harvesting of crops. It spreads by seed, adventitious budding from the crown, and vegetative reproduction from root fragments produced by cultivation. It is a proclaimed noxious weed in all States and Territories except the Northern Territory (Panetta & Dodd 1995).

Well known to any Australian who has walked barefoot on lawns is *Soliva sessilis* Ruiz & Pav. and its allies, known as Bindyi, Jo-jo or Onchunga. They are low, mat-forming, inconspicuous herbs with greenish heads, and achenes with terminal sharp spines, native to South America, but introduced in all Australian States and Territories except the Northern Territory. They are common in lawns and damp grasslands, and on roadsides (Hussey *et al.* 2007).

Poisonous plants

A number of introduced and native Asteraceae have been noted, with varying degrees of reliability, as poisonous, usually to stock, rarely to humans. In some cases, poison status has been attributed on the basis that a particular plant is common in an area where poisoning has occurred, but without much other evidence (see, for example *Apowollastonia cylindrica* Orchard, this volume). In other cases poison plants are also unpalatable, so poisoning only occurs when stock lack alternative food, or when the poison plant is a contaminant of hay (for example, *Senecio jacobaea*). Some plants are also only poisonous at some stages of their lifecycle or at particular times of the year (e.g. *Arctotheca calendula*).

Everist (1981) listed 32 species of poisonous Asteraceae for Australia, in the genera *Acanthospermum*, *Arctotheca*, *Baccharis*, *Carduus*, *Centaurea*, *Craspedia*, *Eupatorium*, *Helenium*, *Helichrysum* (now *Argentipallium*), *Inula*, *Ixiolaena*, *Lactuca*, *Osteospermum* (now *Dimorphotheca*), *Senecio*, *Verbesina*, *Wedelia* (now *Apowollastonia* and *Acunniana*) and *Xanthium*. Everist documented for each species the conditions of poisoning, toxicity and symptoms, and treatments. For details, see his work. Occasionally other plants, particularly native species, have been noted anecdotally as poison plants. Where documented, this is mentioned in the notes accompanying the text.

References

- Adanson, M. (1763), *Familles des Plantes*. Vincent: Paris.
- Bentham, G. (1866), *Flora Australiensis*, vol. 3, Myrtaceae to Compositae. Lovell Reeve & Co: London.
- Bentham, G. (1873a), Notes on the classification, history and geographical distribution of Compositae, *J. Linn. Soc., Botany* 13: 335–577.
- Bentham, G. (1873b), Compositae, pp. 163–533, in G.Bentham & J.D.Hooker, *Genera Plantarum* vol. 2(1). Lovell Reeve & Co: London.
- Bremer, K. (1994), *Asteraceae, Cladistics & Classification*. Timber Press; Portland, Oregon.
- Calabria, L.M., Emerenciano, V.P., Scotti, M.T. & Mabry, T.J. (2009), Secondary chemistry of Compositae, pp. 73–88, in V.A.Funk, A.Susanna, T.F.Stuessy & R.J.Bayer (eds), *Systematics, Evolution, and Biogeography of Compositae*. International Association for Plant Taxonomy: Vienna.
- Caligari, P.D.S. & Hind, D.J.N. (1996), *Compositae: Biology and Utilisation, Proceedings of the International Compositae Conference, Kew, 1994*, vol. 2. Royal Botanic Gardens: Kew.
- Candolle, A.P. de (1836), *Prodromus Systematis Naturalis Regni Vegetabilis*, vol. 5. Treuttel & Würtz: Paris.
- Cassini, H. (1819), Sixième mémoire sur la famille des Synanthérées, contenant les caractères des tribus, *J. Phys. Chim. Hist. Nat. Arts* 88: 150–163.
- Everist, S.L. (1981), *Poisonous Plants of Australia*, rev. edn. Angus & Robertson: Sydney.
- Francis, C.M. & Campbell, M.C. (2003), *New high quality oil seed crops for temperate and tropical Australia*. RIRDC Publication No. 03/045. RIRDC: Canberra.
- Funk, V.A., Susanna, A., Stuessy, T.F. & Bayer, R.J. (eds), (2009a), *Systematics, Evolution, and Biogeography of Compositae*. International Association for Plant Taxonomy: Vienna.
- Funk, V.A., Susanna, A., Stuessy, T.F. & Robinson, H. (2009b), Classification of Compositae, pp. 171–189, in V.A.Funk, A.Susanna, T.F.Stuessy & R.J.Bayer (eds), *Systematics, Evolution, and Biogeography of Compositae*. International Association for Plant Taxonomy: Vienna.
- Giseke, P.D. (1792), *Praelectiones in Ordines Naturales Plantarum*. Hoffmann: Hamburg.
- Heywood, V.H. (2009), The recent history of Compositae systematics: from daisies to deep achenes, sister groups and metatrees, pp. 39–44, in V.A.Funk, A.Susanna, T.F.Stuessy & R.J.Bayer (eds), *Systematics, Evolution, and Biogeography of Compositae*. International Association for Plant Taxonomy: Vienna.
- Hind, D.J.N. & Beentje, H.J. (eds) (1995), *Compositae: Systematics, Proceedings of the International Compositae Conference, Kew, 1994*, vol. 1. Royal Botanic Gardens: Kew.
- Hoffmann, O. (1890–1894), Compositae, pp. 87–387, in A.Engler & K.Prantl (eds), *Die natürlichen Pflanzenfamilien*, vol. 4(5). W.Engelmann: Leipzig.
- Hussey, B.M.J., Keighery, G.J., Dodd, J., Lloyd, S.G. & Cousens, R.D. (2007), *Western Weeds. A Guide to the Weeds of Western Australia*, 2nd edn. The Weeds Society of Western Australia: Victoria Park, W.A.
- Jeffrey, C. (2007), Compositae, Introduction with key to tribes, pp. 61–87, in K.Kubitski (Gen. ed.), *The Families and Genera of Vascular Plants, vol. VIII Flowering Plants Eudicots Asterales* (J.W.Kadereit & C.Jeffrey, vol. eds). Springer-Verlag: Berlin, Heidelberg.
- Kadereit, J.W. (2007), Asterales: Introduction and conspectus, pp. 1–6, in K.Kubitski (Gen. ed.), *The Families and Genera of Vascular Plants, vol. VIII Flowering Plants Eudicots Asterales* (J.W.Kadereit & C.Jeffrey, vol. eds). Springer-Verlag: Berlin, Heidelberg.

- Kadereit, J.W. & Jeffrey, C. (eds) (2007), *Vol. VIII Flowering Plants Eudicots Asterales*, in K.Kubitski, (gen. ed.), *The Families and Genera of Vascular Plants*. Springer-Verlag: Berlin, Heidelberg.
- King, R.M. & Dawson, H. (1975), *Cassini on Compositae*. Oriole Editions: New York.
- King, R.M., Janaske, P.C. & Lellinger, D.B. (1995a), *Cassini on Compositae, II*. Monographs in Systematic Botany from the Missouri Botanical Garden 54, Missouri Botanical Garden: St. Louis.
- King, R.M., Janaske, P.C. & Lellinger, D.B. (1995b), *Cassini on Compositae, III*. Monographs in Systematic Botany from the Missouri Botanical Garden 55, Missouri Botanical Garden: St. Louis.
- Lessing, C.F. (1832), *Synopsis generum Compositarum, earumque dispositionis novae tentamen monographus multarum capensium interjectis*. Duncker & Humblot: Berlin.
- Low, T. (1991), *Wild Herbs of Australia and New Zealand*. Angus & Robertson: Sydney.
- Lundberg, J. (2009), Asteraceae and relationships within Asterales, pp. 157–169, in V.A.Funk, A.Susanna, T.F.Stuessy & R.J.Bayer (eds), *Systematics, Evolution, and Biogeography of Compositae*. International Association for Plant Taxonomy: Vienna.
- Maiden, J.H. (1889), *The Useful Native Plants of Australia (including Tasmania)*. Technological Museum of N.S.W.: Sydney.
- Martynov, I.I. (1820), *Tekhnno-Botanicheskii Slovat*. Rossilska Akademia: St. Petersburg.
- Mauricio Bonifacino, J., Robinson, H., Funk, V.A., Lack, H.W., Wagenitz, G., Feuillet, C. & Hind, D.J.N. (2009), A history of research in Compositae: early beginnings to the Reading Meeting (1975), pp. 3–38, in V.A.Funk, A.Susanna, T.F.Stuessy & R.J.Bayer (eds), *Systematics, Evolution, and Biogeography of Compositae*. International Association for Plant Taxonomy: Vienna.
- Panero, J.L. & Funk, V.A. (2002), Toward a phylogenetic subfamilial classification for the Compositae (Asteraceae), *Proc. Biol. Soc. Washington* 115: 909–922.
- Panetta, F.D. & Dodd, J. (1995), *Chondrilla juncea* L., pp. 67–86, in R.H.Groves, R.C.H.Shepherd & R.G.Richardson (eds), *The Biology of Australian Weeds*, vol. 1. R.G. & F.J.Richardson: Melbourne.
- Richardson, F.J., Richardson, R.G. & Shepherd, R.C.H. (2006), *Weeds of the South-East, an Identification Guide for Australia*, 2nd edn. R.G. & F.J.Richardson: Meredith, Victoria.
- Simpson, B.B. (2009), Economic importance of Compositae, pp. 45–58, in V.A.Funk, A.Susanna, T.F.Stuessy & R.J.Bayer (eds), *Systematics, Evolution, and Biogeography of Compositae*. International Association for Plant Taxonomy: Vienna.
- Tournefort, J.P. de (1700), *Institutiones Rei Herbariae*. Typographia Regia: Paris.
- Vaillant, S. (1719–1723), Établissement de nouveaux caractères de trois familles ou classes de plantes à fleurs composées; sçavoir, des Cynarocéphales, des Corymbifères, et des Cichoracées. *Mém. Acad. Roy. Sci. (Paris 4^e)* 1718: 143–191, t. 5, 6 (1719); 1719: 277–318, t. 20 (1721); 1720: 277–339, t. 9 (1722); 1721: 174–224, t. 7, 8 (1723).
- Weiss, P.W., Adair, R.J. & Edwards, P.B. (1998), *Chrysanthemoides monilifera* (L.) T.Norl., pp. 49–61, in F.D.Panetta, R.H.Groves & R.C.H.Shepherd (eds), *The Biology of Australian Weeds*, vol. 2. R.G.Richardson & F.J.Richardson: Melbourne.

ASTERACEAE

SYNOPTIC CLASSIFICATION OF AUSTRALIAN ASTERACEAE

A.E.Orchard

This arrangement follows in general that outlined in J.W.Kadereit & C.Jeffrey (eds), *The Families and Genera of Vascular Plants Volume VIII, Flowering Plants Eudicots Asterales* (2007), modified somewhat by elements from V.A.Funk, A.Susanna, T.F.Stuessy & R.J.Bayer (eds), *Systematics, Evolution and Biogeography of Compositae* (2009). In most groups the arrangement follows the phylogenetic suggestions of these works. However, Bayer *et al.* in Kadereit & Jeffrey (2007) adopted an alphabetical arrangement for the genera of the Gnaphalieae as they were unable to determine relationships for a sizeable number of genera. Funk *et al.* (2009) presented a new phylogenetic tree based on chloroplast DNA sequences, which provides a classification for about 60% of the genera in Australia. Given the large uncertainties that still remain, an alphabetical arrangement is here adopted for this Tribe.

The estimated number of species in continental Australia (i.e. excluding offshore Territories, for which see *Flora of Australia* vols. 49 and 50) is given in brackets after each genus. This estimate includes species which are doubtfully naturalised and which may not be treated in full in the text; and taxa for which only phrase names (= manuscript names) are available. For genera not treated in this volume, the species concepts and numbers are usually those of the Australian Plant Census (<http://www.cpbr.gov.au/chah/apc/>).

Symbols before genus names:

[no symbol] = all species native.

* = all species naturalised.

^ = some species naturalised, some native.

> = introduced genus formerly recorded, now thought to be eradicated; or an otherwise doubtful record.

Subfamily Mutisoideae

Tribe Mutiseae

Trichocline (1)

Subfamily Carduoideae

Tribe Cardueae

>*Echinops* (1)

Hemisteptia (1)

**Carduus* (5)

**Silybum* (1)

**Picnomon* (1)

**Cirsium* (2)

>*Notobasis* (1)

**Cynara* (1)

**Onopordum* (5)

**Arctium* (2)

**Carthamus* (4)

>*Crupina* (1)

>*Volutaria* (1)

^*Rhaponticum* (2)

**Mantisalca* (1)

**Centaurea* (18)

Subfamily Cichorioideae

Tribe Cichorieae

- | | |
|-------------------------|-----------------------------|
| * <i>Scolymus</i> (2) | <i>Microseris</i> (2) |
| * <i>Cichorium</i> (2) | * <i>Hieracium</i> (4) |
| * <i>Chondrilla</i> (1) | * <i>Tolpis</i> (2) |
| * <i>Crepis</i> (6) | * <i>Hedypnois</i> (1) |
| ^ <i>Taraxacum</i> (17) | * <i>Urospermum</i> (2) |
| <i>Youngia</i> (1) | * <i>Hypochaeris</i> (3) |
| * <i>Lapsana</i> (1) | * <i>Leontodon</i> (1) |
| * <i>Lactuca</i> (2) | * <i>Helminthotheca</i> (1) |
| ^ <i>Sonchus</i> (4) | ^ <i>Picris</i> (12) |
| <i>Actites</i> (1) | * <i>Scorzonera</i> (1) |
| <i>Launaea</i> (1) | * <i>Tragopogon</i> (4) |
| * <i>Reichardia</i> (2) | |

Tribe Arctotideae

- | | |
|-------------------------|-----------------------|
| * <i>Arctotheca</i> (3) | * <i>Gorteria</i> (1) |
| * <i>Arctotis</i> (1) | * <i>Berkheya</i> (1) |
| <i>Cymbonotus</i> (3) | * <i>Gazania</i> (2) |

Tribe Vernonieae

- | | |
|--------------------------------|---------------------------|
| * <i>Elephantopus</i> (2) | * <i>Cyanthillium</i> (2) |
| * <i>Pseudelephantopus</i> (1) | * <i>Tarlmounia</i> (1) |
| * <i>Ethulia</i> (1) | <i>Vernonia</i> (1) |
| ^ <i>Centratherum</i> (2) | <i>Decaneuropsis</i> (1) |
| <i>Pleurocarpaea</i> (3) | |

Subfamily Asteroideae

Tribe Senecioneae

- | | |
|-------------------------|-----------------------------|
| <i>Abrotanella</i> (3) | * <i>Cineraria</i> (1) |
| <i>Centropappus</i> (1) | ^ <i>Senecio</i> (97) |
| <i>Bedfordia</i> (3) | * <i>Erechtites</i> (1) |
| * <i>Petasites</i> (1) | <i>Arrhenechthites</i> (1) |
| * <i>Roldana</i> (1) | * <i>Crassocephalum</i> (1) |
| * <i>Delairea</i> (1) | * <i>Emilia</i> (2) |
| * <i>Euryops</i> (2) | <i>Gynura</i> (1) |

Tribe Calenduleae

- | | |
|-------------------------------|---------------------------|
| * <i>Calendula</i> (3) | * <i>Monoculus</i> (1) |
| * <i>Chrysanthemoides</i> (1) | * <i>Oligocarpus</i> (1) |
| * <i>Dimorphotheca</i> (2) | * <i>Osteospermum</i> (4) |

Tribe Gnaphalieae (alphabetical as discussed above)

- | | |
|----------------------------|-----------------------------|
| <i>Acanthocladium</i> (1) | * <i>Facelis</i> (1) |
| <i>Acomis</i> (4) | <i>Feldstonia</i> (1) |
| <i>Actinobole</i> (4) | * <i>Filago</i> (2) |
| ^ <i>Ammobium</i> (2) | <i>Fitzwillia</i> (1) |
| <i>Anemocarpa</i> (3) | * <i>Gamochaeta</i> (6) |
| <i>Angianthus</i> (21) | <i>Gilberta</i> (1) |
| <i>Apalochlamys</i> (1) | <i>Gilruthia</i> (1) |
| <i>Argentipallium</i> (6) | ^ <i>Gnaphalium</i> (3) |
| <i>Argyroglottis</i> (1) | <i>Gnephosis</i> (20) |
| <i>Argyrotegium</i> (4) | <i>Gratwickia</i> (1) |
| <i>Asteridea</i> (9) | <i>Haeckeria</i> (2) |
| <i>Basedowia</i> (1) | <i>Haegiela</i> (1) |
| <i>Bellida</i> (1) | <i>Haptotrichion</i> (2) |
| <i>Blennospora</i> (3) | <i>Helichrysum</i> (7) |
| <i>Calocephalus</i> (11) | <i>Hyalochlamys</i> (1) |
| <i>Calomeria</i> (1) | <i>Hyalosperma</i> (9) |
| <i>Cassinia</i> (44) | <i>Ixiolaena</i> (1) |
| <i>Cephalipterum</i> (1) | <i>Ixodia</i> (2) |
| <i>Cephalosorus</i> (1) | <i>Lawrencella</i> (2) |
| <i>Chondropyxis</i> (1) | <i>Leiocarpa</i> (11) |
| <i>Chrysocephalum</i> (13) | <i>Lemoorea</i> (1) |
| <i>Chthonocephalus</i> (7) | <i>Leptorhynchus</i> (10) |
| <i>Coronidium</i> (20) | <i>Leucochrysum</i> (6) |
| <i>Craspedia</i> (24) | <i>Leucophyta</i> (1) |
| <i>Cremnothamnus</i> (1) | * <i>Logfia</i> (1) |
| <i>Decazesia</i> (1) | <i>Millotia</i> (16) |
| <i>Dielitzia</i> (1) | <i>Myriocephalus</i> (15) |
| <i>Dithyrostegia</i> (2) | <i>Nablonium</i> (1) |
| <i>Epitriche</i> (1) | <i>Neotysonia</i> (1) |
| <i>Eriochlamys</i> (4) | <i>Odixia</i> (2) |
| <i>Erymophyllum</i> (5) | <i>Ozothamnus s.l.</i> (54) |
| <i>Euchiton</i> (9) | <i>Paenula</i> (1) |
| <i>Ewartia</i> (4) | <i>Parantennaria</i> (1) |

Tribe Gnaphalieae, *continued*

<i>Phacellothrix</i> (1)	<i>Rutidosia</i> (9)
<i>Pithocarpa</i> (4)	<i>Schoenia</i> (5)
<i>Podolepis</i> (26)	<i>Siloxerus</i> (4)
<i>Podotheca</i> (6)	<i>Sondottia</i> (2)
<i>Pogonolepis</i> (2)	<i>Stuartina</i> (2)
<i>Polycalymma</i> (1)	<i>Taplinia</i> (1)
<i>Pterochaeta</i> (1)	<i>Thiseltonia</i> (1)
<i>Pterygopappus</i> (1)	<i>Tietkensia</i> (1)
<i>Pycnosorus</i> (6)	<i>Trichanthodium</i> (4)
<i>Quinetia</i> (1)	<i>Triptilodiscus</i> (1)
<i>Quinqueremulus</i> (1)	* <i>Vellereophyton</i> (1)
<i>Rhetinocarpha</i> (1)	<i>Waitzia</i> (5)
<i>Rhodanthe</i> (48)	<i>Xerochrysum</i> (12)

Tribe Astereae

* <i>Felicia</i> (1)	* <i>Baccharis</i> (2)
<i>Achnophora</i> (1)	<i>Camptacra</i> (2)
<i>Celmisia</i> (9)	<i>Dichromochlamys</i> (1)
<i>Olearia</i> (122)	<i>Dimorphocoma</i> (1)
<i>Brachyscome</i> (87)	<i>Elachanthus</i> (2)
<i>Roebuckia</i> (9)	<i>Iotasperma</i> (2)
<i>Allittia</i> (2)	<i>Isoetopsis</i> (1)
<i>Hullsia</i> (1)	<i>Ixiochlamys</i> (4)
<i>Pembertonia</i> (1)	<i>Kippistia</i> (1)
<i>Calotis</i> (30)	<i>Minuria</i> (13)
<i>Ceratogyne</i> (1)	<i>Vittadinia</i> (incl. <i>Peripleura</i>) (33)
* <i>Bellis</i> (1)	<i>Tetramolopium</i> (2)
* <i>Dichrocephala</i> (1)	* <i>Aster</i> (3)
<i>Erodiophyllum</i> (2)	* <i>Solidago</i> (3)
<i>Pilbara</i> (1)	* <i>Grindelia</i> (3)
<i>Lagenophora</i> (5)	* <i>Heterotheca</i> (1)
<i>Solenogyne</i> (3)	* <i>Conyza</i> (7)
<i>Pappachroma</i> (9)	^ <i>Erigeron</i> (11)

Tribe Anthemideae

**Ursinia* (2)
 **Tanacetum* (4)
 **Artemisia* (3)
 **Achillea* (4)
 **Lasiospermum* (1)
 **Chamaemelum* (1)
 **Anthemis* (3)
 **Argyranthemum* (1)
 **Glebionis* (2)
 **Mauranthemum* (1)

**Leucanthemum* (2)
 **Tripleurospermum* (1)
 **Matricaria* (2)
 **Eriocephalus* (1)
 **Oncosiphon* (2)
 **Pentzia* (2)
 ^*Cotula* (7)
Leptinella (4)
 **Soliva* (4)

Tribe Inuleae

Subtribe Inulineae

Blumea (11)
 **Dittrichia* (2)

**Asteriscus* (1)
 **Carpesium* (1)

Subtribe Plucheinae

Cratystylis (4)
Pterocaulon (13)
Sphaeromorphaea (6)
Ethuliopsis (1)
Pluchea (13)

Thespidium (1)
Coleocoma (1)
Sphaeranthus (2)
Streptoglossa (8)
Allopterigeron (1)

Tribe Arthroismeae

Centipeda (9)

Tribe Helenieae

**Gaillardia* (2)
 **Helenium* (1)

Tribe Coreopsideae

Trioncinia (2)
Diodontium (1)
Glossocardia (3)
 **Cosmos* (3)

**Coreopsis* (2)
 ^*Bidens* (6)
 **Dahlia* (2)

Tribe Neurolaeneae

^*Enydra* (2)

Classification

ASTERACEAE

Tribe Tageteae

**Flaveria* (1)

**Tagetes* (2)

**Thymophylla* (1)

Tribe Bahieae

**Schkuhria* (1)

**Florestina* (1)

Tribe Heliantheae

Subtribe Ecliptinae

**Synadrella* (1)

**Synadrellopsis* (1)

^*Blainvillea* (4)

**Calyptocarpus* (1)

**Eleutheranthera* (1)

Pentalepis (6)

^*Eclipta* (3)

**Sphagneticola* (1)

Wollastonia (2)

Apowollastonia (7)

Acunniana (1)

**Pascalina* (1)

Subtribe Montanoinae

**Montanoa* (2)

Subtribe Verbesininae

**Verbesina* (1)

Subtribe Spilanthinae

^*Acmella* (2)

**Spilanthes* (1)

Subtribe Zinniinae

**Zinnia* (3)

Subtribe Helianthinae

**Tithonia* (2)

**Helianthus* (5)

Subtribe Ambrosiinae

**Ambrosia* (4)

**Iva* (1)

**Parthenium* (1)

**Xanthium* (8)

Tribe Millerieae

Subtribe Dyscritothamninae

**Tridax* (1)

Subtribe Galinsoginae

**Galinsoga* (1)

Subtribe Melampodiinae

**Acanthospermum* (2)

Subtribe Milleriinae

**Guizotia* (1)

Sigesbeckia (2)

Tribe Madieae

>*Centromadia* (1)

**Madia* (1)

Tribe Eupatorieae

**Ageratina* (3)

**Stevia* (1)

**Mikania* (1)

**Ageratum* (2)

**Chromolaena* (2)

**Praxelis* (1)

**Eupatorium* (2)

Adenostemma (2)

**Gymnocoronis* (1)

ASTERACEAE

KEY TO SUBFAMILIES OF AUSTRALIAN ASTERACEAE

- 1 Ray florets functionally female; corollas white above, pink to purplish beneath, bilabiate with outer lip shortly 3-toothed, inner lip with 2 long linear tightly coiled lobes; basal appendages of staminodes decurrent on filament; style shaft glabrous, with branches short, stigmatic papillae covering entire surface subfam. **Mutisioidae**
- 1: Florets without the above combination of characters; lobes of inner lip of ray florets never coiled
- 2 Stigmatic papillae covering entire inner surface of style branches; capitula often discoid, disciform or ligulate, rarely radiate
- 3 Leaves alternate, usually simple, entire or often serrate, dentate or lobulate, and usually harshly spiny; capitula usually discoid, or discoid with outer florets sterile and apparently radiate; involucre bracts often spiny; receptacle usually epaleate and often setose, rarely paleate; anther tails sometimes pilose or fringed; style branches usually obtuse, with a thickened pilose basal annulus subfam. **Carduoideae**
- 3: Leaves alternate or opposite, usually simple, entire to deeply lobed, usually not harshly spiny (harshly spiny in *Berkheya*, *Scolymus*); capitula discoid, ligulate or radiate; involucre bracts not spiny; receptacle epaleate, often alveolate, or paleate; anther tails usually simple; style branches usually tapered, acute, without a thickened pilose basal annulus subfam. **Cichorioideae**
- 2: Stigmatic papillae usually in 2 distinct lines on inner surface of style branches; capitula radiate, disciform or discoid subfam. **Asteroideae**

Key to the genera of Australian Asteraceae treated in this volume

The following key is broadly based on that of H.R.Toelken in B.D.Morley & H.R.Toelken, *Flowering Plants in Australia* (1983). Rather than follow the usual convention of a cascading series of hierarchical keys based on tribes, which in Asteraceae is complicated by the numerous exceptions to suites of tribal diagnostic characters, this key is divided into eight artificial groups. Those genera appearing in this volume are keyed directly to genus, with their tribal affinity noted as detailed below in front of each generic name. The two large tribes Astereae and Gnaphalieae, which will appear in *Flora of Australia* volume 38, are treated differently. Where leads in the key below terminate in taxa of either of these tribes, the reader is referred to separate keys which deal, respectively, with each in their entirety (Gnaphalieae beginning on p. 35; Astereae on p. 42). The genera mentioned in this key under Gnaphalieae and Astereae are the main exemplars, but not necessarily the only ones, which would key to these leads.

Tribes are noted as follows: Anthemideae (ANT); Arctotideae (ARC); Arthroismeae (ART); Astereae (given in full); Bahieae (BAH); Calenduleae (CAL); Cardueae (CAR); Cichorieae (CIC); Coreopsidae (COR); Eupatorieae (EUP); Gnaphalieae (given in full); Helenieae (HEL); Helianthieae (HTH); Inuleae (INU); Madieae (MAD); Millerieae (MIL); Mutiseae (MUT); Neurolaeneae (NEU); Senecioneae (SEN); Tageteae (TAG); Vernonieae (VER).

Independent keys, within tribes, are also provided in the text.

KEY TO ARTIFICIAL GROUPS

- 1 Fruiting heads grouped into conceptacles or clusters surrounded by ±fused bracts, often forming burrs, or spiny, sessile in axils of leaves along stems (male capitula sometimes in terminal or axillary ±spikelike clusters) **Group G**
- 1: Fruiting heads not axillary conceptacles or burrs, or if with stiff barbed bristles, then in terminal heads

ASTERACEAE

- | | | |
|-----|---|----------------|
| 2 | Flower heads with all florets with rays | Group A |
| 2: | Flower heads with a mixture of ray and tubular/filiform florets, or all tubular/filiform florets | |
| 3 | All florets tubular and/or filiform, or ray florets with short inconspicuous rays (< 3 mm long); involucre bracts sometimes coloured and spreading, resembling rays | |
| 4 | Styles with a tuft of hairs below stigmatic branches; receptacles paleate with scales or bristles (receptacle with a single floret in <i>Echinops</i>); leaves usually spine-tipped (spiny thistles) | Group B |
| 4: | Styles lacking tuft of hairs below stigmatic branches; receptacles epaleate, or if with scales then leaves opposite and not spiny (<i>Parthenium</i> has alternate leaves, deciduous paleae; <i>Pilbara</i> has paleae and alternate leaves) | |
| 5 | Leaves opposite, at least towards base of plant | Group C |
| 5: | Leaves alternate (spirally arranged) or in a basal rosette | |
| 6 | Involucre bracts ±equisized and fused in a single whorl, sometimes with a few very short bracts at base; flower heads simple capitula | Group C |
| 6: | Involucre bracts usually gradated, in 2 or more whorls and free, or flower heads compound | |
| 7 | Flower heads compound, with capitula tightly clustered and densely surrounded by scales and leaves, rarely scales and leaves absent | Group D |
| 7: | Flower heads not as above (usually of single capitula), sessile or stalked | |
| 8 | Involucre bracts herbaceous, rarely with membranous margins, and tip appressed | Group E |
| 8: | At least some (often all) involucre bracts dry, papery and/or membranous or cartilaginous, and apices often recurved or spreading, mimicing ray florets | Group F |
| 3: | Outer florets with obvious rays (> 3 mm long) | |
| 9 | Leaves opposite, at least towards base of plant | Group G |
| 9: | Leaves alternate (spirally arranged) and/or in a basal rosette | |
| 10 | Pappus present and usually prominent | Group H |
| 10: | Pappus absent, reduced to less than 1 mm long, or a cup | Group I |

GROUP A

Flower heads with all florets with rays; fruits not burrs. All Cichorieae.

- | | | |
|----|--|--------------------------|
| 1 | Florets blue or violet, rarely white | |
| 2 | Pappus of minute scales | [CIC] CICHORIUM |
| 2: | Pappus of plumose hairs (marginal achenes sometimes not plumose) | |
| 3 | Leaves linear, grass-like, entire | [CIC] TRAGOPOGON |
| 3: | Leaves oblong; margins toothed, sinuate or pinnatifid | [CIC] HYPOCHAERIS |
| 1: | Florets (at least outer ones) yellow to orange | |
| 4 | Receptacle paleate | |
| 5 | Stems winged; plants spiny | [CIC] SCOLYMUS |
| 5: | Stems without wings; soft herbs | [CIC] HYPOCHAERIS |

ASTERACEAE

- 4: Receptacle epaleate
 - 6 Involucral bracts in 1 whorl (2 whorls in *Hedypnois*, but outer whorl tiny)
 - 7 Pappus of scales or bristles [CIC] HEDYPNOIS
 - 7: Pappus hairs plumose
 - 8 Leaves oblanceolate to lyrate; margins toothed to pinnatisect [CIC] UROSPERMUM
 - 8: Leaves linear, grass-like, entire [CIC] TRAGOPOGON
 - 6: Involucral bracts in more than 1 whorl, usually gradate
 - 9 All leaves in a basal rosette
 - 10 Outer involucral bracts spreading or recurved at maturity
 - 11 Inner involucral bracts in several series; achenes usually beaked [CIC] TARAXACUM
 - 11: Inner involucral bracts in 2 series; achenes unbeaked [CIC] YOUNGIA
 - 10: All involucral bracts clasping and tightly appressed
 - 12 Pappus of plumose hairs on central achenes only (scales on outer achenes) [CIC] LEONTODON
 - 12: Pappus of bristles or scales
 - 13 Pappus of long scales or of bristles broader at base [CIC] MICROSERIS
 - 13: Pappus of scabrid bristles which are not broader at base
 - 14 Taprooted perennial herbs; achenes usually beaked [CIC] TARAXACUM
 - 14: Stoloniferous herbs, rooting at nodes; achenes not beaked [CIC] LAUNAEA
 - 9: Leaves basal and/or cauline
 - 15 Achenes beaked apically
 - 16 Pappus hairs plumose
 - 17 Outer involucral bracts conspicuously cordate to broadly ovate [CIC] HELMINTHOTHECA
 - 17: Outer involucral bracts not broadly ovate or cordate [CIC] PICRIS
 - 16: Pappus hairs simple or at most minutely scabridulous
 - 18 Achenes strongly compressed [CIC] LACTUCA
 - 18: Achenes not compressed
 - 19 Achenes with 1 or more rings of teeth (scales) below beak [CIC] CHONDRILLA
 - 19: Achenes without teeth below beak
 - 20 Inner involucral bracts hardened and erect at maturity [CIC] CREPIS
 - 20: All involucral bracts soft & reflexed at maturity [CIC] YOUNGIA
 - 15: Achenes not beaked, abruptly constricted apically or gradually tapering
 - 21 Achenes strongly compressed
 - 22 Achenes elongate-elliptic [CIC] SONCHUS
 - 22: Achenes flask-shaped [CIC] ACTITES
 - 21: Achenes not or hardly compressed
 - 23 Pappus of plumose hairs [CIC] SCORZONERA
 - 23: Pappus of bristles, scales or absent
 - 24 Pappus absent [CIC] LAPSANA
 - 24: Pappus present, rarely absent and then achene 4-ribbed
 - 25 Pappus of scales (inner achene pappus scales sometimes awned) [CIC] HEDYPNOIS

ASTERACEAE

- 25: Pappus of bristles or absent
- 26 Achenes with 6 to several ribs
- 27 Stellate hairs present [CIC] HIERACIUM
- 27: Stellate hairs absent
- 28 Stem leaves with clasping auricles [CIC] CREPIS
- 28: Stem leaves lacking clasping auricles
- 29 Pappus of numerous long bristles [CIC] YOUNGIA
- 29: Pappus of a single row of minute bristles; inner
achenes with additional 2–5 longer bristles [CIC] TOLPIS
- 26: Achenes rough and 4-ribbed or 4-angled
- 30 Pappus scale-like, broadened at base [CIC] TOLPIS
- 30: Pappus of fine silky hairs [CIC] REICHARDIA

GROUP B

Fruits not axillary burrs; heads with all tubular/filiform florets, or rays if present shorter than 3 mm; styles with tuft of hairs below stigmatic branches; receptacle paleate; leaves usually spine-tipped (spiny thistles). All Cardueae.

- 1 Receptacle epaleate, glabrous
- 2 Heads simple, each an individual multi-floretted capitulum [CAR] ONOPORDUM
- 2: Heads compound, of many 1-floretted capitula [CAR] ECHINOPS
- 1: Receptacle paleate with scales or setae
- 3 Receptacle with scales
- 4 Floret corollas yellow [CAR] BERKHEYA
- 4: Floret corollas purple, pink or white
- 5 Achenes cylindrical or 4-ribbed
- 6 Achenes cylindrical; plants with latex [CAR] CRUPINA
- 6: Achenes 4-ribbed; plants lacking latex [CAR] HEMISTEPTIA
- 5: Achenes compressed or flat
- 7 Leaves scarcely lobed, lacking spines [CAR] ARCTIUM
- 7: Leaves lobed and spiny
- 8 Involucral bracts with a terminal spine only [CAR] CIRSIUM
- 8: Involucral bracts with a terminal spine and 2–8 lateral spinules [CAR] PICNOMON
- 3: Receptacle with setae
- 9 Involucral bracts leaf-like and loose
- 10 Achenes compressed, flat [CAR] CENTAUREA
- 10: Achenes 4-angled [CAR] CARTHAMNUS
- 9: Involucral bracts scale-like and ±appressed
- 11 Achenes obliquely attached to receptacle
- 12 Leaves with spiny margins [CAR] NOTOBASIS
- 12: Leaves without spiny margins
- 13 Pappus deciduous [CAR] RHAPONTIUM

ASTERACEAE

- 13: Pappus persistent, rarely absent
- 14 Pappus absent [CAR] CENTAUREA
- 14: Pappus persistent
- 15 Achenes smooth or sulcate, never foveolate [CAR] CENTAUREA
- 15: Achenes diversely ridged, ribbed or foveolate
- 16 Annual to 80 cm tall [CAR] VOLUTARIA
- 16: Perennial to 150 cm tall [CAR] MANTISALCA
- 11: Achenes vertically attached to receptacle
- 17 Achenes compressed
- 18 Pappus 1–3.5 mm long [CAR] ARCTIUM
- 18: Pappus 15–40 mm long
- 19 Leaves uniformly green on upper surface [CAR] CYNARA
- 19: Leaves white-veined or variegated on upper surface [CAR] SILYBUM
- 17: Achenes terete
- 20 Pappus hairs simple or barbellate [CAR] CARDUUS
- 20: Pappus hairs plumose [CAR] CYNARA

GROUP C

Fruits not axillary burrs; all florets tubular/filiform, or rays inconspicuous (< 3 mm long); styles lacking tuft of hairs below stigmatic branches; leaves opposite, at least basally, or alternate or rosulate, and then involucre bracts fused in a single ±equisized whorl. Diverse tribes, but particularly Eupatorieae, Coreopsiadeae and Senecioneae.

- 1 Leaves opposite at least basally, rarely in whorls
- 2 Heads compound go to Group D, lead 1
- 2: Heads simple
- 3 Leaves lobed or deeply divided
- 4 Pappus absent or of very short hairs or scales
- 5 Water plant with soft branches; involucre bracts 4 [NEU] ENYDRA
- 5: Delicate terrestrial plant with stiffly erect branches; involucre bracts many [BAH] SCHKUHRIA
- 4: Pappus hair-like, or with bristles more than half as long as achene
- 6 Upper leaves clasping stem; pappus of fine hairs [SEN] EMILIA
- 6: All leaves not clasping; pappus of few bristles
- 7 Involucre bracts fused into tube; plants with pungent smell [TAG] TAGETES
- 7: Involucre bracts free; plants usually odourless [COR] BIDENS
- 3: Leaves entire or toothed
- 8 Pappus absent or very small
- 9 Capitulum covered with glandular hairs [MIL] SIGESBECKIA
- 9: Capitulum without glands
- 10 Capitula axillary and sessile in axils of leaves
- 11 Swamp plants; involucre bracts 4, outer 2 longer than inner 2 [NEU] ENYDRA
- 11: Plants of dry land; involucre bracts 2 or many (never 4)

ASTERACEAE

- 12 Florets 4 per capitulum; pappus of 2 awns fused to wings; involucre bracts 2 [HTH] SYNEDRELLOPSIS
- 12: Florets 7–50 per capitulum; pappus absent; involucre bracts many [HTH] IVA
- 10: Capitula terminal and ±stalked
- 13 Pappus absent [EUP] GYMNOCORONIS
- 13: Pappus of small scales or a lacerate crown
- 14 Florets few (c. 5 or 6) per capitulum [HTH] ELEUTHERANTHERA
- 14: Florets numerous in each capitulum
- 15 Ray florets absent; disc florets usually blue to mauve, sometimes white [EUP] AGERATUM
- 15: Ray florets present, with white ligules to c. 1.8 mm long; disc florets whitish [HEL] ECLIPTA
- 8: Pappus at least half as long as achene
- 16 Capitula with 4 or 5 florets
- 17 Pappus of numerous bristles [EUP] MIKANIA
- 17: Pappus of 3 bristles alternating with 3 scales [EUP] STEVIA
- 16: Capitula with numerous florets
- 18 Involucre bracts membranous several GNAPHALIEAE *q.v.*
- 18: Involucre bracts herbaceous, sometimes with membranous margins
- 19 Pappus hairs gland-tipped [EUP] ADENOSTEMMA
- 19: Pappus hairs without glands
- 20 Leaves linear to oblong, entire, sometimes narrowly pinnatifid
- 21 Involucre bracts linear to linear-lanceolate or oblong
- 22 Achenes flattened and winged [COR] DIODONTIUM
- 22: Achenes ±cylindrical, unwinged
- 23 Achenes with a long elongate beak, curled into an inverted J-shape [COR] GLOSSOCARDIA
- 23: Achenes ±truncate, not beaked
- 24 Awns spreading at c. 90° to body of achene, or reflexed [COR] TRIONCINIA
- 24: Awns erect or only slightly diverging [COR] GLOSSOCARDIA
- 21: Involucre bracts broad
- 25 Pappus absent or tiny; achenes dimorphic [HTH] ACMELLA
- 25: Pappus of stiff bristles; achenes homomorphic [HTH] SPILANTHES
- 20: Leaves (or leaflets) lanceolate to ovate, toothed or serrate, or entire
- 26 Leaves (at least upper ones) compound, trifoliate, entire [BAH] FLORESTINA
- 26: Leaves simple, toothed or serrate
- 27 Pappus of scales [EUP] AGERATUM
- 27: Pappus of hairs or bristles
- 28 Pappus of 2–4 bristles [HTH] CALYPTOCARPUS
- 28: Pappus of many fine hairs
- 29 Perennial herbs; involucre bracts in 1 or 2 whorls
- 30 Involucre bracts all approximately equal in length; pappus bristles 5–15 [EUP] AGERATINA
- 30: Involucre bracts unequal; pappus bristles 25–40 [EUP] EUPATORIUM

ASTERACEAE

- 29: Shrubs; involucre bracts in 4–7 whorls
 - 31 Leaves hirsute and gland-dotted on both surfaces; achenes attached laterally to conical receptacle [EUP] PRAXELIS
 - 31: Leaves sparsely hairy above, more densely below, not gland-dotted; achenes attached terminally to flat receptacle [EUP] CHROMOLAENA
- 1: Leaves alternate and/or rosulate
 - 32 Pappus purplish-mauve [SEN] ERECTITES
 - 32: Pappus white or almost so
 - 33 Florets pink, or yellow-orange to orange, or reddish brown
 - 34 Leaves clasping upper stems; florets pink [SEN] EMILIA
 - 34: Leaves not clasping stems; florets yellow-orange to reddish brown (sometimes drying pink)
 - 35 Leaves ±sessile, lacking a pair of stipule-like lobes [SEN] GYNURA
 - 35: Leaves petiolate; lamina often with a pair of stipule-like lobes [SEN] CRASSOCEPHALUM
 - 33: Florets usually yellow or white (rarely pink or purple)
 - 36 Annual herbs [SEN] SENECHIO
 - 36: Climbers, perennial herbs, shrubs or small trees
 - 37 Climbers to 3 m [SEN] DELAIREA
 - 37: Perennial herbs, shrubs or small trees
 - 38 Lower leaf surface, peduncles and capitula densely woolly; shrubs or trees [SEN] BEDFORDIA
 - 38: Lower leaf surfaces, peduncles and capitula not densely woolly; herbs, or if shrubs or small trees then leaves glabrous
 - 39 Leaves glabrous, viscid, gland-dotted; shrubs or small trees [SEN] CENTROPAPPUS
 - 39: Leaves hairy, or if glabrous, not viscid and gland-dotted; perennial herbs
 - 40 Capitula disciform; outer florets with rudimentary ligule c. 1 mm long; central bisexual or functionally male florets 2–5 [SEN] ARRHENECHTITES
 - 40: Capitula discoid, or if disciform then outer florets without a ligule; central bisexual florets usually more than 5 [SEN] SENECHIO

GROUP D

Fruits not axillary burrs; all florets tubular/filiform, or rays inconspicuous (< 3 mm long); styles lacking tuft of hairs below stigmatic branches; receptacle epaleate; heads compound, often with a secondary involucre of leaves or scales. Gnaphalieae, Astereae, Inuleae and Vernonieae.

- 1 Inflorescence loosely spike-like, with heads of 1–6 capitula each with 4 florets [VER] PSEUDELEPHANTOPUS
- 1: Inflorescence a dense compound head
 - 2 Corolla 4-lobed and split on one side [VER] ELEPHANTOPUS
 - 2: Corolla 5-lobed ±equisized (if fewer lobes then not split)
 - 3 Secondary involucre (sometimes small) of densely clustered leaves and/or bracts enclosing compound heads
 - 4 Leaves opposite and petiolate various GNAPHALIEAE *q.v.*
 - 4: Leaves alternate and radical, or opposite and sessile
 - 5 Compound head surrounded by numerous white or yellow scales various GNAPHALIEAE *q.v.*

ASTERACEAE

- 5: Compound head surrounded by few scales or leaves
- 6 Receptacle paleate various GNAPHALIEAE *q.v.*
- 6: Receptacle epaleate
- 7 Corolla hairy GNAPHALIEAE (ERIOCHLAMYS) *q.v.*
- 7: Corolla glabrous
- 8 Outer florets female and/or all florets filiform
- 9 Plants stemless ASTEREAE (ISOETOPSIS) *q.v.*
- 9: Plants with erect stems GNAPHALIEAE (GNAPHALIUM, STUARTINA) *q.v.*
- 8: All florets tubular and bisexual
- 10 Pappus plumose, as long as or longer than corolla; plants prostrate GNAPHALIEAE (ACTINOBOLE) *q.v.*
- 10: Pappus absent, or of various types, but if as long as corolla then plants erect
- 11 Glabrous erect herb dichotomously branching from below terminal capitulum [SEN] FLAVERIA
- 11: Usually hairy herbs, irregularly branching; lateral inflorescences rarely overtopping terminal ones numerous GNAPHALIEAE *q.v.*
- 3: Secondary involucre absent, with just a few loosely arranged leaves below the compound head
- 12 Individual capitula with all florets alike (homogamous) numerous GNAPHALIEAE *q.v.*
- 12: Individual capitula with 2 types of florets (heterogamous)
- 13 Achenes tapering into a terminal beak GNAPHALIEAE (WAITZIA) *q.v.*
- 13: Achenes ±abruptly constricted below pappus
- 14 Stems not winged (if leaves decurrent, not along whole internode) numerous GNAPHALIEAE *q.v.*
- 14: Stems winged
- 15 Pappus bristle-like [INU] PTEROCAULON
- 15: Pappus absent [INU] SPHAERANTHUS

GROUP E

Fruits not axillary burrs; all florets tubular/filiform, or rays inconspicuous (< 3 mm long); styles lacking tuft of hairs below stigmatic branches; receptacle epaleate (or if paleate, then leaves opposite and not spiny, alternate in *Pilbara*); heads simple capitula, usually stalked; involucre bracts herbaceous (sometimes with membranous margins). Various tribes, particularly Vernonieae, Anthemideae, Inuleae.

- 1 Pappus absent or cup-shaped
- 2 Achenes beaked
- 3 Achenes cylindrical; plants erect GNAPHALIEAE (MILLOTIA) *q.v.*
- 3: Achenes compressed; plants with basal rosette, rarely almost erect ASTEREAE (LAGENOPHORA) *q.v.*
- 2: Achenes not beaked, ±abruptly constricted towards apex
- 4 Ray floret corollas blue to purple

ASTERACEAE

- 5 Achenes smooth ASTEREAE (DICHROCEPHALA) *q.v.*
- 5: Achenes ribbed or angled
- 6 Achenes usually 4-angled or 4-ribbed [VER] ETHULIA
- 6: Achenes with 8–10 ribs
- 7 Outer involucre bracts leaf-like and longer than florets [VER] CENTRATHERUM
- 7: All involucre bracts shorter than florets [VER] PLEUROCARPAEA
- 4: Ray floret corollas yellow or white, rarely tinged red, or capitula lacking ray florets
- 8 Involucre bracts leaf-like; florets subtended by paleae GNAPHALIEAE
(NEOTYSONIA) *q.v.*
- 8: Involucre bracts herbaceous; paleae minute or absent
- 9 Achenes terete or 3- or more angled
- 10 Leaves entire or almost so (minutely denticulate in *Abrotonella forsteroides*)
- 11 All florets bisexual GNAPHALIEAE
(MILLOTIA) *q.v.*
- 11: Outer florets female; inner florets bisexual or male
- 12 Inner florets bisexual [ART] CENTIPEDA
- 12: Inner florets male [SEN] ABROTANELLA
- 10: Leaves toothed or deeply divided
- 13 Leaves with a few teeth towards apex or evenly serrate, but never deeply divided [ART] CENTIPEDA
- 13: Leaves deeply divided
- 14 Plants usually > 50 cm tall [ANT] ARTEMISIA
- 14: Plants usually < 50 cm tall
- 15 Subshrubs [ANT] PENTZIA
- 15: Annual herbs
- 16 Plants glabrous; disc greenish [ANT] MATRICARIA
- 16: Plants sparsely hairy; disc yellow [ANT] ONCOSIPHON
- 9: Achenes compressed but often ribbed
- 17 Outer florets with short rays [ANT] ERIOCEPHALUS
- 17: Outer florets tubular or filiform
- 18 All florets tubular [SEN] ABROTANELLA
- 18: Outer florets filiform or reduced
- 19 Pappus of bristle-like hairs, caducous [INU] BLUMEA
- 19: Pappus absent or minute
- 20 Capitula sessile; achenes spinous apically
- 21 Achenes with 2 ciliate horns on both sides of apex ASTEREAE
(CERATOGYNE) *q.v.*
- 21: Achenes with spinescent style and sometimes 2 spiny wings [ANT] SOLIVA
- 20: Capitula on distinct peduncle; achenes lacking spines
- 22 All leaves in basal rosette ASTEREAE
(SOLENOGYNE) *q.v.*
- 22: Leaves basal and cauline [ANT] COTULA

ASTERACEAE

- 1: Pappus present
 - 23 Involucral bracts leaf-like and spreading [INU] ASTERISCUS
 - 23: Involucral bracts short and ±appressed
 - 24 Pappus of at least fertile flowers scale-like
 - 25 Florets tubular, 5-lobed GNAPHALIEAE (QUINETIA) *q.v.*
 - 25: Outer florets filiform, 2- or 3-lobed ASTEREAE (ELACHANTHUS) *q.v.*
 - 24: Pappus hair-like, sometimes barbed
 - 26 Pappus rose or pink GNAPHALIEAE (BELLIDA) *q.v.*
 - 26: Pappus white or yellow (drying red in *Decaneuropsis*) but florets sometimes purple
 - 27 Outer florets filiform (sometimes few)
 - 28 Leaves toothed or lobed, rarely entire; filiform florets numerous [INU] BLUMEA
 - 28: Leaves entire; filiform florets few GNAPHALIEAE (IXIOLAENA) *q.v.*
 - 27: Outer florets various but not filiform
 - 29 Achenes beaked GNAPHALIEAE (MILLOTIA) *q.v.*
 - 29: Achenes not beaked, abruptly constricted towards apex
 - 30 All florets tubular
 - 31 Achenes 5–10-ribbed
 - 32 Leaves coarsely biserrate; stiffly erect shrubs ASTEREAE (PILBARA) *q.v.*
 - 32: Leaves entire or almost so; perennial herbs or scrambling shrubs
 - 33 Perennial herbs; achenes inconspicuously 4- or 5-ribbed [VER] VERNONIA
 - 33: Scrambling shrubs; achenes 10-ribbed [VER] DECANEUOPSIS
 - 31: Achenes lacking ribs
 - 34 Annual or perennial taprooted herbs or short-lived shrubs [VER] CYANTHILLIUM
 - 34: Rhizomatous shrubby climbers [VER] TARLMOUNIA
 - 30: Outer florets filiform or with rays
 - 35 Outer achenes flat, inner ones terete ASTEREAE (DIMORPHOCOMA) *q.v.*
 - 35: All achenes similar or aborted
 - 36 Achenes flattened ASTEREAE (VITTADINIA) *q.v.*
 - 36: Achenes terete, rarely slightly compressed
 - 37 Involucral bracts linear; herbs GNAPHALIEAE (ASTERIDEA) *q.v.*
 - 37: Involucral bracts ovate with dry margins; shrubs or subshrubs ASTEREAE (OLEARIA) *q.v.*

ASTERACEAE

GROUP F

Fruits not axillary burrs; all florets tubular/filiform, or rays inconspicuous (< 3 mm long); styles lacking tuft of hairs below stigmatic branches; receptacle epaleate (*Parthenium* deciduously paleate); heads simple capitula, usually stalked; at least some involucre bracts dry, and/or papery or membranous, the apices often recurved or spreading, and mimicking rays. Mainly tribes Inuleae and Gnaphalieae.

- 1 Achenes with 2 thick spines apically; pappus absent **GNAPHALIEAE**
(**NABLONIUM**) *q.v.*

- 1: Achenes lacking spines, or spines slender; pappus usually present
 - 2 Pappus absent, cup-shaped or much reduced
 - 3 Corolla and whole plant glandular **GNAPHALIEAE (MILLOTIA, THISELTONIA) *q.v.***
 - 3: Corolla glabrous or rarely leaves glandular
 - 4 Leaves deeply divided **[ANT] TANACETUM**
 - 4: Leaves entire or toothed
 - 5 Achenes beaked **[INU] CARPESIMUM**
 - 5: Achenes ±abruptly constricted apically
 - 6 Involucre bracts broadly ovate, with apices not spreading; paleae equalling or exceeding florets **GNAPHALIEAE**
(**NEOTYSONIA**) *q.v.*
 - 6: Involucre bracts usually lanceolate to elliptic, with apices spreading or not; paleae absent or usually shorter than florets
 - 7 Receptacle paleate **GNAPHALIEAE**
(**AMMOBIUM, IXODIA**) *q.v.*
 - 7: Receptacle epaleate
 - 8 All florets alike **numerous GNAPHALIEAE *q.v.***
 - 8: Outer florets filiform
 - 9 Filiform florets few; leaves entire **numerous GNAPHALIEAE *q.v.***
 - 9: Filiform florets numerous; at least some leaves toothed or lobed
 - 10 Capitula axillary or leaf-opposed; achenes cylindrical with 5–14 ribs **[INU]**
SPHAEROMORPHEAE
 - 10: Capitula in terminal panicles; achenes lunate with 1 longitudinal rib **[INU] ETHULIOPSIS**
- 2: Pappus of hairs, bristles or scales
 - 11 Achenes abruptly constricted into neck or beak below pappus
 - 12 Involucre bracts with petaloid spreading tips **GNAPHALIEAE (WAITZIA) *q.v.***
 - 12: Involucre bracts appressed and membranous
 - 13 Plants with glandular hairs, aromatic; capitula sessile **[INU] DITTRICHIA**
 - 13: Plants lacking glandular hairs; capitula pedunculate **GNAPHALIEAE**
(**LEPTORHYNCHOS**) *q.v.*
 - 11: Achenes lacking neck or beak below pappus
 - 14 Middle involucre bracts pouched **GNAPHALIEAE (LOGFIA, FILAGO) *q.v.***
 - 14: No involucre bracts pouched
 - 15 Plants with 2 types of capitula (tubular florets, tubular and/or filiform)

ASTERACEAE

- 16 Mat- or hummock-forming plants; capitula cup-shaped **GNAPHALIEAE (EWARTIA) *q.v.***
- 16: Shrubs or subshrubs; capitula cylindrical **[INU] CRATYSTYLIS**
- 15: Plants with all capitula similar
- 17 Outer florets with short rays; achenes shed in complex structure including paleae and bracts **[AMB] PARTHENIUM**
- 17: Outer florets lacking rays; achenes shed independently of paleae and bracts
- 18 All florets in capitulum filiform **numerous GNAPHALIEAE *q.v.***
- 18: All florets in capitulum either tubular or filiform and tubular
- 19 Outer slender or filiform florets rare or absent
- 20 Pappus hair-like, simple, barbed or plumose **GNAPHALIEAE (PHACELLOTHRIX) *q.v.***
- 20: Pappus scaly at least at base, if hair-like and plumose then inner involucre bracts linear-lanceolate, pointed
- 21 Florets all similar and bisexual **several GNAPHALIEAE *q.v.***
- 21: Outer florets filiform, female **[INU] COLEOCOMA**
- 19: Outer filiform florets in several rows
- 22 Leaves obovate-spathulate, 4 mm long **GNAPHALIEAE (PTERYGOPAPPUS) *q.v.***
- 22: Leaves linear-lanceolate, oblanceolate, usually more than 8 mm long
- 23 Perennials, usually shrubs or subshrubs
- 24 Pappus of narrow scales **[INU] THESPIDIUM**
- 24: Pappus of hairs
- 25 Mat-forming alpine plants **GNAPHALIEAE (EUCHITON, ARGYROTEGIUM) *q.v.***
- 25: Erect plants of tropics and subtropics **[INU] PLUCHEA**
- 23: Annual herbs, rarely with slightly woody base
- 26 Pappus absent on filiform outer florets
- 27 Capitula axillary or leaf-opposed; achenes cylindrical with 5–14 ribs **[INU] SPHAEROMORPHEA**
- 27: Capitula in terminal panicles; achenes lunate with 1 longitudinal rib **[INU] ETHULIOPSIS**
- 26: Pappus present on all florets
- 28 Pappus of narrow scales **[INU] COLEOCOMA**
- 28: Pappus of simple or plumose hairs
- 29 Pappus hairs simple **GNAPHALIEAE (GNAPHALIUM) *q.v.***
- 29: Pappus hairs barbed or plumose on fertile florets
- 30 Florets few (c. 6); disc florets sterile **[INU] ALLOPTERIGERON**
- 30: Florets numerous (15–190); disc florets fertile
- 31 Mat-forming alpine plants; leaves not noticeably aromatic **GNAPHALIEAE (EUCHITON, ARGYROTEGIUM) *q.v.***
- 31: Erect plants of tropics and subtropics; leaves often aromatic **[INU] STREPTOGLOSSA**

ASTERACEAE

GROUP G

Fruits axillary burrs, or not; capitula radiate, with some florets with conspicuous rays (> 3 mm long); leaves mostly opposite, at least basally. Mainly Coreopsideae, and tribes of the 'Heliantheae alliance' (Bahieae, Heliantheae, Madieae, Millerieae, Neurolaeneae, Tageteae).

- 1 Fruiting heads grouped into conceptacles or clusters surrounded by
±fused bracts, often forming burrs, or spiny, sessile in leaf axils along
stems (male capitula sometimes in terminal or axillary ±spikelike
clusters)
- 2 Leaves opposite, sometimes alternate above
- 3 Leaves deeply divided [AMB] AMBROSIA
- 3: Leaves entire, toothed or rarely shallowly lobed
- 4 Fruits of achenes with 2 terminal spines, in heads surrounded by
loose bracts [HTH] CALYPTOCARPUS
- 4: Fruits of achenes enclosed in spiny conceptacle of fused bracts [MIL] ACANTHOSPERMUM
- 2: Leaves alternate or in basal rosette
- 5 Leaves deeply divided [AMB] AMBROSIA
- 5: Leaves entire, toothed, or if lobed or pinnately divided then fruits
covered with hooked spines [AMB] XANTHIUM
- 1: Fruiting heads not axillary conceptacles or burrs, or if spiny or with
barbed hairs then in terminal heads
- 6 Bracts and whole plant covered with glandular hairs
- 7 Leaves linear, sessile, opposite below, alternate above [MAD] MADIA
- 7: Leaves lanceolate to elliptic, petiolate, opposite [MIL] SIGESBECKIA
- 6: Bracts and whole plant without glandular hairs
- 8 Corolla of outer florets longer than (7–) 8 mm
- 9 Leaves entire, toothed or shallowly lobed
- 10 Leaves sessile and clasping stem
- 11 Leaves usually entire; involucre bracts in at least 2 whorls [HTH] ZINNIA
- 11: Leaves usually toothed; involucre bracts in 2 whorls [MIL] GUIZOTIA
- 10: Leaves petiolate or constricted towards base, not stem-clasping
- 12 Pappus of few hairs, absent, or a cup ASTEREAE (OLEARIA) *q.v.*
- 12: Pappus of many hairs
- 13 Prostrate or procumbent perennial herbs [MIL] TRIDAX
- 13: Erect shrubs or subshrubs
- 14 Achenes winged [HTH] VERBESINA
- 14: Achenes angled or compressed but without wings
- 15 Pericarp thickened and extended above pappus, forming
a cup [HTH] SPHAGNETICOLA
- 15: Pericarp if thickened sometimes forming wings, but not
a cup, or not thickened
- 16 Paleae blunt, just exceeding achenes and ±hooded [HTH] WOLLASTONIA
- 16: Paleae acute, shorter than or exceeding achenes, never
hooded
- 17 Paleae soft, membranous
- 18 Receptacle conical [HTH] ACMELLA
- 18: Receptacle flat to convex [HTH] PASCALIA

ASTERACEAE

- 17: Paleae stiff, cartilaginous
 - 19 Outer involucre bracts longer than inner bracts [HTH] ACUNNIANA
 - 19: Outer involucre bracts shorter than or equalling inner bracts [HTH] APOWOLLASTONIA
- 9: Leaves (at least lower ones) deeply lobed
 - 20 Lobes of leaves up to 2 mm wide [COR] COSMOS
 - 20: Lobes of leaves 4–50 mm wide
 - 21 Subshrubs to 80 cm tall; ray corollas yellow [COR] COREOPSIS
 - 21: Herbs or shrubs to 4 m tall; corollas white, yellow, red or purplish
 - 22 Paleae accrescent; corollas white [HTH] MONTANOA
 - 22: Paleae not accrescent; corollas various colours including white [COR] DAHLIA
- 8: Corolla of outer florets up to 5 mm long (4–7 mm in *Centromadia*)
 - 23 Receptacle epaleate
 - 24 Involucre bracts in 1 whorl and fused; plants with pungent smell [TAG] TAGETES
 - 24: Involucre bracts in several whorls, free; plants not pungently aromatic [BAH] SCHKUHRIA
 - 23: Receptacle paleate
 - 25 Pappus of awns, bristles or scales
 - 26 Leaves pinnately divided (at least basally) [COR] BIDENS
 - 26: Leaves entire or toothed
 - 27 Achenes dimorphic: ray achenes flattened with short marginal deeply lacerate wing; disc achenes biconvex with 2 apical awns [HTH] SYNADRELLA
 - 27: Achenes all similar, obconical; pappus of numerous fimbriate scales [MIL] GALINSOGA
 - 25: Pappus absent, rarely a cup, or very short hairs or scales
 - 28 Involucre bracts covered with stalked glands [MIL] SIGESBECKIA
 - 28: Involucre bracts without glands
 - 29 Tubular florets sterile
 - 30 Involucre bracts many; achenes with offset apical horn [MAD] CENTROMADIA
 - 30: Involucre bracts 4–6; achenes lacking apical horn
 - 31 Capitula sessile in leaf axils; ray florets in several whorls [NEU] ENYDRA
 - 31: Capitula stalked (sometimes shortly); ray florets (always 5) in 1 whorl [HEL] PENTALEPIS
 - 29: All florets fertile; involucre bracts numerous in 2 or more whorls
 - 32 Receptacle conical [HTH] ACMELLA
 - 32: Receptacle flat or slightly convex
 - 33 Paleae blunt or truncate
 - 34 Paleae truncate, erose, membranous [HTH] BLAINVILLEA
 - 34: Paleae blunt, not erose, cartilaginous [HTH] WOLLASTONIA
 - 33: Paleae acute
 - 35 Outer achenes 3-angled in section; inner achenes 2-angled, often winged [HTH] ECLIPTA
 - 35: All achenes similar, sometimes angled, rarely winged

ASTERACEAE

- | | |
|---|----------------------|
| 36 Outer involucre bracts longer than inner bracts | [HTH] ACUNNIANA |
| 36: Outer involucre bracts shorter than or equalling inner bracts | [HTH] APOWOLLASTONIA |

GROUP H

Fruits not axillary burrs; capitula radiate, with some florets with conspicuous rays (> 3 mm long); leaves alternate or in rosettes; pappus present and usually prominent. Various tribes, but particularly Senecioneae, Helenieae, Astereae, Heliantheae.

- | | |
|---|--------------------|
| 1 Leaves linear in clusters along stem | |
| 2 Pappus of 2 awns | [COR] DIODONTIUM |
| 2: Pappus of 5 translucent, usually awned, scales | [HEL] HELENIUM |
| 1: Leaves alternate, cauline, if clustered then not linear | |
| 3 Involucre bracts in 1 whorl, usually fused, rarely with a few much shorter ones basally | |
| 4 Pappus scale-like | [ARC] GAZANIA |
| 4: Pappus of hairs or bristles | |
| 5 Capitula borne singly on long peduncles in lateral positions | [SEN] EURYOPS |
| 5: Capitula usually in terminal clusters, rarely solitary and terminal | |
| 6 Shrubs to 3.5 m high; leaves viscid, with upper surface gland-dotted | [SEN] CENTROPAPPUS |
| 6: Herbs or shrubs; leaves not viscid or gland-dotted | |
| 7 Leaves with distinct lamina and petiole; petiole 5 cm long or more | |
| 8 Hermaphrodite shrubs to 3 m high; ligules yellow | [SEN] ROLDANA |
| 8: Rosetted, dioecious herbs to 0.4 m high (plants male in Australia); ligules white | [SEN] PETASITES |
| 7: Leaves sessile, rarely petiolate, and then petiole much less than 5 cm long | |
| 9 Achenes compressed | [SEN] CINERARIA |
| 9: Achenes not compressed | [SEN] SENEIO |
| 3: Involucre bracts in 2 to several whorls, free | |
| 10 Receptacle paleate | |
| 11 Involucre bracts leaf-like and much longer than florets | [INU] ASTERISCUS |
| 11: Involucre bracts shorter than or equalling florets | |
| 12 Plants usually exceeding 1 m tall, and with 1–several erect branches | |
| 13 Leaves deeply divided | [HTH] TITHONIA |
| 13: Leaves entire or toothed | |
| 14 Pappus of short bristles; rays lobed or distinctly toothed | [HTH] VERBESINA |
| 14: Pappus of deciduous scales; rays scarcely toothed | [HTH] HELIANTHUS |
| 12: Plants with basal rootstock, somewhat branched; branches to 50 cm long | |
| 15 Pappus of 2 deciduous scales | [HTH] HELIANTHUS |
| 15: Pappus of 2 persistent awns, or of 6–10 persistent scales | |
| 16 Rays large and spectacular | [ARC] GAILLARDIA |

ASTERACEAE

- 16: Rays scarcely longer than involucre
 - 17 Achenes flattened and winged [COR] DIODONTIUM
 - 17: Achenes cylindrical [COR] GLOSSOCARDIA
- 10: Receptacle rough or pitted but lacking paleae
 - 18 Involucral bracts fused into a tube basally [ARC] GAZANIA
 - 18: Involucral bracts in several whorls, free
 - 19 At least some leaves divided or lobed
 - 20 Ray florets sterile
 - 21 Pappus of broad white spreading scales [ANT] URSINIA
 - 21: Pappus scales small or absent [ARC] ARCTOTHECA
 - 20: Ray florets female
 - 22 Achenes with 3 wing-like ridges on 1 side; pappus of scales [ARC] ARCTOTUS
 - 22: Achenes ribbed but not winged; pappus of bristles ASTEREAE (VITTADINIA) *q.v.*
- 19: Leaves entire and linear, or toothed
 - 23 Inner involucral bracts dry and membranous
 - 24 Achenes with a short neck below pappus [INU] DITTRICHIA
 - 24: Achenes cylindrical, without a neck
 - 25 Style branches slender and pointed [INU] ALLOPTERIGERON
 - 25: Style branches short and blunt GNAPHALIEAE (PODOLEPIS) *q.v.*
 - 23: All involucral bracts herbaceous, or sometimes with membranous margins
 - 26 Achenes beaked ASTEREAE (IXIOCHLAMYS) *q.v.*
 - 26: Achenes not beaked
 - 27 Ray florets in 2 or more whorls
 - 28 Involucral bracts and receptacle glandular; ligules 2–4-lobed STREPTOGLOSSA
 - 28: Involucral bracts and receptacle not glandular; ligules entire several ASTEREAE *q.v.*
 - 27: Ray florets in 1 whorl
 - 29 Pappus a double row of brick red bristles, outer ones short, inner ones long ASTEREAE (HETEROTHECA) *q.v.*
 - 29: Pappus 1-seriate or if a double row of bristles then not brick red and of 2 lengths
 - 30 All florets fertile ASTEREAE (GRINDELIA) *q.v.*
 - 30: Either disc or ray florets sterile
 - 31 Disc florets usually male; pappus of scales, or rarely plumose bristles or absent (pseudo-pappus of barbellate awns derived from pericarp) ASTEREAE (CALOTIS) *q.v.*
 - 31: Ray florets functionally female or neuter; pappus and pseudo-pappus not as above
 - 32 Ray florets neuter [ARC] ARCTOTHECA
 - 32: Ray florets functionally female
 - 33 Ray florets with staminodes [MUT] TRICHOCLINE
 - 33: Ray florets without staminodes numerous ASTEREAE *q.v.*

ASTERACEAE

GROUP I

Fruits not axillary burrs; capitula radiate, with some florets with conspicuous rays (> 3 mm long); leaves alternate or in rosettes; pappus absent or reduced to less than 1 mm long, or a cup. Various tribes, but particularly Calenduleae, Arctotideae, Anthemideae, Astereae.

- 1 Plants tufted, with linear leaves, old leaves clothing base ASTEREAE
(ACHNOPHORA) *q.v.*

- 1: Plants erect, or if with a basal rosette, then leaves not linear
- 2 Achenes beaked
- 3 Achenes polymorphic, some rostrate; rays yellow [CAL] OLIGOCARPUS
- 3: Achenes homomorphic, all shortly beaked; rays white to purple ASTEREAE
(LAGENOPHORA) *q.v.*

- 2: Achenes abruptly constricted at apex, not beaked or rostrate
- 4 Involucral bracts with a terminal spine
- 5 Perennials; leaves with spines [ARC] BERKHEYA
- 5: Annuals; leaves without spines [ARC] GORTERIA
- 4: Involucral bracts without terminal spine
- 6 Receptacle paleate
- 7 Capitula small and in terminal clusters [ANT] ACHILLEA
- 7: Capitula larger and individually pedunculate or solitary
- 8 Leaves lobed to almost entire [ARC] CYMBONOTUS
- 8: Leaves deeply divided
- 9 Paleae longer than outer florets ASTEREAE
(ERODIOPHYLLUM) *q.v.*
- 9: Paleae shorter than florets
- 10 Achenes woolly [ANT] LASIOSPERMUM
- 10: Achenes glabrous
- 11 Rhizomatous perennials; achenes 3-ribbed [ANT] CHAMAEMELUM
- 11: Annuals or perennials, not rhizomatous; achenes c. 8–10-ribbed [ANT] ANTHEMIS

- 6: Receptacle epaleate
- 12 All florets producing achenes, or only disc florets producing achenes
- 13 Only disc florets producing achenes [ANT] MAURANTHEMUM
- 13: All florets producing achenes
- 14 Achenes heteromorphic, inner and outer achenes different
- 15 At least inner achenes curved to C-shape [CAL] CALENDULA
- 15: All achenes straight or almost so
- 16 Annual herbs
- 17 Plants glandular-puberulous
- 18 Achenes dimorphic, 2- and 3-angled [CAL] DIMORPHOTHECA
- 18: Achenes polymorphic, curved or straight, winged or wingless, sometimes rostrate [CAL] OLIGOCARPUS
- 17: Plants not glandular-puberulous (achenes dimorphic)
- 19 Achenes entirely lacking pappus [ANT] GLEBIONIS
- 19: Achenes with a very short scarious pappus, of a solitary scale on ray achenes, a short ring on disc achenes [ANT] MATRICARIA

ASTERACEAE

- 16: Perennial herbs, without glands
- 20 Ray achenes shortly winged [ANT] ARGYRANTHEMUM
- 20: Ray achenes \pm terete [ANT] LEUCANTHEMUM
- 14: Achenes homomorphic
- 21 Receptacle convex to conical
- 22 Ray ligules short, < 10 mm long various ASTEREAE *q.v.*
- 22: Ray ligules 10–18 mm long
- 23 Leaves 3-pinnatisect, at least at base; rays white [ANT] TRIPLEUROSPERMUM
- 23: Leaves 1-pinnatisect; rays yellow [SEN] EURYOPS
- 21: Receptacle flat
- 24 Achenes oblong to obovoid [ARC] CYMBONOTUS
- 24: Achenes prominently winged [CAL] MONOCULUS
- 12: Only outer florets producing achenes
- 25 Achenes with fleshy outer tissue [CAL] CHRYSANTHEMOIDES
- 25: Achenes all dry
- 26 Achenes with prominent wings [CAL] OSTEOSPERMUM
- 26: Achenes without wings
- 27 Outer involucre bracts much longer than inner bracts ASTEREAE
(ERODIOPHYLLUM) *q.v.*
- 27: Involucre bracts \pm equisized
- 28 Inner disc florets fertile [ANT] COTULA
- 28: Inner disc florets functionally male [ANT] LEPTINELLA

KEY TO AUSTRALIAN GENERA OF TRIBE GNAPHALIEAE

Adapted from R.J.Bayer, I.Breitwieser, J.Ward & C.Puttock, *XIV. Tribe Gnaphalieae (Cass.) Lecoq & Juillet (1831)*, in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 246–284 (2007).

- 1 Plants perennial
- 2 Plants woody
- 3 Plants forming alpine cushions PTERYGOPAPPUS
- 3: Plants shrubby, sometimes mat-forming
- 4 Capitula heterogamous, radiate or disciform
- 5 Style branches with sweeping hairs dorsally only or apically and dorsally CREMNOTHAMNUS
- 5: Style branches with sweeping hairs apically only
- 6 Plants mat-forming ARGYROTEGIUM
- 6: Plants erect shrubs or small trees
- 7 Branches terminating in a thorn ACANTHOCLADIUM
- 7: Branches not terminating in a thorn OZOTHAMNUS
- 4: Capitula homogamous, discoid
- 8 Leaf lamina flat (revolute or involute margins, if any, < 10% of width)
- 9 Capitula solitary or only few together

ASTERACEAE

- | | |
|---|------------------------------|
| <p>10 Receptacle conical; involucre bracts cartilaginous</p> | <p>ARGYROGLOTTIS</p> |
| <p>10: Receptacle flat to convex; involucre bracts papery</p> | <p>OZOTHAMNUS</p> |
| <p>9: Capitula many in corymbs</p> | |
| <p>11 Paleae present; florets 3–15 per capitulum</p> | |
| <p>12 Involucre bracts incurved at apex</p> | <p>CASSINIA</p> |
| <p>12: involucre bracts with spreading tips</p> | <p>IXODIA</p> |
| <p>11: Paleae absent; florets more than 15 per capitulum</p> | |
| <p>13 Sub-herbaceous perennials, with weakly woody stems dying back after flowering; inner involucre bracts with radiating tips</p> | <p>PITHOCARPA</p> |
| <p>13: Shrubs or small trees with permanent woody branches, or if sub-herbaceous perennials then inner involucre bracts lacking radiating tips</p> | <p>OZOTHAMNUS</p> |
| <p>8: Leaf lamina not flat (trigonous in section or appearing ±terete due to inrolled margins)</p> | |
| <p>14 Leaves trigonous in section, ±glabrous, with embedded dark glands</p> | |
| <p>15 Paleae sheathing achene</p> | <p>PAENULA</p> |
| <p>15: Paleae absent</p> | <p>HAECKERIA</p> |
| <p>14: Leaves dorsiventral but with margins involute or revolute, occupying major part of lamina (and therefore appearing almost terete), usually hairy (at least abaxially), lacking embedded glands</p> | |
| <p>16 Leaf margin involute</p> | <p>ODIXIA</p> |
| <p>16: Leaf margin revolute</p> | |
| <p>17 Paleae present</p> | <p>CASSINIA</p> |
| <p>17: Paleae absent</p> | <p>OZOTHAMNUS</p> |
| <p>2: Plants herbaceous</p> | |
| <p>18 Capitula homogamous</p> | |
| <p>19 Stereome divided</p> | |
| <p>20 Involucre bracts brownish or hyaline</p> | |
| <p>21 Receptacle flat or convex</p> | <p>ACOMIS</p> |
| <p>21: Receptacle conical</p> | |
| <p>22 Pappus of flattened bristles; achenes without reddish knob</p> | <p>LEUCOPHYTA</p> |
| <p>22: Pappus of rudimentary bristles or scales; achenes with conspicuous reddish knobs</p> | <p>RUTIDOSIS</p> |
| <p>20: Involucre bracts coloured</p> | |
| <p>23 Anther appendage narrower than thecae</p> | <p>ARGENTIPALLIUM</p> |
| <p>23: Anther appendage as wide as thecae</p> | <p>LEUCOCHRYSUM</p> |
| <p>19: Stereome undivided</p> | |
| <p>24 Plants functionally dioecious</p> | <p>PARANTENNARIA</p> |
| <p>24: Plants synoecious</p> | |
| <p>25 Capitula solitary or a few together</p> | |
| <p>26 Basal claw on involucre bract distinct; receptacle epaleate</p> | |
| <p>27 Pappus bristles glabrous; heads compound</p> | <p>RHETINOCARPHA</p> |
| <p>27: Pappus bristles barbellate or plumose; heads simple</p> | |
| <p>28 Pappus bristles barbellate</p> | |

ASTERACEAE

29	Pericarp papery; style apex rounded; carpopodium several cells high	ANEMOCARPA
29:	Pericarp brittle; style apex ovate to acuminate; carpopodium 1 cell high	CORONIDIUM
28:	Pappus bristles plumose	LEUCOCHRYSUM
26:	Basal claw on involucre bract absent; receptacle paleate	
30	Erect perennial non-stoloniferous (rosette-forming) herbs; achene spines slender	AMMOBIUM
30:	Creeping perennial stoloniferous herbs; achene spines thick	NABLONIUM
25:	Capitula many	
31	Capitula in glomerules	
32	Capitula pedicellate	CRASPEDIA
32:	Capitula sessile	PYCNOSORUS
31:	Capitula in panicles	
33	Receptacle conical, paleate	APALOCHLAMYS
33:	Receptacle flat or convex, epaleate	CALOMERIA
18:	Capitula heterogamous	
34	Outer florets blue to purple	
35	Central florets functionally male or female	EWARTIA
35:	Central florets bisexual	
36	Style branches with sweeping hairs dorsally and apically	
37	Distinct outer florets radiate or absent	RUTIDOSIS
37:	Distinct outer florets filiform	EUCHITON
36:	Style branches with sweeping hairs branches apically only or dorsally only	
38	Achene hairs short, clavate	GNAPHALIUM
38:	Achene hairs globose, elongated or absent	GAMOCHAETA
34:	Outer florets yellow, white, or pale green	
39	Style branches with sweeping hairs apically and dorsally	
40	Capitula many	EUCHITON
40:	Capitula solitary or few	
41	Involucre bracts coloured	XEROCHRYSUM
41:	Involucre bracts brownish or hyaline	
42	Style apex obtuse; stereome undivided	ARGYROTEGIUM
42:	Style apex much prolonged; stereome divided	RUTIDOSIS
39:	Style branches with sweeping hairs apically only	
43	Involucre bracts brownish or hyaline	
44	Achenes hispid; pappus deciduous	IXIOLAENA
44:	Achenes glabrous; pappus persistent	LEIOCARPA
43:	Involucre bracts coloured	
45	Distinct outer florets more numerous than central florets	HELICHRYSUM
45:	Distinct outer florets fewer than central florets, or absent	
46	Anther appendages flat; achenes oblong	ARGENTIPALLIUM
46:	Anther appendages concave; achenes ellipsoidal to turbinate	CHRYSOCEPHALUM

ASTERACEAE

- 1: Plants annual or biennial
 - 47 Capitula homogamous
 - 48 Achenes ellipsoid or turbinate or long and rod-like
 - 49 Achenes long and rod-like **CHONDROPYXIS**
 - 49: Achenes ellipsoid or turbinate
 - 50 Involucral bracts in 1 whorl
 - 51 Pappus bristles capillary **MILLOTIA s. str.**
 - 51: Pappus bristles rudimentary or pappus of scales
 - 52 Distinct leaf glands present **MILLOTIA (TOXANTHES)**
 - 52: Distinct leaf glands absent **MILLOTIA (SCYPHOCORONIS)**
 - 50: Involucral bracts in more than 1 whorl
 - 53 Involucral bracts with a distinct claw
 - 54 Central florets functionally male **SCHOENIA**
 - 54: Central florets bisexual
 - 55 Style apex acute to conical **WAITZIA**
 - 55: Style apex obtuse or truncate
 - 56 Style apex obtuse; achenes ellipsoid **LEUCOCHRYSUM**
 - 56: Style apex truncate; achenes narrowly elliptic with a short beak **HAPTOTRICHION**
 - 53: Involucral bracts without a claw
 - 57 Involucral bracts herbaceous
 - 58 Receptacle epaleate **PODOTHECA**
 - 58: Receptacle paleate **NEOTYSONIA**
 - 57: Involucral bracts papery or cartilaginous
 - 59 Involucral bracts cartilaginous
 - 60 Pappus bristles capillary **TAPLINIA**
 - 60: Pappus bristles few, scale-like **QUINETIA**
 - 59: Involucral bracts papery
 - 61 Achenes longer than or equalling corolla
 - 62 Receptacle conical **BELLIDA**
 - 62: Receptacle flat or convex
 - 63 Receptacle paleate **NEOTYSONIA**
 - 63: Receptacle epaleate **QUINQUEREMULUS**
 - 61: Achenes shorter than corolla
 - 64 Stereome divided; receptacle conical **RUTIDOSIS**
 - 64: Stereome undivided; receptacle flat **GILBERTA**
 - 48: Achenes oblong or obovoid
 - 65 Achenes of central florets oblong
 - 66 Involucral bracts brownish hyaline **PHACELLOTHRIX**
 - 66: Involucral bracts coloured **VELLEREOPHYTON**
 - 65: Achenes of central florets obovoid
 - 67 Involucral bracts brownish hyaline or clear hyaline
 - 68 Receptacle paleate

ASTERACEAE

| | |
|---|------------------------|
| 69 Receptacle flat or convex | |
| 70 Involucral bracts cartilaginous; pappus of connate scales | TRICHANTHODIUM |
| 70: Involucral bracts cartilaginous; pappus of scales absent | |
| 71 Capitula surrounded by whorl of leaves | CHTHONOCEPHALUS |
| 71: Capitula not surrounded by whorl of leaves | DECAZESIA |
| 69: Receptacle conical or peg-like | |
| 72 Receptacle conical | SILOXERUS |
| 72: Receptacle peg-like | CRASPEDIA |
| 68: Receptacle epaleate | |
| 73 Achenes hairy | |
| 74 Achenes densely villous | |
| 75 Receptacle peg-like | FITZWILLIA |
| 75: Receptacle conical | |
| 76 Leaf glands distinct | POLYCALYMMA |
| 76: Leaf glands absent | |
| 77 Pappus of basally connate subplumose to plumose bristles | FELDSTONIA |
| 77: Pappus of basally connate short flattened bristles | DITHYROSTEGIA |
| 74: Achenes not densely villous | |
| 78 Receptacle flat or convex | |
| 79 Involucral bracts cartilaginous | TRICHANTHODIUM |
| 79: Involucral bracts papery | |
| 80 Leaf glands distinct | ERIOCHLAMYS |
| 80: Leaf glands absent | POGONOLEPIS |
| 78: Receptacle conical or peg-like | |
| 81 Receptacle peg-like | BLENNOSPORA |
| 81: Receptacle conical | |
| 82 Leaf glands absent; pappus plumose, at least apically | ACTINOBOLE |
| 82: Leaf glands distinct; pappus bristles scabrid or barbellate | |
| 83 Capitula surrounded by whorl of leaves | MYRIOCEPHALUS |
| 83: Capitula not surrounded by whorl of leaves | GNEPHOSIS |
| 73: Achenes glabrous | |
| 84 Involucral bracts cartilaginous | |
| 85 Involucral bracts in several whorls | DIELITZIA |
| 85: Involucral bracts in 1 whorl | SONDOTTIA |
| 84: Involucral bracts papery | |
| 86 Leaves glabrous | LEMOORIA |
| 86: Leaves tomentose | |
| 87 Leaf glands distinct; receptacle conical | HYALOCHLAMYS |
| 87: Leaf glands absent; receptacle flat or convex | |
| 88 Pappus basally connate as a jagged scale-like cup | CEPHALOSORUS |
| 88: Pappus absent | EPITRICHE |

ASTERACEAE

| | |
|---|----------------------|
| 67: Involucral bracts coloured | |
| 89 Involucral bracts herbaceous | PODOTHECA |
| 89: Involucral bracts papery | |
| 90 Inner involucral bracts conspicuously longer than outer bracts | |
| 91 Pappus absent | PITHOCARPA |
| 91: Pappus present | |
| 92 Pappus scabrid or barbellate | |
| 93 Leaves alternate | |
| 94 Leaves filiform | ERYMOPHYLLUM |
| 94: Leaves linear or elliptic to ovate | PITHOCARPA |
| 93: Leaves opposite, at least basally | |
| 95 Achenes of outer florets dorsiventrally compressed, not basally excavated; 2 vascular bundles medial to cotyledons; anther appendage cordate; pappus colourless or yellow | SCHOENIA |
| 95: Achenes of outer florets not dorsiventrally compressed, basally excavated; 2 vascular bundles lateral to cotyledons; anther appendage broadly ovate; pappus colourless or pink | LAWRENCELLA |
| 92: Pappus plumose at least apically | |
| 96 Receptacle flat or convex; pappus bristles free or cohering by patent cilia | CEPHALIPTERUM |
| 96: Receptacle conical; pappus bristles connate in a ring | |
| 97 Achenes densely villous with elongated twin hairs | RHODANTHE |
| 97: Achenes not villous, but with sessile globose hairs | HYALOSPERMA |
| 90: Inner involucral bracts not conspicuously longer than outer bracts | |
| 98 Pappus absent | THISELTONIA |
| 98: Pappus present | |
| 99 Pappus of jagged scales | PLEUROPAPPUS |
| 99: Pappus of flattened plumose bristles | |
| 100 Achenes glabrous | GILRUTHIA |
| 100: Achenes hairy | |
| 101 Receptacle paleate | PYCNOSORUS |
| 101: Receptacle epaleate | |
| 102 Involucral bracts usually 4; 2 concave outer bracts and (0–) 2 inner flat bracts | ANGIANTHUS |
| 102: Involucral bracts 7–c. 22, flat to concave | CALOCEPHALUS |
| 47: Capitula heterogamous | |
| 103 Achenes of central florets obovoid | |
| 104 Capitula in glomerules or spikes | TIETKENSIA |
| 104: Capitula solitary or few together | |
| 105 Inner bracts coloured, conspicuously longer than outer bracts | LAWRENCELLA |
| 105: Inner bracts hyaline; not conspicuously longer than outer bracts | HAEGIELA |
| 103: Achenes of central florets ellipsoid, turbinate or oblong | |
| 106 Achenes of central florets ellipsoid or turbinate | |

ASTERACEAE

| | | |
|-------------|--|-----------------------|
| 107 | Outer florets radiate | |
| 108 | Involucral bracts filiform-subulate, densely plumose | ASTERIDEA |
| 108: | Involucral bracts flat, mainly broadly ovate (inner ones with claws concealed by outer bracts), glabrous or long-ciliate only on margins | PODOLEPIS |
| 107: | Outer florets filiform or tubular, or corolla absent | |
| 109 | Central florets functionally male | BASEDOWIA |
| 109: | Central florets bisexual | |
| 110 | Leaf glands distinct | |
| 111 | Involucral bracts brownish or hyaline | ASTERIDEA |
| 111: | Involucral bracts coloured | |
| 112 | Pappus bristle 1 | GRATWICKIA |
| 112: | Pappus bristles more than 1 | CHRYSOCEPHALUM |
| 110: | Leaf glands absent | |
| 113 | Capitula surrounded by a whorl of leaves | |
| 114 | Involucral bracts coloured | PTEROCHAETA |
| 114: | Involucral bracts brownish or hyaline | |
| 115 | Receptacle conical | TRIPTILODISCUS |
| 115: | Receptacle flat or convex | EUCHITON |
| 113: | Capitula not surrounded by a whorl of leaves | |
| 116 | Leaves opposite, at least basally | HAEGIELA |
| 116: | Leaves all alternate | |
| 117 | Outer florets purple to blue | FACELIS |
| 117: | Outer florets yellow | LEPTORHYNCHOS |
| 106: | Achenes of central florets oblong | |
| 118 | Central florets functionally male | FILAGO |
| 118: | Central florets bisexual | |
| 119 | Stereome divided | VELLEREOPHYTON |
| 119: | Stereome undivided | |
| 120 | Receptacle flat or convex | |
| 121 | Pappus bristles connate in a ring | GAMOCHAETA |
| 121: | Pappus bristles free or cohering by patent cilia | |
| 122 | Style branches truncate | GNAPHALIUM |
| 122: | Style branches obtuse | EUCHITON |
| 120: | Receptacle conical | |
| 123 | Inner involucral bracts folded around florets | LOGFIA |
| 123: | Inner involucral bracts not enclosing florets | |
| 124 | Pappus present | FILAGO |
| 124: | Pappus absent | STUARTINA |

ASTERACEAE

KEY TO AUSTRALIAN GENERA OF TRIBE ASTEREAE

Modified from G.Nesom & H.Robinson, *XV. Tribe Astereae Cass. (1819)*, in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 284–342 (2007).

- | | | |
|--|---|------------------------|
| 1 | Capitula of 2 types (each unisexual); plants usually dioecious, rarely monoecious (subtrib. Baccharidinae) | BACCHARIS |
| 1: Capitula of one type | | |
| 2 | Rays (when obvious) usually yellow or white; achenes often terete to fusiform | |
| 3 | Involucral bracts thickened or keeled; style appendages of fertile disc florets hairy | |
| 4 | Pappus of 2–10 caducous uncoloured awns (subtrib. Machaerantherinae) | GRINDELIA |
| 4: | Pappus biseriate, brick-red to rust-coloured; outer series inconspicuous; inner series long, barbellate (subtrib. Chrysopsidinae) | HETEROTHECA |
| 3: | Involucral bracts flattened, not keeled; style appendages of fertile disc florets papillose, rarely hairy | |
| 5 | Pappus (1) 2 (3)-seriate; leaves often tomentose abaxially (subtrib. Hinterhuberianae) | |
| 6 | Receptacle paleate | ACHNOPHORA |
| 6: | Receptacle epaleate | |
| 7 | Perennial rosulate herbs | CELMISIA |
| 7: | Shrubs or trees | OLEARIA |
| 5: | Pappus 1-seriate; leaves subglabrous (subtrib. Solidagininae) | SOLIDAGO |
| 2: | Rays elongate and bluish to purplish or white, or rays reduced or lacking; achenes usually \pm compressed | |
| 8 | Involucral bracts with orange-resinous ribs or veins (subtrib. Conyzinae) | |
| 9 | Female florets tubular or with short erect limbs | CONYZA |
| 9: | Female florets with long limbs | ERIGERON |
| 8: Involucral bracts without prominent resinous veins | | |
| 10 | Ray florets, when present, (1–) 2–4-seriate (ray florets absent in <i>Pilbara</i>) | |
| 11 | Pappus of bristles in (1–) 2–3 series; limbs of ray florets sometimes elongate and coiling (subtrib. Podocominae) | |
| 12 | Achenes with a short neck or long beak | |
| 13 | Achenes with a long filiform beak | IXIOCHLAMYS |
| 13: | Achenes with a short neck | |
| 14 | Achenes with narrowed basal extension, densely tufted with stiff hairs | VITTADINIA |
| 14: | Achenes without basal extension, hairs uniform | |
| 15 | Achenes c. 2 mm long; pappus bristles 2-seriate | DICHROMOCHLAMYS |
| 15: | Achenes c. 1 mm long; pappus bristles 1-seriate | IOTASPERMA |
| 12: Achenes apically rounded or truncate, without beak or neck | | |
| 16 | Achenes usually with 2–many facial nerves between the 2 lateral nerves | |
| 17 | Achenes with a narrowed basal extension, densely tufted with stiff hairs | VITTADINIA |
| 17: | Achenes without basal extension; hairs uniform | |

ASTERACEAE

- | | |
|---|---|
| <p>18 Disc floret ovaries fertile; perennial herbs with woody rootstock</p> | <p>CAMPTACRA</p> |
| <p>18: Disc floret ovaries sterile; shrubs or subshrubs</p> | <p>TETRAMOLOPIUM</p> |
| <p>16: Achenes with only 2 lateral nerves</p> | |
| <p>19 Achenes with narrowed basal extension, densely tufted with stiff hairs</p> | <p>VITTADINIA</p> |
| <p>19: Achenes without basal extension, hairs uniform</p> | |
| <p>20 Disc floret ovaries fertile; pappus of ray and disc florets similar</p> | |
| <p>21 Ray floret corollas yellow; disc corollas 4-lobed</p> | <p>KIPPISTIA</p> |
| <p>21: Ray floret corollas white to bluish; disc corollas 5-lobed</p> | <p>VITTADINIA
(PERIPLEURA)</p> |
| <p>20: Disc floret ovaries sterile; pappus of ray and disc florets different</p> | |
| <p>22 Disc floret corollas 5-lobed; pappus of ray achenes of bristles</p> | <p>MINURIA</p> |
| <p>22: Disc floret corollas 3- or 4-lobed; pappus of ray achenes of scales or scales and bristles</p> | |
| <p>23 Leaves oblanceolate; ray achene pappus of scales and bristles</p> | <p>DIMORPHOCOMA</p> |
| <p>23: Leaves linear; ray achene pappus of scales</p> | |
| <p>24 Erect or decumbent herbs with solitary terminal heads; leaves cauline</p> | <p>ELACHANTHUS</p> |
| <p>24: Sessile herbs with heads clustered among bases of clustered rosette leaves</p> | <p>ISOETOPSIS</p> |
| <p>11: Pappus reduced or lacking, rarely a single series of bristles; ray florets with limbs short or lacking</p> | |
| <p>25 Achenes not beaked; achene hairs often anchor-tipped; receptacles often conical or cyathiform (subtrib. Grangeinae)</p> | |
| <p>26 Receptacle epaleate</p> | <p>DICHROCEPHALA</p> |
| <p>26: Receptacle paleate</p> | |
| <p>27 Perennial herbs; leaves pinnatisect</p> | <p>ERODIOPHYLLUM</p> |
| <p>27: Shrubs; leaves entire</p> | <p>PILBARA</p> |
| <p>25: Achenes often beaked; achene hairs not anchor-tipped; receptacles usually convex or flat (subtrib. Lagenophorinae)</p> | |
| <p>28 Pappus of 6–20 short barbellate bristles</p> | <p>PAPPACHROMA</p> |
| <p>28: Pappus absent or of distorted caducous bristles</p> | |
| <p>29 Capitula radiate; limb of ray florets obvious</p> | <p>LAGENOPHORA</p> |
| <p>29: Capitula disciform; limb of ray florets rudimentary or absent</p> | <p>SOLENOGYNE</p> |
| <p>10: Ray florets 1-seriate</p> | |
| <p>30 Pappus reduced or lacking</p> | |
| <p>31 Plants rosulate with heads solitary on individual scapes; limbs of ray florets not coiling; achene hairs simple (subtrib. Bellidinae)</p> | <p>BELLIS</p> |
| <p>31: Plants not rosulate with heads on individual scapes; limbs of ray florets coiling or short; achene hairs (if present) with anchor-shaped tips (subtrib. Brachyscominae)</p> | |
| <p>32 Achenes distally Y- or T-shaped with widely spreading arms, with wings involute on 1 side; pappus lacking</p> | <p>CERATOGYNE</p> |
| <p>32: Achenes without distal arms or projections; pappus usually present</p> | |

ASTERACEAE

- | | | |
|-----|---|-------------|
| 33 | Disc florets mostly bisexual | |
| 34 | Leaves with long coarse septate brown hairs at base | ALLITTIA |
| 34: | Leaves lacking long coarse septate brown hairs at base | |
| 35 | Achenes large, flattened, glabrous with multiple vascular strands in pericarp | PEMBERTONIA |
| 35: | Achenes without the above combination of characters | BRACHYSCOME |
| 33: | Disc florets usually functionally male | |
| 36 | 'Pappus' of pericarpic subulate to spreading appendages, often retrorsely barbed; true pappus sometimes of plumose bristles, or scales, or absent | CALOTIS |
| 36: | Pericarpic appendages absent; pappus absent | HULLSIA |
| 30: | Pappus usually of capillary bristles | |
| 37 | Involucral bracts mostly herbaceous throughout; receptacles epaleate (subtrib. Asterinae) | ASTER |
| 37: | Involucral bracts usually with broad hyaline margins; receptacles often paleate (subtrib. Homochrominae) | FELICIA |

ASTERACEAE

Subfam. 1. MUTISOIDEAE

A.E.Orchard

Asteraceae subfam. *Mutisoideae* Cass. in J.C.Loudon, *Encycl. Pl.* 1074 (1829) as *Mutisieae*

Type: *Mutisia* L.f.

Perennial herbs (elsewhere shrubs or trees). Leaves rosulate, oblanceolate, usually sinuate to lobulate or rarely broadly serrate, lacking spines. Capitula solitary on terminal scapes, radiate, heterogamous; involucre bracts 3–5-seriate, gradate, not spiny; receptacle epaleate, glabrous; florets numerous, all fertile but heteromorphic. Ray florets functionally female, uniseriate; corollas bilabiate, with outer lip well-developed, shortly 3-lobed, white above, pink to purplish beneath, inner 2 lobes long, linear, tightly coiled, often somewhat dissimilar; basal appendages of staminodes decurrent on filament; style shaft glabrous, branches adnate. Disc florets actinomorphic or sub-bilabiate, with 5 subequal lobes; anthers calcarate, long-caudate, usually smooth; style shaft glabrous, with branches relatively short, shortly papillate outside towards apices; stigmatic papillae covering entire inner surface of branches. Achenes cylindrical, densely covered with long, blunt papillae. Pappus few-seriate, of barbellate setae.

A subfamily of c. 60 genera and 720 species, mostly confined to S. America. In Australia one native genus with a single species.

D.J.N.Hind, *II. Tribe Mutisieae* Cass. (1819), in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 90–123 (2007).

TRICHOCLINE

N.S.Lander

Trichocline Cass., *Bull. Sci. Soc. Philom. Paris* 1817: 13 (1817); from the Greek *trichos* (hairy) and *klīnein* (bed, slope, slant, to lean, leaning), possibly referring to the trichomes on the vegetative surfaces.

Type: *T. incana* Cass.

Amblysperma Benth. in S.F.L.Endlicher *et al.*, *Enum. Pl.* 67 (1837). T: *A. scapigera* Benth.

Perennial scapigerous herbs or shrubs, heterogamous. Indumentum of vegetative surfaces pubescent or woolly. Leaves rosulate, petiolate. Capitula solitary on erect scapes, radiate; involucre bracts gradate; receptacle epaleate. Ray florets uniseriate, female; lower lip ligulate, 3-lobed; upper lip minutely 2-lobed; staminodes well-developed. Disc florets sub-bilabiate, hermaphrodite; outer lip 3-lobed; inner lip 2-lobed; basal anther appendages long-caudate, papillose or pilose; style branches scarcely divided, obtuse, papillate. Achenes cylindric to ovoid, apically truncate, villous with twin-hairs. Pappus uniseriate, of barbellate setae, white or cream.

A genus of 21 species, from S. America and Australia; one species in south-western W.A.

E.M.Zardini, Revision del Genero *Trichocline* (Compositae), *Darwiniana* 19: 618–733 (1975); D.J.N.Hind, A new combination in *Amblysperma* (Compositae: Mutisieae), *Kew Bull.* 56: 711–713 (2001); L.Katinas, *Amblysperma* should be retained under *Trichocline* (Asteraceae, Mutisieae), *Taxon* 53(1): 108–112 (2004); D.J.N.Hind., *Trichocline*, in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 114 (2007).

Trichocline spathulata (Cunn. ex DC.) J.H.Willis, *W. Austral. Naturalist* 10: 157–158 (1967)

Celmisia spathulata A.Cunn. ex DC., *Prodr.* 5: 209 (1836); *Amblyserma spathulata* (Cunn. ex DC.) D.J.N.Hind, *Kew Bull.* 56: 711–713 (2001). T: Oyster Harbour, King George's Sound [W.A.], Jan 1818, A.Cunningham; holo G-DC; iso K, photo PERTH.

Amblyserma scapigera Benth. in S.F.L.Endlicher *et al.*, *Enum. Pl.* 67 (1837); *Trichocline scapigera* (Benth.) F.Muell., *Syst. Census Austral. Pl.* 1: 85 (1882). T: Swan River, W.A., C.von Hügel; holo W.

Amblyserma minor Keighery, *Compositae Newslett.* 42: 26–29 (2005). T: W.A., Tuart Forest SW Ludlow, 33° 37' S, 115° 33' E, 13 Dec. 1994, G.J.Keighery 12347; holo: PERTH.

Trichocline sp. *Treeton* (G.J.Keighery & N.Gibson), Western Australian Herbarium, *FloraBase* Version 2.5.9 (2008).

Trichocline sp. *KWD 61*, J.S.Pate & K.W.Dixon, *Tuberous, Cormous and Bulbous Pl.* 150 (1982).

Illustration: N.G.Marchant *et al.*, *Fl. Perth Region* 2: 710, fig. 262 (1987).

Perennial, tuberous-rooted herb to 1 m high. Indumentum of vegetative surfaces white- or grey-pubescent or woolly. Leaves with petiole 5–12 mm long; lamina lanceolate to obovate, 30–115 mm long, 12–30 mm wide, entire or shortly and broadly lobed, discolorous, glabrous above. Capitula ±heterochromous; involucre bracts lanceolate. Ray florets 10–21; ligule discolorous, white or cream above, pink beneath, sparsely and minutely papillate with twin-hairs. Disc florets 20–40, off-white; tube glabrous, white or pale green; anthers 5–7 mm long including basal appendages 1.5–2.5 mm long, sparsely papillate to smooth; style branches ligulate, 1.1–1.7 mm long. Achenes cylindric, villous with twin hairs. Pappus of 60–70 uniseriate, barbellate setae, 8.5–12.0 mm long, white or cream. *Native Gerbera*. Fig. 1.

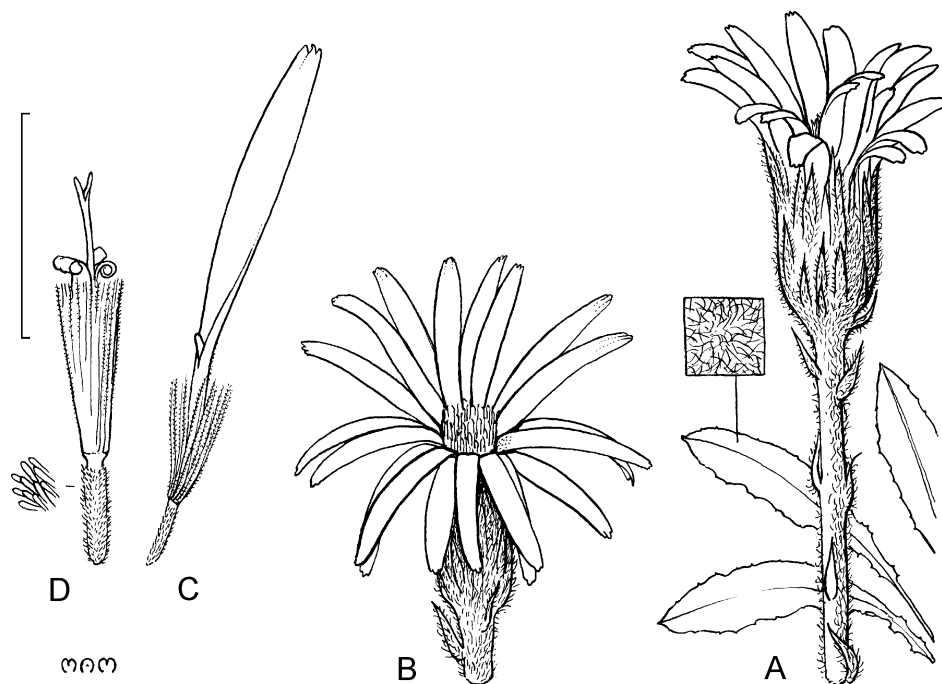


Figure 1. *Trichocline spathulata*. A, flowering stem and basal leaves with leaf hair detail; B, flowering capitulum; C, ray floret; D, disc floret with ovary hair detail (A–D, voucher not recorded). Scale bars: A, B = 30 mm; C = 15 mm; D = 10 mm. Drawn by M.A.Wilson. Reproduced with permission from N.G.Marchant *et al.*, *Fl. Perth Region* 2: 710 (1987).

Occurs in south-western W.A. from Jurien Bay south to near Busselton and eastwards to Albany and Cape Riche. Grows in stony sand and clay soils over laterite, granite and limestone in low shrub-land, sedgeland and woodland, and on the margins of seasonally wet depressions and river embankments. Flowers Oct.–Apr.

W.A.: Lot 14 View Range Rd, 250 m W of NE corner, Tenterden, *J.E.Wajon 1247* (PERTH); Property of V. Pike, off W end of Pike Rd, W of Brookton, *M.Hislop & M.Griffiths WW 233-26* (PERTH); Kemerton; S of Marriot Rd, 9 km SE Binningup, *G.J. & B.J.Keighery 661* (PERTH); Arthur R., *T.Erickson 325* (PERTH); Cooke State Forest, Millars Log Rd, Wandering, 9.4 km E of Albany Hwy, *F.Hort 2158 & P.Brenton-Coward* (PERTH).

The putatively new species referred to informally at PERTH as *Trichocline* sp. Treeton (G.J.Keighery & N.Gibson) and as *Trichocline* sp. KWD 61 by J.S.Pate & K.W.Dixon (see synonymy above) appears to be a dwarf variant of *T. spathulata* occurring on the margins of seasonally wet depressions.



ASTERACEAE

Subfam. 2. CARDUOIDEAE

A.E.Orchard

Asteraceae subfam. *Carduoideae* Cass. ex Sweet, *Hort. Brit.* 213 (1826), as *Carduaceae*

Type: *Carduus* L.

Asteraceae subfam. *Cynaroideae* Kostel., *Allg. Med.-Pharm. Fl.* 2: 602, 603 (1833), as *Cynareae*. T: *Cynara* L.

Perennial, biennial or rarely annual herbs (shrubs or rarely trees or scandent elsewhere); leaves alternate, usually simple, entire, serrate, dentate or lobulate, usually spiny, particularly in herbaceous plants. Capitula solitary on terminal scapes to cymose, usually discoid, or discoid with outer florets sterile and radiate, homogamous or heterogamous; involucre bracts 3–many-seriate, usually gradate, often spiny; receptacle usually epaleaceous and often setose, rarely paleate. Florets usually numerous, rarely solitary, all fertile or some sterile, usually all tubular to subregular, 5-lobed, rarely with outer florets apparently radiate; anthers calcarate, caudate, with tails long, sometimes pilose or fringed; style shaft often with an articulation near the branching of the arms, marked by a ring of hairs, glabrous below articulation, hairy above, shaft sometimes thickened apically; style branches short to long, obtuse, rarely acute, glabrous or with dorsal hairs; stigmatic papillae covering entire inner surface of branches. Achenes variously shaped, glabrous or with twin or simple hairs. Pappus of bristles or scales, rarely absent.

A subfamily of c. 93 genera and 2600 species, mostly native to the Old World, but many are widespread weeds. Sixteen genera and 47 species in Australia, almost all introduced.

This subfamily, comprising the true thistles, is usually easily recognised, with usually spiny lobed leaves and spiny involucre bracts surrounding capitula which are cylindrical to more or less globular or urceolate, and containing tubular disc florets (outer florets sometimes slightly irregular). Four tribes are generally recognised within the subfamily, of which only *Cardueae* occurs in Australia.

Trib. 1. CARDUEAE

A.R.Bean

Asteraceae trib. *Cardueae* Cass., *J. Phys. Chim. Hist. Nat. Arts* 88: 155 (1819), as *Carduinae*

Type: *Carduus* L.

Asteraceae trib. *Cynareae* Less., *Linnaea* 5: 128 (1830). T: *Cynara* L.

Robust and often monopodial, spiny or unarmed herbs. Stems longitudinally striate or terete, often winged due to decurrent leaf bases, or occasionally stems absent. Leaves alternate, rarely rosulate, often extending (with reduced size) to base of capitulum; margins often spinose. Capitula solitary or corymbose, rarely in secondary heads (*Echinops*), discoid or disciform or “radiate”, homogamous or heterogamous. Involucre bracts multiserial, imbricate; inner bracts usually longer and thinner. Receptacle mostly epaleate, usually bearing long setae, rarely alveolate. Florets actinomorphic, 5-lobed, all tubular and fertile, or outer florets ray-like and sterile. Anthers calcarate and distinctly caudate, united laterally, with long sterile apical appendages. Style linear, dorsally papillose-pilose; style branches short, with a thickened pilose basal annulus. Achenes usually glabrous with distinct apical rim. Pappus with plumose or barbellate, capillary or ensiform bristles, or rarely scales. *Thistles*.

A tribe of 83 genera and around 2500 species, predominantly native to Europe and Asia, but also in N America and Africa. A handful of species are native to S America and Australia. Of the 16 genera recorded for Australia, 14 are naturalised and 2 are native.

ASTERACEAE

A single plant of *Echinops exaltatus* Schrad. was found near Gulgong in N.S.W. in 1976, and a specimen lodged at NSW. Based on this collection, the species was subsequently included in *Fl. New South Wales* 3: 319 (1992), misidentified as *E. sphaerocephalus* L. The collector, when contacted, stated that he had not seen it before or since. Weeds Officers in surrounding districts are unaware of any *Echinops* species, and it is treated in this account as not naturalised.

M.Dittrich, *Cynareae* – systematic review, in V.H.Heywood *et al.* (eds), *Biol. & Chem. Compositae* 2: 999–1015 (1977); K.Bremer, *Asteraceae - Cladistics and Classification* 112–156 (1994); D.P.Petit, Generic interrelationships of the *Cardueae* (Compositae): a cladistic analysis of morphological data, *Pl. Syst. Evol.* 207: 173–203 (1997); A.R.Bean, Pappus morphology and terminology in Australian and New Zealand thistles (Asteraceae, tribe *Cardueae*), *Austrobaileya* 6: 139–152 (2001); W.Greuter, The Euro+Med treatment of *Cardueae* (Compositae) – generic concepts and required new names, *Willdenowia* 33: 49–61 (2003); A.Susanna & N.Garcia-Jocas, *III. Cardueae Cass. (1819)*, in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 123–147 (2007); A.Susanna & N.Garcia-Jocas, *Cardueae (Carduoideae)*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 293–313 (2009).

KEY TO GENERA

- 1 Leaf margins without spines or with innocuous spinules 0.5–1.5 mm long
- 2 Median involucre bracts terminating in a sharp spine OR strongly recurved (hooked)
 - 3 Median involucre bracts strongly recurved; leaves broadly ovate to orbicular **9. ARCTIUM**
 - 3: Median involucre bracts spinose; leaves linear to ovate **13. CENTAUREA**
- 2: Median involucre bracts not spinose or recurved
 - 4 Leaf margins with multicellular barbed hairs **†CRUPINA**
 - 4: Leaf margins lacking multicellular barbed hairs
 - 5 Lower surface of leaf white due to dense arachnoid hairs **1. HEMISTEPTIA**
 - 5: Lower surface of leaf grey-green, with hairs sparse
 - 6 All florets fertile
 - 7 Appendages of median involucre bracts entire or lacerate, but without conspicuous cilia **11. RHAPONTICUM**
 - 7: Appendages of median involucre bracts with conspicuous dark brown to black transverse cilia **13. CENTAUREA**
 - 6: Outer florets sterile
 - 8 Median involucre bracts with ciliate or lacerated appendage or margins **13. CENTAUREA**
 - 8: Median involucre bracts entire, without ciliate or lacerated margins
 - 9 Median involucre bracts glabrous, terminating in a short firm mucro **12. MANTISALCA**
 - 9: Median involucre bracts conspicuously hairy, terminating in a long fine hair **††VOLUTARIA**
- 1: Leaves with spiny margins; spines 1.5–30 mm long
 - 10 Stem extremely short; flowers borne at ground level **8. ONOPORDUM**
 - 10: Stem elongate; flowers aerial
 - 11 Stem with spinose wings formed by decurrent leaf bases
 - 12 Upper surface of leaves with many stiff spinules, mostly 0.8–2 mm long on cauline leaves (often longer on rosette leaves) **5. CIRSIUM**
 - 12: Upper surface of leaves without spinules

ASTERACEAE

- 13 Reduced cauline leaves surrounding and exceeding capitula; outer and median involucre bracts with pinnatisect terminal appendage; leaf marginal spines yellow to golden, 6–13 mm long 4. PICNOMON
 - 13: No cauline leaves surrounding capitula; outer and median involucre bracts without terminal appendage; leaf marginal spines white to yellow-brown, 2–7 (–10) mm long
 - 14 Receptacle not alveolate, with setae dense and obvious 2. CARDUUS
 - 14: Receptacle deeply alveolate, without setae 8. ONOPORDUM
 - 11: Stem not winged, not spinose; leaf bases not decurrent
 - 15 Lower surface of leaves white due to dense tomentum
 - 16 Leaves entire or shallowly pinnatifid 5. CIRSIUM
 - 16: Leaves pinnatisect, with segments divided almost to midrib 7. CYNARA
 - 15: Lower surface of leaves glabrous or hairy, but never densely white-tomentose
 - 17 Upper leaf surface variegated (with a network of white markings); bases of cauline leaves auriculate; anther filaments connate (forming a tube) 3. SILYBUM
 - 17: Upper leaf surface uniform in colour, or sometimes with pale mid-vein; bases of cauline leaves not auriculate; anther filaments free throughout
 - 18 Cauline leaves almost indistinguishable from outer involucre bracts 10. CARTHAMUS
 - 18: Cauline leaves readily distinguishable from involucre bracts
 - 19 Reduced cauline leaves clustered around base of inflorescence 6. NOTOBASIS
 - 19: Reduced cauline leaves not clustered around base of inflorescence
 - 20 Inflorescence globose, comprising many 1-flowered involucre †††ECHINOPS
 - 20: Inflorescence not globose; involucre enclosing many florets 5. CIRSIUM
- †*Crupina vulgaris* Cass. was recorded from Hope Valley in S.A. It has not been collected since 1936, and is presumably no longer present in Australia. Not treated further.
- ††A specimen of *Volutaria muricata* (L.) Maire is present at PERTH. It was collected at Nannup in 1961. There is no other label information and in all probability it was from a cultivated plant. Not treated further.
- †††*Echinops exaltatus* Schrad. has been collected once in N.S.W. (see note above). Not treated further.

1. HEMISTEPTIA

Hemisteptia Fisch. & C.A.Mey., *Ind. Sem. Hort. Petrop.* 2: 38 (1835); from the Greek *hemi-* (half), and *-steptos* (crowned), in reference to the short persistent bristles which surmount the achene, but only on one side.

Type: *H. lyrata* (Bunge) Fisch. & C.A.Mey.

Annual or biennial herbs. Stems erect, sparsely branched, longitudinally striate; wings absent. Leaves lyrate, pinnatifid, not spinose. Capitula pedunculate, homogamous. Involucre bracts not spine-tipped, the outer and median ones with a keeled appendage near apex. Receptacle almost flat, not alveolate, densely setose. Corolla purple; tube filiform; lobes linear. Anther filaments free, glabrous. Style branches rounded-truncate and granular-tuberculate at tip, becoming recurved. Achenes oblong, longitudinally 15-ribbed, glabrous, with narrow apical rim. Pappus with few, very short, persistent, ensiform bristles, and deciduous, plumose, capillary bristles, the latter basally united in a ring.

A monotypic genus distributed from northern China to Thailand, westwards to India, and then in eastern Australia. It has sometimes been included with the large genus *Saussurea*, and published records of that genus from Australia are referable to *Hemisteptia*.

S.Y.Hu, The Compositae of China, *Quart. J. Taiwan Mus.* 19: 286–8 (1966); A.R.Bean, Notes on *Hemisteptia lyrata* (Asteraceae) and its Australian occurrence, *Austral. Syst. Bot. Soc. Newslett.* 98: 10–12 (1999); A.R.Bean, A further note on *Hemisteptia*, *op. cit.* 103: 8 (2000).

***Hemisteptia lyrata* (Bunge) Fisch. & C.A.Mey., *Ind. Sem. Hort. Petrop.* 2: 38 (1835)**

Cirsium lyratum Bunge, *Enum. Pl. China Bor.* 2: 110 (1833). T: near Lun-züan-ssy, Tan-schan, China, 1830–31, *A.A.Bunge*; holotype: ?LE n.v.

Serratula carthamoides Roxb., *Fl. Ind. ed. 1832* 3: 407 (1832), *nom. illeg., non* Poir. (1804); *Aplotaxis carthamoides* DC., *Prodr.* 6: 540 (1838), *nom. nov.*; *Saussurea carthamoides* (DC.) Benth., *Fl. Hongk.* 168 (1861). T: cult. at Calcutta Botanic Garden (ex Nepal); holotype: ?G n.v.

Saussurea affinis Spreng. ex DC., *Prodr.* 6: 540 (1838), *nom. nud.*

Aplotaxis australasica F. Muell., *Fragm.* 1: 36 (1858), as *Haplotaxis*. T: Dawson and Burnett Rivers, [Qld], 1856, *F. Mueller*; holotype: K.

Herb to 1 m high. Stems sparsely arachnoid-tomentose. Leaves green above, glabrous or almost so, densely white-tomentose below; sessile glands numerous on both surfaces. Capitula numerous at ends of 6–25 cm peduncles; involucre broadly campanulate, 15–23 mm diam. at anthesis; median involucral bracts erect, narrowly deltate, 4–8 mm long, 1–1.4 mm wide at base, entire, acute, arachnoid dorsally. Corolla: tube 9–11 mm long; lobes 2–2.5 mm long. Anthers 2–2.5 mm long. Achenes 2.0–2.8 mm long, dark brown. Pappus with 7–10 ensiform bristles 0.2–0.3 mm long, in partial whorl, and 14–18 capillary bristles 7–10 mm long. Fig. 2A–E.

Historically recorded from numerous places in northern coastal N.S.W. and southern Qld. Since 1955, collected only from central southern Qld. It inhabits creekbanks or low-lying areas on alluvial flats with heavy clay soil. Flowers Sept.–Oct.; fruits Oct.–Dec.

Qld: 3.7 km along Springwood road, W of Rolleston, *A.R.Bean* 14133 (BRI); Maroochy Experimental Station, Nambour, 12 Dec. 1951, *K.Fisher-Webster* (BRI); Brookfield, 30 Dec. 1888, *J.H.Simmonds* (BRI). N.S.W.: Murwillumbah, Nov. 1892, *W.Bauerlen* (NSW); Taree district, Oct. 1954, *G.M.North* (NSW).

Endangered in Australia due to habitat clearance and weed infestation, and probably extinct in N.S.W. and coastal Qld.



2. CARDUUS

Carduus L., *Sp. Pl.* 2: 820 (1753); *Gen. Pl.* 5th edn, 358 (1754); this is the ancient Latin name for these thistles.

Type: *C. nutans* L.

Annual or biennial herbs; stems erect, sparsely to strongly branched, longitudinally striate; wings present, spinose. Leaves oblong, pinnatifid; margins with numerous spine-tipped lobes and lobules. Capitula pedunculate or sessile, homogamous. Involucral bracts spine-tipped, entire or rarely pectinate (not in Australia). Receptacle flat or convex, not alveolate, densely setose. Corolla purple; tube filiform; lobes linear. Anther filaments free, pilose. Style branches connate, erect. Achenes obloid-obovoid, smooth, glabrous, with narrow apical rim; carpophodium basal. Pappus deciduous, of numerous barbellate capillary bristles, basally united in a ring.

A genus of about 120 species, distributed in Europe, the Mediterranean, central Asia and eastern Africa. Five species have been recorded as naturalised in Australia.

S.M.A.Kazmi, Revision der Gattung *Carduus* (Compositae), *Mitt. Bot. Staatssamml. München* 5: 139–98 (1963); *ibid.* 279–550 (1964); J.Franco, *Carduus* in T.G.Tutin *et al.* (eds), *Fl. Europaea* 4: 220–32 (1976); W.T.Parsons, Taxonomy of two species of *Carduus* in Australia, *Proc. Seventh Conf. Asian-Pacific Weed Sci. Soc.* 305–10 (1979); A.M.Desrochers *et al.*, A bio-systematic study of the *Carduus nutans* complex in Canada, *Canad. J. Bot.* 66: 1621–31 (1988); P.J.Garnock-Jones, *Carduus* in C.J.Webb *et al.* (eds), *Fl. New Zealand* 4: 298–301 (1988).

- 1 Lower leaf surface glabrous or with multicellular hairs mostly or solely along midrib and main veins; involucre at least as wide as long
- 2 Capitula sessile, erect, 10–16 mm diam.; corolla 15–18 mm long; pappus 11–14 mm long 3. *C. acanthoides*
- 2: Capitula pedunculate, nodding when mature, 20–60 mm diam.; corolla 19–26 mm long; pappus 15–23 mm long
- 3 Stems and leaves sparsely to moderately pubescent; involucre bracts with arachnoid hairs 1. *C. nutans*
- 3: Stems and leaves glabrous; involucre bracts glabrous 2. *C. thoermeri*
- 1: Whole of lower leaf surface densely arachnoid-tomentose; involucre longer than wide
- 4 Capitula in clusters of 1–4; stems with narrow wings, almost lacking below inflorescence; median involucre bracts sparsely to conspicuously arachnoid, without scarious margins; corollas mostly longer than involucre bracts 4. *C. pycnocephalus*
- 4: Capitula in clusters of 3–10; stems with broad wings, extending up to base of inflorescence; median involucre bracts sparsely arachnoid or glabrous, with scarious margins; corollas mostly shorter than involucre bracts 5. *C. tenuiflorus*

1. **Carduus nutans* L., *Sp. Pl.* 2: 821 (1753)

T: Europe, *Herb. Linn. No 966.2*; lecto: LINN, *fide* S.M.A.Kazmi, *Mitt. Bot. Staatssamml. München* 5: 323 (1964). ?*C. macrocephalus* Desf., *Fl. Atlantica* 2: 245 (1799); *C. nutans* subsp. *macrocephalus* (Desf.) Nyman, *Consp. Fl. Eur.* 2: 411 (1879). T: in monte Zowan apud Tunetanos [Tunisia]; *n.v.*

Illustrations: W.T.Parsons, *Noxious Weeds Victoria* 47 (1973); F.J.Richardson *et al.*, *Weeds of the South-east* 121 (2006).

Herb to 1.5 m high. Stem sparsely to moderately pubescent; wings 3–10 mm wide. Leaves green, with multicellular hairs mainly along midrib and on major veins; glands absent; marginal spines 2–6 mm long, white to brownish. Capitula solitary, terminal on 10–40 cm long side-branches, nodding at maturity; involucre depressed-globose, 20–45 mm wide excluding patent bracts, persistent; median involucre bracts patent or recurved, narrowly deltate, 22–29 mm long, 2.5–3.5 mm wide at widest point, entire, sparsely arachnoid dorsally. Corolla tube 13–17 mm long; lobes 6–8 mm long. Anthers 6–7 mm long. Achenes ellipsoid, 3.3–3.8 mm long, brown, with darker longitudinal streaks. Pappus bristles 130–169, 15–20 mm long. *Nodding Thistle*. Plate 1.

Native to Europe, extending to central Asia. In Australia, currently naturalised in eastern N.S.W. and Vic., and Tas. A population appeared in W.A. in 1976, but was eradicated. This species is considered an aggressive and highly undesirable weed in pastures, paddocks and waste land. Flowers Sept.–Jan.; fruits Dec.–Feb.

W.A.: Mr. N.Pearse's property, Green Ra., Nov. 1976, *S.J.Trevenen* (PERTH). N.S.W.: 7.4 km along Maybole Rd, SW of Glen Innes, *A.R.Bean 15694* (BRI, NSW); "Tomalla", Barrington Tops, *J.R.Hosking 694* & *A.J.Maguire* (BRI, CBG, MEL, NE, NSW). Vic.: Parish of Kirkenong, N of Orbost, Feb. 1967, *J.Slater* (MEL). Tas.: Ouse, 22 Sept. 1998, *S.Noye* (HO).



Two undetermined specimens collected from Fulham (a suburb of Adelaide, S.A.) in 1910 appear to be close to *C. nutans*, but are quite unlike material from elsewhere in Australia.



Figure 2. A–E, *Hemisteptia lyrata*. A, flowering capitulum; B, outer involucre bract showing keeled appendage; C, leaf; D, achene; E, spent capitulum showing persistent setae (A–C, A.R.Bean 14133, BRI; D, K.R.McDonald s.n., BRI AQ0490245; E, Simmons 268, BRI). F–I, *Carduus pycnocephalus*. F, flowering branchlet; G, leaf; H, achene and pappus; I, floret (F–I, A.R.Bean 15601, BRI). Scales bars: A, E, H = 10 mm; B = 0.5 mm; C, F = 20 mm; D = 1 mm; G = 40 mm; I = 5 mm. Drawn by W.A.Smith.

2. **Carduus thoermeri* Weinm., *Bull. Soc. Imp. Naturalistes Moscou* 10(7): 69 (1837)

T: Tambov, Russia, 1835–36, *O.Thoermer*; holo: ?LE n.v.

Herb to 1.5 m high. Stem glabrous; wings 3–8 mm wide. Leaves green, glabrous; glands absent; marginal spines 2–7 mm long, white to brownish. Capitula solitary, terminal on 10–40 cm long peduncles, nodding at maturity; involucre globose to depressed-globose, 35–60 mm wide excluding patent bracts, persistent; median involucre bracts patent or recurved, narrowly deltate, 18–24 mm long, 2.5–5.5 mm wide at widest point, entire, glabrous. Corolla tube 13–19 mm long; lobes 6–7 mm long. Anthers 6–7 mm long. Achenes ellipsoid, 3.5–4.1 mm long, yellow-brown with darker longitudinal bands. Pappus bristles 125–170, 17–23 mm long. *Nodding Thistle*.

Native to eastern and south-eastern Europe, including Russia. In Australia, naturalised in SE Qld between Kingaroy and Toowoomba. It inhabits fertile soils, often on alluvial flats. Flowers Sept.–Feb.; fruits Oct.–Mar.

Qld: Anduramba, 8 miles [13 km] NNE of Crows Nest, Oct. 1969, *L.J.Barnes* (BRI); 2.1 km SW of Meringandan, N of Toowoomba, *A.R.Bean* 15892 (BRI, CANB, NSW); Benarkin S.F., Blackbutt, *R.J.Henderson* H303 (BRI); 14 miles [22 km] S of Gympie, 9 Nov. 1970, *H.S.Tutt* (BRI).



3. **Carduus acanthoides* L., *Sp. Pl.* 2: 821 (1753)

T: Europe, *Herb. Linn. No. 966.6*; lecto: LINN, *vide* S.M.A.Kazmi, *Mitt. Bot. Staatssamml. München* 5: 356 (1964), incorrectly cited as 966.5.

Herb to 1 m high. Stem sparsely pubescent; wings 1–4 mm wide. Leaves green, with multicellular hairs mainly along midrib and on major veins; glands absent; marginal spines 2–6 mm long, white to brownish. Capitula in sessile or shortly pedunculate clusters, terminal, erect; involucre hemispherical, 10–16 mm wide excluding patent bracts, somewhat deciduous at fruiting stage; median involucre bracts erect or recurved, narrowly deltate, 9–13 mm long, 0.8–1.5 mm wide at widest point, entire, sparsely arachnoid dorsally. Corolla tube 9–10 mm long; lobes 6–8 mm long. Anthers 5.5–6.5 mm long. Mature achenes not seen. Pappus bristles 11–14 mm long. *Plumeless Thistle*.

Native throughout much of Europe. In Australia, recorded only from NE Vic. It is recorded as growing on roadsides on an alluvial flat. Flowers recorded Jan.

Vic.: 13 miles [21 km] from Corryong to Biggara in Murray Valley, Jan. 1979, *R.Medd* (Orange Agricultural Institute).

The only known population was subject to an eradication program, and hence this species may no longer be present in Australia.



4. **Carduus pycnocephalus* L., *Sp. Pl.* 2nd edn, 2: 1151 (1763)

T: southern Europe, *Herb. Linn. 966.9*; lecto: LINN, *vide* S.M.A.Kazmi, *Mitt. Bot. Staatssamml. München* 5: 445 (1964).

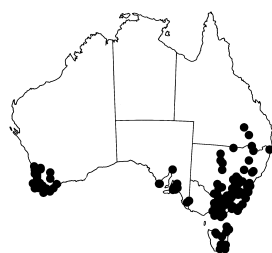
Illustration: F.J.Richardson *et. al.*, *Weeds of the South-east* 121 (2006).

Annual or biennial herb to 1.2 m high. Stems arachnoid-hairy; wings 2–6 mm wide. Leaves grey, moderately arachnoid-tomentose above, densely arachnoid-tomentose below; glands absent; marginal spines 2–6 mm long, white to pale brown. Capitula in sessile to subsessile terminal clusters of 1–4; involucre cylindrical, 17–23 mm long, 8–11 mm wide excluding patent bracts, deciduous at fruiting stage; median involucre bracts erect to patent, narrowly deltate, 13–17 mm long, 2–3 mm wide at base, with entire herbaceous margins, sparsely to densely arachnoid-hairy. Corolla tube 9–14 mm long; lobes 4.5–5.5 mm long. Anthers 5–6 mm long. Achenes ellipsoid, 4.8–5.3 mm long, pale brown with darker longitudinal streaks. Pappus bristles 167–190, 14–16 mm long. *Slender Thistle*. Fig. 2F–I.

ASTERACEAE

Native to southern and south-eastern Europe. Widely naturalised throughout southern Australia in pastoral and grazing districts, where it occurs on a wide range of soils. Flowers Sept.–Jan.; fruits Oct.–Jan.

W.A.: 17 km NE of Boyup Brook, *J.Dodd 33* (PERTH). S.A.: Morialta Conservation Park, 15 km E of Adelaide, *Y.Sidler 1* (AD). Qld: 14 km S of Warwick along road to Dalveen, *A.R.Bean 15672* (BRI, CANB). N.S.W.: 5.5 km NE of Dungog, *A.R.Bean 15738* (BRI, NSW). A.C.T.: Barton Hwy to Weetangera, turnoff Canberra to Hall, *M.Gray 4642* (CANB). Vic.: S edge of L. Corangamite, *D.E.Albrecht 5064 et al.* (AD, CANB, MEL). Tas.: Macquarie Plains, Jan. 1944, *W.M.Curtis* (HO).



5. **Carduus tenuiflorus* Curtis, *Fl. Londin.* fasc. 6, t. 55 (1789)

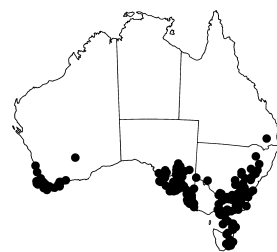
T: the illustration, W.Curtis, *loc. cit.*

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 724 (1981); F.J.Richardson *et. al.*, *Weeds of the South-east* 121 (2006).

Annual or biennial herb to 1.2 m high. Stems arachnoid-hairy; wings 2–10 mm wide. Leaves grey, moderately arachnoid-tomentose above, densely arachnoid-tomentose below; glands absent; marginal spines 2–5 mm long, white to pale brown. Capitula in sessile terminal clusters of 3–10; involucre cylindrical, 15–20 mm long, 7–11 mm wide excluding patent bracts, deciduous at fruiting stage; median involucral bracts erect to patent, narrowly deltate, 13–18 mm long, 2–3 mm wide at base, with entire scarious margins, glabrous or sparsely arachnoid-hairy. Corolla tube 7–11 mm long; lobes 4.5–5 mm long. Anthers 5–6 mm long. Achenes ellipsoid, 4–4.5 mm long, pale brown with darker longitudinal streaks. Pappus bristles 147–195, 11–13 mm long. *Slender Thistle*, *Winged Slender Thistle*, *Sheep Thistle*.

Native to western Europe, including Great Britain. Widely naturalised in southern Australia. An economically important weed in pastoral and grazing districts, on a wide range of soil types. Flowers and fruits Oct.–Jan.

W.A.: Cape Riche rubbish tip, c. 17 km SE of Hassell Hwy on Sandlewood Rd, *B.J.Lepschi & T.R.Lally 2332* (CANB, PERTH). S.A.: Scorpion Springs Conservation Park, S of Pinnaroo, *D.E.Symon 8635* (AD, CANB). Qld: Pittsworth, 9 Oct. 1956, *P.Round* (BRI). N.S.W.: 2.4 km along Niangala Rd, W of Walcha, *A.R.Bean 15697* (BRI, MEL, NSW). A.C.T.: Black Mtn, Canberra, *M.Gray 5770* (CANB). Vic.: Bindy Stn, 18.5 km NE of Swifts Creek township, *G.W.Carr 10243* (CANB, MEL). Tas.: Cape Portland, 1 Feb. 1983, *K.Harris* (HO).



This species and *C. pycnocephalus* are very similar, and some specimens are hard to place. Parsons (1979) outlined the most reliable differences between the taxa in Australia.

Excluded Name

Carduus crispus L., *Sp. Pl.* 2: 821 (1753)

T: Europe, *Herb. Clifford 393*, *Carduus 6*; lecto: BM, *fide* S.M.A.Kazmi, *Mitt. Bot. Staatssamml. München* 5: 368 (1964).

Recorded for Victoria by F.Mueller in *Key Vict. Pl.* 1: 534 (1888), but the record is not substantiated by herbarium specimens.

ASTERACEAE

3. SILYBUM

Silybum Adans., *Fam. Pl.* 2: 116, 605 (1763), *nom. cons.*; a latinised version of the Greek *sillybos* or *silybon*, meaning milk-thistle.

Type: *S. marianum* (L.) Gaertn.

Annual or biennial herbs. Stems erect, strongly branched, longitudinally striate; wings absent. Leaves oblanceolate, coarsely sinuate with spine-tipped lobes; upper leaves auriculate. Capitula pedunculate, homogamous. Involucral bracts spine-tipped; margins pectinate, spinose. Receptacle flat to slightly convex, not alveolate, densely setose. Corolla purple; tube filiform; limb conspicuously expanded; lobes linear. Anther filaments connate, glandular. Style branches connate, erect. Achenes obovoid, smooth, glabrous, with narrow apical rim; carpodium sub-basal. Pappus deciduous, of numerous barbellate capillary bristles, united in a ring at base.

A genus of 2 species, both indigenous to the Mediterranean area. One species is naturalised in Australia.

Chemicals called flavonolignans, extracted from *Silybum*, are of considerable interest in the field of medicine.

R.D.Meikle, *Silybum*, in *Fl. Cyprus* 2: 962–3 (1985); R.W.Scott, The Genera of Cardueae (Compositae; Asteraceae) in the Southeastern United States, *J. Arnold Arbor.* 71: 426–9 (1990).

**Silybum marianum* (L.) Gaertn., *Fruct. Sem. Pl.* 2: 378, t. 162 (1791)

Carduus marianus L., *Sp. Pl.* 2: 823 (1753). T: 'in England, France and Italy', *Herb. Clifford*: 393, *Carduus* 9; lecto: BM, *fide* C.Jeffrey, *Kew Bull.* 22: 131 (1968).

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 725 (1981); C.Lamp & F.Collet, *Field Guide to Weeds in Australia*, 3rd edn, no. 270 (1989); F.J.Richardson *et al.*, *Weeds of the South-east* 159 (2006).

Herb to 2 m high. Stems glabrous or thinly pilose with arachnoid hairs. Leaves glabrous and mostly green above with a network of white areas, glabrous or sparsely white-tomentose below, with sessile glands absent; spines 2–6 mm long, white to pale yellow. Capitula solitary, terminal on 8–25 cm long side-branches; involucre globose, 25–45 mm diam. at anthesis excluding patent bracts; median involucral bracts patent, subulate, 20–45 mm long, 6–10 mm wide at widest point, with pectinate margins and rigidly spinose apex, glabrous dorsally. Corolla tube 20–28 mm long; lobes 5.5–7 mm long. Anthers 5.5–6 mm long. Achenes compressed oblong to ellipsoid, 5.6–6.7 mm long, brown with dark streaks. Pappus bristles distinctly flattened, 126–167, 15–20 mm long. *Variegated Thistle*. Plate 2.

Originating from the Mediterranean region, and eastwards to Iran and Afghanistan. Naturalised in pastures and paddocks in non-arid parts of southern Australia and occasional as far N as Ravenshoe, NE Qld; an economically important weed in many areas. Flowers Sept.–Jan.; fruits Oct.–Mar.

W.A.: 1.7 km SE of Balingup on South Western Hwy, *B.J.Lepschi & T.R.Tally BJL3304* (CANB, PERTH). S.A.: Bull Ck, Mt Lofty Ra., *D.A.Cooke 411* (AD). Qld: Killarney, Nov. 1917, *C.T.White s.n.* (BRI). N.S.W.: 35 miles [56 km] NW of Cobar on Louth road, *C.W.Moore 7181* (CANB). A.C.T.: 8 km N of Hall on Barton Hwy, *K.Mowle 130* (CANB). Vic.: Anson Rd, c. 5 km SW of Pombomeit, *I.C.Clark 2118* (CANB, MEL). Tas.: Don Heads, *D.I.Morris 8665* (HO, NSW).

All parts of the plant are toxic if ingested, and can cause heavy losses of cattle and sheep. The leaves contain high levels of nitrates.



ASTERACEAE

4. PICNOMON

Picnomon Adans., *Fam. Pl.* 2: 116, 590 (1763); a classical name probably derived from the Greek *pyknos* (dense, compact) and *nomos* (an abode or a pasture), perhaps in reference to its bushy growth habit.

Type: *P. acarna* (L.) Cass.

Annual herbs. Stems erect, strongly branched, terete or obscurely longitudinally striate; wings present, spinose. Leaves linear-oblong, obscurely pinnatifid; margins with long spines interspersed by many short spinules. Capitula sessile, homogamous, surrounded and exceeded by reduced leaves. Involucral bracts with a pinnately dissected, spiny, terminal appendage. Receptacle almost flat, not alveolate, densely setose. Corolla purplish; tube filiform; lobes linear. Anther filaments free, glabrous or glandular. Style branches connate, erect. Achenes compressed-obovoid, smooth, glabrous, with narrow apical rim; carpopodium basal. Pappus deciduous, of numerous plumose, capillary bristles, basally united in a ring.

A monotypic genus distributed from Spain to Afghanistan, sparingly naturalised in Australia. Closely related to *Cirsium* and sometimes included with it.

F.K.Kupicha, *Picnomon*, in P.H.Davis (ed.), *Fl. Turkey*, 5: 412–4 (1975); R.D.Meikle, *Picnomon*, in *Fl. Cyprus* 2: 953–4 (1985).

****Picnomon acarna* (L.) Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 40: 188 (1826)**

Carduus acarna L., *Sp. Pl.* 2: 820 (1753); *Cirsium acarna* (L.) Moench, *Suppl. Meth.* 226 (1802). T: Spain, *J.Burser, Herb. Burser XXI*: 26; lecto: UPS, *fide* N.J.Turland in C.E.Jarvis & N.J.Turland (eds), *Taxon* 47: 356 (1998).

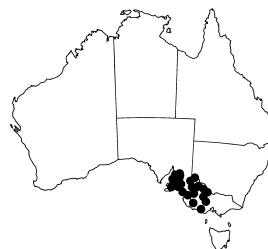
Illustrations: B.A.Auld & R.W.Medd, *Weeds - An illustrated guide to the weeds of Australia* 109 (1987); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds Australia* 223–4 (1992); F.J.Richardson *et. al.*, *Weeds of the South-east* 152 (2006).

Herb to 0.6 m high. Stems densely pilose with arachnoid hairs; wings 1–2.5 mm wide, spinose. Leaf lamina grey-green above with arachnoid hairs, densely white-tomentose below; sessile glands absent; marginal spines 6–13 mm long, yellow or golden. Capitula 1–3 at ends of 5–20 cm long side-branches; involucre ovoid to cylindrical, 6–12 mm diam. at anthesis; median involucral bracts erect, narrowly oblong, 9–13 mm long, 1.2–2 mm wide at base, densely arachnoid dorsally, with a pectinate-spinose apical appendage 3–7 mm long. Corolla tube 10–12 mm long; lobes 3–5 mm long. Anthers 5–6 mm long. Achenes 4.5–5.6 mm long, brown. Pappus bristles 95–105, 13–17 mm long. *Soldier Thistle*. Fig. 3A–E.

Naturalised in semi-arid western Vic. and SE S.A., on roadsides, neglected areas or in cereal crops. Flowers and fruits Dec.–Mar.

S.A.: Goolwa, c. 65 km SSE of Adelaide, 16 Jan. 1936, *J.B.Cleland* (AD); Murray Bridge, Feb. 1937, *W.H.Schubert* (AD). Vic.: Casterton, 1 Mar. 1952, *L.M.Hoatson* (MEL); Danninin Channel, 5 miles [8 km] S of Walpeup, *C.Tann* 26 (MEL); c. 21 km WSW of Kerang, 23 Feb. 1993, *C.E.Williams* (MEL).

Distinctive by virtue of its small stature, bushy habit, and leaves with long yellow or golden spines.



ASTERACEAE

5. CIRSIUM

Cirsium Mill., *Gard. Dict. abr. ed.* 4 (1754), *emend.* J.A.Scopoli, *Fl. Carniol.* 355 (1760); from the Latin *cirsion* (thistle), used by Dioscorides, from *kirsos* or *cirsos*, a swollen vein, which it was said to cure.

Type: *C. heterophyllum* (L.) Hill

Annual, biennial or perennial herbs. Stems erect, strongly branched, longitudinally striate, with or without wings, or plants acaulescent (not in Australia). Leaves oblong, pinnatilobed, with numerous spine-tipped lobes and lobules or entire. Capitula pedunculate, homogamous, sometimes unisexual (plants dioecious). Involucral bracts spine-tipped; margins entire. Receptacle flat to subconical, not alveolate, densely setose. Corolla purple, white or yellow; tube filiform; lobes linear. Anthers sagittate-connate; filaments free, pilose. Style branches connate, erect. Achenes oblong, smooth, glabrous, with narrow apical rim; carpodium basal. Pappus deciduous, of numerous plumose, capillary bristles, basally united in a ring.

A genus of 250–350 species distributed through the temperate parts of N America, northern Africa, Europe and Asia. Two species are naturalised in Australia, mainly in temperate higher-rainfall areas; both are economically important as weeds of paddocks and pasture.

R.J.Moore & C.Frankton, *Thistles of Canada* 22–28 (1974); F.Petrak, *Cirsium*, in K.H.Rechinger (ed.), *Fl. Iranica* 139a: 231–80 (1979); R.D.Meikle, *Cirsium*, in *Fl. Cyprus* 2: 954–5 (1985); R.W.Scott, The Genera of Cardueae (Compositae; Asteraceae) in the Southeastern United States, *J. Arnold Arbor.* 71: 391–451 (1990).

Spinose stem wings continuous; leaf upper surface with many stiff spinules, mostly 0.8–2 mm long on cauline leaves; flowering heads 25–40 mm diam., bisexual

1. *C. vulgare*

Spinose stem wings absent or very short; leaf upper surface glabrous or very sparsely arachnoid-hairy, lacking spinules; flowering heads 8–14 mm diam., functionally unisexual

2. *C. arvense*

1. **Cirsium vulgare* (Savi) Ten., *Fl. Napol.* 5: 209 (1835–36)

Carduus vulgaris Savi, *Fl. Pis.* 2: 241 (1798). T: Italy, *coll. unknown*; holo: ?PI n.v.

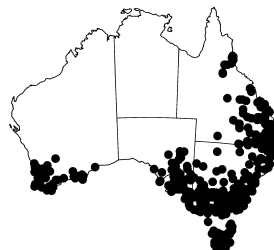
Carduus lanceolatus L., *Sp. Pl.* 2: 821 (1753); *Cirsium lanceolatum* (L.) Scop., *Fl. Carniol.* 2nd edn, 2: 130 (1772), *nom. illeg. non Hill* (1769); *Cnicus lanceolatus* (L.) Willd., *Fl. Berol. Prodr.* 259 (1787). T: 'Europe', *Herb. Linn. No. 966.1*; lecto: LINN, *fide* S.Talavera & B.Valdés, *Lagascalia* 5: 197 (1976).

Illustrations: C.Lamp & F.Collet, *Field Guide to Weeds in Australia*, 3rd edn, no. 77 (1989); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds Australia* 209, 211 (1992); F.J.Richardson *et. al.*, *Weeds of the South-east* 129 (2006).

Herb to 1.5 m high. Rhizomes absent. Stems thinly pilose with mixed arachnoid and multicellular hairs; wings 1–3 mm wide, spinose. Leaves green above with numerous stiff 0.8–2 mm long spinules, densely white-tomentose below; sessile glands absent; marginal spines 1.5–5 mm long, pale yellow. Capitula 1–3 at ends of 8–25 cm long side-branches; involucre globose, 25–40 mm diam. at anthesis excluding patent bracts; median involucral bracts suberect, subulate, 12–20 mm long, 1–2.5 mm wide at base, with entire margins and rigidly spinose apex, arachnoid dorsally. Corolla purple; tube 20–25 mm long; lobes 5–9 mm long. Anthers 6–7 mm long. Achenes compressed ellipsoid, 3.5–4.5 mm long, yellowish with dark streaks. Pappus bristles 38–85, 19–28 mm long. *Spear Thistle*, *Scotch Thistle*. Plate 3.

Native in Europe, Asia and N Africa; naturalised, common and widespread in eastern, SE and SW Australia. It grows in disturbed areas, especially paddocks and pastures, on a wide range of soils. Flowers and fruits mainly Sept.–Mar.

W.A.: Boranup Scenic Drive, 5.8 km S of northern entry from Caves Rd, *N.S.Lander 1464* (MEL, NSW, PERTH). S.A.: Zadows Landing, c. 10 km S of Mannum, *C.R.Alcock 10449* (AD). Qld: Peak Downs, *S.L.Everist*



4409 (BRI, CANB). N.S.W.: E side of Cawdor Rd, 6.2 km S of Camden, *P.C.Jobson* 4501 (BRI, CANB, NSW). A.C.T.: northern base of Black Mtn, Canberra, *H.S.McKee* 11809 (CANB). Vic.: 2 km NW of Strathbogie on route to Euroa, *T.G.Hartley* 15130 (CANB). Tas.: Ben Lomond, N slope, *M.G.Noble* 28323 (HO, MEL).

Originally from Europe, this weed is now found world-wide in temperate to sub-tropical climatic areas. It has a very broad ecological and geographical range in Australia, occurring from around Perth, W.A., to southern Tas. and as far north as Tolga in Qld.

2. **Cirsium arvense* (L.) Scop., *Fl. Carniol.* 2nd edn, 2: 126 (1772)

Serratula arvensis L., *Sp. Pl.* 2: 820 (1753); *Carduus arvensis* (L.) Robson, *Brit. Fl.* 163 (1777); *Cnicus arvensis* (L.) Hoffm., *Deutschl. Fl.* 2nd edn, 2: 130 (1804). T: Europe, *Herb. Linn. No.* 965.19; lecto: LINN, *fide* R.J.Moore & C.Frankton, *Thistles Canada* 24 (1974).

Illustration: F.J.Richardson *et. al.*, *Weeds of the South-east* 129 (2006).

Herb to 1 m high. Rhizomes present, forming aerial shoots. Stems glabrous or arachnoid-hairy; wings absent or very short. Leaves green and glabrous or very sparsely arachnoid-hairy above, glabrous to densely arachnoid-hairy below; spinules and sessile glands absent from lamina; marginal spines 1.5–6 mm long, yellow-brown. Capitula 2–7 at ends of 5–10 cm long side-branches, of all male or all female flowers; involucre obovoid-cylindric, 8–14 mm diam. at anthesis; median involucral bracts erect, tapering, 4–10 mm long, 1.5–2.5 mm wide at base, with entire margins and recurved spinose apex, usually glabrous. Corolla purple; tube 10–16 mm long; female flowers with lobes 2.7–3.7 mm long; male flowers with lobes 4.5–6.2 mm long. Anthers 4–5 mm long. Achenes compressed narrowly ellipsoid, 2.5–3.5 mm long, straw-coloured. Pappus bristles 57–80, 15–22 mm long. *Perennial Thistle, Canada Thistle, Creeping Thistle.*

Occurs most commonly in Tas. and Vic., but also in other temperate parts of Australia. It grows in pastures, cultivated land, on roadsides and other disturbed sites. There are 2 varieties known from Australia.

Leaves green below, glabrous or very sparsely hairy; marginal spines 3–6 mm long

2a. var. *arvense*

Leaves white below, densely hairy; marginal spines 1–3 mm long

2b. var. *vestitum*

2a. **Cirsium arvense* (L.) Scop. var. *arvense*

Illustrations: W.T.Parsons, *Noxious Weeds Victoria* 65 (1973); C.Lamp & F.Collet, *Field Guide to Weeds in Australia*, no. 78 (1989); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds Australia* 205 (1992).

Stems glabrous. Leaves green below, glabrous or with sparse arachnoid hairs, shallowly to deeply pinnatifid; marginal spines 3–6 mm long.

Native in many parts of Europe. In Australia, naturalised in non-arid parts of SE Australia, particularly in Tas. Former occurrences in S.A. and W.A. have been eradicated. Flowers Oct.–Mar.; fruits Jan.–Mar.

W.A.: Walpole, *R.D.Royce* 2574 (PERTH). S.A.: Spring Gully, foothills behind Penfolds and Stoneyfel, *C.R.Alcock* 7840 (AD). N.S.W.: Guthega Dam, Kosciusko Natl Park, *J.Thompson* 4088 (CANB). Vic.: South Gippsland Hwy, 12.4 km NW of Korumburra, *D.E.Albrecht* 2498 (CANB, MEL). Tas.: Cambridge, Jan. 1944, *W.M.Curtis* (HO).

This is now one of the most widespread and important agricultural weeds in temperate climatic areas of the world. It spreads very efficiently by rhizomes.



2b. *Cirsium arvense var. vestitum Wimm. & Grab., *Fl. Siles.* 2(2): 82 (1829)

T: Poland?; *n.v.*

Stems tomentose. Leaves white-tomentose below, densely hairy, entire or shallowly pinnatifid; marginal spines less than 3 mm long.

This taxon has been collected only once in Australia, in Hobart, Tas. Flowers and fruits recorded in March.

Tas.: Waterworks Rd, just above intersection with Romilly St, Hobart, Mar. 1966, *D.I.Morris* (HO).

**Excluded Names**

Cirsium acaule (L.) All. in F.H.Wiggers, *Prim. Fl. Holsat.* 59 (1780)

Carduus acaulis L., *Sp. Pl.* 2: 1199 (1753). T: Europe; not designated.

Recorded for S.A. by A.G.Hamilton, *J. & Proc. Roy. Soc. New South Wales* 26: 235 (1892), but the record is not substantiated by herbarium specimens.

Cirsium lanceolatum Hill, *Herb. Brit.* 1: 80 (1769), *nom. illeg.*

Recorded for Australia by K.Domin, *Biblioth. Bot.* 89: 687 (1928); undoubtedly he was referring to *C. vulgare* (Savi) Ten., which was then known by the illegitimate name *C. lanceolatum* (L.) Scop.

Cirsium palustre (L.) Scop., *Fl. Carniol.* 2nd edn, 2: 128 (1772)

Carduus palustris L., *Sp. Pl.* 2: 822 (1753). T: Europe, *Gmelin s.n.*, *Herb. Linn. No.* 966.5; lecto: LINN, *fide* S.Talavera & B.Valdés, *Lagascalia* 5: 188 (1976).

Recorded as common in Tas. (as *Cnicus palustris*) by J.D.Hooker in *Fl. Tasman.* cviii (1859), but this species has not subsequently been found there or elsewhere in Australia. Presumably Hooker mis-identified the plants he saw.

6. NOTOBASIS

Notobasis Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 25: 225 (1822); from the Greek *notos* (back) and *basis* (base), in reference to the position of the carpodium on the achene.

Type: *N. syriaca* (L.) Cass.

Annual herb. Stems erect, sparsely branched, longitudinally striate; wings absent. Leaves oblong, pinnatilobed, with numerous spine-tipped lobes and lobules. Uppermost leaves pinnatisect, immediately below capitula. Capitula sessile to very shortly pedunculate, homogamous. Involucral bracts somewhat spine-tipped; margins entire. Receptacle not alveolate, densely setose. Corolla pink or purple; tube filiform; lobes unequal, linear. Anthers very shortly sagittate at base; filaments free, pilose. Style branches connate, erect. Achenes compressed-obovoid, smooth, glabrous; apical rim virtually absent; carpodium sub-basal. Pappus deciduous, of numerous plumose, capillary bristles, basally united in a ring.

A monotypic genus, distributed from Spain and N Africa to Iran and Azerbaijan. Formerly naturalised in Australia, where its continued existence is very doubtful.

F.K.Kupicha, *Notobasis*, in P.H.Davis (ed.), *Fl. Turkey* 5: 419–20 (1975); N.Feinbrun-Dothan, *Fl. Palaestina* 3: 377 (1978); F.Petrak, *Notobasis*, in K.H.Rechinger (ed.), *Fl. Iranica* 139a: 285–6 (1979); R.D.Meikle, *Notobasis*, in *Fl. Cyprus* 2: 952–3 (1985).

****Notobasis syriaca* (L.) Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 35: 171 (1825)**

Carduus syriacus L., *Sp. Pl.* 2: 823 (1753); *Cirsium syriacum* (L.) Gaertn., *Fruct. Sem. Pl.* 383 (1791); *Cnicus syriacus* (L.) Roth, *Ann. Bot. (Ustari)* 8: 10 (1794). T: Syria, Crete and Spain, *Herb. Linn. No.* 966.31; lecto: LINN, *fide* F.K.Kupicha in P.H.Davis, *Fl. Turkey* 5: 420 (1975).

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 678 (1999).

Herb to 0.7 m high. Stems thinly pilose with arachnoid hairs. Leaves green and glabrous above, sparsely arachnoid-hairy below; sessile glands absent; spines 3–12 mm long, yellowish white. Capitula 1–4 in terminal or lateral clusters; involucre broadly ovoid, 15–20 mm diam. at anthesis; median involucre bracts suberect, lanceolate, 8–15 mm long, 2–3 mm wide at base, entire, spinose at apex, glabrous or sparsely arachnoid dorsally. Corolla purple; tube c. 12 mm long; lobes 3–6 mm long. Anthers 6–8 mm long. Achenes 5–6.5 mm long, brown to grey. Pappus bristles 65–80, 13–17 mm long. *Syrian Thistle*.



Recorded from Mansfield in Vic. in the summer of 1920–21. That population was presumably destroyed, and it has not been recorded in Australia since then. Flowers and fruits Dec.

Vic.: Mansfield, Dec. 1920, *R.G.Dundas* (MEL).

7. CYNARA

Cynara L., *Sp. Pl.* 2: 827 (1753), *Gen. Pl.* 5th edn, 359 (1754); from an ancient Greek name for the Globe Artichoke.

Type: *C. cardunculus* L.

Annual or biennial herbs. Stems erect, strongly branched, longitudinally striate; wings absent. Leaves broad, bipinnatifid to pinnatifid, with numerous spine-tipped lobes. Capitula pedunculate, homogamous. Involucre bracts spine-tipped or rarely unarmed; margins entire. Receptacle concave to convex, not alveolate, densely setose. Corolla purple or white; tube filiform; lobes linear. Anther filaments free, glandular. Style branches connate except near tip, erect. Achenes compressed-obovate, smooth or faintly ribbed, glabrous; apical rim indistinct; carpodium basal. Pappus deciduous, of numerous plumose, capillary bristles, basally united in a ring.

A genus of 8 species distributed mainly in the countries surrounding the Mediterranean Sea, but also the Canary Is, Portugal and Iran. One species is naturalised in Australia.

F.K.Kupicha, *Cynara*, in P.H.Davis (ed.), *Fl. Turkey* 5: 327–9 (1975); R.D.Meikle, *Cynara*, in *Fl. Cyprus* 2: 960–2 (1985); A.Wiklund, The genus *Cynara* L. (Asteraceae-Cardueae), *Bot. J. Linn. Soc.* 109: 57–123 (1992).

****Cynara cardunculus* L., *Sp. Pl.* 2: 827 (1753)**

subsp. **flavescens** Wiklund, *Bot. J. Linn. Soc.* 109: 120 (1992)

T: Villasequilla de Yepes, Toledo, Spain, 6 July 1980, *Laorgia s.n.*; holo: MAF *n.v.*

Cynara scolymus L., *Sp. Pl.* 2: 827 (1753); *Cynara cardunculus* var. *scolymus* (L.) Benth., *Fl. Austral.* 3: 459 (1867). T: Italy, Sicily, S. France, *Herb. Linn. No.* 969.1; lecto: LINN, *fide* F.K.Kupicha in P.H.Davis (ed.) *Fl. Turkey* 5: 329 (1975).

Illustrations: J.G.Vaughan & C.A.Geissler, *New Oxford Book of Food Plants* 175 (1997); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds Australia* 213, 214 (1992); F.J.Richardson *et. al.*, *Weeds of the South-east* 134 (2006).

Herb to 1.2 m high. Stems thinly pilose with arachnoid hairs. Leaves green and glabrous or sparsely pilose above, densely white-tomentose below; sessile glands numerous on both surfaces; marginal spines yellow to orange, 8–30 mm long. Capitula solitary, terminal on 5–30 cm long branchlets; involucre globose, 35–70 mm diam. at anthesis excluding patent

bracts; median involucre bracts suberect, deltate, 30–45 mm long, 9–16 mm wide at base, entire, with rigidly spinose apex, glabrous. Corolla purple or white; tube 37–49 mm long; lobes 8–11 mm long. Anthers 8–12 mm long. Achenes compressed-obovoid, 4.8–7 mm long, grey to yellowish with darker streaks, smooth or with faint longitudinal ribs. Pappus bristles 66–93, 26–35 mm long. *Artichoke Thistle*, *Wild Artichoke*, *Cardoon*.

Native to Portugal, Canary Is, Spain, southern France and Morocco and perhaps elsewhere. Naturalised on fertile soils in non-arid parts of southern Australia, particularly in Vic. and southern S.A. Flowers and fruits Sept.–Feb.

W.A.: Donnybrook, 11 Nov. 1974, *M.Aitken* (PERTH). S.A.: Main St, Bute, *B.Copley* 940 (AD, MEL). Qld: Jondaryan HS, Dec. 1989, *N.Douglas* (BRI). N.S.W.: Leeton, *J.E.Jessup* 2 (NSW). Vic.: Campaspe R., W of Redesdale, *A.C.Beauglehole* 70622 (MEL). Tas.: McRobies Gully, Hobart, *A.M.Buchanan* 8802 (HO).



The Globe Artichoke is a cultivar of *C. cardunculus* subsp. *flavescentis*, bred for lack of spines and fleshy involucre bracts. It is propagated vegetatively; progeny derived from seed tend to revert to wild forms.

8. ONOPORDUM

Onopordum L., *Sp. Pl.* 2: 827 (1753); *Gen. Pl.* 5th edn, 359 (1754); latinised from the ancient Greek name of the plant, *Onopordon*, from *onos* (donkey) and *porde* (flatulence). Pliny stated that it caused flatulence in donkeys.

Type: *O. acanthium* L.

Biennial herbs. Stems either lacking or well-developed, erect, sparsely branched, longitudinally striate; wings present, spinose. Leaves oblong to ovate, pinnatilobed; margins with numerous spine-tipped lobes and lobules. Capitula sessile or pedunculate, homogamous. Median involucre bracts spine-tipped; margins entire or serrulate. Receptacle almost flat, without setae, prominently alveolate, glabrous. Corolla purple or white; tube filiform; lobes linear, glabrous or glandular. Anther filaments free, pilose. Style branches connate, erect. Achenes obovoid, angular, transversely rugulose, glabrous; apical rim absent or rudimentary. Pappus deciduous, of numerous barbellate or plumose (not in Australia) capillary bristles, basally united in a ring.

A genus of about 60 species occurring throughout Mediterranean Europe, as well as northern Africa and western Asia; 4 species naturalised in Australia. All of the Australian species have been divided into 2 or more subspecies by European workers, however these infraspecific names have not been used in this treatment, because of the lack of a recent monograph and the doubt as to their application to Australian populations.

W.J.Dress, Notes on the Cultivated Compositae 9. *Onopordum*, *Baileya* 14: 74–86 (1966); A.Danin, *Onopordum*, in P.H.Davis (ed.), *Fl. Turkey* 5: 356–69 (1975); J.Franco, *Onopordum*, in T.G.Tutin *et al.* (eds), *Fl. Europaea* 4: 244–8 (1976); G.González Sierra *et al.*, Revisión taxonomica de las especies ibéricas del género *Onopordum* L., *Candollea* 47: 181–213 (1992).

1 Prostrate plant; flowers white, borne at ground level

1. *O. acaulon*

1: Erect plant; flowers pink to purple, terminal on aerial branches

2 Leaves green with many glandular hairs

2. *O. tauricum*

2: Leaves grey due to dense arachnoid indumentum; glandular hairs absent

3 Median involucre bracts 1.5–2.3 mm wide at base; corolla 19–25 mm long, with eglandular lobes

3. *O. acanthium*

3: Median involucre bracts 4.5–7 mm wide at base; corolla 30–38 mm long, with glandular lobes

4 Outer involucre bracts strongly recurved, purplish

4. *O. illyricum*

4: All involucre bracts erect, yellow

†*O. nervosum*

†A specimen from a single plant of *O. nervosum* Boiss. subsp. *castellanum* Gonz.Sierra, Perez Morales, Penas & Rivas Mart., was collected from Baringhup, Vic. in 1962, and two plants were recorded from Ravenswood, Vic., in 2009.

1. **Onopordum acaulon* L., *Sp. Pl.* 2nd edn, 2: 1159 (1763)

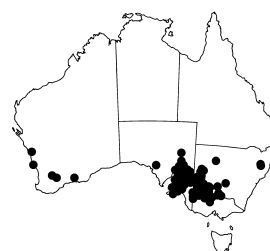
T: *Herb. Jussieu No. 8174*; neo: P-JU, *fide* G.A.López Gónzales in C.E.Jarvis & N.J.Turland (eds), *Taxon* 47: 364 (1998).

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 726 (1981); B.A.Auld & R.W.Meddy, *Weeds - An illustrated guide to the weeds of Australia* 109 (1987); F.J.Richardson *et al.*, *Weeds of the South-east* 150 (2006).

Prostrate herb to 0.8 m diam. Stems rudimentary. Leaves grey on both sides, densely arachnoid-tomentose; sessile glands absent; marginal spines 2–8 mm long, yellow to yellow-brown. Capitula in sessile clusters of 1–7 surrounded by leaf rosette; involucre globose, 28–40 mm diam. at anthesis excluding patent outer bracts; median involucre bracts erect, deltate, 18–25 mm long, 3–4 mm wide at base, entire, rigidly spinose at apex, glabrous. Corolla white; tube 16–20 mm long; lobes 2.7–3.5 mm long, glabrous. Anthers 6–6.5 mm long. Achenes obovoid, obscurely to obviously 4-angled, 4–4.5 mm long, brown, with faint longitudinal ribs, and numerous transverse wrinkles. Pappus bristles barbellate, 135–164, 20–25 mm long. *Stemless Thistle*. Plate 4.

Native to Spain and France. A serious weed in drier agricultural areas of S.A., western Vic. and N.S.W. Also occurs sporadically in southern W.A. Flowers Sept.–Dec.; fruits Nov.–Feb.

W.A.: Grass Patch, 1 Dec. 1959, *R.J.Guest* (PERTH). S.A.: Murray Bridge, 27 Mar. 1967, *H.Amtsberg* (AD); Whealmotley Hills, c. 40 km S of Yunta, *N.N.Donner* 3743 (AD). N.S.W.: 21 km E of Balranald, *A.E.Orchard* 4165 (CANB). Vic.: Sunset Tank, 35 km by road N of Tutty, *M.G.Corrick* 6590 & *P.S.Short* (CANB, MEL).



This is the only prostrate thistle occurring in Australia.

2. **Onopordum tauricum* Willd., *Sp. Pl.* 3(3): 1687 (1803)

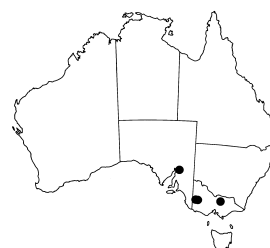
T: 'in Tauria' [Crimea], *Herb. Willd. No. 14960B*, coll. unknown; lecto: B-W, *fide* A.Danin in P.H.Davis (ed.), *Fl. Turkey* 5: 367 (1975).

Herb, up to 2 m high. Stems with dense erect glandular hairs; wings 3–10 mm wide. Leaves green, with glandular hairs on both surfaces; marginal spines yellow-brown, 3–6 mm long. Capitula solitary, terminal, on short peduncles; involucre sub-globose, 27–50 mm diam. excluding patent bracts; median involucre bracts patent, deltate, 18–35 mm long, 3–6 mm wide, entire, glandular-hairy. Corolla purple; tube 18–25 mm long; lobes 7–10.5 mm long, glabrous. Anthers 8.5–11 mm long. Achenes cuneiform, obscurely 4-angled, 4.1–4.7 mm long, brown, without longitudinal ribs, but with numerous prominent transverse wrinkles. Pappus bristles barbellate, 55–84, 9–11 mm long. *Taurian Thistle*.

Native to SE Europe and Turkey. Rarely naturalised in S.A. and Vic. Flowers and fruits Nov.–Jan.

S.A.: Orroroo, Pekina Rd, *C.R.Alcock* 6151 (AD). Vic.: c. 15 km WSW of Natimuk, 23 Jan. 1964, *C.W.Gebert* (MEL); Parish of Balmattum, District of Euroa, 22 Nov. 1984, *W.T.Parsons* (AD, MEL, NSW).

This species has been the target of an eradication program, so that it is probably now extinct in Australia.



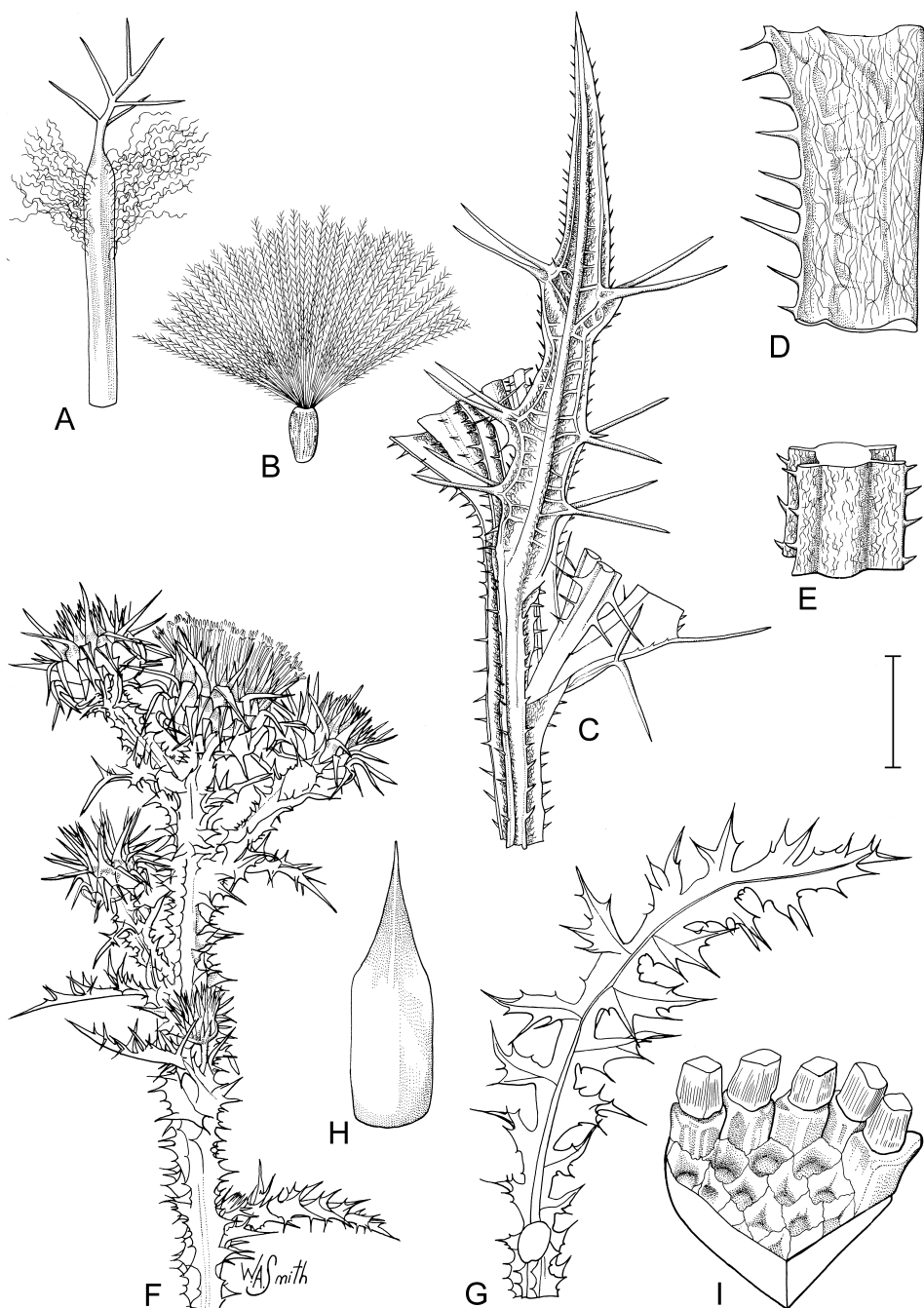


Figure 3. A–E, *Picnomon acarna*. A, median involucre bract; B, achene and pappus; C, leaf and short section of stem; D, section of leaf margin; E, cross-section of stem showing wings (A–E, C.Tann, MEL629000). F–I, *Onopordum illyricum*. F, upper part of flowering plant; G, leaf; H, upper part of median involucre bract; I, portion of receptacle showing alveolae (F–I, A.R.Bean 15815, BRI). Scale bar: A, E, I = 5 mm; B, C, H = 10 mm; D = 25 mm; F = 50 mm; G = 30 mm. Drawn by W.A.Smith.

3. **Onopordum acanthium* L., *Sp. Pl.* 2: 827 (1753)

T: Misnia, Germany, undated, *J.Burser, Herb. Burser XXI: 44*; lecto: UPS, *fide* A.Danin in P.H.Davis (ed.), *Fl. Turkey* 5: 368 (1975).

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 725 (1981); G.J.Harden (ed.), *Fl. New South Wales* 3: 324 (1992); F.J.Richardson *et al.*, *Weeds of the South-east* 149 (2006).

Herb to 1.8 m high. Stems densely arachnoid-tomentose; wings 5–20 mm wide. Leaves grey, with moderate to dense arachnoid tomentum on both surfaces; sessile glands absent; marginal spines 4–7 mm long, creamy to yellowish. Capitula solitary on 15–30 cm long peduncles; involucre oblate to globose, 25–45 mm diam. excluding patent bracts; median involucral bracts erect, linear, 14–21 mm long, 1.5–2.3 mm wide, entire or serrulate, arachnoid-tomentose. Corolla purple; tube 14–18 mm long; lobes 5–7 mm long, glabrous. Anthers 6.5–8 mm long. Achenes cuneiform, obscurely 4-angled, 4.1–5 mm long, with numerous prominent transverse wrinkles, brown or brown with black dapples. Pappus bristles barbellate, 73–119, 9–11 mm long. *Scotch Thistle, Cotton Thistle.*

Native to most of Europe and to central Asia. In Australia, naturalised mainly in central to southern N.S.W., and eastern Vic., but also present in Tas. and SE S.A. It grows in paddocks and pasture, in fertile clayey soils. Flowers Nov.–Feb.; fruits Dec.–Apr.

S.A.: Lincoln Hwy, c. 7 km N of Port Lincoln, 21 Dec. 1964, *C.R.Alcock s.n.* (AD). N.S.W.: Orange–Cudal road, 0.6 km E of Spring Creek, *A.R.Bean 15805* (BRI, NSW). A.C.T.: Jerrabomberra Ck, on Queanbeyan–Cooma road, *M.Gray & P.Michael 5046* (CANB). Vic.: Shire of Mansfield, Dec. 1921, *R.G.Dundas* (MEL). Tas.: Hamilton, Jan. 1947, *F.E.Ward* (HO).



An economically important weed, particularly in N.S.W., where it is declared noxious in several shires.

4. **Onopordum illyricum* L., *Sp. Pl.* 2: 827 (1753)

T: Southern Europe; lecto: illustration in M.de L'Obel, *Pl. Icon.* 2: 1 (1581), *fide* A.Danin in P.H.Davis (ed.), *Fl. Turkey* 5: 361 (1975).

Illustrations: W.T.Parsons, *Noxious Weeds Victoria* 80 (1973); G.J.Harden (ed.), *Fl. New South Wales* 3: 325 (1992); F.J.Richardson *et al.*, *Weeds of the South-east* 150 (2006).

Herb to 2 m high. Stems densely arachnoid-tomentose; wings 3–15 mm wide. Leaves grey, with dense arachnoid tomentum on both surfaces; stalked glandular hairs absent, sessile glands absent or obscured; marginal spines 4–10 mm long, yellow-brown. Capitula solitary, on 5–25 cm long peduncles; involucre oblate to globose, 30–60 mm diam. excluding patent bracts; median involucral bracts patent, deltate, 25–40 mm long, 4.5–7 mm wide, entire, glabrous. Corolla purple; tube 21–26 mm long; lobes 9–12 mm long, glandular. Anthers 12–14 mm long. Achenes cuneiform, 4-angled, 4.1–6.5 mm long, without longitudinal ribs, but with numerous prominent transverse wrinkles, brown. Pappus bristles barbellate, 61–93, 6–11 mm long. *Illyrian Thistle.* Fig. 3F–I.

Native throughout southern Europe from Portugal to Bulgaria. Commonly naturalised in the central and southern tablelands of N.S.W., and very sporadically in Vic. and S.A. It grows in pastures and paddocks and disturbed areas. Flowers Nov.–Jan.; fruits Jan.–Apr.

S.A.: Sedan Rd, 5 km from Angaston, *C.R.Alcock 4977* (AD). N.S.W.: Hume Hwy at Jugiong, *T.G.Hartley 15131* (CANB); Wyangala Dam Trout Farm, Cowra shire, *K.Nelligan ONO19* (CANB). Vic.: near Daylesford, 20 Dec. 1937, *Wood* (MEL).

Extensive hybridisation events have occurred in the southern N.S.W. populations of *Onopordum*, involving *O. illyricum* and *O. acanthium*. The genetic make-up of these plants is being studied, so that efficient biological control measures can be implemented.



Excluded Species

Onopordum leptolepis DC., *Prodr.* 6: 619 (1838)

T: Persia, *Belanger*; holo: G-DC? *n.v.*

Reported by J.H. Willis, *Handb. Pl. Victoria* 763 (1972). Apparently no specimen was ever collected, and there have been no further reports.

9. ARCTIUM

Arctium L., *Sp. Pl.* 2: 816 (1753); *Gen. Pl.* 5th edn, 357 (1754); derived from the Greek *arctos* (bear), probably in reference to the clawed involucre.

Type: *A. lappa* L.

Annual or biennial herbs. Stems erect, branched, longitudinally striate; wings absent. Leaves broadly ovate to orbicular, cuneate to cordate at base; margins unarmed and almost entire (very shortly dentate), or rarely pinnatifid and shortly spinose (not in Australia). Capitula sessile to pedunculate, homogamous. Involucral bracts with entire margins and strongly hooked spinose apex. Receptacle flat to sub-concave, not alveolate, densely setose. Corolla purple; tube filiform; lobes narrowly deltate. Anther filaments free, smooth to papillose. Style branches free, becoming somewhat recurved. Achenes oblong-obovoid, rugose or smooth (not in Australia), glabrous, with or without narrow apical rim; carpopodium basal. Pappus deciduous, comprising many free, barbellate, ensiform bristles.

A genus of 11 species distributed in Europe, extreme northern Africa and extra-tropical Asia. Two species are naturalised in SE Australia.

The hooked involucral bracts of *Arctium* spp. provided the inspiration for “Velcro” fabric fasteners.

F.K. Kupicha, *Arctium*, in P.H. Davis (ed.), *Fl. Turkey* 5: 354–6 (1975); R.D. Meikle, *Arctium*, in *Fl. Cyprus* 2: 947–8 (1985); R.W. Scott, The Genera of Cardueae (Compositae; Asteraceae) in the Southeastern United States, *J. Arnold Arbor.* 71: 432–6 (1990); H. Duistermaat, Monograph of *Arctium* L. (Asteraceae), *Gorteria*, Suppl. 3. Leiden: Rijksherbarium (1996).

Capitula 17–26 mm diam. (excluding patent bracts) at anthesis; capitula arranged in terminal corymbs; peduncles 2.5–5 cm long; petioles of basal leaves solid

1. A. lappa

Capitula 10–16 mm diam. (excluding patent bracts) at anthesis; capitula arranged racemously; peduncles 0.5–3 cm long; petioles of basal leaves hollow

2. A. minus

1. **Arctium lappa* L., *Sp. Pl.* 2: 816 (1753)

T: Europe; lecto: the illustration “Bardana, sive Lappa maior” in R. Dodoens, *Stirp. Hist. Pempt.* 2nd edn, 2: 38 (1616), *fide* H. Duistermaat, *Taxon* 52: 851 (2003).

Illustrations: G.J. Harden (ed.), *Fl. New South Wales* 3: 320 (1992); F.J. Richardson *et al.*, *Weeds of the South-east* 114 (2006).

Herb to 1.2 m high. Stems thinly pilose with arachnoid hairs. Leaves green above with very sparse multicellular hairs, white to grey-green below with arachnoid hairs; sessile glands abundant; petioles (of basal leaves) solid. Capitula arranged in terminal corymbs; peduncles 2.5–5 cm long; involucre broadly ovoid to globose, 17–26 mm diam. at anthesis excluding patent outer bracts; median involucral bracts erect, linear-deltate, 13–16 mm long, 1.2–1.7 mm wide at base, glabrous or with a few glandular hairs. Corolla tube 9.5–11 mm long; lobes 1.8–2.5 mm long. Anthers 3.7–4.5 mm long. Achenes compressed-obovoid, 6.9–7.3 mm long, rugose, with indistinct longitudinal furrows, brown. Pappus bristles 80–150, of differing lengths, to 3.5 mm long. *Greater Burdock*.

Widely distributed in northern Europe, extending to China and Japan. In Australia, sporadically naturalised in Vic. and Tas. and formerly present in N.S.W. Flowers and fruits Dec.–Feb.

N.S.W.: Coombing Park, Carcoar, 7 Jan. 1931, *Whitney Pastoral Company* (NSW). Vic.: Traralgon township, *I.C. Clarke* 2060 (CANB, MEL); Coleraine, 6 Feb. 1914, *J.T. Kerr* (MEL). Tas.: Peppermint Point, Woodbridge, Dec. 1986, *K.M. Drake* (AD, HO, MEL); Cressy, 1997–98, *S. Welsh* (HO).

This species is grown widely in eastern Asia (especially Japan) for its edible roots, which are high in minerals and said to contain antibiotics. The roots can be cooked fresh for soup, or dried for later use.



2. **Arctium minus* (Hill) Bernh., *Syst. Verz.* 154 (1800)

Lappa minor Hill, *Veg. Syst.* 4: 28, t. 25, 3a (1762). T: the illustration in J. Hill, *loc. cit.*, fide H. Duistermaat, *Gorteria*, Suppl. 3, 83 (1996).

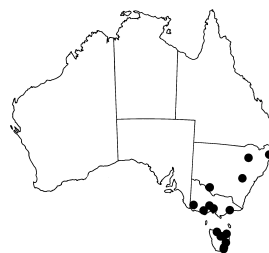
Illustrations: C. Lamp & F. Collet, *Field Guide to Weeds in Australia*, 3rd edn, no. 25 (1989); F. J. Richardson *et. al.*, *Weeds of the South-east* 115 (2006).

Herb to 1.0 m high. Stems thinly pilose with arachnoid hairs. Leaves green above with very sparse multicellular hairs, grey-green below with arachnoid hairs; sessile glands abundant; petioles (of basal leaves) hollow. Capitula arranged racemosely along stems; peduncles 0.5–3.0 cm long; involucre broadly ovoid to globose, 10–16 mm diam. at anthesis excluding patent outer bracts; median involucre bracts erect, linear-deltate, 10–13 mm long, 0.9–1.3 mm wide at base, glabrous or with a few glandular hairs. Corolla tube 7–8.5 mm long; lobes 1.3–1.6 mm long. Anthers 3.0–3.5 mm long. Achenes compressed-obovoid, 5.2–6 mm long, brown and black, rugose. Pappus bristles 60–100, of differing lengths, to 3.3 mm long. *Lesser Burdock*.

Widely distributed throughout Europe, and extending to Turkey and Morocco. In Australia, it is sporadically naturalised in Vic. and Tas., and rarely recorded for N.S.W.; on disturbed sites in higher rainfall areas. Flowers and fruits Jan.–Apr.

N.S.W.: 3 miles [5 km] from Orange on Mullion Creek road, 11 Jan. 1968, *R. Nalder* (NSW). Vic.: Bairnsdale, Mar. 1929, *T.S. Hart* (MEL); Casterton, Feb. 1906, *F.M. Reader* (MEL). Tas.: Burnie, Feb. 1948, *W.M. Curtis* (HO); New Town Ck, opposite Talire School, *D.I. Morris* 8049 (HO).

In Tasmania, this species is apparently much more common than *A. lappa*.



10. CARTHAMUS

Carthamus L., *Sp. Pl.* 2: 830 (1753); *Gen. Pl.* 5th edn, 361 (1754); a Medieval Latin name, derived from the Arabic name for Safflower, *C. tinctorius*.

Type: *C. tinctorius* L.

Kentrophyllum Neck. ex DC., *Ann. Mus. Natl. Hist. Nat.* 16: 158 (1810). T: *K. lanatum* (L.) DC. & Duby

Annual herbs. Stems erect, strongly branched in upper 1/2, longitudinally striate; wings absent. Leaves ovate to pinnatilobed; margins with several spine-tipped lobes. Capitula terminal, homogamous. Involucre bracts spine-tipped; outer bracts leaf-like, patent, with margins mostly spiny-lobed. Receptacle convex, not alveolate, with numerous setae. Corolla orange, yellow or pink-purple; tube linear but with expanded limb marked with longitudinal black lines; lobes linear. Anther filaments free, pilose. Style branches connate, erect. Achenes ovoid-truncate, slightly 4-angular, smooth, glabrous, without apical rim; carpopodium lateral. Pappus persistent (or mostly absent in *C. tinctorius*), of numerous barbellate, ensiform bristles, outer ones much shorter than inner, pale brown, free.

A genus of about 16 species distributed from the Canary Is to SW Asia, but with highest diversity in the countries of the eastern Mediterranean; 4 species naturalised in Australia, with one, *C. lanatus*, being very widespread.

P.Hanelt, Monographische Übersicht der Gattung *Carthamus* L. (Compositae), *Feddes Repert. Spec. Nov. Regni Veg.* 67: 41–180 (1963); K.H.Rechinger, *Carthamus*, in *Fl. Iranica* 139b: 430–7 (1980); R.D.Meikle, *Carthamus*, in *Fl. Cyprus* 2: 978–83 (1985); G.L.González, Acerca de la Clasificación natural del género *Carthamus* L. s.l., *Anales Jard. Bot. Madrid* 47(1): 11–34 (1990); J.R.Peirce, *Carthamus lanatus*, in R.H.Groves *et al.*, (eds), *Biol. Austral. Weeds* 1: 51–66 (1995).

- | | | |
|----|---|---------------------------------|
| 1 | Leaves and involucre bracts ±entire, with spiny marginal teeth 1–2.5 mm long; stems glabrous | 1. <i>C. tinctorius</i> |
| 1: | Leaves and outer involucre bracts deeply lobed, with long-spinose margins; stems hairy | |
| 2 | Glandular hairs on branchlets dense, 0.2–0.5 mm long; glands white or transparent | 2. <i>C. dentatus</i> |
| 2: | Glandular hairs on branchlets sparse to moderately dense, sessile or to 0.15 mm long; glands yellow to white | |
| 3 | Flowers pink-purple; crisped and arachnoid indumentum absent from stems; involucre 8–10 mm diam. at anthesis (excluding patent involucre bracts); stems white; outer involucre bracts 2–3 times length of inner bracts | 3. <i>C. leucocaulos</i> |
| 3: | Flowers yellow; crisped hairs moderately dense to dense on stems, arachnoid indumentum sparse to dense on stems; involucre 15–20 mm diam. at anthesis (excluding patent involucre bracts); stems yellowish to straw-coloured; outer involucre bracts 1.2–1.8 times length of inner bracts | 4. <i>C. lanatus</i> |

1. **Carthamus tinctorius* L., *Sp. Pl.* 2: 830 (1753)

T: Egypt, *Herb. Clifford*: 394, *Carthamus* 1; lecto: BM, *vide* K.H.Rechinger, *Fl. Iranica* 139b: 434 (1980).

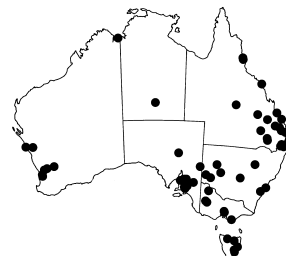
Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 721 (1981); F.J.Richardson *et. al.*, *Weeds of the South-east* 122 (2006).

Herb to 1.5 m high. Stems white to straw-coloured, glabrous. Leaves ovate, green above and below, glabrous; marginal spines 1–2 mm long, pale brown. Capitula solitary, terminal on 5–25 cm long branches; involucre subglobose, 21–27 mm diam. at anthesis, excluding patent bracts; outer involucre bracts 0.9–1.2 times length of inner; median bracts erect, 21–24 mm long, 6–7 mm wide at base, not constricted, entire or shortly toothed, spinose at apex. Corolla orange or yellow; tube 16–24 mm long; lobes 5.5–7 mm long. Anthers 5–5.5 mm long. Achenes obovoid, 6.5–8 mm long, white to grey. Pappus to 6 mm long on inner achenes, otherwise absent. *Safflower*.

Sporadically naturalised in Australia, although it seems that it has never become permanently established anywhere. Prefers fertile clay-loams. Flowers and fruits Oct.–May.

W.A.: Kununurra district, *P.Gowland* 255 (DNA). N.T.: 14 km SW of Alice Springs, *P.K.Latz* 10401 (DNA). S.A.: Big Gumtree Ck, Oct. 1851, *F.Mueller* (MEL). Qld: Tara, Oct. 1960, *S.Lester* (BRI, CANB). N.S.W.: along Darling R., Wilcannia, 1 Dec. 1975, *W.D.Wolstenholme s.n.* (NSW). Vic.: East Oakleigh, Melbourne, Mar. 1990, *J.A.Kippe* (MEL). Tas.: Little Swanport, Feb. 1993, *G.Williams* (HO, MEL, NSW).

This species is not known in the wild state. Formerly cultivated over a large part of Europe for its red and yellow flower-pigments used in dyeing; now cultivated widely (including in Australia) for the oil derived from the achenes.



2. **Carthamus dentatus* Vahl, *Symb. Bot.* 1: 69, t. 17 (1790)

T: Malta, 14–20 June 1761 or ‘Tenedos’ [Bozca], Greece, 13–19 July 1761, *P.Forsskal*; lecto: C, *fide* P.Hanelt, *Feddes Repert. Spec. Nov. Regni Veg.* 67: 92 (1963).

Herb to 1 m high. Stems yellowish to straw-coloured, densely pilose with transparent to white glandular hairs 0.2–0.5 mm long; arachnoid and crisped multicellular hairs sparse or absent. Leaves pinnatifid, grey-green above and below, densely glandular-hairy; marginal spines 3–7 mm long, yellow-brown distally. Capitula solitary, terminal on 5–25 cm long branches; involucre ovoid, 15–19 mm diam. at anthesis excluding patent bracts; outer involucral bracts 1.5–1.8 times length of inner; median bracts erect, 25–34 mm long, 7–9 mm wide at widest point, glandular, with fimbriate-pectinate terminal appendage, spinose at apex. Corolla pink-purple; tube 17–24 mm long; lobes 4–6 mm long. Anthers 5–7 mm long. Achenes obpyramidal, 4.5–5.8 mm long, grey. Pappus bristles 127–168, longest ones 13–16 mm long. *Toothed Thistle*.

Native to the eastern Mediterranean (Bulgaria, Greece, Turkey, Crete, Cyprus). In Australia, sporadically naturalised from central N.S.W. to western Vic. Often grows in pasture, in sandy-loam soils. Flowers and fruits recorded Jan.–Mar.

N.S.W.: “Glenair” Stn, c. 1 km N of Biala, Gunning to Wheeo road, *M.Gray & J.Medway 7083* (AD, BRI, CANB, MEL, NSW); Gollan via Wellington, 9 May 1947, *J.Lockrey* (NSW); Boorowa, Jan. 1923, *T.G.Wenham* (MEL, NSW). Vic.: Romsey, Feb. 1907, *K.Campbell* (MEL); Green Hill Lake Reserve, c. 5 km E of Ararat, Mar. 1985, *B.Howlett* (AD, CANB, HO, K, MEL, NSW).



3. **Carthamus leucocaulos* Sm. in J.Sibthorp & J.E.Smith, *Fl. Graec. Prodr.* 2: 160 (1813)

Onobroma leucocaulon (Sm.) Spreng., *Syst. Veg.* 3: 392 (1826). T: Crete, *J.Sibthorp*; holo: OXF n.v., photo seen.

[*Carthamus glaucus* auct. non M.Bieb.: J.H.Willis, *Handb. Pl. Victoria* 2: 766–7 (1972); D.A.Cooke in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia*, 4th edn, 3: 1630 (1986); J.A.Jeanes in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 676 (1999)]

Illustration: W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds Australia* 198 (1992).

Herb to 0.7 m high. Stems white, thinly pilose with yellow to white glandular hairs to 0.15 mm long. Leaves pinnatifid, green above and below; ±sessile glands present on both surfaces; marginal spines 3–6 mm long, yellow-brown distally. Capitula solitary, terminal on 4–20 cm long branches; involucre ovoid, 8–10 mm diam. at anthesis excluding patent bracts; outer involucral bracts 2–3 times length of inner; median bracts suberect, 12–15 mm long, 3.5–4.5 mm wide at widest point, entire, rigidly spinose at apex, glandular. Corolla pink-purple; tube 10–13 mm long; lobes 2.5–3 mm long. Anthers 2.5–3 mm long. Achenes obpyramidal, 3–3.5 mm long, grey. Pappus bristles 87–108, longest ones 4.5–5.3 mm long. *Glaucous Star Thistle*.

Native to the islands in the Aegean Sea between Greece and Turkey, and on Crete. Naturalised sporadically in western Vic., SE S.A. and southern W.A. Habitat for one specimen given as shallow soil over limestone. Flowers and fruits Jan.–Apr.

W.A.: East Tambellup, Dec. 1975, *J.R.Peirce* (PERTH). S.A.: Pelican Lagoon Conservation Park, Kangaroo Is., *B.M.Overton 767* (AD); 15 km WNW of Mundulla, near Bordertown, *R.L.Specht 1638* (AD). Vic.: c. 4.5 km E of Wartook, just W of Grampians Natl Park, Apr. 1993, *D.Venn* (MEL); Kaniva, Apr. 1948, *Hicks* (MEL).



4. **Carthamus lanatus* L., *Sp. Pl.* 2: 830 (1753)

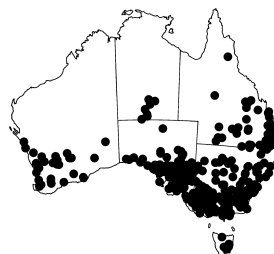
Kentrophyllum lanatum (L.) DC. & Duby in J.E.Duby, *Bot. Gall.* 1: 293 (1828). T: France, Italy and Crete, *Löfving 610a*, *Herb. Linn. No.* 973.2; lecto: LINN, *fide* P.Hanelt, *Feddes Repert. Spec. Nov. Regni Veg.* 67: 136 (1963).

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 722 (1981); A.Clemson, *Honey and Pollen Fl.* 213 (1985); F.J.Richardson *et al.*, *Weeds of the South-east* 122 (2006).

Herb to 1.3 m high. Stems yellowish to straw-coloured, thinly to densely pilose with mixed arachnoid and crisped multicellular hairs, and yellow to white glandular hairs to 0.15 mm long. Leaves pinnatilobed, green above and below; ±sessile glands present on both surfaces; marginal spines 3–8 mm long, yellow to brown distally. Capitula solitary, terminal on 5–25 cm long branches; involucre ovoid, 15–20 mm diam. at anthesis excluding patent bracts; outer involucral bracts 1.2–1.8 times length of inner; median bracts suberect, 22–33 mm long, 4–7 mm wide at base, with margins entire or spinose and apex spinose, glandular. Corolla yellow; tube 19–24 mm long; lobes 5–6.5 mm long. Anthers 5–5.5 mm long. Achenes obpyramidal, 4.5–5.7 mm long, grey to brown. Pappus bristles 93–123, longest ones 6.5–11 mm long. *Saffron Thistle*. Plate 5.

Native to most countries bordering the Mediterranean Sea, and E to central Asia. Widely naturalised in southern Australia, particularly in lower rainfall areas. It grows on a wide range of soil types. Flowers Nov.–Mar.; fruits Dec.–Mar.

W.A.: Marda Dam, Mt Jackson Stn, *G.J.Keighery 4364* (CANB, PERTH). N.T.: Roe Ck, S of Alice Springs, *A.S.Mitchell 397* (DNA). S.A.: 8 km from Kadina on Bute road, *B.Copley 910* (AD). Qld: Banks Creek road, 6 km NE of Fernvale, *A.R.Bean 16710* (BRI, MEL, NSW). N.S.W.: 9 km from Wee Jasper towards Tumut on Yass road, *T.R.Lally 206* (AD, CANB, MEL, NSW). A.C.T.: Gungahlin, 1 km NE of Gungahlin Hill, *I.Crawford 1277* (CANB, MEL, NSW). Vic.: Underbool, c. 48 km WSW of Ouyen, *R.V.Smith 69/123* (AD, CANB, MEL). Tas.: Sorell, Jan. 1929, *F.H.Long* (HO).



A widespread and serious weed of pastures and cereal-crops. It does not seem possible, from Australian material, to recognise meaningful subspecific taxa in *C. lanatus*.

11. RHAPONTICUM

Rhaponticum Vaill., *Königl. Akad. Wiss. Paris Phys. Abh.* 5: 177 (1754); thought to be derived from the Greek *Rha* (of the Volga River) and the Latin *ponticus* (pertaining to Pontus, the old name for an area near the Black Sea).

Type: *R. jacea* (L.) Scop.

Acroptilon Cass., *Dict. Sci. Nat.* 50: 464 (1827). T: *A. repens* (L.) DC.

Stemmacantha Cass., *Bull. Sci. Soc. Philom. Paris* 1817: 12 (1817). T: *S. centaurioides* (L.) Cass.

Annual to perennial herbs. Stems erect, sparsely branched, longitudinally striate; wings absent. Leaves without spines, elliptic to lanceolate, ±entire to lyrate-pinnatifid. Capitula pedunculate, homogamous. Involucral bracts adpressed; outer and median bracts with distinct terminal, concave, scarious appendage, entire or lacerate, never spinose. Receptacle flat, not alveolate, densely setose. Corolla purple-pink or yellow (not in Australia); tube filiform; lobes linear. Anthers with short appendages at base; filaments free, finely verrucose. Style branches connate, erect. Achenes obovoid, slightly compressed, glabrous or hairy; apical rim toothed; carpodium basal. Pappus deciduous, of numerous plumose or barbellate (not in Australia) capillary bristles, outer ones shorter than inner, basally united in a ring, or free and individually deciduous.

A genus of 20 species, distributed throughout the former USSR, also Mongolia, Iran, Turkey, southern Europe, northern Africa and Australia. Two species in Australia, one endemic and one naturalised.

J.Holub, Contribution to the Taxonomy and Nomenclature of *Leuzea* DC. and *Rhaponticum* auct., *Folia Geobot. Phytotax.* 8: 377–95 (1973); M.Dittrich, *Rhaponticum*, in K.H.Rechinger (ed.), *Fl. Iranica* 139b: 299–302 (1980); W.Greuter *et al.*, Vaillant on Compositae, *Taxon* 54: 149–74 (2005).

Involucres 22–35 mm diam. at anthesis; achenes 4.5–5.5 mm long

1. *R. australe*

Involucres 4.5–10 mm diam. at anthesis; achenes 3–4 mm long

2. *R. repens*

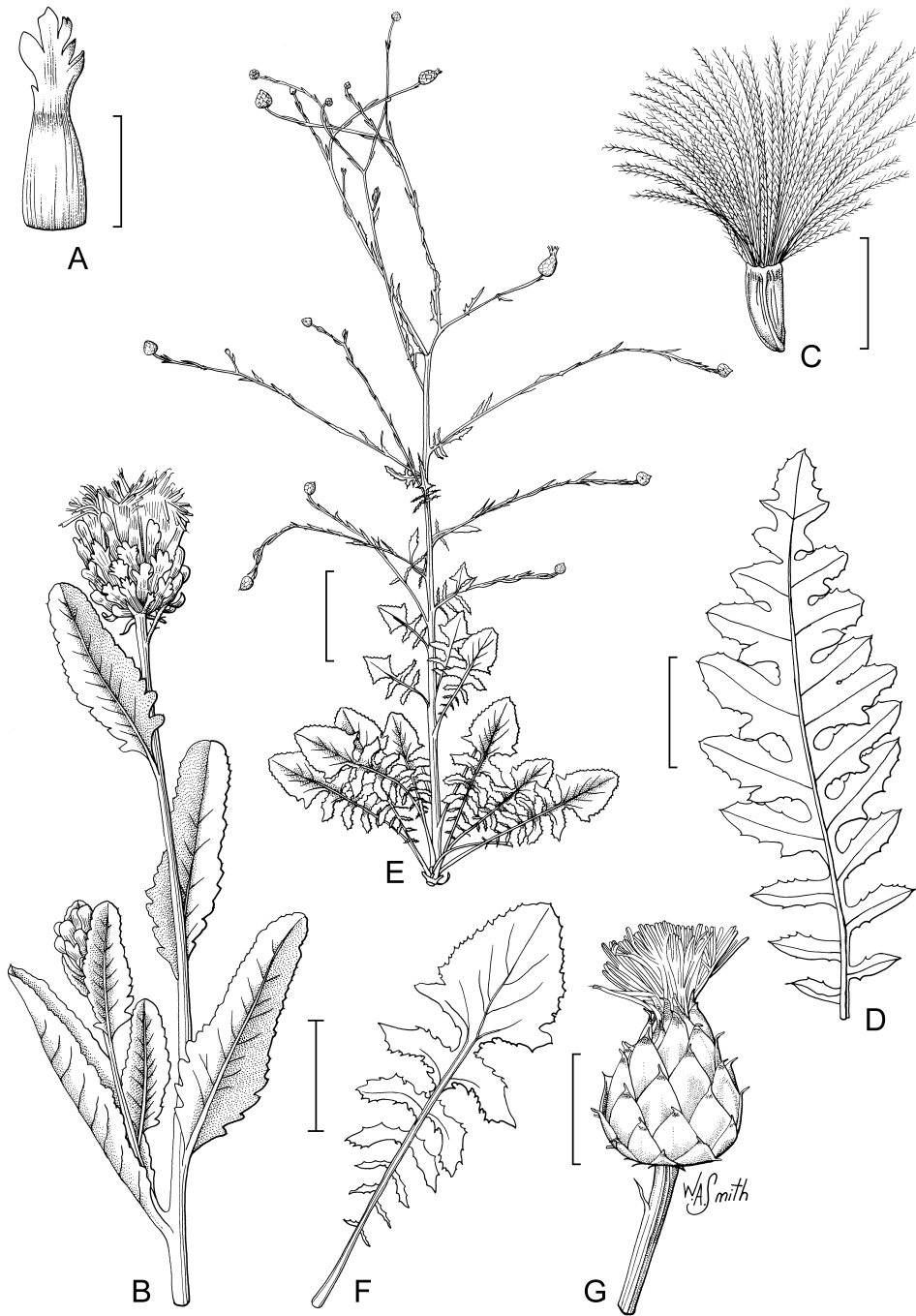


Figure 4. A–D, *Rhaponticum australe*. A, median involucral bract; B, flowering branchlet; C, achene and pappus; D, a lyrate-pinnatifid leaf (A–C, A.R.Bean 11348, BRI; D, N.H.Scarlett 90, BRI). E–G, *Mantisalca salmantica*. E, whole plant; F, basal leaf; G, flowering capitulum (E–F, A.R.Bean 15566, BRI; G, A.R.Bean 15637, BRI). Scale bars: A, C, E, G = 10 mm; B, D, F = 30 mm. Drawn by W.A.Smith.

1. *Rhaponticum australe* (Gaudich.) Soják, *Novit. Bot. Delect. Seminum Horti Bot. Univ. Carol. Prag.* 48 (1962)

Leuzea australis Gaudich., *Voy. Uranie* 4: 462, t. 92 (1829); *Centaurea australis* (Gaudich.) F.M.Bailey, *Syn. Queensland Fl.* 268 (1883), *nom. illeg. non* Pančič (1874); *Stemmacantha australis* (Gaudich.) Dittrich, *Candollea* 39: 45 (1984). T: Fish R., Blue Mtns, N.S.W., Nov.–Dec. 1819, *C. Gaudichaud-Beaupré*; lecto: P (left-hand piece); isolecto: FI, G, *fide* M.Dittrich, *op. cit.* 46 (1984).

Illustration: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 678 (1999).

Herb to 0.9 m high. Stems sparsely arachnoid-tomentose. Cauline leaves elliptic, entire or lyrate-pinnatifid, grey-green on both surfaces, sparsely arachnoid-tomentose or glabrous; sessile glands numerous. Capitula solitary; peduncles 8–30 cm long; involucre globose to broadly ovoid, 22–35 mm diam. at anthesis; median involucre bracts erect, deltate, 15–30 mm long, 4–7 mm wide, entire, with fine adpressed hairs; appendage with broad obtuse lacerate apex. Corolla purple-pink; tube 25–30 mm long; lobes 3.5–4 mm long. Anthers 4.5–5.5 mm long. Achenes cylindric-cuneate, 6.5–8.4 mm long, longitudinally striate, glabrous, brown. Pappus bristles sub-plumose, longest ones 18–23 mm long, basally united in a ring. *Austral Cornflower*. Fig. 4A–D.

Endemic to Australia and currently known from southern Qld only. Formerly recorded from eastern N.S.W. and eastern Vic. It grows on fertile clay soils in grassland or open eucalypt woodland. Flowers Oct.–Apr.; fruits Dec.–June.

Qld: 1.5 km N of Bancroft, towards Kalpowar, *A.R.Bean* 9263 & *P.A.Robins* (BRI, MEL); Gowrie Jctn, S of railway line, *A.R.Bean* 15613 (BRI, NSW); between Jondaryn and Acland, Nov. 1998, *O.Foley* (BRI). N.S.W.: Port Jackson, 1802–5, *R.Brown* (MEL). Vic.: Murrindal R., Mar. 1854, *F.Mueller* (MEL).

Probably extinct in both Vic. and N.S.W.



2. **Rhaponticum repens* (L.) Hidalgo, *Ann. Bot. (London)* 97: 714 (2006)

Centaurea repens L., *Sp. Pl.*, 2nd edn, 2: 1293 (1763); *Acroptilon repens* (L.) DC., *Prodr.* 6: 663 (1837). T: not designated.

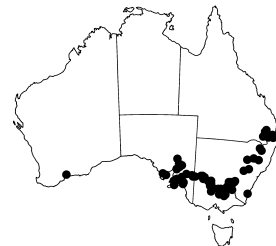
Centaurea picris Pall. ex Willd., *Sp. Pl.* 3(3): 2302 (1803); *Acroptilon picris* (Pall. ex Willd.) C.A.Mey., *Verz. Pfl. Casp. Meer.* 67 (1831). T: "Habitat ad mare Caspium (v.s.)"; *n.v.*

Illustration: G.M.Cunningham *et al.*, *Pl. W New South Wales* 719 (1981).

Branched rhizomatous herb to 0.4 m high. Stems sparsely arachnoid-tomentose, becoming glabrous. Cauline leaves ovate to lanceolate, dentate or lyrate-pinnatifid (lower) or entire (upper), grey-green on both surfaces, sparsely arachnoid-tomentose or glabrous; sessile glands numerous. Capitula solitary; involucre globose to broadly ovoid, 4.5–10 mm diam. at anthesis; median involucre bracts erect, broadly ovate, 2–4 mm long, 2–3 mm wide, entire or lacerate, obtuse, glabrous or with sparse arachnoid hairs; appendage 0.5–1.5 mm long, membranous, translucent. Corolla purple-pink; tube 6.5–9.5 mm long; lobes 2.5–3 mm long. Anthers 4–5 mm long. Achenes ellipsoid, 3–4 mm long, faintly longitudinally striate, sparsely tomentose, cream-coloured. Pappus bristles free, sub-plumose, longest ones 8–10 mm long. *Russian Knapweed*, *Hard Heads*.

Native from eastern Europe to Mongolia, including Russia, parts of Siberia, Iran and Turkey. Widely naturalised, and a serious weed in the U.S.A. and southern Canada. In Australia, it is widely naturalised in S.A., N.S.W. and northern Vic., formerly in SE Qld, and known from a single record from W.A. It grows in heavy soils, and is most often recorded from cropping areas. Flowers Oct.–Apr.; fruits Dec.–June.

W.A.: farm in Ravensthorpe area, Nov. 1982, *G.Growth s.n.* (PERTH). S.A.: near Spencer Gulf, between Wandearan and Pt Pirie, Broughton R.,



B.Copley 1636 (AD). Qld: c. 4 miles [c. 6 km] SW of Bell, Feb. 1969, *J.Mann s.n.* (BRI). N.S.W.: 42 km W of Euston, *W.E.Mulham 821* (CANB, NSW). Vic.: Piangil, c. 40 km NW of Swan Hill, *R.V.Smith 71/25* (AD, CANB, HO, MEL, NSW).

Not recorded for Qld since 1972, possibly eradicated.

12. MANTISALCA

Mantiscalca Cass., *Bull. Sci. Soc. Philom. Paris* 1818: 142 (1818); an anagram of the specific epithet of the type species, *salmantica*.

Type: *M. salmantica* (L.) Briq. & Cavill.

Microlonchus Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 44: 38 (1826). T: *M. salmanticus* (L.) DC.

Annual or biennial herbs. Stems erect, strongly branched, longitudinally striate; wings absent. Leaves without spines; rosette leaves pinnatisect; cauline leaves sparse, much reduced, linear, serrate. Capitula pedunculate, heterogamous. Involucral bracts adpressed, entire, mucronate but not spine-tipped. Receptacle flat, not alveolate, densely setose. Corolla pink or mauve; tube slender; lobes linear. Anthers sagittate-caudate; filaments free, smooth to papillose. Style branches connate or separate, erect. Achenes cylindrical, slightly compressed, glabrous; carpodium lateral. Pappus somewhat persistent, of numerous barbellate ensiform bristles, free to base, outer ones shorter than inner, innermost bristle conspicuously broad-based.

A genus of 4 or 5 species from northern Africa, southern Europe and Turkey; 1 species is naturalised in Australia.

G.Wagenitz, *Mantiscalca*, in P.H.Davis (ed.), *Fl. Turkey* 5: 464 (1975); R.D.Meikle, *Mantiscalca*, in *Fl. Cyprus* 2: 975–6 (1985).

****Mantiscalca salmantica* (L.) Briq. & Cavill., *Arch. Sci. Phys. Nat.* ser. 5, 12: 111 (1930)**

Centaurea salmantica L., *Sp. Pl.* 2: 918 (1753); *Microlonchus salmanticus* (L.) DC., *Prodr.* 6: 563 (1838). T: southern Europe, *Herb. Clifford*: 421, *Centaurea* 5; lecto: BM, *fide* D.Jeanmonod *et al.* in D.Jeanmonod (ed.), *Compl. Prodr. Fl. Corse, Asteraceae II* 212 (2004).

Illustration: F.J.Richardson *et al.*, *Weeds of the South-east* 148 (2006).

Biennial herb to 1.3 m high. Stems glabrous or thinly pilose with multicellular hairs. Leaves green above and below, sparsely tomentose with multicellular hairs; sessile glands absent. Capitula solitary, terminal; involucre ovoid to subglobose, 12–15 mm diam. at anthesis; median involucral bracts erect, elliptic, 8–11 mm long, 4–5 mm wide, glabrous. Corolla pink to mauve; inner (fertile) florets with tube 15–17 mm long, and lobes 3–4.5 mm long; sterile florets shorter. Anthers 4.5–5 mm long. Achenes 3.5–4.5 mm long, grey, with faint longitudinal ribs and transverse lacunae. Pappus bristles 77–107, longest ones 2.5–3.3 mm long. Fig. 4E–G.

Native throughout southern Europe, and E to Cyprus and western Turkey. Naturalised in Australia; currently confined to around Myrtleford in Vic., and a small area of the Darling Downs, Qld, where it grows on fertile basaltic soils. Flowers Sept.–Nov.; fruits Nov.–Jan.

Qld: Hodgson Ck, S of Pittsworth, *A.R.Bean 15637* (BRI, NSW). Vic.: Myrtleford, Jan. 1955, *L.Ling* (MEL); Greenmount, Nov. 1931, *H.Mansbridge* (MEL).



ASTERACEAE

13. CENTAUREA

Centaurea L., *Sp. Pl.* 2: 909 (1753); *Gen. Pl.* 5th edn, 389 (1754); from the Greek *kentauros* (centaur - half man, half horse); the name was used by Pliny for a medicinal herb associated with the centaur Chiron, the legendary founder of medicine.

Type: *C. paniculata* L.

Cnicus L., *Sp. Pl.* 2: 826 (1753), *nom. cons.* T: *C. benedictus* L.

Annual or biennial herbs. Stems erect, strongly branched, longitudinally striate; wings present or absent. Leaves entire to pinnatisect. Capitula sessile or pedunculate, ovoid, heterogamous, rarely homogamous. Involucral bracts adpressed, imbricate, entire to pectinate, often spine-tipped at apex. Receptacle flat, not alveolate, densely setose. Outer florets neuter, spreading. Inner florets fertile, bisexual; tube slender; lobes linear. Anthers sagittate-caudate; filaments free, smooth to papillose. Style branches connate or separated, erect. Achenes cylindrical to ellipsoid, slightly compressed, glabrous or hairy; carpodium lateral. Pappus sometimes absent, otherwise persistent, of numerous free, barbellate, ensiform bristles (rarely awns).

A genus of 300–500 species distributed mainly in southern Europe and SW Asia, but also northern Africa, India, China, and S America; 12 species naturalised in Australia.

K.H.Rechinger, *Centaurea*, in *Fl. Iranica* 139b: 313–420 (1980); R.D.Meikle, *Centaurea*, in *Fl. Cyprus* 2: 967–975 (1985); J.Dostál, *Centaurea*, in T.G.Tutin *et al.* (eds), *Fl. Europaea* 4: 254–301 (1976); R.J.Moore & C.Frankton, *Thistles of Canada* 22–28 (1974); G.Wagenitz, *Centaurea*, in P.H.Davis (ed.), *Fl. Turkey*, 5: 465–585 (1975); C.Stace, *Centaurea*, in *New Fl. Brit. Isles* 811–5 (1991); S.Španiel *et al.*, Diploid and Tetraploid Cytotypes of *Centaurea stoebe* (Asteraceae) in Central Europe: Morphological Differentiation and Cytotype Distribution Patterns, *Folia Geobot.* 43: 131–158 (2008).

- | | | |
|----|--|----------------------------------|
| 1 | Involucral bracts with spreading spines | |
| 2 | Stems not winged (leaves not decurrent) | |
| 3 | Involucres partly hidden, surrounded by foliose bracts; leaf margins with teeth 0.5–1.5 mm long | 6. <i>C. benedicta</i> |
| 3: | Involucres sometimes flanked by reduced leaves, but not hidden; leaf margins not toothed | |
| 4 | Leaves silvery; corolla yellow; involucres 20–25 mm diam. | † <i>C. ragusina</i> |
| 4: | Leaves green to grey-green; corolla purple, pink or mauve; involucres 6–10 mm diam. | |
| 5 | Central spine of involucral bracts 8–24 mm long, with lateral spines much shorter | 1. <i>C. calcitrapa</i> |
| 5: | Involucral bracts with 3–5 subequal spines, each 1.5–3 mm long | 2. <i>C. aspera</i> |
| 2: | Stems winged (leaves decurrent) | |
| 6 | Spines of involucral bracts 12–26 mm long, with spinules all near base of spine; corolla not glandular | 5. <i>C. solstitialis</i> |
| 6: | Spines of involucral bracts 3–13 mm long, with 1 pair of spinules c. halfway along spine; corolla glandular | |
| 7 | Leaves without arachnoid hairs; spines of involucral bracts 3–7 mm long; involucre 7–11 (–13) mm diam. at anthesis | 3. <i>C. melitensis</i> |
| 7: | Leaves with arachnoid hairs; spines of involucral bracts 8–13 mm long; involucre 17–20 mm diam. at anthesis | 4. <i>C. eriophora</i> |
| 1: | Involucral bracts variously dissected or pectinate, but not spinose | |
| 8 | Involucre 35–50 mm diam. | † <i>C. macrocephala</i> |
| 8: | Involucre 4–25 mm diam. | |
| 9 | Stems winged (leaf bases decurrent) | † <i>C. montana</i> |

- 9: Stems not winged (leaf bases not decurrent)
- 10 Most or all cauline leaves pinnatifid to pinnatisect
- 11 Involucres narrowly ovoid, 4–7.5 mm diam.
- 12 Appendages of involucre bracts brown; apical cilium longer than lateral cilia **7. *C. paniculata***
- 12: Appendages of involucre bracts dark brown to black; apical cilium shorter than lateral cilia **8. *C. stoebe***
- 11: Involucres hemispherical to broadly ovoid or globose, 11–22 mm diam.
- 13 Leaves strikingly silvery **9. *C. cineraria***
- 13: Leaves green **†*C. scabiosa***
- 10: All cauline leaves entire
- 14 Leaves linear, > 10 times longer than broad; pappus as long as achene; flowers bright blue **†*C. cyanus***
- 14: Cauline leaves lanceolate to narrowly elliptic; pappus absent or much shorter than achene; flowers pink to purple
- 15 Flower heads discoid (all flowers anther-bearing); involucre appearing almost black **10. *C. nigra***
- 15: Flower heads “radiate” (outer flowers neuter, without anthers); involucre only speckled with black, or entirely pale to dark brown
- 16 Involucre bract appendages white to pale brown, ±entire and toothed, or with a few deep radial lacerations **12. *C. jacea***
- 16: Involucre bract appendages dark brown to black, with 3–12 pairs of transverse marginal cilia
- 17 Appendages 3.5–5 mm long; heads 15–20 mm diam. **11. *C. ×moncktonii***
- 17: Appendages < 2 mm long; heads 8–10 mm diam. **†*C. nigrescens***

†*Centaurea cyanus* L. (syn. *Cyanus segetum* Hill), *C. macrocephala* Willd., *C. montana* L., *C. nigrescens* Willd., *C. ragusina* L. and *C. scabiosa* L. are not considered to be currently naturalised in Australia, and are not described further in this treatment. *C. scabiosa* and *C. nigrescens* have not been recorded since 1924 and 1936 respectively. *C. macrocephala* and *C. montana* have each been collected once adjacent to garden plantings at Falls Creek, Vic. *C. ragusina* has been collected just once from Normanville, S.A., in 1992. *C. cyanus* was collected once in 1948 at Cooma, N.S.W., as a garden escape.

1. **Centaurea calcitrapa* L., *Sp. Pl.* 2: 917 (1753)

T: “Habitat in Helvetia, Anglia & Europa australiori secus vias”, *Herb. Linn. No. 1030.55*; lecto: LINN, *vide* C. Jeffrey, *Kew Bull.* 22: 137 (1968).

Illustrations: G.M. Cunningham *et al.*, *Pl. W New South Wales* 721 (1981); B.A. Auld & R.W. Medd, *Weeds - An illustrated guide to the weeds of Australia* 90–1 (1987); F.J. Richardson *et al.*, *Weeds of the South-east* 124 (2006).

Annual or biennial to 1 m high. Stems with adpressed arachnoid hairs, becoming glabrous; wings absent. Cauline leaves ovate to lanceolate, pinnatifid (lower) to entire (upper), green to grey-green above and below, with sparse scabrid and multicellular hairs; sessile glands present. Capitula solitary, pedunculate; involucre ovoid, 6–8 mm diam. at anthesis; median involucre bracts elliptic to ovate, 5–7 mm long, 3–5.5 mm wide, glabrous; appendages comprising a straight, patent, pungent, terminal spine 8–24 mm long with 1–3 pairs of spinules at base. Florets pink to mauve; inner (fertile) florets with tube 10.5–14 mm long, glandular, and lobes 2.5–4.5 mm long; sterile florets c. same length as fertile florets. Anthers 5–7.5 mm long. Achenes ellipsoid, 3–3.7 mm long, glabrous, streaked brown and grey. Pappus absent or present, with longest bristles c. 1.5 mm long. *Star Thistle*. Fig. 5A–C.

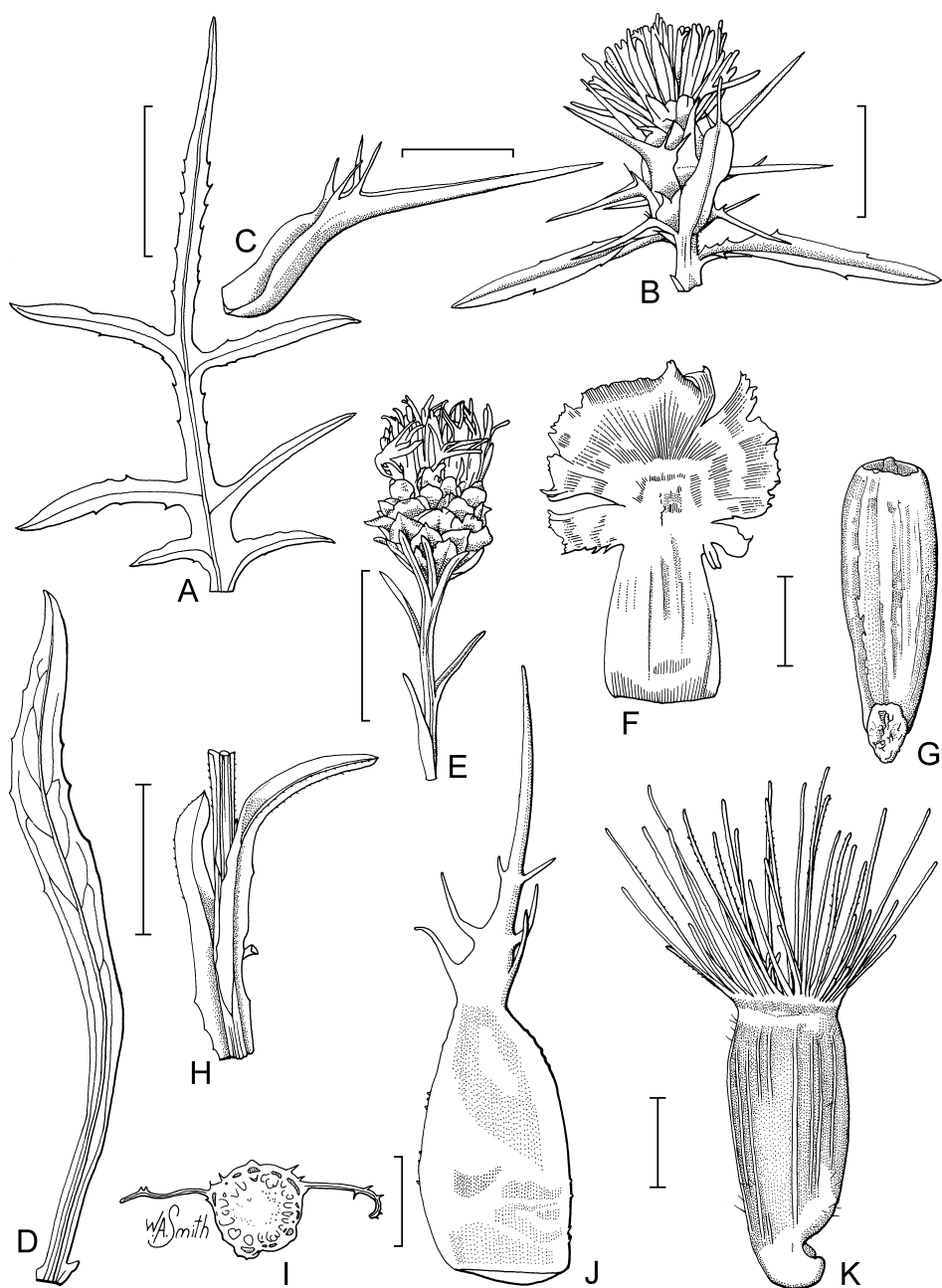
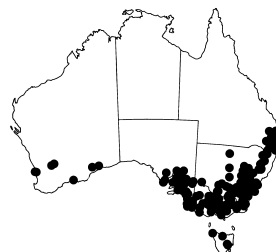


Figure 5. *Centaurea*. **A–C**, *C. calcitrapa*. **A**, lower leaf; **B**, flowering capitulum and upper leaves; **C**, median involucre bract (**A**, A.R.Bean 15747, BRI; **B**, **C**, A.R.Bean 24574, BRI). **D–G**, *C. jacea*. **D**, lower leaf; **E**, flowering capitulum and upper leaves; **F**, median involucre bract; **G**, achene (**D–F**, P.I.Forster 25378 & L.H.Bird, BRI; **G**, L.H.Bird *s.n.*, BRI). **H–K**, *C. melitensis*. **H**, lower leaves and stem; **I**, TS of stem showing wings; **J**, median involucre bract; **K**, achene and pappus. (**H**, **I**, A.R.Bean 15617, BRI; **J**, G.N.Batianoff 2112426 & D.Halford, BRI; **K**, L.S.Smith 3047, BRI). Scales bars: **A**, **D**, **E**, **H** = 20 mm; **B** = 10 mm; **C** = 5 mm; **F**, **I**, **J** = 1 mm; **G**, **K** = 0.5 mm. Drawn by W.A.Smith.

Native to southern Europe, SW Asia and northern Africa. Naturalised in parts of northern Europe, Canada, U.S.A., S Africa, New Zealand, S America and Australia. Widely naturalised in southern Australia, where annual rainfall is above 400 mm. Previously naturalised in Qld (not recorded since 1966) and Tas. (not recorded since 1947). Flowers and fruits Oct.–June.

W.A.: c. 1 km E of Carrabin roadhouse on Great Eastern Hwy, c. 40 km E of Southern Cross, May 1998, *R.Tanner s.n.* (AD, BRI, CANB, MEL, NSW, PERTH). S.A.: 3 km E of Kimba, *C.R.Alcock 3830* (AD). Qld: Warwick, Jan. 1966, *G.Wilkinson* (BRI). N.S.W.: alongside Peel R., below Chaffey Dam, *J.R.Hosking 696* (CANB, MEL, NSW, NE). A.C.T.: Mr J.Garran's farm, *N.Burbidge 7707* (BRI, CANB). Vic.: Williamstown, *R.V.Smith 68/29* (BRI, MEL). Tas.: Sheffield, Area school, 19 Feb. 1947, *M.J.Firth s.n.* (HO).



While many Australian collections of *C. calcitrapa* have achenes which lack a pappus, a significant proportion includes achenes (especially the immature ones) with a pappus up to 1.5 mm long. These geographically scattered collections differ in no other way from *C. calcitrapa*, and are accepted here as that species. A few Australian collections of *C. calcitrapa* bearing a pappus have been identified as *C. iberica* Trevir. ex Spreng., but the involucre are too narrow to be that species.

2. **Centaurea aspera* L., *Sp. Pl.* 2: 916 (1753)

T: not designated.

C. isnardii L., *Sp. Pl.* 2: 916 (1753). T: not designated.

Annual or biennial to 0.6 m high. Stems with adpressed arachnoid hairs, becoming glabrous; wings absent. Cauline leaves narrowly ovate to linear, pinnatifid (lower) to entire (upper), green to grey-green above and below, with sparse scabrid and arachnoid hairs; sessile glands present. Capitula solitary, pedunculate; involucre cylindrical to ovoid, 8–10 mm diam. at anthesis; median involucral bracts elliptic to ovate, 5–8 mm long, 2.5–3.5 mm wide, glabrous; appendages comprising 3–5 straight, patent, pungent spines, each 1.5–3 mm long. Florets pink to mauve; inner (fertile) florets with tube 10–12 mm long, glandular, and lobes 4–4.5 mm long; sterile florets c. same length as fertile florets. Anthers 6.5–7.5 mm long. Achenes ellipsoid, 3.8–4.3 mm long, glabrous, streaked brown and grey. Longest pappus bristles 0.8–1.5 mm long, white. *Rough Star Thistle*.

Native to western Europe (Portugal, Spain, France and Italy) and Morocco. It is sparingly naturalised in Great Britain, the Channel Is and Australia. In Australia, it is apparently confined to Hindmarsh Is. in S.A., where it has existed since at least 1930. It was recorded once from N.S.W. in 1925. One specimen includes the note that it grows mainly on limestone. Flowers recorded in Oct. and Dec.; fruits recorded for Dec. and May.



S.A.: Goolwa district, 15 Dec. 1955, *coll. unknown* (AD); Hindmarsh Is., just E of Goolwa, 11 May 1956, *J.Dodd* (AD); Hindmarsh Is., 12 Dec. 1975, *D.Keane* (AD); Hindmarsh Is., 17 Oct. 1930, *H.Newell s.n.* (AD). N.S.W.: Uppington, Koorawatha, 3 Mar. 1925, *M.J.Steinbrecher s.n.* (NSW).

3. **Centaurea melitensis* L., *Sp. Pl.* 2: 917 (1753)

T: Malta, *Herb. Linn. No. 1030.62*; lecto: LINN, *fide* M.O.Dillon, *Fieldiana, Bot. n.s.* 10: 2 (1982).

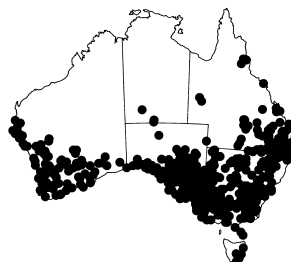
Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 720 (1981); B.A.Auld & R.W.Medd, *Weeds - An illustrated guide to the weeds of Australia* 91 (1987); F.J.Richardson *et al.*, *Weeds of the South-east* 125 (2006).

Annual or biennial to 0.8 m high. Stems with sparse arachnoid and short scabrid hairs, becoming glabrous; wings present. Cauline leaves linear to narrowly lanceolate, entire, green above and below, sparsely to densely scabrid; sessile glands present. Capitula solitary or occasionally 2 together, pedunculate; involucre ovoid to globose, 7–11 (–13) mm diam. at

arachnoid hairs; appendages comprising a straight, patent, pungent, terminal spine 3–7 mm long with (2 or) 3 pairs of lateral spinules, the distal pair about halfway along spine. Florets yellow; inner (fertile) florets with tube 7–10 mm long, glandular, and lobes 1.3–2 mm long; sterile florets c. same length as fertile florets. Anthers 3–3.5 mm long. Achenes cylindrical, 2.5–3 mm long, sparsely hairy, brown. Longest pappus bristles 2.0–2.5 mm long, white. *Malta Thistle*, *Maltese Cockspur*. Plate 6; Fig. 5H–K.

Native to southern Europe and northern Africa. Naturalised in Zimbabwe, U.S.A., Brazil, Peru, Argentina, S.Africa, New Zealand and Australia. Widely naturalised in extra-tropical Australia. Flowers and fruits Sept.–June.

W.A.: 14.4 km E of Hopetoun, on South East Ocean Rd, *B.J.Lepschi & T.R.Lally BJL3210* (CANB, PERTH). S.A.: Gawler Ra., Mt. Ive tank, *J.Z.Weber 8125* (AD, BRI). Qld: 17.6 km S of Inglewood on road to Texas, *G.N.Batianoff 200112124* (BRI). N.S.W.: 9.5 km N of Stannifer, *A.R.Bean 24573* (BRI, CANB, NSW). A.C.T.: Canberra, 1930, *J.Calvert s.n.* (CANB). Vic.: Daylesford, 1878, *Wallace s.n.* (MEL). Tas.: Bothwell, Jan. 1984, *A.Ashby s.n.* (HO, MEL).



4. **Centaurea eriophora* L., *Sp. Pl.* 2: 916 (1753)

T: Spain; not designated.

Annual or biennial to 0.8 m high. Stems with dense persistent arachnoid hairs; wings present. Cauline leaves lanceolate to spatulate, dentate to pinnatifid (lower) or entire (upper), grey above and below, with dense scabrid and arachnoid hairs; sessile glands present. Capitula solitary, pedunculate; involucre broadly ovoid to globose, 17–20 mm diam. at anthesis; median involucre bracts elliptic, 8–10 mm long, 4–5.5 mm wide, with sparse to dense arachnoid hairs; appendages comprising a straight, patent, pungent, terminal spine 8–13 mm long with 3 or 4 pairs of lateral spinules, the distal pair about halfway along spine. Florets greenish yellow; inner (fertile) florets with tube 15–16 mm long, glandular, and lobes 2.5–3 mm long; sterile florets shorter than fertile florets. Anthers 5.5–6 mm long. Achenes cylindrical, 4–4.5 mm long, sparsely hairy, brown and yellow in streaks. Longest pappus bristles 6–7.5 mm long, dark brown. *Woolly Cockspur*.

Native to Spain and Portugal, N Africa, and possibly Israel. Sparingly naturalised in Australia; known from 2 localities from S.A., with collections in 1984 and 1996. Flowers and fruits recorded Nov.

S.A.: Cambrai, *C.R.Alcock 7797* (AD); Road reserve adjoining Section 164, Hundred of Bagot, c. 12 km NE of Sedan, *D.A.Cooke 718* (AD, MEL); Sedan, on roadside adjacent Hundred of Bagot, Section 164, Nov. 1984, *R.Hodges s.n.* (AD, MEL).



5. **Centaurea solstitialis* L., *Sp. Pl.* 2: 917 (1753)

T: "Habitat in Gallia, Anglia, Italia", *Herb. Linn. No. 1030.59*; lecto: LINN, *fide* C.Jeffrey, *Kew Bull.* 22: 136 (1968).

Illustrations: A.Clemson, *Honey and Pollen Fl.* 213–4 (1985); B.A.Auld & R.W.Medd, *Weeds - An illustrated guide to the weeds of Australia* 91–2 (1987); F.J.Richardson *et. al.*, *Weeds of the South-east* 126 (2006).

Annual or biennial to 0.8 m high. Stems with dense adpressed arachnoid persistent hairs; wings present. Cauline leaves narrowly lanceolate to linear, entire, grey above and below, with adpressed arachnoid hairs; sessile glands present. Capitula solitary, pedunculate; involucre ovoid to globose, 8–11 mm diam. at anthesis; median involucre bracts elliptic to ovate, 4–7.5 mm long, 3–4 mm wide, with arachnoid hairs; appendages comprising a straight, patent, pungent, terminal spine 12–26 mm long with 2 pairs of lateral spinules near base of spine. Florets yellow; inner (fertile) florets with tube 10–14 mm long, not glandular, and lobes 3–4.5 mm long; sterile florets shorter than fertile florets. Anthers 5.5–7 mm long.

Achenes cylindrical, 2.5–3 mm long, glabrous, brown. Longest pappus bristles 3–4 mm long, white. *St Barnaby's Thistle*, *Yellow Star Thistle*. Fig. 6A–E.

Native to nearly all countries bordering the Mediterranean Sea, extending to SW Asia. Naturalised in U.S.A., Bolivia, Argentina, S.Africa, New Zealand and Australia. A widespread weed of SE mainland Australia. It has not been collected in W.A. since 1969. Flowers Oct.–Apr.; fruits Nov.–May.

W.A.: near Caiguna, Eyre Hwy, 25 Nov. 1969, *A.C.Lints s.n.* (PERTH). S.A.: Manoora, c. 105 km NNE of Adelaide, 7 Sept. 1967, *H.Amtsberg* (AD). Qld: Inglewood–Warwick road, 3 km from Inglewood, *S.L.Everist 9856* (BRI, CANB). N.S.W.: Sinclair Lookout, Waterloo Ra., 14.4 km W of Glen Innes, *R.Coveny 12494 et al.* (BRI, MEL, NSW). Vic.: Ovens Hwy, 4 miles [6.5 km] E of Wangaratta, *T.B.Muir 2061* (CANB, MEL).



6. **Centaurea benedicta* (L.) L., *Sp. Pl.* 2nd edn, 2: 1296 (1763)

Cnicus benedictus L., *Sp. Pl.* 2: 826 (1753); *Carbeni benedicta* (L.) Adans., *Fam. Pl.* 2: 116 (1763). T: islands of Khios and Lemnos, Greece, *Herb. Clifford.* 394, *Cnicus* 1; lecto: BM, *fide* C.Jeffrey, *Kew Bull.* 22: 138 (1968).

Illustrations: R.J.Moore & C.Frankton, *Thistles of Canada* 99 (1974); G.J.Harden (ed.), *Fl. New South Wales* 3: 328–9 (1992).

Annual or biennial to 0.3 m high. Stems with sparse arachnoid and multicellular hairs; wings absent. Cauline leaves elliptic, sinuate, toothed (teeth 0.5–1.5 mm long), green above and below, with sparse multicellular hairs; sessile glands present. Capitula solitary, sessile; involucre subglobose, 15–25 mm diam. at anthesis, surrounded and partly obscured by foliose bracts; median involucral bracts ovate, 10–12 mm long, 5–6 mm wide, glabrous or with sparse arachnoid hairs; appendages 8–16 mm long, with spreading pectinate spines. Florets yellow; inner (fertile) florets with tube 7–12 mm long, not glandular, and lobes 2–4 mm long; sterile florets longer than fertile florets. Anthers 3.5–4.5 mm long. Achenes cylindrical, 7.2–8.5 mm long, glabrous, grey, longitudinally ribbed. Pappus in 2 rows each of 10 awns; outer awns 10–11 mm long, aristate; inner awns 2.3–3 mm long, fimbriate. *Blessed Thistle*.

Native to most countries bordering the Mediterranean Sea, eastwards to central Asia, and naturalised in many temperate areas of the world. It was sparingly naturalised in SE Australia during the early to mid 1900s, but no specimens have been collected since 1955, nor have there been any reported occurrences in the literature. Habitat is unknown. Flowers and fruits recorded July–Nov.

Qld: Dundas near Fernvale, 13 Oct. 1955, *A.C.Hoffman* (BRI, CANB); Oakley, Sept. 1948, *Valuer General* (BRI). N.S.W.: Wagga, Nov. 1939, *W.C.Duggan* (NSW); Leeton, July 1924, *A.N.Shepherd* (NSW). Vic.: Wangaratta, Oct. 1911, *C.J.Kidd* (MEL).



In the Middle Ages, infusions of this species were believed to be a cure-all, effective against the plague and able to ward off evil.

7. **Centaurea paniculata* L., *Sp. Pl.* 2: 912 (1753)

T: “Habitat in G. Narbonensi, Austria, Hispania, Verona, Sibiria”; lecto: drawing in J.Bauhin & J.H.Cherler, *Hist. Pl.* 3(1): 31 (1651), *fide* W.Greuter *et al.*, *Taxon* 50: 1205 (2001).

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 678 (1999).

Annual or biennial to 0.8 m high. Stems with short scabrous and adpressed woolly hairs; wings absent. Cauline leaves linear, pinnatisect or entire, grey-green above and below, with short scabrous hairs; sessile glands present. Capitula solitary, pedunculate; involucre narrowly ovoid, 4.5–7.5 mm diam. at anthesis; median involucral bracts narrowly elliptic, 6–8 mm long, 1.3–2 mm wide, glabrous or with sparse arachnoid hairs; appendages c. 1.5 mm long, brown, with 4–6 pairs of stiff marginal cilia. Florets purple; inner (fertile) florets with tube

7–7.5 mm long, glandular, and lobes 2.5–3 mm long; sterile florets longer than fertile florets. Anthers 5–5.5 mm long. Achenes ellipsoid, c. 3.5 mm long, sparsely tomentose, pale brown. Longest pappus bristles 1.5–2 mm long, white.

Native to SW Europe (Portugal, Spain, France, Italy). In Australia it was, and perhaps still is, infrequently naturalised in NE Vic. and SE S.A. Flowers and fruits Jan.–Mar.

S.A.: Hope Valley reservoir, 4 July 1908, *H.H.D.Griffiths s.n.* (AD); Hope Valley, c. 12 km NE of Adelaide, 4 June 1908, *S.A.White s.n.* (AD). Vic.: Mudgegonga, 24 Feb. 1937, *R.A.Black s.n.* (MEL); Myrtleford, *L.Ling 1221* (MEL); S of Yackandandah, 24 Jan. 1940, *R.T.Patton s.n.* (MEL).

Not recorded in Australia since 1955, and it is doubtful whether it is still present. Closely related to *C. stoebe*.



8. **Centaurea stoebe* L., *Sp. Pl.* 2: 913 (1753)

T: Austria, Neiderösterreich, 13 July 1908, *E.Korb s.n.*; neo: W, *fide* W.Greuter, *Willdenowia* 33: 56 (2003).

[*C. maculosa* auct. non Lam.: F.J.Richardson *et. al.*, *Weeds of the South-east* 124 (2006)]

Annual or biennial to 0.7 m high. Stems with adpressed arachnoid hairs; wings absent. Cauline leaves linear, pinnatisect to entire, grey-green above and below, with adpressed arachnoid hairs; sessile glands present. Capitula solitary, pedunculate; involucre narrowly ovoid, 4–7 mm diam. at anthesis; median involucral bracts narrowly elliptic, 5–8 mm long, 1.5–2 mm wide, glabrous or with sparse arachnoid hairs; appendages 1.5–2 mm long, dark brown to black, with 5–7 pairs of stiff marginal cilia. Florets purple; inner (fertile) florets with tube 8–9 mm long, glandular, and lobes 3–4 mm long; sterile florets longer than fertile florets. Anthers 4–5.5 mm long. Achenes cylindrical, 2.7–3 mm long, sparsely tomentose, dark brown. Longest pappus bristles 1–1.5 mm long, white. Fig. 6F–H.

Native to eastern Europe, and widely naturalised in Canada and U.S.A. Naturalised in Australia at a single known location in the A.C.T. Flowers and fruits recorded Jan.–Mar.

A.C.T.: Sharp hairpin bend before Cotter Pumping Station, Murrumbidgee R., *M.Gray & L.G.Adams 7121* (CANB, MEL); inside bend of Cotter Rd, opposite Casuarina Sands entrance, 5 Feb. 1999, *D.Roso s.n.* (BRI, CANB, PERTH).



9. **Centaurea cineraria* L., *Sp. Pl.* 2: 912 (1753)

T: Italy, *Herb. Linn. No. 1030.22*; lecto: LINN, *fide* G.C.Renzoni & L.Viegi, *Atti Soc. Tosc. Sci. Nat. Pisa Mem., ser. B* 89: 105 (1983).

Illustration: Anon., *Botanica's Pocket Annuals and Perennials* 208 (1999).

Annual or biennial to 0.9 m high. Stems with dense adpressed arachnoid hairs; wings absent. Cauline leaves elliptic, pinnatisect to bipinnatisect, silvery-grey above and below, with dense persistent adpressed arachnoid hairs; sessile glands present. Capitula solitary, pedunculate; involucre broadly ovoid, 11–15 mm diam. at anthesis; median involucral bracts broadly elliptic, 5–9 mm long, 2.5–4 mm wide, with sparse arachnoid hairs; appendages 1–1.5 mm long, brown, with 5–8 pairs of stiff marginal cilia. Florets purple; inner (fertile) florets with tube 13–15 mm long, glandular, and lobes 4–5.5 mm long; sterile florets longer than fertile florets. Anthers 7.5–8.5 mm long. Achenes ellipsoid, 3.6–4.3 mm long, sparsely tomentose, grey. Longest pappus bristles 2–2.5 mm long, white. *Dusty Miller*.



Native to Italy, but widely cultivated as an ornamental; naturalised in New Zealand and Australia. In Australia it occurs at several localities in S.A., in sandy soils close to the ocean. Flowers and fruits recorded Jan.

S.A.: S of Port Stanvac, *R.J.Bates* 26079 (AD); Hart, just out of town, off road to Brinkworth, *R.J.Bates* 63633 (AD); Hallett Cove, foreshore at The Amphitheatre, *P.C.Heyligers* 99037 (CANB); Stenhouse Bay, Innes Natl Park, *D.E.Symon* 9542 (AD, CANB).

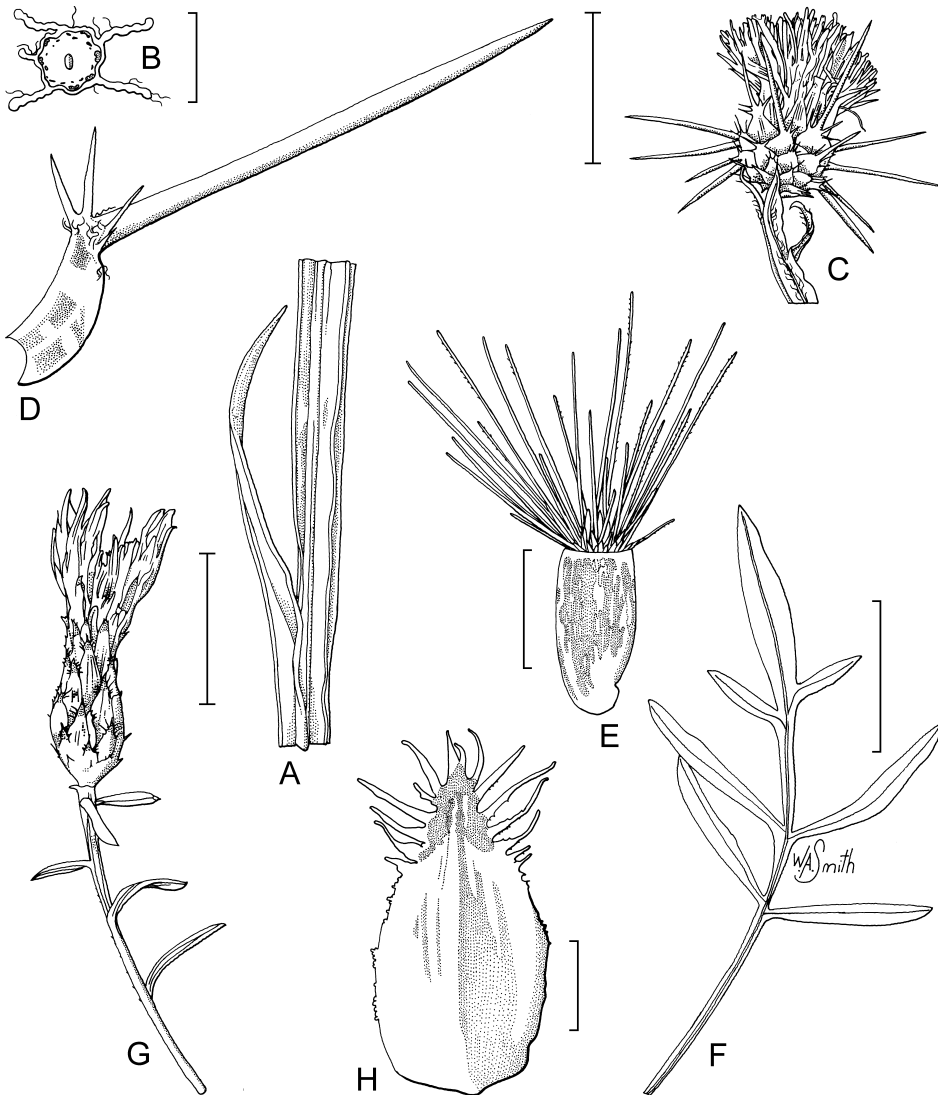


Figure 6. *Centaurea*. **A–E**, *C. solstitialis*. **A**, lower leaf and stem; **B**, TS of stem, showing wings; **C**, flowering capitulum; **D**, median involucre bract; **E**, achene and pappus (**A–D**, G.N.Batianoff 20011283 & D.Halford, BRI; **E**, A.R.Bean 8210, BRI). **F–H**, *C. stoebe*. **F**, lower leaf; **G**, flowering capitulum and upper leaves; **H**, median involucre bract (**F–H**, D.Roso s.n., BRI). Scales bars: **A**, **G** = 10 mm; **B**, **E** = 2 mm; **C**, **F** = 20 mm; **D** = 5 mm; **H** = 1 mm. Drawn by W.A.Smith.

10. *Centaurea nigra L., *Sp. Pl.* 2: 911 (1753)

T: 'Habitat in Anglia, Helvetia, Austria', *Herb. Linn. No. 1030.13*; lecto: LINN, *fide* E.Marsden-Jones & W.B.Turrill, *Brit. Knapweeds* 13, t. 4 (1954).

C. sp. B, L.Murray in G.J.Harden (ed.), *Fl. New South Wales* 3: 326 (1992).

[*C. nigrescens* auct. non Willd. subsp. *nigrescens*: W.R.Barker *et al.*, *Census S. Austral. Vasc. Pl.* 5th edn 140 (2005)]

Illustrations: F.J.Richardson *et al.*, *Weeds of the South-east* 125 (2006); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 678 (1999).

Annual or biennial to 0.8 m high. Stems with short scabrous and adpressed arachnoid hairs; wings absent. Cauline leaves lanceolate to elliptic, entire, green above and below, with short scabrous and longer multicellular hairs; sessile glands present but very sparse. Capitula solitary, pedunculate; involucre broadly ovoid, 10–13 mm diam. at anthesis; median involucre bracts narrowly elliptic, 4–7 mm long, 1.3–2 mm wide, glabrous or with sparse arachnoid hairs; appendages 3.5–5 mm long, dark brown to black, with 7–12 pairs of stiff marginal cilia. Florets all bisexual, purple; tube 7–9 mm long, not glandular; lobes 3.5–5 mm long. Anthers 6–6.5 mm long. Achenes obovoid, 3–3.5 mm long, sparsely tomentose, grey. Longest pappus bristles c. 0.5 mm long, white. *Black Knapweed*.

Native to western Europe, including Great Britain, and N Africa; naturalised in Canada, U.S.A., New Zealand and Australia. In Australia, known only from a few localities in Vic., and one in S.A. Flowers and fruits Jan.–Mar.

S.A.: Eden Valley, near new dam site, *R.Bates 52081* (AD). Vic.: Gisborne, 100 m W of intersection of Ross Watt Rd and Swinburne Ave., Jan. 2004, *L.Milne s.n.* (MEL); Melbourne–Ballarat railway line, 200 m E of Llandeiro road crossing, Feb. 1990, *G.Wallace s.n.* (CANB, MEL).

Tasmanian records of this species are *C. ×moncktonii*.

**11. *Centaurea ×moncktonii** C.E.Britton, *Bot. Soc. Exch. Club Brit. Isles* 1920 6: 172 (1921)

T: United Kingdom, Epsom Downs, Surrey; syn: K *n.v.*; Hassocks, W. Sussex, *T.Hilton*; syn: K *n.v.*; Wellington College, Berks, *H.W.Monckton*; syn: K *n.v.*; Wellington College, Berks, *C.E.Britton*; syn: K *n.v.*

[*C. nigra* auct. non L.: J.H.Willis, *Handb. Pl. Victoria* 2: 765 (1972); D.A.Cooke in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia*, 4th edn, 3: 1632 (1986); J.A.Jeanes in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 681 (1999); W.M.Curtis, *Students Fl. Tasmania* 2: 379 (1963)]

[*C. jacea* auct. non L.: W.M.Curtis, *Students Fl. Tasmania* 2: 378 (1963)]

Illustration: W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds Australia* 262–4 (1992), as *C. nigra*.

Annual or biennial to 0.7 m high. Stems with short scabrous and adpressed arachnoid hairs; wings absent. Cauline leaves lanceolate to narrowly elliptic, entire, green above and below, with short scabrous and long arachnoid hairs; sessile glands absent. Capitula solitary, pedunculate; involucre broadly ovoid, 15–20 mm diam. at anthesis; median involucre bracts narrowly elliptic, 2–4.5 mm long, 1.5–2.5 mm wide, glabrous or with sparse arachnoid hairs; appendages 3.5–5 mm long, pale to dark brown, with 3–12 pairs of marginal cilia or broad divisions. Florets purple; inner (fertile) florets with tube 8–10 mm long, not glandular, and lobes 4–5 mm long; sterile florets longer than fertile florets. Anthers 5.5–7 mm long. Achenes obovoid, 3–3.5 mm long, sparsely tomentose, grey to brown. Longest pappus bristles c. 0.5 mm long, white. *Meadow Knapweed*, *Protean Knapweed*.

Originating in Europe, but now naturalised and widespread in N America. In Australia, it is naturalised in Vic., S.A. and Tas., and was formerly recorded from N.S.W. Flowers Nov.–Mar.; fruits Nov.–May.



S.A.: Encounter Bay, Fleurieu Penin., Sept. 1928, *J.B.Cleland s.n.* (AD). N.S.W.: Tenterfield, Nov. 1903, *H.A.Smith s.n.* (NSW). Vic.: end of Hilton Rd, Ferny Ck, *J.R.Hosking 2561* & *V.Stajsic* (CANB, MEL, NE, NSW); near corner Colman St and Skinners Rd, Warragul, *R.V.Smith 64/14* (AD, MEL). Tas.: Sheffield, Apr. 1947, *R.A.Black s.n.* (MEL).

Widely considered to be a hybrid between *C. jacea* and *C. nigra*. It is particularly variable in the extent of division of the involucre bract appendages. Australian specimens were formerly determined as *C. nigra*. It differs from that species by the presence of sterile florets and the brown (rather than black) appendages of the involucre bracts.

12. **Centaurea jacea* L., *Sp. Pl.* 2: 914 (1753)

T: 'Habitat in Europa septentrionale', *Herb. Linn. No. 1030.36*; lecto: LINN, *vide* E.Marsden-Jones & W.B.Turrill, *Brit. Knapweeds* 14, t. 2 (1954).

Annual or biennial to 0.7 m high. Stems with adpressed arachnoid hairs; wings absent. Cauline leaves linear to lanceolate, entire, green to silvery-green above and below, with adpressed arachnoid or short scabrous hairs; sessile glands present. Capitula solitary, pedunculate; involucre broadly ovoid, 7–16 mm diam. at anthesis; median involucre bracts narrowly elliptic, 4–6 mm long, 1.5–2 mm wide, glabrous or with sparse arachnoid hairs; appendages 4–5.5 mm long, white to pale brown, membranous, ±orbicular with irregular marginal teeth and a few deep radial lacerations. Florets purple; inner (fertile) florets with tube 8–8.5 mm long, glandular, and lobes 3.5–5 mm long; sterile florets longer than fertile florets. Anthers 5–6.5 mm long. Achenes cylindrical, c. 3 mm long, glabrous or sparsely tomentose, grey. Pappus absent. *Brown Knapweed*. Fig. 5D–G.

Native to continental Europe, where it is widespread, and in NW Africa. It is naturalised in Canada, U.S.A., New Zealand and Australia. Uncommon in Australia, being confined to just a few sites in S.A., Qld, and Vic. Flowers and fruits Nov.–June.



S.A.: Norwood, Jan. 1904, *J.M.Black s.n.* (NSW). Qld: 300 m E of Jones Rd, Redbank Plains, Ipswich, 29 Apr. 1989, *L.H.Bird s.n.* (BRI, K, US). Vic.: Olinda, Dandenong Ra., c. 45 km E of Melbourne, *N.G.Karunajeewa 07/5* (CANB, MEL); Neerim North, 5 Mar. 1920, *H.Sharples s.n.* (MEL).

Excluded name

Centaurea cyanoides Wahlenb., *Resor i Europa och Osterlanderne af J. Berggren Bihang* 2: 65 (1826)

T: unknown.

This name (attributed to Berger) was listed in R.J.Hnatiuk, *Census Austral. Vasc. Pl.* 48 (1990), for W.A. The record does not appear to be supported by herbarium specimens.

ASTERACEAE

Subfam. 3. CICHORIOIDEAE

A.E.Orchard

Asteraceae subfam. *Cichorioideae* Chevall., *Fl. Gén. Env. Paris* 2: 531 (1828), as *Cichoraceae*

T: *Cichorium* L.

Asteraceae subfam. *Lactucoideae* Cass. in J.C.Loudon, *Encycl. Pl.* 1073 (1829). T: *Lactuca* L.

Perennial biennial or annual herbs (shrubs or trees, rarely scandent or aquatic elsewhere). Leaves alternate or opposite, often rosulate, usually simple, entire to deeply lobed, usually not spiny (spiny in *Berkheya*, *Scolymus*; weakly spiny in *Sonchus*, *Lactuca*). Capitula solitary on terminal scapes or cymose, discoid, ligulate or radiate, homogamous to heterogamous; involucre bracts (1–) 2–many-seriate, gradate, rarely spiny (stiff and burr-like in *Berkheya*, spiny in *Scolymus*); receptacle epaleate and alveolate, glabrous, sometimes paleate. Florets usually numerous, rarely solitary (not in Australia), all fertile or some sterile, all tubular, all ligulate, or inner tubular and outer radiate, usually 5-merous; anthers calcarate, caudate or ecaudate, with tails usually simple; style shaft lacking articulation but sometimes thickened apically, glabrous; style branches usually long, tapered, acute, dorsally hairy; stigmatic papillae covering entire inner surface of branches. Achenes variously shaped (often with a long neck), usually with twin hairs. Pappus of bristles or scales, sometimes heteromorphic, rarely absent.

A subfamily of c. 241 genera and 2900 species, almost cosmopolitan; many are widespread weeds. In Australia, 3 tribes, 36 genera and c. 85 species, the majority introduced, but some native.

Trib. 1. CICHORIEAE

I.R.Thompson

Taraxacum by *N.H.Scarlett*

Microseris by *B.V.Sneddon*

Helminthotheca & *Picris* by *S.Holzapfel*

Asteraceae trib. *Cichorieae* Lam. & DC., *Syn. Pl. Fl. Gall.* 255 (1806)

Type: *Cichorium* L.

Asteraceae trib. *Lactuceae* Cass., *J. Phys. Chim. Hist. Nat. Arts* 88: 151 (1819). T: *Lactuca* L.

Herbs, or rarely (not in Australia) shrubs, trees and vines, mostly taprooted; latex abundant. Hairs glandular or eglandular, sometimes 2–5-furcate, rarely stellate. Leaves alternate and/or rosulate, not glandular. Inflorescences terminal. Capitula ligulate, with all florets bisexual, pedunculate, less often sessile to sub-sessile; involucre bracts uni-, bi- or multiseriate, free or nearly so, sometimes with outgrowths; receptacle epaleate except in *Hypochaeris* and *Scolymus* (in Australia), usually \pm flat. Florets bisexual; ligule commonly yellow (adaxial surface), also of other colours, with apex truncate, 5-lobed; tube generally pilose at least at summit; anthers calcarate and caudate, with apical appendage thin, obtuse to rounded; style with acute hairs, \pm evenly distributed; style branches generally long, tapering, with a single stigmatic area. Achenes homomorphic or dimorphic, terete or compressed, beaked or not, with ribs ornamented or smooth; papillose hairs lacking. Pappus sometimes dimorphic, rarely absent, comprising bristles or scales; bristles/scales sometimes of 2 types within a pappus, smooth, scabridulous, barbellate, or plumose.

A tribe of c. 98 genera. In Australia 23 genera and c. 50 species, with 16 of the genera represented entirely by introduced species. Three genera are represented by a mixture of native and introduced species, and 4 genera are represented by exclusively native species. *Actites* is the only genus and *A. megalocarpus* is the only species endemic in Australia.

ASTERACEAE

Members of the tribe are readily recognised by the presence of abundant latex and the ligulate capitula. Most species are erect, tap-rooted plants, however, the native *Launaea sarmentosa* and the introduced *Hieracium aurantiacum* are stoloniferous, and *Actites megalocarpus* is rhizomatous. Many species are widespread and common weeds of urban environments, wasteland and agricultural land.

Achenial dimorphism, where the generally small proportion of achenes located peripherally on the receptacle differ from those located centrally, occurs in several genera. Sometimes these marginal achenes are concealed within the concavity of the adjacent hardened involucre bract. The term beak is used to refer to the prolonged distal tapering seen in achenes of some species. The ligules of members of the Cichorieae are thin and have a truncate, distinctly 5-lobed apex. The ligule is most often yellow, although the abaxial surface often has a pale or variously coloured stripe. Another feature is the clumping of withered corollas so that they fall away from the capitulum en masse.

In all descriptions below, the diameter of the involucre is the diameter in unpressed specimens measured at about mid-involucre.

I.R.Thompson, A taxonomic treatment of tribe Lactuceae (Asteraceae) in Australia, *Muelleria* 25: 59–100 (2007); H.W.Lack, *VIII. Tribe Cichorieae Lam. & DC. (1806)*, in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 180–199 (2007); N.Kilian, B.Gemeinholzer & H.W.Lack, *Cichorieae*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 343–383 (2009).

KEY TO GENERA

- | | |
|--|-------------------------------|
| <p>1 Stem leaves ±rigid, spiny, decurrent as prominent wings down stems; capitula subsessile, surrounded and exceeded by large foliaceous bracts; paleae c. 6–7 mm long, enclosing achene</p> | <p>1. SCOLYMUS</p> |
| <p>1: Stem leaves absent or soft to firm, sometimes weakly spiny, not decurrent down stem; capitula not both subsessile and surrounded and exceeded by large foliaceous bracts; paleae absent or > 10 mm long, not enclosing achene</p> | |
| <p>2 Pappus of at least central florets with plumose bristles (i.e. bristles with long, extremely fine branches)</p> | |
| <p>3 Involucral bracts uniseriate (rarely an isolated outer bract present); achenes 10–50 mm long</p> | |
| <p>4 Leaves not grass-like, pinnate-veined, with scattered hairs on both surfaces; peduncle setose, sometimes minutely so; ligule yellow, exceeding involucre; achenes with an abrupt junction between body and beak sections</p> | <p>17. UROSPERMUM</p> |
| <p>4: Leaves grass-like, parallel-veined, glabrous; peduncle not setose; ligule pale to dark purplish, or if yellow then much shorter than involucre; achenes with a smooth transition into beak</p> | <p>23. TRAGOPOGON</p> |
| <p>3: Involucral bracts bi- or multiseriate; achenes 3–15 mm long</p> | |
| <p>5 Paleae attending each floret</p> | <p>18. HYPOCHAERIS</p> |
| <p>5: Paleae absent</p> | |
| <p>6 Spreading hairs absent; achenes pale, without transverse ridges, not beaked or tapering distally, slightly inflated and whitish in proximal third</p> | <p>22. SCORZONERA</p> |
| <p>6: Spreading furcate hairs present; all or most achenes orange-brown with transverse scale-like ridges and beaked or at least tapering distally</p> | |
| <p>7 Plants scapose; hairs on stems and leaves bifurcate, with prongs not recurved; pappus of marginal achenes a corona of fused scales 0.5–1 mm long</p> | <p>19. LEONTODON</p> |

ASTERACEAE

- 7: Plants usually with cauline leaves; hairs on stems and leaves
2–5-furcate with prongs recurved; pappus of marginal achenes
not as above
 - 8 Capitula surrounded by 5 ovate foliaceous bracts, > 4 mm wide,
inner involucre bracts bearing a long setose sub-apical spur;
achenes heteromorphic
 - 8: Capitula surrounded by > 5 bracts, at least some < 4 mm wide;
inner involucre bracts without a sub-apical spur; achenes
homomorphic
 - 2: Pappus never containing plumose bristles (bristles either scabrid-
barbellate or ±smooth) or pappus absent
 - 9 Achenes beaked (zone of distal narrowing > 1 mm long)
 - 10 Plants scapose; capitulum usually solitary
 - 10: Plants with stem leaves and/or branches; capitula few to numerous
 - 11 Achenes strongly compressed
 - 11: Achenes not or only slightly compressed
 - 12 Stems often leafless at anthesis; capitula in ±sessile clusters along
branches; bracts lacking setose or glandular hairs; achenes with a
prominent ring of scales at the abrupt transition from body to beak
 - 12: Stem leaves present at anthesis; all capitula distinctly
pedunculate; bracts with spreading setose or glandular hairs;
achenes ±gradually tapering, with ring of scales absent
 - 9: Achenes not beaked (achenes not narrowing distally or zone of distal
narrowing < 1 mm long)
 - 13 Stem leaves generally no more than 4; inner involucre bracts firm,
strongly convex at maturity; marginal and central achenes markedly
different and/or their pappus very different in length
 - 14 Leaf hairs simple; outer involucre bracts shorter or longer than
inner bracts; achenes 1.3–2.0 mm long
 - 14: Leaf hairs furcate; outer involucre bracts shorter than inner bracts;
achenes 4.5–9 mm long
 - 13: Stem leaves few to many, or leaves all basal; inner involucre bracts
sometimes firm or convex at maturity; achenes and/or pappus all
similar
 - 15 Ligule of florets entirely blue, rarely white or pink; pappus of
minute scales
 - 15: Ligule of florets yellow or orange; pappus of bristles or hairs or
absent
 - 16 Leaves divided with terminal lobe/segment markedly larger than
lateral lobes; outer involucre bracts ovate, 0.5–1 mm long; inner
bracts 4–8 mm long, glabrous; pappus absent or c. 3 mm long
 - 17 Stem leaves 0–3; inner involucre bracts 4–5 mm long,
remaining thin, only keeled near base; pappus present
 - 17: Stem leaves > 3; inner involucre bracts 5–8 mm long, becoming
firm, keeled along length; pappus absent
 - 16: Leaves divided or not, terminal lobe variously large; outer bracts
variously shaped, > 1 mm long; inner involucre bracts 2.5–20 mm
long, glabrous or hairy; pappus > 3 mm long (1–1.5 mm long in
Crepis pusilla)
 - 18 Achenes all somewhat compressed; pappus of somewhat persistent
fine hairs and an inner series of early caducous bristles
 - 19 Non-rhizomatous annuals or biennials; involucre to c. 13 mm
long; achenes < 4 mm long
- 20. HELMINTHOTHECA**

21. PICRIS

5. TARAXACUM

8. LACTUCA

3. CHONDRILLA

4. CREPIS

15. TOLPIS

16. HEDYPNOIS

2. CICHORIUM

6. YOUNGIA

7. LAPSANA

9. SONCHUS

ASTERACEAE

- 19: Rhizomatous perennials; involucre mostly > 12 mm long; achenes > 4 mm long 10. ACTITES
- 18: Achenes not compressed; pappus not of 2 types of bristles as above
- 20 Leaves all basal
- 21 Plants to 2 cm high with sessile capitula; pappus bristles not broader at base 4. CREPIS
- 21: Plants scapose; pappus of long scales or bristles that are broader basally 13. MICROSERIS
- 20: Plants with stem leaves
- 22 Plants glabrous; outer involucre bracts broadly ovate to ovate, with hyaline margin 0.3–2 mm wide
- 23 Prostrate plants to 10 cm high, with runners bearing a single capitulum at few-leaved nodes; outer involucre bracts not cordate-based 11. LAUNAEA
- 23: Erect plants to c. 70 cm high, without runners; outer involucre bracts strongly cordate-based 12. REICHARDIA
- 22: Plants hairy; outer involucre bracts lanceolate to linear, with hyaline margin hardly developed
- 24 Plants not stoloniferous; at least some leaves usually divided, with margins entire or nearly so; cauline leaves not narrowing to base, with stem-clasping auricles; stellate hairs absent; achenes tapering distally 4. CREPIS
- 24: Plants sometimes stoloniferous; leaves not divided, with margins entire or denticulate; cauline leaves much reduced, narrowing to base, not stem-clasping; fine stellate hairs present; achenes not tapering distally 14. HIERACIUM

1. SCOLYMUS

I.R.Thompson

Scolymus L., *Sp. Pl.* 2: 813 (1753); from the Greek *scolymus*, the classical name for *Scolymus hispanicus*.

Type: *S. maculatus* L.

Annual, biennial or perennial herbs, branching. Hairs simple, non-glandular. Leaves predominantly cauline, rigid, spiny, decurrent down stems as green spiny wings. Inflorescences of 1 or few capitula. Capitula sessile or sub-sessile; involucre bracts multiseriate; inner bracts not hardened, ±erect at maturity; paleae broadly oblong-elliptic or ovate in profile, obtuse to rounded, broadly winged, enclosing and falling with achene. Florets: ligule golden-yellow. Achenes homomorphic, strongly compressed, unbeaked. Pappus homomorphic, of minute scales and sometimes bristles, with bristles not persistent; bristles scabrid-barbellate, uniform within pappus.

A genus of 3 species from the Mediterranean region; 2 species naturalised in Australia.

A somewhat atypical member of tribe Cichorieae, placed in a subtribe of its own by K.Bremer, *Asteraceae, Cladistics and Classification* 172 (1994). Leaves of *Scolymus* appear variegated due to the pale venation and spines. Its fleshy roots have historically been eaten.

F.M.Vazquez, The genus *Scolymus* Tourn. ex L. (Asteraceae): Taxonomy and distribution, *Anales Jard. Bot. Madrid* 58: 83–100 (2000).

Biennials or perennials; leaves decurrent for c. 1–4 cm, mostly not extending to leaf below; stems moderately coarsely woolly; hairs on ligule drying pale; long pappus bristles 2 or 3

1. *S. hispanicus*

Annuals; leaves decurrent mostly for > 4 cm, typically extending to or beyond the leaf below; stems ±glabrous; hairs on ligule drying dark; long pappus bristles absent

2. *S. maculatus*

1. **Scolymus hispanicus* L., *Sp. Pl.* 2: 813 (1753)

T: Italy; *Löfning s.n.*, *Herb. Linn. No. 963.2*; lecto: LINN, *fide* F.M.Vázquez, *Anales Jard. Bot. Madrid* 58: 86 (2000).

Illustrations: W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 225 & 226 (1992); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 684, fig. 130a (1999).

Biennials or perennials to c. 0.9 m high, somewhat woolly on stems. Stem leaves deeply divided with segments spreading to antrorse, spiny; decurrent leaf-bases extending 1–4 cm down stem, mostly not extending to leaf below, spiny; margin with scattered spinules. Capitula surrounded and exceeded by 3 or 4 foliaceous bracts 3–5 cm long arising at base; involucre 10–15 mm long, c. 5–8 mm diam.; bracts with spinose apex and narrow hyaline margin; outer bracts 6–8 mm long; inner bracts 10–15 mm long; paleae ovate, c. 7 mm long, 5 mm wide, erose apically. Florets: ligule 10–15 mm long; tube with pale hairs; style hairs pale. Achenes 3–5 mm long, with faces obovate, yellowish brown. Pappus a corona of minute scales and 2 or 3 long scabrid-barbellate bristles. *Golden Thistle*. Fig. 7A–B.

Native to the Mediterranean region. Naturalised in central and far south-central N.S.W., and in central Vic. A troublesome weed in Argentina, Chile and California, U.S.A. Grows in disturbed sites such as pastures and wasteland. Flowers late spring–summer.

N.S.W.: Hill Plain, S Deniliquin, *W.E.Mulham W822* (NSW). Vic.: Terrick Terrick State Park, *A.C.Beaglehole 82589* (MEL); c. 2–3 km NW from Werribee township, at Lollypop Ck, *V.Stajsic 1302* (CANB, MEL, NSW).



A noxious weed in Victoria.

2. **Scolymus maculatus* L., *Sp. Pl.* 2: 813 (1753)

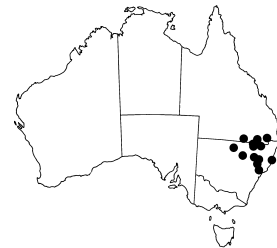
T: Italy, *Herb. Linn. 963.1*; lecto: LINN, *fide* C.Jeffrey in C.E.Jarvis *et al.*, *Regnum Veg.* 127: 86 (1993).

Illustrations: K.H.Rechinger (ed.), *Fl. Iranica* 122: t. 1 (1977); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 228 (1992).

Annuals to c. 1 m high, ±glabrous. Stem leaves deeply divided with segments spreading to antrorse, spiny; decurrent leaf-bases extending several–many cm down stem, extending to or beyond leaf below, spiny; margin with scattered spinules. Capitula surrounded and exceeded by 3 or 4 foliaceous bracts 3–4 cm long arising at base; involucre c. 15 mm long, c. 5–8 mm diam.; bracts with spinose apex and narrow hyaline margin; outer bracts 5–10 mm long; paleae obovate, c. 6 mm long, 4 mm wide, entire at apex. Florets: ligule 10–15 mm long; tube with dark hairs; style hairs pale. Achenes 2.5–4 mm long, with faces obovate, yellowish brown. Pappus a corona of minute scales, with long bristles absent. *Spotted Golden Thistle*.

Native to the Mediterranean region. Naturalised in SE Qld and northern N.S.W. as far S as Merriwa. Grows in heavier soils in disturbed sites such as pastures and wasteland. Flowers early summer.

Qld: 9 km S of Dirranbandi on road to Hebel, Maranoa, *G.N.Batianoff 2112181* & *D.Halford* (BRI, MEL). N.S.W.: 66 km N of Moree, towards Goondiwindi, *A.R.Bean 15836* (BRI, NSW); Wallangra, 19 Dec. 1983, *J.Black s.n.* (NSW).



A declared noxious weed in some shires in NE N.S.W. The basal leaves are much softer and less spiny than cauline leaves and may be seen in younger plants.

ASTERACEAE

2. CICHORIUM

I.R.Thompson

Cichorium L., *Sp. Pl.* 2: 813 (1753); from the Greek *cichorion*, the classical name for *Cichorium intybus* (Chicory).

Type: *C. intybus* L.

Annual, biennial or perennial herbs, branching. Hairs simple, glandular and eglandular. Leaves basal and cauline. Inflorescences paniculate. Capitula pedunculate or sub-sessile; involucre bracts biseriate; basal portion of inner bracts hardened and erect at maturity. Florets: ligule violet-blue or blue, rarely white or pink. Achenes homomorphic, not compressed, beakless. Pappus of scales, persistent; scales uniform within pappus.

A genus of c. 9 species from Europe, northern Africa and Asia; one species naturalised in Australia.

Ligules blue, or rarely white; pappus scales 0.2–0.3 mm long

C. intybus

Ligules purplish; pappus scales 0.6–1.0 mm long

†***C. endivia***

†*Cichorium endivia* L., Endive, is a similar species cultivated as a leaf vegetable. It has been recorded from the Parkes and Wallendbeen areas of N.S.W. and from Swan Hill in Vic., but does not appear to be naturalised. Its frilly leaf margin, purplish florets, and longer pappus scales distinguish it from *C. intybus*.

**Cichorium intybus* L., *Sp. Pl.* 2: 813 (1753)

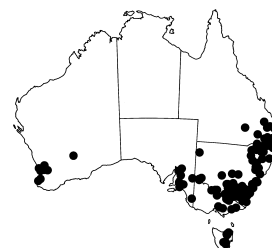
T: Europe, *Herb. Linn.* 962.1; lecto: LINN *n.v.*, *fide* H.W.Lack in K.H.Rechinger (ed.), *Fl. Iranica* 122: 6 (1977).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1640, fig. 750b (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 684, fig. 130b (1999); B.M.J.Hussey *et al.*, *Western Weeds* 2nd edn 93 (2007).

Perennials to c. 2 m tall, becoming much-branched, with short spreading eglandular hairs on stems and leaves, becoming glabrous. Basal leaves with l:w ratio (1–) 3–8, divided or not, entire, denticulate or dentate; divided leaves with up to 6 retrorse segments per side; cauline leaves several, mostly undivided, becoming slightly stem-clasping at base. Capitula numerous, with single capitula on a stout peduncle, or groups of 2 or 3 ±sessile capitula; involucre 9–12 mm long, 2–4 mm diam.; bracts glabrous, or with a few gland-tipped hairs or setae; outer bracts c. 6, ovate to narrowly ovate, 4–6 mm long, with pale oval region proximally; inner bracts erect and firm at maturity; receptacle c. 3–4 mm diam. Florets: ligule c. 15–25 mm long, blue or rarely white; style hairs pale. Achenes angular-obconical, 2–3 mm long, with ribs undeveloped, brown, sometimes mottled. Pappus 0.2–0.3 mm long, white. *Chicory*. Fig. 7C–D.

Native to Europe, N Africa and Asia. Naturalised in SW W.A. mostly S from Perth, in eastern Australia from Bundaberg in SE Qld SSW to Vic. and further W to SE S.A., and in eastern Tas. Grows in disturbed environments, particularly on roadsides. Flowers spring–summer.

W.A.: Reserve 2311, 2 km E of Mundijong, *G.J.Keighery* 12715 (PERTH). S.A.: Port Rd, Woodville near Woodville Rd intersection, *R.J.Chinnock* 3362 (AD). Qld: Carneys Creek Rd, near Croftby, SW of Boonah, *P.I.Forster* 28063 & *G.Leiper* (AD, BRI, MEL, NSW). N.S.W.: 19 km W of Glen Innes on road to Inverell, *J.J.Plat* 9 *et al.* (MEL, NSW). A.C.T.: Ginnindera Experiment Station, *M.Gray* 4693 (CANB). Vic.: c. 8 km NNW of Peechelba, along the Wangaratta to Yarrawonga Hwy, *H.I.Aston* 2171 (HO, MEL). Tas.: Hollow Tree Rd (Bothwell–Hamilton), 4.4 km from Lyell Hwy, *E.A.Brown* 94/173 & *K.L.Radford* (HO, NSW).



Cichorium intybus has been cultivated in Australia for its large tap-root which can be roasted and ground for mixing with coffee.

ASTERACEAE

3. CHONDRILLA

I.R.Thompson

Chondrilla L., *Sp. Pl.* 2: 796 (1753); from the Greek *chondros* (gristle), alluding to the tough wiry stems.

Type: *C. juncea* L.

Annual or perennial herbs, branching. Hairs simple, eglandular. Leaves basal and cauline. Inflorescences paniculate. Capitula \pm sessile; involucre bracts biseriate, not hardened, reflexed at maturity. Florets: ligule yellow. Achenes homomorphic, not or hardly compressed, beaked. Pappus of bristles, persistent; bristles scabridulous, uniform within pappus.

A genus of c. 25 species from Europe, N Africa and Asia; 1 species naturalised in Australia.

**Chondrilla juncea* L., *Sp. Pl.* 2: 796 (1753)

T: Europe, *Herb. Clifford* 383, *Chondrilla* no. 1; lecto: BM, *fide* H.W.Lack in K.H.Rechinger (ed.), *Fl. Iranica* 122: 285 (1977)

Illustrations: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 695, fig. 133a (1999); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1640, fig. 750a (1986); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 265 & 267 (1992).

Perennials to c. 1.3 m high, becoming much-branched, with spreading to retrorse bristles 2–3 mm long and a close fine wool basally on stems. Basal leaves with l:w ratio c. 5–8, runcinately divided, dentate or denticulate; cauline leaves much smaller than basal leaves, narrowly linear, entire, not stem-clasping, often absent at anthesis. Capitula many, with lateral capitula sub-sessile, solitary or in groups of 2 or 3; involucre 7–13 mm long, c. 2 mm diam.; bracts somewhat appressed-woolly; outer bracts c. 6, ovate, c. 1 mm long; inner bracts c. 7–9, with hyaline margin narrow and vestigial. Florets 9–12; ligule 7–10 mm long; style hairs pale. Achenes 8–10 mm long; body c. obloid-ellipsoid, with prominent ribs, scaly distally, terminating in a ring of 5 scales surrounding base of beak, cream to brown; beak capillary, c. 50% longer than body, generally caducous with pappus. Pappus 6–7 mm long, white; bristles minutely scabridulous. *Skeleton Weed*. Plate 8; Fig. 7E–G.

Native to western Asia, Europe and northern Africa. Naturalised in SW W.A. from Geraldton SE to Esperance, in eastern Australia from Bundaberg, Qld, S to Vic. and extending further W into SE S.A. Grows in disturbed sites including roadsides and on agricultural land. Flowers late spring–autumn.

W.A.: E part of Curtin University Campus, Bentley, Perth, *B.J.Lepschi* 2532 (AD, CANB, MEL, PERTH). S.A.: Abutting S boundary of the Hincks Natl Park sect. 40, *C.R.Alcock* 2563 (AD). Qld: Thane Ck, near Warwick, 22 Dec. 1958, *J.Mitchell* (BRI). N.S.W.: c. 8.5 km from Blakney Ck toward Bevendale, at Handy's Ck crossing, *E.M.Canning* 6372 (AD, CANB, MEL, NSW). A.C.T.: N.S.W.-A.C.T. Border adjacent to Queanbeyan rubbish tip and racecourse, *R.Coveny* 11508 & *P.Hind* (CBG). Vic.: c. 10 km E of Yarrawonga, along the Murray Valley Hwy, *H.I.Aston* 2173 (MEL).



A declared noxious weed in all states. Its ability to regrow from underground parts has made it difficult to eradicate by mechanical means. V.J.Hull & R.H.Groves (*Austral. J. Bot.* 21: 113 (1973)) identified three variants although these have not been recognised taxonomically. Variation was greatest in the shape of the basal leaves but also occurred in inflorescence and fruit morphology. The less common variants were largely restricted to central-eastern N.S.W. Narrow- and broad-leaf forms have been recognised in S.A.

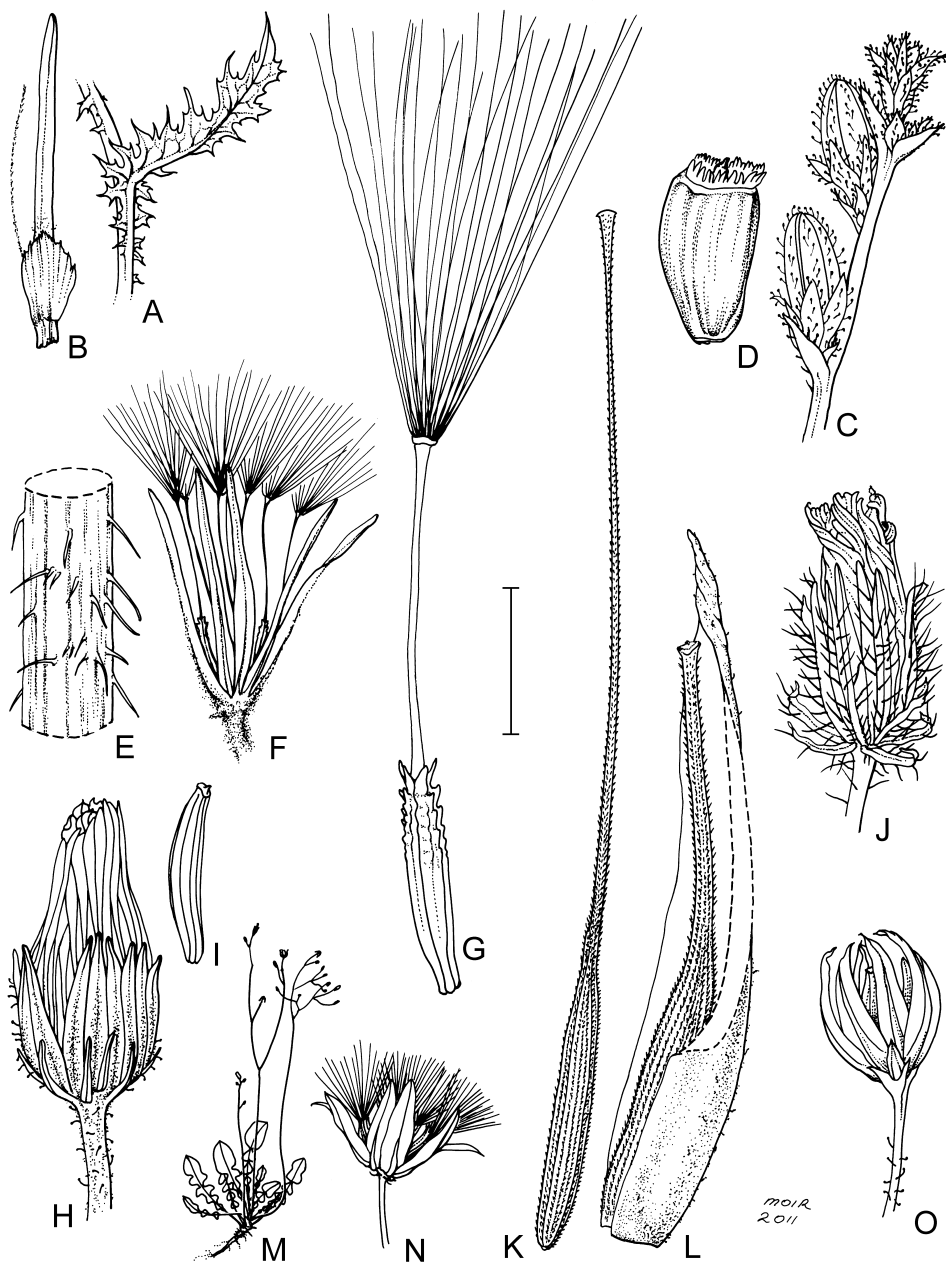


Figure 7. A–B, *Scolymus hispanicus*. A, leaf; B, palea, floret & pappus bristle (A–B, A.C.Beauglehole 82589, MEL). C–D, *Cichorium intybus*. C, portion of inflorescence, flowers in bud; D, achene (C–D, W.M.Curtis, 27 Nov. 1941, MEL). E–G, *Chondrilla juncea*. E, lower stem section; F, fruiting capitulum; G, achene (E–G, H.I.Aston 2173, MEL). H–I, *Crepis capillaris*. H, capitulum; I, achene (H–I, R.V.Smith 73/53, MEL). J, *Crepis setosa*, capitulum (T.B.Muir 2801, MEL). K–L, *Crepis foetida* subsp. *foetida*. K, central achene with pappus removed; L, marginal achene (pappus removed) encased within inner involucre bract (K–L, E.M.Canning 6850, MEL). M–N, *Youngia japonica*. M, habit; N, fruiting capitulum (M–N, I.R.Thompson 1154, MEL). O, *Lapsana communis* subsp. *communis*, fruiting capitulum (J.R.Hosking 1069, MEL). Scale bar: A = 15 mm; B, E, F, H, J, N, O = 6 mm; C = 10 mm; D, G, I, K, L = 2 mm; M = 10 cm. Drawn by M.Moir.

ASTERACEAE

4. CREPIS

I.R.Thompson

Crepis L., *Sp. Pl.* 2: 805 (1753); from the Greek *krepis* (foundation or boot), originally used for the related *Helminthotheca echioides* and probably alluding to the tuberculate bases of the hairs.

Type: *C. biennis* L.

Annual or biennial herbs, branching, or stemless in *C. pusilla*. Hairs simple, glandular and eglandular. Leaves predominantly basal. Inflorescences cymose or paniculate. Capitula usually pedunculate (sessile in *C. pusilla*): involucre bracts biseriate; inner bracts mostly hardened, strongly convex and erect at maturity. Florets: ligule yellow. Achenes homomorphic or slightly dimorphic; sometimes slightly compressed, beaked or not. Pappus of bristles, persistent or not; bristles minutely scabridulous, uniform within pappus. *Hawksbeards*.

A genus of c. 200 species from the Northern Hemisphere, tropics and southern Africa; 5 species naturalised in Australia.

The inner series of involucre bracts of most species of this genus become firm and strongly convex as fruits develop. Often achenes adjacent to these bracts are shorter and with a more curved body than more central achenes and tend to be enclosed within the convexity of the bract at maturity. Achenes have c. 10 prominent ribs.

E.B.Babcock, The genus *Crepis*, parts I and II, *Univ. Calif. Publ. Bot.* 21–22: 1–1030 (1947).

- | | | |
|----|--|--------------------------------|
| 1 | Plants stemless; capitula sessile at base of plant | 5. <i>C. pusilla</i> |
| 1: | Plants developing aerial stems, to 1 m high; capitula pedunculate | |
| 2 | Peduncles and involucre bracts with robust pale spreading eglandular bristles 1–2 mm long; indumentum not cobwebby and glandular hairs absent | 2. <i>C. setosa</i> |
| 2: | Peduncles and involucre bracts without bristles as above; indumentum cobwebby and often also with spreading gland-tipped hairs to c. 1.5 mm long | |
| 3 | Stem leaves moderately hairy, entire to lobed; involucre bracts lacking black hairs; capitular buds nodding; central achenes 12–17 mm long, exceeding involucre bracts at maturity | 4. <i>C. foetida</i> |
| 3: | Stem leaves glabrous or nearly so, or if moderately hairy then usually mostly pinnatisect; involucre bracts often with black midline hairs; capitular buds erect; central achenes 1.5–9 mm long, shorter than involucre bracts at maturity | |
| 4 | Outer involucre bracts lanceolate, 1.0–1.3 mm wide; achenes 6–9 mm long, beaked; pappus clearly overtopping involucre bracts | 3. <i>C. vesicaria</i> |
| 4: | Outer involucre bracts narrow-lanceolate to linear, 0.3–0.6 mm wide; achenes 1.5–6 mm long, not or hardly beaked; pappus not or hardly overtopping involucre bracts | |
| 5 | Involucre not densely white-woolly; achenes 1.5–2.5 mm long; | 1. <i>C. capillaris</i> |
| 5: | Involucre densely white-woolly; achenes 4–6 mm long | †<i>C. dioscoridis</i> |

†*Crepis dioscoridis* L. has been recorded once in Australia, from Meadows in the Southern Lofty Ra., S.A., but there is no indication that it is naturalised. Vegetatively similar to *C. capillaris* but with a larger more densely tomentose capitulum and longer achenes.

1. **Crepis capillaris* (L.) Wallr., *Erst. Beitr. Fl. Hercyn.* 287 (1840)

Lapsana capillaris L., *Sp. Pl.* 2: 812 (1753); *C. virens* L., *Sp. Pl.* 2nd edn, 1134 (1763), *nom. illeg.*, *L. capillaris* in syn. T: not designated.

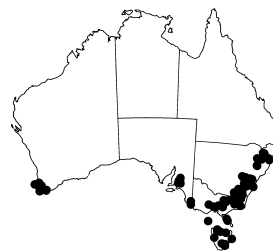
[*C. tectorum* auct. non L.: A.J.Ewart, *Fl. Victoria* 1197 (1931)]

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1642, fig. 751a (1986); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 686, fig. 131a (1999); B.M.J.Hussey *et al.*, *Western Weeds* 2nd edn 95 (2007).

Plants to c. 1.2 m high, glabrous except for spreading weak hairs on lower stem and leaf midrib. Basal leaves undivided, lobed or lyrate-pinnatisect, with l:w ratio c. 5–8, with segments \pm spreading; margin entire or nearly so. Stem leaves few, undivided or lobed above mid-stem; base becoming sagittate, stem-clasping upwards. Capitula few to several; involucre 5–8 mm long, c. 1.5–3 mm diam.; outer bracts 8–10, 2–4 mm long, 0.3–0.6 mm wide, hairy or nearly glabrous; inner bracts usually cobwebby, with emergent usually blackish and broad-based gland-tipped hairs, hardened and convex at maturity or not; receptacle 1.5–4 mm diam. Florets: ligule 5–9 mm long; style hairs sometimes slightly darkened. Achenes fusiform, 1.5–2.5 mm long, unbeaked, with ribs well-spaced, without ornamentation. Pappus caducous, 3–4 mm long, white. $2n = 6$ [cited as 3_{II}], G.D.Carr *et al.*, *Amer. J. Bot.* 86: 1009 (1999). *Smooth Hawksbeard*. Fig. 7H–I.

Naturalised in SW W.A. from Augusta E to Albany, in SE Australia from Glen Innes, N.S.W., SSW to southern Vic. and further W to Adelaide in SE S.A., and in Tas. Grows in mesic environments, mostly in disturbed sites such as urban habitats and roadsides, in plains, forests and woodland, from sea level to c. 1300 m. Flowers spring–autumn.

W.A.: c. 3.2 km E of Nannup, *R.D.Royce 8400* (MEL, PERTH). S.A.: Onkaparinga R. near Mylor, 9 Dec. 1944, *J.B.Cleland* (AD). N.S.W.: Adaminaby Cemetery, *I.Crawford 3782* (CANB, MEL, NSW). A.C.T.: Goessling Pl., Flynn, *L.G.Adams 4014* (CANB, NSW). Vic.: Terang, *R.V.Smith 75/16* (AD, BRI, CANB, HO, MEL, NSW). Tas.: Franklin, *D.I.Morris 86491* (HO).



Prior to fruit development, the less divided leaves, smaller capitula and narrower outer bracts distinguish *C. capillaris* from the otherwise similar *C. vesicaria* subsp. *taraxacifolia*. The inner involucre bracts of *C. capillaris* are glabrous adaxially, unlike those of *C. foetida*, *C. vesicaria* and *C. setosa*.

2. **Crepis setosa* Haller f. in J.J.Roemer, *Arch. Bot. (Leipzig)* 1: 1 (1797)

T: Peru, 1855–56, *Spruce 4191*; syn: B, C, E, all *n.v.*

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 686, fig. 131c (1999).

Plants to c. 1 m high, with spreading hairs on stems and leaves, long-setose on stems. Basal leaves undivided, lobed or lyrate-pinnatisect, with l:w ratio c. 4–8; margin entire or with scattered denticulations. Stem leaves few, undivided or lobed above mid-stem; base becoming auriculate, stem-clasping upwards. Capitula few or several; involucre 6–10 mm long, c. 3–4 mm diam.; outer bracts 8–10, 2–4 mm long, 0.7–1.0 mm wide, with robust, spreading, pale non-glandular hairs 1–2 mm long; inner bracts with similar indumentum, also slightly cobwebby, hardened and convex at maturity; receptacle c. 3 mm diam. Florets: ligule 5–9 mm long; style hairs dark. Achenes 4–7 mm long, tapered into a beak; body fusiform, 2.5–4.5 mm long, with ribs well-spaced, scabridulous; marginal achenes shorter. Pappus persistent, 4–5 mm long, white. *Bristly Hawksbeard*. Fig. 7J.

A native of the Mediterranean region and SW Asia. Naturalised in NE and south-central Vic., and around Hobart in Tas. There is an old record from Hornsby, N.S.W. Grows mostly in disturbed sites such as roadsides and river flats but also extending into forest. Flowers summer–autumn.

N.S.W.: Hornsby, Feb. 1918, *W.H.Blakely* (NSW). Vic.: Porepunkah, next to Ovens R., *J.R.Hosking 1414* (CANB, MEL, NE, NSW). Tas.: Mt Nelson Rd, Hobart, 19 Jan. 1947, *W.M.Curtis* (HO).



Similar to *C. capillaris* except for the setose indumentum and the longer, beaked achenes.

3. **Crepis vesicaria* L., *Sp. Pl.* 2: 805 (1753)

subsp. **taraxacifolia** (Thuill.) Thell. in H.Schinz & R.Keller, *Fl. Schweiz*, 3rd edn, 2: 361 (1914)

C. taraxacifolia Thuill., *Fl. Env. Paris* 409 (1799). T: France; *n.v.*

Barkhausia haenseleri Boiss. ex DC., *Prodr.* 7: 153 (1838); *C. vesicaria* subsp. *haenseleri* (Boiss. ex DC.) P.D.Sell, *Bot. J. Linn. Soc.* 71: 254 (1975). T: Southern Spain, *E.Boissier*; *n.v.*

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1642, fig. 751e (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 686, fig. 131b (1999); both as *C. vesicaria* subsp. *haenseleri*.

Plants to c. 1.2 m high, with spreading hairs on stem and leaves, sometimes rather sparse. Basal leaves lyrate 1- or 2-pinnatisect, with l:w ratio c. 5–8, with segments \pm spreading; margin entire or with scattered teeth or denticulations. Stem leaves few, usually pinnatisect above mid-stem; base becoming dilated and stem-clasping upwards. Capitula few to many; involucre 8–12 mm long, c. 3–5 mm diam.; outer bracts 8–12, 3–5 mm long, 1.0–1.3 mm wide, nearly glabrous; inner bracts cobwebby, with emergent usually blackish and broad-based gland-tipped hairs, ?not hardened, slightly convex at maturity; receptacle 3–6 mm diam. Florets: ligule 5–9 mm long; style hairs dark. Achenes 6–9 mm long, beaked; body \pm fusiform, 3–4.5 mm long, with ribs well-spaced, scabridulous. Pappus persistent, c. 5 mm long, white. *Dandelion Hawksbeard*.

Native to Europe. Naturalised in SE Australia from the Adelaide region, S.A., E to Ballarat in south-central Vic. Also naturalised in New Zealand. Grows in waste land. Flowers Oct.–Dec.

S.A.: Mt Watch Quarry area, c. 1 km from Millicent–Glencoe road, *A.A.Munir* 5341 (AD). Vic.: Nigretta Falls on Wannon R., c. 7.5 km (direct line) ENE of Wannon, *I.C.Clarke* 2527 (AD, CANB, MEL, NSW); roadside near Drive-In Theatre, outskirts of Portland, *R.V.Smith* 67/130 (AD, CANB, MEL, NSW).

A very common weed of roadsides between Warrnambool and Portland. It has a similar indumentum to *C. capillaris* but its leaves are more divided, inflorescences more congested and with larger capitula, the outer involucre bracts are broader, and achenes much longer and beaked.



4. **Crepis foetida* L., *Sp. Pl.* 2: 807 (1753)

subsp. **foetida**

T: France; not designated.

C. foetida a. *vulgaris* Bisch., *Beitr. Fl. Deutschl.* 252 (1851); *C. foetida* subsp. *vulgaris* (Bisch.) Babc., *J. Bot.* 76: 205 (1938). T: *n.v.*

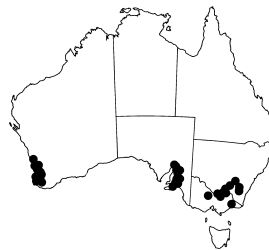
Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1642, fig. 751c (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 686, fig. 131d (1999); B.M.J.Hussey *et al.*, *Western Weeds* 2nd edn 95 (2007).

Plants to c. 0.8 m high, with spreading hairs on lower stem and leaves. Basal leaves divided or not, with l:w ratio c. 5–8; margin entire, dentate or denticulate. Stem leaves few or several, entire or lobed above mid-stem; base becoming sagittate, stem-clasping upwards. Capitula few–several; involucre 9–12 mm long, c. 3–4 mm diam.; outer bracts 12–14, 4–6 mm long, 0.4–1.0 mm wide, hairy; inner bracts cobwebby, with numerous emergent pale slender-based gland-tipped hairs, hardened and convex at maturity; receptacle c. 2–4 mm diam. Florets: ligule 5–9 mm long; style hairs mostly pale. Achenes 7–17 mm long, beaked, dimorphic; central achenes 12–17 mm long; body narrowly fusiform, c. 4 mm long, with ribs crowded, scabridulous; marginal achenes 7–10 mm long. Pappus persistent, 5–8 mm long, white. *Stinking Hawksbeard*. Fig. 7K–L.

Native of Europe and SW Asia. Naturalised from Moore R. S to Kingston forest in SW W.A., in SE Australia from the Yorke Penin., S.A., E to Tumut in SE N.S.W. and SE to Wangaratta in north-central Vic., with an isolated record from Buchan in far eastern Vic. Grows in disturbed sites, often in poor soils, in urban environments, forest and woodland. Flowers most of year.

W.A.: Landers Rd, Lesmurdie, *A.A.Mitchell* 4134 (PERTH). S.A.: W end of Torrens Gorge, *A.G.Spooner* 294 (AD). N.S.W.: near Wee Jasper Caves, *M.Gray* 5363 (BRI, CANB); Brocklesby, Dec. 1921, *J.Hunter* (NSW). Vic.: Green Rd, Upper Lurg, *J.Strudwick* 770 (MEL).

Readily identified in fruit by the extremely long beaks of the central achenes. These exceed the involucre bracts at maturity. The somewhat shorter marginal achenes are held within the convex involucre bracts at maturity. At flowering, the nodding capitular buds and paler indumentum of the involucre distinguish it from *C. capillaris* and *C. vesicaria* subsp. *taraxacifolia*. Specimens in Australia mostly conform to subsp. *foetida* as defined by P.D.Sell in T.G.Tutin *et al.* (eds), *Fl. Europaea* 4: 354 (1976), but some specimens have outer involucre bracts broader than 0.75 mm.



5. **Crepis pusilla* (Sommier) Merxm., Mitt. Bot. Staatssamml. München 7: 275 (1968)

Melitella pusilla Sommier, *Nuovo Giorn. Bot. Ital.* 14: 497 (1907). T: n.v.

Illustration: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1642, fig. 751d (1986).

Plants to 2 cm high, acaulescent, nearly glabrous. Leaves divided or not, with l:w ratio c. 5–12; margin entire or denticulate. Capitula few–several, sessile; involucre 2.5–4 mm long, c. 1 mm diam.; outer bracts 2–4, c. 1 mm long, 0.5 mm wide, glabrous; inner bracts glabrous, but hairs at base of involucre, morphology not known at maturity; receptacle c. 2 mm diam. Florets: ligule c. 1 mm long; style hairs black. Achenes ellipsoid, c. 2 mm long, not or hardly beaked, with ribs crowded, ?smooth. Pappus persistent, 1–1.5 mm long, white. *Dandelion Crepis*.

Native to Portugal, Malta, Greece and Crete. Naturalised in S.A. on the Eyre Penin., Kangaroo Is., and the Fleurieu Penin. Grows on agricultural land. Flowers spring.

S.A.: Proper Bay, Port Lincoln, *C.R.Alcock* 2167 (CANB); near Bascombe Well HS, c. 25 km WSW of Lock, *Hj.Eichler* 19345 (AD, MEL).



Excluded Name

Crepis nicaeensis Balb. ex Pers., *Syn. Pl.* 2: 376 (1807)

T: Nice, France, *coll. unknown*; n.v.

Recorded for Tas. in W.M.Curtis, *Stud. Fl. Tasmania* 2: 384 (1963) but this appears to have been an error.

5. TARAXACUM

N.H.Scarlett

Taraxacum F.H.Wigg., *Prim. Fl. Holsat.* 56 (1780), *nom. cons.*; from the latinised form of the Persian name *tarkhashqun* for plants of the genus.

Type: *T. officinale* F.H.Wigg.

Taprooted, perennial, scapose herbs. Leaves basal, rosetted, usually lobed, glabrous or arachnoid-hairy. Capitula homogamous, bisexual or functionally female, ligulate, solitary or rarely a few on scapes; involucre oblong-campanulate; involucre bracts in several series; outer series recurved, spreading or appressed to the longer, erect inner series, sometimes with a terminal or subterminal callus; receptacle epaleate. Florets bisexual but in the

apomictic species functionally female (parthenogenetic), sometimes male sterile, yellow, rarely white; outer ligules often with coloured stripes. Achenes oblong, terete to subterete, ribbed, variously coloured, usually spinulose or muricate above, narrowed into a conical or cylindrical cone that subtends a slender beak (rarely beak absent). Pappus bristles in several series, finely scabrous, persistent. *Dandelions*.

A genus of c. 2500 species in c. 52 sections, predominantly Eurasian but also in N Africa, the Americas and Australasia; present in all Australian States and Territories, including the southern N.T. (Alice Springs). Six sections are certainly present in Australia, including the native section *Australasica* with two species. The introduced species in Australia belong to five Eurasian sections, and two informal species groups of uncertain sectional affinities.

Following Bentham (*Fl. Austral.* 3: 680 (1866)), Australian authors assigned all *Taraxacum* species to *T. officinale* and its synonyms (see Kirschner & Štěpánek, 1987) until the recognition by Willis (1973) of the native *T. aristum*. Cooke (1986) recognised both *T. officinale* and *T. erythrospermum* in South Australia, the latter name being used in a broad sense to refer to section *Erythrosperma*. Scarlett's treatment of *Taraxacum* in Victoria (1999) recognised 5 sections as well as one informal species group and an apparently undescribed species of uncertain sectional affinities, now identified as *T. squamulosum* Soest. In this treatment only sections *Australasica*, *Erythrosperma*, and *Celtica* are resolved to the species level, as the species of the other sections and their mutual delimitation are too poorly known as yet. Thus in Australia the sections must be used for the time being as "one of the basic categories in the taxonomic hierarchy" as was recommended for *Taraxacum* in China by Ge *et al.* (2011).

World-wide, the majority of described species are polyploid (mainly triploid $3n = 24$), with an obligately agamospermous, diplosporous parthenogenetic breeding system; the remaining c. 10% are sexual diploids ($2n = 16$), including the species of the Australasian native section *Australasica* (see Hughes & Richards, 1989). All recorded chromosome counts of introduced species in Australia up to the present time are triploid (P.Ellis *in sched.*, AD collections).

The genus is of minor economic importance; various species are cultivated as a source of food and herbal medicine as "*Taraxacum officinale*". *Taraxacum koksaghyz* Rodin, a source of latex for rubber production, was grown experimentally in W.A. and Tas. during the Second World War.

Poorly dried, blackened *Taraxacum* collections are rarely identifiable. Capitula in bud and flower, mature achenes and a representative sample of well-pressed leaves are all essential. Notes on colour and bract posture from living material and capitula preserved in alcohol are extremely useful. Richards (1972) gives further detail.

The following points should be borne in mind when using the key and descriptions:

Achenes Achene measurements and descriptions are based on mature fruit (almost-ripe capitula can be ripened indoors with the scape-base in water). Achene lengths include the 'cone', the distal part that tapers to a very slender beak. The cone shape traditionally termed 'cylindrical' is actually elongate-conical, with some degree of tapering. All *Taraxacum* achenes are longitudinally ribbed; where a part of the achene surface is described as 'smooth' this refers to the absence of spines or warts on these ribs, it does not mean that the ribs are absent.

Capitula Diameter measurements include the marginal ligules.

Involucral bracts Care must be taken to distinguish the outermost and shortest 1–2 series from the slightly longer intermediate series and the longest innermost series. Bract borders are rarely uniform in width; measurements refer to the border at the widest part of the bract. The calli may be obscured in withered dry bracts and these should be soaked out in water. The posture of bracts is best observed in live or preserved flowering capitula. Bracts of seeding capitula often have a different posture.

Leaves Leaf descriptions refer only to the mature leaves of flowering material; leaves collected at other times are often different in shape and degree of dissection. Shape and degree of dissection also vary between lateral lobes, terminal lobes and interlobes.

Phenotypic plasticity Populations in extremely dry, extremely fertile or very shaded sites may have dimensions outside those noted for species or sections. Leaf morphology may also be aberrant. It is worthy of note that as a general rule the leaves of late winter to mid spring flowering plants are more simply dissected than those of later flowering plants ('summer forms'). When this contrast is extreme, it is noted in the descriptions below.

H.Handel-Mazzetti, *Monogr. Taraxacum* (1907); A.J.Richards, The *Taraxacum* flora of the British Isles, *Watsonia* 9 (suppl.): 1–141 (1972); J.H.Willis, *Handb. Pl. Victoria* 2 (1973); D.A.Cooke, *Taraxacum* in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1655–1656 (1986); J.Hughes & A.J.Richards, Isozymes and the status of *Taraxacum* (Asteraceae) agamospecies, *Bot. J. Linn. Soc.* 99: 365–376 (1989); A.A.Dudman & A.J.Richards, *Dandelions of Great Britain and Ireland* B.S.B.I. Handbook 9 (1997); N.H.Scarlett, *Taraxacum* in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 688–694 (1999); I.Uhlemann, J.Kirschner & J.Štěpánek, The genus *Taraxacum* (Asteraceae, Lactuceae) in the Southern Hemisphere. 1. The section *Antarctica* Handel-Mazzetti and notes on dandelions of Australasia, *Folia Geobot.* 39: 205–220 (2004); X.J.Ge, J.Kirschner & J.Štěpánek, *Taraxacum*, in Z.Y.Wu, P.H.Raven & D.Y.Hong (eds), *Fl. China* 20–21: 270–325 (2011).

KEY TO SECTIONS

- 1 Outmost involucre bracts completely appressed to the next series, always with a clear white border 0.25–0.5 mm wide; ligules scarcely exceeding involucre **sect. 1. AUSTRALASICA**
- 1: Outmost involucre bracts not completely appressed to the next series, at least the upper part patent to reflexed, variously bordered; ligules mainly far exceeding involucre
- 2 Achenes pale red to dark red-brown; cone cylindrical ≥ 0.5 mm long **sect. 2. ERYTHROSPERMA**
- 2: Achenes olive-green, grey, straw-coloured to brown; cone various
- 3 Outmost involucre bracts with a white border ≥ 0.5 mm wide, cordate to ovate-lanceolate, erect, patent, to abruptly reflexed, usually with a callus **SPECIES GROUP 2**
- 3: Outmost involucre bracts not bordered or with a narrow white border < 0.5 mm wide, linear-lanceolate to ovate, erect to reflexed, with or without a callus
- 4 Petioles and midribs clearly striate on upper surface (i.e. with interwoven purple and green strands visible with a $\times 5$ lens); involucre bracts without a callus
- 5 Outer involucre bracts glaucous above and dark green below, recurved to reflexed to different degrees in a single capitulum **sect. 3. HAMATA**
- 5: Outer involucre bracts not or very slightly glaucous above, green to light green below, erect to recurved to same degree in a single capitulum **sect. 4. CELTICA**
- 4: Petioles and midribs green or uniformly purple on upper surface, not striate; involucre bracts with or without a callus
- 6 Achene cone tapering abruptly to beak (conical to subconical); outer involucre bracts without a callus **sect. 5. TARAXACUM**
- 6: Achene cone tapering gradually to beak (cylindrical); outer involucre bracts with a callus **SPECIES GROUP 1**

Sect. 1. AUSTRALASICA

Taraxacum sect. *Australasica* Kirschner, Scarlett & Štěpánek in I.Uhlemann *et al.*, *Folia Geobot.* 39: 204 (2004)

Type: *T. aristum* G.E.Haglund & Markl.

T. sect. *Antarctica* Hand.-Mazz., *Monogr. Taraxacum* 54 (1907), p.p. *T.* *melanocarpum* Hand.-Mazz.

Leaves oblong to linear-lanceolate, c. 4–16 (–26) cm long, rarely entire, mainly dissected with lobes short, deltoid to falcate, glabrescent; distal margins denticulate to lobulate; petioles and midribs green or uniformly purple on upper surface. Capitula 15–20 mm diam.; outermost involucre bracts ovate to lanceolate, completely appressed to next series, variously coloured but not glaucous, thickened at apex but without a callus; borders white, 0.25–0.5 mm wide. Marginal florets with ligule scarcely exceeding involucre; pollen present; stigmas yellow. Achenes straw-coloured, red or purplish black; cone cylindrical; beak equal to or up to 3 times length of body of achene. Pappus yellowish white.

A section of 3 species native to southern Australia and New Zealand; 2 endemic species in Australia.

Achenes verrucate to base

1. *T. cygnorum*

Achenes smooth in lower $\frac{1}{3}$ (but longitudinal ribs present throughout)

2. *T. aristum*

1. *Taraxacum cygnorum* Hand.-Mazz., *Monogr. Taraxacum* 55 (1907)

T. Swan River to Cape Riche, W.A., *J.Drummond* 5: 367; lecto: K; isolecto: K, V, *fide* N.H.Scarlett, *Fl. Australia* 37: 606 (2015).

[*T. dens-leonis* auct. non Desf.: G.Bentham, *Fl. Austral.* 3: 680 (1867) p.p. *quoad spec.* ‘Drummond, n. 367’ & ‘in the plains of the Avon’ *cit.*]

Illustrations: H.Handel-Mazzetti, *op. cit.* t. 2; N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 692, fig. 132a (1999).

Leaves oblong to linear-lanceolate, c. 4–12 cm long, 0.8–2 mm wide, ±entire or dissected, green with midrib pale green to purple; petiole usually pale green, very narrowly winged. Dissected leaves with lateral lobes in 4–7 pairs, short, obtusely to acutely deltoid to hooked-attenuate, sometimes pointing forward; distal margins of upper 2 to 3 lobes denticulate to lobulate; proximal margins entire; terminal lobe relatively short, entire to trilobulate, sometimes with marginal teeth. Scapes 3–5 cm long at anthesis, 6–10 cm long in fruit, white-woolly in bud, glabrous at flowering except under capitulum, green. Capitula 15–20 mm diam.; outer bracts ovate to ovate-lanceolate, 3–6 mm long, 1–2.5 mm wide, appressed to next series, white-bordered (c. 0.3–0.5 mm wide), fimbriate marginally, apiculate with a small, dark, smooth thickening; innermost bracts linear, 11–16 (–19) mm long, c. 1.5 mm wide, not thickened at tip. Outer florets with ligule involute, subequal to involucre, pale lemon-yellow. Achenes narrowly fusiform, (4–) 4.5–6 mm long, c. 1 mm wide, with ±flat, straight scale-like spines 0.2 mm long at apex, verrucate towards base, dark red to blackish purple; cone 1.2–2 mm long; beak (3–) 4–6 (–7) mm long, subequal to body of achene. Pappus 5–6 mm long. Fig. 8E–H.

Currently known from Vic. and S.A. Known only from 19th century collections in W.A. (including the type), N.S.W. and Tas.; grows in woodland and scrub on coastal limestone in the case of the currently known stands. Flowers and fruits Sept.–Mar.

W.A.: near Israelite Bay, *Miss Brooke s.n.* (MEL). S.A.: 11.6 km NNW of Waccla; Bascombe Well Conservation Park, *D.J.Lang* 1991 (AD). N.S.W.: Jenolan Caves, *W.F.Blakely s.n.* (NSW). Vic.: Lower Glenelg Natl Park, *N.H.Scarlett* 84-467 (MEL). Tas.: Flinders Is., *J.Milligan s.n.* (HO, MEL).

Distinguished from *T. aristum* by the achene shape and sculpturing and the proportionately short beak. The type description gives an achene length of 7 mm, but no material I have seen has achenes of this length, including the surviving type material in K and W. Recognised as Vulnerable under the *Environment Protection and Biodiversity Conservation Act* 1999.



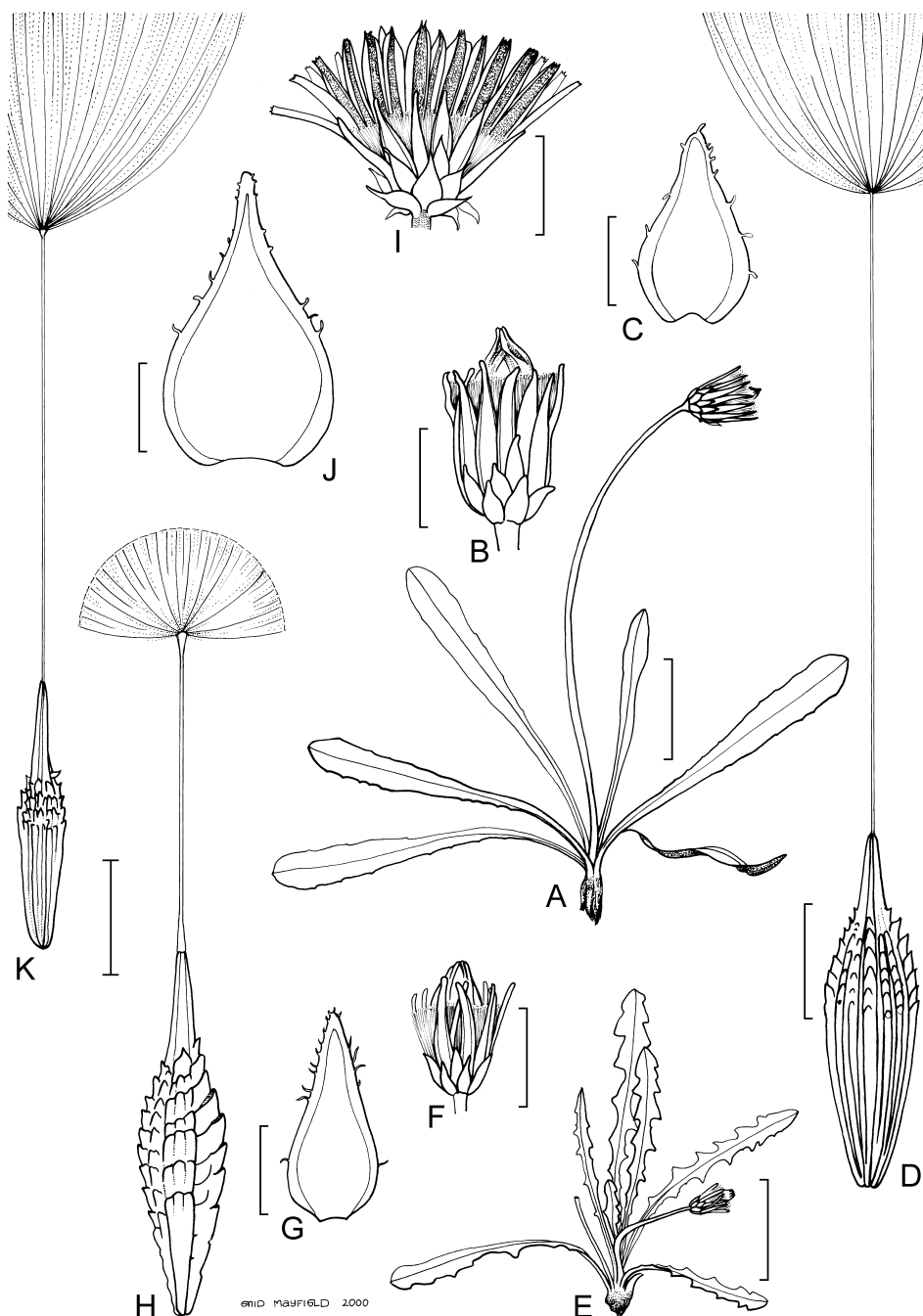


Figure 8. *Taraxacum*. A–D, *T. arustum*. A, habit; B, capitulum; C, outer involucre bract; D, achene (A–D, N.H.Scarlett 86-1, LTB). E–H, *T. cygnorum*. E, habit; F, capitulum; G, outer involucre bract; H, achene (E–H, N.H.Scarlett 85-219, LTB). I–J, *T. squamulosum*. I, capitulum; J, outer involucre bract (I–J, N.H.Scarlett, LTB). K, *T. khatoonae*, achene (R.D.Pearce 110, AD). Scale bars: A, E = 20 mm; B, F, I = 10 mm; C, D, G, H, J, K = 2 mm. Drawn by E.Mayfield.

The historic N.S.W. and eastern Vic. collections, except for that from the Jenolan Caves, are rather fragmentary and their assignment to *T. cygnorum* is thus rather uncertain. Modern collections are needed for verification.

2. *Taraxacum aristum* G.E.Haglund & Markl., *Bot. Not.* 117: 197 (1964)

T: Mt Gingera, A.C.T., 30 Jan. 1949, *O.H.Selling* 334; holo: S.

[*T. magellanicum* auct. non Comm. ex Sch.Bip.: H.Handel-Mazzetti, *Monogr. Taraxacum* 56 (1907) *quoad spec.* 'Illawarra (sic), N.S.W.' *cit.*]

Illustrations: G.E.Haglund & G.Marklund, *op. cit.* t. 1 & 2; N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 692, fig.132b (1999).

Leaves oblong to linear-lanceolate, 8–26 (usually c. 15) cm long, 0.8–2.5 cm wide, often \pm entire, green with midrib green or purple; petiole usually purple at base, very narrowly winged. Dissected leaves with lateral lobes in 6 or 7 (–8) pairs, short, blunt, deltoid to falcate; distal margins of upper 2 or 3 lobes with up to 5 teeth, 1 or 2 teeth sometimes enlarged into a short lobe; terminal lobe rounded to acutely trilobulate. Scapes 4–18 cm long at anthesis, 8–30 cm long in fruit, white-woolly in bud, glabrous at flowering. Capitula 15–20 mm diam.; outer bracts ovate to ovate-lanceolate, (2.5–) 5–7 (–10) mm long, 1.5–2.5 mm wide, appressed to next series, white-bordered (0.5–1 mm wide), fimbriate marginally, apiculate with a dark, smooth thickening; innermost bracts linear, (12–) 17–19 mm long, 1.5–2 mm wide, not thickened at tips. Outer florets with ligule involute, subequal to involucre, pale lemon-yellow. Achenes fusiform, 4–6 mm long, 1–1.5 mm wide, with \pm straight, flattened spines c. 0.2 mm long at apex, verrucate below, but smooth in lower $\frac{1}{3}$, yellow-brown, dark grey, or red to blackish purple; cone cylindrical, 1–1.5 (–2) mm long; beak 6.5–9 (–11) mm long, longer than body of achene. Pappus 5–7 mm long. *Mountain Dandelion*. Fig. 8A–D.

Occurs in N.S.W., A.C.T., Vic. and Tas. in inland areas. Grows in grassland and grassy woodland to open forest, mainly in subalpine parts of the Eastern Highlands. Flowers and fruits Dec.–Mar.

N.S.W.: Tinderry Mtns, c. 6 miles [c. 10 km] ESE of Michelago, *L.G.Adams & R.Pullen* 2613 (CANB). A.C.T.: small valley c. 500 m E of Boboyan Hill, Namadgi Natl Park, *J.D.Briggs & L.G.Adams* 1909 (CANB). Vic.: Nunniong Plateau, 0.95 km NE (by road) of the Stony Ck crossing of the Nunniong Rd, *N.H.Scarlett* 83-45 (MEL). Tas.: Stone Hut Hill, *W.R.Archer s.n.* (HO, MEL).



Sect. 2. ERYTHROSPERMA

Taraxacum sect. *Erythrosperma* Dahlst., *Acta Fl. Sueciae* 1: 36 (1921)

T. [unranked] *Erythrospermia* H.Lindb., *Acta Soc. Fauna Fl. Fenn.* 29(9): 18 (1908). T: *T. rubicundum* (Dahlst.) Dahlst.

[*T. erythrospermum* auct. non Andr. ex Besser: D.A.Cooke in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1655 (1986)]

Leaves lanceolate to oblanceolate, glabrous to sparsely arachnoid-hairy; lobation diverse and sometimes complex with lobes further divided; petioles and midribs green or uniformly purple on upper surface. Capitula c. 2.5–4.5 cm diam.; outermost involucre bracts ovate to lanceolate, erect, patent to recurved, never completely appressed to next series (in Australia), green or glaucous-green, normally callus-tipped; borders white, < 0.5 mm wide. Marginal florets with ligule usually far exceeding involucre; pollen present (rarely absent); stigma dull green to bright yellow. Achenes pale red to red-brown, greyish red or deep brown, rarely pale ochre, spinulose above, verrucate to smooth below; cone cylindrical, 0.5–c. 2 mm long; beak (5–) 7–12 mm long. Pappus white to yellowish white.

A section of c. 100 species extending from central Asia to western Europe, naturalised in the Americas, Australia and New Zealand. The species recognised here occur from southern Qld to S.A. and Tas. The presence of species of this section in W.A. has yet to be confirmed.

The most widespread species in sect. *Erythrosperma* are *T. hepaticolor* Soest, *T. gracilens* Dahlst. and *T. multidentatum* Soest. Two other species, known only from single localities, *T. chelelobatum* Sahlén (Tamworth, N.S.W.) and *T. argutum* Dahlst. (Jenolan, N.S.W.), are not treated further here.

Taraxacum squamulosum Soest and *T. retzii* Soest, formally placed in sect. *Erythrosperma*, have some of the characters of sect. *Scariosa* Hand.-Mazz. and are thus treated separately here. *Taraxacum* sect. *Erythrocarpa* Hand.-Mazz. intergrades with *T. sect. Erythrosperma*; *T. multidentatum*, included in the latter section by van Soest, may be better placed in *T. sect. Erythrocarpa*, as is discussed below.

- 1 Achenes dark red-brown with relatively long (± 0.4 mm) spreading ($\pm 45^\circ$) to recurved spines at apex **3. *T. gracilens***
- 1: Achenes salmon-pink to red-brown with relatively short (< 0.4 mm) non-recurved antorse (forward-pointing at $< 45^\circ$) spines at apex
- 2 Achenes broadly fusiform, with body tapering abruptly into cone
- 3 Distal margins of at least some of the upper lateral leaf-lobes with 2–4 falcate lobules, the proximal margins always entire; interlobes sparsely denticulate; outermost involucre bracts ovate-lanceolate to lanceolate, narrowly white-bordered (c. 0.2 mm wide) **4. *T. sarcidanum***
- 3: Plants without the above combination of characters
- 4 Distal margins of upper lateral leaf-lobes entire or with 1 or 2 \pm patent teeth, the proximal margins or adjacent interlobes with 1 or 2 prominent teeth or acute lobules; outermost involucre bracts cordate to ovate-lanceolate, broadly white-bordered (0.25–0.5 mm wide) **5. *T. gasparini***
- 4: Distal margins of upper lateral leaf-lobes as above, the proximal margins and adjacent interlobes entire or rarely with 1 small tooth; outermost involucre bracts broadly lanceolate to lanceolate, very narrowly white-bordered (c. 0.1 mm wide)
- 5 Outer involucre bracts 7–9 mm long, 2–3 mm wide, recurved **6. *T. hepaticolor***
- 5: Outer involucre bracts 4–7 mm long, 1.5–2 mm long, upright to patent **8. *T. lambinonii***
- 2: Achenes narrowly fusiform, with body tapering gradually into cone
- 6 Achenes red-brown; cone 0.8–1 mm long; apical spines 0.2–0.3 mm long, lower $\frac{2}{3}$ verrucate, rarely smooth; upper lateral leaf-lobes triangular to falcate, acute but never caudate, with distal margins entire to denticulate, sometimes with 1 or 2 larger teeth **6. *T. hepaticolor***
- 6: Achenes salmon-pink to dark red-brown; cone 1.2–1.5 mm long; apical spines < 0.3 mm long, lower $\frac{2}{3}$ usually smooth, sometimes verrucate; upper lateral leaf-lobes deltoid to deltoid-caudate, the tails often with expanded tips, with distal margins usually dentate to lacinate **7. *T. multidentatum***

3. **Taraxacum gracilens* Dahlst., *Acta Horti Berg.* 9: 30 (1926)

T: in Horto Botanico Upsaliensi annis 1924–1925 e fructibus a cl. G.Samuelson anno 1921 in monte Parnassos supra Delphi [Greece] lectus educatum, *G.Dahlstedt s.n.*; holo: S, photo seen; iso: B, photo seen, S, photo seen.

Illustrations: G.Dahlstedt, *op. cit.* 31, fig. 14; t. 1, 47–49.

Leaves lanceolate, 10–15 cm long, 25–50 mm wide, grey-green to yellowish green, sparsely arachnoid; lateral lobes in 3 or 4 pairs, deltoid often with \pm linear attenuate tips; distal margins of upper 2–3 lobes usually lacinate, often with 1 or 2 longer \pm parallel lobules, proximal margins entire; terminal lobe hastate, sometimes dentate to lacinate; petioles rose-

purple, not winged; midrib similarly coloured, at least at base. Scapes 4–7 cm long at anthesis, 11–20 cm long in fruit, white-woolly in bud, glabrous at maturity except under capitulum, wine-red, usually \pm throughout. Capitula c. 4.5 cm diam.; outer bracts ovate-lanceolate to lanceolate, 7–9 mm long, 2–3 mm wide, patent to reflexed, white-bordered (0.25–0.5 mm wide), sparsely ciliate marginally, callus-tipped; innermost bracts linear, c. 15 mm long, 1–1.5 mm wide, callus-tipped. Outer florets with ligule flat, exceeding involucre by c. 10 mm; anthers with pollen; stigmas dull green. Achenes narrowly fusiform, 3.8–4.25 mm long, 0.5–0.7 mm wide, apically with slender spines \pm 0.4 mm long, spreading at \pm 45° to reflexed, dark red-brown, lower $\frac{2}{3}$ muricate to base; cone 1–1.3 mm long; beak 8–10 mm long. Pappus 5–7 mm long.

A species native to southern Europe. In Australia it is found mainly in the Mildura–Loxton area of Vic. and S.A., with an apparently isolated occurrence in the Scone district of N.S.W. Grows in disturbed grassy open forest, riverine woodland, farmland and urban areas, usually on clay soils. Flowers and fruits Aug.–Nov.



S.A.: Renmark, *R.D.Pearce s.n.* (AD). N.S.W.: Moonan Overlook above Moonan Brook, c. 70 km E of Scone, *N.H.Scarlett 90-19* (LTB, MEL). Vic.: Red Cliffs Sports Ground, *J.H.Browne s.n.* (MEL).

Taraxacum gracilens can resemble *T. multidentatum* vegetatively, but the different colour and sculpturing of the achenes separates the two species.

4. **Taraxacum sarcidanum* Arrigoni, *Parlatorea* 9: 87, 89 (2007)

T: [Italy], Sardegna, Laconi, in loc. Bruncu Neddu, 19 May 1967, *S.Alias s.n.*; holo: FI1002111, photo seen.

Illustration: P.V.Arrigoni, *op. cit.* 88, fig. 1.

Leaves oblanceolate to lanceolate, 5–12 cm long, 15–30 mm wide, greyish green, glabrescent; lateral lobes in 4–6 pairs, falcate; distal margins of the upper 2 to 3 lobes with 2 or 3 (–4) falcate lobules, proximal margins entire; terminal lobe narrow, sagittate, entire to trilobulate; petiole light purple, sometimes narrowly winged; midrib usually light purple basally. Scapes 4–10 cm long at anthesis, 15–26 cm long in fruit, white-woolly in bud, glabrous at flowering except under capitulum, rose-purple basally. Capitula 2.5–3.5 cm diam.; outer bracts ovate-lanceolate to lanceolate, 8–12 mm long, 2.0–2.5 mm wide, erecto-patent to recurved, narrowly white-bordered (c. 0.2 mm wide), ciliate marginally, thickened to callose at tips; innermost bracts linear, 14–16 mm long, 1.5–2.5 mm wide, callus-tipped. Outer florets with ligule flat, exceeding involucre by 3–6 mm; anthers with pollen; stigmas greenish yellow. Achenes broadly fusiform, c. 4 mm long, 0.8–1.3 mm wide, bright red-brown, with spines < 0.3 mm long and straight to slightly incurved at apex, lower part squamulose to verruculose to base; cone c. 1 mm long; beak c. 9 mm long. Pappus c. 6 mm long.

Described from Sardinia, Italy. In Australia it occurs from Toowoomba, Qld to far eastern Vic. Found in natural grassland and grassy woodland, rarely in disturbed urban vegetation. Flowers and fruits Sept.–May.

Qld: Toowoomba, *C.T.White 6664* (BRI). N.S.W.: Edwards Lookout at Wollomombi Falls, *N.S.Lander 509* (NSW); SW of Zalka Heights, Cooma, *J.H.Willis s.n.* (AD, MEL). Vic.: Little Bog Ck, 8 km (direct) SE of Upper Bendoc, *N.H.Scarlett 85-52* (MEL).



This species has characteristically elongated shallowly dissected leaves in early flowering, corresponding well with Arrigoni's illustration. Later flowering plants have more deeply dissected leaves. Arrigoni (*loc. cit.*) does not assign his species to a section, its placement in sect. *Erythrosperma* here is thus provisional.

5. **Taraxacum gasparini* Tineo ex Lojac., *Fl. Sicul.* 2(1): 201 (1903)

T: Italy, Etna, Vallone dei Zappini, *Todaro s.n.*; lecto: PAL *n.v.*, *fide* A.Galan de Mera & J.A.Vincente Orellana, *Candollea* 65(1): 110 (2011).

Illustrations: J.L.van Soest, *Collect. Bot. (Barcelona)* 4: 24, fig. 10 (1954); D.Jeanmonod & J.Gamisans, *Fl. Corsica* CXVII, fig. 120g (2007); A.Galan de Mera & J.A.Vincente Orellana, *op. cit.* 111, fig. 1.

Leaves oblanceolate, 6–20 cm long, 4–6 cm wide, dark green, glabrous; lateral lobes in 6 or 7 pairs, deltoid; distal margins of upper 2 to 3 lobes entire or with 1 or 2 patent teeth, the proximal margins or adjacent interlobes with 1, rarely 2, prominent teeth or acute lobules; terminal lobe relatively short and trilobulate, later in age inner leaves may develop narrow linear lacinate lateral lobes; petioles rose-purple, not winged; midrib rose-purple at least basally. Scapes 6–20 cm long at anthesis, 12–25 cm long in fruit, white-woolly in bud, glabrous at flowering except below capitulum, rose-purple at least basally, often entirely so. Capitula c. 3 cm diam.; outer bracts ovate to lanceolate, with outermost cordate, 7–9 mm long, 2–3 mm wide, erecto-patent to recurved, appressed in lower ½, broadly white-bordered (0.25–0.5 mm wide), ciliolate marginally, callus-tipped; innermost bracts linear, 13–19 mm long, c. 2 mm wide, variably callose at tips. Outer florets with ligule flat, exceeding involucre by 7–8 mm; anthers with pollen; stigmas bright yellow. Achenes broadly fusiform, 4–5 mm long, c. 1 mm wide, with short, flat straight spines c. 0.2 mm long at apex, pale red-brown, the lower ⅔ usually smooth; cone 1–1.5 mm long; beak 8–9 mm long. Pappus 5–6 mm long.

Native to southern Europe. In Australia known only from NE N.S.W. Grows in semi-natural grassland and grassy woodland. Flowers and fruits Dec.–Mar.

N.S.W.: Moona Plains, 30 km E of Walcha, *N.H.Scarlett 90-48* (NSW); Moonan Brook, 6 km from the Gloucester turnoff, c. 70 km E of Scone, *N.H.Scarlett 90-6* (LTB).



6. **Taraxacum hepaticolor* Soest, *Proc. Kon. Ned. Akad. Wetensch. C* 69(3): 380 (1966)

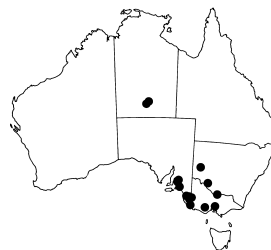
T: Iran, Kazerum to Shiraz, 50 miles from Shiraz, *P.Furze 1258*; holo: K.

[*T. disseminatum auct. non* G.E.Haglund: D.A.Cooke in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1656 (1986)]

Illustration: J.L.van Soest, *op. cit.* 380, fig. 11.

Leaves lanceolate to oblanceolate, (4–) 6–12 (–18) cm long, 1–4 cm wide, greyish to yellowish green, glabrescent; upper lateral lobes in 5 or 6 pairs, triangular to falcate; distal margins entire to denticulate, sometimes with 1 or 2 patent teeth, the proximal margins and adjacent interlobes entire or rarely with 1 small tooth; terminal lobe relatively short, triangular to trilobulate; petiole rose-purple, with wings very narrow to absent; midrib usually rose-purple in proximal ¾. Scapes (1–) 6–12 (–18) cm long at anthesis, 8–25 cm long in fruit, white-woolly in bud, glabrescent at flowering except below capitulum, usually rose-purple throughout. Capitula 2.5–3.5 cm diam.; outer bracts broadly lanceolate to lanceolate, 7–9 mm long, 2–3 mm wide, recurved, very narrowly white-bordered (c. 0.1 mm wide), not marginally ciliolate, variably callose at tips; innermost bracts linear, c. 15 mm long, c. 2 mm wide, rarely callus-tipped. Outer florets with ligule often involute, exceeding involucre by 2–4 (–6) mm; anthers with pollen; stigmas greenish yellow. Achenes narrowly to broadly fusiform, 4–5 mm long, 0.8–1.0 mm wide, with short, flat, rarely recurved spines 0.2–0.3 mm long at apex, red-brown, the lower ⅔ verrucate, rarely smooth; cone 0.8–1 mm long; beak 8–9 mm long. Pappus 6–7 mm long. Fig. 9D–F.

A species described from Iran. It occurs in southern N.T., eastern S.A., SW N.S.W. and Vic., growing in a wide range of semi-natural vegetation and also in urban habitats in relatively dry areas. Flowers and fruits mainly Sept.–Mar.



N.T.: Alice Springs Resort, N side of Stott Terrace on E bank of the Todd R., *R.F.Parsons* 682 (LTB). S.A.: Bordertown, Soldier's Park, *N.H.Scarlett* 08-631 (LTB). N.S.W.: Balranald Motor Inn, *R.F.Parsons* 617 (LTB, MEL). Vic.: Lower Glenelg Natl Park, N of fire track which runs W from the Nelson–Glenelg River road, 1 km S of the River Rd, *N.H.Scarlett* 84-473 (MEL).

Precociously flowering juvenile plants may have leaves entire or dissected less than halfway to the midrib.

Taraxacum hepaticolor in 'summer form' can be confused with *T. multidentatum*, as is discussed under the latter species.

7. **Taraxacum multidentatum* Soest, *Proc. Kon. Ned. Akad. Wetensch. C* 69(4): 444 (1966)

T: France, Hérault, en dessus de Montferrier pres de Tinal, *Hordeetum leporini*, 4 Apr. 1964, *R.Sutter s.n.*; holotype: L2578, photo seen.

Illustration: J.L.van Soest, *op. cit.* 445, fig. 7.

Leaves lanceolate, 9–30 cm long, 20–90 mm wide, green, hairy to glabrous; lateral lobes in 5–8 pairs, markedly dimorphic, in early flowering plants broadly deltoid with finely denticulate distal margins and entire proximal margins, in later flowering plants deltoid-caudate, the tail often long and expanded at tips; distal margins of upper 2 or 3 lobes \pm lacinate with 1 or 2 longer \pm parallel lobules, proximal margins entire or with 1 acute lobule; terminal lobe acute, hastate to trilobulate; petiole relatively short, rose-purple, sometimes narrowly winged; midrib similarly coloured at least at base. Scapes 6–10 cm long at anthesis, 15–25 (–30) cm long in fruit, white-woolly in bud, becoming glabrous at maturity except below capitulum, wine-red throughout. Capitula 3–3.5 cm diam.; outer bracts broadly lanceolate to lanceolate, 8–10 mm long, 2–4 mm wide, patent to recurved, white-bordered (c. 0.25 mm wide), with a large apical callus c. 1.5 mm high; innermost bracts linear, 16–17 mm long, 1–3 mm wide, usually with a large apical callus to 1 mm high. Outer florets with ligule flat, exceeding involucre by 3–5 mm; anthers usually with pollen; stigmas greenish yellow. Achenes narrowly fusiform, 4–5 mm long, 0.75–1.25 mm wide, with flattened, straight spines < 0.3 mm long at apex, usually smooth, rarely verrucate in lower $\frac{2}{3}$ of body, very pale brown to salmon-pink or dark red-brown; cone 1.2–1.5 mm long; beak 8–10 mm long. Pappus 5–7 mm long.

Native to France, Italy and Spain. In Australia it occurs in urban areas from West Wyalong (N.S.W.) south to eastern S.A., Melbourne, Vic. and Hobart, Tas., growing mainly in lawns and on footpaths. Flowers and fruits mainly Sept.–Apr.

S.A.: Clare Valley: Auburn township, back lawn of the Rising Sun Hotel, *R.F.Parsons* 630 (LTB). N.S.W.: Blackett, 25 km W of Sydney, pot grown Waite Inst. from roots, *R.D.Pearce* 53B (AD). Vic.: Glenlyon Rd, Brunswick East, Melbourne, *N.H.Scarlett* (LTB, MEL). Tas.: Hobart, *L.Rodway* 454 (HO).



This species, although classed in sect. *Erythrosperma* by Soest, has the robust growth habit and large achenes with long cones of sect. *Erythrocarpa* species and seems more closely related to these than to most sect. *Erythrosperma* species. Early flowering plants producing dark red-brown achenes are very close to *T. calocephalum* Hand.-Mazz, and the two species may eventually prove to be conspecific. Australian specimens that I have determined as the latter species are best included with *T. multidentatum* pending further investigation.

'Summer forms' of *T. multidentatum* and *T. hepaticolor* can be difficult to separate. The most convenient and useful character to distinguish the former species is the constant presence of calli on the inner involucre bracts, which are virtually absent in *T. hepaticolor*.

8. **Taraxacum lambinonii* Soest, *Acta Bot. Neerl.* 10: 289 (1961), as *T. lambinoni*

T: Massif de l'Authion, prairie subalpine rase, bord route du circuit à environ 1 km de Cabanes Vieille, près de la borne f. [française], 20 June 1958, *J.Lambinon* 58/M/1663; holotype: L n.v..

T. castellanum Sonck, *Ann. Bot. Fenn.* 27: 277 (1990). T: New Zealand, South Island, Canterbury, Castle Hill Basin, 4 Nov. 1985, *C.E.Sonck s.n.*; holotype: H.

Illustrations: J.L.Soest, *op. cit.* 303, fig. 13; C.E.Sonck, *Ann. Bot. Fenn.* 27: 278, figs 1 & 2 (1990), as *T. castellanum*.

Leaves oblong to linear-lanceolate, 6–10 (–20) cm long, 1–2 cm wide, green, glabrous; lateral lobes in 4–5 (–7) pairs, falcate to deltoid; distal margins of upper 3 or 4 lobes entire, proximal margins entire; terminal lobe hastate; petioles faintly pink, narrowly winged; midrib green. Scapes c. 2 cm long at anthesis, c. 14 cm long in fruit, woolly in bud, glabrous at maturity, green to pale purple. Capitula 3 cm diam.; outer bracts ovate-lanceolate to lanceolate, 4–7 mm long, 1.5–2 mm wide, upright to patent, white-bordered (c. 0.2 mm wide), sparsely ciliolate marginally, slightly callus-tipped; inner bracts linear, 10–11 mm long, 1–1.5 mm wide, slightly callus-tipped. Outer florets with ligule flat, exceeding involucre by c. 3 mm; anthers with pollen; stigmas greenish yellow. Achenes turbinate, 3.5–4 mm long, c. 0.8 mm wide, light red-brown, usually smooth in lower part, with erect spines c. 0.2 mm long apically; cone cylindrical, 0.5–0.6 mm long; beak 6–7 mm long. Pappus 5–6 mm long, pale brown.

Native to southern France; introduced in eastern Tas. and New Zealand, apparently rare. Grows in semi-natural grassy woodland. Flowers and fruits Sept.–Dec.

Tas.: Derwent, Quoin Ridge, *A.M.Buchanan* 11805 (HO); St. Marys, Oct. 1961, *J.Somerville* (HO).

Taraxacum lambinonii has been confused with the native *T. cygnorum*, but it is easily distinguished from the latter by its achene colour, shape and sculpturing.



Sect. 3. HAMATA

Taraxacum sect. *Hamata* H.Øllg., *Pl. Syst. Evol.* 141: 201 (1983)

Type: *T. hamatum* Raunk.

Leaves lanceolate to oblanceolate, c. 5–40 cm long, glabrescent, with hooked lobes; petioles and leaf midribs striate, i.e. with interwoven purple and green strands on upper surface (stomata present only on green strands). Capitula c. 4.5 cm diam.; outermost involucre bracts erect, patent or recurved, usually to different degrees within a single capitulum, ovate to ovate-lanceolate, c. 8–12 mm long, bordered or unbordered, not callus-tipped, glaucous on upper surface; inner involucre bracts dark green. Marginal florets with ligule far exceeding involucre; pollen present; stigmas greenish yellow. Achenes turbinate, pale to dark brown, spinulose above, smooth below; cone conical, 0.3–0.7 mm long; beak more than 3.5 mm long, always longer than achene body. Pappus white.

A section of c. 30 species native to Europe; introduced in Australia and also S America. All are triploid apomicts. Widespread from sea level to sub-alpine regions in the eastern highlands, from Tambourine Mtn (Qld) to Vic. and Tas., growing in urban gardens, farmland and disturbed native grassland and grassy woodland. Flowers and fruits Sept.–Apr.

Taraxacum hamatum Hagend., Soest & Zevenb. has been definitely identified in Victoria (Scarlett, 1999), and at least four other species have been provisionally identified for Australia in general, but more work on their precise delimitation is needed.



Øllgaard, *Pl. Syst. Evol.* 141: 205–212 (1983) gives a key to most of the species of the section. The following specimens are representative of the section in Australia:

S.A.: Burnside, Adelaide, cultivated in Melbourne from seed collected by D.E.Symon (4:2008), *N.H.Scarlett 09-100* (LTB). Qld: Lions Park, Tambourine North, *N.H.Scarlett 01-155* (LTB). N.S.W.: Deep Ck, Pokolbin State Forest, 16 Sept. 1954, *E.F.Constable s.n.* (NSW). A.C.T.: Snowy Flat, Bimberi Ra., Cotter River District, *R.Pullen 3853* (NSW). Vic.: Norlane [a northern suburb of Geelong], *N.H.Scarlett 90-192* (MEL, NSW). Tas.: Meander, *A.M.Buchanan 4392* (HO).

Sect. 4. CELTICA

Taraxacum sect. *Celtica* A.J.Richards, *Taxon* 34: 639 (1985)

Type: *T. celticum* A.J.Richards

Leaves lanceolate to oblanceolate, c. 5–30 cm long, sparsely arachnoid-hairy; lateral lobes falcate, not hooked; petioles and midribs striate, i.e. with interwoven purple and green strands. Capitula c. 4 cm diam.; outermost involucre bracts ovate to lanceolate, erect to recurved, oriented \pm uniformly in the same capitulum, with white borders absent or very narrow, < 0.2 mm wide (in Australia), not callus-tipped, green and rarely lightly glaucous on upper surface; inner involucre bracts green. Outer florets with ligule far exceeding involucre; pollen present (in Australia); stigmas green to yellowish green. Achenes olive- to pale brown or straw-coloured, spinulose above, smooth or verrucate below; cone conical to \pm cylindrical, c. 0.3–1.0 mm long; beak always longer than achene body. Pappus white.

A section of c. 30 species native to western Europe; introduced in Australia and in Central America (Mexico). Members of this section occur in A.C.T. and Vic., but the number of species is still uncertain. A specimen of a species in the closely related Nordic sect. *Naevosa*, differing diagnostically from sect. *Celtica* species by its black spotted leaves, has been collected at only one locality in the Eastern Highlands of Vic. Section *Naevosa* may be more widespread, but evidence is lacking.

1 Leaf-blades glabrescent

2 All or most scapes bracteate, with bracts often large and leaf-like; outermost involucre bracts narrow and \pm lacinate

9. *T. bracteatum*

2: Scapes ebracteate, rarely with one minute linear bract; outermost involucre bracts never both narrow and lacinate

10. *T. subbracteatum*

1: Leaf-blades with numerous short crisped hairs

11. other sect. *Celtica* species

9. **Taraxacum bracteatum* Dahlst., *Ark. Bot.* 19: 11 (1925)

T: Sweden, Öland, Vickelby, Bo, 3 June 1924, *H.Dahlstedt s.n.*; lecto: S05-7703; isolecto: S05-7754, *fide* C.F.Lundevall & H.Øllgaard, *Preslia* 71: 66 (1999); photos seen.

Illustrations: A.Hagendijk *et al.*, *Fl. Neerlandica* 4 (10b): 172, fig. 78 (1982); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 692, fig. 132e (1999).

Leaves oblanceolate to lanceolate, 10–25 cm long, 3–5 cm wide, dark green, glabrescent; lateral lobes in 3–5 pairs, broadly deltoid to hooked; distal margins of upper 2 or 3 lobes entire, proximal margins entire, usually convex; terminal lobe broadly helmet-shaped in outline to triangular; petiole brown-purple, very narrowly winged at base, with wings broader distally; midrib brown-purple throughout, sparsely hairy. Scapes 5–20 cm long at anthesis, 15–35 cm long in fruit, usually with foliose bracts, glabrous at flowering except below capitulum, usually rose-purple throughout. Capitula c. 4.5 cm diam.; outermost bracts narrowly lanceolate, 5–7 mm long, 1–2 mm wide, usually lacinate; next series lanceolate and entire, c. 10 mm long, 2–3 mm wide, erecto-patent, narrowly white-bordered, not callus-tipped; innermost bracts linear c. 15 mm long, 2–3 mm wide, not callus-tipped. Outer florets with ligule flat, exceeding involucre by 8 mm; anthers with pollen; stigmas dull green. Achenes broadly fusiform, 3.5–4.5 mm long, c. 1 mm wide, shortly spinulose at apex, with

lower part verruculose to smooth, olive-brown to straw-coloured; cone conical to \pm cylindrical, c. 0.8–1 mm long; beak 6–9 mm long. Pappus 5–6 mm long. Fig. 9A–C.

Native to central and western Europe; naturalised in central and eastern Vic. and southern N.S.W.; also in Mexico. Grows in damp places in gardens, camping grounds, and on roadsides. It is also abundant in disturbed alpine grassland; often on heavy basaltic or alluvial soil. Flowers and fruits Sept.–Apr.

N.S.W.: Albury Botanic Gardens, *E.J.McBarron* 3040 (MEL); Seaman's Hut, Mt Kosciusko area, *C.Totterdell* 156 (CANB). Vic.: Memorial Cross area below wireless station, Mt Macedon, *N.H.Scarlett* 84-428 (MEL); Ingram's Mill, Western Tyers, *N.H.Scarlett* 98-483 (MEL); Cairn on walking track to Mt Jim, Bogong High Plains, *N.H.Scarlett* 99-41 (MEL).



Taraxacum bracteatum is included in section *Hamata* by Øllgaard (*Pl. Syst. Evol.* 141: 200 (1983)) for cytological reasons, while Dudman & Richards (1997) include it in section *Celtica*. It is one of a number of species which fits uneasily in either section.

10. **Taraxacum subbracteatum* A.J.Richards in A.J.Richards & C.C.Haworth, *Watsonia* 15: 89 (1984)

T: England, Brill, Buckinghamshire, v.c. 24, GR42/65, 14, 5 May 1969, *A.J.Richards*; holo: OXF *n.v.*; iso: BM, LTR, S *n.v.*

Illustration: A.J.Richards & C.C.Haworth, *op. cit.* pl. 2B, facing p. 95.

Leaves oblanceolate to lanceolate, c. 10–20 cm long, 2–6 cm wide, dark green, glabrous; lateral lobes in 4–6 pairs, deltoid; distal margins of upper 2 or 3 lobes entire or with 1 (–3) patent, acute lobules, proximal margins entire, usually convex; terminal lobe broad helmet-shaped in outline to triangular and \pm trilobulate; petiole brown-purple, narrowly winged; midrib brown-purple throughout. Scapes c. 8–10 cm long at anthesis, c. 20 cm long in fruit, usually ebracteate, woolly in bud, glabrescent at flowering including below capitulum, usually rose-purple throughout. Capitula 2–3 cm diam.; outer bracts ovate-lanceolate to lanceolate, 3–8 mm long, 2–3 mm wide, erecto-patent and adpressed to inner series in lower $\frac{1}{2}$; outermost series not laciniate, very narrowly white-bordered, not callus-tipped. Outer florets with ligule flat, exceeding involucre by 4–6 mm; anthers with pollen; stigmas greenish yellow. Achenes broadly fusiform, c. 3 mm long, 0.8 mm wide, with minute spines apically, the lower $\frac{2}{3}$ smooth, straw-coloured; cone conical, c. 0.3 mm long; beak 6–8 mm long. Pappus c. 5 mm long.

Endemic in England. Naturalised in eastern Australia, where known only from 3 localities in A.C.T. and Vic. in damp urban habitats, but probably more widespread. Flowers and fruits Sept.–Apr.

A.C.T.: Ainslie, Cox St, *L.G.Adams* 2868 (AD, BRI, CANB, MEL, NSW, PERTH). Vic.: Drouin, W side of town beside railway embankment, *N.H.Scarlett* 98-504 (MEL).

This species is very closely related to *T. bracteatum*, but the differences between the species are maintained in cultivation.



11. **Taraxacum* sect. *Celtica* (other taxa)

Taxonomically difficult populations of *T.* sect. *Celtica* occur in the eastern highlands of Victoria. The species involved appear to be related to *T. gelertii* Raunk. and *T. duplidentifrons* Dahlst., having hairy leaf-blades and bluntly triangular lateral leaf lobes, sometimes with dentate distal margins on the upper leaf-lobes. The following is an exemplar:

Vic.: Neulyne's Mill car park below Baw Baw Village, *N.H.Scarlett* 99-7 (MEL).



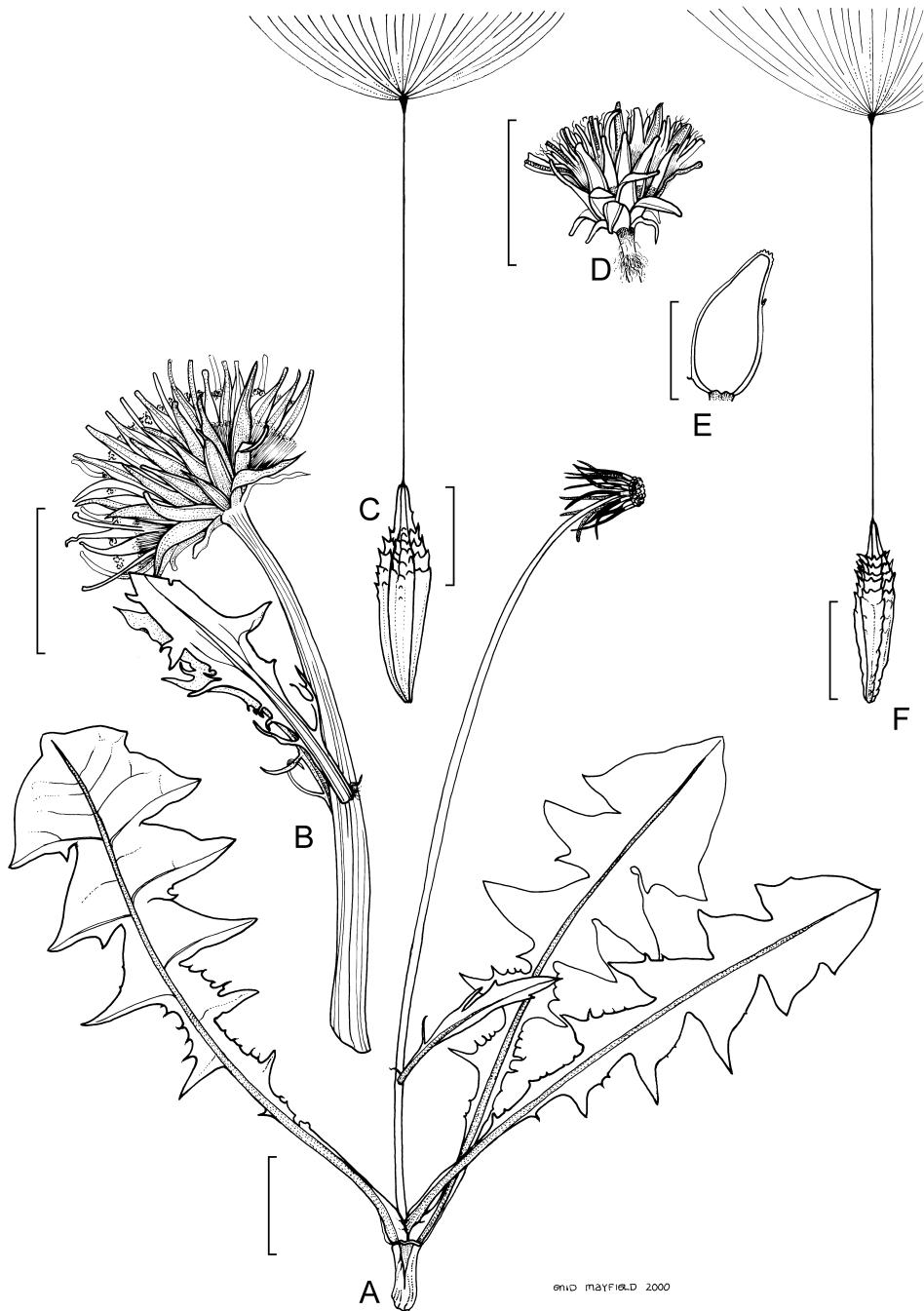


Figure 9. *Taraxacum*. **A–C**, *T. bracteatum*. **A**, habit; **B**, capitulum; **C**, achene (**A–C**, N.H.Scarlett 84-428, MEL). **D–F**, *T. hepaticolor*. **D**, capitulum; **E**, outer involucre bract; **F**, achene (**D–F**, R.D.Pearce 107, AD). Scale bars: **A** = 30 mm; **B**, **D** = 20 mm; **C**, **F** = 2 mm; **E** = 5 mm. Drawn by E.Mayfield.

Sect. 5. TARAXACUM

Taraxacum F.H.Wigg. sect. *Taraxacum*

Type: *T. officinale* F.H.Wigg.

T. sect. *Ruderalia* Kirschner, H.Øllg. & Štěpánek, *Taxon* 36: 615 (1987). *T. fasciatum* Dahlst.

Leaves lanceolate to oblanceolate, c. 8–30 cm long, deeply lobed, usually with complex further dissection, arachnoid-hairy to glabrescent; petioles and midribs green or uniformly purple. Capitula c. 4.5 cm diam. or more; outermost involucre bracts lanceolate to linear-lanceolate, erecto-patent to abruptly reflexed, uniformly or variously oriented in a single capitulum, with white borders absent or very narrow (< 0.2 mm wide), not callus-tipped, variously coloured. Marginal florets with ligule far exceeding involucre; pollen usually present; stigmas yellow, yellowish green or grey. Achenes brown to straw-coloured, spinulose above, smooth below; cone conical, 0.2–0.5 (–0.7) mm long; beak longer than body of achene. Pappus white.

A section of c. 1000 very narrowly delimited agamosperous species, native from western Asia to western Europe and N Africa. Introduced in the Americas, India, Indonesia, Australia and New Zealand. At least 10 species of the section have been provisionally identified in Australia but more work on their precise delimitation is needed. Species of the section are confined to humid areas from southern Qld to Tas. And W to Eyre Penin., S.A., growing in urban habitats and damp native vegetation, including alpine grasslands. Flowers and fruits Sept.–Apr.

The following specimens are exemplars of this complex:

S.A.: Plympton, pot grown Waite Inst. from roots, *R.D.Pearce* 53B (AD). Qld: Darling Downs, Mt Kynoch, grown in Melbourne from seed collected by I.L.Menkins, *N.H.Scarlett* 12-16 (LTB). N.S.W.: Kanangra-Boyd Natl Park, Luther's Ck, *N.H.Scarlett* 99-123 (MEL). A.C.T.: Kiandra, *M.Gray* 7027 (CANB). Vic.: Melbourne suburb of Balwyn, 7 Glenliss St, *M.G.Corrick* 9069 (MEL). Tas.: Strahan, *R.F.Parsons* 698(2) (LTB).



The binomial *Taraxacum officinale* is currently used by many botanical authors to represent the “Common or Garden Dandelion”, disregarding A.J.Richards’ lectotypification (*Taxon* 34: 633–644 (1985)), which restricted its use to a species of the then section *Crocea* M.P.Christ. of northern and alpine Europe. A new lectotypification proposal, which would return the name to its most common usage has recently been published (J.Kirschner & J.Štěpánek, *Taxon* 60(1): 216–220 (2011)). This proposal is followed here and thus *T.* sect. *Taraxacum* replaces *T.* sect. *Ruderalia*. *Taraxacum* sect. *Taraxacum* as diagnosed above excludes those species with relatively long cylindrical cones and callosed involucre bracts, which are included in the section by most authors. These are placed, in this treatment, in *Taraxacum* species group 1, see below.

Species Group 1

Taraxacum species Group 1, *sensu* N.H.Scarlett in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 693 (1999); *Taraxacum* sp. Group 1 *Fl. Victoria* (A.C.Beauglehole 67529) Vic. Herbarium, *sensu* Australian Plant Census www.anbg.gov.au/chah/apc, accessed 12 May 2014.

Leaves lanceolate to lyrate, often over 30 cm long and relatively broad, initially arachnoid-hairy, becoming glabrous; lamina shallowly to deeply lobed; proximal lobe margins often lobulate to lacinate; petioles and midribs green or uniformly purple. Capitula c. 3.5–4 cm diam.; outermost involucre bracts lanceolate to linear-lanceolate, erecto-patent to abruptly reflexed, uniformly or variously oriented in a single capitulum, white-bordered (≤ 0.25 mm wide), with apical callus, variously coloured. Marginal florets with ligule exceeding involucre, sometimes scarcely so; pollen present or absent; stigmas lime-green to grey. Achenes dark olive-brown to straw-coloured, markedly spinulose above, verrucate to smooth

below; cone cylindrical, (0.5–) 1–1.5 mm long; beak longer than body of achene. Pappus white or yellowish white.

The species grouped here have affinities with a number of sections: *Taraxacum*, *Dissimilia* Dahlst., *Erythrocarpa* Hand.-Mazz. and *Macrocornuta* Soest. They extend from W.A. to S.A. and Vic. and are the predominant *Taraxacum* species of coastal northern N.S.W. and southern Qld. They grow in urban habitats, farmland and native vegetation from sea-level to subalpine grassy woodland. Flowers and fruits Aug.–Apr.

Only *T. khatoonae* Abedin (S.A., N.S.W.) has been definitely identified in this group. Further collections and comparative studies are needed to determine the other species.

T. koksaghyz Rodin (sect. *Ceratoidea* Kirschner & Štěpánek), which was grown experimentally for rubber production during the Second World War (W.A., S.A., Tas.) would key to *T.* species group 1. However, it has not become naturalised.

Achene cone (0.8–) 1–1.5 mm long

12. *T. khatoonae*

Achene cone < 1 mm long

13. other Group 1 species

12. **Taraxacum khatoonae* Abedin in S.Abedin & Z.Tajuddin, *Pakistan J. Bot.* 41(2): 587 (2009)

T. lahoulense Abedin, *Pakistan J. Bot.* 39(5): 1422 (2007), *nom. illeg. non* Soest (1966). T: India: Western Himalaya Province Lahol, left shore of the Bhaga (later Tsinab) at Kardong, 14 June 1856, *Schlagintweit 4047*; *holo: BM n.v.*

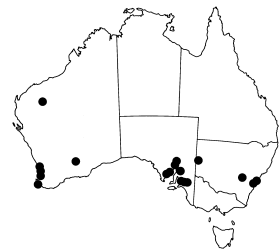
[*T. pseudocalocephalum* *auct. non* Soest: W.R.Barker, *Census S. Austral. Vasc. Pl.* 5th edn, 381 (2005)]

Illustration: S.Abedin, *Pakistan J. Bot* 39(5): 1419, fig. 1a–a' (2007).

Leaves oblanceolate to lanceolate, c. 15–22 cm long, 38 cm wide, green to grey-green, initially woolly but becoming glabrous; lateral lobes in (3–) 4–6 pairs, acutely triangular, with distal margins entire, toothed or shortly lacinate, and proximal margins with 1 or 2 acute lobes close to midrib; terminal lobe broadly helmet-shaped in outline to triangular and ±trilobulate; petiole light red-brown; midrib light red-brown and green distally. Scapes 5–8 cm long at anthesis, (30–) 50–60 cm long in fruit, very densely woolly in bud but becoming glabrous in fruit, green. Capitula c. 2–4 cm diam.; outer bracts lanceolate to linear-lanceolate, 7–15 mm long, 2–3 mm wide, erect to recurved with narrow (c. 0.2 mm) white or purple borders, ciliolate marginally, callus-tipped; inner involucre bracts linear, 15 mm long, 1–1.5 mm wide. Outer florets with ligule flat, exceeding involucre by 3–5 mm; anthers with pollen; stigmas lime-green. Achenes narrowly fusiform, (3–) 4–5.5 mm long, 0.8 mm wide, apically densely spinulose, verrucate to smooth in lower part, straw-coloured; cone cylindrical, (0.8–) 1–1.5 mm long; beak 8–11 mm long. Pappus 7–8 mm long, brownish white. Fig. 8K.

A species native to the Western Himalayan Province of India. Naturalised and abundant in dry areas of W.A. and S.A., apparently rare in N.S.W. Growing on alkaline loams in urban weedy habitats and disturbed native vegetation, most commonly in riparian areas. Flowers and fruits June–Nov.

W.A.: Paraburdoo Town, *G.J. & B.J. Keighery 890* (CANB, PERTH); Pinjarra, *G.J. Keighery 9837* (MEL, PERTH). S.A.: Braddock Park, Port Augusta, *N.H. Scarlett 08-581* (AD); Adelaide, suburban garden, 22 Mar. [190]4, *R.E. Shapter s.n.* (AD). N.S.W.: Forbes, riverside park, *N.H. Scarlett 01-44* (LTB).



Abedin *op. cit.* 39: 1422 (2007) assigns *T. khatoonae* to sect. *Macrocornuta* Soest, species of which are widespread in Central Asia, but the weakly developed corniculation of the involucre bracts and the brownish white pappus of *T. khatoonae* are not diagnostic of that section, and its sectional placement is thus uncertain.

13. *Other *Taraxacum* Group 1 species

[*T. pseudocalocephalum* auct. non Soest: N.H.Scarlett in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 69 (1999)]

Though sharing the diagnostic characters of the group, these residual species are morphologically heterogeneous. One widespread pollenless species may be *T. simile* Raunk.

Introduced from Eurasia. Widespread in lowland humid areas from southern Qld to Vic., growing in urban areas, farmland and native vegetation on fertile soils. Flowering and fruiting Sept.–Apr.

The following are exemplars of this variable group:

S.A.: Pot grown Waite Inst. from roots from P.Kloot, St. Peters suburb of Adelaide, *R.D.Pearce* 110 (AD). Qld: Levers Plateau, on Qld/N.S.W. border c. 90 km SSW of Brisbane, *R.J.Henderson* 1282 (BRI, NSW). N.S.W.: Moona Plains, Walcha, *N.H.Scarlett* 90-40 (MEL). Vic.: Geelong suburb of Norlane, 17 Princes Hwy, *N.H.Scarlett* 99-69 (MEL).



Species Group 2

Leaves oblanceolate to lanceolate; lateral lobes deltoid to falcate, often with narrow apices; petioles green to rose-purple, sometimes narrowly winged. Capitula 3–4.5 cm diam.; outermost bracts cordate to ovate-lanceolate, erect, patent to abruptly reflexed, with or without apical callus; borders 0.3–0.5 mm wide, hair-fringed, white to pale pink. Outer florets with ligule flat to naviculate, exceeding involucre by 5–11 mm; anthers with pollen, sometimes sparsely so; stigmas greenish yellow. Achenes pale ochre, cinnamon or grey; cone mostly cylindrical, rarely conical, 0.5–1.0 mm long; beak 5–10 mm long. Pappus 5–7 mm long, white.

Taraxacum squamulosum and the rare *T. retzii* are formally placed in sect. *Erythrosperma*, but they have obvious affinities to sect. *Scariosa* Hand.-Mazz. species in having very broadly bordered outer involucre bracts and shortly coned achenes with relatively short beaks; for this reason they are treated separately here.

Outer involucre bracts cordate to ovate-lanceolate, upright, patent to recurved, usually with a callus

14. *T. squamulosum*

Outer involucre bracts ovate-lanceolate, patent to abruptly reflexed in upper half, usually without a callus

15. *T. retzii*

14. **Taraxacum squamulosum* Soest, *Acta Bot. Neerl.* 6: 413 (1957)

T: Corsic], Pietralba, au S-W. de la gare, bord d'un ruisseau, 4 Apr. 1936, *R.de Litardiere* s.n.; lecto: G n.v.; isolecto: L, *fide* D.Jeanmonod, *Candollea* 65 (1): 38 (2010).

T. sp. I, N.H.Scarlett in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 690 (1999).

[*T. aristum* auct. non G.E.Haglund & Markl.: J.H.Willis, *Handb. Pl. Victoria* 2: 772 (1973) *p.p. quoad loc.* 'Brisbane Ranges' *cit.*]

Illustrations: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 692, fig. 132c (1999), as *T. sp. I*; D.Jeanmonod & J.Gamisans, *Fl. Corsica* CXVIII, fig. 120e (2007).

Leaves oblanceolate to lanceolate, 5–15 (–20) cm long, 15–30 (–60) mm wide, greyish green, glabrous; lateral lobes in 3–7 pairs, deltate, often caudate, sometimes narrow and falcate, with distal margins of upper 2 to 3 lobes entire or with 1–3 teeth or acute lobules, and proximal margins entire or with 1 acute lobule; terminal lobe relatively large, sagittate, entire to trilobulate; petiole rose-purple, sometimes narrowly winged; midrib rose-purple, at least basally. Scapes 5–18 cm long at anthesis, 10–30 cm long in fruit, woolly in bud, glabrescent at flowering including below capitulum, usually rose-purple throughout. Capitula 3.5–4.5 cm diam.; outer bracts cordate to ovate-lanceolate, 4–7 mm long, 2–4 mm wide, erect, erecto-

patent to slightly recurved, white-bordered (0.3–0.5 mm wide), marginally ciliolate or rarely smooth, apiculate, with tips thickened to minutely callose; innermost bracts linear, 10–15 (–20) mm long, 1–2 mm wide, usually minutely callus-tipped. Outer florets with ligule flat, exceeding involucre by 5–10 mm; anthers with pollen; stigmas greenish yellow. Achenes broadly fusiform, 3–5 mm long, c. 1 mm wide, with prominent broad scale-like spines apically, smooth in lower $\frac{1}{3}$ at least, light pinkish brown to grey; cone cylindrical, sporadically also conical, (0.5–) 0.8–1.0 mm long; beak 6–7 mm long. Pappus 5–7 mm long, white. Fig. 8 I–J.

A species described from Corsica. It occurs in Vic. and Tas. (Bass Strait Is), growing mainly in native grassy forest and woodland from sea-level to sub-alpine regions, frequently in gullies and on riparian flats; scattered in the suburbs of Melbourne, Vic. Flowers and fruits mainly Sept.–Apr.

Vic.: Barrabool Flora and Fauna Res., *A.C.Beauglehole* 85694 (MEL); Pyrete Ck, N section, approx. 8.5 km (direct) SW of Gisborne, *N.H.Scarlett* 83-199 (MEL); above the falls at Basin Ck., 8.5 km (direct) SE of Murrindal, *N.H.Scarlett* 84-412 (MEL); S side of Bald Hill, which is 4.5 km (direct) SE of Woods Point, *N.H.Scarlett* 84-650 (MEL). Tas.: Badger Is., Furneaux Group, *J.S.Whinray* 1044 (MEL).



Štěpánek and Kirschner in *Feddes Repert.* 123: 165 (2012) have reduced *T. squamulosum* to synonymy with *T. oxoniense* Dahlst ex Druce. Since *T. oxoniense* lacks the characteristic squamulose achenes of *T. squamulosum*, the latter species is maintained here.

15. **Taraxacum retzii* Soest, *Acta Bot. Neerl.* 10: 290 (1962)

T: France, Forêt de Vernon, 22 Apr. 1959, *B.de Retz* 44411, p.p.; holotype: L n.v.

Illustration: J.L.Soest, *op. cit.* 306, fig.16.

Leaves oblanceolate, c. 8–18 cm long, 24.5 cm wide, greyish green, becoming glabrous; lateral lobes in (3) 4 pairs, deltoid and falcate, often with distally directed apices which are acute and often caudate; distal margins of upper 2 or 3 lobes entire or with 1 (2) acute lobes, proximal margins entire or with 1 acute lobe close to midrib; terminal lobe sagittate, acute; petiole green suffused with purple. Scapes c. 7 cm long at anthesis, c. 25 cm long in fruit, green suffused with pink, woolly in bud, glabrous at anthesis except just below involucre. Capitula c. 3 cm diam.; outer bracts ovate-lanceolate, appressed to inner bracts basally, patent to abruptly reflexed in upper half, with white to pale pink borders 0.3–0.5 mm wide, marginally ciliolate, usually without calli; inner bracts linear, 12–14 mm long, 13 mm wide, corniculate at tips. Outer florets with ligule apically naviculate, exceeding involucre by 7–11 mm; anthers with pollen; stigmas greenish yellow. Achenes turbinate, 2.5–3 mm long, c. 1 mm wide, smooth to verrucate in lower $\frac{1}{2}$, with incurved flat spines c. 0.2 mm long apically, pale cinnamon to pale ochre; cone broadly cylindrical, 0.5–0.8 mm long; beak 5–10 mm long. Pappus 6 mm long, white.

Native to France. Naturalised in S.A., N.S.W. and Vic.; grows in natural grassy woodland and disturbed urban areas, mainly on alkaline loamy soils. Flowers and fruits June–Sept.

S.A.: Mallala Council Offices lawn (pot grown at the Waite Inst.), *R.D.Pearce* 99 (AD, LTB). N.S.W.: Jenolan Caves Reserve, McKeown's Valley, *N.H.Scarlett* NHS 99-115 (LTB). Vic.: southern part of Murrayville Community College, *R.F.Parsons* 651 (LTB).



Taraxacum retzii superficially resembles *T. squamulosum*, but has wider abruptly reflexed outer involucre bracts and pale ochre to cinnamon achenes.

ASTERACEAE

6. YOUNGIA

I.R.Thompson

Youngia Cass., *Ann. Sci. Nat. (Paris)* 23: 88 (1831); derivation unknown.

T: not designated.

Annual, biennial or perennial herbs, branching. Hairs simple, eglandular. Leaves all or mostly basal. Inflorescences cymose or paniculate. Capitula pedunculate; involucre bracts biseriate; soft and reflexed at maturity. Florets: ligule yellow. Achenes homomorphic, not compressed or outer ones slightly compressed, unbeaked. Pappus of bristles, usually persistent; bristles scabrid-barbellate, uniform within a pappus.

A genus of c. 40 species predominantly from Asia; one species native to Australia.

E.B.Babcock & G.L.Stebbins, The genus *Youngia*, *Publ. Carnegie Inst. Washington* 484: 1–106 (1937).

***Youngia japonica* (L.) DC., *Prodr.* 7: 194 (1838)**

Prenanthes japonica L., *Mant. Pl.* 1: 107 (1767); *Crepis japonica* (L.) Benth., *Fl. Hongk.* 194 (1861). T: *Kleynhoff, Herb. Linn. No. 952.6*; lecto: LINN, *fide* A.Grierson in M.S.Dassanayake & F.R.Fosberg (ed.), *Revised Handb. Fl. Ceylon* 1: 268 (1980).

[*Youngia thunbergiana* auct. non DC.: J.D.Hooker, *Fl. Tasman.* 1: lxxv (1859)]

Illustration: G.J.Harden (ed.), *Fl. New South Wales* 3: 341 (1992).

Scapose or scapiform annuals to c. 0.6 m high, with spreading coarse hairs scattered or sparse on stems and leaves. Basal leaves to c. 20 cm long, with l:w ratio 3–8, often lyrate divided, petiole-like basally, entire, denticulate or dentate; cauline leaves few, similar to basal leaves or much reduced, undivided. Capitula several–many; involucre 4–5 mm long, c. 1.5–2 mm diam.; outer bracts 3–5, ovate, 0.5–1.0 mm long, with broad hyaline margin; inner bracts 7–10, 4–5 mm long, with a prominent pale keel developing basally, with hyaline margin alternately distinct and vestigial. Florets: ligule c. 3 mm long, yellow, possibly rarely white; style hairs pale. Achenes narrowly ellipsoid, 1.5–2 mm long, slightly to moderately compressed, tapering to a neck c. 0.2 mm long, with ribs crowded, unequally prominent, ciliate, with cilia longer distally, reddish brown or mid-brown. Pappus c. 3 mm long, white; bristles barbellate proximally. Plate 7; Fig. 7M–N.

Native in eastern Australia from Mt Windsor in N Qld S to Sydney, N.S.W. Widely distributed in eastern Asia, including New Guinea. Grows in forests; also a weed of lawns and roadsides. Flowers most of year.

Qld: Palm Tree Ck, 22 km SE of Toowoomba, *D.Halford Q634* (BRI, MEL). N.S.W.: Gloucester, Sept. 1965, *R.G.Coveny s.n.* (NSW); Torrington–Silent Grove road, *N.S.Lander 535a* (BRI, CANB, HO, MEL, NSW); Alum Mtn, Buladelah, July 1923, *H.M.R.Rupp* (MEL).

A dainty, rosetted, often scapose species with small capitula on a slender peduncle. A form recorded from disturbed and urban localities has leaves with fewer sessile lateral segments, a denser stem indumentum, and achenes mid-brown rather than darker reddish brown. This form possibly has come from outside Australia and further investigation into the variation is warranted.



ASTERACEAE

7. LAPSANA

I.R.Thompson

Lapsana L., *Sp. Pl.* 2: 811 (1753); from the Greek *lapsane*, the classical name for an edible weed, probably *Sinapis arvensis* L. (Charlock).

Type: *L. communis* L.

Annual, biennial or perennial herbs, branching. Hairs simple, glandular and eglandular. Leaves predominantly cauline. Inflorescences paniculate. Capitula pedunculate; involucre bracts biseriate; inner bracts somewhat firm and erect at maturity. Florets: ligule yellow. Achenes homomorphic, mildly compressed, beakless. Pappus absent.

A genus of c. 10 species from Europe, Asia and NW Africa; one species naturalised in Australia.

****Lapsana communis* L., *Sp. Pl.* 2: 811 (1753)**

subsp. ***communis***

T: Locality unknown, *Herb. Clifford 389*, *Lapsana* no. 1A; lecto: BM, *fide* P.D.Sell, *Watsonia* 13: 301 (1981).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1646, fig. 753c (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 684, fig. 130c (1999).

Annuals or biennials to c. 1.2 m high, with gland-tipped hairs on lower stem and sometimes upper stem, and short eglandular hairs on or near leaf margins. Basal leaves variably persistent; cauline leaves to 16 cm long, with l:w ratio 1–4, undivided or lyrate-divided, petiole-like basally, with 1 or 2 spreading or slightly retrorse lobes per side; margin denticulate or dentate; blade or terminal segment ovate, with base truncate or cordate; upper stem leaves tending to be undivided, narrowly elliptic, with base narrowly cuneate. Capitula few-many; involucre 5–8 mm long, c. 2–2.5 mm diam., with margin of bracts glabrous or inconspicuously ciliate; outer bracts 4–6, ovate, c. 1 mm long, with hyaline margin vestigial; inner bracts 6–10, 5–8 mm long, keeled, slightly incurved, with hyaline margin vestigial. Florets: ligule 5–10 mm long; style hairs black. Achenes narrowly ellipsoid to obconical, 3–5 mm long, slightly compressed, briefly tapering distally, with ribs crowded, not prominent, glabrous, pale brown or greenish. *Nipplewort*. Fig. 7 O.

Native of Europe. Naturalised in SE S.A., south-central Vic., and eastern Tas., with isolated records from Bendemeer in NE N.S.W. and Killarney in SE Qld. Predominantly a weed in or near sites of human habitation, in shady, damp environments, including forest. Flowers mainly summer.

S.A.: Lobethal, c. 25 km E of Adelaide, 13 Feb. 1965, *M.Tregus* (AD).
Qld: Moss Gardens, c. 15 km E of Killarney, *A.R.Bean 18321* (BRI, MEL, NSW).
N.S.W.: alongside Macdonald R., Bendemeer, *J.R.Hosking 1694 et al.* (CANB, MEL, NE, NSW).
Vic.: S side of Yarra R., immediately NW of intersection of Don Rd with Warburton Hwy, *I.C.Clarke 3086* (CANB, HO, MEL).
Tas.: Nicholls Rivulet, *A.M.Buchanan 15034* (HO).

The glandular portion of the stem hairs is often lost early and hairs will appear eglandular.



ASTERACEAE

8. LACTUCA

I.R.Thompson

Lactuca L., *Sp. Pl.* 2: 795 (1753); from the Latin *lac* (milk), alluding to the milky latex contained in these plants and other members of the Chicorieae (syn. Lactuceae).

Type: *L. sativa* L.

Annual, biennial or perennial herbs or (not in Australia) subshrubs or climbers, branching. Hairs simple, eglandular. Leaves predominantly cauline. Inflorescences paniculate. Capitula \pm sessile, sometimes clustered; involucre bracts multiseriate, soft and erect or reflexed at maturity. Florets: ligules yellow (in Australia), drying whitish or bluish. Achenes homomorphic, strongly compressed, beaked. Pappus of bristles, persistent (in Australia); bristles minutely scabridulous, uniform within pappus. *Lettuces*.

A genus of c. 100 species from Europe, Asia, Africa and N America; 2 species naturalised in Australia.

The Australian species have complex panicles with a proportion of capitula sessile or shortly pedunculate, slender capitula with relatively few florets, achenes that taper abruptly from the body to a long capillary beak, and often silvery stems.

Plants to c. 2 m high; lower stems prickly-setose or glabrous; margin of at least larger stem leaves crowded-spinulose; involucre bracts typically \pm reflexed at maturity; body of achene bearing minute whitish cilia distally; beak < 30% longer than body

1. *L. serriola*

Plants to c. 1 m high; stems glabrous; margin of all leaves without spinules; involucre bracts typically erect at maturity; body of achene scabridulous distally but without whitish cilia; beak > 30% longer than body

2. *L. saligna*

1. **Lactuca serriola* L., *Cent. Pl.* II 29 (1756)

T: southern Europe, *Herb. Linn.* 950.3; lecto: LINN, *vide* S.D.Prince & R.N.Carter, *Watsonia* 11: 331–338 (1977).

L. scariola L., *Amoen. Acad.* 4: 489 (1759). T: Europe; lecto: plate '*Lactuca silvestris*...' in J.Bauhin & J.H.Clerler, *Hist. Pl.* 2: 1003 (1651), *vide* I.M.de Vries & C.E.Jarvis, *Taxon* 36: 151–153 (1987).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1646, fig. 753b (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 695, fig. 133b (1999).

Annuals or biennials to c. 2 m high, with lower stems and abaxial midrib of leaves prickly-setose, or less often stem glabrous, sometimes glaucous. Stem leaves to c. 20 cm long, with l:w ratio c. 4–8, divided or not; base above mid-stem sagittate, stem-clasping; margin spinulose-denticulate, often becoming \pm smooth nearer summit; undivided leaves narrowly oblong; divided leaves with 1–3 broad retrorsely arching lobes or segments per side. Capitula many to c. 100; involucre 6–10 mm long, elongating to c. 15 mm long at maturity, c. 2 mm diam.; bracts reflexed at maturity; outer bracts 3–6, ovate, 1–2 mm long, lacking hyaline margin; longer intermediate bracts subequal to inner bracts at anthesis; inner bracts 4 or 5, with distinct hyaline margin. Florets: ligule 7–10 mm long; style hairs pale. Achenes 6–8 mm long; body c. 3 mm long; faces narrowly obovate, mid-brown, with minute whitish cilia distally; beak as long as or up to c. 30% longer than body. Pappus c. 6 mm long, white; bristles extremely fine, minutely scabridulous. *Prickly Lettuce*. Plate 10.

A native of Europe and western Asia. Two forms of *L. serriola* were recognised by S.D.Prince & R.F.Carter, *Watsonia* 11: 331–338 (1977) and both of these occur in Australia.

The panicles are typically pyramidal with capitula of primary branches tending not to diverge greatly from the branch. Leaves are typically twisted at the base so that the lamina is in a vertical plane and alternate leaves point in opposite directions. *Lactuca sativa*, from which edible lettuce varieties were derived, has \pm identical fruits to *L. serriola* but has involucre bracts that are finally erect. There is no clear evidence that it is naturalised in Australia. Another species sometimes confused with *L. serriola* is *L. virosa*. However, it has larger,

darker achenes and leaves always undivided. Recorded by S.L.Everist, *Poisonous Pl. Australia*, rev. edn 175 (1981), as possibly poisonous to stock but nothing is known about the nature of the poisonous principle.

At least the mid-stem leaves lobed to subpinnatisect (dissection > 30% toward midrib)

1a. f. *serriola*

Leaves all entire or at the most with a few shallow broad teeth (dissection < 30% toward midrib)

1b. f. *integrifolia*

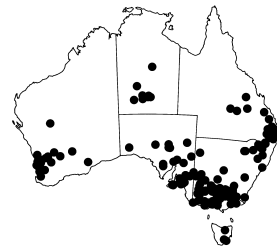
1a. **Lactuca serriola* L. f. *serriola*

Illustration: B.M.J.Hussey *et al.*, *Western Weeds* 2nd edn 101 (2007).

Mid-stem leaves lobed to subpinnatisect, with 1–3 spreading or retrorsely arched lobes/segments per side, or sometimes a proportion entire; upper-stem leaves and leaves of branches lobed or entire. Fig. 10D–E.

Naturalised in southern Australia, in all States and Territories. Grows in disturbed sites including roadsides, wasteland and agricultural land. Flowers spring–autumn.

W.A.: 17.5 km S of Goodwood Rd on Upper Capel Rd, c. 7 km WSW of Kirup, *B.J.Lepschi* 3342 & *T.R.Lally* (AD, CANB, PERTH). N.T.: Ormiston Gorge, Heavitree Ra., *G.W.Carr* 1479 & *A.C.Beaglehole* 45258 (CANB, DNA, MEL). S.A.: section 16, Southern Lofty region, *A.W.Bell* 135 (AD, MEL). Qld: ‘The Hermitage’, Biggenden, *P.I.Forster* 7660 (AD, BRI, MEL). N.S.W.: N side of Oberne Rd, 5.7 km E of Tarcutta, *P.C.Jobson* 4576 *et al.* (BRI, MEL, NSW). A.C.T.: O’Connor, *H.S.MacKee* 8910 (CANB). Vic.: Terrick Terrick State Park, *A.C.Beaglehole* 82660 (MEL). Tas.: Pass Rd, Rokeby, *A.M.Buchanan* 15149 (HO).



In more arid regions of Australia, including the N.T., this form is relatively lacking in prickles, but the lower length:width ratio of leaves, different achene morphology, and the involucre bracts being reflexed at maturity distinguish it from *L. saligna*.

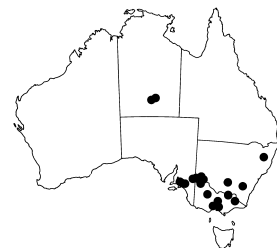
1b. **Lactuca serriola* f. *integrifolia* (Gray) S.D.Prince & R.N.Carter, *Watsonia* 11: 337 (1977)

L. virosa var. *integrifolia* Gray, *Nat. Arr. Brit. Pl.* 2: 417 (1821). T: [presumably Great Britain], *A.Buddle*, *H.S. 118 folio* 2; lecto: BM, *vide* S.D.Prince & R.N.Carter, *op. cit.* 338.

Mid-stem leaves entire or sometimes some with a few broad teeth; upper-stem leaves and leaves of branches entire. Fig. 10F.

Naturalised in SE Australia from Adelaide, S.A., through Vic. to NE and SE N.S.W., and around Alice Springs in N.T. Grows in disturbed sites including urban environments and agricultural land. Flowers spring–autumn.

N.T.: Chinamans Ck: c. 1 km upstream from Todd R. Junction, *D.E.Albrecht* 5677 (CANB, DNA, MEL, NT). S.A.: Fullarton, *Hj.Eichler* 14607 (AD). N.S.W.: Traffic Education Centre, Armidale, *R.G.Coveny* 16371 (AD, BRI, CANB, HO, MEL, NE, NSW). Vic.: Baranduda Range Regional Park, *A.C.Beaglehole* 88474 (MEL).



Although the two forms are readily distinguished in the field, herbarium material commonly lacks sufficient evidence of the stem leaves to make a determination. Forma *integrifolia* appears to be less common than f. *serriola* but is likely to be more widespread than the distribution map indicates. In Melbourne at least, f. *integrifolia* is known to be widespread and common based on field observations.

2. **Lactuca saligna* L., *Sp. Pl.* 2: 796 (1753)

T: 'Habitat in Gallia, Lipsiae' [western Europe], *Herb. Burser VI: 11*; lecto: UPS, *fide* I.M.de Vries & C.E.Jarvis, *Taxon* 36: 153 (1987).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1646, fig. 753a (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 695, fig. 133c (1999).

Annuals or biennials to c. 1 m high, glabrous except for sparse bristles on abaxial midrib of leaves, not glaucous. Stem leaves to c. 20 cm long, with l:w ratio c. 3–30, divided or not; base above mid-stem narrowly sagittate, stem-clasping; margin entire or remotely toothed; undivided leaves linear to narrowly so; divided leaves with 1–3 narrow retrorsely arching segments per side. Capitula many; involucre 6–10 mm long, elongating to c. 15 mm long at maturity, c. 1–1.5 mm diam.; bracts \pm erect at maturity; outer bracts 2 or 3, ovate, c. 2 mm long; longer intermediate bracts subequal to inner bracts at anthesis; inner bracts 4 or 5. Florets: ligule 7–10 mm long; style hairs pale. Achenes 7–10 mm long; body 3–4 mm long; faces elliptic, dark brown, commonly mottled blackish, scabridulous distally, tapering somewhat abruptly to a capillary beak; beak c. 40–90% longer than body. Pappus 4–5 mm long, white; bristles extremely fine, \pm smooth. *Willow-leaf Lettuce*. Fig. 10A–C.

A native of Europe and western Asia. Naturalised in SW W.A. mostly around Perth but also further E, in SE Australia from Gympie in SE Qld SSW through eastern N.S.W. to Vic. and S.A. as far W as Kangaroo Is., and in the Hobart area, SE Tas. Grows in disturbed sites such as urban environments and agricultural land. Flowers spring–autumn.

W.A.: Benger Swamp, c. 12 km S of Harvey, *J.J.Alford 1664* (PERTH). S.A.: Zadows landing, c. 6 km S of Mannum, *C.R.Alcock 11104* (AD). Qld: Coolmunda dam, 16 km W of Inglewood, *G.N.Batianoff 2010400* & *C.Appelman* (BRI, CANB, DNA, NSW). N.S.W.: Sinclairs Lookout, 14.4 km W of Glen Innes, *C.J.Dunn 41 et al.* (BRI, MEL, NSW). A.C.T.: Coppins Crossing of Molonglo R., *R.Coveny 11581* & *P.Hind* (CANB, NSW). Vic.: Murray R. 3 km SW of Tocumwal P.O., *A.C.Beauglehole 63986* (MEL). Tas.: Sandy Bay, 2 May 1958, *W.M.Curtis* (HO).



9. SONCHUS

I.R.Thompson

Sonchus L., *Sp. Pl.* 2: 793 (1753); from the Greek *sonchos*, a classical name for *S. asper* and *S. oleraceus*.

Type: *S. oleraceus* L.

Annual, biennial or perennial herbs, branching, sometimes glaucous. Hairs simple, glandular and eglandular. Leaves basal and cauline. Inflorescences cymose. Capitula pedunculate; involucre bracts multiserial, not hardening, reflexed at maturity. Florets: ligules yellow (in Australia). Achenes homomorphic, moderately to strongly compressed, unbeaked. Pappus of bristles, partially persistent; bristles nearly smooth or scabridulous, of 2 types within pappus. *Sow-thistles*.

A genus of c. 55 species mainly from Africa, but virtually cosmopolitan; one native and two introduced species in Australia.

Species in Australia have succulent hollow stems and are nearly glabrous or they develop distinctive spreading gland-tipped hairs on upper stems, branches, peduncles and the involucre. A fine caducous wool is sometimes also present on the receptacle. Teeth on leaf margins are spine-tipped and sometimes prickly. The multiserial involucre comprises 25–45 bracts in several gradational series with the longer intermediate bracts almost as long as the inner bracts. Before and at the onset of anthesis the involucre is cylindrical but it soon

becomes markedly conical as the receptacle expands and achenes enlarge proximally and the involucre closes on the withered corollas distally. Pappus bristles in Australian species are white, comprising an inner series of several caducous scabridulous bristles and an outer series of numerous persistent downy hair-like bristles. *Actites megalocarpus* is very similar to species of *Sonchus* in Australia but it is rhizomatous and its achenes are substantially larger and more attenuate distally.

L.Boulos, Revision systematique du genre *Sonchus* L. *s.l.*, I: introduction et classification, *Bot. Not.* 125: 287–305 (1972); L.Boulos, Revision systematique du genre *Sonchus* L. *s.l.*, IV: sous-genre 1, *Sonchus*, *Bot. Not.* 126: 155–196 (1973).

- 1 Rhizomatous perennial; achenes elliptic and transversely rugose †*S. arvensis*
- 1: Annual or biennial, not rhizomatous; achenes not both elliptic and transversely rugose
- 2 Leaf margin with few to numerous denticulations or teeth with spiny tips to c. 1 mm long, or margin entire, generally not prickly; auricles commonly sagittate, sometimes downcurved but not arched back towards apex; achenes \pm oblanceolate, 0.5–1 mm wide, with l:w ratio > 3, weakly to strongly transversely wrinkled 1. *S. oleraceus*
- 2: Leaf margin with numerous denticulations or teeth with spiny tips to c. 5 mm long, prickly or not; auricles rounded, downcurved and arched back toward apex; achenes elliptic or slightly obovate, 0.8–2.0 mm wide, with l:w ratio < 3, without transverse wrinkles
- 3 Mid-stem leaves with l:w ratio 1.5–5 (–8); achenes \pm elliptic, 2.0–3.2 mm long, central ones orange-brown and marginal ones pale yellow 2. *S. asper*
- 3: Mid-stem leaves with l:w ratio 3–10; achenes oblong-elliptic, 2.8–4.2 mm long, usually all mid- to dark chocolate-brown 3. *S. hydrophilus*

†*Sonchus arvensis* L., a native of Europe, was identified from Clare in the northern Lofty Ra. S.A. in 1960, however, there is no evidence to suggest that it has become naturalised.

1. **Sonchus oleraceus* L., *Sp. Pl.* 2: 794 (1753)

T: Europe, *Herb. Linn.* 949.6; lecto: LINN, *fide* L.Boulos, *Bot. Not.* 126: 155 (1973).

[*S. tenerrimus* auct. non L.: D.A.Cooke in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1653 (1986), *p.p.*; J.A.Jeanes in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 684 (1999), *p.p.*]

Illustrations: J.P.Jessop & H.R.Toelken (eds), *op. cit.* 1653, fig. 757d; N.G.Walsh & T.J.Entwistle (eds), *op. cit.* 684, fig. 130a; B.M.J.Hussey *et al.*, *Western Weeds* 2nd edn 107 (2007).

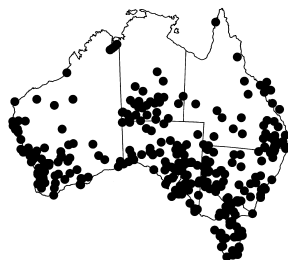
Annuals or biennials to c. 1.8 m high, with rosette variously developed. Leaves to c. 25 cm long, with l:w ratio commonly c. 2–10, divided or not, thin or slightly coriaceous, always \pm pliant along margin; base above mid-stem strongly stem-clasping with auricles usually sagittate, sometimes slightly to strongly downturned, but not arching back toward apex; margin variably denticulate, with spiny tips 0.5–1 mm long, or entire, generally not prickly; divided leaves pinnatisect, occasionally almost bipinnatisect, with up to 5 spreading to retrorse primary lateral segments per side; terminal segment often much larger than lateral segments; uppermost leaves variously shaped. Capitula mostly several; involucre 8–13 mm long, 3–6 mm diam.; outer and intermediate bracts ovate to lanceolate. Florets: ligule 5–8 mm long, \pm equal to tube; style hairs dark. Achenes oblanceolate, 2.2–3.2 mm long, 0.5–1 mm wide, moderately compressed, not obviously winged, transversely wrinkled, minutely scabridulous on margins; marginal achenes pale yellow and central ones reddish brown. Pappus 5–8 mm long. *Sow Thistle*. Fig. 10L–M.

Native to Europe and naturalised in many parts of the world. Naturalised in all States and Territories of Australia, but more common in southern areas corresponding to the degree of human activity. Grows in a wide variety of soils predominantly in disturbed environments. Flowers most of the year, particularly spring to autumn.

W.A.: Mt Lawley Golf Course, Inglewood, *B.J.Lepschi & T.R.Lally 1774* (CANB, PERTH). N.T.: Muranji Rockhole, Mt Winter, *B.G.Thomson 1565* (DNA). S.A.: Mortlock Experimental Stn, *D.E.Symon 6704* (AD, CANB). Qld: side road 6.5 km N of Goondiwindi, *A.R.Bean 17800* (BRI). N.S.W.: 53 km W of Nyngan

on Cobar road, *G.M.Cunningham* 902 (NSW). A.C.T.: CSIRO grounds, Black Mtn, *R.Pullen* 3007 (CANB). Vic.: Ulupna Is., Murray R., 29 km N of Numurkah P.O., *A.C.Beauglehole* 64251 (MEL). Tas.: Waterhouse Is., 17 Dec. 2002, *S.Harris & A.Connolly* (HO, MEL).

This species is extremely variable in leaf shape and its shape may resemble that of *S. asper*. However, unlike in *S. asper*, the auricles are not arched back towards the apex of the leaf and are commonly sagittate rather than rounded, and the uppermost leaves sometimes have an entire or nearly entire margin. Some forms of *S. asper* have prickly leaves, whereas *S. oleraceus* is generally not prickly. *Sonchus oleraceus* commonly occurs with *S. asper* and is likely to hybridise with it.



Forms with lateral leaf-segments somewhat constricted proximally or with linear segments have been identified as *S. tenerrimus* L. Compared to *S. oleraceus*, *S. tenerrimus* is a more delicate plant. Its leaves become abruptly petiole-like distally to the amplexicaul base and the lateral segments of the leaves are more numerous and more strongly constricted proximally. The ligules of *S. tenerrimus* are markedly longer than the corolla-tube, and the receptacle has a more persistent wool.

2. **Sonchus asper* (L.) Hill, *Herb. Brit.* 1: 47 (1769)

subsp. *asper*

S. oleraceus var. *asper* L., *Sp. Pl.* 2: 794 (1753). T: Europe, *Herb. Burser* VI: 14; lecto: UPS, *fide* L.Boulos in C.E.Jarvis & N.Turland (eds), *Taxon* 47: 368 (1998).

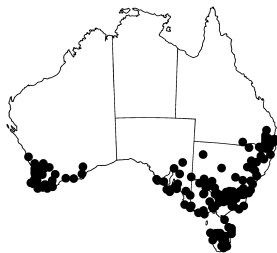
[*S. asper* subsp. *glaucescens* auct. non (Jord.) Ball: D.A.Cooke in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1654 (1986), *p.p.*; J.A.Jeanes in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 698 (1999), *p.p.*]

Illustration: B.M.J.Hussey *et al.*, *Western Weeds* 2nd edn 107 (2007).

Annuals to c. 1.2 (–2) m high, with rosette variously developed. Leaves to c. 30 cm long, with l:w ratio 1–5 (–8), divided or not, thin to coriaceous, sometimes semi-rigid at margin; base above mid-stem strongly stem-clasping, with auricles rounded basally, strongly down-turned and arching back toward apex; margin denticulate or toothed, with spiny tips 0.5–5 mm long, somewhat prickly or not; divided leaves lobed to subpinnatisect, with up to 8 usually spreading or slightly retrorse lobes or segments per side; terminal segment usually not or hardly larger than lateral segments; uppermost leaves mostly ovate to narrowly ovate. Capitula few–many; involucre 8–13 mm long, 3–8 mm diam.; outer and intermediate bracts ovate to lanceolate. Florets: ligule 4–5 mm long, shorter than tube; style hairs dark. Achenes elliptic or slightly obovate, 2.0–3.2 mm long, 0.8–1.8 mm wide, strongly compressed, distinctly winged, without transverse wrinkles, usually minutely scabridulous on margin; marginal achenes pale yellow and central ones orange-brown. Pappus 7–9 mm long. Fig. 10J–K.

Naturalised in SW W.A., SE Australia from Brisbane, Qld, S through eastern N.S.W. to Vic. and W to SE S.A., and in Tas. Grows mostly in disturbed environments, in urban areas, woodland and forest. Flowers all year, mostly spring–autumn.

W.A.: c. 50 km SSE of Kojonup on road to Mt Barker township, *B.J.Lepschi & T.R.Lally* 2289 (CANB, PERTH). S.A.: Cherry Gardens, Frith St, *D.E.Symon* 13387 (AD, CANB). Qld: 9 km along Spring Ck Rd towards Killarney from Teviot Falls Lookout, *G.N.Batianoff* 20011123 & *D.Halford* (BRI). N.S.W.: Perisher Valley, Kosciuszko area, Aug. 1985, *J.Mallen s.n.* (CANB). A.C.T.: corner of Haydon Drive and Belconnen Way, Bruce, *L.G.Adams* 3313 (CANB). Vic.: Yarrowonga Regional Park, *A.C.Beauglehole* 81843 (MEL). Tas.: Clarkes Is., Bass Strait, Dec. 1966, *J.Whinray s.n.* (MEL).



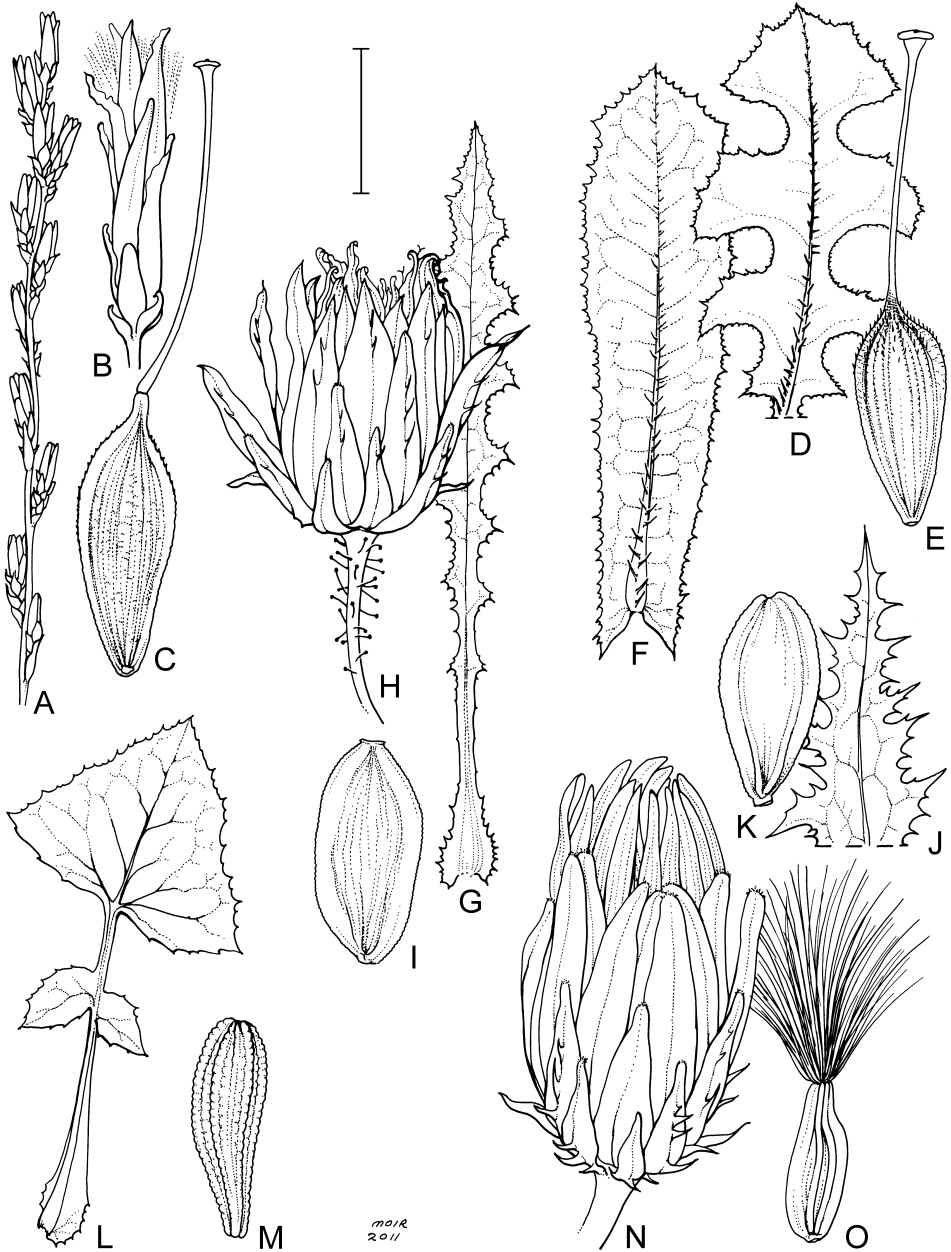


Figure 10. A–C, *Lactuca saligna*. A, branch of inflorescence; B, capitulum; C, achene (A–C, H.I.Aston 911, MEL). D–E, *Lactuca serriola* f. *serriola*. D, leaf; E, achene (D–E, R.V.Smith 64/85, CANB). F, *Lactuca serriola* f. *integrifolia*, leaf (I.R.Thompson 881, MEL). G–I, *Sonchus hydrophilus*. G, lower-stem leaf; H, capitulum; I, achene (G–I, G.G.Allen 40, MEL). J–K, *Sonchus asper* subsp. *asper*. J, portion of leaf; K, achene (J, A.C.Beauglehole 69522, MEL; K, A.C.Beauglehole 86633, MEL). L–M, *Sonchus oleraceus*. L, mid-stem leaf; M, achene (L, T.B.Muir 5555, MEL; M, A.C.Beauglehole 77586, MEL). N–O, *Actites megalocarpus*. N, capitulum; O, achene (N, A.C.Beauglehole 63502, MEL; O, I.Crawford 410, MEL). Scale bar: A = 15 mm; B, H, N = 6 mm; C, E, I, K, M, O = 2 mm; D, G = 6 cm; F, J, L = 3 cm. Drawn by M.Moir.

Sonchus asper subsp. *asper* is highly variable in leaf dissection, prickliness and degree of rosette development, with almost a continuum of variation evident in these characters. However, a reasonably distinctive robust form with stouter thicker-walled stems, a better developed rosette, and more coriaceous leaves occurs in SE Australia. It is probably fairly common but is possibly undercollected. It is sympatric with other forms of *S. asper*. At the other extreme, there is a form with little or no rosette development and thin, undivided or shallowly divided, non-prickly leaves.

The name subsp. *glaucescens* has been applied in recent years to more prickly-leaved forms of *S. asper* including the form described above. However, according to L.Boulos (in T.G.Tutin *et al.*, *Fl. Europaea* 4: 165 (1976)), subsp. *glaucescens* is a biennial with denser and recurved spinules on the margins and ribs of the achenes. All Australian plants appear to be annuals, albeit with different degrees of rosette development, and no significant differences in achene morphology have been identified.

3. *Sonchus hydrophilus* Boulos in Hj.Eichler, *Suppl. J.M.Black's Fl. S. Australia* 331 (1965)

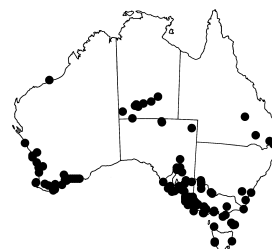
S. asper f. *hydrophilus* (Boulos) J.Kost., *Blumea* 23(1): 165 (1976). T: Fleurieu Penin., in watercourse 3 miles (c. 5 km) N of Victor Harbour, S.A., 8 Jan. 1945, *J.B.Cleland s.n.*; holotype: AD n.v., *vide* L.Boulos, *loc. cit.* Illustrations: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 684, fig. 130a (1999); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1653, fig. 757b (1986).

Annuals or ?biennials to c. 1.8 m high, with rosette well-developed. Leaves to c. 40 cm long; stem leaves with l:w ratio c. 3–10, undivided to deeply lobed, thin to mildly coriaceous; base above mid-stem strongly stem-clasping, with auricles rounded basally, strongly downturned and arching back toward apex; margin usually with frequent teeth with spiny tips 1–3 mm long, not or slightly prickly; lobate leaves with up to 6 spreading to retrorse lobes per side; uppermost leaves ± lanceolate. Capitula several–many; involucre 8–12 mm long, c. 4–9 mm diam.; outer and intermediate bracts narrowly ovate or more often lanceolate. Florets: ligule c. 5–7 mm long, shorter than tube; style hairs dark. Achenes elliptic or oblong-elliptic, 2.8–4.2 mm long, 1.3–2.0 mm wide, strongly compressed, distinctly winged, with margin smooth or minutely scabridulous, without transverse wrinkles, generally all mid- to dark chocolate-brown. Pappus 7–9 mm long. *Native Sow-thistle*. Plate 9; Fig. 10G–I.

Occurs in W.A. mainly S of Geraldton SE to Esperance, in central Australia S to southern S.A., and in eastern Australia from the Carnarvon Ra. in E Qld SSW through eastern N.S.W. to Vic., and Tas. Also occurs in New Zealand and New Guinea. Usually associated with streams and lakes in herbfields, woodland, or forest. Flowers mostly spring–autumn.

W.A.: 2.3 km S of Reagans Ford on road to Muchea, *B.J.Lepschi & T.R.Lally 1713* (CANB, MEL, PERTH). N.T.: Churnside Ck Crossing, Petermann Ra., *C.R.Dunlop 1966* (DNA). S.A.: Dalhousie Springs, Far North, *D.E.Symon 13159* (AD, CANB, DNA). Qld: c. 4.8 km SE of The Gums, *R.W.Johnson 552* (BRI, CANB). N.S.W.: Gerrington, *F.A.Rodway 5209* (NSW). A.C.T.: shores of L. Burley Griffin, Canberra, *M.Gray 6742* (CANB, NSW). Vic.: 1–1.5 km downstream from Kirks Bridge Rd crossing of Little R., *V.Stajsic 871* (MEL). Tas.: Hogan Is., Jan. 1968, *per N.Scarlett, McCoy Society* (MEL).

Similar to *S. asper* in leaf and achene morphology. It can usually be distinguished from that taxon by the leaves which generally have a higher length to width ratio, and by the achenes which are larger, with broader wings and usually all chocolate brown. *Sonchus hydrophilus* is also similar to the coastal species *Actites megalocarpus* in leaf and achene morphology, but the latter is rhizomatous, its capitula and achenes are longer, and the achenes usually paler and more tapered distally.



ASTERACEAE

10. ACTITES

I.R.Thompson

Actites Lander, *Telopea* 1: 130 (1976); from the Greek *aktites* (coast dweller), a reference to the habitat of the species.

Type: *A. megalocarpus* (Hook.f.) Lander

Perennial herbs, rhizomatous, branching. Hairs simple, glandular and eglandular. Leaves all cauline after first season; marginal teeth spinulose, hardly prickly. Inflorescences cymose. Capitula pedunculate; involucre bracts multiseriate, soft and reflexed at maturity. Florets: ligule narrowly oblong, yellow, sometimes purplish towards base. Achenes homomorphic, strongly compressed, unbeaked. Pappus of bristles, partially persistent; bristles nearly smooth or scabridulous, of 2 types within a pappus.

An endemic monotypic genus occurring in coastal regions of southern Australia. Morphologically close to *Sonchus*, particularly *S. hydrophilus*, but its longevity and rhizomatous habit distinguishes it from species of *Sonchus* in Australia.

N.S.Lander, *Actites*, a new genus of Compositae from Australia, *Telopea* 1: 129–135 (1976).

***Actites megalocarpus* (Hook.f.) Lander, *Telopea* 1: 129 (1976)**

Sonchus asper var. *megalocarpus* Hook.f., *Fl. Tasman.* 1: 227 (1856); *S. megalocarpus* (Hook.f.) J.M.Black, *Fl. S. Australia* 661 (1929); *Embergeria megalocarpa* (Hook.f.) Boulos in Hj.Eichler, *Suppl. J.M.Black's Fl. S. Australia* 333 (1965). T: 'near the sea on the north shore of the island', Tas., *R.C.Gunn* 845; holo: K n.v.

Sonchus asper var. *littoralis* J.M.Black, *Naturalised Fl. S. Australia* 104 (1909), *nom. illeg. non Kirk* (1895). T: Precise locality unknown, S.A., *J.M.Black*; neo: NSW; isoneo: AD, *fide* N.S.Lander, *op. cit.* 130.

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1653, fig. 757c (1986), as *S. megalocarpa*; N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 699, fig. 134f (1999).

Perennials to c. 0.6 m high. Leaves often crowded, to 26 cm long, with l:w ratio 3–7, undivided or lobed, somewhat coriaceous; base above mid-stem cordate or sagittate; margin entire, denticulate or dentate; lobed leaves with 3–6 spreading to slightly retrorse lobes per side. Capitula few–several; involucre 12–20 mm long, c. 6–12 mm diam.; outer and intermediate bracts narrowly ovate to lanceolate, with hyaline margin very narrow, often bearing spine-like hairs along midrib; inner bracts with distinct hyaline margin; receptacle glabrous or pit margins fimbriate. Florets: ligule 6–10 mm long, slightly shorter than tube; style hairs often dark. Achenes 4–8 mm long, compressed, pale to dark brown, smooth except for 3 longitudinal ribs, with these ribs often inflated; margin smooth, rounded. Pappus 7–13 mm long, white. *Dune Thistle*. Plate 12; Fig. 10N–O.

Occurs on the eastern and southern coastlines of mainland Australia from Toorbul in southern Qld S and then W to near Perth, W.A., and on the SW coast of Tas. Grows on coastal sand dunes and cliffs. Flowers most of year.

W.A.: W of Dempster Hill, Esperance, 16 Nov. 1950, *J.H.Willis* (MEL). S.A.: Kangaroo Is., West Bay, *R.J.Bates* 30273 (AD, MEL). Qld: 0.5 km S of Eurong, Fraser Is., *A.R.Bean* 8066 (BRI). N.S.W.: Kioloa Beach, c. 1 km N of Kioloa, *I.R.Telford* 10159 (AD, CANB, MEL). Vic.: Point Nepean, 27 Nov. 1963, *J.D.M.Pearson* (MEL). Tas.: Sanctuary Bay, *A.Moscal* 5631 (AD, HO, MEL).



Very similar to *Sonchus asper* and *S. hydrophilus*. Apart from features given in the key, *A. megalocarpus* tends to have leaf-bases less stem-clasping, hairs when developed on the peduncle and outer and intermediate bracts always spine-like and more robust, and the margin of the achenes rounded and smooth rather than with a sharp edge and scabridulous. The longitudinal ribs of the achenes often become inflated in this species and this feature was used by N.S.Lander *loc. cit.* to distinguish his new genus from *Sonchus*. This inflation of ribs also sometimes occurs in *S. hydrophilus*, although to a lesser extent. The pappus of

dimorphic bristles corresponds to the morphology seen in *Sonchus*. The distinctive glandular hairs seen in species of *Sonchus*, particularly on the peduncle, have not been seen in *A. megalocarpus*.

Actites megalocarpus has also been confused with *Reichardia tingitana*, a species with similar-sized capitula which also occupies coastal dunes in S.A. Among a number of differences, the outer bracts of *A. megalocarpus* are entirely herbaceous whereas those of *R. tingitana* have a broad hyaline margin.

11. LAUNAEA

I.R.Thompson

Launaea Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 25: 321 (1822); derivation unknown; possibly named after a friend or relative of Cassini.

Type: *L. sarmentosa* (Willd.) Kuntze

Annual to perennial herbs, sometimes stoloniferous, branching or not. Hairs \pm lacking. Leaves predominantly basal. Inflorescences solitary or cymose. Capitula pedunculate; involucre bracts multiseriate. Florets: ligule yellow. Achenes homomorphic, not or hardly compressed, unbeaked. Pappus of bristles, ?persistent; bristles scabridulous, uniform within pappus (in Australia).

A genus of 54 species, principally from Africa and SW Asia, but also in the Mediterranean region; one species native to Australia.

The style branches in this genus have relatively long hairs, a feature it shares with *Reichardia* according to K.Bremer, *Asteraceae, Cladistics and Classification* 187 (1994).

N.Kilian, Revision of *Launaea* Cass. (Compositae, Lactuceae, Sonchinae), *Englera* 17: 1–478 (1997).

***Launaea sarmentosa* (Willd.) Kuntze, *Rev. Gen. Pl.* 1: 350 (1891)**

Prenanthes sarmentosa Willd., *Phytographia* 10, t. 6(2) (1794). T: India, 1793, *Klein*; holo: B-W 14595.

Illustration: B.M.J.Hussey *et al.*, *Western Weeds* 2nd edn 101 (2007).

Herb to c. 10 cm high, developing stolons to c. 1 m long, rooting at nodes. Leaves all basal, undivided, to 10 cm long, with l:w ratio c. 3–4, attenuate at base, entire or denticulate; secondary rosettes with much smaller leaves. Capitula solitary at nodes; involucre 4–6 mm diam.; outer bracts c. 8, ovate, c. 3 mm long, with distinct hyaline margin; intermediate bracts c. 6, reaching c. halfway along involucre; inner bracts c. 8, 10–15 mm long. Florets: ligule c. 5 mm long; style hairs pale or darkened. Achenes narrowly obloid, 4–5 mm long, with ribs prominent, brown, glabrous. Pappus caducous, c. 7 mm long, white; bristles scabridulous.

Native to coastal W.A. predominantly between Exmouth and Karratha and on adjacent islands. Also native to areas abutting the Indian Ocean and South China Sea including countries in Africa and southern Asia. Grows on coastal sands. Flowers most of year.

W.A.: Alpha Is., Monte Bello Is, 13 Nov. 1953, *F.L.Hill* (CANB); Thevenard Is., *M.White* 028 (CANB, PERTH).

A distinctive species with its stoloniferous habit. According to N.Kilian (*op. cit.* 296), labels indicate that it has been used as a salad vegetable in several countries.



12. REICHARDIA

I.R.Thompson

Reichardia Roth, *Bot. Abh. Beobacht.* 35 (1787); named after J.J.Reichard (1743–82), German physicist and botanist.

Type: not designated.

Annual or perennial herbs, branching. Hairs \pm lacking. Leaves basal and cauline. Inflorescences solitary or cymose. Capitula pedunculate; involuclral bracts multiseriate, soft, not convex, infolded at maturity. Florets: ligule predominantly yellow. Achenes homomorphic or inner ones abortive, not compressed, unbeaked. Pappus of bristles, not persistent; bristles \pm smooth, uniform within pappus.

A genus of 8 species from the Mediterranean region. Two species naturalised in Australia.

A feature of these two species is the relatively broad outer and intermediate involuclral bracts that are cordate-based and with a conspicuous hyaline margin.

M.J.Gallego, S.Talavera & S.Silvestre, Revision del genero *Reichardia* Roth (Compositae), *Lagascalia* 9: 159–217 (1980).

Leaf margin crowded-denticulate; outer bracts 5–7 mm long; outer and intermediate bracts overlapping, with hyaline margin 1–2 mm wide; ligules purple-red basally

1. *R. tingitana*

Leaf margin entire or nearly so; outer bracts c. 3 mm long; outer and intermediate bracts not or hardly overlapping, with hyaline margin 0.3–0.5 mm wide; ligules not purple-red basally

2. *R. picroides*

1. **Reichardia tingitana* (L.) Roth, *Bot. Abh. Beobacht.* 35 (1787)

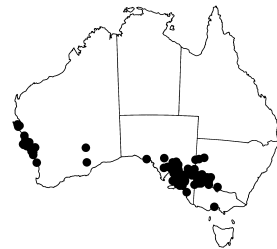
Scorzonera tingitana L., *Sp. Pl.* 2: 791 (1753); *Picridium tingitanum* (L.) Desf., *Fl. Atlant.* 2: 220 (1799). T: ‘Habitat in Tingide’, NW Africa, *Herb. Linn. No.* 947.10; lecto: LINN, *fide* C.Jeffrey, *Kew Bull.* 18: 477 (1966).

[*Reichardia picroides* auct. non (L.) Roth: J.M.Black, *Fl. S. Australia* 2nd edn, 4: 944 (1957)]

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1651, fig. 756a (1986); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 699, fig. 134g (1999); B.M.J.Hussey *et al.*, *Western Weeds* 2nd edn 103 (2007).

Annual or biennial herbs to c. 0.7 m high, branching, glabrous, often glaucous. Leaves forming a rosette, to 17 cm long, with l:w ratio 3–5, divided or not; margin crowded-denticulate, often minutely, also commonly remotely dentate, sometimes weakly spinulose; divided leaves with 2–5 slightly antrorse segments per side; cauline leaves few–several, becoming lanceolate upwards; base becoming cordate-auriculate upwards, somewhat stem-clasping. Capitula solitary or few; peduncle dilating distally; involucre 10–14 mm long, c. 7–10 mm diam.; outer bracts c. 8, broadly ovate, 5–7 mm long, with hyaline margin 1–2 mm wide, with short black sub-apical spur; longer intermediate bracts extending over halfway along involucre; inner bracts with hyaline margin distinct but narrower than in outer bracts. Florets: ligule 16–20 mm long, purple-red at base; style hairs pale or slightly darkened. Achenes broadly obloid, 1.5–4 mm long, not tapering apically, sometimes squarish in TS, deeply verrucose or transversely ridged; outer achenes light or dark brown, inner ones pale. Pappus c. 7–9 mm long, white, detaching as a unit; bristles fine, smooth. $2n = 16$ [cited as 8_{II}], G.D.Carr *et al.*, *Amer. J. Bot.* 86: 1009 (1999). *False Sow-thistle*, *Reichardia*. Plate 11; Fig. 11A–C.

Native to the Mediterranean region. Naturalised on the W coast of W.A. from Shark Bay SSE to Perth, in southern W.A. NE of Esperance, and in SE Australia from south-central S.A. E to Deniliquin in southern N.S.W., and Queenscliff, Vic. Grows in predominantly semi-arid or coastal environments, particularly in disturbed sites such as roadsides, including coastal dunes, in



sand, loams, clays and gypsum, in herbfields, shrubland and woodland. Flowers mostly late winter–early summer, also other times.

W.A.: near Seven Mile Beach N of Dongara, *N.S.Lander 1299* (MEL, PERTH). S.A.: Pine Point Foreshore Res., *R.V.Smith 86/07* (AD, CANB, HO, MEL, NSW). N.S.W.: Near Tori HS remnant, just N of Tori L., *P.G.Kodala 461 et al.* (AD, BRI, CANB, MEL, NSW). Vic.: c. 0.4 km W of Boinka between Underbool & Murrayville, W of Ouyen, *R.V.Smith 69/32* (AD, CANB, HO, MEL, NSW).

Readily recognised by its large capitula, long ligules, and overlapping, broad-margined outer bracts. A very common weed in SE S.A.

2. **Reichardia picroides* (L.) Roth, *Bot. Abh. Beobacht.* 35 (1787)

Scorzonera picroides L., *Sp. Pl.* 2: 792 (1753). T: cult., locality unknown, *Herb. Linn. No. 947.11*; lecto: LINN, *fide* M.J.Gallego *et al.*, *Lagascalia* 9: 194 (1980).

Similar to *R. tingitana* but differing most markedly in the following features (based on limited Australian material). Leaf margin entire or nearly so. Involucre c. 10 mm long, c. 5–6 mm diam.; outer bracts c. 3 mm long, with hyaline margin 0.3–0.5 mm wide, with subapical spur very small. Florets: ligule not purple-red basally. Achenes 2–3 mm long, with central ones smooth.

Native to southern Europe. Recorded once from Mt Melville, Albany in SW W.A. where common. Growing on slope in grey gravelly sand over granite in forest. Flowers summer.

W.A.: Mt Melville, *P.Foreman 161* (PERTH).



13. MICROSERIS

B.V.Sneddon

Microseris D.Don, *Philos. Mag. Ann. Chem.* 11: 388 (1832); from the Greek *mikros* (small) and *seris* (chicory or endive).

Type: *M. pygmaea* D.Don

Phyllopappus Walp., *Linnaea* 14: 507 (1841). T: *P. lanceolatus* Walp.

Perennial or annual scapose herbs with a short erect or rarely rhizomatous underground stem bearing 1–several fleshy brown to white roots. Hairs simple, multicellular, eglandular, furfuraceous on leaves, scapes and involucre, black-villous on petiole and scape bases and involucre. Leaves all or chiefly basal; petiole winged, widened at base. Scapes naked or bracteate; capitula solitary, nodding in bud; involucre bracts herbaceous, mostly in 2 unequal series; outer bracts much shorter than inner ones; receptacle epaleate, pitted. Florets: ligule yellow; anthers caudate; pollen mass orange. Style branches short, obtuse. Achenes narrowly terete, ribbed, not beaked. Pappus parts 2–66, persistent, each with a basal scale prolonged into a scabrid to plumose awn or rarely some or all parts capillary throughout.

A genus of c. 14 species in western N America, Chile, Australia and New Zealand; 2 species in Australia, 1 endemic.

The characteristic furfuraceous hairs on leaves, scapes and involucre are made up of a row of cells beneath a greatly enlarged, spherical terminal cell. Where abundant these hairs give a mealy white appearance to plant parts.

Indumentum density varies in *M. lanceolata* and *M. scapigera* and nearly glabrous plants are common in both species. The most pubescent leaves are furfuraceous on both surfaces, but only when young: mature leaves (and scapes) are \pm glabrous. On almost glabrous plants furfuraceous hairs can always be found on young scapes beneath the capitulum bud, and black-villous ones are usually (if sparsely) present on inner involucre bracts.

K.Chambers, A biosystematic study of the annual species of *Microseris*, *Contr. Dudley Herb.* 4: 207–312 (1955); B.V.Sneddon, A biosystematic study of *Microseris* subgenus *Monermos* (Compositae: Cichorieae). *Ph.D. dissertation, Victoria University of Wellington, New Zealand* (1977); R.K.Jansen *et al.*, Systematic implications of chloroplast DNA variation in the subtribe Microseridinae (Asteraceae: Lactuceae), *Amer. J. Bot.* 78: 1015–1027 (1991); K.Vijverberg *et al.*, Morphological, taxonomical, and evolutionary aspects of Australian and New Zealand *Microseris* (Asteraceae), *Austral. J. Bot.* 50: 127–143 (2002).

Roots tuberous and/or ±cylindrical-tapering and sometimes producing adventitious shoots; pappus parts 8–30, with basal scales from $\frac{1}{3}$ length of achene to longer than achene

1. *M. lanceolata*

Roots non-tuberous and tapering gradually from insertion, never producing adventitious shoots; pappus parts 30–66, with basal scales usually less than $\frac{1}{3}$ length of achene

2. *M. scapigera*

1. *Microseris lanceolata* (Walp.) Sch.Bip., *Jahresber. Pollichia* 22–24: 310 (1866)

Phyllopappus lanceolatus Walp., *Linnaea* 14: 507 (1841). T: Nova Hollandia [Australia], (undated), *J.Lhotsky*; lecto: KIEL; isolecto: BM, *fide* B.V.Sneddon, *Fl. Australia* 37: 606 (2015).

Scorzonera lawrencei Hook.f., *London J. Bot.* 6: 124 (1847); *M. forsteri* Hook.f., *Fl. Nov.-Zel.* 1: 151 (1852), *nom. illeg.*, *S. lawrencei* in *syn.* T: not designated.

M. forsteri var. *subplumosa* Benth., *Fl. Austral.* 3: 676 (1867). T: W. Australia, *Drummond 5th Coll.* 366; *syn:* K; Scott's Brook, near Cape Arid, W.A., *Maxwell*; *syn:* MEL.

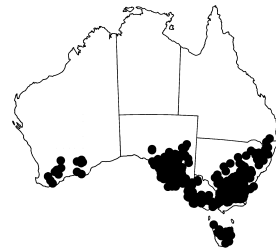
M. latifolia Gand., *Bull. Soc. Bot. France* 65: 52 (1918). T: N.S.W., Tia Falls, Oct. 1900, *Forsyth*; *holo:* LY; *iso:* NSW.

M. walteri Gand., *loc. cit.* T: Vic., Sandringham, Sept. 1900, *Walter*; *holo:* LY.

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1648, fig. 754B (1986); G.J.Harden (ed.), *Fl. New South Wales* 3: 331 (1992); K.Vijverberg *et al.*, *Amer. J. Bot.* 86: 1451, fig. 2 (1999).

Perennial herb; underground stem sympodial, erect, 3–25 mm long; roots several, tuberous to narrowly cylindric-tapering, sometimes producing adventitious shoots. Leaves all basal, linear to narrowly lanceolate or oblanceolate, 5–35 cm long, 2–20 mm wide, entire to dentate or pinnatifid. Scapes unbranched, naked, 10–60 cm long; capitula 20–60-flowered; involucre 10–25 mm long; outer bracts subequal, usually calyculate; inner bracts elongate, ±equal. Florets: ligules yellow; outer ligules 10–20 mm long and usually well-exceeding involucre. Achenes slender, straight, 4–12 mm long. Pappus parts 8–30, ±equal, each with a basal scale 3–12 mm long, 0.3–1.3 mm wide tapering into a scabrid to subplumose awn. $2n = 36$, K.L.Chambers, *Contr. Dudley Herb.* 4: 248 (1955); $2n = 72$, B.V.Sneddon, *op. cit.* pl. 42 (1977). *Yam Daisy*, *Murnong*, *Native Dandelion*. Plate 13.

Occurs in temperate W.A., S.A., N.S.W., A.C.T., Vic., and Tas. Absent from the arid zone except for northern Eyre Penin. and Flinders Ranges. Grows in a wide range of soil types in open forest and woodland, heath, mallee, grassland and alpine herbfield from near sea level to c. 2210 m. Flowers Aug.–Mar.



W.A.: Southern Hills Stn in Fraser Ra., *C.A.Gardner 2851* (PERTH). S.A.: Mt Serle, 57 km E of Copley, *A.J.A.Sikkes & P.Ollerenshaw 1050* (CBG). N.S.W.: Snowy Mtns near Bett's Ck, S of the Paralyser (c. 9 km ENE of Mt Kosciuszko), *Hj.Eichler 13677* (AD). A.C.T.: Snowy Flats c. 1 mile [1.6 km] NNW of Mt. Gingera, *L.G.Adams 562* (CANB, NSW). Vic.: Whitfield–Lake Buffalo road, 7 km NE of Whitfield State Forest, *T.J.Entwistle 1736 & S.Bodsworth* (BRI, HO, MEL). Tas.: Launceston, 11 Nov. 1844, *Gunn* (K).

A very variable self-sterile species which requires further study to resolve its taxonomy. There appear to be three main variants. (1) A variant common in montane to alpine regions of Vic., A.C.T. and N.S.W. which has long, ±horizontal, narrowly cylindrical roots that often produce adventitious shoots. (2) A variant widespread throughout most of the range of the species (but apparently rare in Tas.) which has fleshy, tuberous roots that were a native food source (B.Gott, *Murnong-Microseris scapigera*: a study of a staple food of Victorian

Aborigines, *Austral. Aboriginal Studies* 2: 2–18 (1983)). The common names for this variant are Murnong and Yam Daisy. Lowland plants of this variant are distinctive for their spring flowering and summer dormancy but plants in montane to alpine sites flower later and are winter-dormant. Such plants cannot be reliably distinguished from the cylindrical-rooted variant on above-ground parts. (3) An uncommon variant known from lowland sites in Tasmania (e.g. Launceston, Mt. Nelson, Ridgeway) which has \pm vertical narrow roots and short (c. 3 mm long) pappus scales. This variant may prove to be closer to *M. scapigera* than *M. lanceolata*.

2. *Microseris scapigera* Sch.Bip., *Jahresber. Pollichia* 22–24: 310 (1866)

Scorzonera scapigera Sol. ex A.Cunn., *Ann. Nat. Hist.* 2: 125 (1838). T: Nova Zelandia [New Zealand], near Totara nui [Queen Charlotte Sound], 1769, *Banks and Solander*; lecto: BM; isolecto: WELT, *vide* B.V.Sneddon, *Fl. Australia* 37: 606 (2015).

S. scapigera G.Forst., *Fl. Ins. Austr.* 91 (1786), *nom. nud.*

M. obtusifolia Gand., *Bull. Soc. Bot. France* 65: 52 (1918). T: Tas., Little Plains, Feb. 1877, *Simpson* 527; holo: LY.

Illustrations: J.D.Hooker, *Fl. Tasman.* 1: t. 66 (1857), as *M. forsteri* [achene only]; K.Vijverberg *et al.*, *Amer. J. Bot.* 86: 1451, fig. 2 (1999).

Perennial herb; underground stem sympodial, erect, 3–25 mm long; roots several, non-tuberos, gradually tapering, never producing adventitious shoots. Leaves all basal, linear to narrowly lanceolate or oblanceolate, 4–30 cm long, 2–10 mm wide, entire to dentate or pinnatifid. Scapes unbranched, naked, 10–50 cm long; capitula 8–40-flowered; involucre 10–20 mm long; outer bracts subequal, usually calyculate; inner bracts elongate, \pm equal. Florets: ligules yellow; outer ligules 5–10 mm long and somewhat exceeding involucre. Achenes slender, straight, 4–12 mm long. Pappus parts 30–66, \pm equal, each with a basal scale 1–4 mm long, 0.15–0.35 mm wide tapering into a scabrid awn or outer parts shorter and \pm capillary throughout. *Native Dandelion*.

Occurs in Vic. in scattered localities from Beveridge westwards to Streatham and southwards to near Colac, and Tas. Grows in dark loam, peat and waterlogged black or grey basalt soils in grassland and herbfield from near sea level to c. 1500 m. Also in New Zealand. Flowers Dec.–Mar.

Vic.: Walls of Jerusalem, *M.J.Brown* 164 (HO); Iris R. crossing on Wilmot–Cradle Mtn road, 15 Feb. 1969, *E.M.Canning* (CBG); Near L. Colac and L. Calvert, Mar. 1885, *F.Mueller* (MEL). Tas.: New Norfolk, 2 Feb. 1839, *R.Gunn?* (K); Ben Lomond Natl Park, Plains of Heaven, *M.G.Noble* 28600 (HO).



The species is variable and may prove to be divisible taxonomically, but further studies of Australian and New Zealand plants are needed to resolve this matter. The species appears to an inbreeder throughout its range in Australia whereas it is predominantly self-sterile in New Zealand. Australian populations of the species have more numerous pappus parts than the New Zealand ones. *Microseris scapigera* is rare in Vic., where it is now largely confined to ungrazed road verges. It is more common in Tas., especially in alpine regions.

Doubtful names

Microseris tasmanica Gand., *Bull Soc. Bot. France* 65: 52 (1918)

T: Tas., Kangaroo Point, 22 Nov. 1877, *Spicer*; holo: LY.

The type specimen is inadequate for a confident identification, but it is probably referable to *M. lanceolata*.

Microseris tenuicula Gand., *loc. cit.*

T: Tas., Sandy Bay, 6 Jan. 1877, *Spicer*; holo: LY.

The type specimen is inadequate for a confident identification, but it is probably referable to *M. lanceolata*.

14. HIERACIUM

I.R.Thompson

Hieracium L., *Sp. Pl.* 2: 799 (1753); from the classical Greek name for plants of this genus and similar plants.

Type: *H. murorum* L.

Perennial herbs, often with long leafy stolons, branching. Hairs usually of 2 or more types including glandular, eglandular, stellate, and plumose. Leaves all or mostly basal. Inflorescences solitary, cymose or paniculate. Capitula pedunculate; involucre bracts multiseriate or approaching biseriate, soft and reflexed at maturity. Florets: ligule yellow, rarely orange, green or white. Achenes homomorphic, not compressed, not beaked. Pappus of bristles, somewhat persistent; bristles scabrid-barbellate, ±uniform within pappus, or length variable.

A complex genus of hundreds of species or up to 5000 taxa if apomictic microspecies are counted. Mostly from temperate regions and mostly Europe; one species naturalised in Australia, with 3 other species recently recorded but not yet considered naturalised. All 4 species recorded in Australia are naturalised in New Zealand.

P.J.Garnock-Jones, *Hieracium*, in C.J.Webb, W.R.Sykes and P.J.Garnock-Jones, *Fl. New Zealand* 4: 324–333 (1988).

- 1 Stolons absent; basal leaves with an abrupt transition from petiole to blade; upper stem and peduncles lacking long non-glandular hairs; achenes > 2.5 mm long, the ribs apically confluent in an obscure ring; pappus bristles in 2 rows, the hairs unequal †*H. murorum*
- 1: Leafy stolons present; basal leaves tapering gradually to base; achenes < 2.5 mm long, the ribs projecting distally to form a crenulate apex; pappus hairs in 1 row with a few hairs shorter than the rest
- 2 Capitula solitary; stems to 15 cm high, naked or with scale-like bracts; lower leaf surface with a moderate to dense tomentum of stellate hairs ††*H. pilosella*
- 2: Capitula several per stem; stems to 50 cm high, typically with 1 or more leaves; lower leaf surface not tomentose, stellate hairs absent or rare
- 3 Leaves green; ligule deep orange turning purple when dry; spreading hairs on upper stem 4–5 mm long, dark, emerging from a dense tomentum of stellate hairs *H. aurantiacum*
- 3: Leaves slightly glaucous; ligule yellow, remaining yellow when dry; spreading hairs on upper stem c. 3 mm long, pale except for base, emerging from a sparse to scattered indumentum of stellate hairs †††*H. praealtum*

†*Hieracium murorum* L. has been recorded from the Blue Mtns in central-eastern N.S.W. (*M.Sherring s.n.*, 1998, MEL, NSW). Another population of plants, of uncertain identity but probably allied to *H. murorum* has also been recorded from the Blue Mtns (*C.H.Barker* & *J.R.Hosking*, CANB, MEL, NSW).

††*Hieracium pilosella* L. has been recorded from the Brindabella Ra. in the A.C.T. (1992, *SGAP s.n.*, CANB) and from near Oatlands in SE Tas. (*A.Woolley*, HO).

†††*Hieracium praealtum* Vill. ex Gochnat subsp. *bauhinii* (Besser) Petunn. is known from a single population near Falls Ck in NE Vic. (*N.G.Walsh* 5962, MEL).

****Hieracium aurantiacum* L., *Sp. Pl.* 2: 801 (1753)**

subsp. ***carpathicola*** Nägeli & Peter, *Hierac. Mitt.-Eur.* 1: 290 (1885)

T: central Europe; *n.v.*

Stoloniferous perennials to c. 0.4 m high. Basal leaves sessile, not divided, with l:w ratio c. 3–6, entire or denticulate; both surfaces with scattered very long eglandular hairs. Cauline leaves 1–3, strongly reducing upwards; base not dilated or stem-clasping. Capitula several; peduncle densely hairy with dark eglandular hairs c. 4–5 mm long and short glandular hairs emerging from an indumentum of whitish stellate hairs; involucre 5–8 mm long; bracts with eglandular and glandular hairs, with stellate hairs few or absent; outer bracts 6–8, narrowly lanceolate, c. 2 mm long. Florets: ligule 5–10 mm long, orange, drying purplish; style hairs dark. Achenes obloid to obovoid, 1.5–2 mm long, with prominent ribs terminating distally as a projection, purplish. Pappus uniseriate, 4–6 mm long, white; bristles brittle, mostly of similar length. *Orange Hawkweed*. Plate 14; Fig. 11D–G.

Naturalised in SE N.S.W., eastern Vic. around Falls Ck and in southern Tas. Grows in disturbed environments at alpine and lower altitudes. Flowers summer.

N.S.W.: Kosciuszko Natl Park, Round Mtn Fire Trail, *N.G. Walsh 5931 et al.* (CANB, MEL, NSW). Vic.: c. 50 m E of P.O., Falls Ck, *J.R. Hosking 1829* (CANB, MEL, NSW). Tas.: Waddamana Rd near Shannon R. Bridge, 18 Dec. 1989, *R.J. Fensham* (HO); Old Village, Butlers Gorge, 23 Jan. 1963, *P.A. Tyler* (HO).



This species has the potential to become a serious environmental weed in alpine areas.

The type subspecies has a longer involucre and does not develop the long, leafy stolons of subsp. *carpathicola*.

15. TOLPIS

I.R. Thompson

Tolpis Adans., *Fam. Pl.* 2: 112 (1763); derivation unknown.

Type: *T. barbata* (L.) Gaertn.

Annual or perennial herbs, branching. Hairs simple, eglandular. Leaves mostly basal. Inflorescences cymose or paniculate. Capitula pedunculate; involucre bracts ±biseriate; inner bracts hardened, strongly convex and erect at maturity. Florets: ligule yellow or purplish brown. Achenes dimorphic, not compressed, unbeaked. Pappus dimorphic, of bristles and scales, persistent; bristles and scales scabridulous, sometimes of 2 types within pappus.

A genus of c. 20 species from the Mediterranean region, Africa and Atlantic Is; 2 species naturalised in Australia.

Apart from characters given in the key to genera, these two species are characterised by being much taller than broad, and with inflorescences where the lateral capitula overtop markedly the primary or medial capitulum.

Outer involucre bracts longer than inner bracts, divergent; ligules at least partly purple; pappus of marginal achenes with scales; pappus of central achenes with 2 or 4 bristles

1. *T. barbata*

Outer involucre bracts shorter than inner bracts, appressed; ligules all yellow (drying greenish); pappus of all achenes with c. 8 bristles

2. *T. virgata*

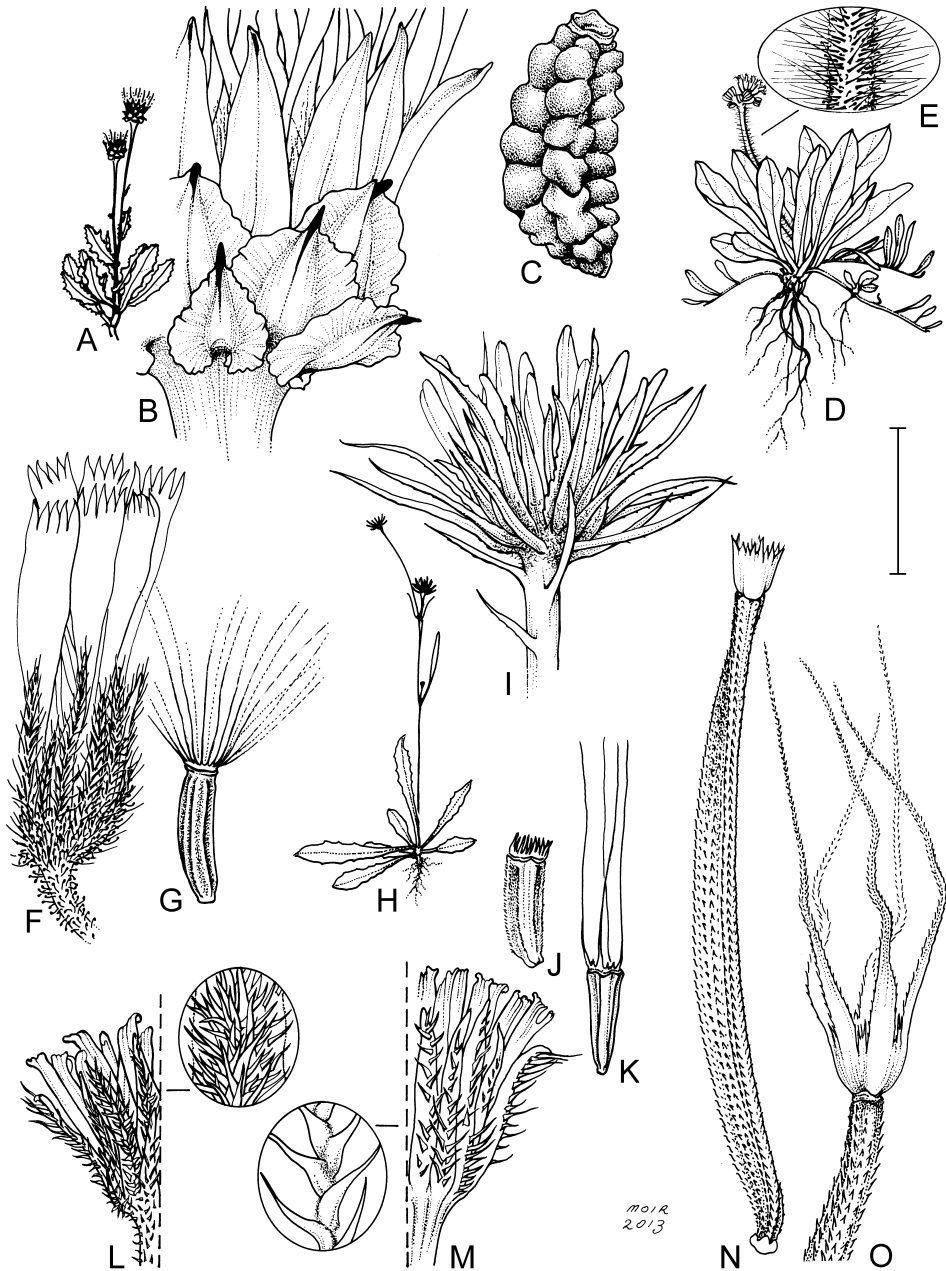


Figure 11. A–C, *Reichardia tingitana*. A, habit; B, capitulum; C, achene (A–B, A.C.Beauglehole 55479, MEL; C, A.Paget 2179, MEL). D–G, *Hieracium aurantiacum* subsp. *carpathicola*. D, habit; E, peduncle; F, capitulum; G, achene (D–E, N.G.Walsh 5931, MEL; F–G, G.McHugh, 6 Mar. 2002, MEL). H–K, *Tolpis barbata*. H, habit; I, capitulum; J, marginal achene; K, central achene (H–K, N.G.Walsh 7201, MEL). L, *Hedypnois rhagadioloides* subsp. *rhagadioloides*, capitulum & indumentum detail (M.G.Corrick 6659 & P.S.Short, MEL). M–O, *H. rhagadioloides* subsp. *cretica*. M, capitulum & indumentum detail; N, marginal achene; O, upper part of central achene (M, T.B.Muir 5994, MEL; N–O, T.B.Muir 1752, MEL). Scale bar: A, D, H = 10 cm; B, F, I, L, M = 6 mm; C, G, J, K, N, O = 2 mm; E = 10 mm. Drawn by M.Moir.

1. **Tolpis barbata* (L.) Gaertn., *Fruct. Sem. Pl.* 2: 372 (1791)

Crepis barbata L., *Sp. Pl.* 2: 805 (1753). T: 'Habitat in Monspelii, Vesuvii, Siciliae, Messanae', *Herb. Linn. No.* 955.2; lecto: LINN, *fide* C.E.Jarvis, *Bot. J. Linn. Soc.* 109: 506, f. 1 (1992).

Tolpis umbellata Bertol., *Rar. Lig. [Ital.] Pl.* 1: 13 (1803). T: 'Repitur Sarzanae ad viarum margines circa S. Francisci coenobium; tum in collibus dictis sarzanello, & Montedarmd', Italy, *coll. unknown; n.v.*

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1656, fig. 758b (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 705, fig. 135g (1999); B.M.J.Hussey *et al.*, *Western Weeds* 2nd edn 107 (2007).

Annuals to c. 0.6 m high, with appressed-cobwebby or woolly indumentum on stems and capitula, becoming glabrous, with sparse to dense septate hairs on leaves, or leaves \pm glabrous. Basal leaves often persistent at anthesis, to c. 11 cm long, with l:w ratio c. 4, undivided or antorsely lobed, attenuate at base, entire, denticulate or dentate; cauline leaves 1–4, becoming somewhat narrower upwards, attenuate at base. Capitula 2–7; peduncle of primary capitulum to c. 3 cm long, c. 1 mm diam.; peduncle of lateral capitula to 12 cm long, mostly c. 0.3–0.6 mm diam.; involucre 8–10 mm long, c. 2–4 mm diam.; outer bracts 15–25, divergent, linear, 8–10 mm long, setaceous; inner bracts c. 16–22, c. 5 mm long, often developing tubercles on midrib, with hyaline margin distinct and vestigial in alternate bracts. Florets: ligule c. 2–5 mm long, yellow with a purple band or entirely purple in central florets; style hairs pale. Achenes c. obloid, 1.3–1.7 mm long, not tapering distally; marginal achenes housed within concavity of hardened inner bract at maturity, densely brown-hairy; central achenes with numerous close-spaced ribs, glabrous. Pappus white; pappus of marginal achenes c. 0.4 mm long, of scales of varying length; pappus of central achenes 3–5 mm long; bristles 2–4, wider at base, scabridulous; intervening shorter scales more numerous, c. 0.3 mm long. *Yellow Hawkweed*. Fig. 11H–K.

Native to the Mediterranean. Naturalised in SW W.A. mostly S from Perth, far SE Qld, eastern N.S.W., Vic., Mount Lofty Ra. of S.A., and eastern Tas. Grows on roadsides and other disturbed sites in woodland and forest. Flowers mid-spring–summer.

W.A.: Bokerup Nat. Res., *G.J.Keighery & N.Gibson* 2433 (PERTH). S.A.: Mt Lofty Ra., Crafers, 20 Jan. 1971, *E.H.Ising s.n.* (AD). Qld: main picnic area, Girraween Natl Park, 22 km S of Stanthorpe, *G.N.Batianoff* 210832 (BRI). N.S.W.: Traffic Education Centre, Armidale, *R.G.Coveny* 16367 & *A.Whalen* (BRI, CANB, NE, NSW). Vic.: 9.7 km W from Whitfield on the Mansfield road, *I.C.Clarke* 2808 (AD, CANB, HO, MEL). Tas.: Hill to E of Bonneys Plains Rd, *A.M.Gray* 783 (HO, MEL).



A native of southern Europe. The name *T. umbellata* has in the past been applied to Australian collections. T.G.Tutin, in T.G.Tutin *et al.*, *Fl. Europaea* 4: 306 (1976), refers to *T. umbellata* as a variant of *T. barbata* with relatively small capitula and all the florets pale yellow. Australian specimens all appear to have small capitula as in *T. umbellata*, but with pigmentation of the corolla typical of *T. barbata* *s. lat.* (outer florets yellow with a purple band at the base of the ligule, and the percentage of purple progressively increasing towards the centre of the capitulum). The long, divergent, marginally setaceous outer bracts are a feature of this species of *Tolpis*. Pappus morphology is reminiscent of that seen in *Hedypnois rhagadioloides*.

2. **Tolpis virgata* (Desf.) Bertol., *Rar. Lig. [Ital.] Pl.* 1: 15 (1803)

Crepis virgata Desf., *Actes Soc. Hist. Nat. Paris* 1: 37, t. 8 (1792). T: Tunisia; syn: *n.v.*; Algeria; syn: *n.v.*

Tolpis altissima Pers., *Syn. Pl.* 2: 377 (1807). T: *n.v.*

Similar to *T. barbata* but differing most markedly in the following features. Biennials or perennials to c. 1 m high. Involucre 5–8 mm long; outer bracts appressed, 1.5–3.5 mm long; inner bracts longer than outer bracts, not developing tubercles on midrib. Florets: ligules not purple basally or throughout. Achenes homomorphic, 1.5–2 mm long, all glabrous. Pappus bristles c. 8, present in all achenes.

Native to the Mediterranean region. Naturalised in SW W.A. between Jarrahwod and Boyup Brook. Grows in various soils in woodland and forest. Flowers summer–early autumn.

W.A.: Vasse Hwy, Nannup to Jarrahwod, *G.J.Keighery 14363* (PERTH); KC4, Kingston Forest Block, *E.D.Middleton K339* (PERTH).

Infraspecific taxa have been described for this species based on the number of pappus bristles. Specimens in Australia appear uniform in this respect and conform to the type variety or subspecies.



16. HEDYPNOIS

I.R.Thompson

Hedypnois Mill., *Gard. Dict. Abr. ed. 4* (1754); from the Greek *hedypnois*, a classical name for some members of the Cichorieae.

Type: not designated.

Annual herbs, mostly branching. Hairs furcate or simple. Leaves predominantly basal. Inflorescences solitary or cymose. Capitula pedunculate; involucre bracts biseriate; inner bracts hardened, strongly convex and erect at maturity. Florets: ligule slightly oblanceolate, yellow. Achenes ±homomorphic, not compressed, not beaked. Pappus dimorphic, of scales and bristles, somewhat persistent; bristles and scales scabridulous, sometimes of 2 types within a pappus.

A genus of 2 species from the Mediterranean region and south-western Asia; one species naturalised in Australia.

B.Nordenstam, 13. *Hedypnois*, in K.H.Rechinger (ed.), *Fl. Iranica* 122: 138–140 (1977).

****Hedypnois rhagadioloides* (L.) F.W.Schmidt, *Samml. Phys.-Oekon. Aufsätze* 1: 279 (1795)**

Hyoseris rhagadioloides L., *Sp. Pl.* 2: 809 (1753). T: Southern Europe, *Herb. Linn.* 957.9; lecto: LINN, *fide* B.Nordenstam, *op. cit.* 139.

Annuals to c. 0.4 m high, often < 0.2 m high. Scattered non-glandular hairs on leaves, distal peduncle and involucre bracts, those of leaves and stems minutely bifurcate. Basal leaves variably persistent, to c. 20 cm long, with l:w ratio 3–12, entire, lobed or pinnatisect, with segments somewhat antrorse; margin entire or dentate. Cauline leaves (0–) 1–4, undivided; base becoming broadly cuneate, hardly stem-clasping. Capitula solitary or few; involucre c. 3 mm diam.; outer bracts 6–10, linear-lanceolate or lanceolate, 2–3 mm long; inner bracts 10–12, 5–9 mm long, variously bristly, or glabrous, hardened and incurved or erect at maturity; hyaline margin narrow or broad in alternate bracts. Florets: ligule c. 3–6 mm long; style hairs pale. Achenes narrowly obloid, curved, 4.5–9 mm long, with ribs inconspicuous, minutely scaly in lines; marginal achenes housed within concavity of bract at maturity. Pappus of marginal achenes a corona of largely-fused scales, 0.5–1 mm long; pappus of central achenes with bristles usually 5, 3–6 mm long, dilated at base, with alternating scales to 0.5 mm long.

There are 2 subspecies in Australia.

Plants vary in habit from erect to prostrate, and often become multi-stemmed from the base. The peduncle dilates to a variable extent distally, and the achenes become firmly attached to the receptacle at maturity and are somewhat enclosed by hardened incurved bracts.

Distal peduncle and lateral parts of inner involucre bracts bearing numerous, sometimes minute, spreading hairs at anthesis; fruiting peduncle to 7 mm diam. below capitulum, 2–4 times its diam. near base

a. subsp. *rhagadioloides*

Distal peduncle and lateral parts of inner involucre bracts glabrous at anthesis (robust spreading hairs sometimes present medially on inner involucre bracts and/or on upper stem in a line below peduncular bracts); fruiting peduncle to 5 mm diam. below capitulum, 1.5–2.5 times its diam. near base

b. subsp. *cretica*

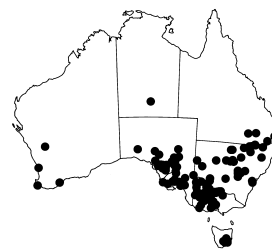
a. **Hedypnois rhagadioloides* (L.) F.W.Schmidt subsp. *rhagadioloides*

Illustrations: K.H.Rechinger (ed.), *Fl. Iranica* 122: t. 100 (1977); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 705, fig. 135h (1999), as *H. cretica*.

Peduncle with spreading hairs distally at anthesis, sometimes minute; fruiting peduncle to 7 mm diam. below capitulum, 2–4 times its diam. near base, sometimes with hairs lost at this stage. Involucre 6–9 mm long, with numerous small hairs distributed over much of the stereome surface, with coarser hairs also present in midline; mature involucre often globular, with only narrow slits between bracts. Florets: ligule 4–6 mm long, usually exceeding involucre by c. 1–2 mm. Achenes 4.5–7 mm long. Pappus bristles of central achenes mostly 3–5 mm long. Fig. 11L.

Native to the Mediterranean region, the Middle East and SW Asia. Naturalised predominantly in SE Australia from far SE Qld S to south-central Vic. and SW to south-central S.A.; a few occurrences in SE Tas., SW W.A., and N.T. around Alice Springs. Grows predominantly in drier regions in sandy loam or clay soils in grassland and woodland. Flowers spring–summer.

W.A.: Cape Leeuwin, *G.J.Keighery* 9200 (CANB, PERTH). N.T.: A.I.B. farm, c. 9 km S of Alice Springs, *D.J.Nelson* 1968 (DNA, MEL). S.A.: near Bosanquet Hill, Eyre Penin., *E.N.S.Jackson* 5019 (AD, MEL). Qld: 5.3 km S along road to Dirranbandi from Carnarvon Hwy, *G.N.Batianoff* 2112204 (BRI, MEL). N.S.W.: Near Tori HS remnant, just N of Tori Lake, *P.G.Kodala* 462 *et al.* (BRI, CANB, MEL, NE, NSW). Vic.: c. 4 km S of Sunset Tank, ‘Sunset Country’, *M.G.Corrick* 6659 & *P.S.Short* (MEL). Tas.: bank of R. Derwent, c. 3 km W of Plenty River Bridge, *A.M.Gray* 1068 (HO).



Often sympatric with subsp. *cretica* q.v., but there is little evidence of hybridisation between the two forms. At fruiting, the shape of the involucre and degree of dilation of the peduncle helps to identify it when indumentum characters have been lost.

b. **Hedypnois rhagadioloides* subsp. *cretica* (L.) Hayek in F.K.G.Fedde, *Repert. Spec. Nov. Regni Veg. Beih.* 30(2): 807 (1931)

Hyoseris cretica L., *Sp. Pl.* 2: 810 (1753); *Hedypnois cretica* (L.) Dum.Cours., *Bot. Cult.* 2: 339 (1802). T: Crete, *Herb. Linn.* 957.11; neo: LINN n.v., *fide* B.Nordenstam in K.H.Rechinger (ed.), *Fl. Iranica* 122: 139 (1977).

Illustrations: K.H.Rechinger (ed.), *Fl. Iranica* 122: t. 101 (1977); B.M.J.Hussey *et al.*, *Western Weeds* 2nd edn 99 (2007).

Peduncle without spreading hairs (spreading hairs may be present on stem in a line below peduncular bracts); fruiting peduncle to 5 mm diam. below capitulum, 1.5–2.5 times its diam. near base. Involucre 7–11 mm long, glabrous or more often with robust hairs confined to medial zone; mature involucre hardly globular, with bracts well-spaced. Florets: ligule 5–8 mm long, usually exceeding involucre by c. 2–4 mm. Achenes (5–) 6–9 mm long. Pappus bristles of central achenes 4–6 mm long. Fig. 11M–O.

Native to the Mediterranean region, the Middle East and SW Asia. Naturalised in W.A. S from the Murchison R. area, and in SE Australia from SE Qld S to south-central Vic. and SE to south-central S.A.; also recorded from SE Tas. around Hobart. Grows predominantly in drier regions in sandy loam or clay soils in grassland and woodland. Flowers spring–summer.

W.A.: Murchison R., *H.Demarz 11437* (CANB, PERTH). S.A.: Gawler Ra., Yardea Stn, c. 1.6 km E of HS, *C.R.Alcock 3989* (AD, CANB). Qld: 2.2 km E of Allora along Forest Plain Rd, *A.R.Bean 10848* (BRI, MEL). N.S.W.: Hillston, bank of Lachlan R., near sewerage treatment works, *R.Medd 161177* (NSW). Vic.: Yarrara forest, adjacent to Millewa main channel, ± 15 km S of Werrimull, *S.J.Forbes 3136 et al.* (MEL). Tas.: Henry St Cemetery, Sorell, *A.M.Buchanan 13511* (HO).

The involuclral bracts of subsp. *cretica* have robust hairs confined to the midline, in 1 or 2 rows, or are glabrous. The distal peduncle may be transiently cobwebby prior to anthesis. Although less reliable for discriminating subspecies, the ligules, achenes and pappus bristles are generally longer in this subspecies and the peduncle generally does not dilate distally to the same extent. A few specimens from NW Vic. are atypical in having more viscid involuclral bracts with hairs slightly more diffuse. B.Nordenstam, *op. cit.* 140, indicates that subsp. *rhagadioloides* is characterised by a chromosome number of $2n = 16$, whereas subsp. *cretica* has a number of $2n = 13$.



17. UROSPERMUM

I.R.Thompson

Urospermum Scop., *Intr. Hist. Nat.* 122 (1777); from the Greek *oura* (tail) and *sperma* (seed), alluding to the long beak on the achene.

Type: *U. picroides* (L.) Scop. ex F.W.Schmidt

Annual or perennial herbs, usually branching. Hairs simple, eglandular. Leaves basal and cauline. Inflorescences solitary or cymose. Capitula pedunculate; involuclral bracts uniseriate, soft and reflexed at maturity. Florets: ligule yellow. Achenes homomorphic, not compressed, beaked. Pappus of bristles, not persistent; bristles plumose, uniform within pappus.

A genus of 2 species from the Mediterranean region, both naturalised in Australia.

Capitula are moderately large and are borne on a long peduncle that gradually dilates distally. Spreading hairs are numerous and variable in size; on or near the margin of leaves they are minute and very densely packed, whereas on lower stems and leaf midribs they are often larger. A distinctive feature of the mature receptacle is the ciliate pit margins.

Involuclral bracts with spreading setose hairs

1. *U. picroides*

Involuclral bracts with appressed silky hairs

2. *U. dalechampii*

1. ****Urospermum picroides*** (L.) Scop. ex F.W.Schmidt, *Samml. Phys.-Oekon. Aufsätze* 1: 275 (1795)

Tragopogon picroides L., *Sp. Pl.* 2: 790 (1753); *Arnopogon picroides* (L.) Willd., *Sp. Pl.* 3: 1496 (1803). T: *Herb. Clifford*: 382, *Tragopogon* 2; lecto: BM, *fide* N.Turland in C.E.Jarvis & N.Turland (eds), *Taxon* 47: 369 (1998).

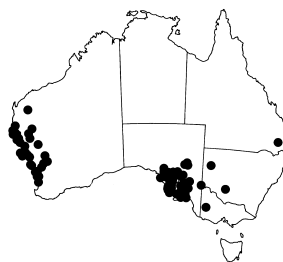
Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1658, fig. 759b (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 705, fig. 135f (1999); B.M.J.Hussey *et al.*, *Western Weeds* 2nd edn 108 (2007).

Annuals to c. 0.5 m high, with spreading to retrorse setose hairs scattered on all parts, and minute hairs on margin of leaves. Leaves undivided, or lobed to pinnatisect, with base becoming truncate, cordate or sagittate, somewhat stem-clasping upwards; margin dentate or denticulate; basal leaves few to several, variably persistent; cauline leaves few to several, to c. 25 cm long, with l:w ratio 3–6. Capitula solitary or 2; involucre 12–22 mm long, c. 5–8 mm diam.; bracts 7–10, with long spreading setose hairs, with hyaline margin slender and usually grey or broad and pale on alternate bracts, finally reflexed. Florets: ligule c. 15 mm long; style hairs pale. Achenes 10–15 mm long, somewhat sigmoidal overall, brown; basal portion

flattened-obloid, 3–5 mm long, with numerous long tubercles on faces; apical portion c. 7–10 mm long, comprising a dilated part 3.5–5 mm long bearing transverse wrinkles, tapering gradually into beak c. 3.5–5 mm long. Pappus 8–12 mm long, detaching as a unit, white. *False Hawkbit*. Fig. 12A–D.

Native to the Mediterranean region. Naturalised in western W.A. mostly S from Carnarvon, and southern S.A. E from Eyre Penin., with isolated occurrences in SE Qld, NW and south-central N.S.W. and western Vic. Grows in a range of soils, often on rocky slopes and outcrops, in shrubland, including chenopod shrublands. Flowers late winter–spring.

S.A.: 6 km NNW of Mongolata on Whitehill Rd, *N.N.Donner 8353* (AD, MEL); Moralana Stn, northern end where powerline crosses 'Little Brachina Ck', *D.E.Symon 14931* (AD, BRI). Qld: L. Perseverance NNE of Toowoomba, 15 Oct. 1995, *M.E.Ballingall s.n.* (BRI). N.S.W.: Mootwingee Natl Park, 4.5 km SE of 'Mootwingee' HS, *A.N.Rodd 5804 et al.* (AD, MEL, NSW). Vic.: W of PMG tower, Callistemon Gorge, Mt Arapiles, *A.C.Beauglehole 29647* (MEL).



A distinctive species with its bristly involucre lacking outer bracts and peculiar achene morphology.

2. **Urospermum dalechampii* (L.) F.W.Schmidt, *Samml. Phys.-Oekon. Aufsätze* 1: 275 (1795)

Tragopogon dalechampii L., *Sp. Pl.* 2: 790 (1753). T: not designated.

Illustration: O.Polenin, *Fl. Europe, field guide* pl. 157, 1526 (1969).

Annuals to c. 0.5 m high, unbranched or few-branched, with spreading to slightly retrorse setose hairs scattered on stems and leaves. Basal leaves several, persistent at anthesis, to c. 16 cm long, with l:w ratio 3–6, lyrate-pinnatifid, with margin entire or denticulate; cauline leaves few–several, becoming undivided, with base truncate to cordate, stem-clasping. Capitula solitary or 2; involucre 12–15 mm long, c. 8–10 mm diam.; bracts 7–10, with appressed silky hairs scattered on surface, with hyaline margin slender and grey or broad and pale on alternate bracts. Florets: ligule c. 15 mm long; style hairs pale. Achenes c. 15 mm long, curved; basal portion flattened-obovoid, c. 4 mm long, verrucose; apical portion plumper than basal portion at base, obscurely wrinkled, tapering into a long, ciliolate beak c. 10 mm long. Pappus c. 10 mm long, cream, falling as a unit.



Naturalised in Hobart, SE Tas. Flowers spring–summer.

Tas.: northern edge of Queens Domain, Cornelian Bay, *A.M.Buchanan 14338* (HO).

18. HYPOCHAERIS

I.R.Thompson

Hypochaeris L., *Sp. Pl.* 2: 810 (1753); a name used by Theophrastus for this or another plant; from the Greek *hypo* (under) and *choiros* (pig), possibly alluding to the underground parts being eaten by pigs.

Type: *H. glabra* L.

Annual, biennial or perennial herbs, usually branching. Hairs simple, eglandular. Leaves all or mostly basal. Inflorescences solitary or cymose. Capitula pedunculate; involucre bracts multiseriate, soft and reflexed at maturity; paleae linear, membranous, filamentous at apex, not enclosing or falling with achene. Florets: ligule yellow or white. Achenes homomorphic

or dimorphic, not compressed, beaked or not. Pappus of bristles, persistent (in Australia), homomorphic or slightly dimorphic; bristles plumose or scabridulous; sometimes of 2 types within pappus.

A genus of c. 60 species mostly from temperate S America and the Mediterranean region, also other parts of Europe and Asia; 3 species naturalised in Australia.

This genus has been spelt *Hypochoeris* in many Australian references. According to article 13.4 of the *Internatl Code Nomencl. Algae, Fungi Pl. (Melbourne Code) 2012*, *Hypochoeris* is the correct spelling.

The involucre bracts of species occurring in Australia have a narrow hyaline margin becoming broader in inner series. The longest intermediate bracts are more than half the length of the inner bracts. Achenes are brown with ribs ornamented with transverse sometimes scale-like ridges and taper into a scabridulous beak.

A.L.Cabrera, Estudios sobre el genero *Hypochoeris*, *Bol. Soc. Argent. Bot.* 10: 166–196 (1976).

- 1 Stems usually with 2 or more leaves (defined as more than $\frac{1}{4}$ of length of basal leaves); longest peduncular bracts commonly > 5 mm long; ligule white or cream; pappus uniseriate, with all bristles plumose, of similar length

3. *H. albiflora*

- 1: Stems leafless or occasionally with 1 leaf (defined as more than $\frac{1}{4}$ of length of basal leaves); longest peduncular bracts < 5 mm long; ligule yellow; pappus biseriate, the outer series scabridulous, finer and much shorter than inner series

- 2 Marginal florets not exceeding involucre or by not more than 2 mm; inner involucre bracts elongating by 60–100% post-anthesis, equal to or longer than paleae in fruit; outer achenes not beaked, sometimes briefly tapering distally

1. *H. glabra*

- 2: Marginal florets usually exceeding involucre by more than 5 mm; inner involucre bracts elongating by < 50% post-anthesis, markedly shorter than paleae in fruit; outer achenes beaked

2. *H. radicata*

1. **Hypochoeris glabra* L., *Sp. Pl.* 2: 811 (1753)

T: Belgium, *Herb. Linn.* 959.4; lecto: LINN, *fide* S.A.Alavi in S.M.H.Jafri & A.El-Gadi (eds), *Fl. Libya* 107: 347 (1983).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1644, fig. 752b (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 711, fig. 136c (1999).

Annuals to c. 0.4 m high, with spreading hairs often on leaves and occasionally on stems. Basal leaves with l:w ratio (1–) 2–6, undivided or with spreading lobes. Cauline leaves absent. Capitula solitary or few to several, not cobwebby; involucre 7–10 mm long at anthesis, subsequently lengthening by 60–100%, c. 1–3 mm diam.; bracts mostly smooth, occasionally with a few spine-like hairs; outer series narrowly ovate, 2–3 mm long; paleae to 17 mm long, shorter than mature inner bracts. Florets: ligule c. 2–5 mm long, not or shortly exceeding involucre, yellow; style hairs pale. Achenes dimorphic, 3–12 mm long; body 3–5 mm long, with numerous ribs; marginal achenes mostly few to several, rarely lacking, with body narrowly obconical or occasionally fusiform, dark red-brown, unbeaked or less often with beak to 2 mm long; central achenes with body narrowly fusiform, red-brown, with glaucous grooves, with beak longer than body. Pappus biseriate, 6–10 mm long, cream; bristles of inner series plumose, with those on marginal achenes more densely plumose proximally; bristles of outer series much shorter, scabridulous. *Smooth Cats-ear*. Fig. 12E–H.

Native to Europe and western Asia. Naturalised in W.A., mostly S and SE from Carnarvon, S.A., Vic., A.C.T., N.S.W., far SE Qld, and eastern Tas., with isolated occurrences in central Qld and southern N.T. Also naturalised in New Zealand. Grows in disturbed or relatively intact sites, often in rocky and/or poor soils. Flowers mostly winter–summer.

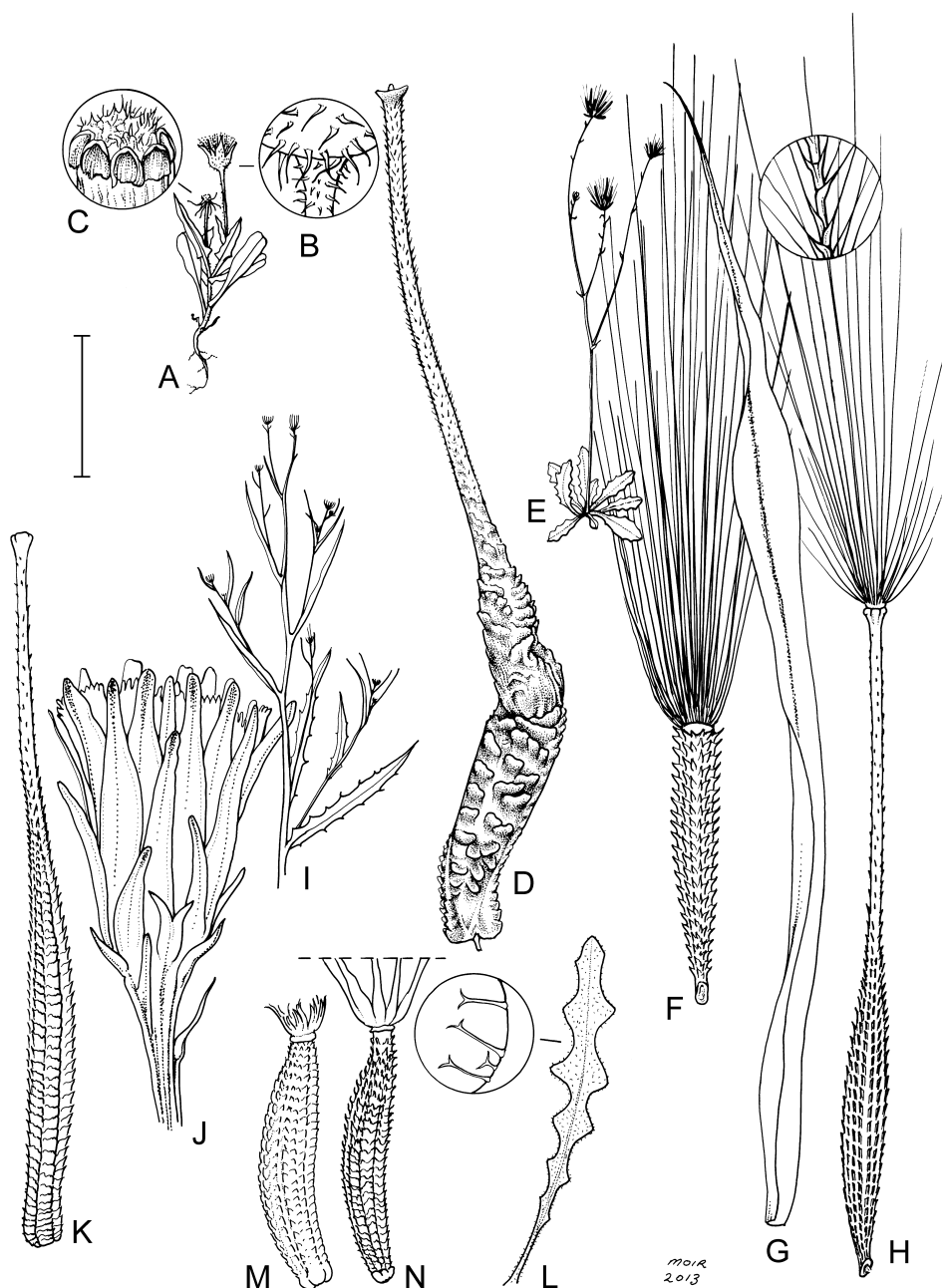
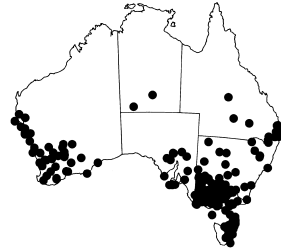


Figure 12. A–D, *Urospermum picroides*. A, habit; B, base of capitulum; C, top of receptacle; D, achene (A–C, I.C.Clarke 2926, MEL; D, A.C.Beauglehole 29647, MEL). E–H, *Hypochaeris glabra*. E, habit; F, marginal achene; G, palea subtending central achene; H, central achene with bristle detail (E–H, J.D.M.Pearson 2038, MEL). I–K, *H. albiflora*. I, habit; J, capitulum; K, achene (I–J, J.R.Hosking 2514, MEL; K, P.G.Wilson 1272, MEL). L–N, *Leontodon saxatilis*. L, leaf with margin detail; M, marginal achene; N, central achene (L, A.C.Beauglehole 62610, MEL; M–N, I.C.Clarke 1924, MEL). Scale bar: A, E, I = 10 cm; B, C, J = 6 mm; D, F–H, K, M, N = 2 mm; L = 3 cm. Drawn by M.Moir.

W.A.: 5 km S of Tamala Stn HS, *G.J.Keighery & J.J.Alford* 1993 (CANB, DNA, PERTH). N.T.: Maggie Springs, Ayers Rock, *P.K.Latz* 8485 (DNA). S.A.: Kolendo, Dawes Dam, 30 km W of HS, *H.R.Toelken* 7490 (AD, HO). Qld: 2 km N of Killarney, road to Warwick, *G.N.Batianoff* 2010330 & *C.Appelman* (BRI, DNA, NSW). N.S.W.: Park Beach, Coffs Harbour, *R.G.Coveny* 12763 *et al.* (BRI, MEL, NSW). A.C.T.: Caswell Drive–William Hovell Drive intersection, *I.Crawford* 3208 (CANB). Vic.: Three Jacks Res., Stawell, *A.C.Beauglehole* 22143 (MEL). Tas.: Little Musselroe Bay, *A.Moscal* 2925 (HO).



Occasional specimens, e.g. from the Wimmera in NW Vic. and the Deniliquin area in south-central N.S.W., are unusual in having setose stems and peduncles. When in flower the narrower capitula with fewer bracts and shorter ligules which barely exceed the bracts readily distinguish *H. glabra* from *H. radicata*. Post-anthesis, the involucre of *H. glabra* elongates markedly and the longer inner bracts typically exceed the paleae. In contrast, the involucre of *H. radicata* elongates less markedly post-anthesis and its inner bracts are much exceeded by the often pigment-tipped paleae. The unbeaked marginal achenes of *H. glabra* also usually distinguish it from *H. radicata*, although in occasional specimens the marginal achenes are short-beaked or absent. Beaked achenes differ from short-beaked achenes of *H. radicata* in the absence of bristles on the beak. Depauperate specimens are fairly common and these have very narrow capitula.

2. **Hypochaeris radicata* L., *Sp. Pl.* 2: 811 (1753)

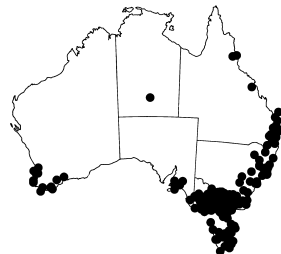
T: Europe, *Herb. Linn. No.* 959.5; lecto: LINN, *fide* A.J.Scott in J.M.Bosser *et al.* (eds), *Fl. Mascareignes* 109: 28 (1993).

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 711, fig. 136b (1999).

Perennials to c. 1 m high, with spreading hairs usually present on leaves. Basal leaves with l:w ratio 3–6, undivided or with spreading to retrorse lobes. Cauline leaves absent or occasionally solitary, with small bracts subtending branches. Capitula usually few to several, not cobwebby; involucre 10–15 mm long at anthesis, subsequently lengthening by c. 20%, c. 3–7 mm diam.; bracts with midrib setose distally or throughout, occasionally ±smooth; outer series narrowly ovate to lanceolate, 2–3 mm long; paleae to 26 mm long, exceeding mature inner bracts. Florets: ligule c. 8–16 mm long, usually exceeding involucre by c. 5–10 mm, yellow; style hairs pale. Achenes homomorphic or dimorphic, 7–14 mm long; body fusiform, 4–5 mm long, with numerous ribs; marginal achenes several or absent, red-brown, with beak shorter than body; central achenes red-brown, with glaucous grooves, with beak longer than body. Pappus biseriate, 9–15 mm long, cream; bristles of inner series plumose, with those on marginal achenes not or hardly more densely plumose proximally; bristles of outer series much shorter, scabridulous. *Cats-ear*, *Flat-weed*. Plate 16.

Native to Europe. Naturalised in SW W.A., in eastern Australia from Cairns, Qld, S through eastern N.S.W. to Vic., southern N.T., SE S.A., and Tas. Also naturalised in New Zealand. Grows in a wide range of natural and disturbed habitats, mostly in areas of moderate to high rainfall. Flowers all year but mostly spring–autumn.

W.A.: Kings Park, Perth, 1 Aug. 1934, *R.Roe s.n.* (CANB). N.T.: 27 km N of Alice Springs, *D.J.Nelson* 2371 (CANB, DNA). S.A.: Mt Crawford Forest Reserve, *H.P.Vonow* 134 (AD, HO). Qld: Kilcoy Lane near entrance to Crystal Waters Village, c. 13 km W of Maleny, *G.N.Batianoff* 201209 *et al.* (BRI, NSW). N.S.W.: Bega Swamp, 30 Jan. 1985, *G.Singh s.n.* (CANB). A.C.T.: Ginninderra Research Stn, *G.M.Stewart & E.M.Canning* 7 (CANB, MEL). Vic.: Cranbourne, Royal Botanic Gardens Annexe, *J.H.Ross* 2648 & *M.G.Corrick* (AD, MEL). Tas.: Ile du Nord, off Maria Is., 20 Dec. 1983, *N.P.Brothers* (HO).



An extremely common and widespread weed in areas with moderate to high rainfall or in watered sites. Peduncles and inflorescence branches are often long and can arise from below mid-stem. Readily distinguishable in flower from the other two species of *Hypochaeris*.

After flowering it can be distinguished in most cases by the marginal achenes and otherwise by the receptacular paleae which greatly exceed the involucre and are more commonly pigmented than in *H. glabra*.

3. **Hypochaeris albiflora* (Kuntze) Azevedo-Gonc. & Matzenb., *Compositae Newslett.* 42: 3 (2005)

H. brasiliensis var. *albiflora* Kuntze, *Revis. Gen. Pl.* 3: 159 (1898); *H. microcephala* var. *albiflora* (Kuntze) Cabrera, *Notas Mus. La Plata, Bot.* 16: 201 (1937). T: Argentina, Santa Fé, Ceres; syn: NY *n.v.*; Paraguay, Concepcion; syn: NY *n.v.*

Illustration: G.J.Harden (ed.), *Fl. New South Wales* 3: 333 (1992).

Perennials to c. 0.4 m high, with spreading hairs on stems and leaves. Basal leaves with l:w ratio 3–6, undivided or with antrorse to retrorse lobes. Cauline leaves 2 or 3, mostly linear to narrowly linear, with l:w ratio to c. 20, not dilated basally, reducing to bracts upwards. Capitula few to several, transiently cobwebby; involucre 8–12 mm long at anthesis, subsequently lengthening by c. 50–80%, c. 2–4 mm diam.; bracts smooth; outer series lanceolate, c. 3 mm long; paleae to 15 mm long, slightly shorter than mature inner bracts. Florets: ligule c. 2–3 mm long, white or cream; style hairs pale. Achenes homomorphic, 6–10 mm long, beaked; body narrowly obloid, 4–7 mm long, with c. 5 broad transversely ridged ribs and narrow non-glaucous grooves; beak slightly shorter than body. Pappus uniseriate, 5–8 mm long, pale yellow-brown proximally, white distally; bristles all plumose. *White Flat-weed*. Fig. 12 I–K.

A native of S America. Naturalised in eastern Australia from Maryborough in SE Qld S to the Sydney region, N.S.W. Also naturalised in S Africa. Grows mostly in disturbed sites, in various soils, in urban environments or in grassland, woodland and forest. Flowers mostly late winter–summer.

Qld: Bunya Mountains Natl Park, *R.Belcher* 809 (BRI, MEL); Indooroopilly, Brisbane, *L.Pedley* 4410 (BRI, CANB, NSW). N.S.W.: Blackett, *R.Coveny* 11299 (BRI, NSW); below Callawajune Mtn, (The Beehive or South Obelisk), c. 5.5 km SSW of Urbenville, *R.G.Coveny* 12795 *et al.* (AD, BRI, CANB, MEL, NSW, PERTH).



Hypochaeris albiflora is in sect. *Achyrophorus* which has its greatest diversity in S America, whereas *H. glabra* and *H. radicata* are in sect. *Hypochaeris* which has its greatest diversity in Europe and Asia. A suite of characters distinguish this species from the other two. Apart from differences given in the key, it can be distinguished by its longer peduncular bracts, and the achenes with fewer, much broader ribs, non-glaucous grooves, and with a more gradual taper to a shorter beak. *Hypochaeris albiflora* and *H. glabra* are similar in that they both have short ligules and the involucre of the two taxa elongate to a similar extent post-anthesis.

Excluded Names

Hypochaeris hispida Willd., *Hort. Berol.* 1, t. 46 (1804)

T: not designated.

This name was given in a list of plants collected in the Sydney region by W.Woolls in *J. Linn. Soc., Bot.* 10: 37 (1867). It is unclear whether this was an incorrect determination. There have been no subsequent records of this species in Australia.

Hypochaeris radicata f. *gigantea* Hochr., *Candollea* 5: 337 (1934)

T: 'Mt Blacksspurs' [Black Spur, near Healesville], Vic., 26 Feb. 1905, *B.P.G.Hochreutiner* 3011; *n.v.*

The type specimen has not been seen and there is some doubt as to whether this is *Hypochaeris radicata*. If so, it is unlikely to be an authentic taxon.

ASTERACEAE

19. LEONTODON

I.R.Thompson

Leontodon L., *Sp. Pl.* 2: 798 (1753); from the Greek *leontos* (lion) and *odontos* (tooth), probably alluding to the deeply toothed leaves.

Type: *L. hispidus* L.

Annual or perennial herbs, not branching. Hairs furcate, with prongs straight. Leaves all basal. Inflorescences solitary. Capitula pedunculate; involuclral bracts multiseriate; inner bracts ±soft, strongly convex and reflexed at maturity. Florets: ligule yellow. Achenes dimorphic, not compressed, beaked or unbeaked. Pappus of bristles and scales, persistent, dimorphic; bristles plumose or scabridulous, sometimes of 2 types within pappus.

A genus of c. 50 species from Europe, northern Africa and SW Asia, mainly in the Mediterranean region; one species naturalised in Australia.

F.J.Widder, Die Gliederung der Gattung *Leontodon*, *Phyton (Horn)* 17: 23–29 (1975).

**Leontodon saxatilis* Lam., *Fl. Franç.* 2: 115 (1779)

T: not designated.

Hyoseris taraxacoides Vill., *Prosp. Hist. Pl. Dauphiné* 33 (1779); *Leontodon taraxacoides* (Vill.) Mérat, *Ann. Sci. Nat. (Paris)* 22: 108 (1831), *nom. illeg. non Hoppe & Hornsch.* (1818). T: *n.v.*

[*L. leysseri auct. non* (Wallr.) Beck: W.M.Curtis, *Stud. Fl. Tasmania* 2: 386 (1963)]

[*L. hirtus auct. non* L.: J.M.Black, *Fl. S. Australia* 659 (1929); A.Ewart, *Fl. Victoria* 1197 (1931)]

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1648, fig. 754a (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 711, fig. 136a (1999).

Scapose perennials to c. 40 cm high. Bifurcate hairs c. 1 mm long, sparse to scattered on leaves and lower stems and sometimes on involucre. Leaves to c. 30 cm long, with l:w ratio 4–15, undivided or lobed to subpinnatisect; margin entire or remotely sinuate dentate; divided leaves with 3–6 ±spreading lobes or segments per side. Capitulum nodding in bud; involucre 6–11 mm long, c. 3–5 mm diam.; bracts glabrous or occasionally moderately hairy; outer bracts c. 6–8, narrowly lanceolate, 1–2 mm long; intermediate bracts not reaching to half way; inner bracts with grey hyaline margin. Florets: ligule c. 7–10 mm long; style hairs pale. Achenes 3–5 mm long; marginal achenes curved-fusiform, tapering into a short neck, ±smooth, housed within adjacent inner bract at maturity; central achenes narrowly fusiform, transversely ridged or scaly, with beak 0.5–1 mm long. Pappus cream; pappus of marginal achenes of fused scales 0.5–1 mm long; pappus of central achenes biseriate, with outer series 0.5–3 mm long, scabridulous, and inner series c. 10, 6–9 mm long, sparsely plumose, much wider at base. *Hairy Hawkbit.* Fig. 12L–N.

Native to Europe. Naturalised in SW W.A., eastern Australia from SE Qld through N.S.W. to Vic., in SE S.A., and in Tas. Occurs mostly nearer the coast associated with human habitation. Also naturalised in New Zealand. Grows in waste land and on nature strips, predominantly in urban environments with moderate rainfall and/or irrigation. Flowers mainly late winter–spring, also other times.

W.A.: 100 m WSW of Albany Hwy on Mondurup Rd, Mt Barker, *B.J.Lepschi* 2574 & *T.R.Lally* (AD, CANB, PERTH). S.A.: Jupiter Ck, *R.J.Bates* 26810 (AD). Qld: Quarry Rd, Sherwood, *A.R.Bean* 17107 (BRI, MEL, NSW). N.S.W.: Glen Innes, *R.Coveny* 12372 *et al.* (BRI, NSW). A.C.T.: Parkes, *B.J.Lepschi* & *I.Crawford* 4254 (CANB, NSW, MEL). Vic.: arboretum in SW corner of Royal Botanic Gardens Annexe, Cranbourne, *P.C.Jobson* 3486 (BRI, CANB, MEL, NSW). Tas.: Balfour, *A.Moscal* 4800 (HO, MEL).

A common weed of disturbed areas and of lawns in southern Australia. The involucre is either glabrous or moderately hairy with little evidence of intermediate forms, however, no correlation



has been identified between this and other characters in Australian collections. Although the involucre is multiseriate, the outer and intermediate bracts are relatively small, and the intermediate bracts generally do not reach halfway along the involucre. This is one of several characters distinguishing *L. saxatilis* from the superficially similar and often co-occurring *Hypochaeris radicata*. Other characters of *L. saxatilis* distinguishing it from *H. radicata* include: stems unbranched; hairs on leaves minutely bifurcate; paleae absent; involucre bracts all smooth, and inner involucre bracts with a grey hyaline margin.

20. HELMINTHOTHECA

S. Holzapfel

Helminthotheca Zinn, *Cat. Pl. Hort. Gott.* 430 (1757); from the Greek *helmins* (worm) and *theca* (case), in reference of the form of the achene, perhaps also in belief of its use as a vermifuge.

Type: *H. echinoides* (L.) Holub

Helminthia Juss., *Gen. Pl.* 170 (1789). T: *H. echinoides* (L.) Gaertn.

Annual to perennial herbs, prostrate to erect, branched, stems and leaves hispid. Indumentum with 2-, 3-, 4-, 5- and 6-hooked anchor hairs. Leaves simple, alternate, basal and cauline. Inflorescence of irregular cymose panicles. Capitula terminal, pedunculate; involucre of at least 2 distinct rows; outer involucre bracts in single row, cordate to broadly ovate; inner bracts in 1 or 2 rows, linear to lanceolate, with a threadlike, sometimes feathery apical appendage; receptacle naked, smooth (not Australia) or shallowly alveolate. Florets: ligule yellow. Achenes homomorphic (not Australia) or heteromorphic, rostrate. Pappus bristles in single row, pure white, not persistent; bristles of central achenes plumose, of marginal achenes plumose (not Australia) or scabrous.

A small genus of c. 5 species from the Mediterranean region; 1 species naturalised in Australia. This genus has often been included with *Picris* L. in Australian and other floras. Differences in the achene morphology, involucre and indumentum support a separation as argued by H.W.Lack (1974).

H.W.Lack, Die Gattung *Picris* L., sensu lato, im ostmediterranean-westasiatischen Raum, *Dissertation der Universität Wien* 116 (1974); H.W.Lack, A note on *Helminthotheca* Zinn (Compositae), *Taxon* 24: 111–112 (1975); H.Meusel & E.J.Jaeger, *Vergleichende Chorologie der Zentraleuropäischen Flora* 3: 132, 307 (1992); S.Holzapfel, A revision of the genus *Picris* (Asteraceae, Lactuceae) s.l. in Australia, *Willdenowia* 24: 97–218 (1994).

****Helminthotheca echinoides* (L.) Holub, *Folia Geobot. Phytotax.* 8: 176 (1973)**

Picris echinoides L., *Sp. Pl.* 2: 792 (1753); *Helminthia echinoides* (L.) Gaertn., *Fruct. Sem. Pl.* 2: 368 (1791), as *Helminthia*. T: Europe, *Herb. Linn.* 984/1; lecto: LINN, *fide* H.W.Lack, *Taxon* 24: 113 (1975).

Illustrations: J.M.Black, *Fl. S. Australia* 2nd edn, 4: 941, fig. 1255 (1957); S.Ross-Craig, *Drawings Brit. Pl.* 17, XVII, plate 29 (1962); T.Low, *Bush Tucker* 156 (photo on left hand side) (1989); all as *P. echinoides*.

Annual to perennial, 25–200 cm high. Indumentum of sparse to dense stiff hairs; anchor hairs mainly 2- and 4-hooked, sometimes with raised base. Capitula few to numerous, 8–19 mm long, 9–13 mm wide; outer involucre bracts 5, upright to spreading, 8–21 mm long, 4–11 mm wide; innermost bracts 8–12, upright, 5–12 mm long, 1–3 mm wide; spur setose, 2–9 mm long. Ligules yellow. Achenes heteromorphic; marginal achenes curved, white, pilose, with body 2.9–3.8 mm long, 0.6–1.4 mm diam.; central achenes brown, glabrous, ribbed, with body 2.4–3.9 mm long, 0.8–1.1 mm diam., rostrum slightly shorter to up to 1.5 times longer than body. Pappus of central achenes 5.9–7.1 mm long; pappus of marginal achenes shorter. 2n = 10, S.Holzapfel, *Willdenowia* 24: 97–218 (1994). *Ox-tongue*, *Prickly Ox-tongue*. Plate 15; Fig. 13A–C.

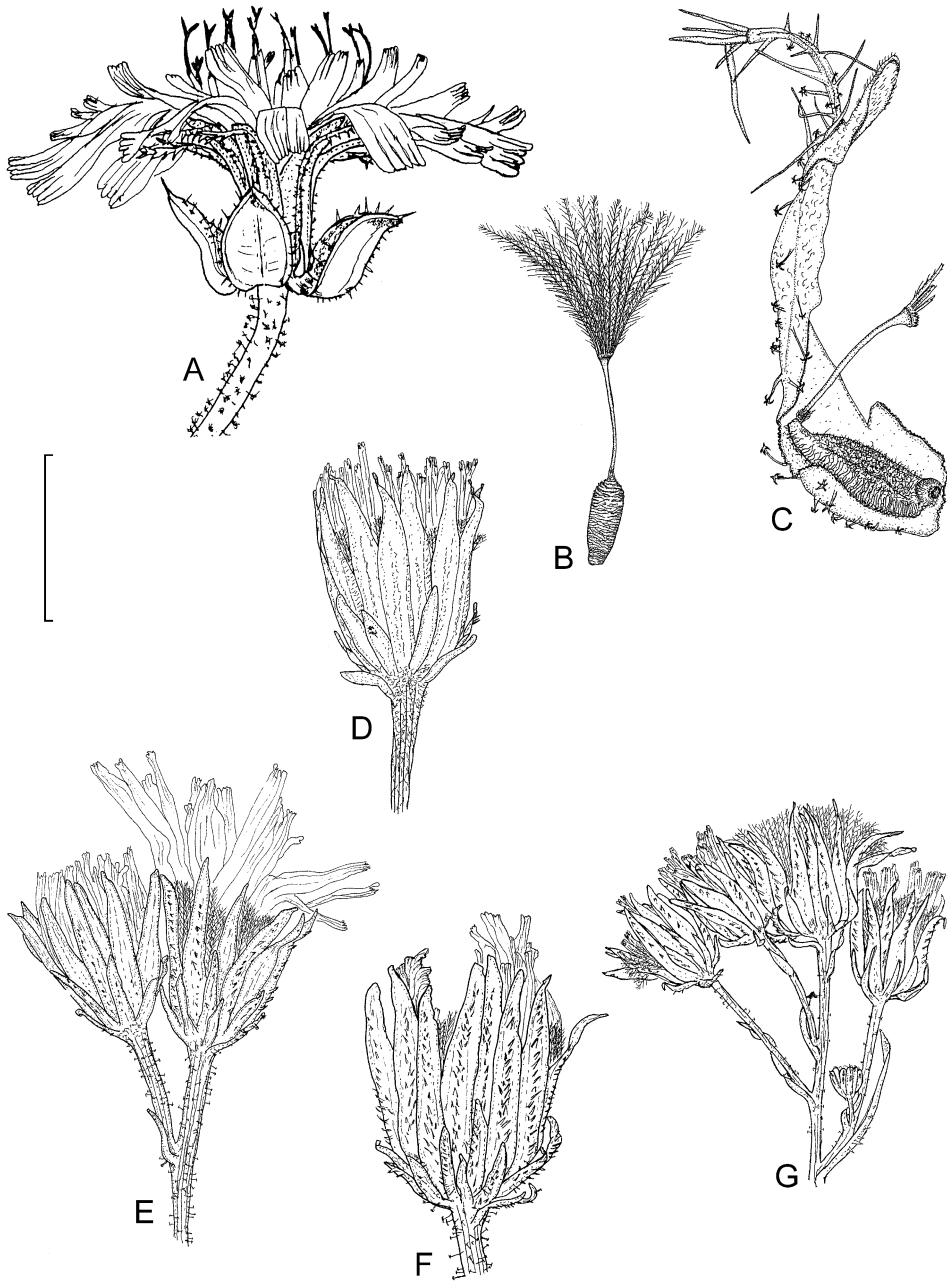


Figure 13. A–C, *Helminthotheca echioides*. A, flowering capitulum; B, marginal achene partially enclosed in inner involucre bract; C, disc achene and pappus (A, cultivated; B, P.C.Jobson 3985 & V.Stajic, MEL; C, J.R.Hoskin 1407, MEL). D–G, *Picris*. D, *P. angustifolia* subsp. *merxmuelleri*, pre-flowering capitulum (R.D.Hoogland 8471, CANB). E, *P. angustifolia* subsp. *carolorum-henricorum*, flowering capitulum (R.G.Coveny 12829 *et al.*, MEL). F, *P. angustifolia* subsp. *angustifolia*, flowering capitulum (A.G.Spooner 10793, AD). G, *P. conyzoides*, flowering and pre-fruitlet capitula (Leichhardt *s.n.*, NSW). Scale bar: A, D–G = 10 mm; B, C = 5 mm. Drawn by S.Holzapfel.

Naturalised in SW W.A., southern S.A., SE Qld, eastern N.S.W., A.C.T., throughout Vic. and in Tas. Probably more widespread than recorded. A native of Europe, SW Asia and N Africa, also naturalised in N and S America and New Zealand. On roadsides, in open areas and gardens in metropolitan and agricultural areas; amongst and alongside pastures and crops, along fence lines, irrigation channels and creeks; less frequently in remnants of native vegetation (*Eucalyptus* woodland); also on recently burned ground. In various soils; mainly 0–200 m alt., less frequently to 1000 m. Flowers and fruits all year, with a peak Nov.–June.



W.A.: Highgate Hill, 8 Dec. 1949, *C.C.Davis* (PERTH). S.A.: Backyard of Exhibition Building in North Terrace, Adelaide, *H.J.Eichler* 14553 (AD, NY). Qld: Minden (Moreton District), Jan. 1957, *J.G.Fullerton* (BRI). N.S.W.: 20.9 km SE along Aratula Rd towards Tocumval, off the Deniliquin–Finley road, *R.G.Coveny* 12900 *et al.* (NSW). A.C.T.: Near farm house at junction of Weetangera Rd & Dryandra St, Canberra, *M.Gray* 5196 (AD, CANB, MEL, NSW, PERTH). Vic.: Midland Hwy, 10 miles [16 km] W of Stanhope, *J.B.Muir* 2549 (MEL). Tas.: Mursey Bluff, near Bluff Caravan Park, behind tennis court, Devonport, *S.Holzapfel* 015 (B, HO, NSW).

Locally abundant and a weed of roadsides and pastures. The innermost involucre bracts often become strongly sclerotic in fruiting capitula and enclose the marginal achenes, which are then not released by wind but fall off with the withering capitulum. A traditional potherb in Europe, listed also as edible in Australia (T.Low, *Bush Tucker* 156 (1989)). All early collections come from around Melbourne and Adelaide, confirming these two ports as the likely gateways for the initial introduction of the species to Australia.

21. PICRIS

S.Holzapfel

Picris L., *Sp. Pl.* 2: 792 (1753); from the Greek *picros* (bitter), in reference to the bitter taste of at least some members of this genus.

Type: *P. hieracioides* L.

Annual to perennial, taprooted herbs, branched, rarely unbranched; stems and leaves hispid. Indumentum with mainly 2-hooked or mainly 2-, 3- and 4-hooked anchor hairs. Leaves simple, alternate, basal and cauline. Inflorescence panicate or rarely solitary. Capitula terminal, pedunculate; involucre of 1–4 irregular outer and 2 inner rows; outer involucre bracts more than 5, imbricate, upright to squarrose; receptacle naked, shallowly alveolate or smooth (not Australia). Florets: Ligule yellow. Achenes homomorphic or heteromorphic (not Australia), fusiform, cuspidate, usually of 5 segments, transversely ribbed; ribs scaly. Pappus rays of marginal achenes plumose or scabrous (not Australia), or reduced (not Australia); of central achenes plumose, creamy white, in 2 rows, joined to a ring at base or free (not Australia). $2n = 10$ (3 species, 3 subspecies studied), H.W.Lack, *Phytologia* 42: 211 (1972); *S.Holzapfel*, *Willdenowia* 24: 97–218 (1994).

A genus of 45–50 species from the Mediterranean region, Africa, central Europe, Asia, Australia and New Zealand; 10 native species in Australia of which 9 are endemic, two further species known from 2 collections each but apparently not naturalised. One species frequently cited as naturalised in Australia, *P. echinoides*, has been transferred to *Helminthotheca* Zinn, as *H. echinoides* (L.) Holub. A specimen of *Picris* (now as *P. angustifolia* subsp. *carolorum-henricorum*) was among plants collected by J.Banks and D.Solander during their first landfall at Botany Bay in 1770. Despite this fact, the genus has often been treated as introduced to Australia.

Picris hieracioides L. (*Hawkweed*) and *P. altissima* Delile, the only non-native species of *Picris* s. str. in Australia, are each known from only 2 early collections and appear to have not

successfully naturalised here. Most previous collections of native species of *Picris* in Australia (including Norfolk Is.) and New Zealand have been incorrectly identified as *P. hieracioides*.

Picris hieracioides (subsp. *hieracioides*) has been collected from Qld and Tas. *Picris altissima* has been collected in S.A. and N.S.W. Apart from the characters of indumentum and pappus, *P. altissima* is distinguished from Australian species by its branches spreading at a wider angle (often 60° or more) and its marginal achenes being enfolded by the inner involucre bracts.

See S.Holzapfel (1994) for detailed descriptions of the Australian specimens of both species.

H.W.Lack, Die Gattung *Picris* L., sensu lato, im ostmediterran-westasiatischen Raum, *Dissertation der Universitaet Wien* 116 (1974); H.W.Lack, New species of *Picris* (*Asteraceae, Lactuceae*) from Australia, *Phytologia* 42: 209–214 (1979); L.Murray & E.A.Brown, *Picris*, in G.J.Harden (ed.), *Fl. New South Wales* 3: 334–335 (1992); S.Holzapfel & H.W.Lack, New species of *Picris* (*Asteraceae, Lactuceae*) from Australia, *Willdenowia* 23: 181–191 (1993); S.Holzapfel, A revision of the genus *Picris* (*Asteraceae, Lactuceae*) s.l. in Australia, *Willdenowia* 24: 97–218 (1994).

- 1 Indumentum of mainly 3- or 4-hooked anchor hairs; pappus of marginal achenes scabrous, of central achenes plumose; pappus of central achenes clearly longer than that of marginal achenes †*P. altissima*
- 1: Indumentum of mainly 2-hooked anchor hairs, pappus of all achenes of equal length, plumose
- 2 Midrib of at least some outer involucre bracts with hairs more than 3 mm long; hairs curled
- 3 Hairs on midrib of outer involucre bracts in more than 1 line; hairs covering entire involucre 9. *P. evae*
- 3: Hairs on midrib of outer involucre bracts in single line 10. *P. barbarorum*
- 2: Midrib of all involucre bracts naked or with hairs less than 2.2 mm long, rarely to 3 mm; hairs straight
- 4 Involucre bracts in 1–4 outer and 2 inner rows; longest outer bracts clearly shorter than inner bracts
- 5 Transition from upper peduncular bracts to outer involucre bracts gradual, with outer involucre bracts appearing to descend onto peduncle; involucre bracts recurved and squarrose
- 6 Midrib of involucre bracts naked or with single line of hairs; longest outer bract at least 8 mm long; achene body fusiform, at least 5 mm long including cusps at least 0.7 mm long 3. *P. squarrosa*
- 6: Midrib of involucre bracts with hairs in more than 1 line; longest outer bract less than 5 mm long; achene body broadest near distal end, less than 5 mm long including cusps 0.1–0.2 mm long †*P. hieracioides*
- 5: Transition from upper peduncular bracts to outer involucre bracts abrupt, with involucre bracts clearly separated and distinct from peduncular bracts; peduncular bracts sometimes absent; involucre bracts straight, appressed or squarrose
- 7 Capitula usually less than 40; peduncles usually more than 2 cm long; capitula 8–16 mm long and 3–10 mm wide at anthesis, 8–18 mm long in fruit 1. *P. angustifolia*
- 7: Capitula numerous (30–200 or more); peduncles not more than 2 cm long; capitula 6–7 mm long and 3–5 mm wide at anthesis, 7–9 mm long in fruit 2. *P. conyzoides*
- 4: Involucre bracts in 2–4 outer and 2 inner rows; longest outer bracts ±same length as inner bracts
- 8 Outer involucre bracts strongly recurved over entire length or at least at tip, squarrose
- 9 Transition from upper peduncular bracts to outer involucre bracts gradual, with outer involucre bracts appearing to descend onto peduncle 3. *P. squarrosa*

- 9: Transition from upper peduncular bracts to outer involucre bracts abrupt, with involucre bracts clearly separated and distinct from peduncle bracts, or peduncle bracts absent
- 10 Midrib of involucre bracts without distinct line of hairs; capitula 10–12 mm wide at anthesis and in fruit 4. *P. compacta*
- 10: Midrib of at least some involucre bracts with single line of short, strong to slender hairs; capitula 5–6 mm wide at anthesis and in fruit 7. *P. burbridgeae*
- 8: Outer involucre bracts straight, appressed or squarrose
- 11 Outer involucre bracts 1.5–5.0 mm wide, with at least some outer bracts wider than innermost bracts
- 12 Margin of outer involucre bracts with conspicuous, often bristly hairs towards base; capitula 13–14 mm wide at anthesis; involucre of up to 50 bracts 5. *P. wagenitzii*
- 12: Margin of involucre bracts without conspicuous hairs; capitula 6–10 mm wide at anthesis; involucre of less than 40 bracts
- 13 Outermost involucre bracts broadly lanceolate to broadly obovate-acute; midrib of involucre bracts hairless or with single line of hairs; achene body more than 6 mm long including cusps more than 1 mm long 6. *P. drummondii*
- 13: Outermost involucre bracts narrowly lanceolate to ovate, acute; midrib of involucre bracts always without conspicuous line of hairs; achene body to 5 mm long including cusps to 0.7 mm in length 8. *P. eichleri*
- 11: Outer involucre bracts 0.4–1.6 (–1.8) mm wide, not wider than innermost bracts
- 14 Capitula (5–) 7–10 mm wide in fruit; achene body (5–) 6.0–12.5 mm long including cusps (1.2–) 2.0–7.4 mm long; cusps ($1/5$ –) $1/3$ – $1/2$ length of achene body 1. *P. angustifolia*
- 14: Capitula 5–6 mm wide in fruit; achene body 4.0–5.2 mm long including cusps less than 1 mm long; cusps $1/8$ – $1/6$ length of achene body 7. *P. burbridgeae*

†Not considered to be naturalised. See notes under generic description above.

1. *Picris angustifolia* DC., *Prodr.* 7: 130 (1838)

T: Nouv. Holl. Côte Merid., Australia [precise locality unknown], [*J.B.L.T. Leschenault de la Tour* or *A. Guichenault*]; lecto: G-DC, *vide* S. Holzappel, *Willdenowia* 24: 97–218 (1994); remaining syn: G-DC.

Annual or perennial, 7–140 cm high, branched or rarely unbranched. Anchor hairs mainly 2-hooked. Peduncles 1–20 cm long; peduncular bracts absent or present, clearly separate from involucre bracts. Capitula few to c. 40, sometimes 1, 8–16 mm long and 3–10 mm wide at anthesis, 8–18 mm long and 5–10 (–12) mm wide in fruit. Involucre of (18–) 20–36 bracts in 2–3 outer and 2 inner rows, with longest outer bracts clearly to slightly shorter than inner bracts; outer involucre bracts straight, appressed or slightly squarrose, linear, lanceolate, oblanceolate or narrowly obovate, (1.7–) 2.3–12.0 mm long, 0.4–1.5 (–1.8) mm wide, not wider than inner bracts; margin glabrous; midrib glabrous or with 1–3 lines of straight hairs 0.7–2.2 (–3.4) mm long. Achenes including cusps 2.9–10.7 (–12.5) mm long; cusps 0.1–6.8 (–7.4) mm long, c. ($1/30$ –) $1/17$ – $1/2$ of total achene length.

Occurs in all States and Territories except N.T.; in coastal areas and mountain ranges to c. 400 km inland, rarely further inland. There are 3 subspecies.

Variation between specimens from extreme ends of the distribution is considerable, in particular in the length of the achene and cusps. Intermediate specimens indicate a cline rather than separate species.

- 1 Capitula 8–10 mm long at anthesis, 8–12 mm long in fruit; achenes 2.9–4.5 (–5.2) mm long including cuspis 0.1–0.7 mm long; hairs on midrib of involucre bracts absent or in single line **1b. subsp. carolorum-henricorum**
- 1: Capitula (9–) 11–16 mm long at anthesis, 11–18 mm long in fruit; achenes 4.2–12.5 mm long including cuspis 0.4–7.4 mm long; hairs on midrib of involucre bracts absent or in single or multiple lines
- 2 Achenes (5–) 6.2–12.5 mm long including cuspis 1.2–7.4 mm long; cuspis ($\frac{1}{5}$ –) $\frac{1}{3}$ – $\frac{1}{2}$ length of achene body; hairs on midrib of involucre bracts, if present, usually in double or triple lines, rarely a single line **1a. subsp. angustifolia**
- 2: Achenes 4.2–6.0 (–6.6) mm long including cuspis 0.4–1.0 (–1.8) mm long; cuspis $\frac{1}{10}$ – $\frac{1}{4}$ of achene body; hairs on midrib of involucre bracts, if present, in single or double line **1c. subsp. merxmuellieri**

1a. *Picris angustifolia* DC. subsp. *angustifolia*

P. asperima Lindl., *Edwards' Bot. Reg.* 24: 58 (1838). T: Van Diemen's Land [Tas.], *Gunn s.n.*; holo: CGE.

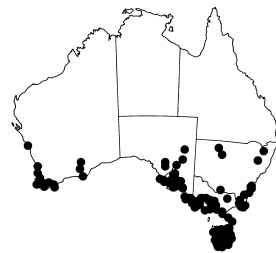
Illustrations: W.E.Blackall & J.B.Grieve, *How to Know W. Austral. Wildfl.* 4: 858, No. 74 (1975), as *P. hieracioides*; J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1650, fig. 755 B (1986) as *P. hieracioides*, S.Holzapel, *Willdenowia* 24: 135, fig. 6 (1994).

Capitula few (rarely 1) to rarely > 30, (9–) 11–15 (–16) mm long and (3–) 4–8 mm wide at anthesis, (11–) 13–18 mm long and (5–) 7–10 mm wide in fruit. Involucre bracts in 2–3 outer and 2 inner rows, with longest outer bracts slightly to clearly shorter than inner bracts; outer involucre bracts narrowly lanceolate, narrowly oblanceolate, narrowly obovate or linear, (1.7–) 2.3–12.0 mm long, 0.4–1.1 (–1.8) mm wide; margin glabrous; midrib glabrous or with 1–3 lines of hairs 0.7–2.2 (–3.4) mm long. Achenes including cuspis (5.0–) 6.2–10.7 (–12.5) mm long; cuspis (1.2–) 2.0–6.8 (–7.4) mm long, c. ($\frac{1}{5}$ –) $\frac{1}{3}$ – $\frac{1}{2}$ of total achene length. Figs 13F, 15F.

Occurs in SW W.A. south of Geraldton to the Recherche Archipelago; coastal S.A. and inland to Flinders Ra.; scattered in southern N.S.W. with disjunct populations also in northern N.S.W.; SW Vic. to c. 200 km inland in lower altitudes; in Tas. and the Bass Strait islands. Also native in New Zealand. Coastal sand dunes, coastal and inland forest at lower altitudes (rarely above 500 m), on undisturbed and disturbed ground. Flowers and fruits mainly Oct.–Apr.

W.A.: Millinup Pass, Porongurup Ra., 35 km NE of Albany, *G.J.Keighery 10963* (AD, BRI, CANB, K, MEL, PERTH). S.A.: Leven Beach, Yorke Penin., *A.G.Spooner 10793* (AD). N.S.W.: Tundulya, c. 40 km SE of Louth, about 1 km S of woolshed, *C.W.E.Moore 8888* (CANB, NSW). Vic.: Point Lonsdale, *J.Tilden 803* (BM, CANB, GH, K, MEL, MO). Tas.: S end of Safety Cove Beach, *S.Holzapel 019* & *G.Jordan* (B, HO, NSW).

Specimens from Yorke and Eyre Peninsulas and Kangaroo Is., S.A. are characterised by long-cuspidate achenes and overall rough indumentum; single-stemmed dwarf plants also occur in this region and in the bays of S and SW Tas., the latter breed true in cultivation in regards to their habit.



1b. *Picris angustifolia* subsp. *carolorum-henricorum* (Lack) S.Holzapel, *Willdenowia* 24: 144 (1994)

P. carolorum-henricorum Lack, *Phytologia* 42: 209 (1979). T: Point Cartwright, 80 km N of Brisbane, Qld, 6 Dec. 1976, *L.Pedley 4402*; holo: B; iso: BRI n.v., CANB, NSW, K.

Illustrations: H.W.Lack, *op. cit.* 42: 213, fig. 1, as *P. carolorum-henricorum*; T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 591, fig. 83, D₁–D₂ (1986), as *P. carolorum-henricorum*; S.Holzapel, *Willdenowia* 24: 144, fig. 9 (1994).

Capitula few to rarely > 30, 8–10 mm long and (4–) 5–7 mm wide at anthesis, 8–12 mm long and 5–8 mm wide in fruit. Involucre bracts in 2 outer and 2 inner rows, with longest outer bracts clearly shorter than inner bracts; outer involucre bracts linear to narrowly oblanceolate,

2.3–6.8 mm long, 0.5–1.0 mm wide; margin glabrous; midrib glabrous or with a single line of 0.6–1.1 mm long hairs. Achenes including cuspid 2.9–4.5 (–5.2) mm long; cuspid 0.1–0.7 mm long, c. $(1/30-1/17-1/5)$ of total achene length. Figs 13E, 15E.

Occurs from Mt Spurgeon, NE Qld, to Mt Dromedary, SE N.S.W., inland as far as Springsure, Qld, and Tamworth, N.S.W. A single specimen from Tas. is tentatively included here as all other collections from this area are of subsp. *angustifolia*. Coastal sand dunes, coastal and inland forest, grassland, streamsides, gullies and roadsides, at altitudes to 1700 m. On undisturbed and disturbed ground. Flowers and fruits mainly Sept.–May, but can flower all year in favorable conditions.

Qld: c. 17 miles [c. 27 km] SSW of Double Island Point and 27 miles [43 km] E of Gympie, *S.L.Everist* 7728 (BRI, K); The Summit, Darling Downs District, *S.L.Everist & L.J.Webb* 1340 (BRI, CANB); Mt. Marlowe, near Proserpine, *Rev. N.Michael* 1086 (BRI, GH). N.S.W.: Port Jackson, [28 Apr.–6 May 1770], *J.Banks & D.Solander* (BM); N of Salisbury Trig, Wingen Maid Nat. Res., *J.R.Hosking* 1679 (MEL).

This subspecies shows considerable variation in habit, indumentum of the involucre and achene morphology. It might be confused with *P. hieracioides* because of its small achenes, though it is clearly distinct from that species through its involucre of straight rather than recurved bracts clearly separated from the peduncular bracts and the presence of at least a small cuspid on the achene.



There is some resemblance to *P. attenuata* A.Cunn. (*Ann. Nat. Hist.* 2: 125 (1839)) from New Zealand, though the immature state of the type material (Bay of Islands, 1834, New Zealand, *R.Cunningham*; holo (?iso): WELT) has not allowed a clear assessment of a possible synonymy.

1c. *Picris angustifolia* subsp. *merxmuelleri* Lack & S.Holzapfel, *Willdenowia* 23: 190 (1993)

T: Summit area of Mt. Gingera, Cotter River District, A.C.T., 28 Feb. 1962, *R.Hoogland* 8471; holo: CANB [2 sheets].

Illustrations: N.T.Burbidge & M.Gray, *Fl. Austral. Cap. Terr.* 401, fig. 405 [pappus erroneously drawn as scape] (1970), as *P. hieracioides*; S.Holzapfel, *Willdenowia* 24: 151, fig. 12 (1994).

Capitula few to many (rarely > 40) or 1, (10–) 11–14 (–16) mm long and (5–) 6–10 mm wide at anthesis, 12–14 (–16) mm long and 6–10 (–12) mm wide in fruit. Involucral bracts in 2 (rarely 3) outer and 2 inner rows, with longest outer bracts clearly shorter than inner bracts; outer involucral bracts oblanceolate to lanceolate, 2.5–7.5 (–8.5) mm long, 0.6–1.2 mm wide; margin glabrous; midrib glabrous or with 1–2 lines of hairs 1 (–2) mm long. Achenes including cuspid (4.2–) 4.5–6.0 (–6.6) mm long; cuspid 0.4–1.0 (–1.8) mm long, c. $1/10-1/6$ (– $1/4$) of total achene length. Figs 13D, 15G.

Occurs in the alpine regions of SE N.S.W. and A.C.T., eastern Vic. and central and SE Tas. Also native in New Zealand. Wet and dry mountain forest and alpine woodland, mountainous grasslands and herb fields, also amongst scree and large stone outcroppings, on clearings and roadsides. Frequently at altitudes between 1000 and 2000 m, rarely below 500 m, on undisturbed and disturbed ground. Flowers and fruits mainly Oct.–Mar., a few specimens collected in fruit to June.

N.S.W.: behind Chairlift at Thredbo Village, *S.Holzapfel* 011 *et al.* (B, CANB, NSW); Kosciuszko Natl Park, Long Plain, *N.G.Walsh* 5523 (K, MEL, NSW). A.C.T.: Mt Ginini summit, *L.G.Adams* 4174 (BRI, CANB, K, MEL, NSW). Vic.: E Gippsland, Three Sisters Rd, 1.1 km S of Waratah Spur Track, 17 Feb. 1983, *D.G.Cameron s.n.* (B, MEL). Tas.: beginning of Channel Highway track, Mt Nelson Lookout, *S.Holzapfel* 017 (B, HO, NSW).



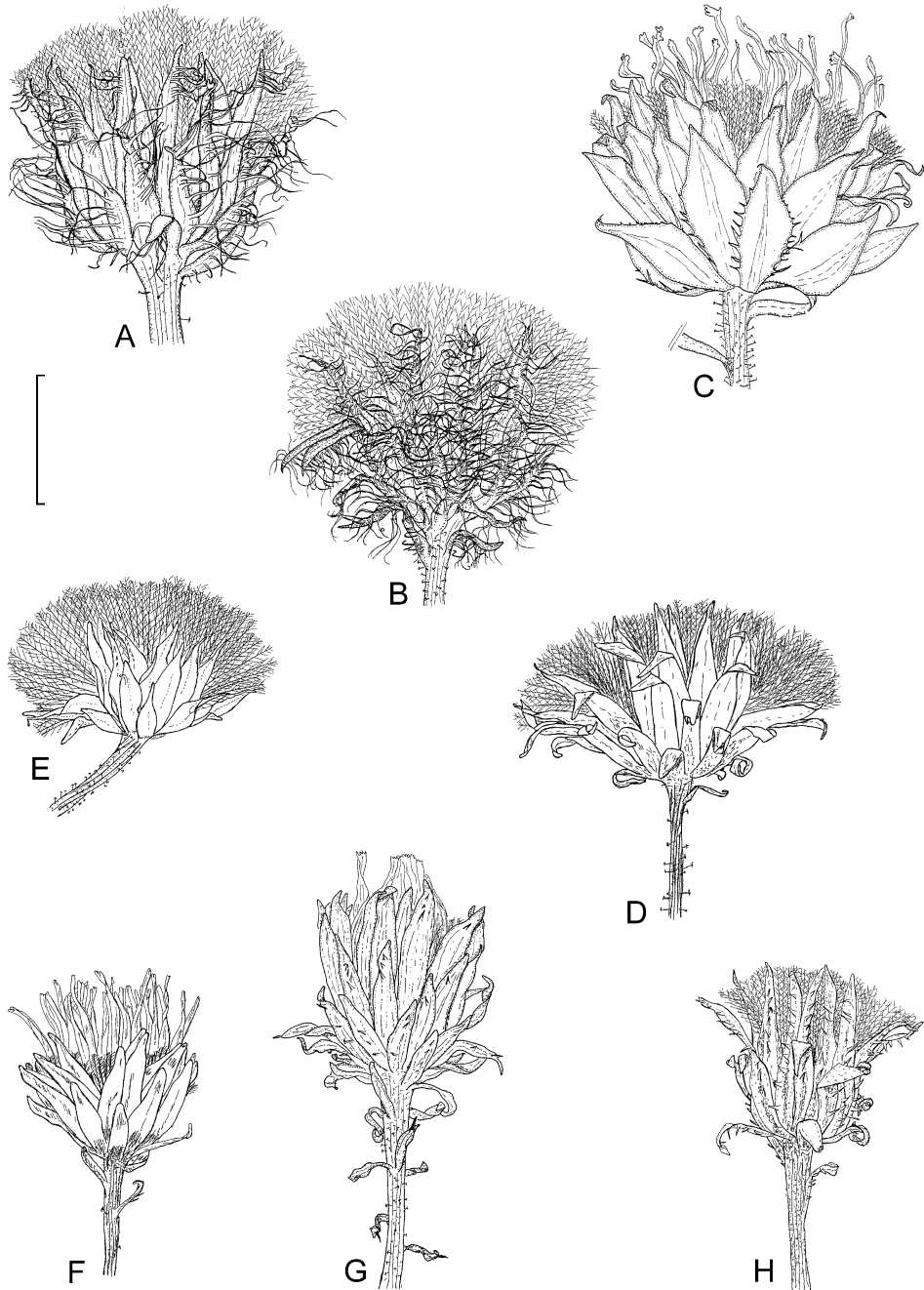


Figure 14. *Picris*. **A**, *P. barbarorum*, fruiting capitulum (C.W.E.Moore 7273, NSW). **B**, *P. evae*, fruiting capitulum (K.Penberthy, 9 Jan. 1986, NSW). **C**, *P. wagenitzii*, flowering capitulum (J.Drummond s.n., K). **D**, *P. compacta*, fruiting capitulum (F.M.Bennett s.n., PERTH). **E**, *P. drummondii*, fruiting capitulum (J.Drummond s.n., P). **F**, *P. eichleri*, flowering capitulum (J.H.Maiden, Dec. 1899, NSW). **G**, *P. squarrosa*, flowering capitulum (J.S.Womersley 369 & D.E.Symon, AD). **H**, *P. burbridgeae*, fruiting capitulum (L.Haegi 1483, AD). Scale bar: **A–H** = 10 mm. Drawn by S.Holzapel.

In the Mt. Kosciuszko area a stable population of smaller, scapose or almost scapose plants is found mainly on open alpine grassland, with specimens of the more typical larger, branched habit growing in Eucalypt woodland nearby. The former breed true in cultivation in regards to their habit (N.Walsh, pers. comm.). Specimens from Tas. are only tentatively placed in this subspecies as morphological differences to subsp. *angustifolia* are not as clear-cut there as on the mainland.

2. *Picris conyzoides* Lack & S.Holzapfel, *Willdenowia* 23: 185 (1993)

T: Kangaroo Point, near Brisbane, Qld, 12 Dec. 1934, *C.T.White* 10228; holo: NY; iso: BRI n.v., K.

Illustration: S.Holzapfel, *Willdenowia* 24: 173, fig. 20 (1994).

Annual, 60–150 cm high, with numerous short branches. Anchor hairs mainly 2-hooked. Peduncles 0.5–2 cm long; peduncular bracts few, clearly separate from involucre bracts. Capitula usually 30–200 or more, 6–7 mm long and 3–5 mm wide at anthesis, 7–9 mm long and 5–6 mm wide in fruit. Involucre of c. 20–26 bracts in 1–2 outer and 2 inner rows, with longest outer bracts not more than $\frac{1}{2}$ as long as inner bracts.; outer involucre bracts straight, appressed or slightly squarrose, narrowly lanceolate to linear, 2.0–5.0 mm long, 0.4–0.9 mm wide, not wider than inner bracts; margin glabrous; midrib with a simple line of straight, 0.4–1.2 mm long hairs. Achenes including cuspid c. 3.9–4.5 mm long; cuspid c. 0.5–0.9 mm long, c. $\frac{1}{8}$ – $\frac{1}{5}$ of total achene length. Figs 13G, 15C.

A rare or undercollected species, only known from within a 100 km radius around Brisbane, Qld, on roadsides, creek beds and other disturbed ground. From low altitude to above 500 m. Flowers and fruits at least Oct.–May.

Qld: 8 km S of Beaudesert, beside highway, *A.R.Bean* 17069 (BRI, MEL); Pinelands on Crows Nest Rd., 27 May 1963, *E.L.Gallagher* (BRI); *s. loc.*, *L.F.W.Leichhardt* (NSW 129009); Ma Ma Ck, c. 18 km due S of Helidon, *B.J.Lepschi* & *A.V.Slee* 1338 (CANB); Indooroopilly, 3 Nov. 1888, *J.H.Simmonds* (BRI).



3. *Picris squarrosa* Steetz in J.G.C.Lehmann, *Pl. Preiss.* 1: 488 (1844)

P. hieracioides var. *squarrosa* (Steetz) Benth., *Fl. Austral.* 3: 678 (1867). T: In Nova Hollandia (Swan River Colonia) in solo limoso districtus Vasse et Murray, W.A., *J.L.Preiss*; holo: MEL 67721; iso: MEL 67856, NSW 362470, P.

Illustrations: G.M.Cunningham *et al.*, *Pl. W. New South Wales*, 717 (1981), as *P. hieracioides* var. *hieracioides*; S.Holzapfel, *Willdenowia* 24: 191, 199, figs 29, 31 (1994).

Perennial, 20–120 cm high, sparingly to densely branched. Anchor hairs 2-hooked. Peduncles 1–15 (–20) cm long, peduncular bracts few to many, gradually transitioning into outer involucre bracts. Capitula few to > 70, 9–18 mm long and 5–9 mm wide at anthesis, (9–) 12–19 mm long and 6–10 mm wide in fruit. Involucre of 35–50 bracts in 3–4 outer and 2 inner rows, with longest outer bracts slightly, rarely clearly ($\frac{1}{2}$ – $\frac{1}{4}$) shorter than inner bracts; outer involucre bracts distinctively squarrose, recurved, linear to ovate or obovate, acute, (4.2–) 5.0–17.5 mm long, 1.3–2.1 mm wide, not wider than inner bracts; margin glabrous or rarely with few simple hairs; midrib glabrous or with a single line of straight hairs 0.2–0.8 (–1.3) mm long. Achenes including cuspid 5.0–8.0 mm long; cuspid 0.7–2.6 mm long, c. ($\frac{1}{7}$ –) $\frac{1}{5}$ – $\frac{1}{3}$ of total achene length. Plate 17; Figs 14G, 15L.

Occurs along rivers and possibly the coast of SW W.A., scattered in S.A., Vic. and N.S.W., and most frequent along the Murray R. and tributaries. Found on coastal sand dunes, inland on riverbanks and alluvial river flats, often in *Eucalyptus* woodland (*E. camaldulensis*, *E. largiflorens*), in naturally disturbed areas and tracksides; vulnerable to urbanisation. Mainly low altitudes (0–200 m), in the Grampians and at Suggan Buggan between 500–1000 m. Flowers and fruits mainly Oct.–Mar., some flowering outside this period (Aug.–May) in favourable conditions.

W.A.: Upper Warren R., 13 Dec. 1877, *F.Mueller* (MEL). S.A.: Glenelg sandhills, *T.H.Johnston* 6229 (ADW); Murray R., at Woolpunda pumping station, *D.E.Symon* 10573 (ADW, B, CANB). N.S.W.: Menindee, downstream from bridge across Darling R., on true LHS of river, *S.Holzapel* 005 (B, NSW). Vic.: Suggan Buggan, Sandy Ck, *A.C.Beauglehole* 36653 (CANB, MEL).



References to *P. squarrosa* outside the above distribution, some based on several more recent collections from W.A., are probably based on confusion with *P. angustifolia* subsp. *angustifolia* (*S.Holzapel*, *op. cit.*: 197). A specimen from W.A. (c. 7 km N of Australind, 1 km E of Bunbury Hwy and c. 600 m N of Marriot Rd, 1985, *A.Napier* 280 (PERTH)) could not be clearly identified and might belong to either *P. squarrosa* or *P. angustifolia* subsp. *angustifolia*.

Specimens from W.A. and coastal S.A. and Vic. are usually robust, with a leafy stem, large capitula and wide involucre bracts, whereas those from the river banks and floodplains of interior S.A., N.S.W. and Vic. are more slender, with fewer stem leaves, smaller capitula and narrow involucre bracts. Intermediate forms occur at both habitat types. Only three collections (including the type) are known from W.A., all from the 19th century.

4. *Picris compacta* *S.Holzapel in H.W.Lack & S.Holzapel, Willdenowia* 23: 185 (1993)

T: Crawley, W.A., Oct. 1941, *F.M.Bennett*; holo: PERTH 03452557.

Illustrations: H.W.Lack & S.Holzapel, *Willdenowia* 23: 187, fig. 2 (1993); *S.Holzapel, Willdenowia* 24: 169, fig. 18 (1994).

Annual (?), c. 90–120 cm high, branched. Anchor hairs mainly 2-hooked. Peduncles 1–5 cm long; peduncular bracts absent or few near capitulum, clearly separate from involucre bracts. Capitula few (–10), 12 mm long and 10 mm wide at anthesis, 12–14 mm long and 10–12 mm wide in fruit. Involucre of c. 40 bracts in 3 outer and 2 inner rows, with longest outer bracts as long and wide as inner bracts; outer involucre bracts straight, appressed to squarrose, with distinctly recurved tips, lanceolate, c. 4.0–11.5 mm long, 1.0–2.0 mm wide; margin and midrib glabrous. Achenes including cuspid c. 6.0–7.5 mm long; cuspid c. 1.7–2.1 mm long, c. 1/4 of total achene length. Figs 14D, 15J.

Known only from Claremont and Crawley, suburbs of Perth, W.A. Full distribution and habitat unknown. Flowers and fruits recorded Sept. & Oct., incompletely known.

W.A.: Claremont, *A.Morrison* (K).

Known from only the type and one other collection. Both specimens, although collected more than 40 years apart, show a remarkable similarity in all their characters. Presumed extinct.



5. *Picris wagenitzii* *Lack, Bot. Jahrb. Syst.* 108: 189 (1987)

T: Swan River, W.A., *Drummond s.n.*; holo: K.

Illustration: H.W.Lack, *op. cit.* 108: 188, Abb.1 (1987) [pappus attachment and achene apex incorrectly drawn].

Annual (to perennial?), 50 (–?) cm high, branched. Anchor hairs 2-hooked. Peduncles 1–10 cm long; peduncular bracts 0–5, near capitulum, clearly separate from, or gradually transitioning into, involucre bracts. Capitula c. 8–20, 14–15 mm long and 13–14 mm wide at anthesis, 14–22 mm long and 12–18 mm wide in fruit. Involucre of c. 50 bracts in 2–3 outer and 2 inner rows, with outermost bracts wider and longest outer bracts only slightly shorter than inner bracts; outer involucre bracts straight, appressed, broadly obovate, lanceolate to linear, 9.0–17.0 mm long, 3.0–5.0 mm wide; margin with conspicuous, simple hairs mainly near base; midrib glabrous or with single line hairs of c. 0.5 mm long. Achenes including cuspid c. 5.5–8.0 mm long; cuspid c. 1.5–3.0 mm long, c. 1/4–1/3 of total achene length. Figs 14C, 15A.

Collected from the Darling Ra., W.A. Full distribution and habitat unknown. Flowers and fruits recorded Oct.–Dec., incompletely known.

W.A.: Nov. Holl. austr. occ., *Drummond* 316 (P p.p.); Swan R., 1826–1827, *C.Fraser N.H.G.* 146 (K p.p.); Darlington, Darling Ra., 26 Dec. 1899, *A.Morrison* (K); Vallies of Darlings Range, near farms, Nov. 1877, [*F.Mueller*] (MEL 67870).

Known from only 5 collections, all made before 1900, thus presumably extinct. The reference to *P. wagenitzii* from Porongurup Ra., W.A. (S.D.Hopper *et al.*, *W Australia's Endangered Fl.* 137 (1990)) could not be verified and might be based on confusion with *P. angustifolia* subsp. *angustifolia* which occurs in the same area.



6. *Picris drummondii* S.Holzapel in H.W.Lack & S.Holzapel, *Willdenowia* 23: 187 (1993)

T: Swan River [Colony], W.A., *Drummond* s.n.; holo: K.

Illustration: S.Holzapel, *Willdenowia* 24: 177, fig. 22 (1994).

Annual to perennial, 17–120 cm high, usually branched. Anchor hairs mainly 2-hooked. Peduncles 1–7 cm long; peduncular bracts 0–2, clearly separate from involucre bracts. Capitula 1 to > 30, c. 8–14 mm long and 6–10 mm wide at anthesis, c. 9–16 mm long and 6–15 mm wide in fruit. Involucre of c. 22–42 bracts in 2–3 outer and 2 inner rows, with outermost bracts wider and longest outer bracts only slightly narrower and shorter than inner bracts; outer involucre bracts straight, appressed, lanceolate or broadly lanceolate to broadly obovate-acute, 4.0–15.0 mm long, 1.5–3.0 mm wide; margin glabrous; midrib glabrous or with single line of hairs 0.5–0.8 mm long. Achenes including cuspis c. 7.0–7.8 mm long, cuspis c. 1.1–2.6 mm long, c. $\frac{1}{5}$ – $\frac{1}{3}$ of total achene length. Figs 14E, 15K.

Recorded from near the mouth of the Oldfield R., W of Esperance W.A., and in central S.A., on loamy, clay or skeletal soil. The locality of the type collection, labelled “Swan River”, refers to the Swan River Colony, which at the time encompassed the whole of SW W.A. and is unlikely to refer to the actual Swan R. on the W coast. Flowers and fruits recorded Sept.–May, incompletely known.

W.A.: Swan R., *Drummond* 216 (4th Coll.) (CGE, K p.p., P) Oldfield R. near the inlet, [? *F.Mueller*] (MEL 67857). S.A.: 9 km SE of Wimbrinna Dam, Stuart Creek Stn, *F.J.Badman* 3804 (AD, B); L. Torrens, 26 km ENE of Andamooka Stn HS, *F.J.Badman* 3892 (AD, B).

Previously assumed restricted to W.A. and extinct, more recent collections from Wimbrinna and Lake Torrens areas have been identified as *P. drummondii*, indicating a wider distribution and extant and possibly undercollected populations for the species. Despite the disjunct distribution, specimens from S.A. are remarkably similar to those from W.A. in characters of the involucre and achenes.



7. *Picris burbridgeae* S.Holzapel in H.W.Lack & S.Holzapel, *Willdenowia* 23: 183 (1993), as *burbridgei*

T: Kunghur, c. 12 miles [c. 20 km] SSW of Murwillumbah, N.S.W., 30 Nov. 1965, *E.F.Constable* 6579; holo: NSW 100977.

Illustrations: H.W.Lack & S.Holzapel, *Willdenowia* 23: 184, fig. 1 (1993); S.Holzapel, *Willdenowia* 24: 164, fig. 16 (1994); A.Brandon *et al.*, *Threatened plants of Waikato Conservancy* [N.Z.] 56 (2004).

Annual (to perennial?), 50–120 cm high, branched. Anchor hairs mainly 2-hooked. Peduncles 1–6 cm long; peduncular bracts 0–3 near capitulum, clearly separate from involucre bracts. Capitula few to > 30, 9–12 mm long and 5–6 mm wide at anthesis, 9–13 mm long and 5–6 (–7) mm wide in fruit. Involucre of 28–40 bracts in 3–4 outer and 2 inner rows, with longest outer bracts slightly (< $\frac{1}{4}$) shorter than inner bracts; outer involucre bracts squarrose and recurved to almost appressed and straight, obovate-acute to lanceolate, 3.5–9.5 mm long,

0.6–1.4 (–1.5) mm wide, not wider than inner bracts; margin glabrous; midrib with a single line of straight, 0.3–0.6 (–1.5) mm long, often dark hairs. Achenes including cuspid 4.0–5.2 mm long; cuspid 0.4–0.9 mm long, c. $\frac{1}{8}$ – $\frac{1}{6}$ of total achene length. Figs 14H, 15D.

Occurs in SE and probably Cape York Penin., Qld, and coastal areas and the NE of N.S.W. Also Norfolk Is., New Zealand and Hawaii. Coastal areas and offshore islands, rainforest, wet and dry sclerophyll forest and mountain grassland, 200 to > 1000 m altitude. Associated mainly with native vegetation, also on road-sides through native forest habitat. Red soil, pale brown clay or clayey soil; over basalt or shale. Flowers and fruits mainly Sept.–Jan., flowering outside this period (Aug.–May) in favourable conditions.



Qld: Tamborine Mtn, c. 45 miles [c. 72 km] S of Brisbane, *C.E.Hubbard* 2507 (BRI); Malanda, roadsides in town area, Sept. 1954, *J.Mann* (BRI). N.S.W.: Nerrigundah–Belowra road, 16 Sept. 1953, *E.F.Constable* (K, NSW); 1.6 km SE of Manning Hill Rd turnoff on Koolonock Rd, Wang Wauk State Forest, 31 km WSW of Forster, *B.J.Lepschi* 4015 & *J.R.Connors* (AD, B, BRI, K, MEL, NSW, P); margins of southern end of Bega Swamp, c. 17 km E of Nimmitabel, 17 Feb. 2001, *J.Miles* (MEL).

References to *P. hieracioides* in Norfolk Is. (*P.Green, Fl. Australia* 49: 369) and *P. squarrosa* in New Zealand (*N.S.Lander in N.G.Marchant et al., Fl. Perth Region* 2: 696 (1987)) are both based on collections of *P. burbidgeae*. Two disjunct populations in the south and the north of eastern Australia extend the distribution of the species from a fairly confined area in NE N.S.W. and SE Qld. A specimen collected from the southern limit, with smaller capitula and 2–3 lines of hairs on the midrib of the outer involucre bracts has been tentatively included here (17 Feb. 2001, *Miles* (MEL)) and is similar to some specimens from New Zealand.

8. *Picris eichleri* Lack & S.Holzapel, *Willdenowia* 23: 188 (1993)

T: Ben Lomond, N.S.W., Dec. 1899, *J.H.Maiden*; holo: NSW 128990 *p.p.* (specimen with basal leaves): iso: NSW 128990 *p.p.* (specimen without basal leaves).

Illustrations: H.W.Lack & S.Holzapel, *Willdenowia* 23: 189, fig. 3 (1993); S.Holzapel, *Willdenowia* 24: 181, fig. 24 (1994).

Annual (to perennial?), 40–140 cm high, branched. Anchor hairs mainly 2-hooked. Peduncles 1.5–11 cm long; peduncular bracts 1–3 near capitulum, clearly separate from involucre bracts. Capitula few to 20 or more, (9–) 10–11 (–12) mm long and 6–8 mm wide at anthesis, (9–) 10–11 (–12) mm long and (6–) 7–9 (–11) mm wide in fruit. Involucre of 28–36 bracts in 2 (–3) outer and 2 inner rows, with some outer bracts as wide as or wider and longest outer bracts only slightly shorter than inner bracts; outer involucre bracts straight, slightly squarrose, narrowly lanceolate to ovate, 3.0–9.4 mm long, 0.8–2.0 mm wide, acute; margin and midrib glabrous. Achenes including cuspid 3.9–5.0 mm long; cuspid 0.3–0.5 (–0.7) mm long, c. $\frac{1}{16}$ – $\frac{1}{14}$ – $\frac{1}{6}$ of total achene length. Figs 14F, 15B.

Occurs in N.S.W. in the New England Ra. and its western spurs (Mt Kaputar, Mt Lindsay, Warrumbungles); an old record from Sydney is not included in the distribution due to doubts about the correctness of the locality. At altitudes mainly above 500 m to more than 1000 m; in gullies on basaltic soil, railway line enclosures; full habitat incompletely known. Flowers and fruits recorded Nov.–May (Aug.), full period incompletely known.



N.S.W.: Green Camp, Mount Kaputar Natl Park, *R.Coveny* 8723 & *S.K.Ray* (K, NSW); alongside Burrows Ck, near boundary fence for 'Taroona', *J.R.Hoskins* 1200 (CANB, MEL, NE, NSW, TARCH); S of Woodsreef mine, *J.R.Hoskins* 1362 (CANB, MEL, NE, NSW, TARCH); Breadknife, Warrumbungles, 24 May 1959, *K.Ingram* (NSW); Sydney, *Verreaux* 39 (P).

A rare or undercollected species.

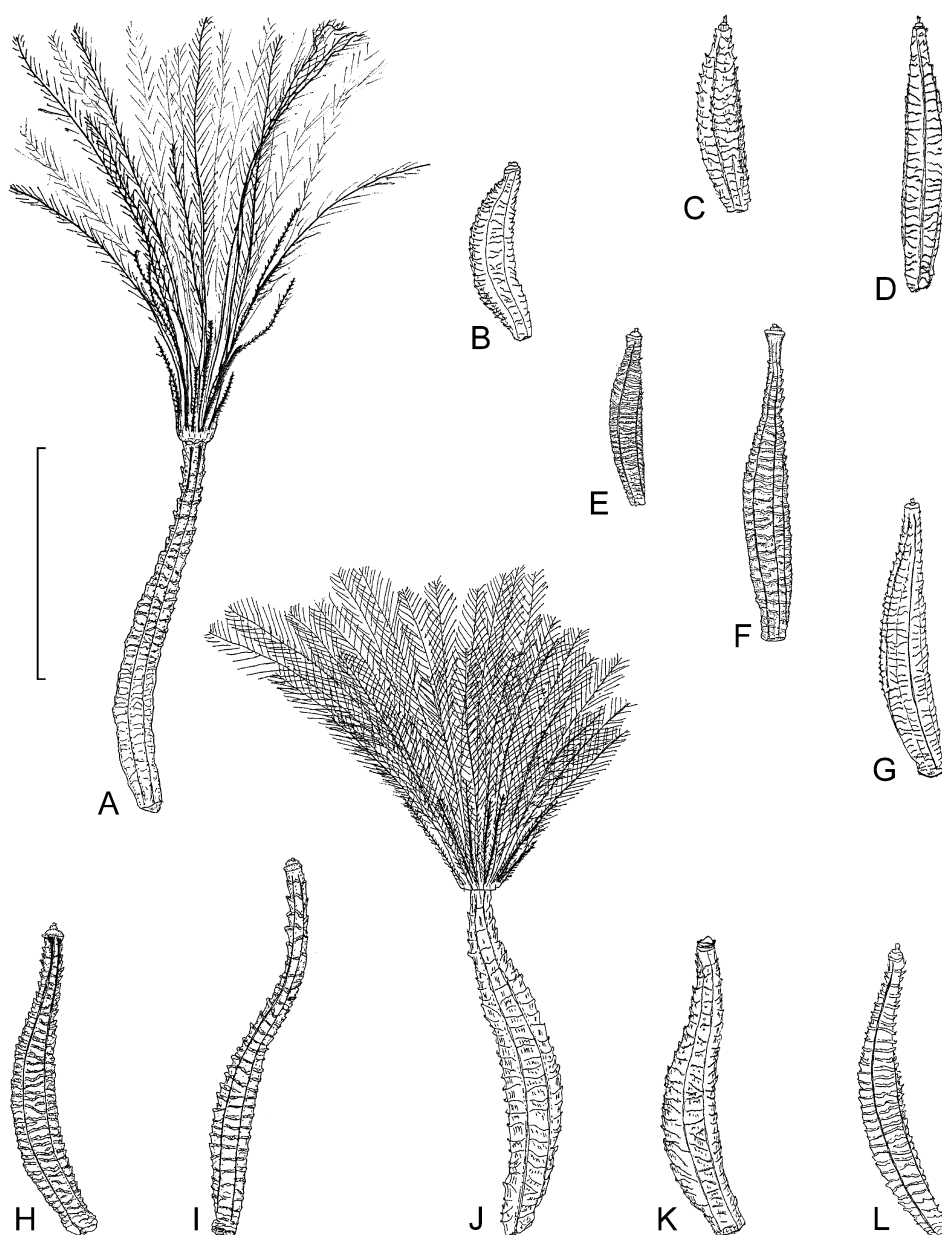


Figure 15. *Picris* achenes. **A**, *P. wagenitzii*, immature achene, with pappus (F.Mueller, MEL). **B**, *P. eichleri* (J.H.Maiden, Dec. 1899, NSW). **C**, *P. conyzoides* (C.T.White 10228, NY). **D**, *P. burbridgeae* (L.Haegi 1483, AD). **E**, *P. angustifolia* subsp. *carolorum-henricorum* (R.G.Coveny 12829 *et al.*, MEL). **F**, *P. angustifolia* subsp. *angustifolia* (S.Holzapel 019, NSW). **G**, *P. angustifolia* subsp. *merxmuelleri* (R.D.Hoogland 8471, CANB). **H**, *P. barbarorum* (C.W.E.Moore 7273, NSW). **I**, *P. evae* (K.Penberthy, 9 Jan. 1986, NSW). **J**, *P. compacta*, achene with pappus (F.M.Bennett *s.n.*, PERTH). **K**, *P. drummondii* (J.Drummond *s.n.*, P). **L**, *P. squarrosa* (J.S.Womersley 369 & D.E.Symon, AD). Scale bar: 5 mm. Drawn by S.Holzapel.

9. *Picris evae* Lack, *Phytologia* 43: 210 (1979)

T: c. 1 km S of Oakey on main road to Toowoomba, Qld, 27 Nov. 1975, *T.Stanley & J.Clarkson* 66; holo: B; iso: BRI AQ270020 *n.v.*

Illustrations: H.W.Lack, *op. cit.*: 214, fig. 2; G.J.Harden (ed.), *Fl. New South Wales* 3: 334 (1992); S.Holzapfel, *Willdenowia* 24: 184, fig. 26 (1994).

Annual (to perennial?), 40–130 cm high, branched. Anchor hairs mainly 2-hooked. Peduncles 2–6 cm long; peduncular bracts 1–5, clearly separate from involucre. Capitula few to > 30, 11–12 mm long and 8–10 mm wide at anthesis, 12–15 mm long and 10–12 mm wide in fruit. Involucre of c. 32–40 bracts in 2–3 outer and 2 inner rows, with longest outer bracts slightly to clearly (c. $\frac{1}{2}$) shorter than inner bracts; outer involucre bracts straight, appressed or slightly squarrose, lanceolate to linear, 3.3–10.0 mm long, 0.6–1.0 mm wide, not wider than inner bracts; margin glabrous; midrib with 2 or more lines of conspicuous, slender, curled hairs 3.8–5.0 mm long; hairs covering entire involucre. Achenes including cuspid (5.8–) 6.9–7.7 mm long; cuspid (2.5–) 3.5–3.8 mm long, c. $\frac{1}{2}$ of total achene length. Figs 14B, 15 I.

Occurs at lower altitudes of the Great Dividing Ra. in SE Qld, and near Inverell, N.S.W. Open *Eucalyptus* forest and grassland, roadsides and paddocks. On black, dark grey or red/brown soil, reddish clay loam or medium clay soil, at 200–500 m alt., rarely to 1000 m. Flowers and fruits mainly Oct.–Jan., a few specimens collected in flower/fruit to May.



Qld: Warwick, Dec. 1875, *F.M.Bailey* (BRI *p.p.*); 1.2 km from Clifton–Pratten road on road to Leyburn, c. 15 km E of Leyburn, *D.Halford Q7226 & G.N.Batianoff* (BRI, MEL, NSW); West Haldon, *L.Pedley 1151* (BRI, CANB, K); Southbrook, *L.Pedley 3585* (BRI, K, NSW). N.S.W.: Elsmore, 16 km E of Inverell, 9 Jan. 1986, *K.Penberthy* (NSW).

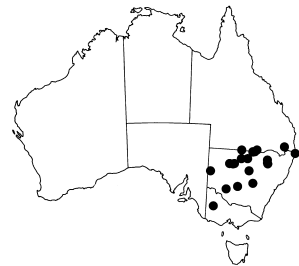
Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

10. *Picris barbarorum* Lindl., *Edwards' Bot. Reg.* 24: 58 (1838)

T: Interior of New Holland, N.S.W., 28 Apr. [1836], [*J.M.Richardson*] 114; lecto: CGE, *fide* S.Holzapfel, *Willdenowia* 24: 158 (1994).

Annual, 5–60 cm high, branched. Anchor hairs mainly 2-hooked. Peduncles 1–4 cm long; peduncular bracts 0–2 close to capitulum, clearly separate from involucre. Capitula few to > 20, 8–12 mm long and 5–8 mm wide at anthesis, 10–15 mm long and 7–10 mm wide in fruit. Involucre of c. 28–38 bracts in 2–3 outer and 2 inner rows, with longest outer bracts slightly to clearly shorter than inner bracts; outer involucre bracts straight, appressed, ovate to lanceolate, 2.3–10.2 mm long, 0.8–2.3 mm wide, not wider than inner bracts; margin glabrous; midrib with a single line of 3.5–7 mm long, conspicuous, slender, curled hairs. Achenes including cuspid c. 4.3–7.6 mm long; cuspid c. 0.9–2.3 mm long, c. $\frac{1}{5}$ – $\frac{1}{3}$ of total achene length. Figs 14A, 15H.

Occurs near Clifton, Qld, in N.S.W. along the watercourses and floodplains of the Darling, Lachlan, Murrumbidgee Rivers and their tributaries, near Broken Hill and at the Brunswick R., and in Vic. near Dimboola. On riverbanks and floodplains on alluvial soil, often among floodplain eucalypts, at low altitudes (0–200 m), rarely to 500 m. Flowers and fruits at least July–Nov., a few specimens collected in flower/fruit to April.



Qld: Clifton, Darling Downs District, *C.T.White 12667* (BRI, GH); Brunswick R., 1866, *coll. unknown* (NSW 128441). N.S.W.: Broken Hill, 9 Sept. 1921, *A.Morris* (AD); 32 km S of Louth on Louth–Tilpa road, E of Darling R., *C.W.E.Moore 7273* (CANB, NSW). Vic.: near Dimboola, 9 Nov. 1889, *J.Reader 11* [?], (MEL *p.p.*).

Probably used as an occasional food plant by aboriginal people of the Murray region (Mitchell, *Three Exped. Australia* 2: 148, 341 (1838)), though confused by some authors with the more frequently eaten *Microseris lanceolata* (*scapigera*) (J.H.Maiden, *Agric. Gaz.*

New South Wales 10: 618 (1899), as *P. hieracioides*; B.Gott, *Archaeology in Oceania* 17: 67 (1982); B.Gott in D.B.Foreman & N.G.Walsh (eds), *Fl. Victoria* 1: 208 (1993), as *P. squarrosa*). The species has not been collected since 1900 from the general type locality (Lachlan and Murrumbidgee Rivers), with recent collections only from the Darling River and its tributaries. Rare or possibly undercollected.

22. SCORZONERA

I.R.Thompson

Scorzonera L., *Sp. Pl.* 2: 790 (1753); possibly from the French *scorzon* (viper), alluding to its supposed value against snakebite, or from the Italian *scorza* (bark, skin) and *nera* (black), alluding to the black epidermis of the root of *S. hispanica*.

Type: *S. humilis* L.

Podospermum DC. in J.B.A.P.de M.de Lamarck & A.P.de Candolle, *Fl. Franç.* 3rd edn, 4: 61 (1805). T: *P. laciniatum* (L.) DC.

Annual, biennial or perennial herbs, branching or not. Hairs simple, eglandular. Leaves mostly basal. Inflorescences solitary, cymose or (not in Australia) paniculate. Capitula pedunculate; involucre bracts multiseriate, soft and reflexed at maturity. Florets: ligule yellow (in Australia), violet, or purple. Achenes homomorphic, hardly compressed, not beaked. Pappus of bristles, persistent; bristles plumose, uniform within pappus.

A genus of c. 175 species from Europe, Asia and N Africa; one species naturalised in Australia.

S.J.Lipschitz, *Fragmenta Monographiae Generis Scorzonera* vol. 2 (1939).

**Scorzonera laciniata* L., *Sp. Pl.* 2: 791 (1753)

Podospermum laciniatum (L.) DC. in J.B.A.P.de M.de Lamarck & A.P.de Candolle, *Fl. Franç.* 3rd edn, 4: 62 (1805). T: 'Habitat in Germania, Gallia', *Herb. Linn. No. 947.8*; lecto: LINN, *fide* S.A.Alavi in S.M.H.Jafri & A.A.El-Gadi (ed.), *Fl. Libya* 107: 363 (1983).

Biennials to c. 40 cm high, with large taproot. Indumentum appressed-woolly, glabrescent or nearly glabrous. Basal leaves many, ±persistent, to c. 18 cm long, with l:w ratio 4–40, undivided or more commonly deeply pinnatisect, with entire margin; divided leaves with 1–several segments per side, variously shaped, weakly sheathing at base; cauline leaves 1–several, similar to basal leaves but smaller, with base not clasping stem. Capitula solitary or few; involucre 8–15 mm long, subsequently elongating to 12–35 mm long, c. 2–7 mm diam.; bracts glabrous or variably appressed-woolly; outer bracts 4–8, 3–8 mm long, with or without subapical spur; intermediate bracts extending over halfway at anthesis; inner bracts alternately long with broad margin and short with narrow margin. Florets: ligule 8–12 mm long; style hairs pale. Achenes 8–15 mm long, glabrous; basal portion elliptic, c. 3–5 mm long, with pale prominent ribs, darker between ribs; apical portion narrower than basal portion, narrowly obloid, c. 6–10 mm long, not tapered apically, pale purplish. Pappus 8–20 mm long, cream. *Scorzonera*.

Native to Europe and Asia; there are 2 varieties in Australia. A feature of this species is the massive taproot.

Segments of leaves or distal 4 cm of undivided leaves with l:w ratio mostly > 10; involucre 8–12 mm long at onset of anthesis elongating to up to 27 mm long at maturity; outer bracts usually unsprurred

a. var. *laciniata*

Segments of leaves or distal 4 cm of undivided leaves with l:w ratio mostly < 10; involucre 10–15 mm long at onset of anthesis elongating to up to 35 mm long at maturity; outer bracts with a subapical spur

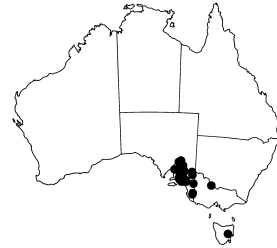
b. var. *calcitrapifolia*

a. *Scorzonera laciniata L. var. **laciniata**

Rachis of leaf less than twice as broad in distal quarter as at midleaf, 1–4 mm wide; lateral segments with l:w ratio mostly > 10. Involucre 8–12 mm long at onset of anthesis, elongating to up to 27 mm long at maturity; bracts glabrous or sparsely appressed-woolly at anthesis, unspurred or spur to 0.8 mm long. Achenes 8–12 mm long. Pappus c. 8–14 mm long.

Native to Europe and western Asia. Naturalised in SE S.A., with isolated records from western Vic., and around Tunbridge, SE Tas. Grows in disturbed or semi-intact native vegetation in heavy soils in grassland and woodland. Flowers spring–summer.

S.A.: Environs of Loxton, *C.R.Alcock* 6170 (AD); Flinders Ras, Walloway, c. 10 km N of Orroroo, *C.R.Alcock* 8394 (AD, CANB, MEL). Vic.: Benjeroop State Forest, *A.C.Beauglehole* 83169 (MEL). Tas.: White Lagoon, *L.Gilfedder* 5 (HO).

**b. *Scorzonera laciniata** var. **calcitrapifolia** (Vahl) Bisch. ex Boiss., *Fl. Orient.* 3: 757 (1875)

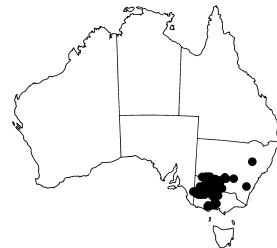
S. calcitrapifolia Vahl, *Symb. Bot.* 2: 87 (1791). T: ‘Legi passim in regno Tunetano’; *n.v.*

Podospermum resedifolium DC. in J.B.A.P.de M.de Lamarck & A.P.de Candolle, *Fl. Franç.* 3rd edn, 4: 61 (1805). T: *n.v.*, *fide* P.E.Boissier, *loc. cit.*

Rachis of leaves commonly at least twice as broad in distal quarter as at midleaf, 2–15 mm wide; lateral segments with a l:w ratio < 10. Involucre 10–15 mm long at onset of anthesis, elongating to up to 35 mm long at maturity; bracts glabrous or sparsely to densely appressed-woolly at anthesis, with outer and usually intermediate involucre bracts bearing a subapical spur to c. 2 mm long. Achenes 10–15 mm long. Pappus c. 12–20 mm long.

Native to Europe and Asia. Naturalised in SE S.A., NW and central Vic. and southern N.S.W., with an outlying collection from the Liverpool plains in central-eastern N.S.W. Grows in disturbed or near-intact sites, in loam or clay soils in grassland or woodland. Flowers spring.

S.A.: Wolseley, *R.J.Bates* 25997 (AD). N.S.W.: alongside road between Premier and Colly Blue, Liverpool Plains, *J.R.Hosking* 1929 (CANB, MEL, NSW); Barham, 13 Oct. 1949, *J.W.Vickery* (NSW). Vic.: Cocklin Ave, Red Cliffs, *J.H.Browne* 937 (MEL); Eynesbury Estate, about 8 km S from Melton P.O., *V.Stajsic* 605 (MEL).



Distinguished from the typical variety by its broader leaf segments, longer capitula and fruit, and the presence of a subapical spur on the involucre bracts.

23. TRAGOPOGON

I.R.Thompson

Tragopogon L., *Sp. Pl.* 2: 789 (1753); from the Greek tragos (billy-goat) and pogon (beard), alluding to the appearance of the pappus.

Type: *T. pratense* L.

Annual, biennial or perennial herbs, branching or not. Hairs simple, eglandular or lacking. Leaves basal and cauline. Inflorescences solitary. Capitula pedunculate; involucre bracts uniseriate, soft and reflexed at maturity. Florets: ligule yellow or purple. Achenes homomorphic or slightly dimorphic, not compressed, beaked. Pappus of bristles, persistent, usually homomorphic (dimorphic in *T. hybridus*); bristles plumose or rarely scabridulous, sometimes slightly dimorphic within pappus.

A genus of c. 50 species from temperate Europe, Asia and Africa; 3 species naturalised in Australia.

Distinctive features of this genus include the linear, entire, sheathing leaves with parallel venation and the solitary capitula lacking outer and intermediate involucre bracts borne on long distally dilated peduncles. The pappus is biseriate and the inner series typically comprises longer bristles that are distally non-plumose.

- 1 Capitula glabrous; ligules pinkish or purplish
- 2 Biennials to 1.3 m high, not or sparingly branched; ligules as long as bracts or nearly so; pappus of all achenes with numerous plumose bristles **1. *T. porrifolius***
- 2: Annuals to 0.5 m high, typically branching; ligules much shorter than bracts; pappus of marginal achenes comprising 5 unequal rigid non-plumose bristles; pappus of central achenes with more numerous plumose bristles **2. *T. hybridus***
- 1: Capitula or base of capitula woolly, sometimes somewhat transiently; ligules yellow
- 3 Mature involucre > 20 mm long, with wool developed only at very base; ligules much shorter than bracts; achenes > 20 mm long, with beak \pm as long as body **3. *T. dubius***
- 3: Mature involucre < 20 mm long, woolly; ligules longer than bracts; achenes < 20 mm long, with beak shorter than body **†*T. brevirostris***

†*Tragopogon brevirostris* subsp. *longifolius* (Heldr. & Sart. ex Boiss.) I. Richardson has been collected once in Australia, from a roadside near Adelaide in S.A. (*R. Bates 52318*, AD, MEL). There is currently no indication that it has become naturalised. The capitula and achenes of this taxon are considerably smaller than in the 3 naturalised taxa.

1. **Tragopogon porrifolius* L., *Sp. Pl.* 2: 789 (1753), as *porrifolium*

subsp. *porrifolius*

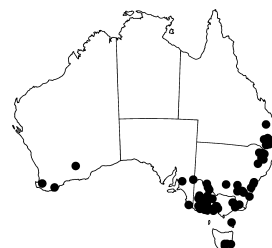
T: Europe, *Herb. Burser XV*(2): 69, *central plant*; lecto: UPS, *fide* C.D. de la Guardia & G. Blanca, *Taxon* 41: 549 (1992).

Illustrations: J.P. Jessop & H.R. Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1658, fig. 759a (1986); N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 4: 711, fig. 136f (1999); B.M.J. Hussey *et al.*, *Western Weeds* 2nd edn 109 (2007).

Biennials to c. 1.3 m high, not or sparsely branched, glabrous, sometimes glaucous. Leaves linear with parallel venation, entire, sheathing at base. Capitula: involucre 25–35 mm long, increasing to up to 60 mm long at maturity, c. 5–12 mm diam.; bracts 5–8, with hyaline margin vestigial or proximally distinct in alternate bracts, finally reflexed. Florets: ligule as long as or slightly shorter than bracts, lilac to deep violet; style hairs pale. Achenes 20–40 mm long, homomorphic except for rib ornamentation; body fusiform, 10–15 mm long, light to mid brown, with crowded scale-like tubercles on ribs, with tubercle size reducing to nearly smooth inwards, with transition into beak fairly abrupt; beak slightly longer than body, with sub-terminal dilation 1–2 mm long. Pappus homomorphic, 15–25 mm long, cream to golden-brown, with numerous plumose bristles. *Salsify*, *Oyster Plant*.

Native to the Mediterranean. Naturalised in SW W.A., in eastern mainland Australia from SE Qld through N.S.W. to Vic. and W to SE S.A., and in Tas. Grows in sandy-loam soils in disturbed environments, particularly roadsides. Flowers spring–summer.

W.A.: c. 40 km NE of Albany on Chester Pass Rd, *B.J. Lepschi & T.R. Lally 2322* (AD, CANB, PERTH). S.A.: Mt Lofty Ra., Angaston, c. 70 km NE of Adelaide, *H. Amtsberg 5* (AD). Qld: Warwick, *G.N. Batianoff 2010349* & *C. Appelman* (BRI, CANB, NSW). N.S.W.: Moss Vale–Unanderra rly crossing, Sheepwash Bridge Rd, c. 10 km due E of Moss Vale, *P.G. Kodala 217* & *S.L. Kodala* (CANB, MEL, NSW). A.C.T.: Mt Ainslie, near Fisher St, *B. Hain 119* (CANB). Vic.: 0.8 km NE of Laverton, c. 20 km WSW of Melbourne, *H.I. Aston 845* (MEL). Tas.: Tasman Hwy at ‘Ardross’, *A.M. Buchanan 15647* (HO).



The non-plumose tips of the longer pappus bristles are usually purplish unlike in the other species in Australia. The beak of the achenes is dilated in the distal few millimetres then abruptly constricted below a hairy pappus ring. This beak morphology is also present in *T. dubius* except that the dilated portion is shorter. Flowers of these two species apparently open only in the morning. Other subspecies of *T. porrifolius* from Europe differ in being lanate or puberulent, having relatively shorter ligules, and achenes more gradually tapering to form the beak. The receptacular pits of *T. porrifolius* and *T. dubius* are thickened and raised.

2. **Tragopogon hybridus* L., *Sp. Pl.* 2: 789 (1753), as *hybridum*

T: Italy, *Herb. Linn. No. 945.1*; lecto: LINN, *fide* C.Díaz de la Guardia & G.Blanca, *Lazaroa* 9: 38 (1988 [1986]).

Annuals to c. 0.8 m high, branched, glabrous, not glaucous. Leaves linear with parallel venation, entire, sheathing at base. Capitula: involucre c. 30 mm long, increasing to c. 50 mm long at maturity, 3–5 mm diam.; bracts 5–8, with hyaline margin vestigial or very slender, not becoming hardened, finally reflexed. Florets: ligule less than half length of bracts, pinkish lilac; style hairs pale. Achenes slightly dimorphic; marginal achenes 35–50 mm long; body narrowly cylindrical, 25–40 mm long, light brown, smooth except for minutely scabridulous ribs, with transition into beak very gradual; beak shorter than body, not dilated sub-terminally; central achenes with body slightly shorter. Pappus 10–20 mm long, cream, dimorphic; pappus of marginal achenes with 5 rigid scabrid bristles of unequal length; pappus of central achenes with numerous plumose bristles.

Native to southern Europe. Naturalised in the Mt Lofty Ra. NE of Adelaide, S.A. Ecological preferences unknown. Flowers spring–summer.

S.A.: P.Smyth's property, Salter Springs, 6 Jan. 1987, *J.Hannay* (AD); N approach to Wasley, Northern Lofty, 17 Nov. 1994, *D.McQuinn s.n.* (AD).

Has been recorded from two different localities in the Northern Lofty Ra. and has probably become naturalised. It is readily distinguished post-anthesis by the pappus of its marginal achenes. It is typically more branched than *T. porrifolius* and *T. dubius*.



3. **Tragopogon dubius* Scop., *Fl. Carniol.* 2nd edn, 2: 95 (1772)

T: 'Habitat circa Tergestum, et Schenoschetz' [central Europe]; *n.v.*

Annuals or biennials to c. 0.8 m high, sparsely branched, transiently woolly on newer growth, not glaucous. Leaves linear with parallel venation, entire, sheathing at base. Capitula with region of caducous wool at very base, with minute stubble persisting; involucre c. 25–35 mm long, increasing to up to 60 mm long at maturity, c. 6–12 mm diam.; bracts mostly 8–12, with hyaline margin vestigial or proximally distinct in alternate bracts, not becoming hardened, finally reflexed. Florets: ligule c. half as long as bracts, yellow; style hairs pale. Achenes 25–35 mm long, homomorphic except for rib ornamentation; body fusiform, 10–15 mm long, light to mid brown, with coarse tubercles on ribs, with tubercle size reducing inwards, with transition into beak gradual; beak \pm as long as body, with sub-terminal dilation 0.5–1 mm long. Pappus 25–35 mm long, cream, or grey-cream, homomorphic. Plate 18.

Naturalised predominantly in SE N.S.W. including the A.C.T., with isolated records from NE N.S.W. and eastern Vic. near Orbost. Grows in loam or clay soils in disturbed sites such as roadsides. Flowers spring–summer.

N.S.W.: North Cooma, Mar. 1963, *M.Gray s.n.* (AD, CANB); Warri Bridge Res., Shoalhaven R., c. 12.5 km NNW of Braidwood, *B.J.Lepschi* 928 (AD, CANB, MEL, NSW). A.C.T.: grounds of Australian Natl Herbarium, CSIRO Black Mtn Site, *B.J.Lepschi* 3940 (AD, CANB). Vic.: Orbost region, Delegate R., 12 Jan. 1987, *D.Allan* (CANB, MEL).



Although the distinctive wool at the base of the capitulum tends to be lost after anthesis, inspection using magnification usually reveals a persistent stubble of hair bases.

ASTERACEAE

Trib. 2. ARCTOTIDEAE

A. Ghafoor

Cymbonotus by A.R.Bean

Asteraceae trib. *Arctotideae* Cass., *J. Phys. Chim. Hist. Nat.* 88: 159 (1819)

Type: *Arctotis* L.

Annual or perennial herbs, rarely subshrubs or (not in Australia) small trees; stems with or without latex. Leaves often rosulate, or cauline and alternate, entire or often lobed to pinnatisect, unarmed, spinulose or spiny. Capitula radiate and heterogamous; involucre bracts free to connate, blunt to acute, with tips foliose, scarious or spiny. Ray florets female, sterile or neuter, usually 3- or 4-lobed, variously coloured but often yellow. Disc florets usually bisexual (rarely functionally male), 5-lobed, usually yellow, sometimes black. Achenes usually \pm obovoid, rarely more elongate, often ribbed, glabrous to villous. Pappus of scales, rarely bristles or absent.

A tribe of 17 genera and around 215 species, mostly distributed in the Old World, especially Southern Africa; represented in Australia by 6 genera and 11 species, all introduced except the native genus *Cymbonotus*.

V.A.Funk, R.Chan & S.C.Keeley, Insights into the evolution of the tribe Arctoteae (Compositae: subfamily Cichorioideae s.s.) using trnL, ndhF, and ITS, *Taxon* 53: 637–655 (2004); R.J.McKenzie *et al.*, Morphology of cypselae in subtribe Arctotidinae (Compositae-Arctotideae) and its taxonomic implications, *Ann. Missouri Bot. Gard.* 92(4): 569–594 (2005); P.O.Karis, *X. Tribe Arctotideae* Cass. (1819), in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 200–207 (2007); A.M.Mahony & R.J.McKenzie, Notes on Two southern African *Arctotis* species (Arctotideae: Asteraceae) growing in California, *Madrono* 55(3): 244–247 (2008); P.O.Karis *et al.*, *Arctotideae*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 385–410 (2009); R.J.McKenzie *et al.*, Revision of *Arctotis* sect. *Anomalae* (Asteraceae; Arctotideae), including the description of a new species from Northern Cape Province, South Africa, *S. African J. Bot.* 77: 45–54 (2011).

KEY TO GENERA

- 1 Involucre bracts free, often obtuse, innermost often apically scarious; ray florets female, rarely neuter, with 3-lobed, mostly 4-nerved ligules; disc floret lobe margins not sclerified
- 2 Ray florets neuter **1. ARCTOTHECA**
- 2: Ray florets female, fertile
- 3 Capitula > 1 cm across; achenes with 1–2-seriate pappus of large or small scales **2. ARCTOTIS**
- 3: Capitula to 1 cm across; achenes without a pappus **3. CYMBONOTUS**
- 1: Involucre bracts conspicuously united in lower part, acute, occasionally spine-tipped; ray florets when present (absent in *Berkheya rigida*) with (2–) 4 or 5-lobed ligules; disc floret lobe margins sclerified
- 4 Leaves and/or involucre bracts spinose or spinulose; apical anther appendages with entire margins **5. BERKHEYA**
- 4: Neither leaves nor involucre bracts spinose or spinulose; apical anther appendages with \pm fringed margins
- 5 Achenes enclosed by lignified involucre bracts; seeds germinating from within old capitula; pappus scales uniseriate, broad, inconspicuous, unequal **4. GORTERIA**
- 5: Achenes not enclosed; involucre bracts not lignified; seeds not germinating within old capitula; pappus scales biseriate, lanceolate to subulate-aristate, subequal **6. GAZANIA**

ASTERACEAE

1. ARCTOTHECA

A. Ghaffoor

Arctotheca Vaill., *Königl. Akad. Wiss. Paris Anat. Abh.* 5: 604 (1754); from the Greek *arctos* (bear) and *theca* (box), an allusion to the shaggy achenes.

Type: *A. repens* J.C.Wendl.

Cryptostemma R.Br. in W.T.Aiton, *Hort. Kew.* 2nd edn, 5: 141 (1813). T: not designated.

Perennial or occasionally annual, trailing or erect herbs. Leaves in basal rosettes and cauline, alternate, petiolate, entire, toothed or mostly lyrate-pinnatifid to bipinnatisect. Capitula solitary, axillary, radiate, broadly campanulate, long-pedunculate; involucre 3–5-seriate, hemispherical; bracts free, imbricate, scarious-margined; outermost row shorter, narrowed to linear appendages; inner bracts oblong with obtuse membranous apices; receptacle flat or slightly convex, alveolate; pit margins \pm fimbriate; paleae absent. Ray florets uniseriate, neuter; ligules 3-lobed, yellow or pale, sometimes basally darker. Disc florets bisexual, fertile; corolla campanulate, deeply 5-lobed; lobes often with an abaxial, thick, deltoid, \pm blackish projection at apex; anthers basally sagittate, with an ovate apical appendage; style branches very short, obtuse, glabrous. Achenes oblong-obovoid, dorsally thin-ribbed, densely to sparsely silky hairy or glabrous. Pappus scales uniseriate, minute, rarely absent.

A genus of c. 4 species, distributed in S. Africa and Mozambique; 3 species naturalised in Australia.

- 1 Leaves broadly ovate to oblate, entire or shallowly toothed, white- or grey-hairy on both sides

1. *A. populifolia*

- 1: Leaves oblanceolate, lyrate-pinnatisect with irregularly toothed lobes, becoming glabrous above, white-hairy beneath

- 2 Perennial, prostrate, rooting at nodes; disc florets yellow; achenes \pm hairy; pappus absent

2. *A. prostrata*

- 2: Annual; disc florets dark purplish distally; achenes with pinkish brown-woolly hairs; pappus of 4–8 scales

3. *A. calendula*

1. **Arctotheca populifolia* (P.J.Bergius) Norl., *Aquilo, Ser. Bot.* 6: 84 (1967)

Arctotis populifolia P.J.Bergius, *Desc. Pl. Cap.* 323 (1767). T: Described from a plant cultivated in Leiden Botanic Gardens, Holland, *J.H.Burmester s.n.*; ?holo: STB.

Osteospermum niveum L.f., *Suppl. Pl.* 386 (1782); *Cryptostemma niveum* (L.f.) G.Nicholson, *Ill. Dict. Gard.* 1: 404 (1885); *Arctotheca nivea* (L.f.) K.Lewin, *Repert. Spec. Nov. Regni Veg. Beih.* 11: 50 (1922). T: Cape of Good Hope, *Thunberg; n.v.*

Illustrations: G.J.Harden (ed.), *Fl. New South Wales* 3: 317 (1992); E.Ripley & B.Rowland, *Pl. Perth Coast & Is* 97 (1995); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 718, fig. 138d (1999).

Perennial, mat-forming, rhizomatous herb, 20–30 cm high. Leaves slightly succulent, long-petiolate, mostly cauline, broadly ovate to oblate, 2–6 cm long, 1.5–5 cm wide, entire or shallowly toothed, subacute, grey- to white-hairy on both surfaces. Capitula 2–3 cm diam.; peduncles erect, stout, 3–11 cm long; involucre hemispherical or campanulate, 3–4-seriate, 1.5–2 cm diam.; bracts broadly lanceolate, acute; inner ones membranous-margined. Ray florets 12–15; ligules 5–12 mm long, yellow. Disc florets numerous, 3–4 mm long, yellow; lobes c. 1 mm long. Achenes oblong, 3–5 mm long, 1.5–2.5 mm wide, sparsely white-woolly. Pappus scales 6–8, \pm obtuse. *Beach Pumpkin, Beach Daisy, Dune Arctotheca, Coast Capeweed.* Fig. 16A, B.

A native of S. Africa; naturalised in W.A., S.A., Vic., N.S.W. and Tas.; on sandy coastal dunes constituting part of pioneer vegetation, often with *Spinifex sericeus* on beaches, and also commonly growing in moist and dry sites near creeks and paddocks. Flowers and fruits Dec.–Apr.



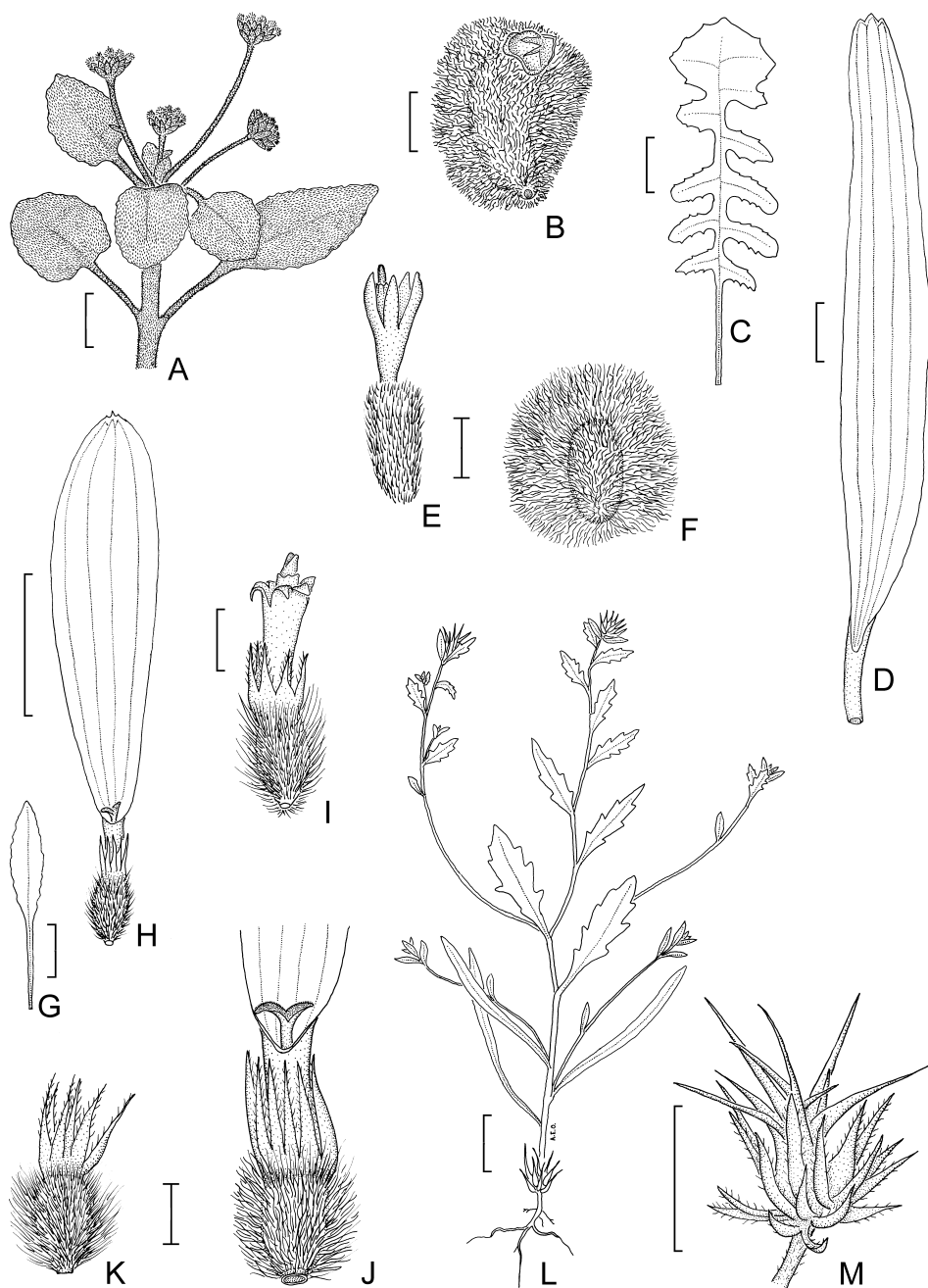


Figure 16. *A, B, Arctotheca populifolia*. *A*, habit; *B*, achene (*A, B*, B.Barnsley 581, CANB). *C–F, A. calendula*. *C*, leaf; *D*, ray floret; *E*, disc floret; *F*, achene (*C–F*, B.J.Lepschi 2141, CANB). *G–K, Arctotis stoechadifolia*. *G*, leaf; *H*, ray floret; *I*, disc floret; *J*, detail of base of ray floret; *K*, young achene (*G–K*, Stockton s.n., CANB479642). *L, M, Gorteria personata*. *L*, habit, showing remains of old capitulum from which seed has germinated; *M*, mature capitulum (*L*, G.J.Keighery & N.Gibson 4610, CANB; *M*, J.Dodd 374, CANB). Scale bars: *A, C, G, L*, = 2 cm; *B, D–F, I–K* = 2 mm; *H, M* = 1 cm. Drawn by A.E.Orchard.

W.A.: Peaceful Bay, *S.Paust* 375 (PERTH). S.A.: Rivoli Bay, 2.5 km E of outlet of Lake George Drain, *P.C.Heyligers* 86025 (CANB). N.S.W.: Nelson Bay, 26 Jan. 1963, *A.W.Scott s.n.* (NE). Vic.: Mallacoota, W side of river mouth, below Bastion Point, *A.C.Cochrane* 808 & *N.Klazenga* (MEL). Tas.: Planter Beach, near South Chain Lagoon, *A.M.Buchanan* 11105 (HO).

2. **Arctotheca prostrata* (Salisb.) Britten, *J. Bot.* 54: 61 (1916)

Arctotis prostrata Salisb., *Prodr. Stirp. Chap. Allerton* 210 (1796). T: Sponte nascentem in Promontoria Cap, Legit Franc Mason; n.v.

Arctotheca repens J.C.Wendl., *Hort. Herrenhus.* 8, t. 6 (1798). T: not designated.

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 715, fig. 138b (1999).

Prostrate, perennial herb, 10–15 cm tall, with shoots rooting at nodes. Leaves in dense basal rosette, and tufted at nodes, oblanceolate, 5–20 cm long, 2–5 cm wide, pinnatisect, with 2–7 pairs of irregularly toothed lobes, sparsely hairy to becoming glabrous above, densely white-hairy beneath. Capitula solitary, terminal, 2.5–4 cm diam.; peduncles erect, 5–30 cm long, glandular-hairy; involucre hemispherical, 4–5-seriate, 1–1.5 cm across; outermost bracts ovate, with patent, awl-shaped apices; inner ones broadly lanceolate, 5–10 mm long, with scarious, black or purple edges. Ray florets 15–20; ligule 12–20 mm long, dorsally yellow, ventrally green or brownish. Disc florets yellow. Achenes c. 2 mm long, ±hairy, mostly 5-ribbed, furrowed/wrinkled. Pappus absent. *Creeping Bears-ear*.

Native to southern Africa; naturalised in Vic. in disturbed grasslands, near creeks as well as dry sites in the paddock, in heavy cracking clay soil associated with *Bursaria spinosa*, *Cynara cardunculus*, *Themeda*, *Poa* and *Calocephalus* spp. Flowers Aug.–Nov.

Vic.: Rushwood Drive Res., Craigieburn, behind factory, *B.J.Bainbridge* 23 (MEL); L. Goldsmith, S of Beaufort, *F.Dwindby* 259 (MEL); Craigieburn Grasslands Reserve (N Paddock), 4 Oct. 2004, *R.Hartland s.n.* (MEL2269731); Craigieburn, 12 Oct. 1946, *A.E.Petty s.n.* (MEL2101266); Waterfolds Park, Templestowe, 8 Oct. 1980, *T.Witham s.n.* (MEL).



3. **Arctotheca calendula* (L.) Levyns, *J. S. African Bot.* 8: 284 (1942)

Arctotis calendula L., *Sp. Pl.* 2: 922 (1753); *Arctotis calendulacea* L., *Syst. Nat.* 12th edn, 2: 578 (1767), *orth. var.*; *Cryptostemma calendulacea* (L.) R.Br. in W.T.Aiton, *Hort. Kew* 2nd edn, 5: 141 (1813), *orth. var.*; *Cryptostemma calendula* (L.) Druce, *Rep. Bot. Exch. Club. Soc. Brit. Isles* 3: 416 (1913); *Arctotheca calendulacea* (L.) K.Lewin, *Repert. Spec. Nov. Regni Veg. Beih.* 11: 49 (1922), *orth. var.* T: 'Aethiopia', *Herb. Linn* 1036.7; lecto: LINN, *fide* D.O.Wijnands, *Bot. Commelins* 66 (1983).

Arctotis tristis L., *Sp. Pl.* 2: 922 (1753); *Cryptostemma triste* (L.) Domin, *Věstn. Král. České Společn. Nauk., Tř. Mat.-Přir.* 2: 124 (1923). T: 'Habitat in Aethiopia'; not designated.

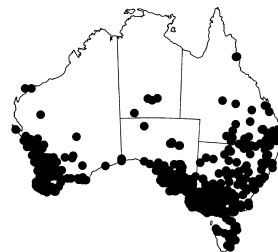
Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1625, fig. 740A (1986); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 579, fig. 82A (1986); E.Rippey & B.Rowland, *Pl. Perth Coast & Is* 95 (1995).

Annual, usually stemless or occasionally with shoots to 30 cm tall, brownish purple, ±fleshy, striate, glabrous. Leaves basal, oblanceolate to narrowly obovate, 5–25 (–30) cm long, (1–) 2–6 (–10) cm wide, lyrate-pinnatifid to bipinnatisect, with broadly ovate, obtuse, dentate terminal lobe and 3–5 pairs of linear-oblong or lanceolate to ovate, entire to dentate lateral lobes, green and scabrid above, silvery with white cobwebby hairs beneath; petioles to 10 (–12) cm long. Capitula solitary, 2.5–4 (–5) cm diam.; peduncles erect, 10–25 cm long, striate, shortly hairy; involucre ±hemispherical, multiseriate, 1–1.5 cm diam.; bracts imbricate; outermost bracts reflexed, narrowly ovate, with subulate, ciliate apices; inner bracts oblong, narrowly black or purple-margined, obtuse. Ray florets 14–18 (–20); ligules oblong, 1.5–2.5 cm long, 3-lobed, pale to lemon-yellow above, purplish-veined beneath. Disc florets yellowish proximally, dark purplish distally. Achenes oblong-obovoid, 2–2.5 mm long, dark brown, enveloped in copious pinkish brown woolly hairs. Pappus scales 4–8, uniseriate, delicate, c. 1 mm long, acute. *Cape Weed*, *African Marigold*. Fig. 16C–F.

Native to southern Africa; naturalised in all states and territories of Australia, including Norfolk Is., as well as many other countries. Occurs on roadsides, unused ground, playing

fields, lawns, street verges, coastal and other consolidated sands, skeletal and loamy soils and pastures. Flowers & fruits Aug.–Dec.

W.A.: Marchagee Nat. Res., Midlands Hwy, S of Coorow, *F.Obbens* 212/99 (PERTH). N.T.: Simpsons Gap HS, *P.Latz* 8098 (DNA). S.A.: Braendler's Property, SE corner of Monarto South, *A.G.Spooner* 6180 (AD, MEL). Qld: Nanango Rd, Yarraman, Aug. 1992, *N.Reeve s.n.* (BRI). N.S.W.: Tamworth, Oxley Park, *J.R.Hosking* 57 (NE, NSW). A.C.T.: Dryandra St, near jctn with Wattle St, *R.W.Purdie* 6826 (CANB). Vic.: Grampians, Frans Ck in Halls Gap, *D.E.Symon* 1864 (AD, NE). Tas.: South Rd, S of Mengha, *M.Baker* 1056 & *M.Duretto* (HO).



This species is reported to have poisoned cattle and sheep in Australia and New Zealand. Its toxicity is probably due to high nitrate content (*I.Popey et al., Illust. Guide Common Weeds New Zealand*, 3rd edn, 46–47 (2010)).

Hybrid

Arctotheca calendula × *A. populifolia*

Perennial (?) prostrate to suberect or decumbent herb, to 40 cm diam. Leaves similar to those of *A. calendula* in shape and indumentum. Capitula black-centred with yellow rays but shaped like *A. populifolia*. Achenes of intermediate dimensions with completely free pappus scales, intermediate pubescence and an indistinct coma.

Sympatric populations of *A. calendula* and *A. populifolia* are common on foreshore dunes facing the ocean in coastal areas of W.A. and N.S.W. and hybridise cryptically. The following specimens are representative.

W.A.: Beach opposite Penguin Is., Safety Bay, 50 km S of Perth, *G.J.Keighery* 11530 (PERTH); Port Beach, North Fremantle, *K.J.Knight* 249 (PERTH); Busselton, *G.J.Keighery* 12893 (PERTH); Capel Beach, *R.D.Royce* 3367 (PERTH). N.S.W.: Great Lakes, Tuncurry, *P.C.Heyligers* 99040 (CANB).

2. ARCTOTIS

A. Ghaffoor

Arctotis L., *Sp. Pl.* 2: 922 (1753); *Gen. Pl.* 5th edn, 394 (1754); from the Greek *arctos* (bear) and *otos* (ear), an allusion to the shaggy winged achenes.

Type: *A. angustifolia* L.

Annual or perennial, white-tomentose herbs or shrublets. Leaves in basal rosettes or cauline and alternate, petiolate or sessile, spatulate to oblanceolate, entire to pinnatisect, abaxially tomentose to sparsely arachnoid. Capitula solitary, radiate, axillary or terminal, pedunculate; involucre ±hemispherical, multiserial; bracts free, unequal; receptacle flat, alveolate; paleae absent. Ray florets uniseriate, female, fertile; ligules 3-lobed, yellow, orange, brick-red, cream, white, pink, purple, violet or blue. Disc florets bisexual, fertile, rarely inner ones female and sterile; corolla tubular, deeply 5-lobed; lobes occasionally with an abaxial, thick, deltoid, usually vividly, ±blackish projection at apex; anthers basally obtuse to sagittate, with ovate apical appendage; style branches 2, smooth or papillose. Achenes oblong-obovoid, to ±obconical, ventrally smooth or rugose and ribless, glabrous or hairy and dorsally 3–5-ribbed or winged, rarely with 2 furrows when mature, often tufted-hairy at base. Pappus scales biseriate, scarious.

A genus of c. 60 species, distributed in S. Africa, Namibia and Angola; 1 species naturalised in Australia.

****Arctotis stoechadifolia*** P.J.Bergius, *Descr. Pl. Cap.* 324 (1767)

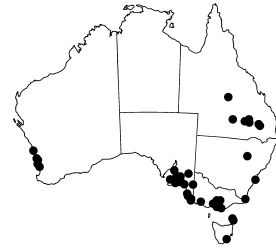
T: Cape Province, S. Africa, n.d., *M.Grubb s.n.*; holo: STB (sheet 4.3.6.57).

Arctotis grandis Thunb., *Arctotis* 4, 8 (1799). T: not designated.

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1625, fig. 740B (1986); E.Ripley & B.Rowland, *Pl. Perth Coast & Is* 99 (1995); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 715, fig. 138a (1999).

Perennial, diffusely branched, arachnose or pannose herbs 30–75 cm tall, with trailing or decumbent to upright, robust shoots. Leaves obovate, or oblong-obovate, 5–10 (–15) cm long, 1–3 (–5) cm wide, densely to sparsely silvery-hairy, entire or toothed to lyrate-pinnatifid, with terminal lobe ovate, obtuse, and lateral lobes ±alternate, oblong; petioles long, ±woolly; upper cauline leaves sessile. Capitula 4–6 (–7) cm diam.; peduncles (6–) 10–15 (–20) cm long, erect, woolly; involucre bracts brownish or purplish-brown, scarious-margined; outer bracts linear-lanceolate, with whitish tomentose, linear appendages; inner bracts oblong-obovate, with 4–6 mm long obtuse appendages. Ray florets 20–30; ligule 2–3 cm long, whitish-creamy to yellow, reddish below. Disc florets dark purple. Achenes broadly obconical, 2.5–3.5 (–4) mm long, 3-ridged on inner face, brown, densely white- to yellowish-hairy. Pappus scales oblong, 4–6 mm long. *White Arctotis*, *Silver Arctotis*. Fig. 16G–K.

Native to S. Africa; a garden escape naturalised in all States but not N.T. and A.C.T. A weed of roadsides and waste places especially in sandy flats near beaches. It is considered a useful coastal erosion control plant in addition to its ornamental value. Flowers and fruits Aug.–Feb.



W.A.: Shaw St, Guilderton, *G.J. & B.J.Keighery* 824 (CANB, MEL, PERTH).
S.A.: Between Outer Harbour and Largs Bay, *D.J.E.Whibly* 8479 (AD, HO).
Vic.: Barwon Heads-Ocean Grove Spit, SW tip of spit beside Barwon Heads-Ocean Grove Road, 12 Dec. 1994, *G.Stockton s.n.* (CANB, MEL).
Tas.: South Arm, 6 Dec. 1952, *W.M.Curtis s.n.* (HO).

The Australian Plant Census and some workers (e.g. R.J.Spencer, *Hort. Fl. Southeastern Australia* 3: 366 (2002)) have suggested that the *Arctotis* species naturalised in Australia may be *A. venusta* Norl., rather than *A. stoechadifolia*. None of the Australian material that the present author has examined is *A. venusta* which is morphologically distinct from *A. stoechadifolia* in being an erect, bush-forming, tap-rooted annual plant with capitula having white shiny ligules with a bright yellow spot at the base and a mauve centre. *Arctotheca stoechadifolia* is a mat-forming perennial that produces long adventitiously-rooting prostrate stems and its capitula have a black centre and creamy to light yellow ligules marked with red or maroon underneath. The two species can further be discriminated on the basis of their leaves which are silvery white-felted in *A. stoechadifolia* but leathery and thinly and laxly short-hairy in *A. venusta*.

R.P.Randall (*The introduced flora of Australia and its weed status* p. 49 (2007)) also records the presence of *A. venusta* as a weed in Australia. He also reports the following *Arctotis* taxa as introduced without indicating their weedy nature and status: *A. aspera* L., *A. auriculata* Jacq., *A. decurrens* Jacq., *A. fastuosa* Jacq. and *A. gumbletonii* Hook.f.

Excluded Name

Arctotis argentea Thunb., *Arctotis* 4, 7 (1799)

T: not designated.

Recorded from Vic. by A.J.Ewart, *Vict. Naturalist* 24: 192 (1908), as a species “not yet sufficiently established to be considered naturalised”.

3. CYMBONOTUS

A.R.Bean

Cymbonotus Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 35: 397 (1825); from Greek *kymbe*, *kymbos* (boat, cup) and *notos* (back), alluding to the convex back of the achenes.

Type: *C. lawsonianus* Gaudich.

Annual herbs, with short stems, glandular-hairy except on achenes. Leaves all basal, entire, toothed to deeply pinnatisect, flat, narrowly tapering at base; indumentum of felted cottony hairs mixed with longer spreading hairs, or nearly glabrous. Capitula broadly campanulate; involucre bracts free, 2–3-seriate, herbaceous throughout or with scarious margins, cottony-hairy and glandular; receptacle slightly convex, pitted, with scarious scales. Corollas yellow, sometimes purplish. Ray florets uiseriate, female, fertile; ligule 3-lobed, 4-veined. Disc florets bisexual, fertile; corolla tubular or campanulate, glandular, deeply 5-lobed; anthers sagittate at base, not tailed, with apical appendage ovate; style minutely pubescent about a slight swelling $\frac{1}{3}$ below apex; style branch apices rounded in ray florets, obtuse in disc florets, smooth. Achenes asymmetrically oblong to obovoid, ridged, ribbed or grooved on adaxial side, glabrous or minutely pubescent. Pappus absent.

An Australian endemic genus of 3 species, in all States and Territories except the N.T.

A.E.Holland & V.A.Funk, A Revision of *Cymbonotus* (Compositae: Arctotideae: Arctotidinae), *Telopea* 11: 266–275 (2006); V.A.Funk, R.Chan & A.E.Holland, *Cymbonotus* (Compositae: Arctotideae, Arctotidinae): an endemic Australian genus embedded in a southern African clade, *Bot. J. Linn. Soc.* 153: 1–8 (2007).

- 1 Lower surface of leaves green or greenish grey, sparsely to moderately cottony-hairy; achenes 4.5–5.9 mm long; outer involucre bracts not expanded and not spreading at apex

1. *C. maidenii*

- 1: Abaxial surface of leaves white or grey, densely hairy with matted cottony hairs; achenes 2–4 mm long; outer involucre bracts expanded and spreading at apex

- 2 Achenes strongly curved, smooth or tuberculate

2. *C. lawsonianus*

- 2: Achenes straight or slightly curved, transversely wrinkled

3. *C. preissianus*

1. *Cymbonotus maidenii* (Beauverd) A.E.Holland & V.A.Funk, *Telopea* 11: 268 (2006)

Arctotis maidenii Beauverd, *Bull. Soc. Bot. Genève* ser. 2, 7: 47 (1915). T: Nulty-Toorale, N.S.W., Sept. 1913, *J.H.Maiden s.n.*; lecto: G, *fide* A.E.Holland & V.A.Funk, *loc. cit.*

C. sp. I, T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 579 (1986).

C. sp. A, L.Murray in G.J.Harden (ed.), *Fl. New South Wales* 3: 319 (1992).

C. sp. (Mitchell R.W.Johnson 2237), R.J.F.Henderson, *Names Distrib. Queensland Pls, Algae Lichens* 28 (2002).

Illustrations: G.Beauverd, *op. cit.* 48, fig. V, as *A. maidenii*; T.D.Stanley & E.M.Ross (eds), *op. cit.* 578, fig. 81F, as *C. sp. I*; A.E.Holland & V.A.Funk, *op. cit.* 267, fig. 1.

Herbs 10–40 cm high. Leaves ascending, lanceolate, 10–40 cm long, 3–9 cm wide, pinnatisect; adaxial surface dark green, sparsely hairy, becoming glabrous; abaxial surface green or greenish grey, sparsely to moderately cottony-hairy. Capitula 15–30 mm diam.; peduncle 2–30 cm long; involucre bracts cottony-hairy and glandular on outer face, with or without a scarious margin to 2 mm wide. Ray florets 15–20; ligule elliptic, 15–28 mm long, 3–6 mm wide, yellow, glandular. Disc florets 30–85; corolla dilated distally from narrow base, 4–5 mm long, yellow, glandular; style branches 0.5–1 mm long. Achenes obovoid, 4.5–5.9 mm long, 2.4–2.8 mm wide, straight or slightly curved, with corolla insertion slightly eccentric, \pm smooth or slightly rugose, brown to nearly black.



Occurs in inland SE Qld and northern N.S.W., on black, brown, or grey heavy cracking clay, usually in open grassland, along roadsides or beside waterholes or watercourses. Flowers throughout the year, probably in response to rain, but most commonly in spring.

Qld: 7 miles [11 km] W of Roma, *S.L.Everist 3518* (BRI, CANB); c. 12 km SE of Dalby, 21 Dec. 1973, *W.Bott s.n.* (BRI). N.S.W.: 12 km from Louth on Wanaaring road, *C.W.Moore 9011* (CANB); Jew's Lagoon, 50 miles [80 km] W of Narrabri, Aug. 1936, *W.F.Blakely s.n.* (NSW).

This species has large attractive flowers. It has been recommended for listing as Endangered under the schedules of the Queensland Nature Conservation Act 1992.

2. *Cymbonotus lawsonianus* Gaudich., *Voy. Uranie* 462, t. 186 (1829)

Arctotis lawsoniana (Gaudich.) Beauverd, *Bull. Soc. Bot. Genève* ser. 2, 7: 50 (1915). T: Port Jackson, Bathurst, N.S.W., *C.Gaudichaud 166*; holotype: G.

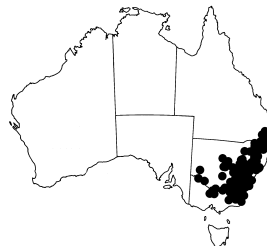
Arctotis australiensis Beauverd, *Bull. Soc. Bot. Genève* ser. 2, 7: 44 (1915). T: Dubbo, N.S.W., Aug. 1903, *J.L.Boorman*; lecto: G, *fide* A.E.Holland & V.A.Funk, *Telopea* 11: 270 (2006).

Illustrations: G.Beauverd, *op. cit.*, 45, fig. IV, as *A. australiensis*; N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 718, fig. 138E (1999).

Herbs to 30 cm high. Leaves ascending or prostrate, ovate, lanceolate or elliptic, 2–25 cm long, 2–9 cm wide, entire or shallowly or coarsely toothed; adaxial surface dark green, sparsely hairy with short coarse hairs or nearly glabrous; abaxial surface densely covered with white matted hairs. Capitula 10–20 mm diam.; peduncle 0–9 cm long; involucre bracts with dense cottony hairs on outer face, often obscuring glands; outer bracts spreading. Ray florets 10–20; ligule linear to oblanceolate, 4–11 mm long, 0.7–1.3 mm wide, yellow. Disc florets 10–30; corolla dilated distal to narrow base, 2–3.5 mm long, yellow, glandular; style branches c. 0.3 mm long. Achenes obovoid, 2.0–2.8 mm long, 1.1–1.5 mm wide, strongly curved, with corolla insertion eccentric, smooth or tuberculate, brown to black.

Occurs from SE Qld to northern Vic. It grows in a range of situations on roadsides, in open forest and woodlands, and in disturbed areas often near water, sometimes also in lawns and gardens. Soils are variable. Flowers throughout the year, probably in response to rain.

Qld: 6 km from Mt Colliery towards Gambubal S.F., E of Warwick, *A.R.Bean 14803* (BRI). N.S.W.: Monga, Sept. 1898, *W.Bauerlen* (NSW); Killarney Gap, Mount Kaputar Natl Park, 35 km from Narrabri towards Bingara, *J.M.Dalby 86/128* (BRI, NSW). Vic.: Kamarooka State Park, *A.C.Beauglehole 69612* (MEL).



Tasmanian records of this species are probably referable to *C. preissianus*.

3. *Cymbonotus preissianus* Steetz in J.G.C.Lehmann, *Pl. Preiss.* 1: 486 (1845)

T: Swan River Colony, W.A., *J.A.L.Priess 13*; lecto: MEL, *fide* A.E.Holland & V.A.Funk, *Telopea* 11: 273 (2006).

Illustrations: G.J.Harden (ed.) *Fl. New South Wales* 3: 318 (1992); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 718, fig. 138f (1999).

Herbs to 30 cm high. Leaves erect or spreading, ovate, lanceolate or elliptic, 2–30 cm long, 2–10 cm wide, coarsely toothed or pinnatisect; adaxial surface dark green, sparsely hairy with short coarse hairs or nearly glabrous; abaxial surface densely covered with white matted hairs. Capitula 12–30 mm diam.; peduncle 0–15 cm long; involucre bracts with dense cottony hairs on outer face, often obscuring glands; outer bracts spreading. Ray florets 10–20; ligule linear to oblanceolate, 6–20 mm long, 1–4 mm wide; corolla lobes 0.2–1 mm long, yellow. Disc florets 10–40; corolla dilated above a narrow base, 2–4 mm long, yellow, glandular; style branches c. 3 mm long. Achenes obovoid, 2.5–4.0 mm long, 1.0–1.4 mm wide, straight or slightly curved, with corolla insertion slightly eccentric, transversely wrinkled throughout, brown to black. Plate 20.



Occurs in the southern half of N.S.W., throughout Vic., in southern S.A., in Tas. and in SW W.A. It grows in a range of open forest and woodland habitats, in disturbed areas, often in drainage lines. Flowers Aug.–Feb.

W.A.: Borden area, 25 Aug. 1966, *F.A.Spratt* (PERTH). S.A.: Mt Bonython, 2 Sept. 1964, *M.E.Phillips* (CANB). N.S.W.: 1 km NNE of Mt Ulandra, *I.Crawford* 6575 (CANB). Vic.: Mouth of Aire R., 4.5 miles [7.2 km] NW of Cape Otway, 13 Sept. 1969, *J.H.Willis* (MEL). Tas.: Deal Is., *J.S.Whinray* 1264 (CANB).

Very similar to *C. lawsonianus*, differing mainly by the more or less straight, transversely wrinkled achenes.

4. GORTERIA

A. Ghafoor

Gorteria L., *Syst. Nat. ed. 10*, 2: 1229 (1759); named in honour of the Dutch physicists and botanists Johannes de Gorter (1689–1762) and his son David de Gorter (1717–83).

Type: *G. personata* L.

Annual or perennial, erect or prostrate herbs with coarse, rigid, basally multicellular hairs on stems and leaves. Leaves cauline, alternate, sessile, narrowly oblong, entire or ±dentate to pinnatifid. Capitula radiate, solitary, terminal or in leaf-axils; involucre ±urceolate, multiseriata; bracts united, becoming hardened to envelope achenes after anthesis; receptacle flat, alveolate; paleae absent. Ray florets uniseriate, male; ligule yellow or reddish, rarely with basal blotch and a blackish dorsal stripe or streak. Disc florets bisexual, outer ones functionally female, inner ones functionally male with sterile ovaries; limb lobes with sclerified margins and large or small, spinuliform hairs; apical anther appendages ±fringed on margins. Achenes obovate, sericeous at apices; seeds germinating while still in old capitula. Pappus scales uniseriate, minute, inconspicuous, hidden among achene hairs.

A genus of 3 species from S. Africa and Namibia, one of which is naturalised in W.A.

**Gorteria personata* L., *Syst. Nat. ed. 10*, 2: 1229 (1759)

T: 'Habitat ad Cap. B. Spei', *Herb. Linn. 1027.1*; lecto: LINN, *fide* H.Roessler, *Mitt. Bot. Staatssamml. München* 3: 321 (1959).

G. calendulacea DC., *Prodr.* 6: 501 (1838). T: 'in cap. Bonae-Spei ad Leeuweberg legit cl. Drege!'; holo: ?TUB005885.

Erect, perennial, much-branched herb, 10–50 cm tall, with rigid, short white hairs on pale green, terete stems. Tap root slender with many fibrous lateral roots. Leaves pinnatipartite, oblong, 6–8 cm long, 1–1.5 (–1.8) cm wide, cuneate at base, with acute lobes, dark green above, pale green beneath, stiffly hairy on both surfaces. Capitula small, terminal, 1.2–2 cm diam.; involucre 3–4-seriate, somewhat copular; bracts thick, apically sharply acute, stiffly hairy, fused and hardening to form woody burr in fruit. Ray florets 8–10; ligule oblong, 5–10 mm long, yellow. Disc florets 6–10, tubular, 5-lobed, dark-red. Achenes 3–6, triangular, light brown, enclosed within woody spiny burr. Fig. 16L, M.

A native of S. Africa, now naturalised in SW W.A.; in disturbed woodlands and shrublands, cultivated fields and road verges as well as lawns and vacant lots in townsites in clay loam, sandy clay and stony soils. Flowers and fruits Feb.–Nov.

W.A.: E corner of Johnston and Vanzetti St, Meckering, *J.Dodd* 289 (PERTH); W end of Stack St, Moora, *J.Dodd* 374 (CANB, K, PERTH); 3 km S of Moora, *G.J.Keighery* 15565 (PERTH); Walebing Reserve 248, *G.J.Keighery* 16400 (CANB, PERTH); N side of railway line, 1.5 km NW of the Midlands Rd, Mingenew Nat. Res., *G.J.Keighery & N.Gibson* 4610 (CANB, PERTH).



The plant spreads by spiny burrs attaching to footwear, machinery or the fur of animals, or by wind. The capitula fall as a unit and the seeds germinate within the burr in the following season.

ASTERACEAE

5. BERKHEYA

A. Ghaffoor

Berkheya Ehrh., *Beitr. Naturk.* 3: 137 (1788), *nom. cons.*; named after Dutch botanist Le Franceq van Berkhey (1729–1812).

Type: *B. fruticosa* (L.) Ehrh.

Thistle-like, perennial herbs, subshrubs or shrubs with arachnoid or woolly hairs. Leaves basal or cauline, alternate, subsessile, rarely decurrent, entire or usually dentate to pinnatisect, with spinules or long spines on conspicuously sclerified margins. Capitula radiate, solitary or in axillary or terminal panicle of corymbose clusters; involucre hemispherical, few-multiseriate; bracts herbaceous, connate at base, entire or lobed, spiny on margins and apices; receptacle almost flat, paleate. Ray florets uniseriate, neuter or absent; ligules (2–) 4-lobed. Disc florets hermaphrodite, fertile, occasionally inner ones sterile and functionally male, yellow; corolla tubular, deeply 5-lobed, the lobes with sclerified margins; anthers basally sagittate; apical anther appendages entire, obtuse; style branches linear, obtuse. Achenes obovoid or turbinate, ±distinctly ribbed, densely to sparsely sericeous or glabrous, entirely embedded in receptacle. Pappus scales uni- or biseriate, ±equal or unequal, short or long, rarely partially united.

A genus of around 80 species, distributed in southern and tropical Africa; 1 species naturalised in Australia.

****Berkheya rigida*** (Thunb.) Ewart, Jean White & B.Rees, *Proc. Roy. Soc. Victoria n.s.*, 22: 20 (1909)

Stobaea rigida Thunb., *Prodr. Pl. Cap.* 141 (1800). T: S. Africa, *Herb. Thunb.*; ?holo: UPS.

[*Berkheya carduiiformis* auct. non DC.: C.A.Gardner, *J. Dept. Agric., W. Australia* ser. 2, 6: 3 (1929)]

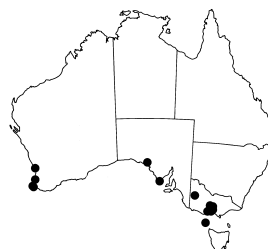
[*Berkheya carduioides* auct. non (Less.) Hutch.: C.A.Gardner, *Enum. Pl. Austral. Occidentalis* 138 (1931)]

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1626, fig. 741A (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 719, fig. 138g (1999).

Rigid, 30–80 cm tall, perennial herbs with extensive roots and creeping rhizomes. Branches terete, cobwebby-canescens, becoming glabrous with age. Leaves rigid, sessile, amplexicaul, lanceolate to ovate, (4–) 5–10 cm long, 2–4 cm wide, deeply pinnatifid to pinnatisect with triangular or lanceolate to subulate, apically stiff spiny lobes, revolute-margined, bluish-green and almost glabrous above, densely white-hairy beneath. Capitula 5–10 mm across, several in terminal and axillary corymbose clusters; involucre 3–4-seriate; bracts herbaceous, ovate-triangular or ovate-lanceolate, 8–12 (–15) mm long, concave, patent, spiny-margined; outermost ±tomentose; receptacle pitted; paleae deeply lacerate, 1 (–2) mm long. Ray florets absent. Disc florets 30–40, yellow; corolla tubular, 5-lobed. Achenes turbinate, 1.5–2.5 (–3) mm long, glabrous or sparsely short-hairy, persistent. Pappus scales oblong-rotund, c. 0.2 mm long, fused into a crown, obtuse. *African Thistle, Hamelin Thistle.* Fig. 17A–D.

A native of S. Africa, introduced and naturalised in W.A., S.A., Vic. and King Is., Tas. Commonly grows on loose sandy, loamy and volcanic clay soils in coastal scrublands (with *Olearia* and *Pimelea* spp.), and salt marshes of *Sarcocornia-Sclerostegia*. Flowers and fruits Oct.–May.

W.A.: Hamelin Bay, *R.D.Royce* 3430 (PERTH); Hamelin Bay, W of Karridale, *R.D.Royce* 4655 (PERTH). S.A.: Eyre Penin., c. 8 km E of Ceduna along the Eyre Hwy, 29 Nov. 1979, *D.Oekey s.n.* (AD, MEL598497). Vic.: Between Bacchus Marsh and Melton on the Western Hwy, E side of Djerriwarrh Ck, 6 Dec. 2006, *Joubert s.n.* (MEL2331674). Tas.: King Is., Currie, N end of Big Beach, *M.L.Baker* 2072 & *M.F.Duretto* (HO, MEL).



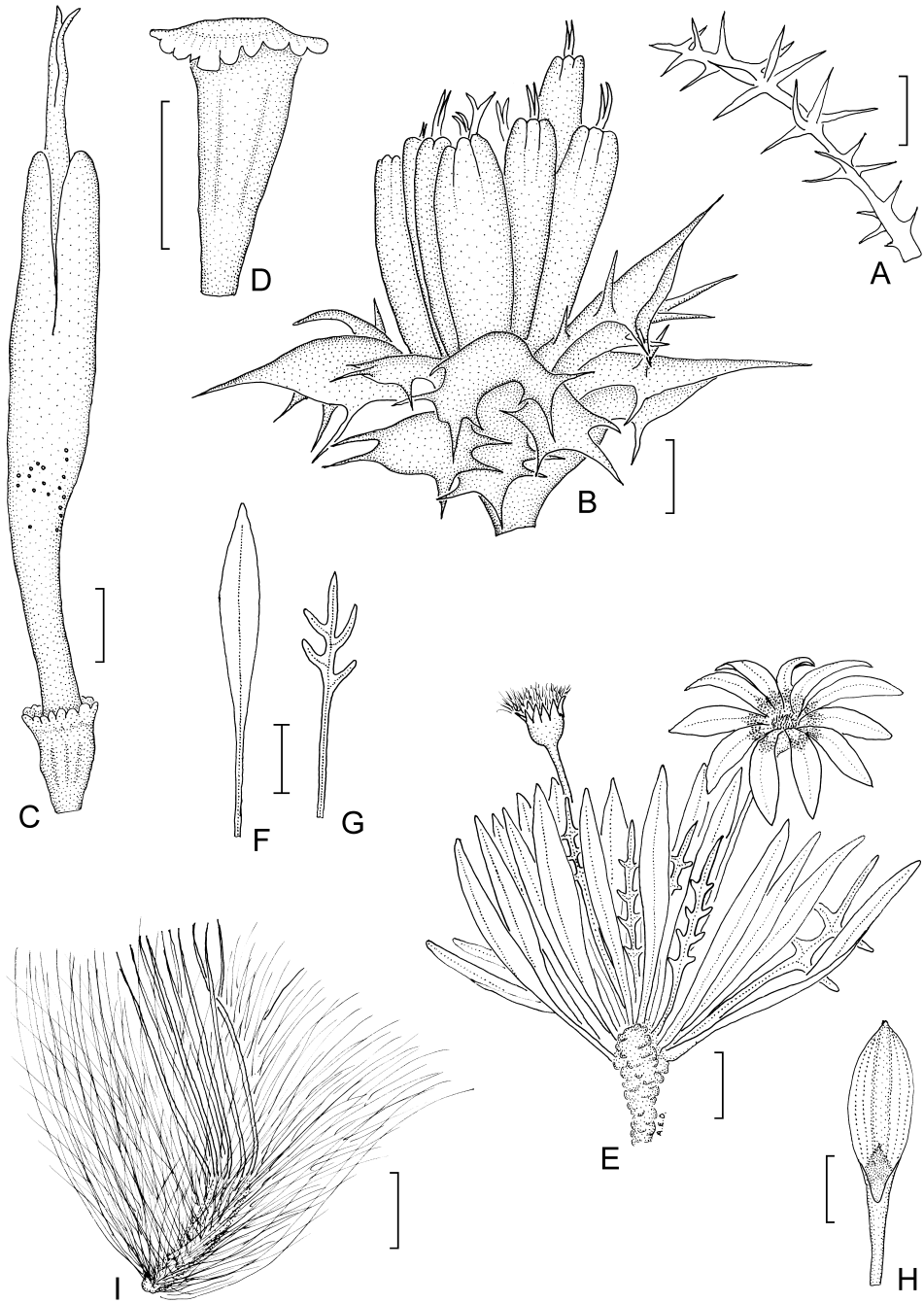


Figure 17. A–D, *Berkheya rigida*. A, leaf; B, capitulum in flower; C, floret; D, achene (A–D, V.Stajsic s.n., CANB682147). E–I, *Gazania linearis*. E, habit; F, G, leaves; H, ray floret; I, achene (E–I, B.J.Lepschi & T.R.Lally 1814, CANB). Scale bars: A, E–G = 2 cm; B, I = 2 mm; C, D = 1 mm; H = 1 cm. Drawn by A.E.Orchard.

The spiny clusters of capitula, containing the seeds, fall and may be rolled or blown long distances by wind or are dispersed by attaching to the fur of passing animals. The seeds germinate while still within the unpalatable heads.

6. GAZANIA

A. Ghaffoor

Gazania Gaertn., *Fruct. Sem. Pl.* 2: 451 (1791); named after Theodorus Gaza (c. 1400–1475), who translated botanical works of Theophrastus from Greek into Latin.

Type: *G. rigens* (L.) Gaertn.

Perennial herbs or subshrubs with decumbent to ascending stems, containing copious milky latex, arachnoid-hairy. Leaves basal or cauline, alternate, petiolate or sessile, entire to pinnatisect, glabrous above, white-woolly beneath. Capitula radiate, solitary, axillary, pedunculate or scapose; involucre 2–4-seriate, ±campanulate, turbinate or cylindrical; bracts connate below, ±scarious on margins; receptacle conical or convex, deeply alveolate. Ray florets uniseriate, neuter or sterile; ligule apically 4-toothed and 5-veined, yellow, orange, or red to maroon, sometimes with a blackish patch at base. Disc florets bisexual, outer fertile, inner usually sterile or functionally male; corolla lobes sclerified marginally; anthers basally sagittate, not tailed, with apical appendages ±fringed on margins; style slender with long branches, hairy below branches. Achenes obovoid, indistinctly ribbed or with rows of swollen cells and ribless, densely sericeous. Pappus scales 7–8 (–12), subequally biseriate, lanceolate to subulate-aristate.

A genus of 17 species in tropical and southern Africa; 2 species naturalised in coastal regions of Australia.

An important genus in horticulture, Gazanias are one of the most widely planted ornamentals in coastal areas, as well as inland. They are considered invasive in Mediterranean climates in California and Australia.

Leaves tufted at ends of rhizomes, mostly linear to narrowly lanceolate, older dead leaves persistent; peduncles usually > 20 cm long; free part of involucre bracts as long as or longer than the fused basal cup-like part

1. *G. linearis*

Leaves tufted at ends of trailing stems, mostly oblanceolate to narrowly spatulate, dead leaves deciduous; peduncles usually < 15 cm long; free part of involucre bracts shorter than the fused basal cup-like part

2. *G. rigens*

1. **Gazania linearis* (Thunb.) Druce, *Rep. Bot. Soc. Exch. Club Brit. Isles* 1916: 624 (1917)

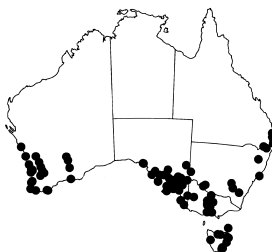
Gorteria linearis Thunb., *Skr. Naturhist.-Selsk.* 4: 2 (1798). T: Cape Province, S. Africa, *Thunberg s.n.*; holo: UPS.

Illustrations: J.M.Gibson, *Wild Fls. Natal* 114 (1975); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1627, fig. 742A (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 719, fig. 138h (1999).

Perennial, 20–30 cm tall, with branched or simple rhizome. Leaves tufted at tips of rhizomes, linear to oblanceolate, (5–) 8–25 (–30) cm long. 0.5–2.5 (–3.5) cm wide, basally attenuate, ±sheathing, entire or sometimes pinnatisect, with margins ±recurved to revolute, acute, mucronate, green and scabrous above, densely cobwebby white-hairy beneath except midrib. Capitula 3–6 (–7) cm diam.; peduncle (15–) 20–30 cm long; involucre 2–3-seriate; bracts linear-lanceolate, 1.2–2 cm long, fused for nearly half length, usually bristly on margins, acute. Ray florets 15–20; ligule 2.5–3.5 (–4) cm long, yellow to orange, basally with or without dark, white-centred spot. Disc florets dark or yellow; lobe margins sclerified. Achenes oblong, 3.5–4 mm long, enveloped by silky, whitish-brown hairs. Pappus scales linear-lanceolate, 4.5–5 mm long, acute-acuminate. *Gazania*, *Gazania* *Daisy*, *Hardy Gazania*, *Treasure Flower*. Plate 19; Fig. 17E–I.

Native to S. Africa, naturalised in all states of Australia and A.C.T., and in many other countries; in coastal areas in sandy-loam soils, disturbed sites around settlements and refuse sites where garden waste is dumped. Flowers and fruits Aug.–Apr.

W.A.: Junction of Merrifield Rd & North Shore Drive, Mullaloo, *B.J.Lepschi & T.R.Lally* 1907 (PERTH). S.A.: Louth Bay, c. 23 km N of Port Lincoln, *C.J.Brodie* 2584 & *D.E.Symon* (AD). Qld: Moffat Head, Caloundra, *G.N.Batianoff* 99089 (BRI). N.S.W.: Park on corner of Kingsley Parade and Blanch St, Boat Harbour, *J.R.Hosking* 2544 & *G.C.Prichard* (CANB, MEL, NE, NSW). Vic.: Chartwell Estate, Mt Cottrell, *J.A.Jeanes* 2217 *et al.* (MEL). Tas.: George Town at Low Head beaches, *G.N.Batianoff* 980126 (BRI, HO).



2. **Gazania rigens* (L.) Gaertn., *Fruct. Sem. Pl.* 2: 451, t. 173 (1791)

Othonna rigens L., *Pl. Rar. Afr.* 24 (1760); *Gorteria rigens* (L.) L., *Sp. Pl.* 2nd edn, 2: 1284 (1763). T: 'Habitat ad. Cap. b. Spei', *Herb. Linn.* 1027.3; lecto: LINN, *fide* H.Roessler, *Mitt. Bot. Staatssamml. München* 3: 371 (1959).

Illustrations: J.P.Jessop & H.R.Toelken, *Fl. S. Australia* 4th edn, 3: 1627, fig. 742B (1986); G.J.Harden (ed.), *Fl. New South Wales* 3: 319 (2002); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 720, fig. 138i (1999).

Perennial, with trailing, branched rhizome rooting at nodes, decumbent to ascending, 20–30 (–40) cm tall, often ±woody. Leaves tufted at stem apices, linear-ob lanceolate to narrowly spatulate, (3–) 5–10 (–12) cm long, 0.5–1.5 (–1.8) cm wide, usually entire, obtuse or subacute, pale-green and glabrous, cobwebby white-hairy beneath except midrib; petiole short, narrowly winged. Capitula (3.5–) 5–6 cm diam.; peduncles 10–15 (–20) cm long; involucre 2–3-seriate; bracts basally fused for more than half their length, linear-lanceolate, 10–15 mm long, denticulate, acute. Ray florets 12–15 (–18); ligule 2–2.5 mm long, yellow or orange-yellow, basally with a black, white-centred blotch. Disc florets tubular, orange; lobe margins sclerified. Achenes obovoid, (4–) 5–6 mm long, ribbed, densely silky-hairy. Pappus scales lanceolate, 2–3 mm long, acute-acuminate. *Trailing Gazania*, *Clumping Gazania*, *Common Gazania*.

A native of S. Africa, naturalised and considered an environmental weed in Australia in all States, but not the N.T. or A.C.T., growing in disturbed areas and on coastal dunes in sandy-clay, moist soils. Flowers and fruits most of the year.

W.A.: Mt Clarence, Brunswick Rd, near Cuddhy Ave, Albany, *G.J.Keighery* 16029 (PERTH). S.A.: Porter Bay, S of Port Lincoln, *D.E.Symon* 13635 (AD). Qld: Buddina Beach, Sunshine Coast, *G.N.Batianoff* 1364 & *J.A.El Sol* (AD). N.S.W.: 25 km N of Balranald, *P.G.Kodala* 487 *et al.* (BRI, CANB, MEL, NSW, PRE). Vic.: Bellarine, Port Henry, Corio Bay, on W side of Alcoa Smelter, *G.W.Carr* 9908-265 (BRI, CANB, HO, NSW). Tas.: Swansea, *G.N.Batianoff* 980125 (BRI, MEL).



Unplaced Name

Gazania pavonia R.Br. in W.T.Aiton, *Hort. Kew.* 2nd edn, 5: 140 (1813), *nom. illeg. non* Moench.

Recorded for S.A. by J.M.Black, *Fl. S. Australia* 4: 698 (1929). No material has been seen by the present author, but the name is listed as a synonym of *G. rigens* in C.Flann, (ed.) *Global Compositae Checklist* (2009+) <http://compositae.landcareresearch.co.nz>, accessed 8 Nov. 2013.

ASTERACEAE

Trib. 3. VERNONIEAE

A. Ghafoor

Asteraceae trib. *Vernonieae* Cass., *J. Phys. Chim. Nat. Arts* 88: 203 (1819)

Type: *Vernonia* Schreb.

Annual or perennial herbs, subshrubs, shrubs or climbers, usually without latex. Leaves alternate. Capitula discoid or pseudo-radiate, usually epaleate, rarely paleate. Florets all bisexual; corollas funnelform, 5-lobed, actinomorphic with lobes longer than wide, rarely zygomorphic, usually bluish or reddish, rarely white, pink or yellow; anther appendages flat, thin to stiff; style branches with papillae covering whole inner surface. Pappus usually of long capillary bristles, often with shorter outer bristles, rarely coroniform or lacking.

A tribe of 118 genera and over 1000 species, divided into about 14 subtribes, mainly tropical in distribution. In Australia, 9 genera with 14 species, of which 1 genus and 4 species are endemic, the rest naturalised.

H. Robinson, Revisions in Paleotropical Vernonieae (Asteraceae), *Proc. Biol. Soc. Washington* 112: 220–247 (1999); H. Robinson, *VI. Tribe Vernonieae Cass. (1819)*, in J.W. Kadereit & C. Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 149–174 (2007); S.C. Keeley & H. Robinson, *Vernonieae*, in V.A. Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 439–469 (2009); H. Robinson & J.J. Skvarla, Genera of the Vernonieae (Asteraceae) of China with a study of their pollen, *Taiwania* 55(3): 254–272 (2010).

KEY TO GENERA

- 1 Plants scandent or scrambling; inflorescences elongate, thyrsoid
- 2 Hairs of stem and leaves T-shaped, with long arms and short stalks; corolla without long slender bases; style with distinct basal node; achenes 5-angled **7. TARLMOUNIA**
- 2: Hairs of stem and leaves simple, not T-shaped; corollas with slender-filiform bases; style branches without basal nodes; achenes 10-ribbed **9. DECANEUROPSIS**
- 1: Plants erect or suberect, neither scandent nor scrambling; inflorescences various
- 3 Pappus absent
- 4 Stem hairs with erect, globose cap cells; involucre bracts 15–40, in (2–) 3–4 series; achenes 4–6-ribbed **3. ETHULIA**
- 4: Stem hairs ±moniliform, rather L-shaped; involucre bracts c. 12, in 2–3 series; achenes 10-ribbed **5. PLEUROCARPAEA**
- 3: Pappus present
- 5 Capitula usually 4-flowered; corolla zygomorphic with deepest sinus towards centre of capitulum
- 6 Capitula aggregated in pedunculate compound heads enclosed in foliaceous bracts; pappus bristles straight **1. ELEPHANTOPUS**
- 6: Capitula aggregated in sessile compound heads, arranged in racemose-spicate inflorescences in leaf axils or bracts; some pappus awns contorted **2. PSEUDELEPHANTOPUS**
- 5: Capitula many-flowered; corolla actinomorphic
- 7 Capitula subtended by foliose bracts, solitary or few together
- 8 Involucre bracts 30–40 in 4 series, with distal margins scarious; corolla tube with stipitate glands; paleae absent **4. CENTRATHERUM**
- 8: Involucre bracts c. 12, in 2–3 series, with distal margins not scarious; corolla tube glands sessile; paleae present **5. PLEUROCARPAEA**

ASTERACEAE

7: Capitula not subtended by foliose bracts, aggregated in secondary inflorescences

9 Annual herbs; involucre bracts 3–4-seriate; corolla lobes without longitudinal chambers or ducts; anthers without glands

6. **CYANTHILLIUM**

9: Perennial herbs or shrubs; involucre bracts 5–6-seriate; corolla lobes often filled with longitudinal chambers or ducts; anthers often with glands

8. **VERNONIA**

1. **ELEPHANTOPUS**

Elephantopus L., *Sp. Pl.* 2: 814 (1753); *Gen. Pl.* 5th edn, 535 (1754); from Greek *elephantos* (elephant) and *pous* (a foot), probably referring to the root of *E. scaber* or to the basal leaves resembling an elephant's footprints.

Type: *E. scaber* L.

Perennial, stiff, ±hirsute herbs with woody rootstock. Leaves usually basal, rosulate, oblanceolate; cauline leaves alternate, becoming smaller distally. Capitula homogamous, few (usually 4)-flowered, several aggregated in secondary bracteate capitula (syncephalous) or glomerules at apices of shoots. Involucre oblong, compressed; bracts biserial, oblong-lanceolate or elliptic-oblong or lanceolate; receptacle small, flat. Ray florets absent. Disc florets white, mauve or purple; corolla zygomorphic, deeply cleft adaxially, 5-lobed; anthers neither calcarate nor tailed. Achenes narrowly turbinate-cylindric, 10-ribbed, hairy, with elongated raphides. Pappus bristles uniseriate, 5–15 or numerous, straight, basally broadened and ciliate.

A genus of c. 12 species, mostly tropical; 2 species naturalised in Australia.

Plants scapose, with lower leaves in a rosette and much larger than the few cauline leaves; florets mauve or purple; corolla with apically glandular limb lobes

1. ***E. scaber***

Plants with stems leafy throughout, no rosette leaves; florets white; corolla not glandular

2. ***E. mollis***

1. ****Elephantopus scaber*** L., *Sp. Pl.* 2: 814 (1753)

T: India; lecto: illustration '*Ana-schovadi*' in H. Rheede, *Hort. Malab.* 10: 13, t. 7 (1690), *vide* C. Jeffrey in C.E. Jarvis *et al.* (eds), *Regnum Veg.* 127: 44 (1993).

Illustrations: P.K. Hajra *et al.* (eds), *Fl. India* 13: 334, fig. 102 (1995); Q. Hu & D. Wu (eds), *Fl. Hong Kong* 3: 301, fig. 267, photo 529 (2009); Z.Y. Wu *et al.* (eds), *Fl. China* 20–21: 369, fig. 348 (2011).

Erect herbs, 30–60 (–100) cm tall, with annual, usually dichotomously branched, densely hirsute stems from woody rootstock. Leaves usually in basal rosette, narrowly oblanceolate or ovate-elliptic to spatulate, (5–) 6–18 (–20) cm long, (1.5) 3–10 cm wide, long attenuate to petiole, semiamplexicaul to sheathing at base, entire or occasionally serrulate-crenulate, bristly-hairy to scabrid; cauline leaves much smaller, sessile and amplexicaul. Capitular glomerules 1.2–2 cm diam., each subtended by 3–5 ovate, leaf-like bracts. Involucre bracts oblong-lanceolate; outer bracts c. 3.5–4.5 mm long; inner bracts c. twice as long as outer, apically cartilaginous, pungent. Florets mauve or purple; corolla (4.5–) 5–7 mm long; lobes apically glandular. Achenes narrowly turbinate-cylindric, 3–4 mm long; ribs setulose. Pappus bristles 5 or 6, stiff, 4.5–5.5 mm long, apically setaceous, dirty-white. *Elephant's Foot*, *Prickly-leaved Elephant's Foot*, *Bull's Tongue*.

Described from India, but common throughout the tropics. Naturalised in Australia in northern N.T. and NE Qld. in pale-clayey, alluvial soils and on deep red sand with metamorphic rocks beneath. It is a declared class 2 weed in Qld. This is an invasive species and established weed of agriculture and the natural environment. The woodlands where it grows commonly are dominated by a mix of species of *Eucalyptus*, *Acacia*, *Alstonia* and *Melaleuca*. Flowers and fruits Mar.–June.

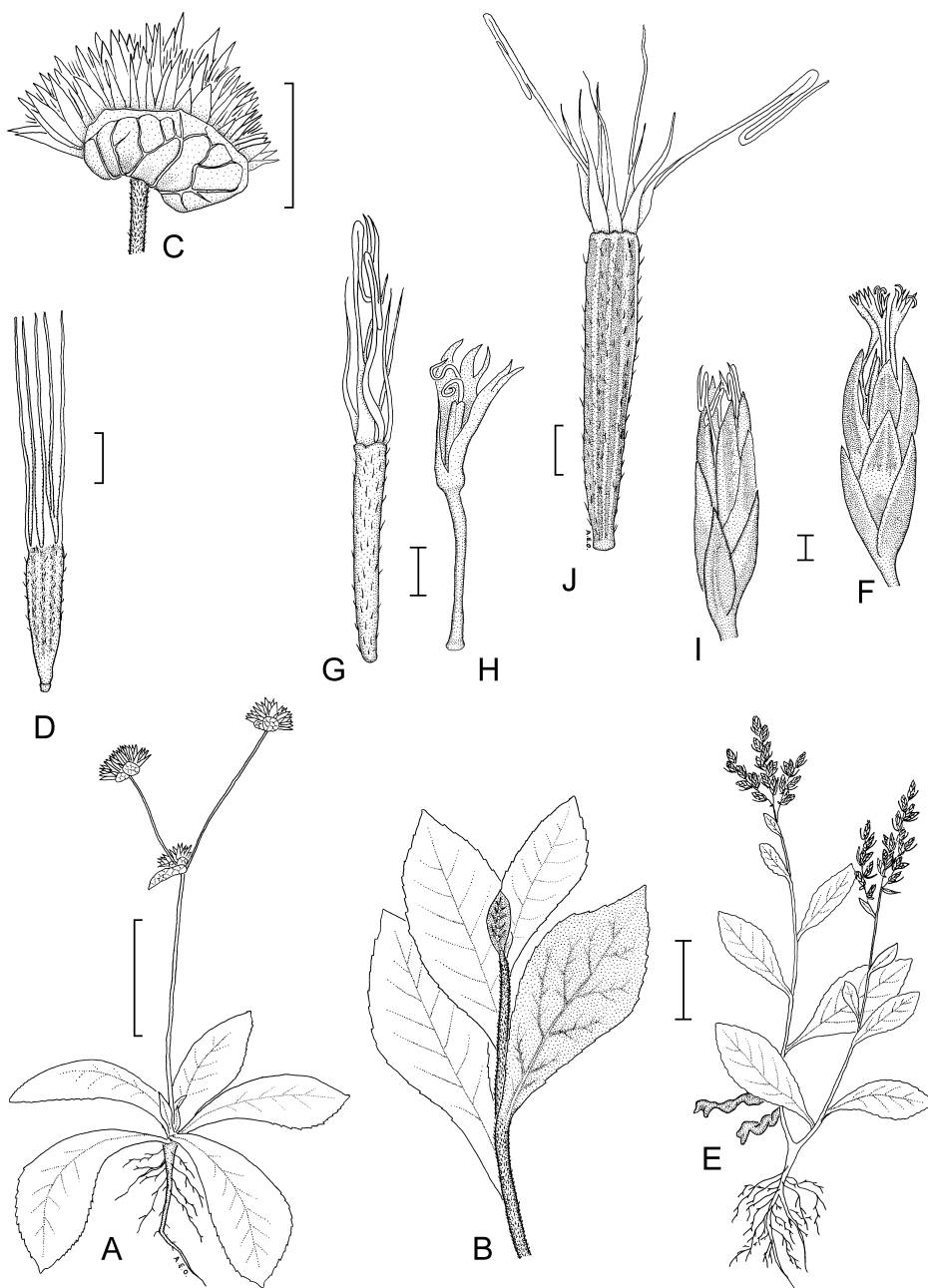


Figure 18. A–D, *Elephantopus mollis*. A, seedling plant with rosette leaves; B, vegetative shoot from mature plant, showing stem leaves; C, fruiting capitulum; D, achene (A, S.G.McKenna 293, CANB; B–D, B.M.Waterhouse 2266, CANB). E–J, *Pseudelephantopus spicatus*. E, habit; F, single capitulum with florets; G, floret, ovary with pappus, corolla removed; H, floret, corolla, staminal tube and style; I, single capitulum with young achenes; J, mature achene (E–I, S.G.McKenna 777, CANB; J, B.M.Waterhouse 6763, CANB). Scale bars: A, B, E = 5 cm; C = 1 cm; D, F–J = 1 mm. Drawn by A.E.Orchard.

N.T.: 10 miles [c. 16 km] SE of Adelaide River Township, *M.Lazarides 6860* (DNA). Qld: Shipton's Flat, S of Cooktown, *A.R.Bean 18780* & *K.R.McDonald* (BRI); Mareeba Wetlands, c. 9.5 km NW of Mareeba, *I.D.Fox 1248* (BRI); between Shipton's Flat and Little Forks, Annan R. catchment, *K.R.McDonald 2017* (BRI); Somerset, *L.J.Webb* & *J.G.Tracey 8257* (BRI).

Roots and leaves are used as emollient for dysuria, diarrhoea, dysentery, swellings and stomach pain. Roots and crushed leaves boiled with water are administered to prevent vomiting. Powdered with pepper, it is applied for toothache (*S.Kumar et al.*, *Bull. Bot. Surv. India* 22: 163 (1980)). Leaves are used in applications for eczema and ulcers (*Li Wang et al.*, *Z. Naturf., C* 59c: 327–329 (2004); *Z.Y.Wu et al.* (eds), *loc. cit.* (2011)).

Elephantopus scaber is distinguished from *E. mollis* by its stiff, coriaceous, oblong-lanceolate leaves that are not soft-puberulent beneath.



2. **Elephantopus mollis* Kunth in F.W.H.A.von Humboldt, A.J.A.Bonpland & C.S.Kunth, *Nov. Gen. Sp.* 4: 26 (1820)

T: Venezuela, Caracas, *Humboldt & Bonpland 627*; holo: P 00322262, photo seen.

Illustrations: P.Busey, *Ann. Missouri Bot. Gard.* 62(4): 877, fig. 7A–D (1975); G.J.Harden (ed.), *Fl. New South Wales* 3: 148 (1992).

Erect herb, (30–) 50–150 cm tall, branched above middle, with soft hairs. Leaves cauline, alternate, ovate, lanceolate or oblanceolate, (5–) 6–20 (–25) cm long, (3–) 4–10 cm wide, basally attenuate and semiamplexicaul, shallowly to sharply toothed on margins, acute to ±obtuse, softly hairy adaxially, gland-dotted and resinous abaxially. Capitular glomerules 1.5–2 cm diam., each subtended by 3 leaf-like bracts; bracts broadly ovate, subcordate, 8–10 mm long, 6–8 mm wide, acute to acuminate, green, pilose. Involucre 8–10 mm long; bracts 8; outer 4 lanceolate, 6.5–9.5 mm long, sparsely hairy, basally membranous-margined, acuminate; inner 4 elliptic-oblong, 7–8 mm long. Florets white; corolla 4.5–6 mm long, glabrous. Achenes narrowly turbinate to cylindrical, c. 3 mm long, densely hirsute, brown to greyish black. Pappus bristles 5, 3–4 mm long, membranous. *Devil's Grandmother*, *Tobacco Weed*. Fig. 18A–D.

Native in the Americas from Mexico to Argentina. In Australia a naturalised noxious invasive weed of agriculture in Qld and N.S.W.; also found in wastelands, along walking tracks, and in forest canopy gaps, on loam and basalt substrates. Flowers and fruits Apr.–Sept.

Qld: walking track to upper reaches of Hartley Ck from Captain Cook Hwy, N of Cairns, *D.Halford Q8529* (BRI); Powerlink access road off Sullies Gap Road, *R.Jensen 1443* & *N.Tucker* (BRI); far end of Mount Lewis Rd, NE of Jullatten, *B.M.Waterhouse 3381* (BRI); former King Ranch property, SW of Tully, *B.M.Waterhouse 4872* & *O.Zeimer* (BRI). N.S.W.: Murwillumbah, 14 July 1989, *S.Pratt s.n.* (NSW).



Some authors (e.g. J.T.Koster, *Blumea* 1: 464 (1935)) have treated *E. mollis* as a synonym of *E. tomentosus* L.

2. PSEUDELEPHANTOPUS

Pseudelephantopus Rohr, *Skr. Naturhist.-Selsk.* 2: 213 (1792), *nom. et orth. cons.*; from Greek *pseudo* (false), and *Elephantopus*, a related genus.

Type: *P. spicatus* (B.Juss. ex Aubl.) C.F.Baker

Perennial, erect, stiff, hairy herbs or subshrubs. Leaves mostly cauline at flowering, alternate, sessile or very inconspicuously petiolate, cuneate, obtuse to acute, pinnately veined, abaxially

gland-dotted. Capitula discoid, usually 4-flowered, sessile, aggregated in glomerules subtended by foliaceous bracts; glomerules \pm globose, 5–10 mm diam., borne in racemose-spicate inflorescences in upper leaf axils. Involucre \pm cylindric-oblong; bracts 8, similar, in 4 decussate pairs, the outer 2 shorter than the inner. Florets bisexual, zygomorphic, (2–) 4 (–5) per capitulum, white, pink or purple; corolla zygomorphic; tube slender, longer than abruptly funnel-shaped limb, with a deep inner sinus; lobes unequal; anthers sagittate below, with obtuse apical appendage; style branches 2, flattened and stigmatic adaxially. Achenes \pm clavate, occasionally \pm flattened, (8–) 10-ribbed; ribs strigulose or hispidulous. Pappus bristles 5–10, \pm equal, broadened below, aristate, some contorted.

A neotropical genus of 2 species; one naturalised in Australia and several E Asian countries.

***Pseudelephantopus spicatus** (B.Juss. ex Aubl.) C.F.Baker, *Trans. Acad. Sci. St. Louis* 12: 55 (1902)

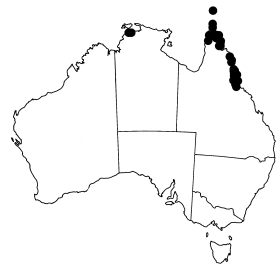
Elephantopus spicatus B.Juss. ex Aubl., *Hist. Pl. Guiane* 2: 808 (1778). T: Based on H.Sloane, *Voy. Jamaica* 1: 256, pl. 150, fig. 3–4 (1707).

Illustrations: P.Busey, *Ann. Missouri Bot. Gard.* 62: 881, fig. 8A–C (1975); Q.Hu & D.Wu (eds) *Fl. Hong Kong* 3: 302, fig. 269 (2009); S.Bunwong & P.Chantaranothai, *Thai Forest Bull., Bot.* 38: 126, fig. 1 (2010).

Erect subshrub, 20–60 (–100) cm tall, dichotomously branched, with striate, sparsely hirsute or subglabrous internodes. Leaves subsessile, slightly amplexicaul; lower leaves oblanceolate, 4–18 (–20) cm long, (1–) 2–5 cm wide, sinuate or sparsely serrate, papery, densely hairy to \pm glabrous; upper leaves oblong-elliptic, 2.5–10 (–11) cm long, 0.5–1.5 cm wide, tapering at both ends. Capitular glomerules spicate; bracts lanceolate to spatulate, 1.5–4.5 cm long, 0.4–0.8 mm wide, acute. Capitula 4- or 5-flowered; involucre bracts elliptic-oblong, 8–10 mm long, c. 2 mm wide, acute, glandular. Florets white; corolla tube 4.5–5 (–6) mm long; limb 3–4 mm long; lobes lanceolate, 1.5–2 mm long. Achenes narrowly obovoid, 5–6 mm long, \pm flattened, 10-ribbed; ribs hispidulous. Pappus bristles uniseriate, 6–10, 3–4.5 mm long except 2 lateral, slightly longer sigmoid bristles. *Dog's Tongue*, *Elephant Weed*. Plate 21; Fig. 18E–J.

A native of the neotropics from Mexico to northern S America; naturalised in Qld, N of Townsville, in grasslands, in sandy loam disturbed soils and mown road verges. Also naturalised in the Philippines, Indonesia, Hong Kong, Taiwan, Thailand, Malayan Archipelago, India and SW Africa. Flowers and fruits July–Sept.

Qld: Yamanie Natl Park, *R.J.Cumming 11304* (BRI); Anderson Park, Townsville, *R.J.Cumming 23171* (BRI); entrance to Murray Upper Natl Park, c. 25 km SSW of Tully, *R.J.Cumming 24523* (BRI); Behana Gorge Rd, near water treatment plant, Behana Ck, S of Gordonvale, *D.Halford Q8450* (BRI); sea shore at Etty Bay, 25 July 1961, *J.H.Saint-Smith s.n.* (BRI).



3. ETHULIA

Ethulia L.f., *Dec. Pl. Horti Upsal.* 1 (1762); probably from Greek *ethos* (character, habit) and *oulios* (baneful, destructive).

Type: *E. conyzoides* L.f.

Annual or short-lived perennial herbs with striate, \pm cylindrical stems. Leaves alternate, rarely proximally opposite, usually subsessile, ovate to linear-lanceolate, subentire to serrate or dentate, mostly acute, with simple multicellular and globose glandular hairs. Capitula homogamous, small, shortly pedunculate, borne in a lax corymb or sometimes in terminal simple or compound cymes. Involucre bracts (2–) 3–4-seriate, imbricate, scarious-margined; receptacle flat or slightly convex, epaleate. Florets strongly exerted from involucre, white, pink or purplish; corolla tube short, glandular, distally expanding gradually into a narrowly campanulate, 5-lobed limb; lobes deltoid, with glabrous apices; anthers included or slightly exerted, with short basal auricles, and ovate-lanceolate terminal appendages; style without

nodes below hairy branches. Achenes \pm turbinate or obconical, (2–) 4–6-ribbed, glandular in furrows, truncate, apically callose-ringed. Pappus absent.

A genus of c. 19 species, most distributed in tropical Africa, 3 or 4 confined to Indonesia and the Philippines; one naturalised in Australia.

****Ethulia conyzoides* L.f., *Dec. Pl. Horti Upsal.* 1 (1762)**

T: 'Habitat in India'; not designated.

Illustrations: M.G.Gilbert & C.Jeffrey, *Kew Bull.* 43(2): 169; figs 1B & 2E–F (1988); G.J.Harden (ed.), *Fl. New South Wales* 3: 146 (1992); P.K.Hajra *et al* (eds), *Fl. India* 13: 335, fig. 103 (1995).

Annual, aromatic herb, (40–) 50–100 cm tall, branched, with reddish or purplish, ribbed, antrorse pubescent to \pm glabrous internodes. Stem hairs with erect, globose cap cells. Leaves almost sessile, elliptic or narrowly ovate to narrowly lanceolate-oblong, 2.5–11 (–12) cm long, 0.6–2.5 (–3) cm wide, basally cuneate, entire or obscurely dentate, acuminate, shortly soft-hairy to \pm glabrous on both sides, glandular. Capitula 3–5 mm diam., in lax, axillary and terminal, corymbiform cymes; peduncles (0–) 3–6 mm long, glandular and rusty-pubescent; involucre shortly campanulate, 2–2.5 mm long and wide; bracts 3 (–4)-seriate, oblong-elliptic, ciliate on margins, acute, glandular centrally, pale or purplish towards apices. Florets 20–30 per capitulum, exserted, purplish or pale mauve; corolla 1.2–2 mm long, glandular. Achenes turbinate, 1.5–2 mm long, 4 or 5-ribbed, glandular between ribs, with an apical rim. Fig. 19A–E.

A native of Africa and India. In Australia weedy and naturalised along streams, partially dried freshwater lagoons and in marshy areas of NE N.S.W. Porteners (in G.J.Harden (ed.), *Fl. New South Wales* 3: 146 (1992)) erroneously reported its presence in Qld.

N.S.W.: Richmond R., 1887, *F.E.Haviland s.n.* (MEL, NSW); 0.4 km E of South Woodburn, Jan. 1887, *F.E.Haviland s.n.* (NSW); East Coraki, Apr. 1965, *R.S.Monaghan s.n.* (BRI, CANB, NSW); Woodburn, June 1895, *unknown collector* (NSW).



4. CENTRATHERUM

Centratherum Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 7: 384 (1817), from Greek *kentron* (spur) and *ather* (barb), because the pappus has stiff bristles.

Type: *C. punctatum* Cass.

Annual or short-lived perennial herbs or small shrubs, branching near base, with T-shaped and simple multicellular hairs. Leaves alternate, serrate or lobed. Capitula hemispherical, homogamous, terminal, solitary or sometimes 2 or 3 together; involucre bracts multiseriate; outermost bracts foliaceous, patent; inner bracts thin, with distal margins scarious; receptacle epaleate. Florets numerous, bisexual, actinomorphic, purple to blue; corolla tube densely stipitate-glandular or glabrous; anthers obtuse at base; style without node below subulate branches, bearing acicular sweeping hairs. Achenes cylindrical to obconic, 8–10-ribbed, with \pm quadrate raphides. Pappus a single series of short, flattened, rigid, stramineous, caducous bristles.

A genus of 2 or 3 species, distributed in subtropical Australia, the Philippines and tropical America; two occur in Australia, one endemic, the other naturalised.

Leaves elliptic to obovate, with 10–18 pairs of acute to acuminate teeth or lobes; capitula 2–2.5 cm diam.; corolla tube with sessile and stipitate glands

1. *C. punctatum*

Leaves lanceolate-oblongate, with up to 8 pairs of obtuse teeth or lobes, rarely entire; capitula 0.8–1.5 cm diam.; corolla tube usually not glandular

2. *C. riparium*

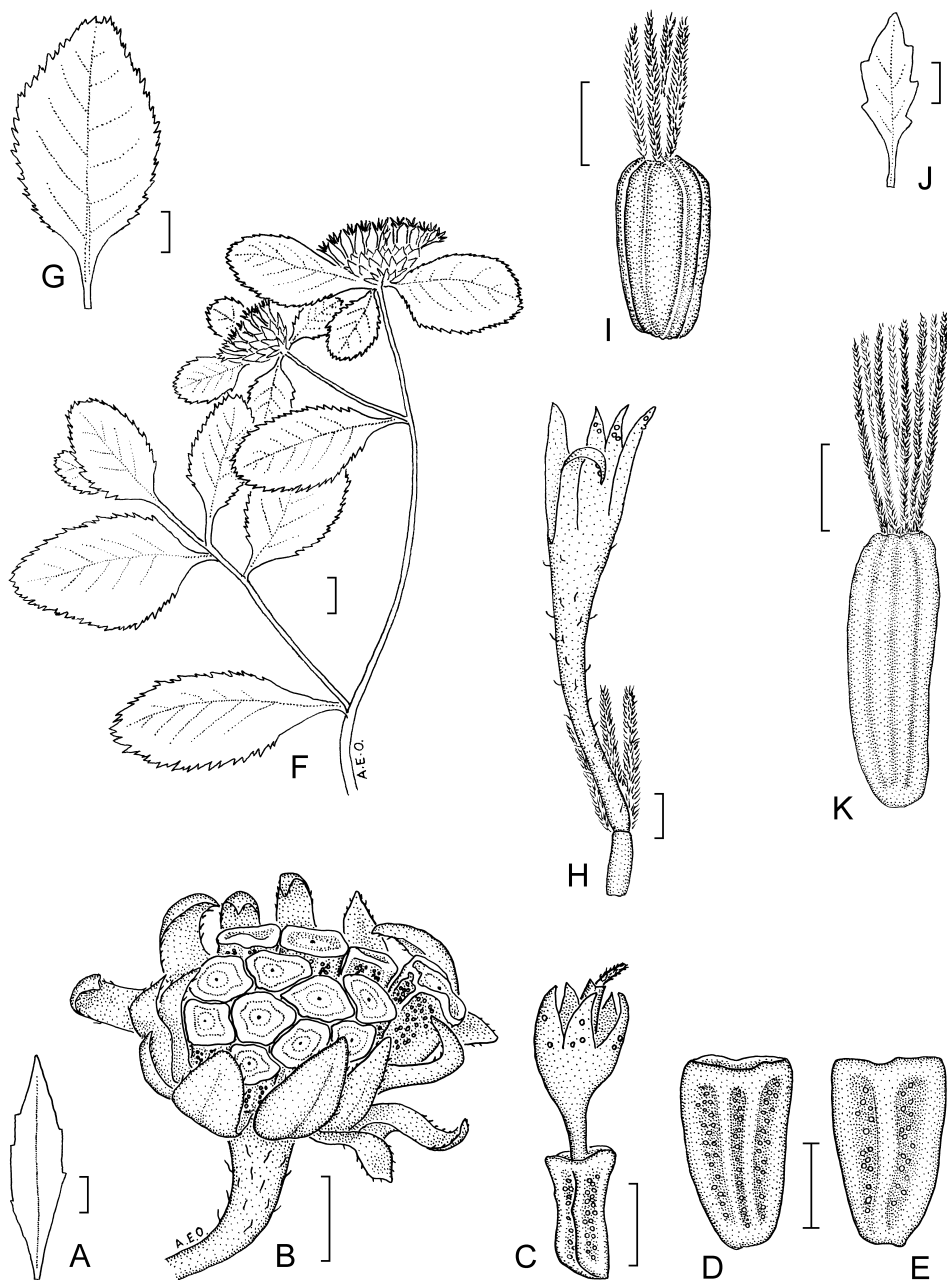


Figure 19. A–E, *Ethulia conyzoides*. A, leaf; B, fruiting capitulum; C, floret; D, achene, abaxial view; E, achene, adaxial view (A–E, R.Monaghan s.n., Apr. 1965, CANB). F–I, *Centratherum punctatum*. F, habit; G, leaf; H, young floret, some pappus bristles removed; I, achene (F–I, S.G.McKenna 435, CANB). J, K, *C. riparium*. J, leaf; K, achene (J, K, M.E.Phillips s.n., CBG 9895). Scale bars: A–E, H, I, K = 1 mm; F, G, J = 1 cm. Drawn by A.E.Orchard.

1. **Centratherum punctatum* Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 7: 384 (1817)

T: not designated; neo: Brazil, Maranhao, *Loretto, Eiten 4042*, SP; isoneo: BRI, G, NY, US, *fide* K.Kirkman, *Rhodora* 83: 15 (1981).

Illustrations: T.S.Elias, *Ann. Missouri Bot. Gard.* 62(4): 858, fig. 2A–B (1975); G.J.Harden (ed.), *Fl. New South Wales* 3: 147 (2002).

Annual herb, 50–100 cm tall, dichotomously branched, procumbent or suberect to erect, basally ±woody with slightly ridged, strigose internodes. Leaves shortly petiolate or sessile, elliptic to obovate, (1.5–) 2–6 (–7) cm long, (0.6–) 1–3 cm wide, basally cuneate to attenuate, with 10–18 pairs of acute to acuminate, minutely mucronate teeth on margins, obtuse, glandular-punctate. Capitula solitary, (1.8–) 2–2.5 cm diam.; peduncles 2–7 cm long; involucre ±campanulate, to c. 12 mm long; bracts multiseriate, glandular; outermost bracts foliaceous, oblong-lanceolate, 12–25 mm long, green; inner bracts ±elliptic, 5–7 mm long, purplish, apically ciliate to fimbriate. Florets mauve to purple; corolla 5–8 mm long, with sessile and stipitate glands. Achenes ±cylindrical, 1.5–2.5 mm long, 8–10-ribbed, glabrous. Pappus bristles 1.5–3 mm long, stramineous, densely pectinate. *Brazilian Button Flower*, *Brazilian Bachelor's Button*. Plate 24; Fig. 19F–I.

A native of central and S America and the West Indies; naturalised in pastures and waste places in coastal plains, in gravelly sandy alluvial soils of N.S.W., Qld, N.T. and northern W.A. Flowers and fruits Mar.–June.

W.A.: Minilya Nursery, Broome, *A.A.Mitchell 6679* (BRI, DNA, PERTH). N.T.: Milikapiti (Snale Bay), Melville Is., *A.Mitchell 8008* (DNA). Qld: second track off Coles Rd, Andergrove, N of Mackay, *S.Burchill MW265* (BRI); road to top of Grassy Hill, Cooktown, *B.M.Waterhouse 5970* (BRI). N.S.W.: 100 m S of McPherson's bridge, Orara R., 3.7 km NE of Coutts Crossing, *N.Taylor 16* (NE).



This species is cultivated in India for its attractive flowers and possesses antibacterial, antioxidant and antiproliferative properties (N.M.Power & N.Arumugam, *Asian J. Pharm. Clin. Res.* 4(3): 71–76 (2011)).

2. *Centratherum riparium* (DC.) A.R.Bean, *Austrobaileya* 8(1): 97 (2009)

Centaurea riparia DC., *Prodr.* 6: 602 (1838). T: N.S.W., Hastings R., near Port Macquarie, [May 1819], *A.Cunningham s.n.*; holotype: G-DC.

Centratherum punctatum subsp. *australianum* K.Kirkman, *Rhodora* 83: 21 (1981); *Centratherum australianum* (K.Kirkman) A.R.Bean, *Austrobaileya* 6: 977 (2004). T: N.S.W., W of Wingham on Bulga road, 12 Apr. 1953, *J.Vickery 23846*; holotype: NSW; isotype: L, MO.

Centratherum muticum (Kunth) Less., *Linnaea* 4: 320 (1829); *Ampherephes mutica* Kunth in F.W.H.A. von Humboldt, A.J.A.Bonpland & C.S.Kunth, *Nov. Gen. Sp.* 4: 25, tab. 315 (1820). T: 'Crescit locis temperatis. Novae Andalusiae in monte summo Cocollard'; holotype: P 00322267, photo seen.

Illustration: G.J.Harden (ed.), *Fl. New South Wales* 3: 147 (1992), as *C. punctatum* subsp. *australianum*.

Erect or suberect herb, to 1 m tall; stem dichotomously branched, ridged, puberulous, greyish. Leaves evenly spaced, rarely clustered, lanceolate-oblong-lanceolate, 1.9–6 cm long, 0.6–2 cm wide, basally attenuate, with up to 8 pairs of somewhat obtuse teeth (rarely entire), subacute, glandular on both sides. Capitula solitary, 8–15 mm diam.; peduncles 4–10 (–12) cm long; involucre campanulate, to 10 mm long; bracts multiseriate, laxly imbricate, membranous, apically dark brown or reddish, glandular; outer bracts triangular, to 2 mm long; inner bracts ovate, 5–6 mm long, apically fimbriate to ciliate on margins, acuminate to sharp-tipped. Florets purple; corolla 4–6 mm long; tube usually glabrous; limb and lobes glandular. Achenes oblong-cylindrical, 2–2.5 mm long, glabrous. Pappus bristles 2–3 mm long, pale, laxly pectinate; pectines less than 50, caducous. Fig. 19J–K.



Endemic to eastern Australia from Mareeba, NE Qld, to Bega, SE N.S.W.; commonly occurring at altitudes up to 300 m in open and layered *Eucalyptus* forest on gentle slopes and valley beds, in red loamy or chocolate loam soils over basalt, and moist clay loam over metasediments, and sandy loams over sandstone. Flowers Mar.–June.

Qld: S of Cliff Barrons Rd, Ormea, *A.R.Bean* 20285 (BRI); Numinbah Valley, 17 km from Nerang along road to Murwillumbah, *R.E.Ford* 14 & *J.Palmer* (NE). N.S.W.: W side of Ebor–Grafton road, 100 m SW of bridge over Hortons Ck, c. 50 km SW of Grafton, *L.M.Copeland* 3367 (CANB, NE, NSW); Kangaroo River S.F., c. 14 km WSW of Glenreagh, 2.4 km ENE of Jesse Smith Trig, 14 June 2001, *J.Goreszki s.n.* (NE); Upper Grady's Ck, Yunahla Gabbalah, 45 km N of Kyogle, *S.M.Turner* 26 & *P.Merrottsy* (NE).

5. PLEUROCARPAEA

Pleurocarpaea Benth., *Fl. Austral.* 3: 460 (1867); from Latin *pleuro* (ribbed) and *carpaea* (fruits), referring to the ribbed achenes.

Type: *P. denticulata* Benth.

Perennial, woody, erect herbs or shrubs, with translucent, inconspicuously stipitate, punctate glands and simple, ±moniliform, or unevenly T-shaped hairs. Leaves sessile to shortly petiolate, alternate, ovate-elliptic to narrowly elliptic, or lanceolate to oblanceolate. Capitula homogamous, pedunculate, solitary or laxly corymbose; involucre bracts c. 12, 2–3-seriate, herbaceous, foliaceous, imbricate, glandular, becoming glabrous; receptacle flat, paleate or epaleate. Florets few to numerous, bisexual, all fertile, purple, pink or white; corolla exceeding the involucre, campanulate; limb 5-lobed almost halfway; tube shorter to longer than lobes, with sessile glands; anther bases sagittate, obtuse, appendages with somewhat thickened cell walls; style without nodes below acute, hairy branches. Achenes prominently 10-grooved and ribbed, glandular and hairy; raphides absent. Pappus absent or of a few short, deciduous, uniseriate bristles.

A genus of 3 species, endemic to tropical Australia, N of 16°S.

C.R.Dunlop, The genus *Pleurocarpaea* Benth. (Asteraceae: Vernoniaeae), *J. Adelaide Bot. Gard.* 14(1): 93–98 (1991); N.S.Lander, & P.J.H.Hurter, *Pleurocarpaea gracilis* (Asteraceae: Vernoniaeae), a new species from the Pilbara region of Western Australia, *Nuytsia* 23: 109–115 (2013).

- 1 Achenes to 1.5 mm long; pappus present, with bristles more than 3.5 mm long

3. *P. gracilis*

- 1: Achenes > 2 mm long; pappus absent or, when present, bristles to 1 mm long

- 2 Leaves ovate, elliptic or narrowly elliptic, 0.5–5 cm wide; capitula usually > 8 mm long; florets > 15 (to 75) per capitulum

1. *P. denticulata*

- 2: Leaves narrowly lanceolate-oblanceolate or narrowly elliptic, < 0.8 cm wide; capitula < 8 mm long; florets < 10 per capitulum

2. *P. fasciculata*

1. *Pleurocarpaea denticulata* Benth., *Fl. Austral.* 3: 460 (1867)

T: Mellinson's Is., Arnhem Bay [N.T.], 1 Mar. 1803, *R.Brown s.n.*; lecto: K; isolecto: BM, CANB, MEL, NSW, *vide* C.R.Dunlop, *J. Adelaide Bot. Gard.* 14(1): 94 (1991).

Illustrations: G.Bentham, *Hooker's Icon. Pl.* 11: 5, t. 1006 (1867); J.Brock, *Top End Native Plants* 284 (1988); J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 935, fig. 286W; 944, fig. 288 I (1992).

Erect shrub to 80 cm tall. Leaves subsessile, ovate, elliptic or narrowly elliptic, 2–8.5 (–10) cm long, 0.5–5 cm wide, denticulate or entire, acute or obtuse, pale-green, ±glabrous, glaucous. Capitula solitary, 0.8–1.2 (–1.5) cm long, 1.2–1.5 cm diam.; peduncles bracteate or ebracteate, (1–) 1.5–3 (–4) cm long; involucre bracts unequal; outermost bracts linear-lanceolate, c. 3 mm long; median and inner bracts broadly lanceolate to ovate, 4.5–6.5 mm long, entire or sometimes 1- or 2-toothed, acute to acuminate, occasionally cuspidate; paleae c. 2.5 mm long. Florets 15–75, purple-pink; corolla tube 3.5–6 mm long; lobes 2.5–3 mm long;

anthers 2.5–3.9 mm long, purplish. Achenes cylindrical to fusiform, 3.5–5 mm long, apically truncate with persistent stylar base, hairy to glabrous. Pappus absent or bristles 1–10, to 1 mm long when present. Fig. 20A–E.

Occurs in W.A., N.T. and Qld; grows in seasonally wet woodlands or open woodlands in sandy alluvial or grey sandy soil, along roadsides in gravelly lateritic soil, and in sandstone country beside creeks, producing new shoots Sept.–Dec. from a woody rootstock. Flowers and fruits Feb.–Apr.

W.A.: Black Mud Swamp, 24 km from Amax Composite, on road to Mitchell River Stn, Mitchell Plateau, *K.F.Kenneally 5331/A* (PERTH). N.T.: near Arafura Swamp, c. 5 km W of Merwangi H.S., *I.D.Cowie 8096* & *R.K.Harwood* (MEL, DNA); East Alligator, *C.R.Dunlop 3335* (AD, BRI, CANB, DNA, K, L, MEL, MO, NSW, NT). Qld: Du Thunty R., SW of “Heathlands” Ranger Station, *L.Pedley 5656* (BISH, BRI, DNA, K, LAE, US); Chula Outstation, Central Cape York, *N.M.Smith 4891* (BRI).



2. *Pleurocarpaea fasciculata* Dunlop, *J. Adelaide Bot. Gard.* 14(1): 96 (1991)

T: 45 km SE of Ramingining, Arnhem Land, N.T., 18 Apr. 1989, *C.R.Dunlop 8481* & *N.G.White*; holo: CANB; iso.: AD, BRI, DNA, K, L, MEL, MO, NSW, PERTH.

Illustration: *C.R.Dunlop, op. cit.* 98, pl. 1A–F.

Erect shrub, (50–) 80–100 cm tall, with twigs becoming glabrous except at leaf axils and axillary buds. Leaves ±sessile, distant, fasciculate on short, axillary branches, narrowly lanceolate-oblongate or narrowly elliptic, 10–35 mm long, 2–7 mm wide, entire or distantly 1–many-toothed, acute, becoming glabrous. Capitula solitary, less than 8 mm long, c. 5–6 mm diam.; peduncles 3–4 cm long; involucre bracts linear-lanceolate to broadly lanceolate; outermost bracts c. half as long as inner ones, acute to acuminate or cuspidate; paleae absent or 1–3. Florets 4–7, white; corolla tube c. 2 mm long; lobes 2.5–3 mm long; anthers as long as corolla lobes. Achenes oblong-obovoid, 2.5–4 mm long, ±compressed, densely colliculate and tomentose along ribs; ribs prolonged to form an open cavity. Pappus bristles, if present, glabrous or tomentose, c. 1 mm long. Fig. 20F–H.

Endemic to Arnhem Land in the N.T.; occurs in silty-clay moist, previously waterlogged areas, along seasonal creeks, seasonal lagoons, among sparse grass and beneath an overstorey of *Melaleuca* species. Flowers and fruits Jan.–June.

N.T.: Central Arnhem Land, Emu Springs area, 19 Sept. 1999, *I.D.Cowie* & *C.R.Dunlop 8432* (DNA); Goyder R., *C.R.Dunlop 8678* & *N.G.White* (AD, CANB, DNA, MEL); 18 miles [c. 29 km] NE of Wilton R., Bulman Crossing, *J.R.Maconochie 1449* (BRI, CANB, NT); Groote Eylandt, *J.Waddy 500* (DNA, K, MEL, NSW); Maningrida area, headwaters of the Tomkinson R., *G.Wightman 4915* (DNA).



3. *Pleurocarpaea gracilis* Lander & P.J.H.Hurter, *Nuytsia* 23: 110 (2013)

T: Hamersley Ra., W.A., 14 Oct. 1998, *S.van Leeuwen 4345*; holo: PERTH; iso: BRI, DNA, K.

Illustration: *N.Lander & P.J.H.Hurter, op. cit.* figs 1 & 2A–B.

Perennial herb, to 40 cm tall, woody below, divaricately branched, with shoots thinly hairy and stipitate-glandular. Leaves distant, sessile, elliptic, 1.8–9.1 mm long, 1.3–5.3 mm wide, cuneate, crenulate, undulate, obtuse, minutely stipitate-glandular, appearing punctate, thinly moniliform-hairy. Capitula 6–7 mm diam. in lax corymbs; peduncles short, bracteate; involucre bracts 3–4-seriate, narrowly obovate to narrowly elliptic, entire, acute, mucronate, densely L-shaped-hairy and glandular; receptacle epaleate. Florets 15, purple or bluish purple, surpassing involucre; corolla tube 5–6 mm long; lobes 2.3–2.5 mm long, acute, dorsally glandular-punctate; anthers as long as or slightly longer than corolla lobes. Achenes triquetrous, 0.8–1.5 mm long, broadening upwards, ±densely sericeous with long, multicellular hairs and scattered sessile glands. Pappus bristles c. 30, uniseriate, filiform, 3.8–4.9 mm long.

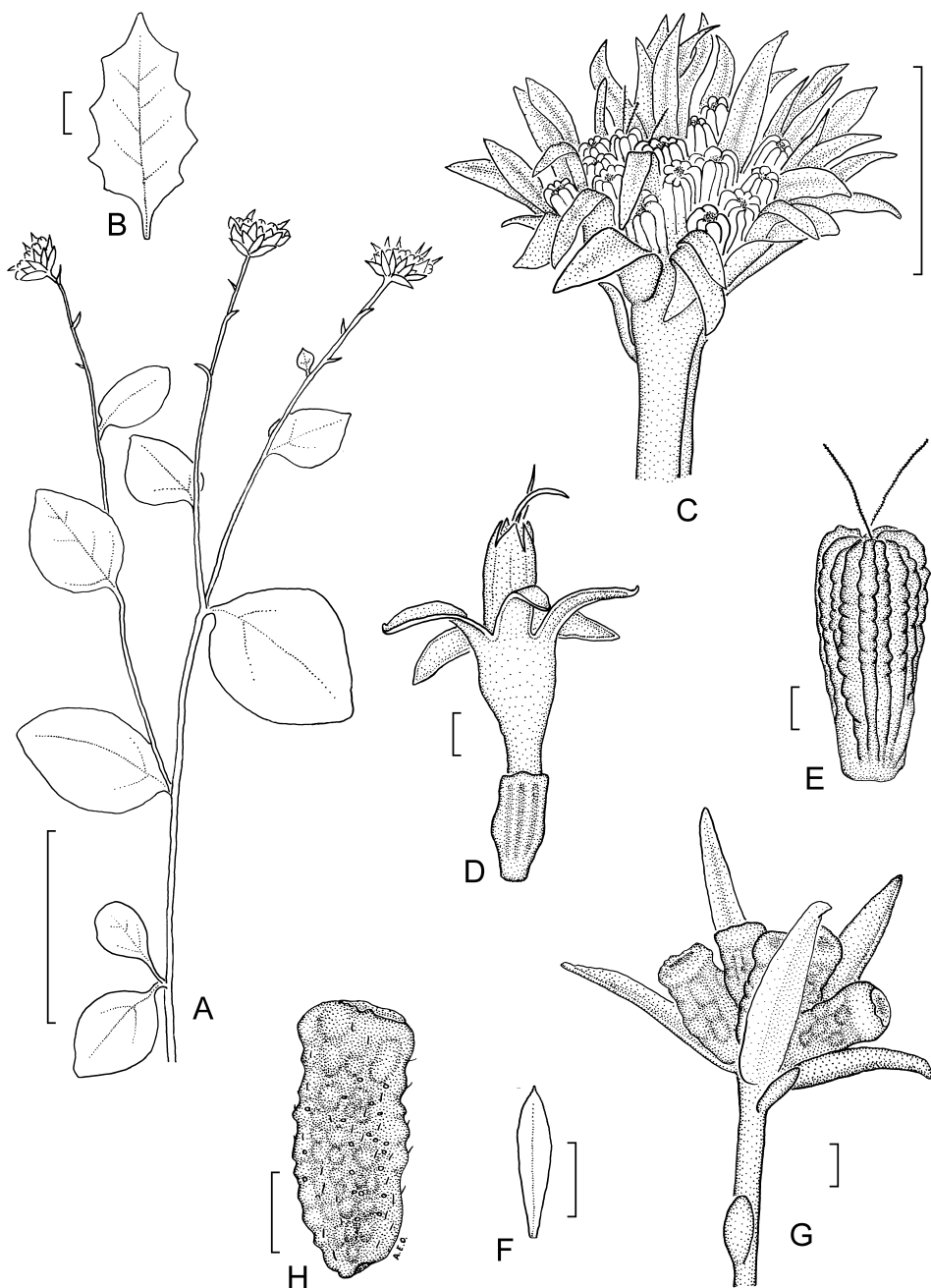


Figure 20. *Pleurocarpaea*. **A–E**, *P. denticulata*. **A**, habit of entire-leaved form; **B**, leaf of denticulate-leaved form; **C**, fruiting capitulum; **D**, floret; **E**, mature achene (**A**, **C**, **E**, C.Dunlop 3335, CANB; **B**, **D**, K.F.Kenneally 7756, CANB). **F–H**, *P. fasciculata*. **F**, leaf; **G**, fruiting capitulum; **H**, mature achene (**F–H**, J.R.Maconochie 1449, CANB). Scale bars: **A** = 5 cm; **B**, **C**, **F** = 1 cm; **D**, **E**, **G**, **H** = 1 mm. Drawn by A.E.Orchard.

Endemic to the Pilbara region in W.A.; occurs on summits, slopes, and sheltered gullies of rounded hills in skeletal, red soil over massive banded ironstone of the Brockman Iron Formation, among woodlands of *Eucalyptus*, *Acacia*, *Hakea*, *Triodia*, *Dampiera* and *Waltheria* species. Flowers and fruits May–Oct.

W.A.: 34.1 km WNW of Mt Farquhar, *S.van Leeuwen 4387* (PERTH); c. 7 km NW of Mt Farquhar, *S.Kern & M.Mikli WH 12125-05* (PERTH); c. 14 km W of Mt Farquhar, *S.Kern Opp 59* (PERTH); c. 9 km W of Mt Delphine and 145 km WNW of Tom Price, *H.Hughes & S.Hitchcock Opp 3-2* (PERTH); c. 23 km S of Mt Delphine, *S.Kern & M.Mikli Opp 28* (PERTH).



The present author has not examined any of the specimens cited in the original publication and the description provided here is based on the original diagnosis. Specimens cited above are from the website of Australia's Virtual Herbarium (www.avh.chah.org.au).

6. CYANTHILLIUM

Cyanthillium Blume, *Bijdr.* 889 (1826); probably from Greek *kyanos* (blue) and *ilium* (flank), referring to the purplish margins of the involucre bracts.

Type: *C. villosum* Blume

Annual short-lived herbs or sometimes perennial and ±shrubby, with short-stalked T-shaped asymmetric or symmetric hairs. Leaves simple, alternate, shortly petiolate. Capitula cylindric-campanulate, hemispherical to depressed globose or ovoid, pedunculate, in terminal cymose panicles; involucre bracts herbaceous, 3–4 (–5)-seriate, ovate, acute to acuminate, purplish on margins and apices; receptacle flat, alveolate, epaleate. Florets bisexual, actinomorphic, tubular, 15–90 (–95) per capitulum; corolla 5-lobed, with straight hairs; anthers sagittate below, without tails or appendages, non-glandular; style with node below subulate branches. Achenes obovoid-terete, mostly 5-ribbed, hairy or glabrous, with idioblasts. Pappus bristly or scaly, 1–2-seriate; outer row of bristles or scales sometimes absent, shorter than inner row, ±fused into a corona or callose ring, fimbriate; inner row usually of terete, white, deciduous bristles.

A genus of 7 or 8 species, distributed in the Indian Ocean, SE and eastern Asia, and tropical Africa; 2 species naturalised in Australia.

Involucre cylindric-campanulate, 2.5–3.5 mm wide; florets 15–20 per capitulum; achenes ±ribless, densely setulose; pappus biseriate, inner longer bristles about as long as corolla, outer shorter bristles persistent

1. *C. cinereum*

Involucre hemispherical to depressed-subglobose, 5–10 mm wide; florets 75–90 per capitulum; achenes 4 or 5-ribbed, glabrous and glandular; pappus uniseriate, delicate, bristles with much shorter than corolla

2. *C. patulum*

1. **Cyanthillium cinereum* (L.) H.Rob., *Proc. Biol. Soc. Washington* 103: 252 (1990)

Conyza cinerea L., *Sp. Pl.* 2: 862 (1753); *Vernonia cinerea* (L.) Less., *Linnaea* 4: 291 (1829). T: "Habitat in India", *Herb. Hermann* 3: 16, No. 419; lecto: BM000594658, *fide* C.Jeffrey, *Kew Bull.* 43: 224 (1988).

Illustrations: J.Jessop (ed.), *Fl. Central Australia* 366, fig. 464 (1985); J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 952, fig. 289M; 955, fig. 290G (1992), as *V. cinerea*; Q.Hu & D.Wu (eds), *Fl. Hong Kong* 3: 298, fig. 264; photo 526 (2009), as *V. cinerea*.

Erect, annual herb to 1.25 m tall; internodes ribbed, pubescent to cinereous-scabridulous. Leaves polymorphic, linear-lanceolate to elliptic, ovate to obovate-spathulate; basal and lower leaves (1–) 2–7 (–8) cm long, to 5 cm wide, sinuate-serrate to pinnatifid or ±entire, adaxially glandular-punctate, sparsely hairy and green, abaxially thinly to thickly fulvous-pubescent or ±glabrous; uppermost leaves often sessile and much smaller. Capitula in lax, terminal corymbs 2.5–5 mm diam.; peduncles 5–12 mm long; involucre cylindric-campanulate, 2.5–3.5 mm wide; bracts hirsute and glandular, often purplish-tipped; outer bracts subulate-lanceolate, 1.5–2 mm long, acuminate; inner bracts narrowly lanceolate, 2.5–4 mm long, awn-tipped. Florets 15–20 per capitulum, mauve, purple or lilac; corolla tube 3–4 (–5) mm long; lobes

hairy and glandular distally. Achenes terete, ±ribless, to 2 mm long, densely setulose, glandular. Pappus biseriate; outer bristles subulate; inner bristles linear, (3–) 4–5 mm long. *Iron Weed, Fleabane, Purple Fleabane.*

Distributed widely from tropical Africa to the Pacific. In Australia 4 varieties are recognised, one native, 3 introduced.

This species is used in India to produce vernolic acid for commercial paints, plastics, coatings, soaps and emulsifying agents, animal feed and dietary supplements (M.V.Viswanathan & H.B.Singh, in P.D.S.Caligari & D.J.N.Hind (eds), *Compositae: Biology and Utilization* 2:643–659. (1996)). Tender leaves and shoots are cooked as a pot herb in Qld, N.S.W. and N.T. (A.B. & J.W.Cribb, *Wild Food in Australia* 136 (1975)).

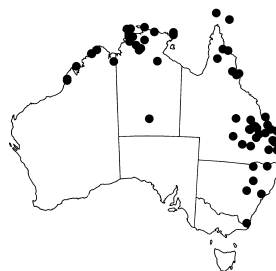
- | | | |
|----|--|------------------------------|
| 1 | Leaves linear or narrowly linear-lanceolate, entire with recurved margins and mucronulate apices; synflorescences small | 1c. var. linifolium |
| 1: | Lower leaves elliptic- or ovate-rhomboid, ovate-elliptic, or lanceolate, entire to lobed, not recurved; synflorescences mostly large, rarely small | |
| 2 | Leaves densely greyish villous-felted beneath, veins and veinlets bulging | 1b. var. lanatum |
| 2: | Leaves sparsely pubescent beneath, veins and veinlets pale, not bulging | |
| 3 | Leaves remotely sinuate-serrate, or remotely irregularly toothed to ±entire | 1a. var. cinereum |
| 3: | Leaves pinnatifid, with 3–6 mm long lobes | 1d. var. pinnatifidum |

1a. **Cyanthillium cinereum* (L.) H.Rob. var. **cinereum**

Stems to 100 cm long, greyish-pubescent. Basal and lower leaves elliptic-ovate to ±rhomboid-ovate; upper ones oblong or linear-oblong, sparsely greyish or fulvous-pubescent beneath, remotely irregularly toothed to ±entire. Synflorescence large. Involucre 4–5 mm long. Florets purple or bluish purple; corolla 3.5–4 mm long. Achenes 1.5–1.75 mm long, densely hairy. Fig. 21A–F.

Pantropical. Naturalised and a frequent weed of waste places in northern N.T. and W.A., and Qld and N.S.W.; on sandy or alluvial soils in grasslands, roadsides, riparian forests and in woodlands of various *Eucalyptus*, *Lophostemon*, *Melaleuca* and *Angophora* species. Flowers and fruits almost all year.

W.A.: Koolan Is., *G.Keighery & N.Gibson* 127 (PERTH). N.T.: Nightcliff, Darwin, *G.Chippendale* 7882 (MEL). Qld: c. 5 km S of 'Yarrol', SE of Monto, *A.R.Bean* 9770 (BRI); 5 km N of Didiot, *P.I.Forster* 1996 (BRI). N.S.W.: junction of Stanthorpe–Amosfield road with Maryland Rd, *P.G.Wilson* 1289 & *R.Rowe* (BRI, NSW).



1b. **Cyanthillium cinereum* var. **lanatum** (J.Kost.) Ghafoor, *Fl. Australia* 37: 607 (2015)

Vernonia cinerea var. *lanata* J.Kost., *Blumea* 1: 415 (1935). T: Mollucas, Amboina, *Zippelius* 244; holo: L.

Young shoots greyish-villous all over. Leaves undulate on margins, apically obtuse to ±rounded, mucronate, densely greyish villous to woolly or felted on lower surface; basal and lower leaves oblong-elliptic, (2–) 2.5–6 (–7) cm long, 1.5–2.5 cm wide, with veins and veinlets bulging and thick. Synflorescence lax to ±dense. Capitula on filiform peduncles; involucre 4–5 mm long; bracts somewhat brownish. Florets purplish or bluish violet; corolla 4.5–5 mm long. Achenes c. 1.5 mm long. Fig. 21G–H.

Distributed in the Mollucas, New Caledonia and P.N.G. Naturalised and very common in Qld, N.T. and northern W.A. and infrequent in NE N.S.W.; grows in grasslands, along field margins, gorges, riparian forest, on coarse sandy soil in woodland of *Eucalyptus acmenoides* and *E. drepanophylla*, occasionally in sandy flood deposits, banks of rivers and in dry stony places, up to 200 m alt. Flowers and fruits Apr.–Sept.



W.A.: SE Kimberley, Wurlwurdii, near Samim mining camp (at crossing of Swamp Ck.), *S.J.Forbes* 2520 (MEL). N.T.: Upper Wearyan R., *J.Russell-Smith* 7005 & *J.D.Lucas* (DNA). Qld: Hilton Shaft, 20 km N of Mt Isa, *S.Barrs* 27 (BRI); alongside water supply pipeline between Ngarabullgan and Mount Mulligan HS, *I.D.Fox* 1366 (BRI). N.S.W.: Walcha, sources of the Namoi R., n.d., *A.R.Crawford s.n.* (MEL).

1c. **Cyanthillium cinereum* var. *linifolium* (Blume) Karthik. & Moorthy, *Fl. Pl. India* 223 (2009)

Vernonia linifolia Blume, *Bijdr.* 893 (1826); *V. cinerea* var. *linifolia* (Blume) J.Kost., *Blumea* 1: 414 (1935). T: not designated.

Erect, to 30 cm tall, with \pm elongated stems and branches. Leaves sessile, linear to narrowly lanceolate, scabrid adaxially, sparsely fulvous below, entire, usually with recurved margins and mucronulate apices; lower leaves 1.5–5 (–7) cm long, 5–10 mm wide; upper leaves 1–2.5 (–3) cm long, 2.5–4 mm wide. Synflorescence small to moderate-sized. Involucre 4–5 mm long. Florets light purple; corolla 4.5–5.5 mm long. Achenes 1.5–1.75 mm long, antrorsely hairy.

Distributed from Burma to P.N.G. Naturalised and occurring infrequently in W.A., N.T. and more commonly in Qld; grows in open forest of *Eucalyptus crebra* and *Corymbia citriodora* with shrub layer of *Acacia* spp., *Hibiscus heterophyllus* and *Grewia latifolia* and grassy ground cover of *Arundinella nepalensis*, *Digitaria* sp. and *Eragrostis* sp. Common in disturbed sandy grassy ground, roadside drainages and on red-clay soil over laterite in *Eucalyptus miniata*/ *Livistona* forest and basalt plateau. Flowers and fruits Dec.–July.



W.A.: 7 km S of West Bay (Napier Broome Bay), Mt. Cone area, *E.A.Chesterfield* 312H (MEL); 40 km from Amax basecamp on Mitchell R., Station Rd, Mitchell Plateau, *K.F.Kenneally* 7063 (PERTH). N.T.: Yangalala camp, *H.Reeve & Wupunba* 541 (CANB). Qld: Condamine R., 20 km S of Dalby, *R.J.Fensham* 1908 (BRI); E of Musgrave beside the road to Marina Plains, *B.S.Wannan* 4514 (BRI).

1d. *Cyanthillium cinereum* var. *pinnatifidum* Ghafoor, *Fl. Australia* 37: 607 (2015)

T.: N.S.W.: Northern Tablelands, Dorrigo–Bellington road, Thora turn off, 30° 26' S, 152° 47' E, 9 Mar. 1963, *I.Hore-Lacey* 881; holotype: NE.

Erect herbs to 60 (–80) cm tall. Stem and branches ribbed, subglabrous to hairy. Leaves with petiole 5–10 mm long; lamina lanceolate-elliptic to oblong, 2.5–6 cm long, 1.5–2.5 cm wide, basally oblique, shallowly to deeply pinnatifid, obtuse, discolorous, dark-green above, sparsely pubescent and light-green beneath; lobes 3–6 mm long, 1.5–1.75 mm wide, \pm acute to subobtuse. Synflorescence large to medium-sized. Involucre 4–5 mm long. Florets pinkish violet or pinkish white; corolla 5–6 mm long. Achenes terete, 1.5–1.75 mm long, densely hirsute. *Purple Fleabane*.

Endemic to Australia in NE N.S.W. & SE Qld; commonly occurs in disturbed areas in degraded woodland of *Eucalyptus carnea* and *E. tereticornis*, in dark sandy clay loam soils along creeks, red chocolate soils, on granite soils in wet sclerophyll forests, on shallow loam, on sediments in dry open forest of *Eucalyptus campanulata/intermedia* with *Imperata cylindrica*, and *Indigofera australis*, on basalt, and in poor sandy granite podzol in layered open forest with *Eucalyptus andrewsii* dominant. Flowers and fruits Nov.–Mar.



Qld: c. 7 km along Painters Creek Rd, from Bruce Hwy, SE of Nambour, *B.Clark* 38 (NE); Mount Crosby Rd, Anstead, *P.I.Forester* 32410 (BRI, MEL, NE). N.S.W.: 'Willows', Bonshaw Rd, c. 43 km WNW Glen Innes, 11 Feb. 1992, *A.G.Hamilton & R.L.Smith s.n.* (NE); New England Natl Park, Point Lookout, Lower Track, *H.Lacey* 133 (NE); E end of Goonoowigall BR, 12 km SE of Inverell, *J.Smith* 7 (NE).

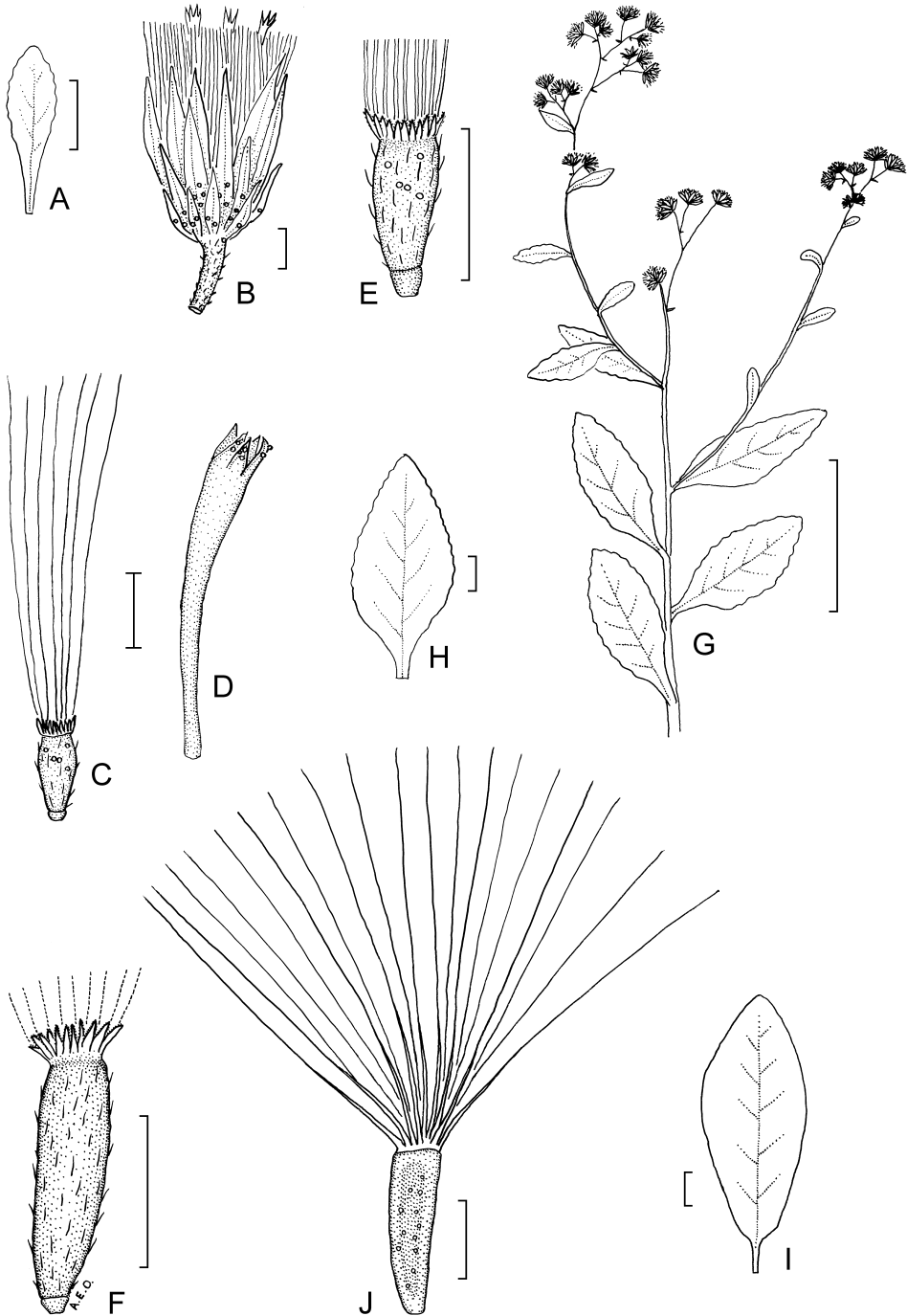


Figure 21. A–F, *Cyananthillium cinereum* var. *cinereum*. A, leaf; B, flowering capitulum; C, floret, corolla removed; D, floret corolla; E, detail of ovary; F, achene, inner pappus shed (A–F, R.J.Cumming 23660, CANB). G, H, *C. cinereum* var. *lanatum*. G, habit; H, leaf (G, H, A.G.Floyd 15852, CANB). I, J, *Tarlmounia elliptica*. I, leaf; J, achene (I, J, F.A.Zich 622, CANB). Scale bars: A, H, I = 1 cm; G = 5 cm; B–F, J = 1 mm. Drawn by A.E.Orchard.

2. **Cyanthillium patulum* (Dryand.) H.Rob., *Proc. Biol. Soc. Washington* 103 (1): 252 (1990)

Conyza patula Dryand. in W.Aiton, *Hort. Kew* 3: 184 (1789). T: Described from a plant cultivated in Kew by Mr Phillip Miller in 1758.

Illustrations: Q.Hu & D.Wu (eds), *Fl. Hong Kong* 3: 298, Photo 527 (2009); Z.Y.Wu *et al.* (eds), *Fl. China* 20–21: 366, fig. 343, 8–15 (2011), as *Vernonia patula* (Ait.) Merr.

Erect herbs, 20–90 cm tall, much branched, with thinly to sparsely hairy, striate-ribbed stems. Leaves with petiole to c. 1 cm long; lamina rhombic to ovate-elliptic, 1.5–10 cm long, 1–5 cm wide, cuneate or ±decurrent, coarsely serrate or subentire, acute to subobtusely, adaxially sparsely sericeous, abaxially glandular, densely silky-hairy. Capitula 75–100-flowered, aggregated in dichotomously branched panicles; peduncles to c. 1 cm long; involucre hemispherical to depressed subglobose, 5–10 mm wide; outer bracts lanceolate, 3–4 mm long; inner bracts 6–7 mm long, broadly pellucid-margined, acuminate, purple-tipped, thinly grey-pubescent. Florets violet; corolla 4–5 mm long, lobes lanceolate, acute; anthers and style branches violet to white. Achenes obovoid-obloid, 1.25–1.5 mm long, 4- or 5-ribbed, pale-brown, glabrous, glandular. Pappus uniseriate; bristles 8–10, stiff, white, caducous. *Spreading Fleabane*.

Native of China, In Australia, naturalised in the N.T. in sandy soil and claypans behind coastal dunes and in coastal vine thickets along with *Limnophila fragrans* and other weedy species. Also naturalised from India to New Guinea, and the Caribbean. Flowers and fruits Apr.–Sept.

N.T.: Bay Hill, Gurig Natl Park, at E end of fenceline from cattle grid at entrance to Park, *K.Brennan* 6936 (DNA); Cobourge Penin., Bowen Strait, *C.R.Dunlop* 7049 & *P.Munns* (DNA); Temira, Port Darwin, *M.W.Holtze* 517 (MEL); Cape Hotham, South Alligator, 16 km S of the Cape, *D.Lucas* 36 & *B.Wilson* (DNA); Minampi, Melville Is., *J.Russell-Smith* 5836 & *J.D.Lucas* (BRI, DNA).



Like *Cyanthillium cinereum*, *C. patula* is a medicinal plant and its many uses include reducing fever and treating malaria, stomach and digestive tract disorders, common colds and headaches (Z.Y.Wu *et al.* (eds), *Fl. China* 20–21: 366 (2011)).

7. TARLMOUNIA

Tarlmounia H.Rob., S.C.Keeley, Skvarla & R.Chan, *Proc. Biol. Soc. Washington* 121 (1): 31 (2008); based on a local name, Tarlmoun (Thailand), for the type species.

Type: *T. elliptica* (DC.) H.Rob., S.C.Keeley, Skvarla & R.Chan

Plants scandent, with dense cover of long-armed, T-shaped hairs on stem, underside of leaves and peduncles. Leaves alternate, shortly petiolate, oblong to elliptic, entire to remotely denticulate, almost glabrous and green above; secondary veins pinnate, 4–6, irregularly arching toward apices. Capitula terminal, in small, ±dense clusters, on branch and branchlet apices in a narrow thyrsoid synflorescence; involucre oblong-cylindric; bracts imbricate, 4–5-seriate; receptacle glabrous, epaleate. Florets c. 5; corolla funnelform, pale purple, fading to white, glandular; anthers tailed with minimal basal fringe; apical appendage narrowly oblong; style base widened with annulus of sclerified cells; upper shaft and branches of style with obtuse sweeping hairs. Achenes usually 5-angled, glabrous, glandular; carpodium nearly cylindrical. Pappus uniseriate; bristles widening distally, delicate.

A monotypic genus, distributed in Sri Lanka, Thailand, Malaysia, Singapore, Vietnam; introduced in Australia, China, Hawaii and elsewhere.

H.Robinson *et al.*, Studies on the Gymnantheminae (Vernoniaeae: Asteraceae) III. Restoration of the genus *Strobocalyx* and the new genus *Tarlmounia*, *Proc. Biol. Soc. Washington* 121(1): 19–33 (2008).

***Tarlounia elliptica** (DC.) H.Rob., S.C.Keeley, Skvarla & R.Chan, *Proc. Biol. Soc. Washington* 121 (1): 32, fig. 3B, 9A–E (2008)

Vernonia elliptica DC. in R.Wight, *Contr. Bot. India* 5 (1934). T: Peninsular India, Neelgherry, *R.Wight* 1377/149; holo: K?; iso: E 00413302.

V. elaeagnifolia DC., *Prodr.* 5: 22 (1836). T: 'India Orient. Ad Maolmyne Myanmar', 1827, *Wallich* 3041; holo: K 000814684.

Illustrations: C.Peng *et al.*, *Taiwania* 43 (4): 324, fig. 4 (1998); Q.Hu & D.Wu (eds) *Fl. Hong Kong* 3: 300, fig. 266 (2009); both as *V. elliptica*.

Rhizomatous, greyish-sericeous, much branched shrubby climbers with pendulous, elongate, finely sulcate shoots. Leaves with curved petiole to c. 2.5 cm long; lamina elliptic-oblong, 2–6 (–7) cm long, 1–4 (–5) cm wide, basally cuneate to obtuse, entire, \pm undulate when dry, acute, glabrous to slightly sericeous above, densely sericeous beneath. Capitula subsessile, in lax panicle; involucre 3–4 mm long, 1.5–2.5 mm wide; bracts ovate to oblong-obovate, thinly puberulous, tinged pale-purple towards obtuse apices. Corolla 5–6 mm long; limb pinkish; lobes 5, c. 2 mm long, sparsely glandular. Achenes clavate, 1.8–2.3 mm long, pale brownish, densely and minutely glandular. Pappus bristles numerous, 4.5–5.5 mm long, white. *Dreadlock, Dread.* Fig. 21 I–J.

Native to India, Myanmar, and Thailand; introduced in Australia, and naturalised in Cape York and the Torres Straits Is, Qld, near beaches, in pure and humid sandy soil in littoral mangrove (*Avicennia marina* and *Lumnitzera littorea*) and fringing forest. Flowers and fruits July–Dec.

Qld: Kewara St, Kewara Beach, 20 km NW of Cairns, *M.Stevens* C569 (BRI); Horn Is., Torres Strait, *B.M.Waterhouse* 7414 (BRI, CANB); Kewara St opposite Brolga St, Kewara Beach, *B.M.Waterhouse* 5051 & *S.Jacobson* (BRI, CANB, DNA, MBA).



8. VERNONIA

Vernonia Schreb., *Gen. Pl.* 2: 541 (1791), *nom. cons.*; named to honour William Vernon (1666–1715), an English botanist.

Type: *V. noveboracensis* (L.) Willd.

Erect or suberect, annual or perennial herbs or sometimes subshrubs, with simple or symmetrically T-shaped hairs. Leaves alternate, simple. Capitula usually pedunculate, 8–75-flowered, in simple or corymbiform cymes with branches longer than central axis. Involucre imbricate, 4–6-seriate; bracts usually persistent; receptacle flat, naked, weakly alveolate. Florets actinomorphic; corolla tubular with narrowly campanulate or funnellform, 5-lobed limb; anthers without tails, appendages often glandular; styles with nodes; style branches subulate, with acute, sometimes septate, sweeping hairs. Achenes oblong or turbinate, 5–10-costate, setulose or glandular and/or with idioblasts; raphides \pm quadrate. Pappus usually biseriate; bristles of inner row filiform, caducous; outer bristles much shorter, squamiform.

A genus of 22 species, distributed from SE U.S.A. and Bahamas to central Mexico, India and SE Asia; one species extending to Australia.

R.P.Randall (*The introduced flora of Australia and its weed status* 496 (2007)) also reports *Vernonia altissima* Nutt (syn. *V. gigantea* (Walter) Trell), *V. arkansana* DC. (syn. *V. crinita* Raf.), *V. glabra* (Steetz) Vatke, *V. messpilifolia* Less. and *V. pedunculata* DC. as introduced, but no herbarium specimens have been seen to confirm this. Their naturalisation status is not known.

***Vernonia junghuhniana* J.Kost., *Blumea* 1: 404 (1935)**

T: Java, *Junghuhn* 389; syn: L, U.

Illustrations: J.Koster, *loc. cit.* pl. II, fig. 15; C.A.Backer, *Fl. Java* 3: 372, fig. 33.3 (1965).

Perennial herbs or shrubs, erect or ascending, to 1 m tall; internodes ribbed, glandular-hairy. Leaves with petiole 5–15 mm long; lamina oblong to ovate-lanceolate or rhombic-ovate, 2–10 cm long, 1–3 cm wide, tapering to base, entire or crenate-serrate, obtuse or \pm acuminate, pubescent and glandular on both sides, dull grey-green. Capitula 20–25-flowered; peduncles 1.2–1.5 cm long, in a dichasium-like panicle; involucre oblong, 4.5–5.5 mm long; bracts oblong, densely glandular hairy, outer bracts linear, with long, articulate hairs; inner bracts lanceolate, 5–6 mm long, sparsely hairy, long-acuminate. Florets pink-mauve or light violet; corolla c. 4.5 mm long; lobes acute, apically hairy; anthers glandular; style branches short. Achenes oblong, 1.5–2 mm long, inconspicuously 4- or 5-ribbed, densely white appressed-hairy. Pappus outer bristles scaly, oblong-lanceolate, c. 0.5 mm long; inner bristles c. 4 mm long. Fig. 22D–G.

A native of the Malaysian Archipelago to P.N.G.; known from islands in the Torres Strait, and probably native there. Flowers collected Apr.–May.

Qld: Warraber (Sue) Is., Torres Strait, *B.M.Waterhouse* 4312 (BRI); Gabba Is., Torres Strait, *B.M.Waterhouse* 6417 (BRI, CANB, US); Warraber Is., Torres Strait, *B.M.Waterhouse* 6413 (BRI, CANB, DNA, MBA); Dalrymple Is., Torres Strait, *B.M.Waterhouse* 6626 (BRI, CANB).



9. DECANEUOPSIS

Decaneuopsis H.Rob. & Skvarla, *Proc. Biol. Soc. Washington* 120(3): 360 (2007); from Latin *deca* (ten) and *neuropsis* (nerves or ribs), referring to the 8–10-ribbed achenes.

Type: *D. cumingiana* (Benth.) H.Rob. & Skvarla

Suffrutescent, scandent, slender-stemmed shrubs with simple, symmetrical to \pm asymmetrical hairs. Leaves alternate, shortly petiolate, oblong to obovate, cuneate to obtuse, entire or remotely denticulate, shortly acuminate, concolorous. Capitula pedunculate, clustered or solitary, on distal or lateral branches, thyriform, or narrowly pyramidal with corymb-like or thyriform lateral branches. Involucral bracts 4–6-seriate, broadly obtuse to acute; receptacle occasionally hirsute. Florets 3–40 or more per capitulum; corolla white to purple or pale yellow; tube slender; limb narrowly campanulate, glandular especially on base of throat; anthers with narrowly ovate to oblong, glabrous appendages and broad tails below; style not thickened below branches, with obtuse sweeping hairs. Achenes strongly 8–10-ribbed, often puberulous; raphides elongate. Pappus 1- or 2-seriate; shorter bristles few or none; longer bristles broadened distally.

A genus of c. 12 species, distributed from India eastwards to Indonesia, the Philippines and China; one species naturalised in Australia.

H.Robinson & J.J.Skvarla, Studies on the Gymnantheminae (Vernonieae: Asteraceae). II. A new genus, *Decaneuopsis*, from China, India and Southeast Asia, *Proc. Biol. Soc. Washington* 120: 359–66 (2007).

****Decaneuopsis obovata* (Gaudich.) H.Rob. & Skvarla, *Proc. Biol. Soc. Washington* 120(3): 365 (2007)**

Gymnanthemum obovatum Gaudich., *Voy. Uranie* 471 (1830). T: 'In insulis Moluccis (Rawak)', *C.Gaudichaud-Beaupré*; holotype: ?P n.v.

Vernonia cuneata Less., *Linnaea* 6: 644 (1831). T: In insula Rowak fortasse haud procul ab insula Timor sita, lectam dedit cl: Gaudichaud (v.s. 1. in hrb Kth.) [From Rowack Is., perhaps situated not far from Timor, collected by the celebrated Gaudichaud (a specimen seen in the herbarium of Kunth)]; holotype: ?B n.v.

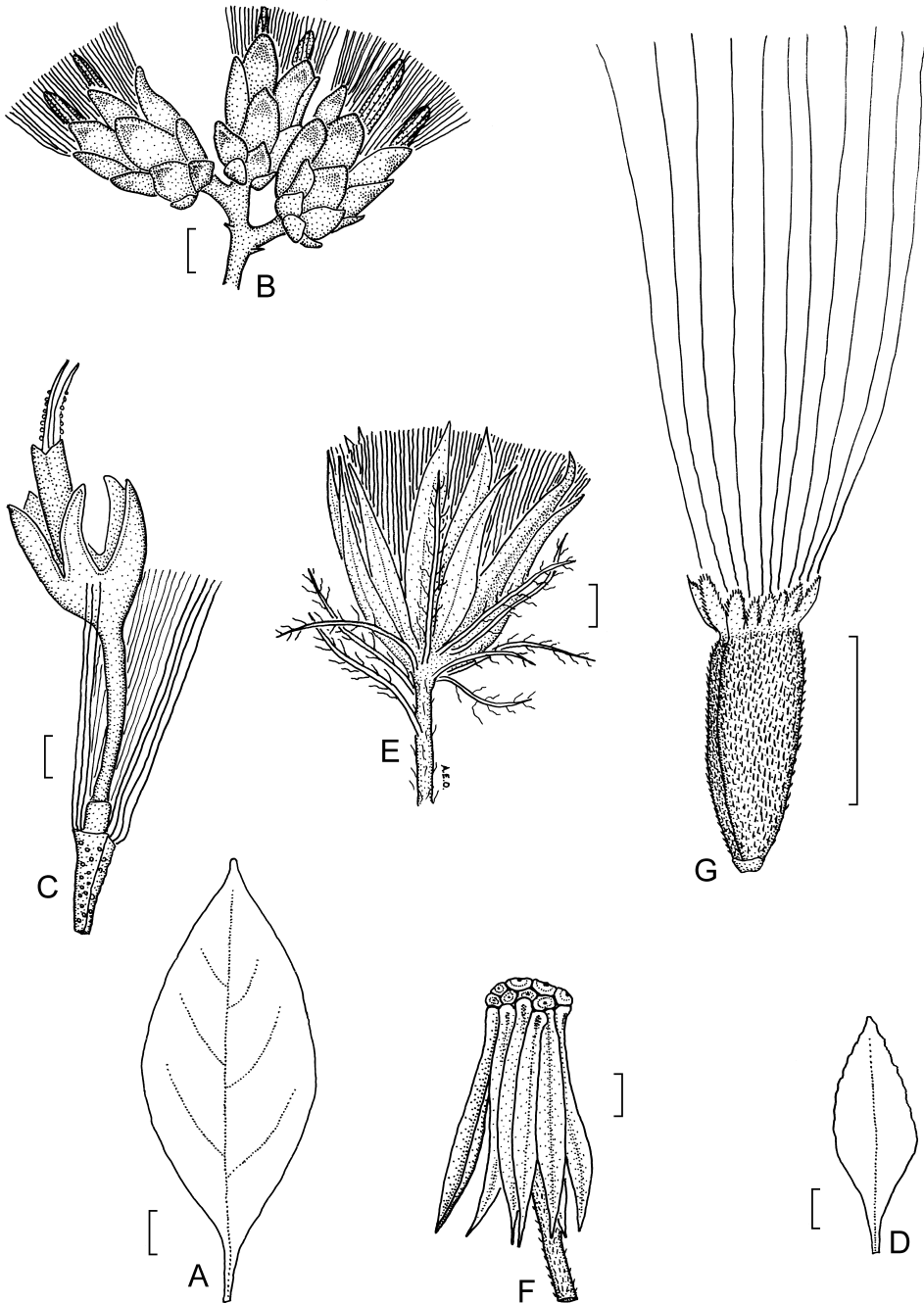


Figure 22. A–C, *Decaneuropsis obovata*. A, leaf; B, three capitula in bud; C, floret, some front pappus bristles removed (A–C, L.J.Brass 19291, CANB). D–G, *Vernonia junghuhniana*. D, leaf; E, capitulum; F, old capitulum, achenes shed; G, achene (D–G, B.M.Waterhouse 6413, CANB). Scale bars: A, D = 1 cm; B, C, E–G = 1 mm. Drawn by A.E.Orchard.

Scrambling, much branched shrub with ribbed, minutely glandular, often tomentose young shoots. Leaves with petiole 5–15 mm long; lamina elliptic-obovate to \pm elliptic, 4–15 cm long, 1.5–6 (–7) cm wide, attenuate, entire, acuminate or acute to subobtusate, tomentose when young then glandular abaxially. Capitula cylindrical, 5–7-flowered, c. 1 cm long, borne in a large, terminal or axillary elongate, thyrsoïd synflorescence; peduncles to 8 mm long; involucre cylindrical, 4-seriate, 6–8 mm long; bracts coriaceous, boat-shaped, minutely ciliate-margined, glandular distally; outer bracts ovate, acuminate, later patent; inner bracts oblong, recurved. Florets creamy-white or pale to light yellow; corolla 6–7 mm long; tube slender; lobes lanceolate, acute, glandular. Achenes narrowly oblong-turbinate, 3–4 mm long, c. 10-ribbed, glabrous to \pm densely glandular or eglandular. Pappus uniseriate; bristles 6–7 mm long, \pm reddish on drying. Fig. 22A–C.



A native of Indonesia. In Australia naturalised and restricted to the Iron Ra. area in NE Qld, climbing to canopy of *Melaleuca leucodendra* near mangrove zone in sandy/silty soil. It appears to be salt tolerant and a potential major environmental weed. Flowers and fruits June–Nov.

Qld: Cape York, Iron Ra., *L.J.Brass* 19141 (BRI); *ibid*, *L.J.Brass* 19291 (BRI).

Excluded species

Vernonia vagans DC., *Prodr.* 5: 32 (1836)

T: In India orient. prov. Silhet leg. cl. Wallich; syn: Bangladesh, Silhet, *N.Wallich* 3040-150 (several specimens), G-DC *n.v.*

Native to India, Myanmar (Burma) and Thailand, listed for Australia by F.Mueller (*Fragm.* 6: 234 (1868)) on the basis of a Dallachy specimen from Rockingham Bay. This specimen has not been seen but the record is almost certainly in error. The species is currently included in *Decaneuropsis*.

ASTERACEAE

Subfam. 4. ASTEROIDEAE

A.E.Orchard

Asteroideae Lindl. in J.C.Loudon, *Encycl. Pl.* 1074 (1829), as *Astereae*

Type: *Aster* L.

Perennial or annual herbs, shrubs or rarely small trees, rarely scandent or facultatively aquatic; leaves alternate or opposite, rarely rosulate, usually simple but often deeply dissected, not spiny. Capitula solitary on terminal scapes or cymose, radiate, disciform or discoid, very rarely ligulate (not in Australia), heterogamous or homogamous; involucre bracts 1–many-seriate, gradate, sometimes equisized (especially *Senecioneae*), never spiny; receptacle epaleate, usually glabrous, or paleate; florets usually numerous, sometimes as few as 1, all fertile or some sterile. Florets all tubular, or outer florets filiform or radiate, (3–) 5 (–6)-merous; anthers usually ecalcarate, caudate or ecaudate, with tails simple; style shaft lacking articulation, glabrous; style branches short to long, tapered and acute to obtuse or truncate, often with a terminal appendage, often dorsally hairy; stigmatic papillae mostly in 2 lines on inner surface of style branches, sometimes confluent towards tip, rarely covering entire surface. Achenes variously shaped, usually with twin hairs. Pappus diverse, of setae, awns, or scales, sometimes coroniform or auriculiform, sometimes heteromorphic, sometimes absent.

A subfamily of c. 1210 genera and 17,000 species, widely distributed on all continents except Antarctica. In Australia 16 tribes, c. 235 genera and 1284 species, the majority in the tribes *Gnaphalieae* (Paper Daisies) and *Astereae* (True Daisies), each with about 500 species. *Gnaphalieae* and *Astereae* will be treated in volumes 38A and 38B for the *Flora of Australia*, the remaining 14 tribes are treated in the present volume. No key to tribes is provided here: readers should use the Key to Genera beginning on page 18 of this volume.

Trib. 1. SENECTIONEAE

I.R.Thompson

A.E.Orchard (Bedfordia)

Asteraceae trib. *Senecioneae* Cass., *J. Phys. Chim. Hist. Nat. Arts* 88: 196 (1819)

Type: *Senecio* L.

Herbs, shrubs or subshrubs, trees or climbers, sometimes dioecious or gynodioecious, taprooted or not; latex lacking. Hairs mostly eglandular, glandular in *Petasites*, not furcate. Leaves mostly alternate, occasionally rosulate, pinnately or palmately veined, not spiny, glandular in *Abrotanella* and *Centropappus*. Inflorescences terminal, or axillary in *Bedfordia*. Capitula disciform, radiate or discoid, mostly pedunculate, sessile at first in *Abrotanella*; involucre usually uniseriate (rarely bi- or multiseriate), sometimes subtended by a series of smaller calycular bracteoles (forming the calyculus); involucre bracts free or rarely connate, without outgrowths; receptacle epaleate, usually ±flat. Florets: ligule of ray florets obtuse, 3-lobed, commonly yellow, also of other colours; tube of ligulate florets mostly glabrous; disc florets sometimes functionally male. Anthers ecalcarate, ecaudate or caudate, with apical appendage ovate, lanceolate or oblong. Style (of perfect florets) glabrous or with obtuse hairs; style branches short to long, not tapering, often penicillate apically, occasionally with a tapering terminal appendage, commonly each with 2 stigmatic zones. Achenes homomorphic, sometimes mildly dimorphic in *Senecio*, terete, compressed in *Cineraria*, with ribs smooth, sometimes with papillose hairs, unbeaked or sometimes shortly beaked in *Senecio*. Pappus homomorphic, absent in *Abrotanella*, white, pink in *Erechtites*; bristles uniform within pappus, capillary, smooth, scabridulous or barbellate.

A tribe of c. 120 genera and more than 3000 species, with 14 genera and 116 species in Australia. Most of the diversity in capitulum types occurs in *Senecio* and the different floret

ASTERACEAE

types and their sex is discussed under that genus. The South African genus *Othonna* is not represented in Australia, although a few species of *Senecio* have in the past been placed there.

I.R.Thompson, A taxonomic treatment of tribe Senecioneae (Asteraceae) in Australia, *Muelleria* 24: 51–110 (2006); B.Nordenstam, *XII. Tribe Senecioneae Cass. (1819)*, in J.W.Kadereit & C.Jeffrey (EDS), *Fam. Gen. Vasc. Pl.* 8: 208–241 (2007); B.Nordenstam *et al.*, *Senecioneae*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 503–525 (2009).

KEY TO GENERA

- 1 Capitula radiate, sometimes ligules short, and sometimes irregularly toothed or purple
- 2 Largest leaves with a sharp division between petiole and lamina, with petiole > 5 cm long, and lamina 1–1.5 times longer than wide, truncate to cordate
- 3 Rosetted, dioecious herbs to 0.4 m high (plants in Australia male only); ligules white **4. PETASITES**
- 3: Hermaphrodite shrubs to 3 m high; ligules yellow **5. ROLDANA**
- 2: Largest leaves not as above or if so then petiole < 5 cm long, and with lamina > 2 times longer than wide, attenuate to cuneate
- 4 Capitula solitary on long, naked peduncle densely woolly at base, ecalyculate; involucre bracts connate proximally **7. EURYOPS**
- 4: Capitula solitary or not; peduncle various, not densely woolly at base, mostly calyculate; involucre bracts free, or if fused then leaves not dissected
- 5 Trees to 3.5 m high; leaves viscid with upper surface gland-dotted **2. CENTROPAPPUS**
- 5: Herbs to 2.5 m high; leaves not viscid or gland-dotted
- 6 Achenes compressed, winged **8. CINERARIA**
- 6: Achenes ±terete, not winged **9. SENECIO**
- 1: Capitula discoid or disciform
- 7 Plants climbing; leaves petiolate, with reniform auricles at base of petiole; lamina ±equal length to petiole, ±as broad as long, strongly cordate **6. DELAIREA**
- 7: Plants not climbing; leaves not petiolate or if so then petiole much shorter than lamina and without reniform auricles at base; lamina longer than wide, with base variously shaped
- 8 Plants < 0.1 m high; central florets functionally male; pappus absent (higher montane to alpine) **1. ABROTANELLA**
- 8: Plants > 0.1 m high; central florets bisexual; pappus present (habitat various)
- 9 Shrubs or trees; leaves entire; lower surface of leaves, peduncles and capitula densely woolly; inflorescences axillary; capitula discoid **3. BEDFORDIA**
- 9: Herbs or shrubs; leaves entire or not; indumentum not entirely as above; inflorescences terminal; capitula disciform or discoid
- 10 Capitula ecalyculate **13. EMILIA**
- 10: Capitula calyculate
- 11 Calycular bracteoles narrowly linear with l:w ratio > 10, 0.1–0.2 mm wide; receptacular pits all raised; style branches purple distally
- 12 Leaves pinnatisect with segments beyond mid-leaf; capitular buds erect; capitula disciform; corolla lobes pink; achenes pale brown; pappus pink **10. ERECHTITES**
- 12: Leaves undivided, or if pinnatisect then segments not present beyond mid-leaf; capitular buds pendent; capitula discoid; corolla lobes orange or red; achenes purple; pappus white **12. CRASSOCEPHALUM**

ASTERACEAE

- 11: Calycular bracteoles variously shaped with l:w ratio < 10, or if > 10 then c. 0.4–0.8 mm wide; receptacular pits not or hardly raised; style branches yellow
- 13 Herbs; capitula discoid; style branches terminating with a tapering, hairy appendage; achenes > 5 mm long 14. GYNURA
- 13: Herbs or shrubs; capitula disciform or discoid; style branches without a tapering hairy appendage; achenes < 5 mm long, or if longer then capitula disciform
- 14 Involucre 12–20 mm long AND 5–7 times longer than diameter (measured at mid-involucre, not pressed); capitula disciform with outer florets bearing a rudimentary, lacerately-lobed ligule c. 1 mm long; central florets 2–5 11. ARRHENECHTHITES
- 14: Involucre shorter and/or less slender than above; capitula discoid or if disciform then outer florets without a ligule; bisexual central florets mostly more than 5 9. SENECIO

1. ABROTANELLA

Abrotanella Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 36: 27 (1825); possibly from the Greek *abrotonon*, an Ancient Greek name for *Artemisia abrotanum* L. (Southernwood), and *ella*, a diminutive suffix, for a supposed resemblance.

Type: *A. emarginata* Cass.

Trineuron Hook.f., *Fl. Antarct.* 1: 23 (1844). T: *T. spathulatum* Hook.f.

Scleroleima Hook.f. in W.J.Hooker, *London J. Bot.* 5: 444, t. 14 (1846). T: *S. forsteroides* Hook.f.

Perennial herbs. Leaves sessile, with sunken glands; venation obscure. Capitula disciform, sessile or subsessile at anthesis, but sometimes subsequently developing a peduncle, ecalyculate; involucre bracts free. Florets: disc florets sometimes functionally male (all Australian species); corolla limb variously coloured; anthers caudate; style undivided (functionally male florets) or shortly branched, truncate, crowned by papillae if functional, without terminal appendage. Achenes homomorphic, obovoid. Pappus absent.

A genus of 18 species predominantly of subantarctic distribution from southern S America, New Zealand, New Guinea, and Australia; 3 endemic species in Australia.

The tribal placement of this genus is problematic; it had been placed in the Anthemideae until transferred to subtribe Blennospermatinae of the Senecioneae by R.B.Nordenstam in V.H.Heywood *et al.* (eds), *The biology and chemistry of the Compositae* 2: 810 (1977). Several molecular studies, e.g. S.J.Wagstaff & I.Breitwieser, *Pl. Syst. Evol.* 231: 203–224 (2002) and P.B.Pelser *et al.*, *Amer. J. Bot.* 89(6): 929–939 (2002), have not clarified its phylogenetic position.

The Australian species of *Abrotanella* have functionally male central florets. Other features of this genus not seen in other senecionoid genera in Australia include the loose and irregular overlapping and uniform shape of the involucre bracts, and the poor differentiation of the corolla into basal cone, tube and limb regions.

U.Swenson, Systematics of *Abrotanella*, an Amphi-pacific genus of Asteraceae (Senecioneae), *Pl. Syst. Evol.* 197: 149–93 (1995).

- 1 Inflorescences of 2 or more capitula 3. *A. scapigera*
- 1: Inflorescences of 1 capitulum
- 2 Leaves suberect, ovate to lanceolate, 3–8 mm long, acute; plants forming dense cushions, with stems closely packed 1. *A. forsteroides*
- 2: Leaves somewhat spreading, linear, 8–20 mm long, ±rounded to truncate; plant habit not as dense as above 2. *A. nivigena*

1. *Abrotanella forsteroides* (Hook.f.) Benth., *Fl. Austral.* 3: 554 (1867), as *forsterioides*

Scleroleima forsteroides Hook.f. in W.J.Hooker, *London J. Bot.* 5: 444, t. 14 (1846). T: Tas., 1839–43, *J.D.Hooker Antarct. Exp.*; lecto: K, *fide* U.Swenson, *Pl. Syst. Evol.* 197: 161 (1995).

Illustrations: U.Swenson, *op. cit.* 160, fig. 3C (1995); C.Howells (ed.), *Tasmania's Nat. Fl.* 2nd edn 26 (2012).

Cushion-plants to 7 cm high, \pm glabrous; adventitious roots c. 1 mm diam. Leaves suberect, ovate to lanceolate, 3–8 mm long, convex abaxially, dilated at base, entire or denticulate, acuminate, mucronate. Capitula 1 per stem; peduncle to c. 8 mm long at maturity, lacking bracteoles; involucre c. 1 mm long; bracts 3–7, \pm oblong, finally erect; stereome flat, thin, without resin ducts. Florets: female florets 1–3; male florets 1–3; corolla 2.0–2.5 mm long; limb 4-lobed, greenish yellow. Achenes obovoid, 1.5–1.8 mm long, slightly to markedly 4-ribbed, brown, glabrous. Fig. 23D.

Occurs in NW, NE and south-central Tas. Grows in summit moors, screes and wet places such as below snowbanks at altitudes over 1000 m. Flowers Oct.–Jan.

Tas.: Ben Lomond Natl Park, Hamilton Crags, 1.5 km E of Legges Tor, *F.E.Davies 1182 et al.* (AD, CANB, HO, MEL); 0.5 km NW of Second Bar L., *A.Moscal 6949* (HO).

Grows with other cushion plants in alpine communities, forming cushions to several metres in diameter. The stems and leaves are closely crowded with older leaves brown and persistent. The involucre is hidden within the upper leaves at anthesis but is exposed at fruiting. Unlike in the other species in Australia, the 1 or 2 achenes in each capitulum strongly exceed the involucre at maturity.



2. *Abrotanella nivigena* (F.Muell.) F.Muell., *Pl. Victoria* 2: t. 40 (1865)

Trineuron nivigenum F.Muell., *Trans. Philos. Soc. Victoria* 1: 105 (1855). T: Mungyang Mtns, N.S.W., Jan. 1855, *F.Mueller*; lecto: MEL, *fide* U.Swenson *op. cit.* 172 (1995); isolecto: MEL.

Illustrations: U.Swenson, *op. cit.* 166, fig. 5D (1995); A.B.Costin *et al.*, *Kosciuszko Alpine Flora* 2nd edn 201 (2000).

Cushion-plants to 3 (–5) cm high, largely glabrous; adventitious roots c. 0.5 mm diam. Leaves somewhat spreading, narrowly oblong to linear, 8–20 mm long, \pm flat, slightly dilated at base, entire, \pm rounded to truncate apically. Capitula 1 per stem; peduncle 5–20 mm long at maturity, bracteolate; involucre 2.5–4.0 mm long; bracts 8–14 (–16), \pm oblong, finally erect; stereome flat, fleshy, with 1 or 3 longitudinal ducts. Florets: female florets 7–17; male florets 4–12; corolla 1.5–3 mm long; limb 3- or 4-lobed, white or purple. Achenes obovoid, 2 mm long, slightly to markedly 4-ribbed, pale but purple distally, glabrous. *Snow-wort*. Plate 23; Fig. 23E.

Occurs in the Kosciuszko region of SE N.S.W. and in eastern Vic. Grows in alpine bogs, herbfields, grasslands, in rock crevices, and often associated with small waterfalls. Flowers Dec.–Jan.

N.S.W.: below Mt Stillwell, Kosciuszko area, *A.B.Costin 36* (CANB); Snowy R. near bridge below Seaman's Hut, Kosciuszko area, *M.Gray 6611* & *C.Totterdell* (CANB, MEL, NSW). Vic.: Southern head of Big R., c. 1.6 km E of Spion Kopje summit, Bogong High Plains, 3 Feb. 1949, *J.H.Willis* (MEL).

Abrotanella papuana S.Moore resembles *A. nivigena*, and was regarded as synonymous by Swenson, *op. cit.*, but it differs in several ways and is not included in the above circumscription of *A. nivigena*. Swenson noted that *A. papuana* lacks 3-lobed central florets, has fewer outer florets, sometimes has hairs on the peduncles and has leaves that are more erect. In addition to this list: leaves are more tapered distally, apically subacute to obtuse, with scattered translucent multicellular hairs on upper surface of leaves especially near margins; peduncular bracts are



fewer (1–4); and involucre are shorter (2.5–3 mm long). Mueller's generic name *Trineuron* is based on the presence of translucent resin ducts (one central and two peripheral) on the stereome of the involucre bracts.

3. *Abrotanella scapigera* (F.Muell.) Benth., *Fl. Austral.* 3: 554 (1867)

Trineuron scapigerum F.Muell., *Trans. Philos. Inst. Victoria* 2: 70 (1857). T: Mt La Perouse, Tas., C.Stuart; lecto: K, *fide* U.Swenson, *op. cit.* 169 (1995).

Illustrations: U.Swenson, *op. cit.* 166, fig. 5C (1995); C.Howells (ed.), *Tasmania's Nat. Fl.* 2nd edn 27 (2012).

Tufted scapiform herbs to 10 cm high, with brownish hairs on scape and leaf-margins; adventitious roots mostly 0.3–0.5 mm diam. Leaves suberect, narrowly spatulate or very narrowly elliptic, 10–40 mm long, ±flat or convex abaxially, slightly dilated at base, entire, obtuse to acute, mucronate. Capitula 2–10 per stem; peduncle to c. 15 mm long at maturity, bracteolate; involucre c. 3.0–3.5 mm long; bracts 8–12 (–14), ±oblong, finally erect; stereome flat, fleshy, with 3 longitudinal ducts. Florets: female florets 8–17; male florets 3–11; corolla 1–2 mm long; limb 4 (or 5)-lobed, white. Achenes obovoid, 1.7–2.2 mm long, slightly to markedly 4-ribbed, brown, glabrous. $2n = 18$, E.J.Beuzenberg & J.B.Hair, *New Zealand J. Bot.* 22: 353–356 (1984). Fig. 23A–C.

Occurs in NW and south-central Tas. Grows in moist low alpine grasslands, amongst cushion plants, sometimes in the shelter of low shrubs and in rock crevices, at altitudes over 950 m. Flowers mid-Dec.–Feb.

Tas.: Eldon Bluff, *A.M.Buchanan* 9993 (HO); Between L. Dobson and summit of Mt Field, *D.N.McVean* 22 (CANB); Naturalist Peak, Mount Field Natl Park, *P.S.Short* 3427 *et al.* (MEL).

The flowering stem of this species has one or a few bracteal leaves, an unusual feature in *Abrotanella*.



2. CENTROPAPPUS

Centropappus Hook.f. in W.J.Hooker, *London J. Bot.* 6: 124 (1847); derivation not stated.

Type: *C. brunonis* Hook.f.

Shrubs or small trees. Leaves petiolate or sessile, sometimes with glands, pinnately veined. Capitula radiate, pedunculate, calyculate; involucre bracts free. Florets: corolla limbs yellow, creamy white or white; anthers caudate or not; style branches obtuse to truncate, crowned by papillae, without terminal appendage. Achenes homomorphic, obloid to obovoid. Pappus ±persistent.

A monospecific genus endemic to Tasmania. The single species, *C. brunonis*, was transferred to *Brachyglottis* by R.B.Nordenstam, *op. cit.* 25. *Brachyglottis* is otherwise a polymorphic genus of about 28 species, all from New Zealand and the Chatham Is. Nordenstam acknowledged the unique suite of features in *C. brunonis* and gave consideration to reinstating it in *Centropappus*. Molecular studies by S.J.Wagstaff & I.Breitwieser, *Syst. Bot.* 29(4): 1003–1010 (2004) have indicated that *Brachyglottis brunonis* and *Bedfordia* together form a monophyletic group, and that this group is nested within a large clade containing New Zealand species of *Brachyglottis* as well as several other genera endemic to New Zealand. Their suggestion for a revised classification based on the molecular evidence is to place all taxa in this clade in the genus *Brachyglottis*. On the other hand, A.E.Orchard, *Muelleria* 19: 81–82 (2004) indicated that *Bedfordia* and *Brachyglottis brunonis*, although probably closely related, were sufficiently different morphologically to be separated at a generic level, and suggested, contingent on further molecular proof, that *B. brunonis* be returned to *Centropappus*.

R.B.Nordenstam, Taxonomic studies in the tribe Senecioneae (Compositae), *Opera Bot.* 44: 1–84 (1978).

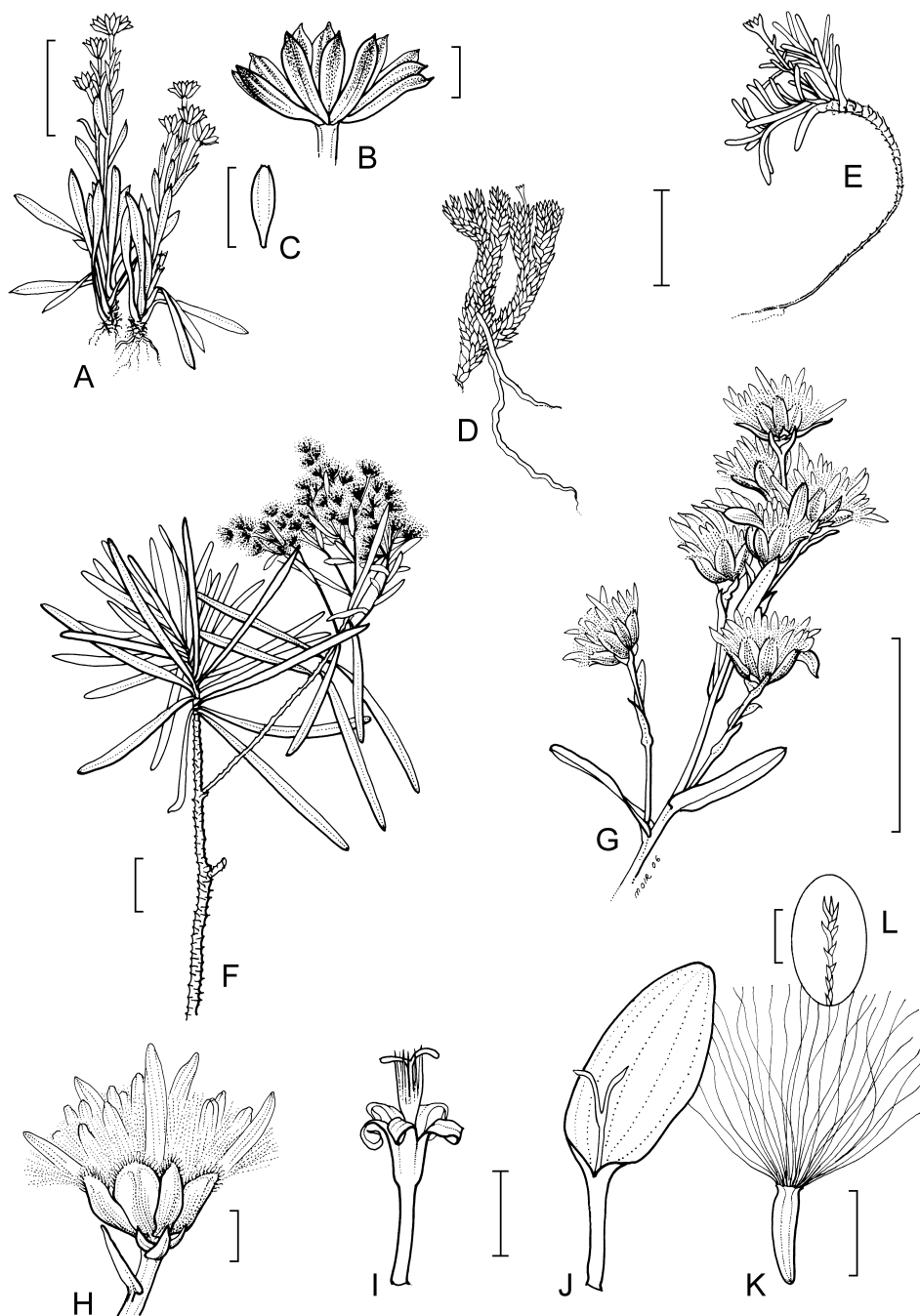


Figure 23. A–C. *Abrotanella scapigera*. A, habit; B, capitulum (fruiting stage); C, achene (A–C, T. & B.Gulliver, MEL1606196). D, *A. forsteroides*, habit (F.E.Davies 1182, MEL). E, *A. nivigena*, habit (M.Gray 6611 & C.Totterdell, MEL). F–L, *Centropappus brunonis*. F, flowering branch; G, cluster of capitula; H, capitulum; I, corolla of disc floret; J, corolla of ligulate floret; K, achene with pappus; L, apex of pappus bristle (F–H, M.G.Corrick 2241, MEL; I–L, T. & B.Gulliver, 1873, MEL). Scale bars: A, D–G = 20 mm; B, C, H–K = 2 mm; L = 0.2 mm. Drawn by M.Moir.

Centropappus brunonis Hook.f. in W.J.Hooker, *London J. Bot.* 6: 124 (1847)

Senecio centropappus F.Muell., *Cat. Pl. Cult. Melbourne Bot. Gard.* 26 (1858), *nom. illeg.*; *Senecio brunonis* (Hook.f.) J.H.Willis, *Muelleria* 1(3): 162 (1967); *Brachyglottis brunonis* (Hook.f.) B.Nord., *Opera Bot.* 44: 30 (1978). T: Mt Wellington, Tas., R.C.Gunn s.n.; holo: K n.v., fide R.B.Nordenstam *loc. cit.*

Illustration: C.Howells (ed.), *Tasmania's Nat. Fl.* 2nd edn 30 (2012), as *Brachyglottis brunonis*.

Shrubs or small trees to 3.5 m high, glabrous, with dark, laminating bark. Leaves crowded, narrowly linear, 5–10 cm long, entire, viscid, with upper surface gland-dotted. Capitula many per stem; peduncle to c. 15 mm long at maturity; calycular bracteoles 3–5, ovate, c. 2 mm long; involucre 3–5 mm long, c. 3 mm diam.; bracts 8, oblong-elliptic to narrowly oblong-elliptic, fimbriate distally; stereome convex, with 1–3 resin ducts; margin of receptacular pits slightly raised. Ligulate florets 5; ligules c. 5 mm long, 5–8-veined, yellow. Disc florets c. 15–20; corolla c. 4–5 mm long, c. 0.6 mm diam. at base, exceeding involucre bracts by c. 2 mm; limb c. $\frac{2}{5}$ of total length, with narrowly oblong, revolute lobes. Achenes slightly obovoid, 2.5–3 mm long, 5–8-ribbed, pale brown, glabrous; basal annulus narrow. Pappus c. 4 mm long, white; bristles scabrid-barbellate to sub-plumose. *Tree Ragwort*. Fig. 23F–L.

Restricted to Mt Wellington and Mt Dromedary in SE Tas. Grows on dolomite, on moderate to steep slopes, in tall open forest at altitudes from 490–1160 m. Flowers Jan.–Feb.

Tas.: Mt Wellington, Pinnacle Rd, c. 3 km from summit at start of Organ Pipes track, F.E.Davies 780 & P.Ollerenshaw (AD, CANB, HO, MEL); c. 2 km below Mt Wellington summit on Mt Wellington Rd, P.C.Jobson 1901 *et al.* (BRI, HO, MEL).

A distinctive species, but similar in several ways including involucre morphology to *Bedfordia* and to a lesser extent *Abrotanella*, although the latter is a dwarf herb. Leaves, when crushed, and flowers are pleasantly fragrant, suggestive of apricots according to one collector.

**3. BEDFORDIA***A.E.Orchard*

Bedfordia DC. in J.B.A.Guillemin, *Arch. Bot.* 2: 332 (1833); named in honour of John Russell (1766–1839), sixth Duke of Bedford, patron of horticulture and botany.

Type: *B. salicina* (Labill.) DC.

Trees or small shrubs. Leaves entire, cuneate basally with a short or poorly-defined petiole, pinnately veined; lower surface densely woolly. Capitula discoid, pedunculate, ecalyculate; peduncles densely woolly; involucre bracts in 2 \pm equal series, free, woolly. Florets: corolla limb cream to yellow or orange; anthers shortly caudate; style branches obtuse, lacking a terminal appendage, papillose. Achenes homomorphic, cylindrical, with 10–14 longitudinal ribs. Pappus \pm persistent.

A genus of 3 species, endemic to SE Australia

Nordenstam (1978) transferred *Centropappus* to the otherwise entirely New Zealand genus *Brachyglottis*, while leaving the closely related *Bedfordia* distinct. Orchard (2004) argued for the distinctiveness of *Bedfordia* and *Centropappus* on morphological grounds, but Wagstaff & Breitwieser (2004) suggested subsuming both into *Brachyglottis*. Pelter *et al.* (2007) have subsequently shown that *Brachyglottis* is polyphyletic, being phylogenetically dispersed among a diverse range of currently recognised genera from New Zealand, New Guinea, S America and Africa. However they have confirmed that *Bedfordia* and *Centropappus* together form a well-supported clade within this complex.

Both *B. salicina* and *B. linearis* contain alkaloids (Bick *et al.* (1991)), perhaps pyrrolizidine alkaloids.

R.B.Nordenstam, Taxonomic studies in the tribe Senecioneae (Compositae), *Opera Bot.* 44: 1–84 (1978); I.R.C.Bick *et al.*, *A Survey of Tasmanian Plants for Alkaloids* (1991); A.E.Orchard, A revision of *Bedfordia* (Asteraceae), *Muelleria* 19: 81–94 (2004); S.J.Wagstaff & I.Breitwieser, Phylogeny and classification of *Brachyglottis* (Senecioneae, Asteraceae): an example of a rapid species radiation in New Zealand, *Syst. Bot.* 29: 1003–1010 (2004); P.B.Pelser *et al.*, An ITS phylogeny of Tribe Senecioneae (Asteraceae) and a new delimitation of *Senecio* L., *Taxon* 56: 1077–1104 (2007); A.E.Orchard, Typification of *Bedfordia* species (Asteraceae: Senecioneae), *Newslett. Australas. Syst. Bot. Soc.* 155: 32 (2013).

- 1 Leaves oblong, lanceolate to narrowly ovate or oblanceolate, more than 1 cm wide; inflorescences with (3–) 8–30 (–40) capitula in each leaf axil
- 2 Undersurface of leaves with woolly hairs in 2 distinct layers, with hairs in outer layer arising from thickened bases and floccose
- 2: Undersurface of leaves with woolly hairs in a single layer; hairs without thickened bases, and closely appressed/matted
- 1: Leaves linear to oblong, usually less than 3 mm wide; inflorescences with a single capitulum in each leaf axil (rarely a group of 3–5 capitula in a few lower axils)

1. *B. arborescens*

2. *B. salicina*

3. *B. linearis*

1. *Bedfordia arborescens* Hochr., *Candollea* 5: 332 (1934)

Senecio bedfordii F.Muell., *Cat. Pl. Cult. Melbourne Bot. Gard.* 26 (1857), *nom. illeg.* (based on *B. salicina* (Labill.) DC., which was misapplied by Mueller to Vic. and N.S.W. plants). T: Australia, Victoria, Mts Blackspurs, 26 Feb. 1905, *B.P.G.Hochreutiner* 3046; holo: G, photo CANB; iso: L, photo seen.

[*B. salicina* auct. mult. non (Labill.) DC.: G.Bentham, *Fl. Austral.* 3: 673 (1867), *p.p.*; J.H.Maiden & E.Betche, *Census New South Wales Pl.* 205 (1916); A.J.Ewart, *Fl. Victoria* 1178 (1931); J.H.Willis, *Handb. Pl. Victoria* 2: 756 (1972); N.T.Burbidge & M.Gray, *Fl. Austral. Cap. Terr.* 375 (1976)]

Illustrations: G.R.Cochrane *et al.*, *Fl. Pl. Victoria* 144 (1968); N.T.Burbidge & M.Gray, *Fl. Austral. Cap. Terr.* 377 (1976); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 967, fig. 198a (1999).

Shrubs or small trees 5–8 (–12) m tall. Leaves: petiole (1–) 2–3 cm long; lamina oblong to narrowly elliptic or lanceolate, 10–22 cm long, 2–5 cm wide, flat, entire to crenate, blunt to rounded apically; upper surface dark glossy green, glabrous, with impressed veins; lower surface densely and thickly woolly-tomentose throughout, with hairs in 2 distinct layers (outermost thick-based, floccose), largely obscuring veins. Inflorescence an irregular panicle of (10–) 20–30 (–40) capitula in axils of several upper leaves. Florets 10–14 per capitulum, yellow to orange. Achenes 2.9–3.0 mm long, 0.6 mm diam., red-brown with 10 weakly paired vertical ribs. *Blanket Leaf*. Plate 22.

Endemic to SE Australia, in SE N.S.W., the A.C.T., and E Vic., with an outlier in Tas. on Mt Munro, Cape Barren Is. Found in the shrub understorey of relatively wet tall open forest (e.g. *Eucalyptus fastigiata* - *E. cypellocarpa* - *E. elata* forest with understorey shrubs such as *Pomaderris aspera*, *Cyathea australis*, *Polystichum*, *Dicksonia*, *Atherosperma*, *Elaeocarpus* and *Olearia argophylla*) at altitudes up to 1160 m. Flowers and fruits Oct.–Feb., with old capitula remaining year round.

N.S.W.: 4 km along Bemboka River Rd, *A.J.Whalen* 348 *et al.* (CBG, MEL, NSW). A.C.T.: saddle to S of Mt Coree, *R.Pullen* 2534 (BM, CANB, K). Vic.: 9 km from Apollo Bay along Great Ocean Rd, *A.E.Orchard* 6125 (HO); Cudgewa Bluff, *R.V.Smith* 73/37 (AD, BRI, CANB, HO, NSW). Tas.: Mt Munro, Cape Barren Is., *P.Collier* 3598 (HO).



2. *Bedfordia salicina* (Labill.) DC., *Prodr.* 6: 441 (1838)

Cacalia salicina Labill., *Nov. Holl. Pl.* 2: 37, tab. 179 (1806); *Culcitium salicina* (Labill.) Spreng., *Syst. Veg.* 3: 431 (1826). T: Habitat in capite Van-Diemen [=SE Tasmania, *J.J.H.de Labillardière*]; holo: FI, herb. Webb. 103152; iso: BM, 895646; FI, herb. Webb. 103151, 103154; K, herb. Hook. *p.p.*; L 1841 *p.p.*; P (several sheets); probable iso: FI, herb. Webb. 103153, NY 162503, P.

Illustrations: J.J.H.de Labillardière, *Nov. Holl. Pl.* 2: Tab. 179 (1806); J.Lindley, *Edwards Bot. Reg.* 11: t. 923 (1825), as *Cacalia salicina*; A.M.Gray, *Muelleria* 3: 66, fig. 30a (1974).

Shrubs or small trees to 2–5 (–7) m tall. Leaves: petiole 1–1.5 cm long; lamina oblanceolate, 6–13 cm long, 1.0–1.8 cm wide, flat to slightly revolute, sometimes slightly undulate, acute to rounded; upper surface dark glossy or dull green, glabrous, with midrib and secondary veins obvious and impressed; lower surface completely covered with a fine white-woolly indumentum in a single matted layer, not obscuring the prominent midrib and lateral veins. Inflorescence an irregular panicle of (3–) 8–25 (–40) capitula in axils of several upper leaves; sometimes with 2 or 3 panicles per axil. Florets 10–15 per capitulum, yellow. Achenes 2.9 mm long, 0.7 mm diam., red-brown with 10 lighter coloured weakly paired vertical ribs. *Blanket Leaf*. Cover, Frontispiece.

Endemic to mainland Tas., most frequent in eastern and central areas. Mainly found in the shrubby understorey of dry sclerophyll forest, on dolerite soils, from sea-level to 1000 m. Commonly associated species include *Eucalyptus obliqua*, *E. delegatensis*, *E. globulus*, *E. pulchella*, *Pomaderris apetala*, *Acacia dealbata*, *A. mucronata*, *Leptospermum lanigerum*, *Bursaria spinosa*, *Dodonaea viscosa*, *Olearia viscosa*, *Monotoca glauca*, *Blechnum wattsii* and *B. nudum*. Flowers (Sept.–) Oct.–Dec.; fruits until about March; old empty capitula remaining year round.

Tas.: above Pipers R. near Karoola *A.M.Buchanan* 4897 (HO); Mersey R. 0.2 km downstream from Alum Cliffs, *A.M.Buchanan* 7527 (HO); Fluted Cape, South Bruny Is., *A.M.Buchanan* 8357 (HO); 8 km N of Tarraleah, *N.T.Burbridge* 3316 (HO, K); Mt Wellington, *R.Melville* 2400 *et al.* (HO, K); Forest Rd extension, Knocklofty, *A.E.Orchard* 5012 (AK, BAA, HO, NSW).



Hybrids between *B. salicina* and *B. linearis* are common, especially on the slopes of Mt Wellington and vicinity. Well-developed hybrid swarms can be found with plants displaying all leaf shapes between *B. salicina* and *B. linearis*. Many of these plants have leaves with the shape of *B. linearis* (both subspecies), but the hairs of *B. salicina*. Inflorescence structure in these hybrid plants is intermediate between the two species, and usually consists of panicles of 2 or 3 capitula per axil. Occasional specimens set apparently normal seed, and the populations have the appearance of containing both F1 and backcross progeny. Representative specimens are: *A.M.Buchanan* 15437 (HO, CANB); *P.Collier* 2623 (HO); *A.M.Buchanan* 2024 (HO); *A.E.Orchard* 6246, 6247, 6248, 6249 (HO).

3. *Bedfordia linearis* (Labill.) DC., *Prodr.* 6: 441 (1838)

Cacalia linearis Labill., *Nov. Holl. Pl.* 2: 36, tab. 178 (1806); *Culcitium lineare* (Labill.) Spreng., *Syst. Veg.* 3: 431 (1826); *Senecio billardieri* F.Muell., *Cat. Pl. Cult. Melbourne Bot. Gard.* 26 (1858), *nom. illeg.* (based on *B. linearis*). T: Habitat in capite Van-Diemen [=SE Tasmania, *J.J.H.de Labillardière*]; holo: FI, herb. Webb. 103148; iso: BM 895694, P 710443; probable iso: FI, herb. Webb 103147; K, herb. Hook. *p.p.*

Illustrations: *J.J.H.de Labillardière*, *Nov. Holl. Pl.* 2: tab. 178 (1806); *M.Cameron*, *Guide Fl. Pl. Tasmania* fig. 83 (1981); *C.Howells* (ed.), *Tasmania's Nat. Fl.* 2nd edn 29 (2012).

Shrubs 1–2 (–3) m tall. Leaves very shortly petiolate; lamina linear to oblong or narrowly oblong, (6–) 10–90 mm long, to 3 mm wide; upper leaf surface glabrous, glossy, with midrib impressed and other veins obscure. Inflorescence of a single capitulum in each of several upper leaf axils (very rarely with 3–5 in lower axils; upper axils always bearing only a single capitulum). Florets 9–17 per capitulum, cream to yellow. Achenes 2.5–3.3 mm long, 0.7–1 mm diam., usually deep purplish black, with 10–14 vertical ribs.

Endemic to Tas.; 2 subspecies and 2 varieties can be distinguished. For discussion of the variation and relationships see *A.E.Orchard*, *Muelleria* 19: 81–94 (2004).

Leaves (10–) 15–20 times as long as wide; leaf tip bluntly acute

3a. subsp. *linearis*

Leaves 3–10 times as long as wide; leaf tip rounded

3b. subsp. *oblongifolia*

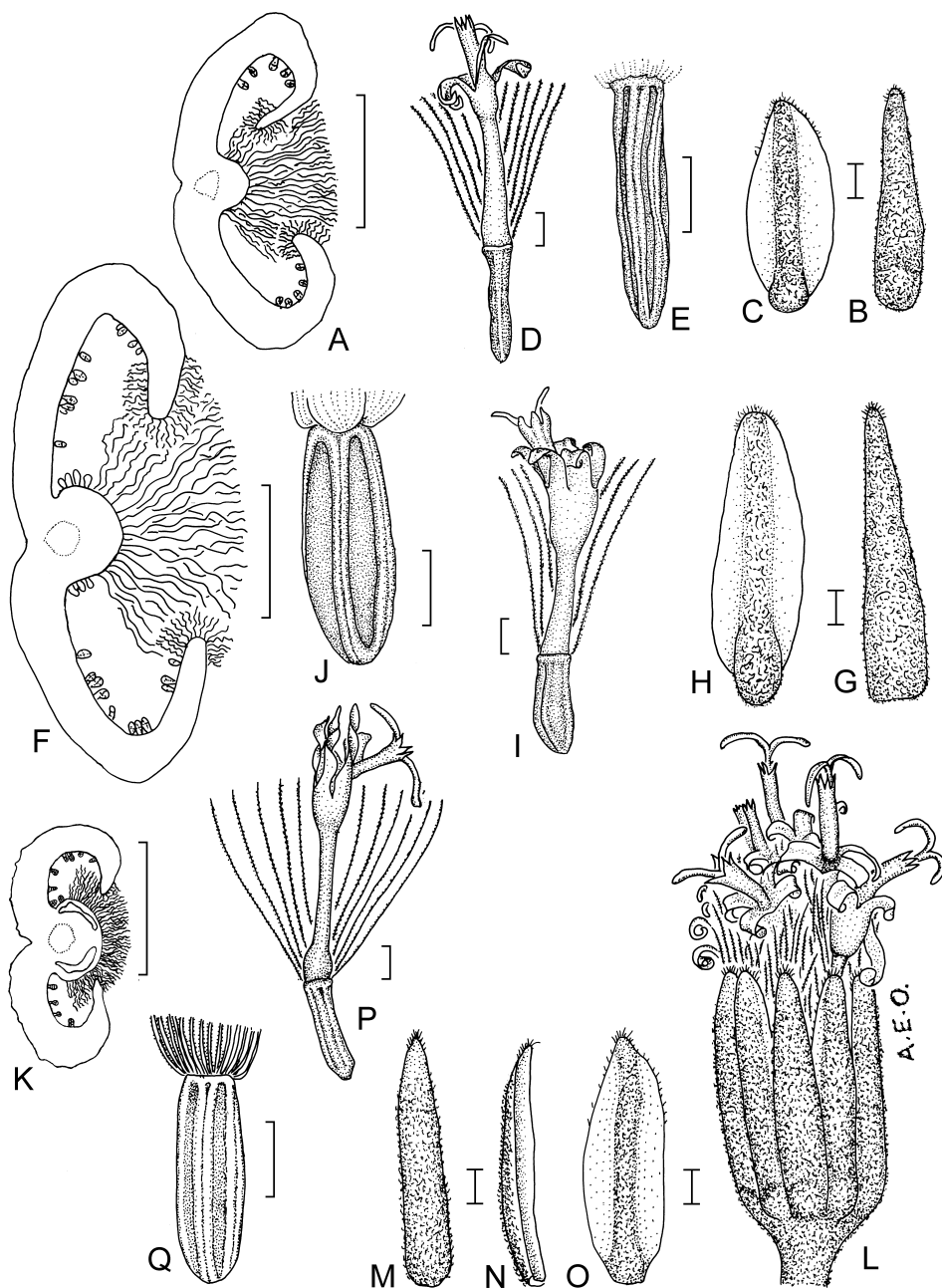


Figure 24. *Bedfordia linearis*. A–E, subsp. *oblongifolia* var. *oblongifolia*. A, leaf TS (semi-diagrammatic); B, outer involucral bract (dorsal view); C, inner bract (dorsal view); D, floret (some pappus bristles removed); E, achene (A–D, A.M.Gray 596, HO; E, L.Rodway, HO9739). F–J, subsp. *oblongifolia* var. *curvifolia*. F, leaf TS (semi-diagrammatic); G, outer involucral bract (dorsal view); H, inner bract (dorsal view); I, floret (some pappus bristles removed); J, achene (F–J, A.E.Orchard 5160, HO). K–Q, subsp. *linearis*. K, leaf TS (semi-diagrammatic); L, capitulum; M, outer involucral bract (dorsal view); N, outer bract (lateral view); O, inner bract (dorsal view); P, floret (some pappus bristles removed); Q, achene (K–Q, P.Collier 3109, HO). Scale bars A–Q = 1 mm. Drawn by A.E.Orchard.

3a. *Bedfordia linearis* (Labill.) DC. subsp. *linearis*

Illustration: A.E.Orchard, *Muelleria* 19: 88, Fig. 2 (2004).

Shrubs to 1.5–2.0 (–3.0) m tall. Leaf lamina narrowly linear, (25–) 35–70 mm long, 1.5–2.0 (–2.5) mm wide, l:w ratio (10–) 15–20, revolute, bluntly acute, slightly reflexed apically. Lower leaf surface densely white-woolly with crisped hairs arising mainly from midrib, interlocking with similar hairs on upper and lower surface of the thin reflexed margin; lamina either side of midrib \pm glabrous apart from scattered subsessile yellow glandular hairs; midrib with or without a longitudinal subcuticular void on each side. Peduncle 4–6 mm long. Achenes 2.5–2.9 mm long, 0.8 mm diam. in centre, tapering very slightly to each end, dark purplish black, faintly reticulate, with c. 12–14 longitudinal ribs. Fig. 24K–Q.

Endemic to Tas. Generally found at slightly higher altitudes (to 1130 m) than subsp. *oblongifolia*, especially where the two abut in distribution on the east coast, but descending to sea-level on the south coast. Found in a range of habitats, usually somewhat wetter than those for subsp. *oblongifolius*. Frequently an understorey shrub in *Eucalyptus delegatensis* (sometimes *E. amygdalina*) forest, often on stony soils in river valleys, ridges, or scree slopes. Flowers Dec.–Jan.; fruits present until March; old empty capitula remaining all year.

Tas.: Mt Barrow, NE slopes, *A.M.Buchanan* 219 (CHR, HO); 6 miles [9.5 km] SW of Great Lake, *N.T.Burbidge* 3419 (K); Derwent Bridge, Lyell Hwy, 10 Jan. 1977, *A.M.Gray* s.n. (AK, CANB, HO); Howell's Bluff, Fish R., Walls of Jerusalem, *A.Moscal* 1474 (AD, HO, MEL); State Forest in the upper NW corner of Badger Gully, Flinders Is., *J.S.Whinray* 8987 & 9386 (AD, CANB, HO, NSW).



In inland collections, as the leaf matures the epidermis on the lower surface and one or two layers of the underlying parenchyma separate from the remaining parenchyma and form elongated inflated voids alongside the midrib. These voids are clearly visible in transverse section at 10 \times magnification. In lowland/coastal collections (e.g. from the south coast, Brassey Hill, Karoola and Flinders Is.) the parenchyma around the lower side of the midrib increases in size and therefore there is no separation and no development of voids.

3b. *Bedfordia linearis* subsp. *oblongifolia* Orchard, *Muelleria* 19: 90 (2004)

T: Tas.: Summerleas Rd, c. 1.5 km from Ferntree, 9 Dec. 1981, *A.M. Gray* 596; holo: HO; iso: AD, AK, MEL.

Shrubs 1–2 (–3) m tall. Leaf lamina oblong to narrowly oblong, spreading, straight or sigmoidly curved with tips upwardly curved, (6–) 10–20 (–45) mm long, (1.5–) 2–3 mm wide, l:w ratio 3–10, revolute, rounded, blunt. Lower leaf surface glabrous apart from scattered glandular hairs, obscured by dense white woolly hairs arising from midrib and interlocking with usually sparse similar hairs on upper and lower surface of revolute margins; midrib with or without a longitudinal subcuticular void on each side. Peduncle 2–7 (–13) mm long. Achenes 2.9–3.3 mm long, 0.7–1.0 mm diam., tapering slightly to base, dark purplish black (sometimes deep red-brown with lighter brown ribs), with 10–12 paired longitudinal ribs.

Two varieties are recognised.

Leaves 5–10 times as long as wide, \pm straight; peduncles 5–7 mm long

3b¹. var. *oblongifolia*

Leaves 3–5 times as long as wide, with tip upwardly curved; peduncles 2–4 mm long

3b². var. *curvifolia*

3b¹. *Bedfordia linearis* (Labill.) DC. var. *oblongifolia*

Illustration: A.E.Orchard, *Muelleria* 19: 91, fig. 3A–E (2004).

Shrubs 1–2 m tall. Leaves straight, spreading at 90° to stem, oblong to narrowly oblong, 10–20 (–45) mm long, (1.5–) 2.5–3 mm wide, l:w ratio c. 5–10; lower midrib with or without voids. Peduncles 5–7 (–13) mm long. Fig. 24A–E.

Endemic to Tas. Most common on the east coast between the Douglas and Apsley Rivers and Mt Wellington, Hobart, with outliers in the central highlands and on Ben Lomond. Found on dry stony dolerite soils in open *Eucalyptus* forest at altitudes of 280–1090 m. In the central

highlands the forest is usually *E. delegatensis*, with a shrubby understorey of *Bedfordia linearis*, *Leptospermum lanigerum*, *Callistemon viridiflorus*, *Helichrysum thyrsoideum*, *Hakea lissosperma*, *Notolaea ligustrina*, *Acacia mucronata* and *Poa labillardieri*. On the east coast the dominant trees are *E. pauciflora*, *E. amygdalina*, *E. pulchella*, *E. tenuiramis*, *E. delegatensis* or *E. globulus*, and the associated shrubs include *Hakea epiglottis*, *Parahebe formosa* and *Westringia rubiaefolia*. Flowers (Oct.–) Dec.–Feb.; fruits in Feb.; old heads retained year-round.

Tas.: Tods Corner, Great Lake, *A.M.Buchanan 15404* (HO); corner of Valley Rd and Meadstone Falls Rd, *A.M.Gray 813c* (HO); Storeys Ck, 4 km upstream from Aberfoyle HS, *A.Moscal 936* (HO); Cathcart Bluff, *A.Moscal 18368* (CANB, HO); Dunns Ck, between Chimney Pot and Ridgeway, *A.V. & D.A.Ratkowsky 945* (HO).



3b². *Bedfordia linearis* var. *curvifolia* Orchard, *Muelleria* 19: 93 (2004)

T: Tas.: East Coast, Fortescue Bay – Cape Hauy track, top of first ridge, 18 Dec. 1980, *A.E.Orchard 5160*; holo: HO; iso: AD, AK, CANB, CHR, MEL, NSW, WELT.

Illustration: A.E.Orchard, *Muelleria* 19: 91, fig. 3F–J (2004).

Shrubs 1–2 (–3) m tall. Leaves sigmoidally spreading with tips upwardly curved, oblong, (6–) 10–12 mm long, 2–3 mm wide, l:w ratio 3–5; voids alongside midrib apparently absent. Peduncles c. 2–4 mm long. Fig. 24F–J.

Endemic to Tas., apparently confined to a small number of localities on the Tasman Penin. between Eaglehawk Neck and Cape Hauy. Most collections are from dry stony ridges in open *Eucalyptus* forest, at altitudes of up to 150 m, associated with *Banksia marginata*, (*Allo*)*Casuarina* spp., *Hakea* sp. and *Acacia mucronata*. Flowers and fruits Nov.–Dec.; remnant old empty heads remaining until March.

Tas.: track to Cape Hauy, 7 Dec. 1980, *I.Boyer s.n.* (HO); Cashes Lookout, Eaglehawk Neck, *A.M.Buchanan 10884, 10885* (HO); Cashes Lookout, *A.M.Gray 593, 594, 595* (HO); Fortescue Bay, Cape Hauy Track, *W.D.Jackson s.n.* (HO50714); Fortescue Forest Res., *A.M.Moscal 30133* (HO).



4. PETASITES

Petasites Mill., *Gard. Dict. Abr. edn 4* (1754), as *Petasitis*; from the Greek, *petasus* (broad-rimmed hat), probably an allusion to the large leaves of this genus.

Type: *P. major* Mill.

Perennial dioecious or gynodioecious herbs. Leaves petiolate, palmately veined. Capitula radiate (in Australia), discoid or disciform, pedunculate, calyculate; involucre bracts free. Florets: corolla limbs yellow, white, greenish, pink or purple; anthers caudate; style branches short, obtuse, ?without terminal appendage. Achenes homomorphic, narrowly obloid, ribbed. Pappus ?caducous.

A genus of c. 19 species from Eurasia and N America; one species naturalised in Australia.

**Petasites fragrans* (Vill.) C.Presl, *Fl. Sicul.* 1: 28 (1826)

Tussilago fragrans Vill., *Actes Soc. Hist. Nat. Paris* 1: 72 (1792). T: n.v.

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 967, fig. 198c (1999).

Dioecious, rhizomatous herbs to c. 0.4 m high, with glandular hairs on most parts. Basal leaves: petiole 10–30 cm long, sheathing basally; lamina suborbicular to reniform, 5–20 cm long, strongly cordate at base, crowded-denticulate. Stem leaves 2–7, c. 2–6 cm long, comprising a well-developed sheath and a small lamina reducing to vestigial upwards.

Capitula several per stem; peduncle to c. 30 mm long at maturity; calycular bracteoles 2–6, \pm linear, 3–8 mm long; involucre 7–12 mm long, c. 3–6 mm diam.; bracts c. 13; stereome flat. Male capitula (all Australian specimens): ligulate florets c. 12, female but sterile; ligule 4–6 mm long, 3–5-veined, white, sometimes tinged purplish; disc florets c. 20, bisexual but functionally male; corolla c. 8 mm long, c. 0.5 mm diam. at base; limb c. $\frac{2}{5}$ of total length, white, with narrowly oblong lobes. Achenes obloid, 1.5–2.0 mm long. Pappus 4–8 mm long, white; bristles scabrid-barbellate. *Winter Heliotrope*. Fig. 25A–C.

Native to N Africa. Naturalised in southern Vic. and Tas. Grows in damp shady places such as roadside ditches. Flowers winter.

Vic.: N side of the railway line, c. 100 m W of Upper Ferntree Gully Rly Stn, *D.E.Albrecht 1856* (MEL). Tas.: Recreation area of Huon Hwy, Franklin, *D.I.Morris 8255* (HO).

Only male plants have been recorded in Australia. Spreads vegetatively from disturbed sites into bushland. Flowers are vanilla-scented.



5. ROLDANA

Roldana La Llave in P. de La Llave & J.J.M.de Lexarza, *Nov. Veg. Descr.* 2: 10 (1825); named for Eugene Montana y Roldan of Otumba, a hero of the Mexican Wars of Independence.

Type: *R. lobata* La Llave

Herbs, shrubs or small trees. Leaves petiolate, palmately (in Australia) or pinnately veined. Capitula radiate, discoid or disciform, pedunculate, calyculate or not; involucral bracts free. Florets: ligule yellow (in Australia), orange, white or greenish; disc florets with corolla limbs yellow (in Australia); anthers caudate; style branches linear, truncate, without terminal appendage. Achenes homomorphic, obloid to obovoid. Pappus caducous. $x = 30$, H.Robinson & R.D.Brettell, *Phytologia* 27: 406 (1974).

A genus of c. 55 species predominantly from Mexico and Central America; one species naturalised in Australia.

H.Robinson & R.D.Brettell, Studies in the Senecioneae (Asteraceae). V. The Genera *Psacaliopsis*, *Telanthophora* and *Roldana*, *Phytologia* 27: 402–39 (1974).

****Roldana petasitis* (Sims) H.Rob. & Brettell, *Phytologia* 27: 423 (1974)**

Cineraria petasitis Sims, *Bot. Mag.* t. 1536 (1813); *Senecio petasitis* (Sims) DC., *Prodr.* 6: 431 (1838). T: cultivated, not designated.

Illustration: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 967, fig. 198d (1999).

Shrubs to c. 3 m high, with short coarse hairs on all parts. Leaves: petiole 5–15 cm long; lamina suborbicular to broadly ovate, 8–15 cm long, cordate at base, finely denticulate. Capitula radiate, many per branch; peduncle to 20 mm long at maturity; calycular bracteoles 1–3, linear, 1–5 mm long; involucre 9–11 mm long, 3–5 mm diam.; bracts c. 8; stereome flat. Florets: ligulate florets 3–6; ligule 6–10 mm long, 4- or 5-veined, yellow; disc florets 10–15; corolla c. 8 mm long, c. 0.8 mm diam. at base, with limb c. $\frac{2}{3}$ of total length, with narrowly triangular lobes. Achenes obloid, 2.5–4.5 mm long, yellowish, 10-ribbed, glabrous. Pappus 7–10 mm long, white; bristles scabrid-barbellate. *Roldana*. Fig. 25D–E.

Native to Central America. Recorded from northern and central coastal areas of N.S.W. and in south-central Vic. A garden escape preferring moister environments. Flowers mainly spring.

N.S.W.: Forbes Forest Rd, Mt Boss State Forest, *P.Gilmour 5848* (CANB). Vic.: Dollar, c. 1.5 km S of township on the Dollar–Gippsland Hwy road, Nov. 1995, *S.Kaiser s.n.* (MEL).



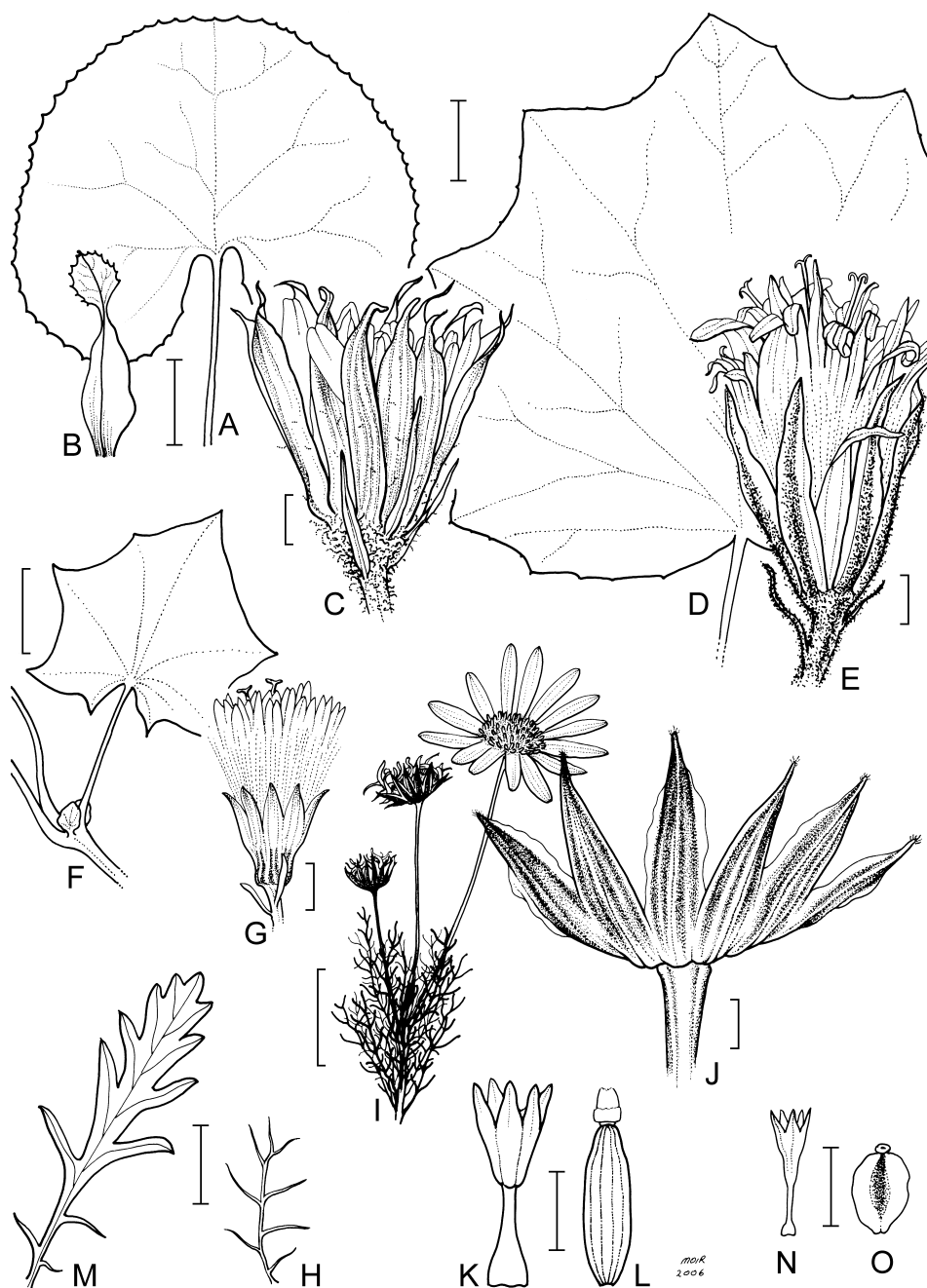


Figure 25. A–C, *Petasites fragrans*. A, basal leaf; B, cauline leaf; C, capitulum (A–C, V.Stajsic 1203, MEL). D, E, *Roldana petasitis*. D, leaf; E, capitulum (D, E, S.Kaiser s.n., Nov. 1995, MEL). F, G, *Delairea odorata*. F, leaf; G, capitulum (F, G, J.Tonkin 569, MEL). H–L, *Euryops abrotanifolius*. H, leaf; I, upper branch and capitula; J, capitulum; K, disc floret; L, achene (H–J, R.J.Adair 1312, MEL; K, L, A.M.Buchanan 3786, MEL). M, *E. chrysanthemoides*, leaf (G.W.Carr 0205-77, MEL). N, O, *Cineraria lyratiformis*. N, disc floret; O, achene of ray floret (N, O, C.R.Beckingham, 4 Jan. 1999, NSW). Scale bars: A, B, D, F, H, I, M = 20 mm; C, E, G, J–L, N, O = 2 mm. Drawn by M.Moir.

A widely-cultivated tall shrub characterised by a short even pubescence, large petiolate leaves, and purple stems, peduncles and involucre bracts.

6. DELAIREA

Delairea Lem., *Ann. Sci. Nat. Bot.* ser. 3, 1: 379 (1844); named after M.Delaire (1810–1856), horticulturalist of Orléans, France, who sent Lemaire the plant described.

Type: *D. odorata* Lem.

Climbing perennials. Leaves petiolate, palmately veined, auriculate. Capitula discoid, pedunculate, calyculate; involucre bracts free. Florets: corolla limbs yellow; anthers caudate; style branches truncate, crowned with papillae, without terminal appendage. Achenes homomorphic, obloid. Pappus caducous.

A monotypic genus native to S Africa, naturalised in SE Australia. The only member of tribe Senecioneae in Australia to have auricles developed at the base of petiolate leaves. Similar in habit and leaf form to climbing species of *Senecio*, but readily differentiated by the presence of auricles and the discoid capitula.

**Delairea odorata* Lem., *Ann. Sci. Nat. Bot.* ser. 3, 1: 380 (1844)

Senecio mikanioides Otto ex Walp. in C.F.Otto & A.Dietrich, *Allg. Gartenzeitung* 13: 42 (1845). T: cult., not designated.

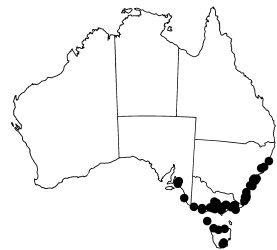
S. scandens DC., *Prodr.* 6: 404 (1838), *nom. illeg. non* D.Don (1825), *p.p.* T: S. Africa [several syntypes]: *n.v.*

Illustration: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 938, fig. 192c (1999).

Climbers to c. 3 m high, ±glabrous. Leaves: petiole 4–7 cm long; lamina to c. 8 cm long, broadly ovate to rotund, lobate, deeply cordate at base, entire. Capitula many per branch; peduncle to c. 10 mm long at maturity; calycular bracteoles 2–4, narrowly oblong to oblanceolate, 2–3 mm long; involucre 3–4 mm long, c. 2 mm diam.; bracts 7–10; stereome flat or slightly ridged proximally, thin, with 1 (or 2) ducts; margin of receptacular pits raised. Florets c. 10–12; corolla c. 5 mm long, c. 0.5 mm diam. at base, exceeding involucre by 3–4 mm; limb c. $\frac{2}{5}$ of total length. Achenes obloid, c. 2 mm long, pale brown, prominently 10-ribbed, glabrous or with sparse hairs. Pappus 5–6 mm long, white; bristles minutely scabrid-barbellate. *Ivy Groundsel*, *Cape Ivy*. Plate 25; Fig. 25F–G.

cNaturalised in SE Australia from Kempsey in NE N.S.W. S to eastern Vic. and from there W across southern Vic., to Adelaide and Robe in SE S.A., also in Tas. Grows in sandy soils in forest and heathland. Flowers winter.

S.A.: Mt Lofty Ra., Gorge Rd, opposite Trout Nursery Dam, *N.N.Donner 754* (AD, MEL). N.S.W.: Alongside Macleay R., c. 1 km from Kinchela towards Jerseyville, *J.R.Hosking 1714 et al.* (CANB, MEL, NE, NSW); lower slopes of Mt Dromedary, c. 1 km W of Tilba Tilba, *P.C.Jobson 4696* (BRI, NSW). Vic.: Labertouche Rd, c. 70 m S of Tarago R., c. 2 km NE of Longwarry North, *I.C.Clarke 2691 et al.* (AD, CANB, MEL). Tas.: Taroona, near Hobart, July 1947, *W.M.Curtis* (AD, HO, MEL).



Superficially similar to introduced climbing species of *Senecio* in Australia (*S. angulatus*, *S. tamoides* and *S. macroglossus*), but usually with prominent reniform leaf-auricles and discoid capitula. The inflorescences are densely corymbiform.

ASTERACEAE

7. EURYOPS

Euryops (Cass.) Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 16: 49 (1820); from the Greek *eury*s (broad) and *ops* (eye), an allusion to the broad disc of the capitulum.

Othonna subg. *Euryops* Cass., *Bull. Sci. Soc. Philom. Paris 1818* 140 (1818). T: *E. erectus* (Compton) B.Nord.

Shrubs or subshrubs, rarely herbs. Leaves sessile, pinnately veined. Capitula radiate (in Australia) or rarely discoid, pedunculate, ecalyculate; involuclral bracts often connate proximally. Florets: ligule yellow; disc florets rarely functionally male; corolla lobes yellow or orange; anthers ecaudate; style branches flattened to subterete, truncate, often crowned by papillae, without terminal appendage. Achenes homomorphic, obloid. Pappus caducous or absent.

An entirely African genus of c. 97 species, with most species in southern Africa; represented in Australia by 2 naturalised species. A third species, *E. pectinatus*, is a widely grown garden shrub with grey-green pectinately-lobed leaves. The large capitula, long naked peduncles and the presence of wool at the base of the peduncle are distinctive features of the genus. Some capitula arise from very short branches and plants will often appear to have inflorescences with multiple capitula. Part of the othonnoid complex of genera described by C.Jeffrey, *Kew Bull.* 41: 876 (1986).

R.B.Nordenstam, The Genus *Euryops*, Part 1. Taxonomy, *Opera Bot.* 20: 1–409 (1968).

Leaves deeply pinnatisect, with segments linear; involuclral bracts connate in proximal $\frac{1}{3}$ – $\frac{1}{2}$; pappus forming a tangled wool

1. *E. abrotanifolius*

Leaves lobate to subpinnatisect, with segments triangular; involuclral bracts connate in proximal $\frac{1}{5}$ – $\frac{1}{4}$; pappus absent

2. *E. chrysanthemoides*

1. **Euryops abrotanifolius* (L.) DC., *Prodr.* 6: 443 (1838)

Othonna abrotanifolia L., *Sp. Pl.* 2: 926 (1753). T: “Aethiopia”; lecto: the plate “*Jacobaea Africana frutescens foliis Abrotani seu Crithmi*” in J.G.Volckamer, *Fl. Noriberg.* 225, unnumbered plate (1700), *fide* R.B.Nordenstam in C.E.Jarvis, *Order out of Chaos* 714 (2007).

Illustrations: R.B.Nordenstam, *Opera Bot.* 20: 367, fig. 62c–g (1968); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1590, fig. 724 (1986).

Shrubs to c. 2 m high, largely glabrous. Leaves 2–6 cm long, pinnatisect, with rachis and segments narrowly linear, narrow at base, entire. Capitula 1 per branch but often a few branches clustered; peduncle to c. 20 cm long; involucre 8–11 mm long, c. 8–10 mm diam.; bracts c. 13, sometimes more, fused in proximal $\frac{1}{3}$ – $\frac{1}{2}$; stereome \pm flat, firm, with 3–5 distinct resin ducts; margin of receptacular pits raised. Ligulate florets c. 13, sometimes more; ligule to 25 mm long, commonly c. 7-veined. Disc florets numerous; corolla c. 4 mm long, c. 1 mm diam. at base; limb c. $\frac{1}{2}$ of total length; lobes narrowly triangular. Achenes obloid-ellipsoid, c. 2.5–5 mm long, 10-ribbed, pale brown, glabrous, with stylopodium appended distally. Pappus white; bristles tangled, some reflexed, 3–6 mm long, scabrid-barbellate. *Winter Euryops*, *Euryops*. Fig. 25H–L.

Naturalised in the Mount Lofty Ra. in SE S.A., Heywood in SW Vic., the eastern fringe of Melbourne in south-central Vic., and around Hobart in SE Tas. Grows in recently disturbed areas such as roadsides, railway cuttings etc., in grassland and forest. Flowers winter–early spring.

S.A.: Mt Lofty Ra., Forest Ra., c. 20 km E of Adelaide, *H.van Dam* 194 (AD).
Vic.: 2.3 km E along the Lilydale–Monbulk road from its intersection with the Lilydale–Montrose road, Mt Evelyn, *D.E.Albrecht* 2840 (CANB, MEL).
Tas.: Mt Stuart, Hobart, *A.M.Buchanan* 3786 (AD, HO).



A garden escape that is well-established in a few areas and capable of increasing numbers rapidly. The stylopodium and tangled pappus do not occur in other species of Senecioneae in Australia.

2. *Euryops chrysanthemoides (DC.) B.Nord., *Opera Bot.* 20: 365 (1968)

Gamolepis chrysanthemoides DC., *Prodr.* 6: 443 (1838). T: S. Africa, *Ecklon & Zeyher* 10.9; lecto: G, *fide* B.Nordenstam, *loc. cit.*

Illustration: R.B.Nordenstam, *op. cit.* 367, fig. 62c–g.

Shrubs to c. 1.5 m high, largely glabrous. Leaves crowded, slightly fleshy, narrowly elliptic to obovate, to 8 cm long, pinnatisect reducing to lobate distally; segments \pm narrowly oblong, entire. Capitula 1 per branch but often a few branches clustered; peduncle to c. 20 cm long; involucre broadly campanulate, 5–8 mm long; bracts 8–15, connate in proximal $1/5$ – $1/4$; stereome flat, with inconspicuous resin ducts; margin of receptacular pits raised. Ligulate florets 8–15; ligule to c. 20 mm long, commonly 4-veined. Disc florets numerous; corolla c. 4.5 mm long, c. 0.5 mm diam. at base; limb c. $2/3$ of total length. Achenes obovoid, 3–5 mm long, 10-ribbed, glabrous, without stylopodium. Pappus absent. *Paris Daisy*. Fig. 25M.

Native to S. Africa. Occurs in central coastal N.S.W. from Northbridge, Sydney, S to Wollongong; also on Norfolk Is. Incipiently naturalised in SE Vic. A weed of roadsides. Flowers winter.

N.S.W.: Northbridge, *L.A.S.Johnson* 7517 (NSW). Vic.: Leongatha township, public land between Young St and Haw St, *G.W.Carr* 0205-77 (AD, CANB, HO, MEL, NSW).

A common garden plant, occasionally escaping into adjoining bushland.



8. CINERARIA

Cineraria L., *Sp. Pl.* 2nd edn, 2: 1242 (1763); from the Latin *cinereus* (grey), presumably alluding to the grey appearance of some species of this genus.

Type: *C. geifolia* L.

Herbs or subshrubs. Leaves sessile, pinnately veined. Capitula radiate (in Australia) or rarely discoid, pedunculate, calyculate; involucre bracts free. Florets: ligule yellow; disc florets rarely functionally male; corolla limbs yellow; anthers obtuse or shortly sagittate; style branches recurved, truncate, crowned with papillae, with terminal appendage minute, conical. Achenes \pm homomorphic, obovate, compressed. Pappus caducous.

A genus of c. 35 species, native to Africa and the Middle East; 1 species naturalised in N.S.W.

***Cineraria lyratiformis** Cron in G.V.Cron *et al.*, *S. African J. Bot.* 65: 287 (1999)

Cineraria lyrata DC., *Prodr.* 6: 308 (1838), *nom. illeg. non* Ledeb. (1818). T: Northern Cape Nieuweveld, between Beaufort and Rhinosterkop, S. Africa, *Drege* 711; holo: G n.v., *fide* G.V.Cron, *loc. cit.*

Illustration: G.V.Cron *et al.*, *op. cit.* 65: 288, fig. 1a–d.

Herbs to c. 0.6 m high, glabrous or cobwebby. Leaves to 8 cm long, with l:w ratio c. 2–3, lyrate-pinnatifid, auriculate, denticulate to dentate. Capitula several–many per stem; mature peduncle to c. 20 mm long; calycular bracteoles 3–6, narrowly ovate, 1–2 mm long; involucre 3.5–5 mm long; bracts 12–14, with 3–5 resin ducts; receptacle smooth. Ligulate florets usually 7 or 8; ligule 3.5–6 mm long, usually 4-veined, yellow. Disc florets 32–40; corolla 3–4 mm long, exceeding involucre bracts by c. 1–2 mm; basal cone c. 0.3 mm diam.; limb c. $3/5$ of total length; lobes triangular. Achenes: body \pm obovoid, 2–2.5 mm long, black or dark brown; wings broad, pale, glabrous or minutely ciliate. Pappus 3–4 mm long, minutely and sparsely scabrid-barbellate. *Cineraria*, *African Marigold*. Fig. 25N–O.



Native to S. Africa. Naturalised in the Rylstone district, in central-eastern N.S.W. Grows in a wide range of soils in wasteland, cultivated land and on roadsides. Flowers summer.

N.S.W.: Oz Mtn, between Rylstone and Bylong, Wollemi Natl Park, *W.Cherry 98/3a et al.* (NSW); 3 km E of Rylstone, 17 Feb. 1995, *G.Hennessy s.n.* (NSW).

A noxious weed in central-eastern N.S.W. In S. Africa it is reported to taint dairy products and to have poisoned pigs. Similar to some radiate species of *Senecio* but distinguished by the compressed achenes.

9. SENECIO

Senecio L., *Sp. Pl.* 2: 866 (1753); from the Latin *senex* (an old man), possibly alluding to the white pappus.

Type: *S. vulgaris* L.

Herbs, shrubs, or climbers, rarely gynodioecious. Leaves sessile, rarely petiolate, pinnately veined. Capitula radiate (with ligules much reduced in *Glossanthus* group) discoid or disciform, calyculate or ecalyculate; involucre bracts free, rarely connate. Florets: ligule mostly yellow, occasionally pink or purple, rarely cream or white; disc florets with corolla limbs mostly yellow or yellow-green, rarely pink or red; anthers ecaudate; style branches truncate or obtuse, crowned by papillae, without terminal appendage. Achenes homomorphic, rarely slightly dimorphic, obloid or obloid-ellipsoid, sometimes bottle-shaped. Pappus caducous or persistent.

An estimated 1300 species throughout the world and one of the largest genera of flowering plants, although recent molecular studies, e.g. P.B.Pelser *et al.*, *Amer. J. Bot.* 89(6): 929–939 (2002), indicate that it is a polyphyletic assemblage. Most species are native to S America and Africa. In Australia 87 native species, all except 4 endemic, and 10 introduced species. Species occur across Australia S of latitude 20° S, but the greatest diversity is in SE Australia.

All three capitulum types, disciform, discoid and radiate, are represented. Disciform and radiate species have heterogamous capitula, with the marginal florets (these being ligulate in radiate species) female and the central or disc florets bisexual. Disciform species in Australia generally have more female florets than bisexual florets, whereas the reverse is true of radiate species. Discoid species have homogamous capitula, with all florets tubular and bisexual.

Disciform species have in the past been placed in *Erechtites* based on the arrangement of florets, but style branch morphology was considered closer to that of *Senecio* by R.O.Belcher, *Ann. Missouri Bot. Gard.* 43(1): 1–85 (1956) and since his publication they have been included in *Senecio*. New Zealand has a small number of endemic disciform species and these are probably related to the Australian species.

Both native and naturalised species of *Senecio* contain hepatotoxic pyrrolizidine alkaloids and are potentially dangerous if ingested by grazing animals, although records of losses in Australia are rather few. S.L.Everist, *Poisonous Plants of Australia* 177–185 (1974), records 11 species that have been associated with poisoning in Australia or overseas, or which have been demonstrated to contain pyrrolizidine alkaloids.

Leaves in this treatment refer to those leaves found in the middle third of stems in herbaceous perennials or of major branches in the case of shrubby species. The diameter of the involucre in all keys and descriptions refers to unpressed specimens measured at the junction of the middle and upper thirds of the involucre. The involucre in pressed specimens will be broader in this region due to squashing and also because the bracts tend to splay when dried.

Hybridisation between radiate and disciform taxa occasionally occurs, producing plants with small-liguled ray florets, and these need to be distinguished from species in the *Glossanthus* group.

R.O.Belcher, A revision of the genus *Erechtites* (Compositae), with inquiries into *Senecio* and *Arrhenechthites*, *Ann. Missouri Bot. Gard.* 43(1): 1–85 (1956); M.E.Lawrence, *Senecio* L. (Asteraceae) in Australia: chromosome numbers and the occurrence of polyploidy, *Austral. J.*

Bot. 28: 151–165 (1980); I.R.Thompson, Taxonomic Studies of Australian *Senecio* (Asteraceae): 1. The disciform species, *Muelleria* 19: 101–214 (2004); I.R.Thompson, Taxonomic studies of Australian *Senecio* (Asteraceae): 2. The shrubby, discoid species and the allied radiate species *Senecio linearifolius*, *Muelleria* 20: 67–110 (2004); I.R.Thompson, Taxonomic studies of Australian *Senecio* (Asteraceae): 3. Radiate, arid region species allied to *S. magnificus* and the radiate, alpine species *S. pectinatus*, *Muelleria* 20: 111–138 (2004); I.R.Thompson, Taxonomic studies of Australian *Senecio* (Asteraceae): 4. A Revision of *Senecio glossanthus* (Senecioneae – Asteraceae), *Muelleria* 21: 3–21 (2005); I.R.Thompson, Taxonomic studies of Australian *Senecio* (Asteraceae): 5. The lautusoid species, *Muelleria* 21: 23–76 (2005).

KEY TO GROUPS

- 1 Capitula discoid: all florets bisexual, or all florets female, and the corolla limb of similar size in all florets, to 1.0 mm diam. at base of lobes OR capitula radiate but with only 1–3 ligules; achenes homomorphic
 - 2 Annuals; calycular bracteoles pigmented black for $\frac{1}{2}$ – $\frac{4}{5}$ of length; involucre bracts 14–23; florets > 40; corolla limb shorter than tube **8. Exotic Group**
(*S. vulgaris*)
 - 2: Perennial herbs or shrubs; calycular bracteoles not as extensively or darkly pigmented as above; involucre bracts 7–13; florets < 40; corolla limb \pm equal to tube
 - 3 Gynodioecious herbaceous perennials (plants female or hermaphrodite), not glaucous; achenes < 2 mm long (SW W.A.) **3. Ramosissimus Group**
 - 3: Hermaphrodite shrubs or subshrubs, rarely herbaceous perennials, often glaucous; achenes > 2 mm long, or if less then unit inflorescences congested, corymbiform (not SW W.A.)
 - 4 Herbaceous perennials; apex of involucre bracts mostly reflexed at anthesis **1. Disciform Group**
 - 4: Shrubs; apex of involucre bracts erect or nearly so at anthesis **2. Odoratus Group**
- 1: Capitula radiate or disciform: if disciform, the corolla limb to 0.5 mm diam. at base of lobes, with that of marginal florets significantly smaller than central florets; if radiate then ligules 4 or more, sometimes inconspicuous; achenes homomorphic or dimorphic
 - 5 Capitula radiate with ligule < 2 mm long, or if ligule vestigial then female marginal florets in a clear minority and corolla tube shorter than achene **6. Glossanthus Group**
 - 5: Capitula radiate with ligule > 2 mm long, OR disciform with a majority of florets female and corolla tube longer than achene
 - 6 Capitula disciform **1. Disciform Group**
 - 6: Capitula radiate
 - 7 Involucre < 5.5 mm long, < 3 mm diam.; disc florets 8–30; calycular bracteoles 4–8; ligules 4–8 **2. Odoratus Group**
 - 7: Capitula not entirely as above
 - 8 Ligules purplish or rarely white and then inflorescences of several capitula, OR plants climbers with petiolate leaves and lamina with l:w ratio < 2, OR plants grey-woolly all over with entire leaves and ligules 15–30 mm long **8. Exotic Group**
 - 8: Plants not as above
 - 9 Plants not glaucous, scapiform or not, rhizomatous or not; calycular bracteoles 4–10 mm long, > 0.5 mm wide at mid-point, parallel-sided or nearly so, \pm entirely herbaceous, or if ever shorter than 4 mm long, then leaves with an abrupt transition from a petiole to an undivided lanceolate lamina with serrulate margin **5. Macranthus Group**

- 9: Plants glaucous or not, not scapiform or rhizomatous (except in *S. pinnatifolius* var. *alpinus*); calycular bracteoles absent or 1–5 mm long, < 0.5 mm wide at mid-point, or if wider then not parallel-sided, ±entirely herbaceous or with a hyaline margin
- 10 Lower surface of leaves with a dense, closely appressed wool; calycular bracteoles 14–20 **8. Exotic Group**
(*S. pterophorus*)
- 10: Lower surface of leaves without a dense, closely appressed wool; calycular bracteoles 3–20
- 11 Biennials with plants a rosette of leaves in first season; stem leaves 2- or 3-pinnatisect, with venation of pinnae and pinnules raised on lower surface; capitula numerous per stem; achenes of ray florets glabrous but those of disc florets papillose-hairy **8. Exotic Group**
(*S. jacobaea*)
- 11: Annuals or perennials with plants developing flowering stems in first season; stem leaves not entirely as above; capitula 1–many; achenes of ray and disc florets not differing as above
- 12 Plants glaucous or not; involucre bracts fused or not, with stereome ±flat on drying; calycular bracteoles 0–4 (–6); achenes various, sometimes bottle-shaped, sometimes with pairs of ribs forming prominent ridges and with hairs restricted to the groove atop each ridge **4. Magnificus Group**
- 12: Plants not glaucous; involucre bracts not fused, with stereome commonly ridged basally on drying; calycular bracteoles 5 or more; achenes various, never bottle-shaped, never with hairy ridges as above **7. Lautusoid Group**

1. Disciform Group

Erect or sprawling, usually perennial herbs, sometimes weakly shrubby, not rhizomatous, or rarely shortly so, not glaucous. Coarse spreading hairs often present, conspicuous or not; fine hairs often present, conspicuous or not. Leaves generally thin. Capitula disciform, rarely discoid, calyculate, with bracteoles parallel-sided or nearly so, 1–5 mm long, 0.1–0.7 mm wide at mid-point, with hyaline margin absent or obscure; involucre 1–5 mm diam. (measured mid-involucre, unpressed); bracts 7–25, free; stereome drying green, flat or ridged, with resin ducts pale, generally inconspicuous, glabrous, or occasionally cobwebby, rarely woolly. Florets 12–100 or more, usually (50–) 65–80% female; corolla limb much shorter than tube, diam. at base of lobes 0.2–0.4 (–0.7) mm (bisexual), 0.1–0.2 mm (female). Achenes homomorphic, ±obloid or bottle-shaped, 1–6 mm long, with ribs mostly flat, with papillose hairs (l:w ratio 1–6) or glabrous; carpophodium $1/4$ – $1/2$ diam. of body. Pappus caducous, scabridulous to ±smooth.

A group of 40 species, widespread in Australia. Endemic except for 4 species which are also native to New Zealand.

The peduncle and base of the capitulum are often transiently or persistently cobwebby in this group. The cobwebbiness around the base of the capitulum is largely due to fine hairs arising from the margin of the bracteoles. Species that are identified here as having peduncle and calyculus not cobwebby at anthesis generally have a glabrous peduncle but residual hair-bases may still be present on the bracteole margins. Achenes described as bottle-shaped taper so that the distal third of the achene is distinctly narrower than the middle and lower thirds.

- 1 Mid- to upper-stem leaves deeply pinnatisect, often approaching bipinnatisect, with pinnate segments in both distal and proximal halves, or if leaves a little less dissected then segments retrorse
- 2 Leaf segments retrorse; involucre 7.0–11.0 mm long **15. *S. runcinifolius***
- 2: Leaf segments not retrorse; involucre 3.5–7.0 mm long
- 3 Stems ±glabrous; involucre length 3–4 times diameter; involucre bracts predominantly c. 8–10 **5. *S. bipinnatisectus***

- 3: Stems sparsely to densely coarsely hairy; involucre length 2–3 times diameter; involucre bracts predominantly c. 12–14
- 4 Leaves glabrous or with hairs on midrib only; achenes 2.0–2.7 mm long, with papillose hairs in bands 7. *S. esleri*
- 4: Leaves coarsely hairy; achenes 1.5–2.0 mm long, with papillose hairs \pm scattered 8. *S. bathurstianus*
- 1: Mid- to upper-stem leaves less dissected than above and segments not retrorse
- 5 All or most involucre in an inflorescence comprising 7–13 bracts AND florets per capitulum ≤ 25 ; involucre 1.0–1.5 mm diam. (measured on unpressed plants at junction of middle and upper thirds of involucre)
- 6 Plants lacking coarse hairs; stems densely appressed-cottony for most of length and lower surface of leaves woolly 20. *S. quadridentatus*
- 6: Plants with coarse hairs (sometimes short and tubercle-like) on stems and/or leaves (close inspection required), or if not, then stems not appressed-cottony for most of length and lower surface of leaves not woolly
- 7 Upper-stem leaves densely scabridulous (coarse hairs short) on upper surface, woolly on lower surface, the wool overlying coarse basal portion of hairs (SE Qld–NE N.S.W. border area) 25. *S. scabrellus*
- 7: Upper-stem leaves not as above
- 8 Leaves glabrous or nearly so (margin may have some short hairs)
- 9 Plants erect; taproot well-developed; mid-stem leaves commonly antorsely lobate; involucre bracts 4.5–6.5 mm long; achenes obloid-ellipsoid 2. *S. diaschides*
- 9: Plants sprawling; taproot inconspicuous; mid-stem leaves entire or with spreading teeth; involucre bracts 6.0–8.0 mm long; achenes narrowly bottle-shaped 30. *S. psilophyllus*
- 8: Leaves with hairs on one or both surfaces
- 10 Leaves not dissected, or if ever with segments then only 1 or 2 developed per side in proximal half; upper-stem leaves usually with l:w ratio > 10 ; base of leaves above mid-stem not or hardly amplexicaul, with auricles lacking or triangular and entire
- 11 Secondary roots fleshy and usually slightly tuberiform; lower stem bearing spreading coarse hairs; achenes narrowly bottle-shaped, 2.8–4.0 mm long 29. *S. prenanthoides*
- 11: Secondary roots slightly to moderately fleshy but not tuberiform; lower stem appressed-cottony or near glabrous, without coarse hairs; achenes not or indistinctly bottle-shaped, 2.0–2.8 mm long
- 12 Leaves without basal lobes or lobes < 2 mm long; papillose hairs \pm crowded in bands in shallow grooves 24. *S. microbasis*
- 12: Leaves often with prominent basal lobes > 2 mm long; papillose hairs rather sparse, usually recessed in deep grooves 26. *S. tenuiflorus*
- 10: Leaves regularly dissected, with 3–6 segments per side extending into distal half, or not dissected but then margin crowded-denticulate; upper-stem leaves with l:w ratio < 10 ; base of leaves above mid-stem somewhat amplexicaul, with auricles well-developed, variously shaped and usually toothed or lobed
- 13 Coarse hairs rather sparse; leaves usually not dissected, with sinuses typically $< 25\%$ of distance to midrib; involucre bracts 7–10 1. *S. minimus*
- 13: Coarse hairs scattered to moderately dense; leaves with primary dissection; involucre bracts 7–13
- 14 Stems and lower surface of leaves often intensely purple; segments of leaves roughly semicircular and with margin crowded-denticulate; uppermost leaves clearly broadest at auricles 4. *S. picridioides*

- 14: Stems and lower surface of leaves mostly green, sometimes slightly to moderately purple; segments of leaves not as above; uppermost leaves broadest at auricles or not
- 15 Mid- to upper-stem leaves with coarse hairs on both surfaces, cobwebby overlay not conspicuous; involucre bracts predominantly 11–13, OR if rarely predominantly 9–10 then achenes < 2.2 mm long, red-brown, and segmentation of mid- to upper-stem leaves confined to proximal $\frac{2}{3}$
- 16 Taproot much stouter than secondary roots; leaves not crowded basally; involucre 1.4–1.8 mm diam.; apex of involucre bracts without purple pigmentation; achenes red-brown **9. *S. hispidulus***
- 16: Taproot hardly stouter than secondary roots; leaves tending to be crowded basally at anthesis; involucre 1.8–2.0 mm diam.; apex of involucre bracts with purple pigmentation; achenes tan or light brown **10. *S. hispidissimus***
- 15: Mid- to upper-stem leaves as above or one or both surfaces \pm glabrous or with a conspicuous cobwebby overlay; involucre bracts predominantly 8–10, OR if sometimes predominantly 11 or 12 then achenes 3–4 mm long, pale olive-brown, glabrous
- 17 Leaves with roughly triangular segments restricted to proximal 50–60% of leaf; achenes 3.0–4.0 mm long, pale olive-brown, glabrous **28. *S. niveoplanus***
- 17: Leaves with triangular, oblong or obovate segments and primary dissection extending into distal $\frac{1}{3}$ of leaf; achenes 2.0–3.0 mm long, brown and with papillose hairs or red-brown with very fine papillose hairs
- 18 Primary root well-developed; secondary roots not fleshy; leaves with the continuous medial band of lamina somewhat elliptic and the distal centimeter of leaves roughly triangular; achenes with l:w ratio c. 6–7, brown, with plump papillose hairs crowded in bands (coastal or occasionally montane) **3. *S. biserratus***
- 18: Primary roots inconspicuous; secondary roots fleshy; leaves with the continuous medial band of lamina (see Figure 26) roughly oblong and the distal centimetre of leaves commonly with an oblong section 2–8 mm long; achenes with l:w ratio c. 4–5, reddish brown, with fine hairs in lines or somewhat scattered (montane) **6. *S. distalilobatus***
- 5: All or most involucre comprising 11–25 bracts AND florets per capitulum > 25; involucre 1.5–5.0 mm diam. (measured on unpressed plants at junction of middle and upper thirds of involucre)
- 19 Stems developing at least some coarse spreading hairs (sometimes partly obscured by overlying wispy extensions), often restricted to basal or lower-stem region and tending to be lost with age
- 20 Secondary roots distinctly fleshy, commonly slightly tuberiform; achenes 2.8–4.5 mm long, narrowly bottle-shaped, with papillose hairs short (with l:w ratio 1–2), and sparse to scattered in lines narrower than ribs **29. *S. prenanthoides***
- 20: Secondary roots fleshy or not, not tuberiform; achenes 1.0–3.0 mm long, obloid, obloid-ellipsoid, or if ever slightly bottle-shaped then papillose hairs longer than above (with l:w ratio c. 3–4), forming dense bands as broad as ribs
- 21 Involucre bracts 3.0–6.5 mm long; involucre < 2.0 mm diam. at junction of middle and upper thirds (unpressed); achenes with papillose hairs forming lines or bands much narrower than ribs
- 22 Peduncle and calyculus cobwebby to woolly at anthesis; calycular bracteoles 6–12 **12. *S. glomeratus***
- 22: Peduncle and calyculus not cobwebby at anthesis; calycular bracteoles 4–8

- 23 Taproot much stouter than secondary roots; leaves not crowded basally; involucre 1.4–1.8 mm diam.; apex of involucre bracts without purple pigmentation; achenes red-brown **9. *S. hispidulus***
- 23: Taproot hardly stouter than secondary roots; leaves tending to be crowded basally at anthesis; involucre 1.8–2.0 mm diam.; apex of involucre bracts with purple pigmentation; achenes tan or light brown **10. *S. hispidissimus***
- 21: Involucre bracts 4.0–12.0 mm long; involucre > 2.0 mm diam. at junction of middle and upper thirds (unpressed); achenes with papillose hairs forming bands mostly as broad as ribs or nearly so
- 24 Upper-stem leaves without auricles or leaves clearly broadest at mid-leaf and with auricles hardly stem-clasping; involucre bracts mostly to 15, rarely c. 18; apex of involucre bracts usually with a conspicuous black tip and without a zone of purple pigmentation; achenes commonly slightly bottle-shaped
- 25 Involucre 8.5–10 mm long **34. *S. oldfieldii***
- 25: Involucre 5–8 mm long
- 26 Coarse hairs on leaves to c. 1 mm long, sparse or absent on uppermost leaves **32. *S. nigrapicus***
- 26: Coarse hairs on leaves often 1–2 mm long, usually numerous on uppermost leaves **33. *S. longipilus***
- 24: Upper-stem leaves usually auriculate, often broadest at auricles and with auricles weakly to strongly stem-clasping; involucre bracts to 25; apex of involucre bracts with black tip absent or inconspicuous and commonly with a zone of purple pigmentation c. 0.5–1 mm long; achenes narrowly obloid
- 27 Uppermost leaves and inflorescence bracts with long coarse hairs typically numerous on margin; capitula 1.8–2.5 mm diam.; achenes generally tan to light brown **10. *S. hispidissimus***
- 27: Uppermost leaves and inflorescence bracts with coarse hairs usually absent or inconspicuous; capitula 2.0–4.0 mm diam.; achenes brown or red-brown or often some achenes blackish
- 28 Taproot usually well-developed; involucre 5–8 mm long, 2.0–2.8 mm diam.; involucre bracts 12–14 **11. *S. multicaulis***
- 28: Taproot poorly developed; involucre 6–11 mm long, 2.8–4.0 mm diam.; involucre bracts (12–) 16–25 **36. *S. squarrosus***
- 19: Stems not developing coarse hairs, with an indumentum of fine hairs variably present and variably dense
- 29 All florets in a capitulum bisexual and \pm identical in shape with all corolla limbs 5-lobed, or disciform with up to c. half of florets female with 4-lobed corollas (in \pm 1 marginal series); apex of involucre bracts typically strongly reflexed at least on drying
- 30 Leaves glabrous **38. *S. interpositus***
- 30: Leaves densely woolly on one or both surfaces
- 31 Leaves densely woolly on lower surface only; inflorescence branchlets, peduncles and bracts sparsely woolly; calycular bracteoles < 4 mm long **39. *S. georgianus***
- 31: Leaves densely woolly on both surfaces; inflorescence branchlets, peduncles and bracts densely woolly; calycular bracteoles > 4 mm long **40. *S. helichrysoides***
- 29: At least $\frac{2}{3}$ of florets in a capitulum female (in \pm 2–3 marginal series), with corolla 2–4-lobed; apex of involucre bracts usually not strongly reflexed
- 32 Plants glabrous or nearly so on all parts; leaves elliptic, with l:w ratio c. 2–4, often lobed; margin of leaves denticulate or dentate, with apex of lobes and teeth acuminate; involucre 4.0–5.0 mm long **14. *S. laceratus***

- 32: Plants variously hairy or nearly glabrous; leaves not entirely as above; involucre 5.0–13.0 mm long
- 33 Achenes narrowly bottle-shaped, 2.0–7.0 mm long
- 34 Stems creeping before arching to erect; leaves in basal third of stem to 8 cm long, markedly broader than mid-stem leaves; lower surface of leaves green, lacking coarse hairs and nearly glabrous (sub-alpine) **31. *S. lageniformis***
- 34: Stems ±erect from base; leaves not entirely as above (lowland to montane)
- 35 Unit inflorescences of few to c. 10 capitula; involucre > 3.0 mm diam.; calycular bracteoles > 3.0 mm long, commonly divergent; achenes with papillose hairs in bands covering > 40% of surface, with l:w ratio of hairs c. 4 **37. *S. macrocarpus***
- 35: Unit inflorescences of several to many capitula; involucre < 3.0 mm diam.; calycular bracteoles < 3.0 mm long, appressed; achenes with papillose hairs in lines or bands covering < 40% of surface, with l:w ratio of hairs c. 1–2
- 36 Involucral bracts < 8 mm long
- 37 Plant branching all along primary stem at anthesis; primary stem leaves with 1 or 2 near-basal teeth per side **19. *S. glabrescens***
- 37: Plant not branching along primary stem at anthesis except from upper axils; primary stem leaves lacking near-basal teeth
- 38 Plants with taproot distinctly stouter than the slightly fleshy secondary roots; at anthesis capitula and peduncles ±glabrous or if cobwebby then lower stems cottony to woolly also; marginal achenes commonly red
- 39 Plants with mature stems and lower surface of mature leaves somewhat obscured by indumentum **20. *S. quadridentatus***
- 39: Plants with mature stems and lower surface of mature leaves not or hardly obscured by indumentum **22. *S. queenslandicus***
- 38: Plants with taproot inconspicuous, not stouter than the distinctly fleshy secondary roots; at anthesis, capitula and peduncles cobwebby to woolly but lower stems ±glabrous; marginal achenes not red
- 40 Involucre > 7 mm long; achenes 4.0–6.0 mm long, with neck 1–2 mm long **16. *S. longicollaris***
- 40: Involucre 5–7 (–7.5) mm long; achenes 2.5–4.0 mm long, with neck 0.5–1 mm long **18. *S. campylocarpus***
- 36: Involucral bracts > 8 mm long
- 41 Plants with taproot inconspicuous, not stouter than the distinctly fleshy secondary roots; mid-stem leaves with l:w ratio < 12; capitula cobwebby but mid-stem region ±glabrous at anthesis **16. *S. longicollaris***
- 41: Plants with taproot distinctly stouter than the slightly fleshy secondary roots; mid-stem leaves with l:w ratio > 12 (excluding any lobes); capitula cobwebby or not at anthesis but if so then mid-stem region also cobwebby
- 42 Leaves in lower $\frac{1}{3}$ of stems ±lacking coarse hairs, linear to narrowly linear, and similar through middle $\frac{1}{3}$ **20. *S. quadridentatus***
- 42: Leaves in lower $\frac{1}{3}$ of stems with scattered coarse hairs, oblanceolate to narrowly oblanceolate, becoming wider spaced, obviously narrower and without coarse hairs through middle $\frac{1}{3}$

- 43 Achenes 5–7 mm long (Tas.) 17. *S. tasmanicus*
- 43: Achenes 3–4 mm long (semi-arid regions of SE Australia) 21. *S. dolichocephalus*
- 33: Achenes obloid or obloid-ellipsoid, 1.5–3.0 mm long; stems not densely appressed-cottony or woolly throughout
- 44 Achenes glabrous or with rather few hairs in lines and covering $< 1/4$ of surface
- 45 Plants commonly growing in water; involucre 2.3–2.8 mm diam. at junction of middle and upper thirds (unpressed); achenes glabrous, with ribs \pm flat 35. *S. psilocarpus*
- 45: Plants not growing in water; involucre 1.5–2.0 mm diam. at junction of middle and upper thirds (unpressed); achenes glabrous or sparsely papillose-hairy, with ribs flat to convex
- 46 Mid-stem leaves undivided and linear or with 1 or 2 lobes per side in proximal half, hispid 26. *S. tenuiflorus*
- 46: Mid-stem leaves undivided and narrowly elliptic or with 3–6 lobes or teeth per side in both halves, hispid or not
- 47 Calycular bracteoles to 5.0 mm long; achenes < 2.5 mm long, red-brown 13. *S. extensus*
- 47: Calycular bracteoles to 3.5 mm long; achenes > 2.5 mm long, olive-brown 27. *S. gunnii*
- 44: Achenes with papillose hairs in bands and covering $1/4$ – $2/3$ of surface
- 48 Base of mid- to upper-stem leaves often somewhat sagittately auriculate; calycular bracteoles 3–5; involucre < 2.0 mm diam. at junction of middle and upper thirds (unpressed) 23. *S. phelleus*
- 48: Base of mid- to upper-stem leaves not sagittately auriculate; calycular bracteoles 6–10; involucre > 2.0 mm. diam. at junction of middle and upper thirds (unpressed)
- 49 Taproot usually well-developed; involucre 5–8 mm long, 2.0–2.8 mm diam.; involucre bracts 12–14 11. *S. multicaulis*
- 49: Taproot poorly developed; involucre 6–11 mm long, 2.8–4.0 mm diam.; involucre bracts (12–) 16–25 36. *S. squarrosus*

1. *Senecio minimus* Poir. in J.B.A.P.M. de Lamarck, *Encycl. suppl.* 5: 130 (1817)

Erechtites pumila DC., *Prodr.* 6: 297 (1838), in error; *E. minima* (Poir.) DC., *Prodr.* 6: 437 (1838). T: Tas., J.J.H. de Labillardière; holo: FI n.v., fide R.O. Belcher, *Ann. Missouri Bot. Gard.* 43: 46 (1956). [It appears that when De Candolle described *E. pumila* based on *S. pumilus* Poir., he actually meant *E. minima* based on *S. minimus*. In fact, on the final page of his treatment of *Senecio*, De Candolle presented a list of species excluded from *Senecio*, and lists *S. minimus* = *E. minima*, but gives no mention of *S. pumilus*]

S. muelleri Regel, *Ind. Sem. Hort. Bot. Imp. Petrop.* 31 (1863), as *Mülleri*. T: cult., seed sent by F. Mueller from Australia; iso: K n.v., fide R.O. Belcher, *loc. cit.*

Illustrations: D.G. Drury, *New Zealand J. Bot.* 12: 519, fig. 3 (1974); N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 4: 959, fig. 196c (1999); I.R. Thompson, *Muelleria* 19: 120, fig. 6 (2004).

Erect herbs to c. 2 m high, not leafier in lower $1/3$ at anthesis. Primary roots well-developed; secondary roots fine. Stems sparsely hispid reducing to \pm glabrous upwards. Leaves 8–25 cm long, with l:w ratio c. 4–6, not divided, or sometimes crenate; base with well-developed auricles; margin crowded-dentate; upper surface glabrous or nearly so; lower surface glabrous or slightly cobwebby, generally not purple. Capitula numerous to 100s per stem; calycular bracteoles 3–5, 1–2 mm long; peduncle and calyculus not or only slightly cobwebby at anthesis; involucre 4.0–6.5 mm long, 1–1.5 mm diam.; bracts 7–10, glabrous. Florets 12–25. Achenes narrowly obloid, 1.6–2.5 mm long, red-brown, with papillose hairs in lines or narrow bands; l:w ratio of hairs c. 3. Pappus 5–6 mm long. $n = 30$, M.E. Lawrence, *Austral. J. Bot.* 28: 155 (1980). Fig. 26A–F.

Occurs in SW W.A. from Pemberton E to the Porongurup Ra., and in SE Australia from Mt Glorious in far SE Qld S through eastern N.S.W. to Mallacoota in far eastern Vic., and from there W to Myponga in SE S.A. In Tas. it occurs from Deal Is. in Bass Strait S to Bruny Is. Also native to New Zealand. Naturalised in California and Oregon, U.S.A. Grows in better soils in moister sites such as beside swamps and streams, in forest and woodland. Flowers mostly summer–autumn.

W.A.: Halls Rock, Porongurup Ra., 35 km N of Albany, *G.J.Keighery 9350* (PERTH). S.A.: Lenswood, c. 20 km E of Adelaide, *A.G.Spooner 5180* (AD). Qld: Mt Glorious Rd, near The Summit, Mt Glorious, *S.P.Phillips 521* & *B.A.Phillips* (BRI, MEL, NSW). N.S.W.: Junction of Coramba Mtn and Bushmans Range Rds, 12.6 km from turnoff at Coramba in Orana West State Forest, *R.G.Coveny 16697* & *A.J.Whalen* (BRI, CANB, MEL, NSW). Vic.: Olinda Ck at Mt Evelyn Recreation reserve, near York Rd, *A.B.Court for R.V.Smith 59/8* (AD, BRI, CANB, MEL). Tas.: near Russell Falls, Mount Field Natl Park, 13 Jan. 1943, *W.M.Curtis* (HO, MEL).

The leaves of *S. minimus* are relatively large, and with a distinctive crowded-denticulate margin. The reticulate venation tends to be more pronounced than in other disciform species. Although distinctive within the Disciform group, a similar leaf morphology occurs in the radiate species *S. linearifolius*, and the discoid species *S. odoratus* and *S. ramosissimus*. The achenes of *S. minimus* are often slightly angular with hairs often arising from grooves on the angles.



2. *Senecio diaschides* D.G.Drury, *New Zealand J. Bot.* 12: 522 (1974)

T: Waipoua R., Waipoua forest, New Zealand, Feb. 1944, *K.A.Allison 95*; holo: CHR *n.v.*, *fide* D.G.Drury, *loc. cit.*

S. cahillii Belcher, *Muelleria* 5: 120 (1983). T: East Gippsland, Buchan R. near junction of Reedy R., Vic., 6 Feb. 1973, *A.C.Beauglehole 41406*; holo: MEL; iso: MEL.

S. sp. B, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980).

S. sp. A, S.W.L.Jacobs & J.Pickard, *Pl. New South Wales* 86 (1981).

Illustrations: D.G.Drury, *New Zealand J. Bot.* 12: 523, fig. 5 (1974); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 959, fig. 196f (1999); I.R.Thompson, *Muelleria* 19: 122, fig. 7 (2004).

Erect herbs to c. 1.5 m high, not leafier in lower $\frac{1}{3}$ at anthesis, with axillary growth precociously developed. Taproot well-developed; secondary roots fine. Stems very sparsely hispid or glabrous. Leaves 7–18 cm long, with l:w ratio c. 5–10, lobate to deeply lobate, with 3–8 triangular lobes per side; base with small to moderate auricles above mid-stem; margin entire or with well-spaced teeth; upper surface glabrous or nearly so; lower surface glabrous, generally not purple. Capitula numerous per stem; calycular bracteoles 3–6, 1–2 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 4.5–6.5 mm long, 1–1.5 mm diam.; bracts predominantly 7–10, glabrous. Florets 12–25. Achenes narrowly obloid-ellipsoid, 2.2–2.5 mm long, brown, with papillose hairs in bands; l:w ratio of hairs c. 3. Pappus 4–5 mm long. Fig. 26G.

Occurs in SW W.A., where possibly introduced, from the Perth area SSE to Walpole, and in SE Australia from Gympie in SE Qld S through eastern N.S.W. to Licola in eastern Vic. Naturalised in New Zealand. Grows in alluvial soils adjacent to swamps and rivers, in forest and woodland. Flowers summer–autumn.

W.A.: Simmonds Block, *G.J.Keighery 14115* (PERTH). Qld: Bald W of Long Plain, Bunya Mtns, *R.J.Fairfax 66* (BRI). N.S.W.: Long Swamp, King's Hwy, 16 km E of Bungendore, *M.Gray 6080* (AD, BRI, CANB, HO, MEL, NSW); 0.85 km above Mitchell Ck Picnic Area, *J.R.Hosking 719* & *R.H.Holtkamp* (CANB, MEL, NSW, UNE). Vic.: W bank of Snowy R., c. 3 km upstream of Snowy–Buchan R. confluence, *N.G.Walsh 3015 et al.* (MEL).

The precocious leafy axillary growth and the undivided narrowly linear leaves of the branches are distinctive features of this species. Similar axillary growth patterns also occur in *S. esleri* and *S. quadridentatus*.



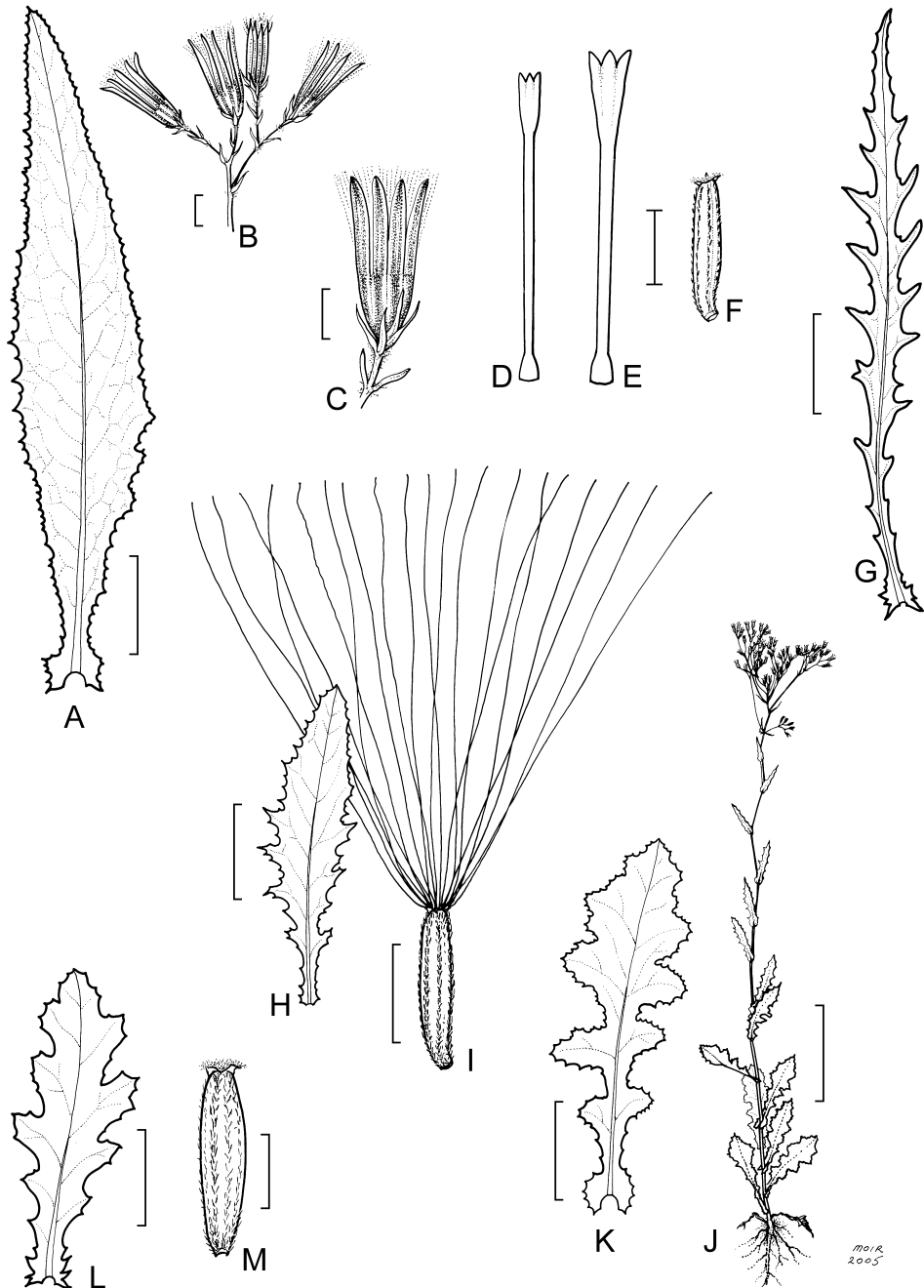


Figure 26. *Senecio*. A–F, *S. minimus*. A, mid-stem leaf; B, group of capitula; C, capitulum; D, female floret; E, bisexual floret; F, achene (A, M.G.Corrick 7933, MEL; B–F, A.B.Court 59/8, MEL). G, *S. diaschides*, mid-stem leaf (N.G.Walsh 3015, MEL). H, I, *S. biserratus*. H, mid-stem leaf; I, achene with pappus (H, I, I.Crawford 547, MEL). J, K, *S. picridioides*. J, habit; K, mid-stem leaf (J, K, I.C.Clarke 2299, MEL). L, M, *S. distalilobatus*. L, mid-stem leaf; M, achene (L, J.R.Hosking 683, MEL; M, J.H.Willis, 21 Feb. 1961, MEL). Scale bars: J = 10 cm; A, G–H, K–L = 20 mm; B–C = 2 mm; D–F, I, M = 1 mm. Drawn by M.Moir.

3. *Senecio biserratus* Belcher, *Ann. Missouri Bot. Gard.* 43: 43 (1956)

S. flaccidus A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 110 (1834), *nom. illeg. non Less.* (1831). T: D'Entrecasteaux Channel, Tas., Baudin voyage of 1826–29, *A.Lesson*; *holo: P.*

Erechtites sonchoides DC., *Prodr.* 6: 296 (1838). T: southern Australia, Baudin voyage of 1826–29, *A.Lesson*; *holo: G n.v., fide R.O.Belcher, loc. cit.*

Illustrations: D.G.Drury, *New Zealand J. Bot.* 12: 521, fig. 4 (1974); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 959, fig. 196d (1999); I.R.Thompson, *Muelleria* 19: 109, fig. 4e; 124, fig. 8 (2004).

Erect herbs to 1 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Primary roots well-developed; secondary roots fine. Stems sparsely to moderately hispid reducing to nearly glabrous upwards. Leaves 5–15 cm long, with l:w ratio c. 1.5–4, coarsely dentate to deeply lobate, with 3–5 triangular or oblong projections per side; base with well-developed auricles; margin serrate; both surfaces glabrous or sparsely hispid; lower surface sometimes purple. Capitula numerous to 100s per stem; calycular bracteoles 2–6, 1–2 mm long; peduncle and calyculus not or slightly cobwebby at anthesis; involucre 4.5–6.5 (–7.5) mm long, 1–1.5 mm diam.; bracts predominantly 7–10, glabrous. Florets 12–20. Achenes narrowly obloid-ellipsoid, (2.0–) 2.5–3.2 mm long, dark brown, with papillose hairs in bands; l:w ratio of hairs c. 3. Pappus 5–6 mm long. *Jagged Fireweed*. Fig. 26H–I.

Occurs in SE Australia, largely on the coast, from Young-husband Penin. in SE S.A. E through southern Vic. to far SE N.S.W.; also in Tas. Grows in sandy, loamy and peaty soils in coastal woodland, shrubland, and grassland, and less often in forests at low to moderate altitudes. Flowers spring–autumn.

S.A.: Honans Scrub Native Forest, 5.5 km SSE of Glencoe, *P.J.Lang* 2461 (AD, HO). N.S.W.: Billangabee Ck, Ben Boyd Natl Park, 19 km SE of Eden, *R.Coveny* 5802 & *J.Armstrong* (MEL, NSW). Vic.: Five and Three Mile Beaches, Wilsons Promontory Natl Park, *P.C.Heyligers* 80192 (CANB, MEL). Tas.: Elliott Point, *A.Moscal* 11877 (HO).



Similar to *S. distalilobatus* but usually less coarsely hairy, with leaf segments more triangular, and leaf denticulations slightly serrate and very acute to acuminate rather than subacute or obtuse, achenes that are longer, more slender and with more robust papillose hairs, and with better-developed primary roots. *Senecio biserratus* is predominantly a coastal plant but it has been recorded from Mt Buninyong and Mt Macedon in south-central Vic. Commonly hybridises with the radiate species *S. pinnatifolius*; the resulting entity was described as *S. orarius*.

4. *Senecio picridioides* (Turcz.) M.E.Lawr., *J. Adelaide Bot. Gard.* 7: 292 (1985)

Erechtites picridioides Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 24(1): 200 (1851); *E. prenanthoides* var. *picridioides* (Turcz.) Benth., *Fl. Austral.* 3: 658 (1867); *S. minimus* var. *picridioides* (Turcz.) Belcher, *Ann. Missouri Bot. Gard.* 43: 48 (1956). T: W.A., 1845, *J.Drummond* 3rd coll. 132; *syn: Fl, K n.v., fide R.O.Belcher, loc. cit.*

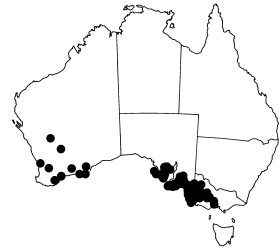
Illustrations: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 959, fig. 196e (1999); I.R.Thompson, *Muelleria* 19: 126, fig. 9 (2004).

Erect herbs to 1 m high, often leafier in lower $\frac{1}{3}$ at anthesis. Taproot small; secondary roots slightly fleshy. Stems sparsely to moderately hispid, with hair density reducing upwards. Leaves 6–20 cm long, with l:w ratio c. 2–4, lobate to deeply lobate, with 4–6 roughly semi-circular lobes per side; base with well-developed auricles; margin with crowded teeth; both surfaces hispid; lower surface commonly intensely purple. Capitula numerous per stem; calycular bracteoles 2–6, 1–2 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 6.0–8.0 mm long, 1.2–1.8 mm diam.; bracts 7–10, glabrous. Florets 15–30. Achenes narrowly obloid, 2.0–2.2 mm long, brown, with papillose hairs in bands; l:w ratio of hairs c. 3–4. Pappus 5.5–6 mm long. *n* = 30, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980). Fig. 26J–K.

Occurs in southern W.A. from Caversham E to Cape Arid, and in SE Australia from the Marble Ra. in south-central S.A. E to Werribee in south-central Vic. Grows in sand, loam

and clay-loam, often in depressions and shaded and rocky sites, in dune scrub, woodland and dry forest. Flowers spring–summer.

W.A.: c. 1.6 km NE of Bungalbin Hill, Helena and Aurora Ra., *B.J.Lepschi 2068* (CANB, MEL, NSW, PERTH). S.A.: Dudley Penin., E end of Kangaroo Is., *G.Jackson 863* (AD); upper tributary of Tanunda Ck near Schlenke Gully, *P.J.Lang 1700* (AD, BRI). Vic.: central block, Broughton's Waterhole, Little Desert Natl Park, 23 km SSE of Kaniva, *I.C.Clarke 2299* (AD, CANB, MEL).



The strong purple coloration of stems and lower surface of leaves, the distinctive leaf-lobation and the strongly stem-clasping, upper-stem leaves make this species readily identifiable.

5. *Senecio bipinnatisectus* Belcher, *Ann. Missouri Bot. Gard.* 43: 41 (1956)

Erechtites atkinsoniae F.Muell., *Fragm.* 5: 88 (1865); *S. atkinsoniae* F.Muell., *loc. cit.*, *nom. inval. pro syn.* T: Blue Mountains, N.S.W., *L.Atkinson*; lecto: K n.v., *fide* R.O.Belcher, *op. cit.* 42 (1956); isolecto: MEL. [Remaining syntype: Monkey Ck near Port Jackson, *W.Woolfs*; syn: MEL].

Illustrations: D.G.Drury, *New Zealand J. Bot.* 12: 529, fig. 8 (1974); G.J.Harden (ed.), *Fl. New South Wales* 3: 303 (1992); I.R.Thompson, *Muelleria* 19: 128, fig. 10 (2004).

Erect herbs to 1.5 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Primary roots well-developed; secondary roots fine. Stems nearly glabrous. Leaves 10–15 cm long, with l:w ratio c. 1.5–2, 1- or 2-pinnatisect, with 4–6 primary segments per side; base with well-developed auricles; margin with well-spaced teeth; upper surface \pm glabrous; lower surface sparsely hispid, generally not purple. Capitula numerous per stem; calycular bracteoles 3–5, 1.5–2.5 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 5.0–7.0 mm long, 1.2–1.5 mm diam.; bracts predominantly 8–10, glabrous. Florets 15–25. Achenes narrowly obloid, 1.8–2.2 mm long, dark red-brown, with papillose hairs in narrow bands; l:w ratio of hairs c. 3. Pappus 4–5 mm long. $2n = 60$, M.E.Lawrence, *Austral. J. Bot.* 28: 154 (1980). *Commonwealth Weed*.

Occurs from Candle Mtn in SE Qld S to Mt Dromedary in far SE N.S.W. and disjunctly in far N Qld. Naturalised in New Zealand. Grows in forests, woodlands, and shrublands. Flowers most of year.

Qld: Base of Mt Killiekrankie, Oakes State Forest, WSW of Bellingen, *A.R.Bean 14599* (BRI); near Sunday Creek forestry camp, 32 km WNW of Maleney, *date & coll. unknown* (BRI); Cunningham's Gap, Mt Mitchell, *P.I.Forster 11107 & R.Reilly* (BRI, MEL). N.S.W.: 15.4 km W of Gingers Ck, Oxley Hwy, *R.H.Holtkamp 15 & A.Maguire* (CANB, MEL, NSW, UNE).



Similar in leaf form to *S. bathurstianus*, but with far fewer coarse hairs on stems and leaves, longer involucre with fewer bracts, and fewer florets.

6. *Senecio distalilobatus* I.Thomps., *Muelleria* 19: 129 (2004)

T: Razorback Spur Track, 500 m S of Limestone Creek Track, Razorback Forest Block, 1.4 km N of Mt Cooper, Vic., 1 Feb. 1985, *G.W.Carr 10361*; holo: MEL.

S. sp. aff. biserratus (Montane), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 109, fig. 4d; 130, fig. 11.

Erect herbs to 1.5 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot small; secondary roots fleshy. Stems moderately hispid, with hair density reducing upwards, or nearly glabrous. Leaves 6–12 cm long, with l:w ratio c. 2–4, lobate to nearly pinnatisect, with 3–6 triangular, oblong or obovate projections per side; base with small to well-developed auricles; both surfaces hispid, occasionally nearly glabrous, lower surface generally not purple. Capitula numerous per stem; calycular bracteoles 3–6, 1–2 mm long; peduncle and calyculus often slightly cobwebby at anthesis; involucre 5.0–7.0 mm long, 1–1.8 mm diam.; bracts 7–10 (–13), glabrous. Florets 12–20. Achenes narrowly obloid to narrowly ellipsoid, 2.0–2.8 mm long,

red-brown, with rather fine papillose hairs in narrow bands or somewhat scattered; l:w ratio of hairs c. 3. Pappus 5–6 mm long. Fig. 26L–M.

Occurs from Glen Elgin in NE N.S.W. S to eastern Vic. extending as far W as Mt Howitt. Also in the Bunya Mtns in SE Qld. Grows in loam soils in forests usually at altitudes over 800 m. Flowers summer–autumn.

Qld: Bunya Mtns, Bell Rd c. 3 miles [5 km] S of Mt Mowbullian Guest House, *R.W.Johnson* 455 & *L.Pedley* (BRI). N.S.W.: Port Philip Trail, Kosciuszko Natl Park, *I.R.Thompson* 751 & *N.G.Walsh* (MEL). A.C.T.: near Parrot Rd turnoff, Bendora to Mt Franklin, *M.Gray* 5022 (CANB, MEL). Vic.: Mt Tennyson, East Gippsland, *J.V.Yugovic* 262 & *A.M.Opie* (MEL).

Senecio distalilobatus is similar to *S. biserratus* q.v. and also resembles *S. hispidulus* but its leaves have a more distal development of segments and teeth, upper-stem leaves are narrowly elliptic rather than lanceolate to linear, auricles are relatively smaller, involucre contains usually fewer, flatter and finally reflexed bracts, corolla lobes of female florets are shorter, and achene hairs are finer.



7. *Senecio esleri* C.J.Webb, *New Zealand J. Bot.* 27: 565 (1989)

T: 7 Stilwell Rd, Mt Albert, Auckland City, 21 Feb. 1989, *C.J.Webb*; holo: CHR n.v., fide *C.J.Webb*, loc. cit.

S. brevityubulus I.Thomps., *Muelleria* 19: 131 (2004). T: Qld, c. 1/2 mile [0.8 km] N of Woodford-Kilcoy-Beerwah road junction on both sides of road for about 1/2 mile [0.8 km], Nov. 1969, *H.S.Tutt*; holo: BRI.

Illustration: I.R.Thompson, *op. cit.* 133, fig. 13.

Erect herbs to c. 1 m high, not leafier in lower 1/3 at anthesis. Roots not seen. Stems hispid, reducing to nearly glabrous upwards. Leaves 7–10 cm long, with l:w ratio c. 1.5–3, pinnatisect to sub-bipinnatisect, with 4–6 narrow triangular or linear segments per side, extending into distal quarter; base with well-developed auricles; upper surface glabrous; lower surface glabrous, or sparsely hispid on midrib, generally not purple. Capitula numerous per stem; calycular bracteoles 3–6, 1–2 mm long; peduncle and calyculus generally not cobwebby at anthesis; involucre 3.5–4.5 mm long, 1.4–1.8 mm diam.; bracts 11–13, glabrous. Florets 35–45. Achenes narrowly obloid-ellipsoid, 2.0–2.7 mm long, red-brown, with papillose hairs in narrow bands; l:w ratio of hairs c. 3. Pappus 4–5 mm long.

Occurs in SE Qld from Cooroy W to the Bunya Mtns, and in far NE N.S.W. on Acacia Plateau near the Qld–N.S.W. border. Naturalised in New Zealand around Auckland. Recorded from rainforest clearings in Australia. Flowers late spring–autumn.

Qld: West Cooroy, Dec. 1959, *N.J.Douglas* (BRI). N.S.W.: Acacia plateau, near Qld border, *C.T.White* 12734 (BRI).

Similar in leaf form to *S. bipinnatisectus*, but perhaps more closely related to *S. bathurstianus* because of its hispid stems and short, relatively plump capitula with an involucre of c. 13 bracts. Achenes of *S. esleri* are longer than those of the aforementioned species, but the corolla is shorter. Appears to have been introduced into New Zealand based on its recent discovery there in urban environments. In Australia it appears to be quite rare, although possibly also undercollected due to its superficial similarity to *S. bathurstianus* and *S. bipinnatisectus*.



8. *Senecio bathurstianus* (DC.) Sch.Bip., *Flora* 28: 498 (1845)

Erechtites bathurstiana DC., *Prodr.* 6: 297 (1838); *E. arguta* var. *dissecta* Benth., *Fl. Austral.* 3: 659 (1867); *E. arguta* var. *bathurstiana* (DC.) Domin, *Biblioth. Bot.* 89: 685 (1930), *nom. illeg.*; *S. hispidulus* var. *dissectus* (Benth.) Belcher, *Ann. Missouri Bot. Gard.* 43: 69 (1956). T: near Bathurst, N.S.W., *A.Cunningham* 135; holo: G microfiche seen.

Illustrations: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 959, fig. 196h (1999), as *S. hispidulus* var. *dissectus*; I.R.Thompson, *Muelleria* 19: 135, fig. 14 (2004).

Erect herbs to 1.5 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot well-developed; secondary roots fine. Stems usually densely hispid, becoming less dense upwards. Leaves 7–15 cm long, with l:w ratio c. 1.5–3, 1- or 2-pinnatisect, with 4–6 primary segments per side; base with well-developed auricles; margin with scattered teeth; upper surface hispid; lower surface hispid, sometimes with cobwebby overlay, sometimes tinged purple. Capitula numerous per stem; calycular bracteoles 3–6, 1–2 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 3.5–6.0 mm long, 1.6–2.0 mm diam.; bracts predominantly 11–13, glabrous. Florets 26–35 (–45). Achenes narrowly obloid, 1.5–2.0 mm long, red-brown or blackish, with papillose hairs usually \pm scattered; l:w ratio of hairs c. 3–4. Pappus 4–5 mm long. $n = 30$, M.E.Lawrence, *Austral. J. Bot.* 28: 154 (1980).

Occurs from Kroombit Tops Natl Park, SE Qld, S through eastern N.S.W. to the Upper Genoa R. in far eastern Vic. and from there W to Mt Bepcha in western Vic. Grows often in poorer soils and often associated with rocky outcrops, e.g. of sandstone or granite, in drier forest and woodland. Flowers spring–summer.

Qld: Bigge Ra., Palmgrove Natl Park, NW of Taroom, *P.I.Forster* 23765 & *R.Booth* (BRI, MEL). N.S.W.: Weddin Mtn, c. 18 km W of Grenfell, *R.Pullen* 10236 (AD, CANB, MEL, NSW). Vic.: Reef Hills Regional Park SW of Benalla, *A.C.Beauglehole* 66149 (CANB, HO, MEL, NSW, PERTH); 9.3 km SSW of Mt Tambo, Spring Hill Track, near summit of Spring Hill, *G.W.Carr* 10279 (AD, CANB, MEL).



Similar to *S. bipinnatisectus* and *S. esleri* q.v. Similar also to *S. hispidulus* but with more deeply divided leaves, stems and leaves more densely coarse-hairy, capitula usually with more florets, and achenes with papillose hairs more scattered. *Senecio glomeratus* has similar-sized capitula and leaf dissection sometimes approaching that of *S. bathurstianus*, but the latter has calycular bracteoles shorter and fewer, and not cobwebby at anthesis.

9. *Senecio hispidulus* A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 92, t. 34 (1834)

Erechtites hispidula (A.Rich.) DC., *Prodr.* 6: 296 (1838). T: Tas., 1828, *A.Lesson* 18; holo: P.

Illustrations: D.G.Drury, *New Zealand J. Bot.* 12: 534, fig. 10 (1974); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 959, fig. 196g (1999); I.R.Thompson, *Muelleria* 19: 137, fig. 15 (2004).

Erect herbs to 1.5 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot well-developed; secondary roots fine or slightly fleshy. Stems sparsely to moderately hispid, reducing to glabrous above mid-stem. Leaves 7–15 cm long, with l:w ratio c. 2.5–6, undivided or deeply lobate to subpinnatisect proximally, with 2–5 \pm triangular, or occasionally oblong, lobes per side, usually undivided or weakly lobate in distal half; base with well-developed auricles; upper surface somewhat hispid; lower surface hispid, occasionally slightly cobwebby, sometimes tinged purple. Capitula numerous per stem; calycular bracteoles 4–6, 1–2.5 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 4.5–6.0 mm long, 1.3–1.8 mm diam.; bracts predominantly (9–) 11–13, glabrous. Florets 18–35. Achenes narrowly obloid, 1.5–2.2 mm long, red-brown, glabrous or with papillose hairs in lines or narrow bands, occasionally slightly scattered; l:w ratio of hairs c. 3. Pappus 4–6 mm long. $n = 30$, M.E.Lawrence, *Austral. J. Bot.* 28: 154 (1980). Fig. 27A.

Occurs in SW W.A. from Nannup SE to Denmark with an outlier on Thomas Is. in the Recherche Archipelago, and in SE Australia from the Bunya Mtns in SE Qld S through eastern N.S.W. to Vic., and from Mallacoota in far eastern Vic. W to Kangaroo Is., S.A., also in Tas. Grows in loamy soils in forest and woodland. Flowers spring–summer.

W.A.: 200 m S of Campers hut, Bibbulmun Track, Donnelly R. valley, *V.L.Tunstall et al.* 163 (PERTH). S.A.: At Jupiter Ck below dam, Southern Lofty Ra., *R.J.Bates* 26777 (AD, MEL, NSW). Qld: Mt Roberts, McPherson Ra., *S.T.Blake* 21561 (BRI). N.S.W.: Corner Hill, SE slope, c. 11 km NW Captains Flat, *N.M.Taws* 806 (CANB). Vic.: Pyrenees Number Two Ck, 10 km W of Avoca, *A.C.Beauglehole* 66523 (CANB, MEL). Tas.: Forest Rd extension, Knocklofty, outskirts of Hobart, *A.E.Orchard* 5016 (HO).



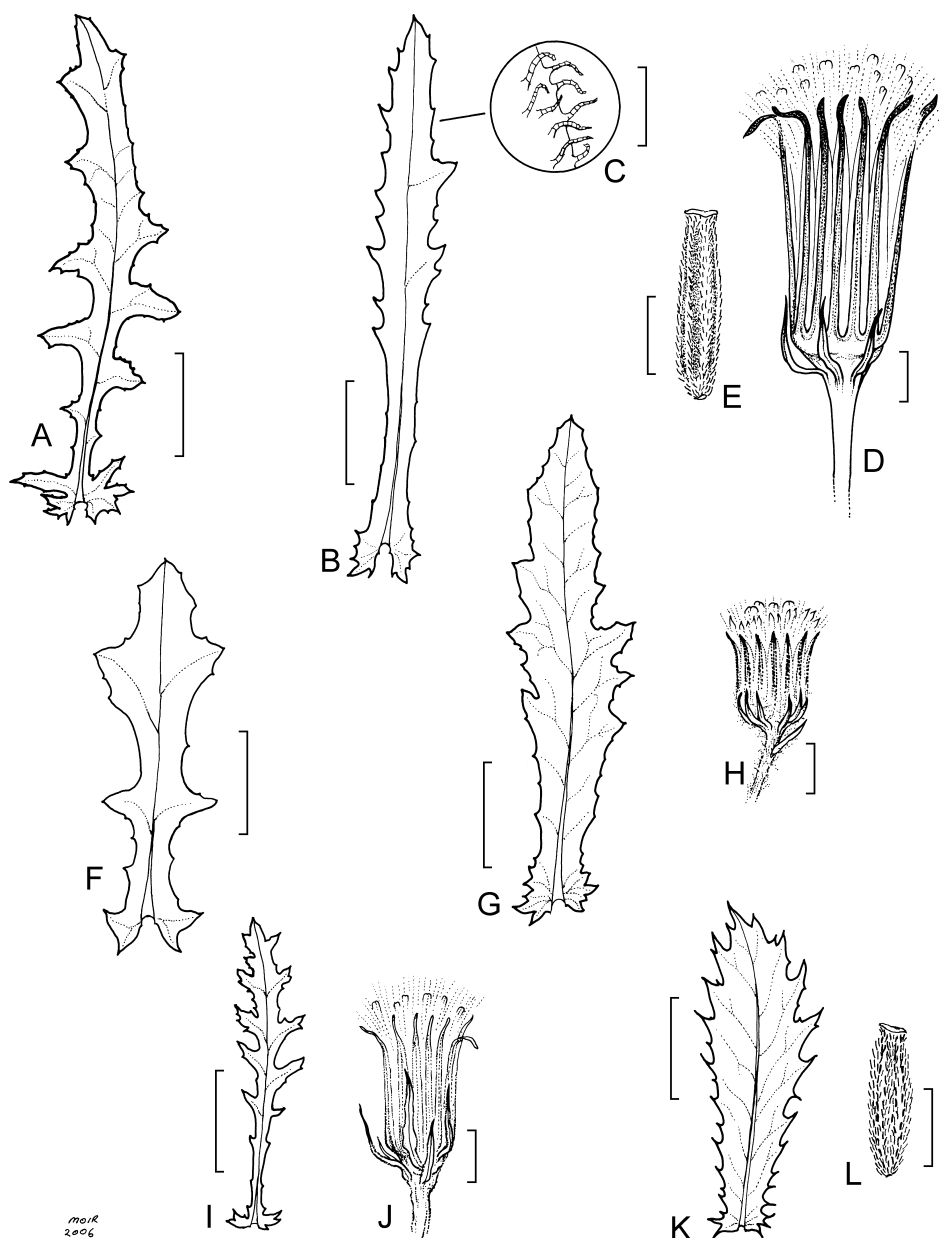


Figure 27. *Senecio*. A, *S. hispidulus*, mid-stem leaf (T.Muir 7041, MEL). B–E, *S. hispidissimus*. B, mid-stem leaf; C, close-up of hairs near margin; D, capitulum; E, achene (B, D, I.R.Thompson 744, MEL; E, A.C.Beauglehole 37985, MEL). F, *S. multicaulis* subsp. *multicaulis*, mid-stem leaf (N.G.Walsh 5450, MEL). G, H, *S. glomeratus* subsp. *longifructus*. G, mid-stem leaf; H, capitulum (G, H, A.C.Beauglehole 78267, MEL). I, J, *S. extensus*. I, mid-stem leaf; J, capitulum (I, J, J.Strudwick 782, MEL). K, L, *S. laceratus*. K, mid-stem leaf; L, achene (K, L, J.H.Willis, 26 May 1974, MEL). Scale bars: A–B, F, G, I, K = 20 mm; D, H, J = 2 mm; C, E, L = 1 mm. Drawn by M.Moir.

Similar to *S. bathurstianus* q.v. Also similar to *S. distalilobatus* but the lobation of its leaves is largely restricted to the proximal half and capitula usually have more involucre bracts. Populations with glabrous achenes are predominantly found in N.S.W.

10. *Senecio hispidissimus* I.Thomps., *Muelleria* 19: 138 (2004)

T: c. 1 km SE of Broughtons Waterhole, N of Sambells Track, central block, Little Desert Natl Park, Vic., 21 Dec. 1993, *I.C. Clarke* 2380; holo: MEL.

Erechtites arguta var. *asper* Hook.f. in W.J.Hooker, *London. J. Bot.* 6: 122 (1847); *S. asper* A.Cunn. in W.J.Hooker, *loc. cit.*, *nom. inval.*, *pro syn.* T: Woolnorth, Tas., *R.C.Gunn*; syn: K, photo MEL.

S. sp. C f. 3, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980).

S. sp. C f. 4, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980).

S. sp. aff. *tenuiflorus* (South-west), J.H.Ross, *Census Vasc. Pl. Victoria* 5th edn 52, 215 (1996).

Illustration: I.R.Thompson, *op. cit.* 139, fig. 16.

Erect herbs to c. 1 m high, often leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary roots fleshy. Stems hispid, commonly densely so, with density gradually reducing upwards. Leaves 6–13 cm long, with l:w ratio c. 4–7, sometimes undivided, more often coarsely dentate to lobate, with 3–7 \pm triangular projections per side; base with well-developed auricles; margin denticulate or nearly entire; both surfaces hispid; lower surface not purple. Capitula several–numerous per stem; calycular bracteoles 5–8, 1.5–3 mm long; peduncle and calyculus not cobwebby but often hispid at anthesis; involucre (5–) 6–9 mm long, 1.8–2.5 mm diam.; bracts mostly 11–14, glabrous. Florets 20–45. Achenes narrowly obloid, 1.5–2.8 mm long, tan or light brown, with papillose hairs in bands; l:w ratio of hairs c. 3–4. Pappus 6–7 mm long. $n = 30$, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980), as *S. sp. C* form 3. Fig. 27B–E.

Occurs from Vivonne Bay, Kangaroo Is., S.A., E to the Grampians in western Vic., on Wilsons Promontory in south-central Vic., and in Tas. in the NW, SE, and on Bass Strait islands of the Furneaux Group. Grows in sandy soils in heathland, woodlands and shrublands in lowland areas. Flowers spring–autumn.

S.A.: N of Bangham Scrub, *R.J.Bates* 15675 (AD); 1.46 km from Meningie at 145°48", *L.D.Williams* 11483 (AD, CANB). Vic.: Rocky Ck N of Baileys Rocks Res., c. 10 km NNW of Dergholm P.O., *A.C.Beauglehole* 37985 (AD, MEL); c. 400 m along unnamed track E of Heath Rd, Lower Glenelg Natl Park, *I.R.Thompson* 743 (AD, CANB, MEL). Tas.: Great Taylors Bay, South Bruny Is., *A.M.Buchanan* 4029 (HO).



Similar to *S. squarrosus* and *S. multicaulis* but generally more densely and evenly hispid, and with coarse hairs conspicuous even in bracts of the inflorescence and sometimes on the margin of bracteoles. Similar also to *S. hispidulus* but more densely hispid, usually with broader capitula, with longer involucre bracts that are purple throughout or purple at the apex, and with the apices distorted on drying.

11. *Senecio multicaulis* A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 105 (1834)

T: King George Sound, W.A., 1828, *A.Lesson*; holo: P.

Erect herbs to 1.5 m high, commonly leafier in lower $\frac{1}{3}$. Tap or primary roots well-developed; secondary roots fine. Stems hispid, sparsely appressed-cottony or \pm glabrous. Leaves 3–13 cm long, with l:w ratio c. 2–30, undivided or lobate, with 1–5 triangular projections per side; base with auricles small or moderately developed; margin with scattered teeth or nearly entire; upper surface sparsely to moderately hispid or glabrous; lower surface hispid, cobwebby or somewhat woolly, sometimes glabrous except for midrib, often purple. Capitula usually numerous per stem; calycular bracteoles 6–10, 1–2.5 mm long; peduncle and calyculus often sparsely to moderately cobwebby at anthesis; involucre (4–) 5–8 mm long, 2–2.8 mm diam.; bracts predominantly 12–14, \pm glabrous. Florets 30–50. Achenes narrowly obloid, 1.5–2.5 mm long, mid to dark brown, with papillose hairs in broad bands, rarely glabrous; l:w ratio of hairs c. 3. Pappus 5–7 mm long.

Occurs in SW W.A.; there are 2 subspecies.

Mid- to upper-stem leaves (excluding auricles) with length:width ratio mostly > 6; lower surface glabrous or indumentum sparse to moderate; involucre 5–8 mm long, length:diam. ratio c. 2.5–3.5

11a. subsp. *multicaulis*

Mid- to upper-stem leaves (excluding auricles) with length:width ratio mostly < 6; lower surface moderately to densely woolly; involucre 4–6 mm long, length:diam. ratio 2.0–2.5

11b. subsp. *stirlingensis*

11a. *Senecio multicaulis* A.Rich. subsp. *multicaulis*

S. pusillus A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 99 (1834). T: King George Sound, W.A., 1826–29, *A.Lesson*; holo: P.

Illustration: I.R.Thompson, *Muelleria* 19: 109, fig. 4c; 142, fig. 17 (2004)

Mid- to upper-stem leaves with l:w ratio 6–30, undivided with margin entire or dentate; lower surface glabrous, sparsely hispid, or cobwebby. Involucre 5–8 mm long, 2–2.5 mm diam. Fig. 27F.

Occurs in SW W.A., from Gin Gin N of Perth S to Walpole and SSE to the Stirling Ra., with a northern outlier at Geraldton and an eastern outlier at Cape le Grand Natl Park. Grows in sandy or sandy clay soils over granite or laterite in forest, heathland and woodland. Flowers spring–summer.

W.A.: Near Pt 5102, Kordabup Rd, 4.3 km from South Coast Hwy, 18 km W of Denmark, *A.R.Annels* 1882 (PERTH); 20 km from Frankland to Cranbrook, *G.J.Keighery* 6580 (PERTH); Dardanup Forest Block, SE Bunbury, *G.J.Keighery* 15140 (PERTH); Neridup, c. 3 km NE of Howick Hill, in Location 251, *A.E.Orchard* 1139 (AD, CANB).



Similar to *S. hispidulus* but with larger capitula, leaves that are less deeply lobed, coarse hairs usually less persistent upwards, and upper-stem leaves often cobwebby.

11b. *Senecio multicaulis* subsp. *stirlingensis* I.Thomps., *Muelleria* 19: 143 (2004)

T: Mt Trio, Stirling Ranges, W.A., 15 Sept. 1985, *G.J.Keighery s.n.* & *J.J.Alford*; holo: PERTH.

Illustration: I.R.Thompson, *op. cit.* 144, fig. 18.

Mid- to upper-stem leaves with l:w ratio 2–6, lobate or undivided with margin dentate; lower surface moderately to densely woolly, with hairs coarse-based or not. Involucre 4–6 mm long, 2–2.8 mm diam.

Occurs in SW W.A. in the Stirling Ra. and the nearby Porongurup Ra. with an outlier further E at Point Anne in Fitzgerald River Natl Park. Grows in soils derived from granite in woodland and forest. Flowers spring–summer.

W.A.: E side of Devils Slide from the Pass at head of Bolganup Ck, Porongurup Natl Park, *W.R.Barker* 2380 (AD); Bluff Knoll, c. 0.5 km SSW from summit, Stirling Ranges Natl Park, *N.G.Walsh* 5453 (MEL, PERTH).



Plants in the Stirling Ra. have leaves that are more conspicuously hispid. The coarse bases of the hairs on the lower surface of its leaves are obscured by the woolly extensions.

12. *Senecio glomeratus* Desf. ex Poir. in J.B.A.P.M.de Lamarck, *Encycl. suppl.* 5: 130 (1817)

T: cult., '*Senecio quadridentatus* Labill. *Senecio glomeratus* h. Par.', Herb. Webb. ex Herb. Desf., right hand specimen; neo: FI, *fide* R.O.Belcher, *Ann. Missouri Bot. Gard.* 43: 62 (1956).

?*Erechtites arguta* (A.Rich.) DC. var. ϵ Hook.f. in W.J.Hooker, *London J. Bot.* 6: 122 (1847), *nom. inval.* ?T: Circular Head, Tas., 11 Dec. 1837, *R.C.Gunn s.n.*; holo: K, photo MEL. [The subspecies of *S. glomeratus*

to which specimens on this sheet belong is unclear from the photo seen. It appears closer to *S. glomeratus* subsp. *longifructus*, but examination of the actual specimen is necessary to confirm this.]

S. sp. H (aff. *glomeratus*), S.W.L.Jacobs & J.Pickard, *Pl. New South Wales* 86 (1981).

Erect herbs to c. 2 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot well-developed; secondary roots fine. Stems hispid in lower $\frac{1}{2}$, with hair density reducing upwards, often giving way to an appressed-cottony indumentum above mid-stem, or becoming nearly glabrous. Leaves 5–20 cm long, with l:w ratio c. 2–7, undivided, or more often coarsely dentate to deeply lobate, with 2–7 oblong to obovate, or less often triangular, lobes per side; base with well-developed auricles; upper surface often hispid but usually becoming appressed-cobwebby or glabrous above mid-stem; lower surface developing an appressed wool above midstem, sometimes nearly glabrous, sometimes tinged purple. Capitula numerous to 100s per stem; calycular bracteoles 6–12, 1.5–3 mm long; peduncle and calyculus sparsely to moderately cobwebby or woolly at anthesis; involucre 3–6 mm long, 1.5–2 mm diam.; bracts mostly 12–14, glabrous or cobwebby basally. Florets 30–50. Achenes narrowly obloid to narrowly ellipsoid, 1–2.2 mm long, brown or olive-green, with papillose hairs in narrow bands; l:w ratio of hairs c. 3. Pappus 5–6 mm long. *n* = 30, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980).

Occurs in southern mainland Australia and Tas.; there are 2 subspecies.

Sometimes confused with *S. hispidulus* which has capitula of similar size and involucre bract number. However *S. hispidulus* has more slender, always green capitula with a \pm glabrous calyculus and peduncle, fewer and generally shorter calycular bracteoles, and upper-stem leaves that generally do not develop a cobwebby or woolly indumentum. *Senecio bathurstianus* has capitula of the same size and bract number as *S. glomeratus*, but the former has more deeply divided leaves and its peduncle and calyculus are not cobwebby.

Achenes $< \frac{1}{3}$ of involucre bract length (bracts 4.0–6.0 mm long; achenes 1.0–1.7 mm long), commonly all medium to dark red-brown; pappus usually > 5 mm long

12a. subsp. *glomeratus*

Achenes $> \frac{1}{3}$ of involucre bract length (bracts mostly 3.0–5.0 mm long; achenes 1.3–2.2 mm long), with marginal ones greenish or olive, and central ones medium brown; pappus usually < 5 mm long

12b. subsp. *longifructus*

12a. *Senecio glomeratus* Desf. ex Poir. subsp. *glomeratus*

S. argutus A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 1: 258 (1832), *nom. illeg. non* Kunth (1820); *Erechtites arguta* (A.Rich.) DC., *Prodr.* 6: 296 (1838); *S. lessonianus* Sch.Bip., *Flora* 28: 498 (1845), *nom. illeg. non* Steud. (1841); *S. lessonii* F.Muell., *Ann. Rep. Govt. Bot.* 26 (1858), *nom. illeg. superfl.*, as *Lessoni*. [Mueller appears to have been creating a new combination in *Senecio* for '*Erechtites arguta* (A.Rich.) DC.' The epithet given, *angusta*, is considered to be a typographical error for *arguta*]. T: Cook Strait, New Zealand, *A.Lesson s.n.*; *holo: P.*

E. glomerata DC., *Prodr.* 6: 297 (1838), *nom. illeg.*; *E. arguta* var. *glomerata* (DC.) Domin, *Biblioth. Bot.* 89: 684 (1930), as *Erechtites*. T: southern Australia, *coll. unknown*; *holo: G n.v., fide* R.O.Belcher, *op. cit.* 43: 61 (1956).

E. glomerata var. *subincisa* DC., *Prodr.* 6: 297 (1838). T: '*Senecio glomeratus* h. pl. 1815'; *syn: G n.v., fide* R.O.Belcher, *loc. cit.*; *locality unknown, coll. unknown*; *syn: G n.v., fide* R.O.Belcher, *loc. cit.*

?*E. glomerata* var. *polycephala* DC., *Prodr.* 6: 297 (1838). T: Bass Strait, New Zealand; *holo: G n.v., fide* R.O.Belcher, *loc. cit.*

E. arguta var. *obovata* Hook.f. in W.J.Hooker, *London J. Bot.* 6: 122 (1847). T: Clarence Plains, Tas., *C.Fraser*; *syn: K, photo MEL*; Mt Wellington, Tas., *coll. unknown*; *syn: K, photo MEL*.

S. multicaulis var. *dissecta* E.L.Robertson in J.M.Black (rev. by E.L.Robertson), *Fl. S. Australia* 2nd edn, 4: 887 (1957), *nom. inval.* T: not designated.

S. glomeratus subsp. 1, J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

[*E. arguta* var. *dissecta* *auct. non* Benth.: J.M.Black, *Fl. S. Australia* 4: 610 (1929)]

Illustrations: D.G.Drury, *New Zealand J. Bot.* 12: 526, fig. 6 (1974); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 963, fig. 197a (1999); I.R.Thompson, *Muelleria* 19: 147, fig. 20 (2004).

Plants to c. 2 m high. Lower surface of upper-stem leaves typically with a \pm dense cobwebby indumentum. Peduncle and margin of calycular bracteoles somewhat moderately cobwebby

to woolly at anthesis; involucre 4–6 mm long, with length 2–3 times diam.; bracts often purple throughout. Corolla of bisexual florets 5–7 mm long; corolla of female florets 4–6 mm long. Achenes 1–1.7 mm long, usually all mid to dark reddish brown, uncommonly some greenish; l:w ratio of hairs c. 1–2. Pappus 5–7 mm long.

Occurs in SW W.A. from Scott Natl Park E to near Albany, and in SE Australia from Port Lincoln, S.A., E to Buchan in eastern Vic. with more northern outliers in the Flinders Ra. in S.A. and at Mudgee in central-east N.S.W., and from the Furneaux Is. in Bass Strait S to South Bruny Is., Tas. Also native to New Zealand. Naturalised in California, U.S.A., although which subspecies occurs there is uncertain. Grows in a range of soils in forest, woodland and heathland. Flowers mostly late spring–autumn.

W.A.: Farra Dam, 8 km W of Kojonup, *C.M.Lewis* 455 (PERTH). S.A.: Kyeema corner, on Willunga to Meadows road, *A.W.Bell* 52 (AD, MEL). N.S.W.: Wog Wog forest habitat - patch experimental area, 30 km SE of Bombala, *P.C.Heyligers* 88218 (CANB). Vic.: Dundas R., 14 km NNW of Cavendish, *L.G.Adams* 3876 (CANB, MEL). Tas.: Yarra Ck Gorge, E coast of King Is., 6 Mar. 1966, *J.H.Willis* (MEL).



The numerous, crowded, small and often purple capitula surrounded basally by many cobwebby calycular bracteoles give this subspecies a distinctive appearance. It is often a rather tall plant in forest environments. It sometimes grows near water and then is sometimes sympatric with subsp. *longifructus*. It is likely that hybridisation takes place between subspecies in these environments.

12b. *Senecio glomeratus* subsp. *longifructus* I.Thomps., *Muelleria* 19: 148 (2004)

T: Buenba Gap Rd, 6.2 km E of Beloka Range Track, 3.2 km SSE of Johnnies Top, Beloka Forest Block, Vic., 12 Jan. 1985, *G.W.Carr* 10286; holo: MEL; iso: AD.

S. multicaulis var. *microcephala* E.L.Robertson in J.M.Black (rev. by E.L.Robertson), *Fl. S. Australia* 2nd edn, 4: 887 (1957), *nom. inval.* T: not designated.

S. glomeratus subsp. 2 (Small capitula), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 149, fig. 21.

Plants to c. 1.5 m high. Lower surface of upper-stem leaves commonly nearly glabrous or sparsely to moderately cobwebby. Peduncle and margin of calycular bracteoles sparsely to moderately cobwebby at anthesis; involucre 3–4.5 (–5) mm long, with length usually no more than twice diam.; bracts usually predominantly green. Corolla of bisexual florets 4.5–5.5 mm long; corolla of marginal florets 3–4.5 mm long. Achenes 1.3–2.2 mm long, light to dark brown, usually also a few to several marginal ones olive or green; l:w ratio of hairs c. 1–2. Pappus 3.5–5 mm long. Fig. 27G–H.

Occurs in SW W.A., and from Kangaroo Is., S.A., E to Newton's Beach in far SE N.S.W., and in Tas. on eastern Bass Strait Is., in the Hobart area, at Welcome Inlet in the far NW, and on the SW coast at Ummarrah Ck. Typically grows adjacent to water. Flowers mostly late spring–autumn.

W.A.: Nanarup, *G.J.Keighery* 5932 (CANB, PERTH). S.A.: Marsh's Swamp area, *I.B.Wilson* 835 (AD). N.S.W.: Newtons Beach, Nadgee Nat. Res., *D.E.Albrecht* 1500 (MEL). Vic.: Upper Delegate R., E branch above 'The Forks', 10.5 km (direct) SSW of Bendoc, *N.H.Scarlett* 84-130 (AD). Tas.: Little Woody Is., Furneaux Group, *J.S.Whinray* 8791 (CANB, HO, MEL).



Subspecies *longifructus* has shorter involucre bracts but slightly longer achenes than subsp. *glomeratus*. It also is generally more sparsely cobwebby and inflorescences generally have fewer and less-congested capitula.

13. *Senecio extensus* I.Thomps., *Muelleria* 19: 150 (2004)

T: south end, Howitts Plain, Alpine Natl Park, Vic., 22 Jan. 2001, *I.R.Thompson 629*, *N.G.Walsh & A.Tolsma*; holo: MEL; iso: BRI, CANB, HO, NSW.

S. sp. 1, *N.G.Walsh* in *N.G.Walsh & T.J.Entwisle* (eds), *Fl. Victoria* 4: 961 (1996).

S. sp. (Alps), *J.H.Ross*, *Census Vasc. Pl. Victoria* 5th edn 52, 215 (1996).

Illustrations: *N.G.Walsh & T.J.Entwisle* (eds), *Fl. Victoria* 4: 963, fig. 197b (1999), as *Senecio* sp. 1; *I.R.Thompson*, *op. cit.* 151, fig. 22.

Erect herbs to c. 0.5 m high, often leafier in lower $\frac{1}{3}$. Roots unknown. Stems sparsely to moderately appressed-cottony, becoming glabrous. Leaves 5–12 cm long, with l:w ratio c. 4–10, undivided or coarsely dentate to deeply lobate, with 3–5 triangular or oblong teeth per side; base becoming mildly auriculate above mid-stem; both surfaces \pm glabrous or minutely hispid and/or slightly cobwebby; lower surface generally not purple. Capitula several–numerous per stem; calycular bracteoles 6–8, (2–) 3–5 mm long; peduncle and calyculus commonly slightly cobwebby at anthesis; involucre 5–7 mm long, 1.8–2 mm diam.; bracts mostly 12–14, glabrous or nearly so. Florets 30–45. Achenes obloid-ellipsoid, 2–2.2 mm long, red-brown, glabrous, or with papillose hairs in lines; l:w ratio of hairs c. 3. Pappus 5–6 mm long. Fig. 27 I–J.

Occurs from Kiandra in far SE N.S.W. to Howitt Plains in eastern Vic., and in central Tas., with a disjunct occurrence in NE N.S.W. at Barrington Tops. Grows in grasslands, herbfields or open shrublands in subalpine areas. Flowers mid-summer–autumn.

N.S.W.: Long Plain, near confluence of Murrumbidgee R. and Boundary Ck, Kosciuszko Natl Park, *I.R.Thompson 746* & *N.G.Walsh* (MEL, NSW). Vic.: Snowy Ra. airstrip, *S.J.Forbes 1953* (MEL, NSW); Long Plain, W of Arbuckle junction, Alpine Natl Park, *I.R.Thompson 757* (CANB, MEL). Tas.: Mackenzies Tier, *A.Moscal 6394* (HO).

Readily distinguished by its long calycular bracteoles. Some populations in southern N.S.W. have slightly shorter bracteoles and/or narrower heads than is typical. Originally thought to have only glabrous achenes (*I.R.Thompson*, *op. cit.* 150) but two Victorian collections with hairy achenes have now been recognised as *S. extensus*.



14. *Senecio laceratus* (F.Muell.) Belcher, *Ann. Missouri Bot. Gard.* 43: 51 (1956)

Erechtites lacerata F.Muell., *Linnaea* 25: 417 (1853). T: Kanyaka R. [in Flinders Ra.], S.A., *F.Mueller*; holo: MEL.

Illustration: *I.R.Thompson*, *Muelleria* 19: 153, fig. 23 (2004).

Erect or sprawling herbs to 1 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot well-developed; secondary roots fine. Stems glabrous. Leaves 8–20 cm long, with l:w ratio c. 2–3, undivided or lobate with 3–7 triangular lobes per side; base becoming slightly auriculate; margin with frequent acuminate teeth; both surfaces \pm glabrous. Capitula numerous per stem; calycular bracteoles 3–6, 1–2 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 4–5 mm long, 1.8–2 mm diam.; bracts 12–14, glabrous. Florets 30–40. Achenes narrowly obloid, 1.8–2.2 mm long, dark brown, with papillose hairs in bands or somewhat scattered; l:w ratio of hairs c. 3. Pappus 3–4 mm long. Fig. 27K–L.

Occurs in central Australia, extending from the Dulcie Ra. in southern N.T. SW to the Rawlinson Ra. in central-eastern W.A. and SSW to Mt Illbillie in NW S.A., and in eastern S.A. from Weetootla Gorge S to Telowie Gorge in the Flinders Ra. with an outlier at Mt Finke further W. Grows on rocky slopes usually in shaded seepage areas, and/or adjacent to water in skeletal, sandy or gravelly soils of sandstone, or quartzite derivation in open woodland. Flowers most of year (rainfall dependent).



W.A.: Pass in Blackstone Ra., *A.S.George* 8755 (PERTH). N.T.: Reedy Ck, George Gill Ra., 14 Aug. 1957, *G.Chippendale* (AD, CANB, DNA, MEL, PERTH). S.A.: Victory Well, Mt Illbillee, Everard Ra., *D.Kraehenbuehl* 5126 (AD).

The acuminate lobes and teeth of the leaves of this species are distinctive.

15. *Senecio runcinifolius* J.H.Willis, *Proc. Roy. Soc. Queensland* 62: 106, t. 7 (1952)

T: Moorundee near Blanchetown, Murray R., S.A., Feb. 1851, *F.Mueller*; holo: MEL.

Erechtites picridioides Sond., *Linnaea* 25: 523 (1853), *nom. illeg. non Turcz.* (1851). T: 'Murray' [probably Murray R.], state unknown, *coll. unknown*; holo: MEL.

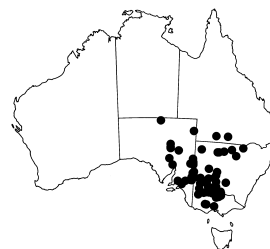
[*E. mixta* auct. non (A.Rich.) DC.: G.Bentham, *Fl. Austral.* 3: 659 (1866); J.M.Black, *Fl. S. Australia* 4: 610 (1929); A.Ewart, *Fl. Victoria* 1179 (1931)]

Illustrations: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 959, fig. 196i (1999); I.R.Thompson, *Muelleria* 19: 155, fig. 24 (2004).

Erect herbs to 1.2 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot usually well-developed; secondary roots slightly fleshy. Stems nearly glabrous. Leaves 7–20 cm long, with l:w ratio c. 2.5–6, deeply lobate to pinnatisect, with 4–8 roughly triangular projections per side; segments generally retrorse, often proximally lobed; base petiole-like, without auricles; margin with scattered denticulations or teeth; upper surface \pm glabrous; lower surface sparsely hispid or \pm glabrous, green or purple. Capitula mostly numerous per stem; calycular bracteoles 3–6, 2–3 mm long; peduncle and calyculus not or slightly cobwebby at anthesis; involucre 7–11 mm long, c. 1.5–2.5 mm diam.; bracts 12–14, glabrous. Florets 40–60. Achenes narrowly obloid-ellipsoid, 2.5–3 mm long, pale brown, with papillose hairs in bands; l:w ratio of hairs c. 3. Pappus 8–13 mm long. Fig. 28A.

Occurs in central and SE Australia extending from the L. Eyre basin in S.A. E to Gilruth Plains in far SW Qld and SE to Melbourne, Vic. Grows on margins of swamps, lakes, or in seasonally damp sites on heavy soils on lowland plains. Flowers mostly winter–spring, also other times of year (rain dependent).

S.A.: Koonamore, c. 60 km N of Yunta, E of Flinders Ra., *Hj.Eichler* 12422 (AD). Qld: L. Bindegolly, E of Thargomindah on road to Eulo, *R.J.Chinnock* 6249 (AD, MEL). N.S.W.: Barwon R., Collarenebri, *R.G.Coveny* 12667 *et al.* (AD, BRI, MEL, NSW); 16 km N of Boorooban and 74 km N of Deniliquin, *M.D.Crisp* 1709 (CANB, NSW). Vic.: L. Watchem reserve, *A.C.Beaglehole* 85027 (AD, MEL).



A plant of floodplains with distinctive leaf morphology. The relatively long pappus is also a feature.

16. *Senecio longicollaris* I.Thomps., *Muelleria* 19: 156 (2004)

T: beside road to L. William Hovell, c. 4 km SW of Cheshunt, Vic., 29 Nov. 2001, *I.R.Thompson* 720; holo: MEL; iso: CANB.

S. sp. aff. *quadridentatus* (North-east), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 109, fig. 4h; 157, fig. 25.

Erect herbs to 1.8 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary roots fleshy. Stems glabrous or sparsely appressed-cottony, becoming glabrous. Leaves very narrowly elliptic, 8–24 cm long, with l:w ratio c. 8–12; base without auricles; margin with small or minute teeth; upper surface sparsely appressed-cottony or glabrous; lower surface sparsely cobwebby or minutely hispid, generally not purple. Capitula numerous per stem; calycular bracteoles 4–8, 1–2 mm long; peduncle and calyculus not cobwebby or more often moderately cobwebby at anthesis; involucre 7–9 mm long, c. 2.5 mm diam.; bracts mostly 12–14, cobwebby or nearly glabrous. Florets 30–50. Achenes bottle-shaped, 4–6 mm long, brown, with papillose hairs scattered in lines; l:w ratio of hairs c. 1–2. Pappus 6–7 mm long. Fig. 28B–D.

Occurs in far SE Qld, central-eastern and south-central N.S.W., in Vic. W from Porepunkah in NE Vic., and by L. Alexandrina in SE S.A. Grows on floodplains and by water in forest, woodland and shrubland. Flowers all year round, mostly summer–autumn.

S.A.: Millowar, *D.E. Murfet* 2647 & *R.L. Taplin* (AD). Qld: between Spring Bluff and Murphys Ck, Main Ra., *C.T. White* 7021 (BRI). N.S.W.: 15 km from Booligal, along Boxyards Rd, Boxyards swamp, *E.M. Canning* 4573 & *M. Lodder* (CANB, MEL). Vic.: L. Nhill, c. 1 km SE of Nhill P.O., *A. Paget* 2457 (MEL); beside road to L. William Hovell, c. 4 km SW of Cheshunt, *I.R. Thompson* 754 & *N.G. Walsh* (AD, MEL, NSW).



Similar to *S. campylocarpus* but with broader leaves that are often coarsely hairy on the lower surface, larger capitula, involucre bracts that are more densely cobwebby, and longer and particularly longer-necked achenes. The achenes of *S. tasmanicus* are like those of *S. longicollaris* but the former species is smaller, has smaller leaves that are crowded basally at anthesis, and the capitulum is ±glabrous at anthesis. A form from southern Qld and coastal N.S.W. with a relatively sparse indumentum, and leaves with a higher length:width ratio and larger teeth is represented only by very old collections. It may represent a distinct taxon, but new collections are required to properly characterise it.

17. *Senecio tasmanicus* I. Thomps., *Muelleria* 19: 158 (2004)

T: Tas., *Archer*; holo: NSW 27852, specimen second from left.

Illustration: I.R. Thompson, *op. cit.* 160, fig. 27.

Erect herbs to c. 0.4 m high, distinctly leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary stems fleshy. Stems sparsely appressed-cottony or nearly glabrous. Leaves 3–8 cm long, with l:w ratio c. 6–30, undivided or coarsely dentate, with 2–4 coarse teeth per side; base without auricles, or uppermost leaves with small projections; margin entire or with scattered teeth; upper surface of lower leaves sparsely scabrid giving way to sparsely cobwebby or glabrous upwards; lower surface similar to upper, sometimes cobwebby over hispid hair-bases, not seen to be purple. Capitula few to several per stem; calycular bracteoles 3–6, 2–4 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 9–11 mm long, 2–2.4 mm diam.; bracts 12–16, glabrous. Florets 40–60. Achenes bottle-shaped, 5–7 mm long, light brown, with papillose hairs scattered in lines; l:w ratio of hairs c. 1–2. Pappus c. 7 mm long.

Recorded from Tas. but possibly now extinct. Grows possibly in lowland plains near swamps. Flowers late spring–summer.

Tas.: Formosa, *R.C. Gunn* 508 (NSW - left hand specimen).

A species previously overlooked and it is likely that its habitat has been destroyed by land clearing since the 1800s. It has similar long-necked, bottle-shaped achenes and a similar indumentum to *S. longicollaris*. It is similar to *S. dolichocephalus* in habit and capitular dimensions and similar to *S. macrocarpus* in capitulum length (but not width) and in having inflorescences of few capitula.



18. *Senecio campylocarpus* I. Thomps., *Muelleria* 20: 139 (2004)

Erechtites glandulosus A.Cunn. ex DC., *Prodr.* 6: 295 (1838); *S. glandulosus* (A.Cunn. ex DC.) Sch.Bip., *Flora* 28: 498 (1845), *nom. illeg. non* Hook. & Arn. (1841); *E. quadridentata* var. *glandulosa* (A.Cunn. ex DC.) Domin, *Biblioth. Bot.* 89: 685 (1930), as *Erechtites*. T: Lachlan R., N.S.W., [1817], *A. Cunningham* 141; holo: G, microfiche seen.

Illustration: I.R. Thompson, *op. cit.* 109, fig. 4g; 161, fig. 28, as *S. glandulosus*.

Erect herbs to c. 1.5 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary roots fleshy. Stems ±glabrous basally, sometimes becoming somewhat appressed-cottony upwards and then becoming glabrous. Leaves very narrowly elliptic to linear, 6–24 cm

long, with l:w ratio c. 12–40, undivided; base without auricles or uppermost leaves with small projections; margin usually with numerous small teeth; both surfaces glabrous or sparsely appressed-cobwebby; lower surface not purple. Capitula numerous per stem; calycular bracteoles 4–8, 1–2 mm long; peduncle and bracteoles moderately cobwebby at anthesis; involucre 5–8 mm long, 1.8–2.2 mm diam.; bracts mostly 12–14, often sparsely cobwebby, becoming glabrous. Florets 30–50. Achenes bottle-shaped, often curved, 2.5–4 mm long, the majority dark brown, with papillose hairs scattered in lines; l:w ratio of hairs c. 1–2. Pappus 5–6 mm long.

Occurs in SE N.S.W. between Crookwell and Canberra, in central Vic. along the Murray R. and S to the coast at Welshpool, and in NE Tas. near Cressy. Grows in loam to clay soils in forest and woodland usually in seasonally inundated areas. Flowers spring–autumn.

N.S.W.: McAlister Travelling Stock Res., c. 6.5 km SE of Laggan on Goulburn Rd, *I.Crawford 5159* (CANB). A.C.T.: Mulligans Flat Res., *L.G.Adams 4224* (CANB). Vic.: Barmah Regional Park, *A.C.Beauglehole 82311* (AD, CANB, HO, MEL); Woori-Yallock–Koo-wee-rup road, c. 3 km S of Woori-Yallock, *I.R.Thompson 704* (AD, BRI, CANB, MEL, NSW). Tas.: Swamp near Cressy, Feb. 1943, *J.H.Wilson* (HO).



Similar to *S. quadridentatus* but with an inconspicuous taproot, fleshier secondary roots, a generally sparser indumentum on stems and leaves, especially in the lower half of the plant, broader and more tapering mid-stem leaves, shorter corollas (those of bisexual florets 4.5–6 mm long compared to 6–9 mm long in *S. quadridentatus*), and with no reddish achenes. Similar also to *S. longicollaris* q.v.

19. *Senecio glabrescens* (DC.) Sch.Bip., *Flora* 28: 498 (1845)

Erechtites glabrescens DC., *Prodr.* 6: 295 (1838); *E. quadridentata* var. *glabrescens* (DC.) Benth., *Fl. Austral.* 3: 660 (1867), p.p. T: L. George, N.S.W., *A.Cunningham*; holo: G, microfiche seen.

S. sp. aff. quadridentatus (Dunkeld), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

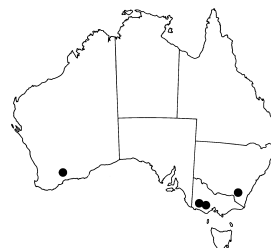
Illustration: I.R.Thompson, *Muelleria* 19: 163, fig. 29 (2004).

Erect herbs to c. 0.5 m high, hardly leafier in lower $\frac{1}{3}$ at anthesis. Taproot well-developed; secondary roots slightly fleshy. Stems glabrous or sparsely appressed-cottony. Leaves 7–12 cm long, with l:w ratio c. 8–12, undivided or lobate proximally, with 1–3 triangular lobes per side; base with well-developed auricles; margin denticulate or dentate; upper surface glabrous; lower surface sparsely cobwebby. Capitula numerous per stem; calycular bracteoles 3–6, 1–2 mm long; peduncle and calyculus cobwebby at anthesis; involucre 6–8 mm long, 1.8–2.2 mm diam.; bracts 12–14, cobwebby basally. Florets 30–40. Achenes bottle-shaped, 4–5 mm long, orange-brown or brown, with papillose hairs scattered in lines; l:w ratio of hairs c. 1–2. Pappus 5–7 mm long.

Recorded from the Grampians in western Vic., the Kiandra region in SE N.S.W., and from South Ironcap in southern W.A. Recorded from margins of watercourses and lakes. Flowers summer–autumn.

W.A.: 5 km S of South Ironcap, *K.R.Newby 5219* (PERTH). N.S.W.: Nungar Plain, Kosciuszko Natl Park, *I.R.Thompson 753* & *N.G.Walsh* (CANB, MEL). Vic.: Australia Felix [Western Vic.], date unknown, coll. unknown (MEL); Freshwater Lake Res., along Victoria Valley Rd, c. 10 km N of Dunkeld, Victoria Valley near Grampians Natl Park, *N.D.Middleton 163* & *C.Marks* (AD, BRI, CANB, HO, MEL, NSW, PERTH).

Senecio glabrescens is a poorly known species characterised by early branching from the lower stem region.



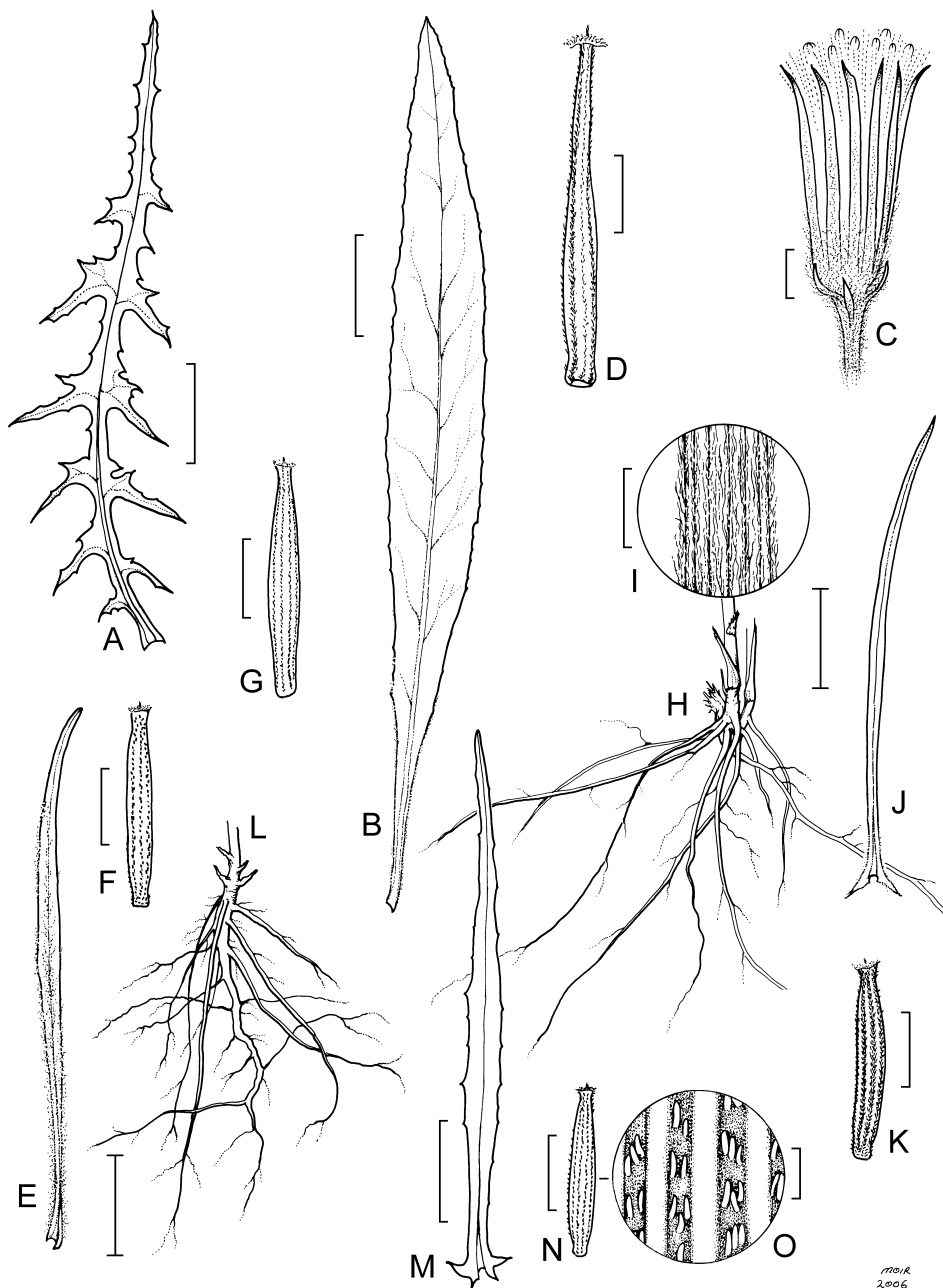


Figure 28. *Senecio*. A, *S. runcinifolius*, mid-stem leaf (D.Parkes, MEL1556656). B–D, *S. longicollaris*. B, mid-stem leaf; C, capitulum; D, achene (B, C, I.R.Thompson 689, MEL; D, A.Paget 2457, MEL). E, F, *S. quadridentatus*. E, mid-stem leaf; F, achene (E, A.C.Beaglehole 82348, MEL; F, R.M.King 9737, MEL). G, *S. dolichocephalus*, achene (T.B.Muir 6321, MEL). H–K, *S. phelleus*. H, root system; I, lower stem showing appressed hairs; J, mid-stem leaf; K, achene (H, I, K, W.Perry, MEL 531024; J, P.F.Clinnick, MEL 677928). L–O, *S. tenuiflorus*. L, root system; M, mid-stem leaf; N, achene; O, achene hair detail (L, P.I.Forster 7128, MEL; M–O, P.I.Forster 19759, MEL). Scale bars: A, B, E, H, J, L, M = 20 mm; C, I = 2 mm; D, F, G, K, N = 1 mm; O = 0.1 mm. Drawn by M.Moir.

20. *Senecio quadridentatus* Labill., *Nov. Holl. Pl.* 2: 48, t. 194 (1806)

Erechtites quadridentata (Labill.) DC., *Prodr.* 6: 295 (1838). T: Tas., *J.J.H.de Labillardiere*; iso: BM, K n.v., *fide* R.O.Belcher, *Ann. Missouri Bot. Gard.* 43: 58 (1956).

E. incana Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 24(2): 85 (1851). T: Swan R., W.A., *J.Drummond* 379; iso: K, photo MEL.

?*E. erecta* F.Muell. ex Lange, *Bot. Tidsskr.* ser. 2, 4: 6 (1874), *nom. illeg.* T: not designated.

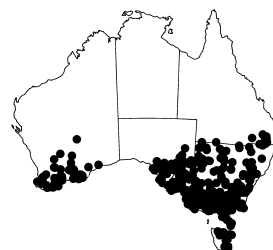
Illustrations: D.G.Drury, *New Zealand J. Bot.* 12: 517, fig. 2 (1974); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 963, fig. 197f (1999); I.R.Thompson, *Muelleria* 19: 165, fig. 30 (2004).

Erect herbs to c. 1.5 m high, not leafier in lower $\frac{1}{3}$ at anthesis, with axillary growth precociously developed. Taproot well-developed; secondary roots hardly fleshy. Stems moderately appressed-cottony to densely woolly throughout. Leaves linear, 8–22 cm long, with l:w ratio (8–) 15–50, undivided, or uncommonly lobate proximally with 1 or 2 triangular lobes per side; base without auricles or uppermost leaves with small projections; margin entire or minutely denticulate; upper surface appressed-cobwebby, often becoming glabrous; lower surface usually moderately to densely woolly, rarely flushed purple. Capitula numerous per stem; calycular bracteoles 4–8, 1–3 mm long; peduncle and calyculus mostly cobwebby at anthesis; involucre 6–10 mm long, 1.2–2 mm diam.; bracts 8–14, cobwebby basally or glabrous. Florets 18–50. Achenes bottle-shaped or not, (1.6–) 2.5–4.5 (–5.0) mm long, orange-brown, brown, or green, with papillose hairs scattered in lines; l:w ratio of hairs c. 1–2. Pappus 6–8 mm long. $n = 20$, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980). *Cotton Fireweed*. Fig. 28E–F.

Occurs S from Dalby in far SE Qld, throughout N.S.W. and Vic., in southern S.A. as far W as Streaky Bay, in southern W.A. from Perup E to Caiguna and NE to Laverton, and in northern and eastern Tas. including the eastern Bass Strait Is. Also native to New Zealand. Grows in a wide range of soil types, in cleared land, grassland, shrubland, woodland and drier forests from sea level to montane altitudes. Flowers most of year, primarily in spring–summer.

W.A.: Bokerup Nat. Res., *G.J.Keighery & N.Gibson 2485* (CANB, PERTH). S.A.: Mt Crawford Forest Res., Kersbrook Forest, *H.P.Vonow 102* (AD, HO, MEL). Qld: 2.2 km E of Allora along Forest Plain Rd, *A.R.Bean 10851* (BRI). N.S.W.: Smiggins Holes to Sawpit Ck., Kosciuszko area, *M.Gray 6081* (AD, BRI, CANB, HO, MEL, NSW). Vic.: c. 2 km E of Baileys Rocks, Dergholm State Park, *I.C.Clarke 2559* (AD, CANB, MEL). Tas.: Huon Rd, near Hobart, 5 Feb. 1952, *W.M.Curtis* (HO, MEL).

A very widespread species that has adapted well to urban environments. It is usually easily recognised by its grey aspect resulting from its woolly or cottony indumentum on stems and on both surfaces or only the lower surface of leaves. Coarse hairs are absent or only occasional on the lowermost leaves (these withered at anthesis). Leaves are typically numerous along stems and exhibits precocious leafy axillary growth.



Populations on the Fleurieu Penin. near Adelaide in S.A. and occasionally in Vic. have achenes that are not or hardly bottle-shaped and only 1.6–2.2 mm long, and inflorescences that are more congested than usual. At the other extreme, some populations in NW N.S.W. have bottle-shaped achenes 5 mm long. In Tas. involucre are often predominantly of only 8–10 bracts and the number of florets per capitulum is also fewer than is typical.

21. *Senecio dolichocephalus* I.Thomps., *Muelleria* 19: 167 (2004)

T: Wonga L., ± 7.5 km NNW of Wonga Hut, WNW side of lake, Wyperfeld Natl Park, Vic., 7 Nov. 1976, *A.C.Beaglehole 55288*; holotype: MEL.

S. sp. aff. *quadridentatus* (North-west), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 168, fig. 31.

Erect herbs to c. 0.6 m high, distinctly leafier in lower $\frac{1}{3}$ at anthesis. Taproot usually well-developed; secondary stems fleshy. Stems usually woolly basally, reducing to sparsely appressed-cottony or nearly glabrous upwards. Leaves 3–12 (–15) cm long, with l:w ratio c. 4–30, sometimes coarsely dentate, with 1–4 teeth per side; base without auricles or

uppermost leaves with small projections; margin entire, denticulate or dentate; upper surface of lower leaves hispid, reducing to sparsely cobwebby or glabrous; lower surface similar to upper, sometimes cobwebby over hispid hair-bases, commonly purple. Capitula numerous per stem; calycular bracteoles 4–8, 1–3 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 8.5–12 mm long, 1.5–2 mm diam.; bracts 12–14, glabrous. Florets 40–60. Achenes slightly bottle-shaped, 3–4 mm long, reddish or brown, with papillose hairs scattered in lines; l:w ratio of hairs c. 1–2. Pappus 7–9 mm long. Fig. 28G.

Occurs in SE Australia from the Eyre Penin., S.A., E to Wycheproof in NW Vic. and in inland N.S.W. Also recorded from a few localities in southern W.A. Grows in sandy soils in woodlands and shrublands. Flowers spring–summer.

W.A.: 10 km ESE of Ravensthorpe, *K.Newbey 5124* (PERTH). S.A.: The Pines Res. near NW corner, c. 7 km NW Kapunda, 30 Sept. 1993, *P.J.Lang 2171* (AD). N.S.W.: Curraweena, N of Cobar, *P.D'Arnay & K.Wells 663* (CANB). Vic.: Murrawong North Roadside Res., *A.C.Beauglehole 83942* (MEL).

Similar in habit and leaf characters to *S. phelleus* but the capitula are much longer and florets have less developed corolla lobes. *Senecio queenslandicus* is also similar to *S. dolichocephalus* but its capitula are shorter, involucre bracts are thinner, and the achenes have a more slender neck.



22. *Senecio queenslandicus* I.Thomps., *Muelleria* 19: 169 (2004)

T: 5 km SE of The Gums, Qld, 2 Sept. 1958, *R.W.Johnson 553*; holo: BRI; iso: NSW.

Illustration: I.R.Thompson, *op. cit.* 170, fig. 32.

Erect herbs to c. 0.4 m high, not or slightly leafier in lower $\frac{1}{3}$ at anthesis. Taproot well-developed; secondary roots hardly fleshy. Stems sparsely to moderately cottony basally, reducing to \pm glabrous upwards. Leaves 5–10 cm long, with l:w ratio c. 6–15, undivided or lobate, with 1–3 triangular lobes per side; base attenuate or uppermost leaves with small projections; margin \pm entire or with scattered teeth; upper surface sparsely hispid or nearly glabrous; lower surface sparsely hispid, reducing to cobwebby upwards. Capitula numerous per stem; calycular bracteoles 4–6, 1–3 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 6–8 mm long, 2–2.5 mm diam.; bracts 12–14 (–18), glabrous. Florets 50–80. Achenes bottle-shaped, 2.5–4 mm long, reddish, brown or green, with papillose hairs in lines; l:w ratio of hairs c. 1–2. Pappus 5.5–6.5 mm long.

Occurs in SE Qld from Blackall ESE to Moggill, and in north-central N.S.W. from Weemelah to Moree and near Muswellbrook. Grows in a wide range of soil types, in cleared land, grassland, shrubland and woodland, at low altitudes in semiarid climates. Flowers most of year, but mostly spring–summer.

Qld: Inglewood–Texas road, 600 m N of Brush Ck, *A.R.Bean 6553* (BRI); Langlo Crossing, 71.6 km WNW of Charleville on road to Adavale, *B.J.Lepschi & A.V.Slee 1116* (BRI, CANB, MEL); 80 km SSW of Blackall, *L.Pedley 5474* (AD, BRI). N.S.W.: “Iolanthe”, c. 26 km SW of Garah, *K.L.Wilson 1919* (AD, BRI, NSW).



Similar to *S. dolichocephalus* q.v. Similar also to *S. quadridentatus* but generally a shorter and green plant, with fewer stem leaves. Also, the peduncles and bracteoles are never cobwebby at anthesis, and the inner involucre bracts are broader and more often have 2 resin ducts.

23. *Senecio phelleus* I.Thomps., *Muelleria* 19: 171 (2004)

T: “The Common”, E of Armstrong, \pm 9 km NNE of Ararat P.O., Vic., 1 Nov. 1978, *A.C.Beauglehole 61220 & Field Naturalists Club of Ballarat 307*; holo: MEL.

Illustrations: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 963, fig. 197d, excluding upper achene (1999), as *S. tenuiflorus*; I.R.Thompson, *op. cit.* 109, fig. 4b; 173, fig. 34.

Erect herbs to c. 1.5 m high, often distinctly leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary roots fleshy. Stems sparsely to moderately appressed-cottony reducing in density to \pm glabrous upwards. Leaves 6–17 cm long, with l:w ratio c. 6–30, undivided or coarsely dentate to lobate, with 1–3 projections per side; base attenuate or with sagittate auricles; margin entire or with well-spaced teeth; upper surface hispid reducing to glabrous upwards; lower surface hispid, usually with a cobwebby overlay, reducing to cobwebby upwards. Capitula numerous per stem; calycular bracteoles 3–5, 1–2 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 6–7.5 mm long, 1.5–2 mm in diam.; bracts 12–14, glabrous. Florets 26–45. Achenes narrowly obloid 2–2.5 (–3) mm long, red-brown or dark brown, with papillose hairs in bands; l:w ratio of hairs c. 2–3. Pappus 6–7.5 mm long. Fig. 28H–K.

Occurs from Bathurst in central-eastern N.S.W. S to eastern Vic. then W to Adelaide, S.A., disjunctly further W on the Eyre Penin., and near Hobart in SE Tas. Grows in sandy or heavy soils, often in rocky sites in heathland, forest, and woodland. Flowers mostly spring–autumn.

S.A.: Telephone Rd, Mt Crawford, *R.J.Bates* 35559 (AD, MEL). N.S.W.: Travelling Stock Res. 39, c. 600 m in from Snowy Mountains Hwy, turnoff c. 2 km past Cooma Caravan Park, 15 Dec. 1998, *J.Miles s.n.* (CANB). A.C.T.: lower E slopes of Black Mtn, *R.Pullen* 2370 (CANB, MEL, NSW). Vic.: Hard Hills Flora Res., 6 km NE of St Arnaud P.O., *A.C.Beaglehole* 65531 (AD, MEL). Tas.: near Conara, *A.C.Rozefelds* 909 (HO).



Similar to *S. microbasis* and *S. tenuiflorus* q.v. Similar also to *S. quadridentatus* but with an inconspicuous taproot, often sagittate leaf-bases, coarse hairs on lower-stem leaves, always non-cobwebby peduncles and capitula, corollas of bisexual florets 5-lobed, and achenes not bottle-shaped. It is similar in habit and in leaf and bracteole morphology to *S. prenanthoides* but does not develop coarse hairs on the lower-stem region, has more florets per capitulum, the secondary roots are not subterraneous, leaf bases are commonly sagittate, and the achenes are shorter and not bottle-shaped.

24. #*Senecio microbasis* I.Thomps., *Muelleria* 19: 175 (2004)

T: c. 15 km direct E of Omeo, Mount Shaw Rd 3.3 km E of intersection with Spring Hill Track, Splitters Ra., Vic., 4 Dec. 2001, *I.R.Thompson* 726; holo: MEL; iso: BRI, CANB, HO, NSW.

S. sp. aff. tenuiflorus (North-east), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 176, fig. 35.

Erect herbs to c. 0.6 m high, distinctly leafier in lower $\frac{1}{3}$ at anthesis. Taproot usually moderately developed; secondary roots mostly fine. Stems \pm glabrous or sparsely appressed-cottony basally. Leaves narrowly oblanceolate to linear, 4–10 cm long, with l:w ratio c. 8–50, undivided; base without auricles or uppermost leaves with small projections; margin \pm entire or with scattered small teeth; both surfaces hispid reducing to glabrous upwards; lower surface generally purple. Capitula numerous per stem; calycular bracteoles 3–5, 1–2 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 5–7 mm long, 1–1.4 mm diam.; bracts 7–13, glabrous. Florets 12–25. Achenes narrowly obloid-ellipsoid, 2–2.8 mm long, red-brown or dark brown, with papillose hairs in lines or bands; l:w ratio of hairs c. 2. Pappus 4.5–6 mm long.

Occurs in inland parts of NE N.S.W. S from Mt Kaputar, far SE N.S.W., southern Vic., extending as far W as Mt Buangor in western Vic., and in eastern Tas. There is a single record from Kambalda in southern W.A. which is probably an introduction. Grows in drier forest and woodland. Flowers spring–summer.

W.A.: 14.1 km from Higginsville Pump Stn, bearing 179°, *A.A.Mitchell* 5049 (PERTH). N.S.W.: S of Woodsreef mine, *J.R.Hosking* 1319 (CANB, MEL, NE, NSW). Vic.: Tambo R. Reference Area, *A.C.Beaglehole* 77127 (CANB, MEL); 5 m NW of Mt Shaw Rd, 3.3 km E of Spring Hill Track, 10.3 km SSW of Mt Tambo, *G.W.Carr* 10233 (AD, MEL). Tas.: Weedons Hill area, N of Fox's gully, Elderslie area, *F.Duncan* 1026 (HO).



Similar to *S. phelleus* but with narrower lower-stem leaves, leaf bases never sagittately auriculate, capitula narrower and with fewer florets, involucre bracts thinner and finally reflexed, corolla lobes fewer and less thickened apically, and the achenes with a more slender neck. Similar also to *S. tenuiflorus* but generally not developing spreading triangular lobes, and the achenes have flatter ribs and more numerous papillose hairs. Similar to *S. prenanthoides* but the lower stem lacks coarse hairs, secondary roots are not subtuberosus, and achenes are shorter.

25. *Senecio scabrellus* I.Thomps., *Muelleria* 19: 177 (2004)

T: Cunninghams Gap, Mt Mitchell, Qld, 18 Aug. 1992, *P.I.Forster 11098* & *R.Reilly*; holo: BRI; iso: K, MEL.

Illustration: I.R.Thompson, *op. cit.* 178, fig. 36.

Erect or sprawling herbs to c. 0.5 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Primary roots well-developed; secondary roots slightly fleshy. Stems hispid but becoming glabrous basally, becoming sparsely to moderately appressed-cottony or woolly upwards. Leaves narrowly elliptic to linear, 5–10 cm long, with l:w ratio 6–15, undivided; base without auricles or uppermost leaves with small projections; margin \pm entire or with scattered teeth; upper surface \pm densely hispid, initially with a cottony overlay; lower surface similar but overlay densely woolly. Capitula several to numerous per stem; calycular bracteoles 3–5, 1–1.5 mm long; peduncle and calyculus cobwebby at anthesis; involucre 5–7 mm long, 1–1.5 mm diam.; bracts mostly 7–10, glabrous. Florets 12–25. Achenes very narrowly obloid to slightly bottle-shaped, 2.8–3.2 mm long, with ribs convex, light or dark brown or reddish, with papillose hairs in lines; l:w ratio of hairs c. 2–3. Pappus 5–6 mm long.

Occurs over a small area of far SE Qld and far NE N.S.W. almost on the border between the two states and c. 100 km inland from the coast. Grows on rocky cliff-lines and trachyte pavements in heathland or woodland on or near mountain summits. Flowers mostly winter–spring.

Qld: Mt Huntley, *P.I.Forster 11832 et al.* (BRI). N.S.W.: Mt Lindesay, c. 11.2 km ESE of Woodenbong, *R.Coveny 4558* & *A.N.Rodd* (BRI, NSW).

Senecio scabrellus is characterised by a much-branched habit, leaves with a densely scabridulous and woolly indumentum, branches and peduncles woolly, capitula slender and few-floreted, and achenes relatively slender.



26. *Senecio tenuiflorus* (DC.) Sieber ex Sch.Bip., *Flora* 28: 498 (1845)

Erechtites tenuiflora DC., *Prodr.* 6: 296 (1838). T: Precise locality unknown, [probably Sydney area], N.S.W., *Sieber 435*; syn: MEL.

Illustration: I.R.Thompson, *Muelleria* 19: 180, fig. 37 (2004).

Erect herbs to c. 1 m high, sometimes leafier in lower $\frac{1}{3}$ at anthesis. Taproot well-developed; secondary roots fine. Stems \pm glabrous or sparsely appressed-cottony. Leaves 7–15 cm long, with l:w ratio 4–40, undivided or proximally lobate, with 1 or 2 triangular lobes per side; base without auricles or uppermost leaves sometimes with spreading narrowly triangular auricles; margin \pm entire; upper surface hispid, with hairs persisting or becoming rather sparse upwards; lower surface as for upper but often also cobwebby, rarely almost woolly. Capitula numerous per stem; calycular bracteoles 2–6, 1–1.5 mm long; peduncle and calyculus not or slightly cobwebby at anthesis. Involucre 5–7 mm long, 1–1.5 mm diam.; bracts 7–13, glabrous. Florets 15–35. Achenes narrowly obloid-ellipsoid to narrowly ellipsoid, 2–2.5 mm long, olive-brown, orange-brown or reddish, with ribs convex, glabrous or with papillose hairs rather few in lines; l:w ratio of hairs c. 2–3. Pappus 5–6 mm long. Fig. 28L–O.

Occurs from Rockhampton in eastern Qld S to the Blue Mtns in central-eastern N.S.W. and extending inland in SE Qld as far as Mitchell. Grows in loamy soil and sand derived from sandstone in forest and woodland. Flowers most of year.



Qld: Maryvale Rubbish Tip, NE of Warwick, *A.R.Bean* 9514 (BRI); Falls Ck, 4 km NW of Haldon, *P.I.Forster* 4745 & *L.H.Bird* (BRI, NSW). N.S.W.: Attunga State Forest, *J.R.Hosking* 210 (NE, NSW).

The achene morphology of *S. tenuiflorus* is distinctive: ribs are typically relatively convex and raised with the short papillose hairs somewhat sparse and often recessed in the intervening grooves or occasionally absent, and marginal achenes are often curved. The stereome of the involucre bracts in *S. tenuiflorus* is relatively thin and flat on drying like those of *S. queenslandicus* and *S. quadridentatus*.

27. *Senecio gunnii* (Hook.f.) Belcher, *Ann. Missouri Bot. Gard.* 43: 64 (1956)

Erechtites gunnii Hook.f. in *W.J.Hooker, London J. Bot.* 6: 122 (1847); *E. quadridentata* var. *gunnii* (Hook.f.) Benth., *Fl. Austral.* 3: 660 (1867). T: Marlboro, Tas., Jan. 1841, *R.C.Gunn* 700/1842; syn: NSW.

Illustrations: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 963, fig. 197g (1999); I.R.Thompson, *Muelleria* 19: 182, fig. 38 (2004); C.Howells (ed.), *Tasmania's Nat. Fl.* 2nd edn 74 (2012).

Erect herbs to c. 1 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot variably developed; secondary roots fleshy. Stems moderately appressed-cottony, sometimes sparser upwards, rarely nearly glabrous. Leaves 6–12 cm long, with l:w ratio c. 3–7, undivided or lobate, with 2–4 lobes per side; base without auricles or uppermost leaves sometimes with small projections; margin \pm entire, or denticulate to dentate; upper surface sparsely to densely appressed-cobwebby, becoming glabrous; lower surface usually moderately densely appressed-cobwebby, rarely sparsely so, sometimes purple. Capitula numerous per stem; calycular bracteoles 3–6, 2–3.5 mm long; peduncle and calyculus cobwebby to woolly at anthesis; involucre 5–7.5 mm long, 1.7–2 mm diam.; bracts 11–14, cobwebby or glabrous. Florets 26–40. Achenes narrowly obloid-ellipsoid, 2.5–4 mm long, olive-brown, with papillose hairs rather few in lines; l:w ratio of hairs c. 2. Pappus 5–6 mm long. $n = 20$, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980).

Occurs from the Brindabella Ra. in the A.C.T. and far SE N.S.W. to Lake Mtn in south-central Vic., and from Mt Arthur in northern Tas. S to Mt Wellington and SW to Eldon Bluff. Grows in woodlands, grasslands/herbfields or open shrublands in montane to alpine areas. Flowers summer–autumn.

N.S.W.: Kangaroo Ra., c. 5 km from Mt Kosciuszko summit, *C.Totterdell* 114 (CANB, MEL, NSW). Vic.: c. 15 km SE of Mt Bernard on Hotham–Dargo Rd, Blue Rag Ra., *L.Haegi* 1638 (MEL, NSW). Tas.: Ski Village, Ben Lomond Natl Park, *S.J.Forbes* 1381 (CANB, HO, MEL).



A common component of alpine and sub-alpine floras, usually readily distinguished from other species of *Senecio* by its grey aspect. Can be readily distinguished from another grey species, *S. quadridentatus*, by the length:width ratio of its leaves.

28. *Senecio niveoplanus* I.Thomps., *Muelleria* 19: 183 (2004)

T: northern end of Howitts Plain, c. 300 m W along Butcher Country Track from intersection with Howitt Plain Rd, Alpine Natl Park, Vic., 6 Feb. 2002, *I.R.Thompson* 758; holo: MEL; iso: AD, CANB, HO, NSW.

S. sp. aff. tenuiflorus (Alps), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

S. sp. aff. tenuiflorus (North-east), J.H.Ross & N.G.Walsh, *loc. cit.*

Illustration: I.R.Thompson, *op. cit.* 109, fig. 4f; 184, fig. 39.

Erect herbs to c. 1.2 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot not seen; secondary roots fleshy. Stems hispid, with density reducing upwards, becoming glabrous or sparsely cottony near summit. Leaves 7–12 cm long, with l:w ratio c. 3–5, coarsely dentate to lobate, with 3 or 4 triangular lobes per side; base with moderate auricles above mid-stem; margin denticulate or dentate; upper surface hispid; lower surface as for upper but usually also cobwebby, purple. Capitula numerous per stem; calycular bracteoles 3–4, 2–3 mm long; peduncle and calyculus sparsely cobwebby at anthesis; involucre 6–8 mm long, 1.5 mm diam.; bracts 8–13, glabrous. Florets 15–25. Achenes very narrowly obloid-ellipsoid, 3–4 mm long, olive-brown, glabrous. Pappus 6–7 mm long. Fig. 29A.

Occurs in eastern Vic. between Licola and Falls Ck, and in the A.C.T. at Cribbs Ck. Grows in subalpine woodland. Flowers late summer–autumn.

A.C.T.: Cribbs Ck, upper Cotter Valley, Namadgi Natl Park, *P. Gilmour* 6455 (CANB). Vic.: beyond Trapyard Hill, c. 115 km N of Heyfield, c. 60 km N of Licola, *J. Carrick* 3146 (AD).

Senecio niveoplanus is similar in indumentum and capitulum size to *S. prenanthoides* but its leaves are not crowded basally and are much broader and more lobed above mid-stem, bracts and bracteoles are longer, and achenes are glabrous and not bottle-shaped.



29. *Senecio prenanthoides* A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 96 (1834)

Erechtites prenanthoides (A.Rich.) DC., *Prodr.* 6: 196 (1838); *E. labillardierei* Hieron., *Bot. Jahrb. Syst.* 29: 63 (1900), *nom. illeg. superfl.* T: Port Jackson, N.S.W., *C. Gaudichaud-Beaupré* 4; *holo: P.*

S. sp. C f. 1, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980).

S. sp. C f. 2, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980).

S. sp. E, G.J.Harden in G.J.Harden (ed.), *Fl. New South Wales* 3: 305 (1992).

S. sp. E (aff. *apargiifolius*), S.J.W.Jacobs & J.Pickard, *Pl. New South Wales* 86 (1981).

S. sp. aff. tenuiflorus, J.H.Ross, *Census Vasc. Pl. Victoria* 5th edn 52, 215 (1996).

Illustration: I.R.Thompson, *op. cit.* 187, fig. 41.

Erect herbs to c. 1 m high, distinctly leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary roots fleshy, often mildly tuberiform. Stems densely hispid basally, sometimes with a cottony overlay, reducing in density upwards, glabrous or sparsely cottony in upper $\frac{1}{2}$. Leaves 6–15 cm long, with l:w ratio c. 5–25, undivided or occasionally proximally lobate, with 1 or 2 lobes per side; base without auricles or uppermost leaves with small projections; margin entire, denticulate or dentate; both surfaces hispid reducing to glabrous upwards; lower surface generally purple. Capitula several to numerous per stem; calycular bracteoles 3–5, 1.5–2.5 mm long; peduncle and calyculus not or sometimes slightly cobwebby at anthesis; involucre (5–) 6–9 mm long, 1.3–1.6 mm diam.; bracts 8–13, glabrous. Florets 15–35. Achenes mostly bottle-shaped, 2.8–4.5 mm long, light or dark brown, with papillose hairs scattered in lines; l:w ratio of hairs c. 1–2. Pappus 6–8 mm long. $n = 20$, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980), as *S. sp. C* form 1. Fig. 29B–E.

Occurs from the Blackdown Tableland in SE Qld S through eastern N.S.W., Vic. and as far W as Adelaide, S.A., and in eastern Tas., with a northern outlier at Mt Fox, Qld. Grows in sandy and loamy soils, in scrub, woodland, and forest, from sea-level to 1500 m. Flowers late spring–autumn.

S.A.: Penola Forest Res. c. 15 km NE of Penola, *J.Z. Weber* 7595 (AD). Qld: Kroombit Tops State Forest, *E.J. Thompson* BIL94 *et al.* (BRI). N.S.W.: Middle Arm Travelling Stock Res., 24.5 km directly N of Goulburn, *I. Crawford* 5090 (CANB). A.C.T.: summit of Stockyard Spur, 2.5 km WSW of Corin Dam wall, *B.J. Lepschi* 735 (CANB). Vic.: 4.5 km due N of Bonang, *D.E. Albrecht* 2360 (AD, MEL). Tas.: Oakden Hill, *A. Moscal* 8770 (CANB, HO).



One of several species resting as a rosette until the phase of rapid stem elongation leading up to flowering. Associated with this, leaves at anthesis tend to be more crowded in the lower third and they are significantly broader in this region. *S. prenanthoides* is superficially perhaps most similar to *S. phelleus* q.v.

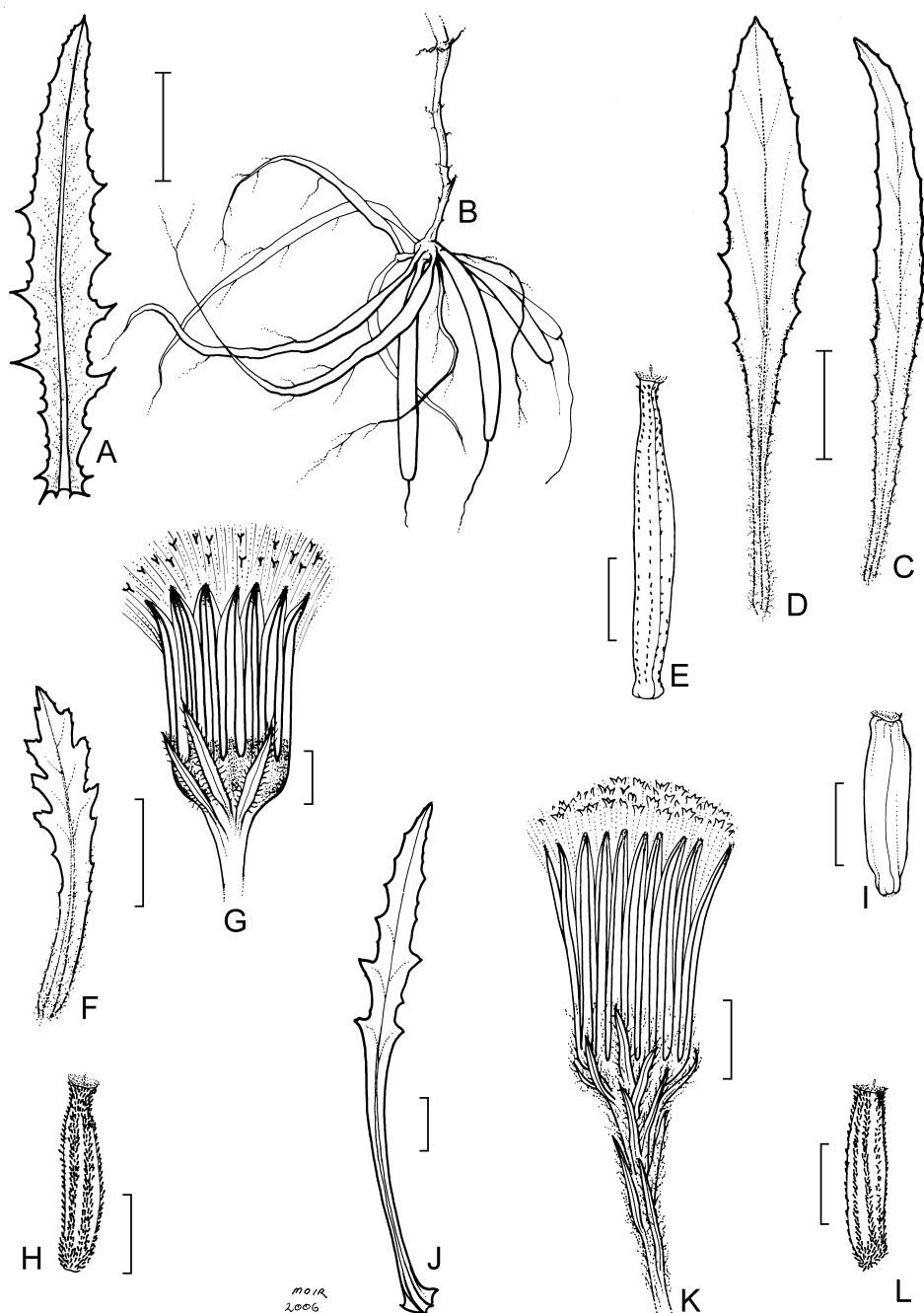


Figure 29. *Senecio*. **A**, *S. niveoplanus*, mid-stem leaf (I.R.Thompson 758, MEL). **B–E**, *S. prenanthoides*. **B**, roots (fleshy cortex lost distally revealing stele); **C**, near-basal leaf; **D**, lower- to mid-stem leaf; **E**, achene (**B**, E.A.Chesterfield 900, MEL; **C**, **D**, A.C.Beauglehole 75340, MEL; **E**, A.C.Beauglehole 66879, MEL). **F–H**, *S. longipilus*. **F**, lower- to mid-stem leaf; **G**, capitulum; **H**, achene (**F**, **G**, N.G.Walsh 4885, MEL; **H**, F.Mueller, MEL 22499). **I**, *S. psilocarpus*, achene (R.Bates 45893, MEL). **J–L**, *S. squarrosus*. **J**, lower- to mid-stem leaf; **K**, capitulum; **L**, achene (**J**, **L**, A.C.Beauglehole 62419, MEL; **K**, R.J.Adair 2378, MEL). Scale bars: **A–D**, **F** = 20 mm; **G**, **J** = 2 mm; **E**, **H**, **I**, **K–L** = 1 mm. Drawn by M.Moir.

30. *Senecio psilophyllus* I.Thomps., *Muelleria* 19: 189 (2004)

T: c. 200 m SW along foreshore from Murray's boat ramp, Booderee Natl Park, A.C.T., 31 July 1996, *N.M.Taws 540*; holo: CANB.

Illustration: I.R.Thompson, *op. cit.* 190, fig. 42.

Sprawling herbs to c. 0.6 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary roots fleshy, sometimes mildly tuberiform. Stems glabrous. Leaves linear, 10–16 cm long, with l:w ratio c. 10–14, undivided; base attenuate; margin entire, or with well-spaced teeth; both surfaces glabrous, or with short hairs on margins of lower leaves; lower surface sometimes purple. Capitula numerous per stem; calycular bracteoles 3–5, 1–1.5 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 6–7.5 mm long, 1.3–1.6 mm diam.; bracts 8–13, glabrous. Florets 15–25. Achenes bottle-shaped, 3–3.5 mm long, light brown, with papillose hairs in lines; l:w ratio of hairs c. 1–2. Pappus 6 mm long.

Occurs in the A.C.T. in Booderee Natl Park, on the southern margin of Jervis Bay and from near Scone in central-eastern N.S.W. Grows in pale grey sand in open forest. Flowers winter.

N.S.W.: Woolooma Mt., Beltrees, Scone, Nov. 1903, *A.L.White* (NSW). A.C.T.: track to Steamers Beach, Booderee Natl Park, *I.R.Thompson 790* (MEL).

Known currently only from Booderee Natl Park, A.C.T., S of Jervis Bay, N.S.W. Similar to *S. prenanthoides*, particularly in capitulum, achene, and root morphology, but with stems and leaves glabrous or nearly so, leaves not crowded basally, and achenes more densely papillose.

**31. *Senecio lageniformis* I.Thomps., *Muelleria* 19: 189 (2004)**

T: Long Plain, near confluence of Murrumbidgee R. and Boundary Ck, Kosciuszko Natl Park, N.S.W., 31 Jan. 2002, *I.R.Thompson 747* & *N.G.Walsh*; holo: MEL; iso: AD, CANB, HO, NSW.

S. sp. N, G.J.Harden in G.J.Harden (ed.), *Fl. New South Wales* 3: 306 (1992).

S. sp. 2, N.G.Walsh in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 962 (1999).

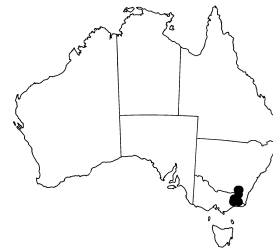
Illustration: I.R.Thompson, *op. cit.* 192, fig. 43.

Erect or ascending herbs to c. 0.4 m high, often leafier in lower $\frac{1}{3}$ at anthesis. Root system not seen. Stems \pm glabrous or transiently sparsely cottony. Leaves oblanceolate, 4–8 (–10) cm long, with l:w ratio c. 4–20, undivided; base without auricles or uppermost leaves with small projections; margin denticulate or dentate; both surfaces glabrous or sparsely and minutely hispid; lower surface not purple. Capitula usually several per stem; calycular bracteoles 3–5, 1.5–2.5 mm long; peduncle and calyculus cobwebby at anthesis; involucre 6–8 mm long, 2–2.6 mm diam.; bracts mostly 12–14, cobwebby or glabrous. Florets 50–60. Achenes bottle-shaped, 3.5–4.5 mm long, dark brown, with papillose hairs scattered in lines; l:w ratio of hairs c. 1–2. Pappus 5–6 mm long.

Occurs from Long Plain near Kiandra in SE N.S.W. SSW to Bentley Plains in eastern Vic. Grows in grasslands/herbfields, low open heathland, or grassy open woodland in subalpine areas. Flowers summer–autumn.

N.S.W.: Nungar Plain, knoll c. 2 km due E from W extremity of plain, N side of Nungar Ck, Kosciuszko Natl Park, *N.G.Walsh 5512 et al.* (MEL). Vic.: 1.5 km NE along Cowombat Flat track from its intersection with Limestone Rd, *D.E.Albrecht 3009* (MEL).

The broad capitula and long bottle-shaped achenes with short papillose hairs distinguish this from other subalpine species.



32. *Senecio nigrapicus* I.Thomps., *Muelleria* 19: 191 (2004)

T: Dimmick's Lookout c. 10 km S of Howitt Plains, Alpine Natl Park, Vic., 6 Feb. 2002, *I.R.Thompson* 760; holo: MEL; iso: BRI, NSW.

S. sp. aff. squarrosus (Alps 1), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 194, fig. 44.

Erect herbs to c. 0.8 m high, sometimes leafier in lower $\frac{1}{3}$ at anthesis. Taproot well-developed; secondary roots mostly fine. Stems hispid basally becoming appressed-cottony or glabrous upwards. Leaves 7–10 cm long, with l:w ratio c. 4.5–8, undivided or lobate, with 3–5 triangular lobes per side; base of upper-stem leaves with small auricles; margin entire or dentate; upper surface slightly hispid or glabrous; lower surface as for upper or cobwebby, not purple. Capitula numerous per stem; calycular bracteoles 8–12, 2–3 mm long; peduncle and calyculus cobwebby or not at anthesis; involucre 6–8 mm long, 2.2–2.8 mm diam.; bracts mostly 12–14, glabrous. Florets 40–60. Achenes narrowly obloid-ellipsoid or slightly bottle-shaped, 2.5–3 mm long, red-brown or brown, with papillose hairs in broad bands; l:w ratio of hairs c. 3–5. Pappus 5–6 mm long.

Occurs from Mt Timbertop E to Wulgulmerang in eastern Vic., then NE to the Brindabella Ra. in the A.C.T.; and disjunctly much further N around Guyra in NE N.S.W. and in the Bunya Mtns in SE Qld where known from a single old record. Grows in forest and woodland in lowland areas or at elevations over 800 m. Flowers summer–autumn.

Qld: Bunya Mtns, Oct. 1919, *C.T.White* (BRI). N.S.W.: railway reserve, 10 km S of Ben Lomond, *R.Bates* 13731 (AD). A.C.T.: Smokers Gap, *L.G.Adams* 4137 (CANB). Vic.: Mt Timbertop, *D.E.Albrecht* 1565 (MEL); on the Doolan Plains Rd, c. 7 km NE of Mt Arbuckle, *T.B.Muir* 4531 (MEL).



33. *Senecio longipilus* I.Thomps., *Muelleria* 19: 193 (2004)

T: Long Plain, near confluence of Boundary Ck and Murrumbidgee R. beside Long Plain Rd, Kosciuszko Natl Park, N.S.W., 31 Jan. 2002, *I.R.Thompson* 748 & *N.G.Walsh*; holo: MEL; iso: CANB, HO, NSW, PERTH.

Illustration: I.R.Thompson, *op. cit.* 196, fig. 45.

Erect or ascending herbs to 0.6 m high, sometimes leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary roots fleshy. Stems densely hispid, sometimes with a cottony overlay, with density reducing upwards, predominantly appressed-cobwebby near top of stem. Leaves 7–15 cm long, with l:w ratio c. 5–8, undivided or sometimes coarsely dentate to lobate with 3–6 triangular projections per side; base without auricles; margin entire or denticulate distally; upper surface hispid, with hairs rather long; lower surface glabrous except for hispid midrib, not purple. Capitula usually several per stem; calycular bracteoles 6–8, 3–5 mm long; peduncle and calyculus sometimes sparsely cobwebby at anthesis, with bracteole margins usually hispid; involucre (5–) 6–8 mm long, 2.8–3.5 mm diam.; bracts 12–15 (–18), glabrous or sparsely cobwebby. Florets 40–60. Achenes narrowly obloid-ellipsoid or more often slightly bottle-shaped, 2.5–3 mm long, red-brown or dark brown, with papillose hairs in broad bands; l:w ratio of hairs c. 3–4. Pappus 6–8 mm long. Fig. 29F–H.

Occurs in SE N.S.W. in the Kiandra area, and in N Tas. near Perth (no recent records from Tas.). Grows in sand or loam soils in grassland/herbfields, shrubland and woodland mostly at elevations over 1000 m but sometimes lowland. Flowers summer.

N.S.W.: c. 100 m W of confluence of Boundary Ck and Murrumbidgee R., Kosciuszko Natl Park, *N.G.Walsh* 4885 & *K.L.McDougall* (MEL). Tas.: South Esk R., near Perth, *R.C.Gunn* 767 (MEL).

Distinguishable from other species with broad capitula by the relatively long (1–2 mm) coarse hairs on stems, leaves and bracts, and the relatively long bracts and peduncular bracteoles. Involucral bracts are fewer than in *S. macrocarpus* and usually fewer than in *S. squarrosus*, and compared to *S. squarrosus* the



stereome is broader, especially in the distal 1.5 mm. The apex of the involucre bracts is typically strongly pigmented black and without a purple zone immediately beneath the black mark, a character it shares with *S. nigrapicus* and *S. oldfieldii*. The pappus is usually relatively densely bristled and relatively long, and it commonly exceeds the florets by c. 1 mm, obscuring them at anthesis.

34. *Senecio oldfieldii* I.Thomps., *Muelleria* 19: 195 (2004)

T: near centre road through Perup Field Centre, south drainage line, W.A., 21 Oct. 1994, *A.R.Annels ARA4699* & *R.W.Hearn*; holo: PERTH.

Illustration: I.R.Thompson, *op. cit.* 197, fig. 46.

Erect herbs to 1.0 m high, sometimes leafier in lower $\frac{1}{3}$ at anthesis. Roots not seen. Stems densely hispid, reducing to sparsely hispid or glabrous upwards. Leaves 7–15 cm long, with l:w ratio c. 5–20, undivided or coarsely dentate to lobate, with 3–5 narrowly triangular projections per side; base without auricles; margin entire or with occasional teeth; upper surface usually hispid, with hairs rather long, sometimes \pm glabrous; lower surface glabrous except for hispid midrib and major veins. Capitula several per stem; calycular bracteoles 8–10, 3–5 mm long; peduncle and calyculus sometimes sparsely cobwebby at anthesis, with bracteole margin often hispid; involucre 8.5–10 mm long, c. 3 mm diam.; bracts c. 13, glabrous. Florets 50–60. Achenes not known in mature state, with papillose hairs present. Pappus 6–8 mm long.

Occurs in SW W.A. in the Busselton to Manjimup area and with one collection further E near Ravensthorpe. Grows in lowlying areas in shrubland and forest. Flowers spring.

W.A.: West R. Crossing, Old Ongerup Rd, c. 30 km WSW of Ravensthorpe, *K.Newbey 11258* (PERTH); Low places, Blackwood R., date unknown, *A.F.Oldfield* (MEL).

A rarely collected and poorly known species similar to *S. longipilus* in having relatively long coarse hairs and relatively long bracts and peduncular bracteoles, but differing in having longer capitula and involucre bracts strongly recurved at the apex.



35. *Senecio psilocarpus* Belcher & Albr., *Muelleria* 8: 113 (1994)

T: SW edge of bushland reserve W of Mumbannar along Princes Hwy, Vic., 13 Mar. 1992, *D.Frood 1/92*; holo: MEL.

S. sp. aff. squarrosus (South West Swamps), J.H.Ross, *Census Vasc. Pl. Victoria* 4th edn 47, 199 (1993).

Illustrations: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 963, fig. 196b (1999); I.R.Thompson, *Muelleria* 19: 200, fig. 48 (2004).

Sprawling herbs to c. 0.8 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary roots fleshy. Stems \pm glabrous. Leaves narrowly oblanceolate, very narrowly elliptic or linear, 7–10 cm long, with l:w ratio c. 7–10, generally undivided; base with small auricles above mid-stem; margin entire, denticulate or dentate; upper surface glabrous or sparsely and minutely hispid; lower surface glabrous, not purple. Capitula several per stem; calycular bracteoles 6–10, 2–4 mm long; peduncle and calyculus not cobwebby at anthesis; involucre 4.5–6.5 (–7.5) mm long, 2.3–2.8 mm diam.; bracts predominantly 12–16, glabrous. Florets 50–60. Achenes narrowly obloid, 1.8–2.5 mm long, usually orange to reddish brown, glabrous. Pappus 5–6 mm long. Fig. 29 I.

Occurs from Honans Scrub near Mt Gambier in S.A. E to Sale in southern Vic., and in NE Tas. from Flinders Is. SW to Cressy. Grows in swamps. Flowers summer–autumn.

S.A.: Honans Scrub, Woods Forests, near Glencoe, *R.L.Taplin 670* & *D.E.Murfet* (AD). Vic.: Connover Swamp, SE of Drik Drik, *D.E.Albrecht 5157 et al.* (AD, CANB, MEL); Lysterfield Lake Park, *A.C.Beaglehole 71574* (MEL). Tas.: Cressy near Launceston, Jan. 1943, *J.H.Wilson* (HO).



Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act* 1999.

Senecio psilocarpus resembles *S. squarrosus* but has a sparser indumentum, shorter capitula, and glabrous achenes. The two species have a similar distribution, but the former has a stronger preference for aquatic habitats.

36. *Senecio squarrosus* A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 107 (1834)

Erechtites richardiana DC., *Prodr.* 6: 297 (1838), *nom. illeg.* (*S. squarrosus* in syn.). T: Port Jackson, N.S.W., *C. Gaudichaud-Beaupré* 5; holo: P.

[*E. hispidula* auct. non (A.Rich.) DC.; G.Bentham, *Fl. Austral.* 3: 660 (1866), *p.p.*; J.M.Black, *Fl. S. Australia* 4: 610 (1929); A.Ewart, *Fl. Victoria* 1179 (1931)]

Illustrations: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 963, fig. 196a (1999); I.R.Thompson, *Muelleria* 19: 202, fig. 49 (2004).

Erect to sprawling herbs to 0.8 m high, usually distinctly leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary roots fleshy. Stems sparsely appressed-cottony or \pm glabrous, transiently or rarely persistently slightly hispid. Leaves 7–13 cm long, with l:w ratio c. 8–15, undivided or lobate, with 1–3 triangular to oblong lobes per side; base with small auricles above mid-stem; margin entire or with scattered teeth; upper surface hispid, becoming sparse upwards; lower surface as for upper, or cobwebby, or glabrous except for midrib. Capitula several (to many) per stem; calycular bracteoles 6–10, 2–4 mm long; peduncle and calyculus slightly to moderately cobwebby at anthesis; involucre 6–11 mm long, 2.8–4 mm diam.; bracts (12–) 16–25, glabrous. Florets 50–70. Achenes narrowly obloid, 2–3 mm long, brown, with papillose hairs in broad bands; l:w ratio of hairs c. 3–4. Pappus 6–8 mm long. $n = 30$, M.E.Lawrence, *Austral. J. Bot.* 28: 155 (1980). Fig. 29J–L.

Occurs from the Fleurieu Penin. in SE S.A. ESE to Bairnsdale in SE Vic., in NE Tas. at Launceston, in SE Tas. around Hobart, and in southern W.A. in the Bremer R. and Fitzgerald R. areas E of Albany. Grows in sandy or clay soils, commonly in lower-lying areas in open forest and woodland. Flowers mostly spring.

W.A.: Bremer R., c. 16 km from mouth, *A.S.George* 6990 (PERTH). S.A.: Kuitpo forest, *A.G.Spooner* 12444 (AD). Vic.: on Border Track near junction of E–W Track, western Block, Little Desert Natl Park, *I.C.Clarke* 2364 (MEL); Between mouth of Angelsea R. and Eumeralla Scout Camp, 11 Oct. 1975, *J.H.Willis* (MEL). Tas.: Domain, Hobart, 30 Oct. 1958, *W.M.Curtis* (HO).



Purple corolla lobes seen in some specimens appear to be a feature unique to this species of disciform *Senecio*. Populations in far western Vic. and SE S.A. have relatively large capitula and relatively dense coarse hairs on the leaves.

37. *Senecio macrocarpus* F.Muell. ex Belcher, *Muelleria* 5: 119 (1983)

T: Wimmera district, Walmar station, Vic., 18 Sept. 1860, *Dallachy* 23; holo: MEL.

[*Erechtites hispidula* auct. non (A.Rich) DC.; G.Bentham, *Fl. Austral.* 3: 660 (1866), *p.p. min.*]

Illustrations: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 963, fig. 197c (1999); I.R.Thompson, *Muelleria* 19: 109, fig. 4i; 204, fig. 50 (2004).

Erect herbs to 0.6 m high, not or hardly leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary roots fleshy. Stems sparse to moderately densely appressed-cottony, reducing to glabrous upwards. Leaves 8–15 cm long, with l:w ratio 8–20, usually undivided, occasionally lobate with 1 or 2 triangular lobes per side; base attenuate; margin appearing entire; upper surface glabrous, sparsely hispid or cobwebby; lower surface glabrous except for hispid midrib, not purple. Capitula few to several per stem; calycular bracteoles 8–12, 3–6 mm long; peduncle and calyculus not or sparsely cobwebby at anthesis; involucre (7–) 9–13 mm long, 3–5 mm diam.; bracts (13–) 20–25, glabrous. Florets 50–100. Achenes bottle-shaped, 3–6 mm long, brown, with papillose hairs in broad bands; l:w ratio of hairs c. 3–4. Pappus 7–10 mm long.

Occurs from Ardrossan in SE S.A. SE to Yan Yean in south-central Vic. with an outlier recently collected at Gundaroo in N.S.W. There are a few old records from Tas. Grows in low-lying areas on basalt-derived clay or clay-loam soils, in grassland, sedgeland and woodland. Flowers mostly winter–spring.

S.A.: Messent Conservation Park, *R.Davies, P.Cooke & P.Green 62(1)e* (AD). N.S.W.: NE section of Lot 99 Dairy Creek Rd, Gundaroo, *D.A.Taylor 75* (CANB, MEL). Vic.: on rly reserve of Melbourne–Geelong line, c. 8 km SW of Werribee, *R.J.Adair 1761* (AD, MEL). Tas.: South Esk R., Oct. [year unknown], *coll. unknown* (MEL).



The narrowly linear, strongly revolute leaves, small number of large capitula, divergent calycular bracteoles, and long, densely hairy, bottle-shaped achenes distinguish this species. Lobate leaves usually only occur on new plants. A few specimens from western Vic. atypically exhibit long basal or near-basal lobes on the uppermost leaves. Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

38. *Senecio interpositus* I.Thomps., *Muelleria* 19: 205 (2004)

T: Smokers Flat, Namadgi Natl Park, A.C.T., 13 Mar. 1986, *L.G.Adams & M.Gray 3976*; holo: CANB; iso: MEL. S. sp. aff. *squarrosus* (*Alps 2*), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003). Illustration: I.R.Thompson, *op. cit.* 206, fig. 51.

Erect herbs to 1.0 m high, usually distinctly leafier in lower $\frac{1}{3}$ at anthesis. Taproot inconspicuous; secondary roots fleshy. Stems sparsely appressed-cottony or glabrous. Leaves 6–12 cm long, with l:w ratio c. 7–20, undivided or coarsely dentate to lobate, with 4–8 triangular projections per side; base without auricles; margin with well-spaced teeth; upper surface \pm glabrous or sparsely appressed-cottony; lower surface \pm glabrous, not purple. Capitula several per stem; calycular bracteoles 6–8, 2–3 mm long; peduncle and calyculus cobwebby at anthesis; involucre cylindric, 5–6.5 mm long, 2–2.5 mm diam.; bracts mostly 11–14, usually recurved apically, glabrous or slightly cobwebby basally. Florets 25–50, sometimes all bisexual. Achenes narrowly obloid, 2.5–3 mm long, light or dark brown, glabrous or with papillose hairs scattered in lines; l:w ratio of hairs c. 2–3. Pappus 5–6 mm long.

Occurs from Amiens in far SE Qld S to Bullock Ck E of Armidale in NE N.S.W., and from Kanangra Boyd Natl Park, N.S.W., SW to the McAlister R. in eastern Vic. Grows in peaty clay soils in swampy flats or grassland and in woodland at altitudes over 900 m. Flowers summer–autumn.

Qld: Watsons Swamp, 6 km N of Amiens, *A.R.Bean 5850 & P.I.Forster* (BRI, NSW). N.S.W.: Tuross Falls Track, Badja State Forest, *L.G.Adams & M.Gray 3925* (CANB, MEL). A.C.T.: Kangaroo Ck, Corin Dam Rd, *N.T.Burbidge 7549* (BRI, CANB, MEL). Vic.: Cowombat Plain, East Gippsland, *A.C.Beauglehole 36555 & E.W.Finck* (MEL); Swamp margins of Pine Ck, between the Caledonia and McAlister Rivers, *N.H.Scarlett 84-12* (AD).



An unusual species in being variable in the composition of the florets: mostly with disciform capitula but on the Northern Tablelands of N.S.W., sometimes with discoid capitula. Disciform plants generally have better developed female florets than in other disciform species. The relatively elongate obconic corolla bases, the glabrous, lobed leaves and purple-pigmented and strongly recurved apex of involucre bracts, and the slightly cobwebby calyculus also help to distinguish this species. The recurved apex of the involucre bracts is also evident in *S. georgianus* and *S. helichrysoides*.

39. *Senecio georgianus* DC., *Prodr.* 6: 371 (1838)

T: L. George, N.S.W., [c. 1817], *A.Cunningham*; holo: G, microfiche seen; iso: K, photo CANB. *Erechtites candicans* Hook.f. in W.J.Hooker, *London J. Bot.* 6: 122 (1847). T: Tas., *R.C.Gunn s.n.*; holo: K, photo CANB. Illustration: I.R.Thompson, *Muelleria* 19: 208, fig. 52 (2004).

Erect herbs to c. 0.8 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Roots not seen. Stems appressed-cobwebby. Leaves 6–8 cm long, with l:w ratio c. 8–12, usually undivided; base without auricles; margin \pm entire; upper surface \pm glabrous or sparsely appressed-cottony; lower surface densely woolly. Capitula several per stem; calycular bracteoles 6–10, 2–3 mm long; peduncle and calyculus not or sparsely cobwebby at anthesis; involucre 5–7 mm long, c. 2 mm diam.; bracts 12–14, recurved apically, glabrous. Florets 25–40, all bisexual, or possibly some female, with stamens reduced to staminodes. Achenes narrowly obloid, 2.5–3 mm long, dark brown, with papillose hairs in bands; l:w ratio of hairs c. 2–3. Pappus c. 6 mm long.

Occurs in N.S.W., Vic. and Tas., but not recorded with certainty for over 140 years. Grows in woodlands, grasslands/herbfields or open shrublands in montane to subalpine areas. Flowers late summer–autumn.

Vic.: L. Omeo, date unknown, *F. Mueller* (MEL).

Listed as Extinct under the *Environment Protection and Biodiversity Conservation Act* 1999. Early records of *S. georgianus* are from L. George in SE N.S.W., from Omeo and McAlister R. in Vic., and from Tas. (locality unknown).



40. *Senecio helichrysoides* F. Muell., *Trans. Proc. Victorian Inst. Advancem. Sci.* 39 (1855)

T: Wheal Barton mine [near Truro], S.A., Jan. 1847, *F. Mueller*; holo: MEL.

Illustration: I.R. Thompson, *op. cit.* 210, fig. 53.

Erect herb to c. 1 m high, not leafier in lower $\frac{1}{3}$ at anthesis. Roots not known. Stems densely woolly. Leaves 6–8 cm long, with l:w ratio c. 4–7, undivided or lobate, with 3–6 triangular lobes per side; margin entire; both surfaces densely woolly. Capitula several per stem; calycular bracteoles 6–8, 4–5 mm long; peduncle and calyculus woolly; involucre c. 6 mm long, c. 3 mm diam.; bracts 12–14, with apex recurved, woolly. Florets c. 40, all bisexual. Achenes not known. Pappus c. 6 mm long.

Occurs in SE S.A. and in NW Vic. Grows in sandy areas on low hills or flats. Flowers Jan.

Vic.: L. Hindmarsh, *coll. unknown* (MEL).

A species allied to *S. georgianus*, but also not collected since the mid-1800s. The above description is based on the single collection bearing capitula.



2. *Odoratus* Group

Erect shrubs, subshrubs or perennials, not rhizomatous, or rarely extensively rhizomatous (*S. behrianus*), glaucous or not. Coarse spreading hairs uncommon, generally inconspicuous; fine hairs sometimes present, mostly inconspicuous, sometimes forming a short wool. Leaves thin or somewhat fleshy. Capitula discoid or radiate, calyculate, with bracteoles ovate-lanceolate or \pm parallel-sided, 1–5 mm long, 0.1–0.5 mm wide at midpoint, with hyaline margin absent or obscure; involucre 1.5–3 mm diam.; bracts 7–14, free; stereome often gently ridged, glabrous or tomentose, with resin ducts often conspicuous, orange or reddish. Florets 8–40; ligulate florets absent or 4–8; ligule yellow; disc florets with corolla limb equal to or longer than tube, 0.5–1 mm diam. at base of lobes. Achenes homomorphic, \pm obloid, 1.5–4 mm long, with ribs \pm flat, with papillose hairs of l:w ratio 2–6 or glabrous; carpopodium $\frac{1}{3}$ – $\frac{1}{2}$ diam. of body. Pappus caducous; bristles scabridulous to \pm smooth.

A group of 10 species, endemic to Australia; its distribution extends from Eucla near the S.A.–W.A. border E to the coast of N.S.W.

The discoid members of the group can be distinguished from species of the Disciform and Ramosissimus groups by the relatively showier florets in each capitulum, where the corolla exceeds the involucre to a greater degree and the corolla limb is considerably larger.

- 1 Capitula radiate
 - 2 Plants extensively rhizomatous; inflorescences of 1–5 capitula; involucre appressed-woolly **49. *S. behrianus***
 - 2: Plants not extensively rhizomatous; inflorescences usually of 20 or more capitula; involucre glabrous
 - 3 Leaves with l:w ratio 1.5–3, strongly cordate at base, and lower surface densely woolly **50. *S. garlandii***
 - 3: Leaves not entirely as above **48. *S. linearifolius***
- 1: Capitula discoid
 - 4 Leaves ±glabrous, lobate to deeply pinnatisect with 2–6 strongly antrorse lobes/segments per side; reticulate venation obscure; short appressed wool absent
 - 5 Leaves deeply pinnatisect, sometimes bipinnatisect, segment axes with l:w ratio > 10 **41. *S. anethifolius***
 - 5: Leaves lobate to subpinnatisect, segment axes with l:w ratio < 5
 - 6 Leaves fleshy, with lobes/segments commonly ±oblong; involucre bracts predominantly 8–10, 4.5–6 mm long (SE W.A.) **42. *S. euclaensis***
 - 6: Leaves not fleshy, with lobes usually triangular; involucre bracts predominantly 11–13, 5–8 mm long (south-central S.A.) **43. *S. gawlerensis***
 - 4: Leaves glabrous or variously hairy, not divided (margins may be toothed), or if lobate then involucre, peduncles and often younger stems and leaves with a short appressed wool; reticulate venation of leaves sometimes distinct on one or both surfaces
 - 7 Leaves to 15 mm wide; margins entire or if denticulate or dentate then involucre lanate; reticulate venation of leaves not apparent
 - 8 Mid-branch leaves l:w ratio > 7; margins entire, revolute; auricles if present not divided; calycular bracteoles to 2 mm long, with l:w ratio mostly < 2; at anthesis, peduncles and capitula glabrous or less often patchily woolly; florets 8–12 (–14) per capitulum **44. *S. cunninghamii***
 - 8: Mid-branch leaves l:w ratio < 10; margins of all or most leaves ±crowded-denticulate to dentate, sometimes lobate, rarely most leaves ±entire; auricles if present often bidentate; calycular bracteoles to 3 mm long, with l:w ratio mostly > 3; at anthesis, peduncles and capitula patchily to densely woolly, rarely ±glabrous; florets 10–18 per capitulum **45. *S. lanibracteus***
 - 7: Leaves to 50 mm wide; commonly ±crowded-denticulate or dentate; reticulate venation of leaves apparent on one or both surfaces; involucre glabrous
 - 9 Plant not glaucous; mid-branch leaves tapering strongly to a petiole-like proximal portion 1–4 cm long, with auricles absent or small, upper surface green, and lower surface ±completely obscured by a ±appressed indumentum **46. *S. hypoleucus***
 - 9: Plant often glaucous; mid-branch leaves not tapering strongly to a petiole-like proximal portion, with auricles commonly well-developed and usually moderately stem clasping, and lower surface mostly glabrous or sparsely hairy, rarely moderately obscured by a loosely appressed indumentum **47. *S. odoratus***

41. *Senecio anethifolius* A.Cunn. ex DC., *Prodr.* 6: 371 (1838)

T: Peel's Ra. [Cocoparra Ra.], N.S.W., *A.Cunningham s.n.*; holo: G, microfiche seen.

Shrubs to c. 2 m high, sometimes glaucous, with only newer growth hairy. Leaves to c. 13 cm long, with l:w ratio c. 1–3, deeply pinnatisect, with 2–6 linear to filamentous segments per side, occasionally bipinnatisect; base attenuate, sometimes with small lobes; margin entire; both surfaces glabrous, with venation indistinct. Capitula numerous per branch; calycular bracteoles 4–6, 0.5–5 mm long; involucre 3.5–8.5 mm long, 2–2.5 (–3) mm diam.; bracts 7–9, glabrous. Florets 8–15, all tubular. Achenes narrowly obloid, 2–3 mm long, with papillose hairs in bands. Pappus 3.5–5 mm long. *n* = 30, M.E.Lawrence, *Austral. J. Bot.* 28: 154 (1980).

Occurs in eastern S.A. and western and central N.S.W. Grows among rocks and in sand beside creeks in open woodland and shrubland. Flowers mostly winter–summer. There are 2 subspecies.

Putative hybrids between *S. lanibracteatus* and one or both of the subspecies and have been recorded at several places in S.A. and near Broken Hill in western N.S.W.

Plants not glaucous, or rarely slightly glaucous; leaf segments very fine (of major branches mostly 0.8–2.0 mm wide; of secondary branches mostly 0.3–0.8 mm wide, dried); calycular bracteoles (1.5–) 2–5 mm long; involucre 5–8.5 mm long; resin ducts of involucre bracts and bracteoles fine, not raised; corolla lobes mostly 1–1.6 mm long (dried)

1a. subsp. *anethifolius*

Plants glaucous at least on newer growth; leaf segments generally broader than above (of major branches mostly 1.5–3.5 mm wide, of secondary branches mostly 0.6–1.5 mm wide, dried); calycular bracteoles 0.5–2 mm long; involucre 3.5–6 (–7) mm long; resin ducts of involucre bracts and bracteoles commonly broad and often raised; corolla lobes mostly 0.6–1 mm long (dried)

1b. subsp. *brevibracteolatus*

41a. *Senecio anethifolius* A.Cunn. ex DC. subsp. *anethifolius*

S. angustilobus F.Muell., *Linnaea* 25: 418 (1853); *S. angustifolius* Sond., *Linnaea* 25: 526 (1853), in error. T: summits of hills near Kanyaka [in Flinders Ra.], S.A., Oct 1847, *F.Mueller*; lecto: MEL 275094; isolecto: MEL, *fide* I.R.Thompson, *Muelleria* 20: 72 (2004).

Illustration: I.R.Thompson, *Muelleria* 20: 71, fig. 1a; 74, fig. 3 (2004).

Plants not or rarely slightly glaucous. Leaf segments 3–6 per side, 0.3–2 mm wide (dried). Capitula: peduncles at anthesis mostly 2–6 mm long; calycular bracteoles (1.5–) 2–5 mm long; involucre 5–8.5 mm long; bracts often not black-tipped, with resin duct usually narrow, not prominent, orange. Florets 7–12; corolla lobes 1–1.6 mm long (dried). Fig. 30A–E.

Occurs in S.A. from the Flinders Ra. SE to Robertstown and E to Broken Hill in far western N.S.W.; also disjunctly further E in central N.S.W. from the Merrimerrriwa Ra. S to the Narrandera district.

S.A.: Yourambulla Caves area, c. 10 km SW of Hawker, *R.V.Smith* 89/29 (AD, MEL). N.S.W.: roadside, 42 km from central Broken Hill on road to Mt Robe, *R.B.Hadlow* 86 & *A.B.Court* (CANB, NSW); Woolshed Ck area, Cocoparra Natl Park, 4 Oct. 1971, *J.W.Wrigley* (CANB).

Sympatric with subsp. *brevibracteolatus* in the Southern Flinders Ra. and possibly sometimes hybridises with it there.



41b. *Senecio anethifolius* subsp. *brevibracteolatus* I.Thomps., *Muelleria* 20: 73 (2004)

T: in Buckaringa Gorge, S.A., 12 Dec. 1985, *L.Haegi* 3480 & *B.R.Moore*; holo: AD; iso: BRI, CANB, MEL.

Illustration: I.R.Thompson, *op. cit.* 71, fig. 1b; 75, fig. 4.

Plants glaucous. Leaf segments 2–4 per side, 0.6–3.5 mm wide (dried). Capitula: peduncle at anthesis mostly 3–10 mm long; calycular bracteoles 0.5–2 mm long; involucre 3.5–6 (–7) mm long; bracts often black-tipped, with resin duct usually rather broad,

prominent, orange, red or blackish red. Florets 10–15; corolla lobes 0.6–1.0 mm long (dried). Fig. 30F.

Occurs in central-eastern S.A. from Mt Livingston in the Gammon Ra. S to the Flinders Ra. and also slightly further SE at Mt Bryan.

S.A.: Horrocks Pass, 9.5 km from Wilmington towards Port Augusta, R.J.Bayer SA-99021 & G.T.Chandler (AD, CANB); near the summit of Mt Bryan, D.N.Kraehenbuehl 7280 (AD, CANB).



42. *Senecio euclaensis* I.Thomps., *Muelleria* 20: 77 (2004)

T: 2 km W of W.A./S.A.border; Eucla National [Park], W.A., 12 Oct. 1986, G.J.Keighery & J.J.Alford 906; holo: PERTH.

Illustration: I.R.Thompson, *op. cit.* 71, fig. 1c; 76, fig. 5.

Shrubs to c. 1.5 m high, not glaucous, largely glabrous. Leaves to c. 10 cm long, with l:w ratio c. 2.5–4, deeply lobate to sub-pinnatisect, with 2–5 mostly \pm oblong projections per side; base attenuate, petiole-like, without lobes; margin \pm entire or sparsely denticulate or dentate; both surfaces \pm glabrous, with venation indistinct. Capitula numerous per branch; calycular bracteoles 4–6, 1.5–2.5 mm long; involucre 4.5–6 mm long, 3–3.5 mm diam.; bracts mostly 8–10, glabrous or slightly cobwebby. Florets c. 20, all tubular. Achenes not seen at maturity, with papillose hairs. Pappus 4–5 mm long.

Occurs in the Eucla area, including Eucla Natl Park, in the far SE of W.A. and probably extending into S.A. Grows in grey sandy clay over limestone in shrubland. Flowers Spring.

W.A.: Eucla, 1877, *Carey* (MEL).

Known only from 2 collections near Eucla slightly W of the W.A.–S.A. border. Closest to *S. gawlerensis* but has fleshier leaves with major divisions more deeply dissected and generally more oblong or obovate rather than triangular, shorter calycular bracteoles, and involucre with fewer, less convex, and at first slightly cobwebby involucral bracts.



43. *Senecio gawlerensis* M.E.Lawr., *J. Adelaide Bot. Gard.* 7: 292 (1985)

S. georgianus var. *latifolius* J.M.Black, *Fl. S. Australia* 4: 613 (1929). T: 10 miles [16 km] W. Yardea, Eyre Penin., S.A., 24 Aug. 1928, J.B.Cleland; lecto: AD, *fide* M.E.Lawrence, *loc. cit.*; remaining syn: AD.

Illustrations: J.P.Jessop & H.R.Toelken, *Fl. S. Australia* 4th edn, 3: 1599, fig 726D (1986); I.R.Thompson, *Muelleria* 20: 71, fig. 1d; 76, fig. 6 (2004).

Shrubs to c. 1.5 m high, not glaucous, glabrous or newer growth transiently cobwebby. Leaves to c. 12 cm long, with l:w ratio c. 2–3, coarsely dentate to sub-pinnatisect, with 3–6 projections per side; base narrow, without lobes; margin entire, or with occasional teeth; venation indistinct. Capitula numerous per branch; calycular bracteoles 4–8, 2–4.5 mm long; involucre (5.5–) 6–8 mm long, c. 3 mm diam.; bracts 11–14. Florets 15–25, all tubular. Achenes narrowly obloid, 2–3 mm long, with papillose hairs in bands. Pappus c. 6 mm long. $n = 30$, M.E.Lawrence, *Austral. J. Bot.* 28: 154 (1980). Fig. 30K.

Occurs in south-central S.A. from Hiltaba E to Quorn in the Flinders Ra. and SSE to Corrunga Hill on the Eyre Penin. Grows commonly among rocks on hillsides, also on sandy flats beside creeks, in open woodland and shrubland. Flowers mostly late winter–spring.



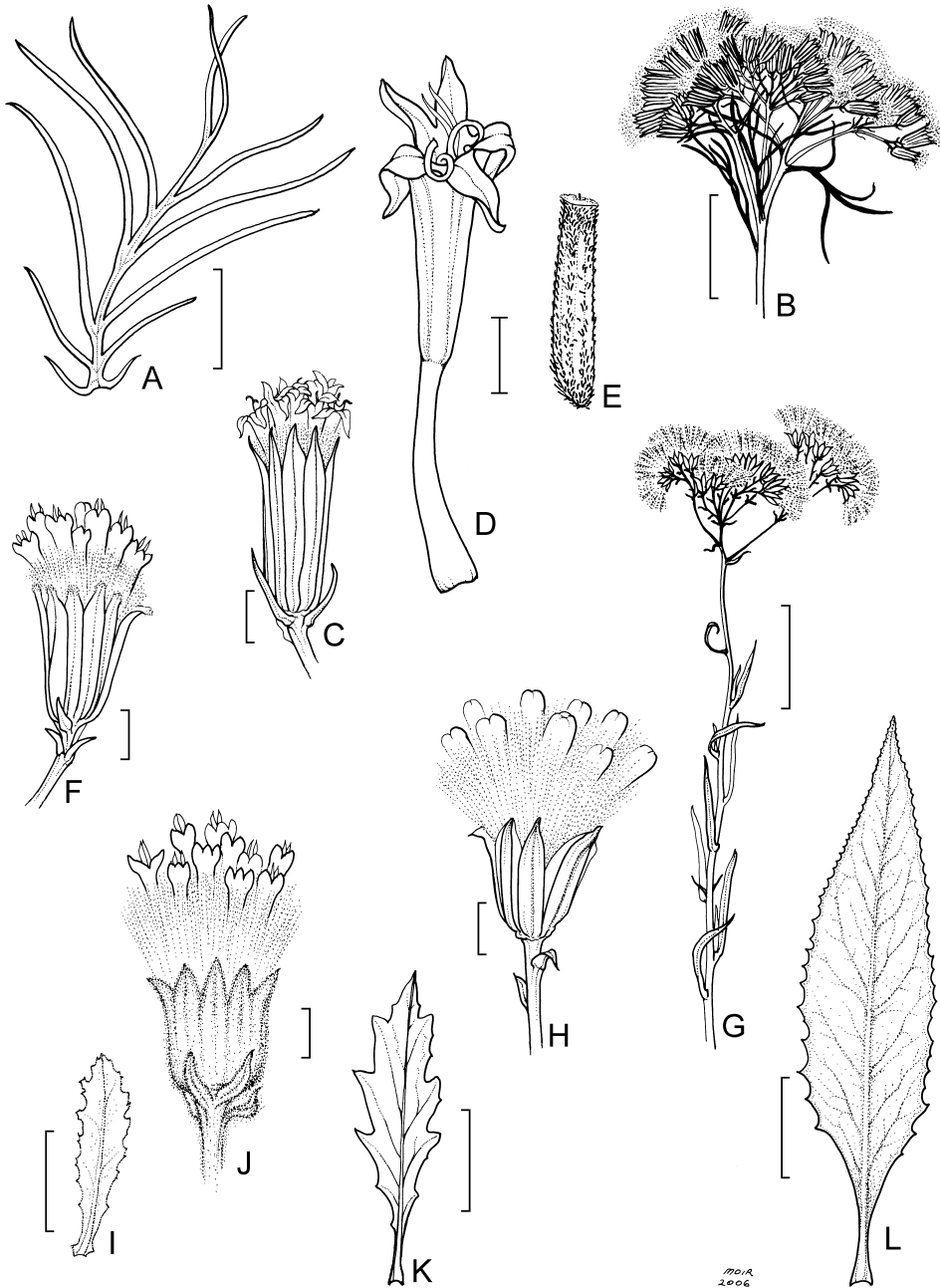


Figure 30. *Senecio*. A–E, *S. anethifolius* subsp. *anethifolius*. A, portion of mid-branch leaf; B, inflorescence; C, capitulum; D, floret; E, achene (A–D, R.V.Smith 89/29, MEL; E, B.Nordenstam & A.Anderberg 1047, MEL). F, *S. anethifolius* subsp. *brevibracteolatus*, capitulum (R.Filson 3170, MEL). G, H, *S. cunninghamii* var. *cunninghamii*. G, flowering branch; H, capitulum (G, H, A.C.Beauglehole 8848, MEL). I, J, *S. lanibracteus*. I, branch leaf; J, capitulum (I, J, F.J.Badman 7569, MEL). K, *S. gawlerensis*, mid-branch leaf (Gawler Ra. Survey 7549, MEL). L, *S. hypoleucus*, mid-branch leaf, abaxial surface (A.C.Beauglehole 8912, MEL). Scale bars: A–B, G, I, K–L = 20 mm; C, F, H, J = 2 mm; D–E = 1 mm. Drawn by M.Moir.

S.A.: Hancocks Lookout, c. 42 km SE of Port Augusta, near Wilmington, Lower Flinders Ra., 2 Oct. 1960, coll. *unknown* (AD); Miccollo Hill, 68 km NW (by road) from Iron Knob, Gawler Ra., *B.J.Conn 1816* (AD, MEL, NSW); E slope of Mt Gairdner, Gawler Ra., 3 Oct. 1972, *P.Price* (AD, CANB).

44. *Senecio lanibracteus* I.Thomps., *Muelleria* 20: 78 (2004)

S. cunninghamii var. *serratus* M.E.Lawr., *J. Adelaide Bot. Gard.* 7: 291 (1985). T: Chintapanna Dam, Witchelina Stn, S.A., 13 Mar. 1979, *F.Badman 182*; *holo*: AD; *iso*: HO.

S. cunninghamii f. 2 (*arid zone*), M.E.Lawrence, *Austral. J. Bot.* 28: 154 (1980).

S. sp. aff. cunninghamii, M.E.Lawrence in J.P.Jessop & H.R.Toelken, *Fl. Central Australia* 385 (1981).

S. sp. F (*aff. cunninghamii*), S.W.L.Jacobs & J.Pickard, *Pl. New South Wales* 86 (1981).

S. sp. (aff. S. cunninghamii), G.M.Cunningham *et al.*, *Pl. W New South Wales* 675 (1981).

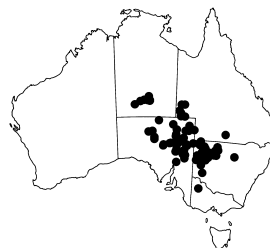
S. sp. aff. cunninghamii (North-west), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1599, fig. 726C (1986), as *S. cunninghamii* var. *serratus*; I.R.Thompson, *op. cit.* 71, fig. 1e; 82, fig. 8.

Shrubs to c. 1.8 m high, sometimes glaucous, usually appressed-cobwebby, sometimes becoming \pm glabrous. Leaves to c. 8 cm long, with l:w ratio c. 2–11, undivided or rarely lobate; base attenuate or uppermost leaves with 1 or 2 small lobes per side; margin denticulate or dentate; surfaces appressed-cobwebby or woolly, sometimes becoming \pm glabrous; venation indistinct. Capitula several to many per branch; calycular bracteoles 2–6, 1.5–2 mm long; involucre 3–6 mm long, c. 2–3 mm diam.; bracts 8–10 (–12), appressed-woolly, sometimes becoming \pm glabrous, rarely glabrous. Florets 10–18 (–22), all tubular. Achenes \pm narrowly obloid, 2.5–4 mm long, with papillose hairs in bands. Pappus 4–7 mm long. *n* = 30, M.E.Lawrence, *Austral. J. Bot.* 28: 154 (1980), as *S. cunninghamii* form 2 (*arid zone*). Plate 26; Fig. 30 I–J.

Occurs from the George Gill Ra. in southern N.T. SE to Pooncarie in far SW N.S.W. Also a single record further S from L. Brambruk in NW Vic. Grows often in or near drains or watercourses in plains, on various soils in shrubland and woodland. Flowers most of year, dependent on moisture.

N.T.: c. 2.5 km E on Col. Rose Drive, South Stuart Hwy, c. 7.5 km SE Heavitree Gap, *D.E.Albrecht 5761* (AD, DNA, MEL, NT). S.A.: Coongie L., *P.E.Conrick 2263* (AD, MEL). Qld: Mulligans R., 1889, *A.Henry* (MEL). N.S.W.: Homestead Gorge, 112 km NE of Broken Hill, Mootwingee Natl Park, *I.Crawford 1062* (CANB, NSW, PERTH). Vic.: SW side of L. Brambruk, 3.5 km N of Wonga Hut, Wyperfeld Natl Park, *A.C.Beauglehole 57048* & *E.Harberger* (MEL).



Senecio lanibracteus differs from *S. cunninghamii* in leaf shape and dentition and, usually, in the presence of indumentum on involucre bracts, leaves and new growth, in the length and shape of calycular bracteoles, and in the number of florets per capitulum. At Dalhousie Springs in northern S.A. (e.g. *D.E.Symon 14462*, AD, CANB) plants differ from typical *S. lanibracteus* in having larger capitula with 12 involucre bracts. Specimens from Macquarie Marshes in central N.S.W. are intermediate in form between *S. lanibracteus* and *S. cunninghamii*. Hybridisation between these two species is a possible explanation but there are no records of typical examples of these species from this locality.

45. *Senecio cunninghamii* DC., *Prodr.* 6: 371 (1838), as *Cunninghami*

T: L. George, N.S.W., *A.Cunningham*; *holo*: G, microfiche seen.

Shrubs to c. 1.8 m high, sometimes glaucous especially on younger growth, glabrous or sometimes newer growth woolly. Leaves to c. 14 cm long, with l:w ratio c. 7–40, undivided; base attenuate or uppermost leaves sometimes with 1 small lobe per side; margin entire; venation indistinct. Capitula several to many per branch; calycular bracteoles 1–4, 0.7–1.5 (–2) mm long; involucre 3–5 mm long, c. 1–1.5 mm diam.; bracts 7–9, patchily woolly at and shortly prior to anthesis, or glabrous, and then often glaucous. Florets 8–12 (–14), all tubular. Achenes \pm narrowly obloid, 2–4 mm long, with papillose hairs in bands. Pappus 4–6 mm long. *n* = 30, M.E.Lawrence, *Austral. J. Bot.* 28: 154 (1980), as *S. cunninghamii* form 1 (typical).

Occurs in S.A., Vic. and N.S.W.; there are 2 varieties.

Length:width ratio of mid-branch leaves (of longer branches) 15–40; peduncles and capitula glabrous, often glaucous at and before anthesis

45a. var. *cunninghamii*

Length:width ratio of mid-branch leaves (of longer branches) 7–15 (–20); peduncles and capitula patchily woolly before anthesis, lost or persistent at anthesis, not glaucous

45b. var. *flindersensis*

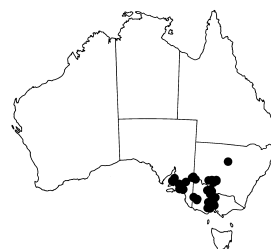
45a. *Senecio cunninghamii* DC. var. *cunninghamii*

S. brachylaenus DC., *Prodr.* 6: 370 (1838). T: Lachlan R., N.S.W., June 1817, *A. Cunningham* 142; holo: G n.v., *fide* G.Bentham, *Fl. Austral.* 3: 672 (1867).

Illustration: I.R.Thompson, *Muelleria* 20: 71, fig. 1f; 83, fig. 9 (2004).

Stem leaves with l:w ratio > 10; margin usually entire; mid-branch leaves with l:w ratio 15–40. Peduncles and capitula glabrous at and before anthesis, often glaucous. Fig. 30G–H.

Occurs from the Fleurieu Penin. in SE S.A. E to Hay in south-central N.S.W. and SE to the western outskirts of Melbourne, Vic.; also occurs disjunctly in the Macquarie Marshes area in north-central N.S.W. Grows in various soils commonly associated with watercourses or in drains or depressions in shrubland, woodland and forest. Flowers mostly summer–autumn.



S.A.: c. 3 km E of Port Victoria, Yorke Penin., 17 Mar. 1959, *J.B. Cleland* (AD, CANB). N.S.W.: 48 km N of Hay, *W.E. Mulham* 537 (CANB). Vic.: N of Benjeroop State Forest, *A.C. Beaglehole* 83197 (AD, CANB).

45b. *Senecio cunninghamii* var. *flindersensis* I.Thomps., *Muelleria* 20: 84 (2004)

T: Lower Flinders Ra., Melrose, S.A., 20 Aug. 1972, *H. Amsberg*; holo: AD.

Illustration: I.R.Thompson, *op. cit.* 71, fig. 1g; 85, fig. 10.

Stem leaves with l:w ratio < 10; mid-branch leaves with l:w ratio 7–15 (–20). Peduncles and capitula mostly patchily woolly at and before anthesis, not glaucous.

Occurs in S.A. from near Hawker in the Flinders Ra. SSE to Clare. Grows in various soils commonly associated with watercourses or in drains or depressions in shrubland, woodland and forest. Flowers mostly summer–autumn.



S.A.: Morchard, *R.J. Bates* 9383 (AD); near Wonaka, *R.J. Bates* 37424 (AD, CANB, MEL); c. 3.2 km W of Quorn, Mar. 1941, *H.M. Cooper* (AD); 42 km ex Yunta, road from Oodla Wirra, *G. Leske* 60 (AD).

46. *Senecio hypoleucus* F.Muell. ex Benth., *Fl. Austral.* 3: 672 (1867)

T: Wimmera, Vic., *Dallachy*; syn: MEL; Mt Lofty, S.A., *Wilhelmi*; syn: K n.v.; Mt Lofty, S.A., *Whittaker*; syn: K n.v.

S. odoratus B *petiolata* Sond., *Linnaea* 25: 526 (1853). T: R. Torrens, S.A., 1849, *F. Mueller*; syn: MEL; Bungle-range [Bugle Ra.], S.A., 23 Nov. 1848, *F. Mueller*; syn: MEL.

Illustration: I.R.Thompson, *Muelleria* 20: 71, fig. 1h; 86, fig. 11 (2004).

Shrubs to c. 1.8 m high, not glaucous, somewhat hairy on stems and leaves. Leaves to c. 14 cm long, with l:w ratio c. 2–6, undivided; base petiole-like for 1–4 cm; margin somewhat crowded-denticulate or dentate; upper surface sparsely appressed-cobwebby, becoming glabrous; lower surface moderately to densely appressed-woolly; venation usually distinct. Capitula numerous per branch; calycular bracteoles 3–6, 1.5–2 mm long; involucre 4–6 mm long, 1.5–2 mm diam.; bracts 7–10, glabrous. Florets 11–14, all tubular. Achenes narrowly obloid, 1.8–2.2 mm long, with papillose hairs in bands. Pappus 4–5 mm long. *n* = 30, M.E.Lawrence, *Austral. J. Bot.* 28: 154 (1980). Fig. 30L.

Occurs in SE S.A. on the Fleurieu Penin. and in western Vic. on Mt Arapiles and Mitre Rock near Natimuk. Occasionally naturalised in New Zealand. Grows in rocky sites, including granite and sandstone outcrops, and in gullies, in forest and woodland. Flowers mostly late spring–summer.

S.A.: between first and second waterfalls, Morialta Gorge, c. 10 km E of Adelaide, *R.Schodde 1035* (AD, CANB). Vic.: Mitre Rock, Mount Arapiles–Toooan Park, *J.E.Tonkin 377* & *J.H.Ross* (MEL).

Relatively common in the Mount Lofty Ra. in S.A. where it hybridises with *S. odoratus* and the introduced *S. pterophorus*.



47. *Senecio odoratus* Hornem., *Hort. Bot. Hafn.* 2: 809 (1815)

Cacalia odorata (Hornem.) Desf., *Cat. Pl. Hort. Paris* 400 (1829). T: Australia, locality unknown, *coll. unknown*; probable syn: MEL. [Presumably a specimen grown in the botanic garden at Copenhagen from achenes sent from England.]

S. odoratus A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 109 (1834), *nom. illeg. non* Hornem. (1815). T: Kangaroo Is., S.A., *A.Lesson*; holo: P n.v.

S. odoratus var. *obtusifolius* J.M.Black, *Trans. & Proc. Roy. Soc. S. Australia* 36: 24 (1912). T: Port Elliot, S.A., *J.M.Black*; holo: AD.

S. odoratus var. *longifolius* M.E.Lawr., *J. Adelaide Bot. Gard.* 7: 289 (1985). T: Ravine des Casoars [on Kangaroo Is.], S.A., 2 Feb. 1948, *J.B.Cleland*; holo: AD; iso: AD.

Illustrations: I.R. Thompson, *Muelleria* 20: 71, fig. 1i; 87, fig. 12 (2004); C.Howells (ed.), *Tasmania's Nat. Fl.* 2nd edn 76 (2012).

Shrubs to c. 1.7 m high, often glaucous, largely glabrous. Leaves to c. 14 cm long, with l:w ratio c. 2–15, mostly undivided; base broad, commonly with well-developed stem-clasping auricles; margin entire, denticulate or dentate, sometimes coarsely so; upper surface glabrous or sparsely to densely hispid; lower surface glabrous, cobwebby, or variably hispid; venation usually distinct. Capitula numerous per branch; calycular bracteoles 3–6, 1–2 mm long; involucre 3.5–6 mm long, 1.5–2 mm diam.; bracts 7–10, glabrous. Florets 10–16, all tubular. Achenes narrowly obloid, 1.6–2.8 mm long, with papillose hairs in bands or scattered. Pappus 4–5 mm long. $n = 30$, M.E.Lawrence, *Austral. J. Bot.* 28: 154 (1980).

Occurs mostly on the coast, from Pearson Is. off the W coast of Eyre Penin., S.A., E to eastern Vic., and in Tas. Grows on rocky slopes, clifftops, or sand dunes in shrubland, woodland and forest. Flowers spring–autumn.

S.A.: c. 2 km NW of Melrose, Mt Remarkable, *I.C.Clarke 2931 et al.* (AD, MEL); Breakneck R. on West Bay Track, Flinders Chase Natl Park, Kangaroo Is., *B.M.Overton 2416* (AD, MEL). Vic.: Childers Cove, Warrnambool area, *M.G.Corrick 7904* (AD, CANB, MEL); Coimadoi Ck area, Long Forest Flora Res., Bacchus Marsh, *V.Stajsic 26* (HO, MEL, NSW, PERTH). Tas.: Penguin Is., Furneaux Group, *J.S.Whinray 8428* (AD, CANB, HO, MEL, NSW).



An aromatic species. It exhibits considerable subtle morphological variation particularly in SE S.A. where it is common. Leaves are usually crowded-denticulate or dentate and the reticulate venation is usually distinct. Common but less consistent features of the leaves include glaucosity and well-developed auricles. Two varieties of *S. odoratus* have been recognised and these represent the extremes for the species in leaf length:width ratio.

The species varies in leaf shape, degree of auricular development, and development of hair on both surfaces, as well as size and glaucosity of the capitula, but there appears to be no consistent pattern. Plants with leaves attenuate basally and moderately woolly on the lower surface are intermediate between the more common forms of *S. odoratus* and *S. hypoleucus* and may represent specimens of hybrid swarms. The capitula of some forms are smaller than usual and are not glaucous; these are reminiscent of capitula of *S. linearifolius* but without the ligulate florets.

Hybridisation with other species of the *Odoratus* group is likely to occur, e.g. in the Flinders Ra., and hybridisation with disciform species, e.g. *S. glomeratus* and *S. minimus*, has also been recorded.

48. *Senecio linearifolius* A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 129 (1834)

T: Tas., *A.Lesson*; holo: P.

[*S. australis* auct. non Willd.: A.Richard in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 257 (1834); A.P.de Candolle, *Prodr.* 6: 374 (1838); G.Bentham, *Fl. Austral.* 3: 669 (1867)]

Subshrubs to c. 2 m high, sometimes glaucous, nearly glabrous or leaves and peduncles sometimes hairy. Leaves to c. 20 cm long, with l:w ratio c. 1.5–40, undivided; base attenuate, or cuneate to cordate, sometimes with basal lobes, mostly hardly stem-clasping; margin entire, denticulate or dentate; upper surface nearly glabrous or sparsely appressed-cottony; lower surface glabrous, cobwebby, sparsely hispid, or woolly; venation variably distinct. Capitula numerous to 100s per stem; calycular bracteoles 2–6, 1.5–3 mm long; involucre 2.5–5.5 mm long, 1.5–3.0 mm diam.; bracts 7–12 (–14), glabrous or slightly cobwebby. Florets 12–30; ligulate florets 4–8 (–9), with ligules 3–8 mm long. Achenes narrowly obloid, 1.3–2.5 mm long, glabrous or with papillose hairs in bands or somewhat scattered. Pappus 4–6 mm long. *n* = 30, M.E.Lawrence, *Austral. J. Bot.* 28: 153 (1980).

Occurs in SE Australia, including Tas., where it occurs in more mesic environments and can be a dominant component of understorey vegetation especially in disturbed sites such as road verges. On the mainland it occurs mostly on and to the coastal side of the Great Dividing Ra., from sea-level to alpine altitudes. Naturalised in New Zealand, but which variety is uncertain. There are 8 varieties.

Senecio linearifolius is a variable species which, despite its radiate capitula, has a close affinity to the discoid species *S. odoratus*. Both species are sometimes glaucous and the nature of the variation in leaf indumentum is similar. Of the radiate species, *S. linearifolius* is probably closest to *S. garlandii*. *Senecio linearifolius* is characterised by small, radiate capitula and relatively large and mostly narrowly to very narrowly elliptic undivided leaves with entire or toothed margins.

- 1 Lower surface of mature leaves woolly, with surface largely to entirely obscured; leaves lacking auricles or auricles present only on uppermost leaves and very small and entire; achenes with papillose hairs
- 2 Hairs of lower surface of leaves entirely fine; florets 16–20 per capitulum **48h. var. *gariwerdensis***
- 2: Hairs of lower surface of leaves basally coarse, multicellular and spreading; florets 20–30 per capitulum **48i. var. *graniticola***
- 1: Lower surface of mature leaves glabrous or slightly to moderately cobwebby, with surface only slightly obscured; leaves often with prominent and/or divided auricles; achenes glabrous or with papillose hairs
- 3 Upper-stem leaves with l:w ratio mostly < 10; involucre 3.5–5.5 mm long; achenes glabrous, or if not then lower surface of leaves strongly glaucous or younger growth moderately woolly/cobwebby
- 4 Plants not glaucous; lower surface of leaves slightly to moderately obscured by mostly cobwebby hairs; new growth ±densely woolly **48e. var. *arachnoideus***
- 4: Plants usually glaucous; lower surface of leaves glabrous or hairs coarse, spreading with cobwebby extensions weakly developed; new growth not woolly
- 5 Leaves mostly dentate, commonly with hairs on lower surface, mildly glaucous or occasionally not glaucous; achenes glabrous **48f. var. *macrodontus***
- 5: Leaves entire to denticulate, glabrous, strongly glaucous; achenes with papillose hairs **48g. var. *dangarensis***
- 3 Upper-stem leaves with l:w ratio various; involucre 2.5–4 (–5) mm long; achenes with papillose hairs
- 6 Plant usually at least slightly glaucous; lower surface of leaves usually with scattered, spreading, rather weak multicellular hairs, becoming glabrous **48d. var. *intermedius***

6: Plant not glaucous; lower surface of leaves glabrous or hairs not as above

7 Margin of stem leaves entire, or with minute callus points; l:w ratio of upper-stem leaves usually > 10

48a. var. *linearifolius*

7: Margin of stem leaves callus-denticulate to dentate; l:w ratio of upper-stem leaves usually < 10

8 Mid- to upper-stem leaves less than 25 mm wide AND with l:w ratio > 4; leaf base attenuate to cuneate, with basal segments barely fused with lamina; margin callus-denticulate or denticulate, with points variably crowded (mostly 1–3 per cm)

48b. var. *denticulatus*

8: Mid- to upper-stem leaves more than 25 mm wide, or if narrower then l:w ratio < 4 and/or with leaf base broadly cuneate, truncate or cordate; basal lobes commonly broadly fused with lamina; margin denticulate to dentate to slightly serrate, with points commonly moderately crowded (c. 3–5 per cm)

48c. var. *latifolius*

48a. *Senecio linearifolius* A.Rich. var. *linearifolius*

S. lessonianus Steud., *Nomencl. Bot.* 2nd edn, 2: 562 (1841), *nom. illeg.* T: none designated.

Illustrations: I.R.Thompson, *Muelleria* 20: 94, fig. 14 (2004); C.Howells (ed.), *Tasmania's Nat. Fl.* 2nd edn 75 (2012).

Plants not glaucous. Upper-stem leaves with l:w ratio mostly 10–30; base (excluding any lobes) narrowly cuneate to attenuate; basal lobes often present, with l:w ratio c. 3–6; margin entire or with minute callus points; lower surface glabrous or slightly or somewhat cobwebby, with venation obscure or secondary veins evident; branch leaves entire. Capitula: peduncle ±glabrous at anthesis; involucre 3–5 mm long; bracts 8–13. Florets 12–22; ligulate florets 4–8. Achenes 1.3–2 mm long, papillose-hairy. Fig. 31H.

Occurs through south-central Vic. to near Moe, disjunctly in far eastern Vic. on the coast, and in Tas. where widespread, with an isolated record from Tanunda in SE S.A. Grows in forest and woodland. Flowers spring-early summer.

S.A.: Tanunda, date unknown, *F.Mueller* (MEL). Vic.: Eynesbury estate, about 8 km S from Melton P.O., *V.Stajic* 603 (MEL, NSW). Tas: South Patriarch Trig, 20 km NE of Whitemark, Flinders Is., *I.Crawford* 1109 (CANB, HO, PERTH); Everalls Point, 3 km N of Cockle Ck, *A.E.Orchard* 5299 (AD, BRI, CANB, HO, MEL, NSW).



A form of this variety with very narrow and sometimes slightly woolly leaves occurs in and around the Brisbane Ra. in south-central Vic. Variety *linearifolius* possibly intergrades with var. *denticulatus* E of Melbourne. In pressed specimens, the margin of leaves of var. *linearifolius* is often revolute, whereas in var. *denticulatus* and var. *latifolius* the margin is usually not revolute.

48b. *Senecio linearifolius* var. *denticulatus* I.Thomps., *Muelleria* 20: 93 (2004)

T: Tali Karng, Gippsland, Vic., 31 Dec. 1963, *T.B.Muir* 2978; holo: MEL.

S. linearifolius var. 2 (Eastern), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 95, fig. 15.

Plants not glaucous. Upper-stem leaves with l:w ratio 4–15, often < 10; base (excluding any lobes) narrowly cuneate to cuneate; basal lobes often present with l:w ratio c. 3–6; margin callus-denticulate to denticulate; lower surface glabrous or somewhat cobwebby, with secondary and often tertiary venation evident; branch leaves with margin entire, callus-denticulate or denticulate. Capitula: peduncle ±glabrous at anthesis; involucre 2.5–4 mm long; bracts 7–11. Florets 12–22; ligulate florets 4–8. Achenes 1.5–1.8 mm long, papillose-hairy.

Occurs from the Dandenong Ra. in south-central Vic. E to Mallacoota in far eastern Vic., in SE N.S.W. as far N as Mt Gingera on the border with the A.C.T., in NE Tas. and on islands in the Furneaux Group to the N, and in SE Tas. Grows mostly in forest.

N.S.W.: 9 km W of Green Cape Lighthouse on Green Cape Rd, Ben Boyd Natl Park, *A.Whalen et al.* 342 (CBG). Vic.: 19 km up the road, Mt Buffalo, 1962, *S.I.Ali* (AD, HO, MEL); Alfred Natl Park, *A.C.Beauglehole* 32078 & *E.W.Finck* (MEL); Horseshoe Rd, at bridge which is c. 2.1 km N of Princes Hwy T.O., Drummer State Forest, *T.J.Christensen* 292 (AD, MEL). Tas.: Lower Marsh Ck, *A.M.Buchanan* 11830 (HO).

Similar to var. *linearifolius* but leaf margins of stem leaves are always at least denticulate, secondary venation of the lower surface is more prominent and tertiary venation is more distinct. The two varieties possibly intergrade in eastern Vic. A specimen from Jigamy Ck near Eden (*T.B.Muir* 2472, MEL, NSW) appears to be intermediate between var. *arachnoideus* and var. *denticulatus*. Also similar to and intergrading with var. *latifolius* q.v., which occurs at higher altitudes.



48c. *Senecio linearifolius* var. *latifolius* I.Thomps., *Muelleria* 20: 96 (2004)

T: Leura Gap, c. 3 km direct NNW of Bimberi Peak, Namadgi Natl Park, A.C.T., 5 Mar. 1996, *A.M.Lyne* 1961 & *D.Mallinson*; holo: CANB; iso: AD, MEL, NSW.

S. linearifolius var. 2 (Montane), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 97, fig. 16.

Plants not glaucous. Upper-stem leaves with l:w ratio 1.5–5 (–6); base broadly cuneate, truncate, or cordate; basal lobes sometimes present; margin denticulate to dentate; lower surface glabrous or nearly so, rarely cobwebby, with secondary and tertiary venation usually evident; branch leaves usually denticulate. Capitula: peduncle \pm glabrous at anthesis; involucre 2.5–4 mm long; bracts 8–11. Florets 12–19; ligulate florets 4 or 5. Achenes 1.5–2 mm long, papillose-hairy. Fig. 31F–G.

Occurs from Powelltown in south-central Vic. ENE to the Brindabella Ra. in the A.C.T. Grows at altitudes over 1000 m in forest and woodland.

N.S.W.: S side of Alpine Way, 11 km SW of Thredbo, *P.Jobson* 447 (MEL, NSW). A.C.T.: Summit area of Mt Gingera, Cotter R. district, *R.D.Hoogland* 8469 (CANB, MEL). Vic.: Blue Range Rd near the crossing at Storm Ck, *M.G.Corrick* 8587 (AD, CANB, MEL); c. 8 km S of Harrietville on the Alpine Hwy, *L.A.Craven* 1555 (CANB, MEL, NSW); Echo Flat, Lake Mtn, 21 km ENE of Marysville, *P.C.Jobson* 1959 (MEL).



Variety *latifolius* is closest to var. *denticulatus* but has broader leaves with more crowded teeth, and is broader at the leaf base.

48d. *Senecio linearifolius* var. *intermedius* I.Thomps., *Muelleria* 20: 98 (2004)

T: Bridle Ck, c. 500 m N of Ballantyne Gap, 4.5 km by road S of Suggan Buggan, 22 km N of Wulgulmerang, Vic., 4 Jan. 1991, *F.A.Zich* 29; holo: CANB; iso: MEL, NSW.

S. linearifolius var. 4 (Suggan Buggan), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 99, fig. 17.

Plants mildly glaucous at least on newer growth, largely glabrous. Upper-stem leaves with l:w ratio 6–30; base (excluding any lobes) attenuate or cuneate; small basal lobes sometimes present; margin entire, denticulate, or sometimes serrate; lower surface usually glaucous, often with scattered coarse-based, spreading hairs, mostly between veins; secondary and sometimes tertiary venation evident; branch leaves entire or denticulate. Capitula: peduncle sometimes slightly cobwebby at anthesis; involucre 3–4 mm long; bracts 8–12. Florets 15–22; ligulate florets 4–6, rarely 8. Achenes 1.6–2.3 mm long, papillose-hairy.

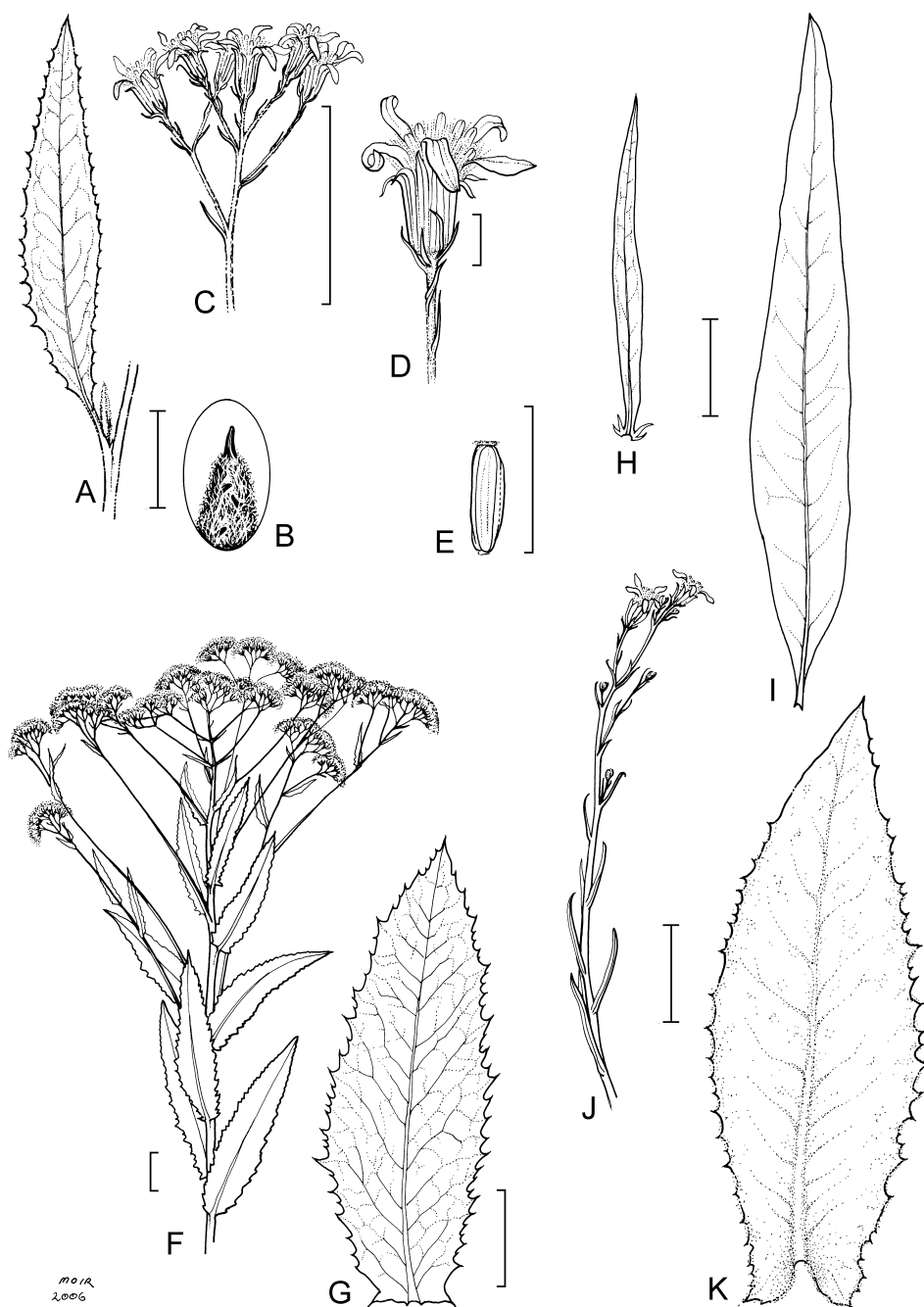


Figure 31. *Senecio*. **A–E**, *S. linearifolius* var. *arachnoideus*. **A**, upper-stem leaf with axillary growth; **B**, leaf tip detail; **C**, cluster of capitula; **D**, capitulum; **E**, achene (**A–D**, L.M.Copeland 3654, MEL; **E**, P.S.Short 4014, MEL). **F**, **G**, *S. linearifolius* var. *latifolius*. **F**, upper stem and inflorescence; **G**, upper-stem leaf (**F**, B.Conn, 24 Jan. 1973, MEL; **G**, M.G.Corrick 7127, MEL). **H**, *S. linearifolius* var. *linearifolius*, upper-stem leaf (G.S.Taylor 1, MEL). **I**, *S. linearifolius* var. *gariwerdensis*, upper-stem leaf (A.C.Beauglehole 8909, MEL). **J**, *S. behrianus*, flowering branchlet (V.Stajsic 3632, MEL). **K**, *S. garlandii*, mid-branch leaf (H.I.Aston 2568, MEL). Scale bars: **A**, **C**, **F–K** = 20 mm; **B**, **D**, **E** = 2 mm. Drawn by M.Moir.

Occurs in SE N.S.W. from L. George S to Bredbo including localities in the A.C.T., and in far NE Vic. around Suggan Buggan and Mt Wheeler. Grows in forest.

N.S.W.: 'Murrunga', 5 km WNW of Mt Michelago, *I.Crawford 3494* (CANB, NSW); E edge of L. George, Jan. 1958, *W.J.M.Streatmens* (CANB, MEL). A.C.T.: Gibraltar, Block 15, 16 Nov. 1972, *H.Flint s.n.* (CBG). Vic.: Suggan Buggan Valley, about 5 km towards Black Mtn, 15 Jan. 1962, *S.I.Ali* (CANB, HO, MEL); Mt Wheeler, c. 10 km E of Wulgulmerang, *A.E.Orchard 2659* (AD, MEL).

This variety has the glaucosity and leaves with coarse, spreading hairs evident in var. *macrodontus*, but has the small capitula and papillose-hairy achenes seen in var. *denticulatus*, var. *latifolius* and var. *linearifolius*.



48e. *Senecio linearifolius* var. *arachnoideus* I.Thomps., *Muelleria* 20: 98 (2004)

T: 10 km E of Nowendoc on Nowendoc–Wingham road, N.S.W., 4 Dec. 1992, *R.H.Holtkamp 14*; holo: MEL; iso: CANB, MEL, NE, NSW.

Illustration: I.R.Thompson, *op. cit.* 20: 101, fig. 19.

Plants not glaucous. Upper-stem leaves with l:w ratio (4.5–) 6–12; base (excluding any lobes) ±attenuate and petiole-like or narrowly cuneate; basal lobes often present; margin mostly denticulate to dentate, with 2–5 teeth per cm; lower surface moderately cobwebby, with hairs sometimes coarse-based, with secondary and tertiary venation evident; branch leaves usually denticulate/serrulate, occasionally entire. Capitula: peduncle often cobwebby at anthesis; involucre 3.5–4.5 mm long; bracts 9–13. Florets 18–25; ligulate florets 5–8. Achenes (1.1–) 1.6–2.5 mm long, glabrous, occasionally papillose-hairy. Fig. 31A–E.

Occurs in eastern N.S.W. from Tenterfield S to Mt Royal and disjunctly further S from Bulli Pass to Green Cape in the far south. Also two records from the coast of Tas. at Mayfield Beach and Tesselated Pavement. Grows in forest.

N.S.W.: Pigeon Top and track, c. 19 km S of Nowendoc, *J.Carrick 3289* (AD, MEL); near summit of Brown Mtn, W side, 24 km E of Nimmitabel on the Bega road, *M.Evans 2594* (AD, CANB, MEL, NSW); c. 9 km from Cathcart along road to Burragate, *P.S.Short 4014* (CANB, MEL, NSW). Tas.: Mayfield Beach, *A.M.Buchanan 8627* (HO).

Similar to var. *denticulatus* but it has glabrous achenes (except at southern limits of range), generally more cobwebby leaves, and slightly larger capitula with more ray florets. The relatively dense indumentum that is evident on newer growth is also diagnostic for this variety. The petiole-like, dentate leaves of var. *arachnoideus* are sometimes reminiscent of leaves of *S. amygdalifolius*, a species with much larger capitula.



48f. *Senecio linearifolius* var. *macrodontus* (DC.) I.Thomps., *Muelleria* 20: 102 (2004)

S. persicifolius A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 123 (1834), *nom. illeg. non* Ramond (1799), as *persicaefolius*; *S. macrodontus* DC., *Prodr.* 6: 373 (1838); *S. australis* var. *macrodontus* (DC.) Benth., *Fl. Austral.* 3: 669 (1867); ?*S. dryadeus* var. *macrodontus* (DC.) Ewart, *Fl. Victoria* 1176 (1931), *nom. inval.* T: Port Jackson, N.S.W., 1828, *A.Lesson*; holo: P.

S. cinerarioides A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 128 (1834), *nom. illeg. non* Kunth (1820); *S. richardianus* DC., *Prodr.* 6: 373 (1838). T: Port Jackson, N.S.W., *C.Gaudichaud-Beaupré 348*; holo: P.

S. dryadeus Spreng., *Syst. Veg.* 3: 562 (1826), *nom. inval. pro syn.* T: probably N.S.W., [1823], *Sieber 337*; syn: MEL.

Illustration: I.R.Thompson, *op. cit.* 20: 103, fig. 20.

Plants glaucous. Upper-stem leaves with l:w ratio 5–8; base (excluding any lobes) attenuate, cuneate, or cordate; basal lobes absent or usually small; margin denticulate to dentate, with 3–5 teeth per cm; lower surface usually sparsely hairy, with hairs coarse-based, spreading, with secondary and tertiary venation usually evident; branch leaves entire or denticulate.

Capitula: peduncle glabrous, rarely cobwebby, at anthesis; involucre 4.5–5 (–5.5) mm long; bracts mostly 9–12. Florets 18–25; ligulate florets mostly 5–8. Achenes 2–2.5 mm long, glabrous.

Occurs in central-eastern N.S.W. from Barrington Tops S to Saddleback Mtn. Grows in basaltic and sandstone-derived loams and sand in dry and wet forest and in woodland.

N.S.W.: Budderoo Natl Park, 1 km at 124° from Budderoo Geodetic Station, *I.Crawford* 938 (CANB, NSW); Mt Darcy, c. 2 km E from summit on The Army Rd, Coricudgy State Forest, *F.E.Davies* 1632 *et al.* (CANB, NSW, PERTH); 287B Kangaroo Valley Rd, Berry, *E.H.Norris* 461 (MEL, NSW).

Similar to var. *arachnoideus* which also has glabrous achenes. The distribution of var. *arachnoideus* is to the N and S of var. *macrodontus*. Variety *macrodontus* differs by having glaucous leaves, stems and peduncles, leaf-bases of upper-stem leaves cuneate to cordate rather than petiole-like to attenuate, newer growth more sparsely hairy, and slightly longer capitula. In the Barrington Tops area plants sometimes have cobwebby as well as glaucous peduncles.



48g. *Senecio linearifolius* var. *dangarensis* Belcher ex I.Thomps., *Muelleria* 20: 104 (2004)

T: Mt Dangar, SE of Gungal, N.S.W., 13 Dec. 1986, *R.O.Belcher* 2678; holo: NSW.

S. sp. C, G.J.Harden in G.J.Harden (ed.), *Fl. New South Wales* 3: 311 (1992).

Illustration: I.R.Thompson, *op. cit.* 105, fig. 21.

Plants glaucous. Upper-stem leaves with l:w ratio 5–8; base cuneate to broadly cuneate, with basal lobes absent or minute; margin entire or denticulate; lower surface glabrous, with secondary and tertiary venation evident; branch leaves ±entire. Capitula: peduncle glabrous, or rarely cobwebby, at anthesis; involucre 3.5–5 mm long; bracts mostly c. 12. Florets 20–31; ligulate florets mostly 7–9. Achenes c. 2 mm long, papillose-hairy.

Occurs only on Mt Dangar, SE of Gungal in central-eastern N.S.W. Collected from a basalt scree on a steep eastern slope.

N.S.W.: E side of Mt Dangar, c. 70 m below summit, Goulburn River Natl Park, *F.E.Davies* 1585 *et al.* (CANB, MEL, PERTH).

This variety is typically the most strongly glaucous of the three glaucous varieties, and unlike var. *macrodontus* and var. *intermedius* the lower surface of its leaves are always glabrous. Differs from var. *macrodontus* also by having papillose achenes and from var. *intermedius* by having much larger capitula with more ray and disc florets.



48h. *Senecio linearifolius* var. *gariwerdensis* I.Thomps., *Muelleria* 20: 104 (2004)

T: ±9 km S of Halls Gap, Glenbowe Ck, Grampians Rd, Grampians, Vic., 12 Dec. 1967, *A.C.Beauglehole* 16404; holo: MEL.

S. linearifolius var. 3 (Grampians), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 106, fig. 22.

Plants not glaucous. Upper-stem leaves with l:w ratio c. 7–12; base petiole-like, attenuate, or cuneate, with basal lobes often absent, otherwise small; margin callus-denticulate or rarely denticulate; lower surface densely appressed-woolly, but with secondary venation usually evident; branch leaves with margin callus-denticulate or entire. Capitula: peduncle glabrous or somewhat cobwebby at anthesis; involucre 3.5–4.5 mm long; bracts mostly 8–10. Florets 13–19; ligulate florets mostly 5. Achenes 2–2.5 mm long, papillose-hairy. Fig. 31 I.

Occurs in the Grampians Ra. in western Vic. from Mt Zero S to Victoria Valley. Grows in forest.

Vic.: 3.8 km N along the Victoria Range Track from its intersection with Sawmill Track, *D.E.Albrecht 3105* (MEL); Mt Zero, Grampians, 24 km SE of Horsham, *H.Streimann 2622* (CANB, NSW, PERTH); Jimmys Ck, at southern foot of Major Mitchell Plateau, Grampians, 8 Dec. 1962, *J.H.Willis* (MEL).

A variety with rather large leaves and a distinctive, dense, appressed wool on the lower surface. The leaf bases lack auricles, or if present they are small and inconspicuous. Leaves of var. *graniticola* have a superficially similar indumentum but the wool overlays and is an extension of coarse hairs evident on close examination. This variety also differs by having smaller leaves and broader capitula with more involucre bracts and florets. The typical variety of *S. linearifolius* has also been recorded from the Grampians but is readily distinguished from var. *gariwerdensis*.



48i. *Senecio linearifolius* var. *graniticola* I.Thomps., *Muelleria* 20: 108 (2004)

T: Teneriffe near Longwood, Vic., 29 Oct. 1989, *R.Thomas 169*; holo: MEL.

S. linearifolius var. 2 (Euroa), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 107, fig. 23.

Plants not glaucous. Upper-stem leaves with l:w ratio c. 8–15; base narrowly cuneate, with basal lobes absent; margin entire or occasionally denticulate; lower surface woolly, with hair-bases coarse, with secondary venation evident or not; branch leaves ±entire. Capitula: peduncle slightly to moderately cobwebby at anthesis; involucre 3–4 mm long; bracts mostly 12–14. Florets 15–24; ligulate florets 5–8. Achenes 1.6–2 mm long, papillose-hairy.

Occurs in the Strathbogie Ra. in NE Vic. Grows in granite-derived soils in woodland.

Vic.: Longwood–Ruffy road, *A.C.Beauglehole 92855* (MEL); Neil Devanny's farm, 10 km magnetic S of Euroa, *R.Thomas 635* (MEL).

Similar to var. *gariwerdensis* and also to *S. garlandii* in terms of lower leaf surface indumentum and in the number of florets per capitulum.



49. *Senecio behrianus* Sond. & F.Muell. in O.Sonder, *Linnaea* 25: 527 (1853)

T: Murray [R.], state unknown, Feb. 1851, *coll. unknown*; syn: MEL; Murray R., 'Wood's Station', S.A., Jan. 1847, ?*F.Mueller*; syn: MEL.

Extensively rhizomatous perennials to c. 0.8 m high, not glaucous, somewhat cobwebby or woolly. Leaves to c. 8 cm long, with l:w ratio c. 15–30, undivided; base attenuate; margin entire or denticulate; upper surface appressed-cobwebby, becoming glabrous; lower surface usually appressed-cobwebby; venation generally indistinct. Capitula few per stem; calycular bracteoles 3–6, 2–3 mm long; involucre 4–5 mm long, c. 2 mm diam.; bracts 11–13, appressed-woolly. Florets 15–22; ligulate florets usually 5 or 6; ligule 3.5–5 mm long. Achenes obloid-ellipsoid, 2.5–3 mm long, with papillose hairs in bands. Pappus c. 7 mm long. *Stiff Groundsel*. Fig. 31J.

Currently known from Corop and Ballarat in Vic. and Wanganella in south-central N.S.W., with old records from SE S.A. and western Vic., Grows in heavy soils in low-lying areas. Flowers summer–winter.

S.A.: near Moorundi, *F.Mueller* (MEL). N.S.W.: Clarkes Ck, Wanganella, *W.E.Mulham 1454* (CANB). Vic.: 12 km E along the Midland Hwy from Corop, 2.5 km S of this point on Gilmour Rd reserve, *D.E.Albrecht 4754* (MEL); Myall, *A.C.F.Gates* (MEL).

Listed as Endangered under the *Environment Protection and Biodiversity Conservation Act* 1999.



There have been only 3 collections of this species in the past 80 years. Readily recognised by the extensively rhizomatous habit, narrowly linear leaves, and small, radiate capitula with a tomentose involucre. Although stem leaves can be up to 8 cm long, branch leaves are typically 0.5–2 cm long.

50. *Senecio garlandii* F.Muell. ex Belcher, *Muelleria* 6: 173 (1986)

T: Wagga Wagga, N.S.W., 1890, *J.R. Garland*; holo: MEL; iso: MEL.

S. dryadeus var. *garlandii* F.Muell. ex Maiden & Betche, *Census New South Wales Pl.* 205 (1916), *nom. inval.*, as *Garlandi*.

S. sp. A ('*garlandii*' of F.Muell.), M.E. Lawrence, *Austral. J. Bot.* 28: 153 (1980).

S. sp. J (aff. *hypoleucus*), S.W.L. Jacobs & J. Pickard, *Pl. New South Wales* 86 (1981).

Perennials to c. 1.5 m high, not glaucous, appressed-cottony on stems and leaves. Leaves to c. 20 cm long, with l:w ratio c. 2–3, undivided; base broad, with auricles variably developed, mildly stem-clasping; margin denticulate; upper surface sparsely appressed-cobwebby, becoming glabrous; lower surface densely woolly, with secondary venation distinct. Capitula numerous per stem; calycular bracteoles 3–6, 2–3 mm long; involucre 4.5–5.5 mm long, 2–3 mm diam.; bracts 12–14, glabrous. Florets 28–38; ligulate florets 8, with ligule 5–7 mm long. Achenes narrowly obloid, c. 2 mm long, with papillose hairs \pm scattered. Pappus 4–5 mm long. $2n = 60$ or 120, M.E. Lawrence, *loc. cit.*, as *S. sp. A* ('*garlandii*' of F.Muell.). Fig. 31K.

Occurs in south-central N.S.W. from near Temora S to Albury and in NE Vic. at Chiltern and Mt Buffalo. Grows in rocky, sheltered sites in woodland and forest. Flowers mostly late winter–summer, also autumn.

N.S.W.: The Rock Hill Nat. Res., c. 30 km SW of Wagga Wagga, *H.I. Aston* 2568 (AD, MEL, NSW); 'Big Bush', Gidginbung, June 1975, *D. Schlunke* (NSW). Vic.: c. 1.5 km S of junction of Yackandandah Rd and Ballarat Rd, Chiltern Regional Park, c. 4.5 km E of Chiltern, *E. Collins* 1 (MEL); near foot of Mt Buffalo, *C.J. Shepard* 206 (CANB).



Allied to *S. linearifolius*, particularly to var. *graniticola*, but with larger capitula and leaves broader and stem-clasping at base. Also resembles the discoid species *S. hypoleucus* but leaves of *S. garlandii* are cordate-based and stem-clasping rather than petiole-like.

3. *Ramosissimus* Group

Erect, gynodioecious, perennial herbs, not rhizomatous, not glaucous. Coarse spreading hairs absent or inconspicuous; fine hairs sometimes present, sometimes conspicuous. Leaves generally thin. Capitula discoid (all florets female with concealed staminodes or, on different plants, all florets hermaphrodite) or capitula radiate, calyculate, with bracteoles 1–2 mm long, 0.2 mm wide, \pm parallel-sided, with hyaline margin absent or obscure; involucre 1.2–2.5 mm diam.; bracts 7–14, free; stereome nearly flat or convex, glabrous, with resin ducts inconspicuous, pale. Florets 9–25, all tubular and uniform in size and either bisexual or female (with staminodes present), or 1–3 ligulate, female; ligule white or pink; disc florets with corolla limb equal to tube, diameter at base of lobes 0.5–1 mm (bisexual), or c. 0.3–0.5 mm (female). Achenes homomorphic, \pm obloid, 1–2 mm long, with ribs \pm flat, with short papillose hairs (l:w ratio c. 2–3); carpopodium $1/3$ – $1/2$ diam. of body. Pappus caducous; bristles nearly smooth.

A group of 4 species endemic to SW W.A. Unique among Australian species of *Senecio* in being gynodioecious. The florets of female plants have 5 staminodes which generally do not exceed the corolla and the corolla has a less dilated limb than in bisexual plants. *Senecio gilbertii* and *S. barkhausioides* are both poorly known and there have been no recent collections of these species. Further investigation into this group is desirable.

- 1 Capitula radiate, with 1–3 small pink or white ligules **51. *S. leucoglossus***
- 1: Capitula discoid
- 2 Plants ±glabrous; leaves undivided, with margin crowded-denticulate; inflorescence narrowly pyramidal (lateral capitula/clusters terminating well below medial capitulum/cluster) **53. *S. ramosissimus***
- 2: Plants conspicuously hairy on stems and/or leaves; leaves divided or not, with margin not crowded-denticulate; inflorescence not narrowly pyramidal
- 3 Leaves pinnatisect; lower surface of leaves appressed-woolly; capitula 4–5 mm long; involucre bracts not recurved **52. *S. gilbertii***
- 3: Leaves undivided or lobate; lower surface of leaves glabrous or with coarse hairs on veins; capitula c. 7 mm long; involucre bracts strongly recurved **54. *S. barkhausioides***

51. *Senecio leucoglossus* F.Muell., *Fragm.* 2: 15 (1860)

T: Harvey and Murray R. region, W.A., *A. Oldfield*; possible iso: MEL.

Herbs to c. 1 m high, ±glabrous. Leaves to c. 10 cm long, with l:w ratio c. 2–3, coarsely dentate to pinnatisect, with 2–5 projections per side; base with well-developed auricles. Capitula several to many per stem; calycular bracteoles 2–4, 1 mm long; involucre c. 3.5 mm long, 1.2–1.5 mm diam.; bracts 7–9. Florets 9–13; ligulate florets 1–3, with ligules 4 mm long, white, sometimes tinged pink. Achenes 1.5 mm long, with papillose hairs in bands. Pappus c. 3 mm long. Fig. 32A–D.

Occurs in SW W.A., from Perth S to Donnelly R. Grows in red-brown gravelly clay and sandy clay in forest. Flowers late winter–spring.

W.A.: Serpentine, 24 Sept. 1899, *coll. unknown* (AD, BRI, CANB, HO, MEL, NSW, PERTH); track off Sandalwood Rd towards Mornington Mills, SE of Harvey, *T.R. Lally 1502 & B. Fuhrer* (CANB, PERTH).

Readily distinguished by its small capitula with a few white or pink-tinged ligules. The lower leaves are distinctive in being entire and narrow proximally before broadening abruptly. The broad portion of the lamina is about as long as broad. A few old specimens from the Perth area are more robust and leaf shape is slightly atypical; further collections of this form are desirable.



52. *Senecio gilbertii* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 24(1): 208 (1851), as *gilberti*

T: Locality unknown [W.A.], *Gilbert 289*; n.v.

Herbs to c. 1 m high. Stems transiently woolly. Leaves to c. 10 cm long, with l:w ratio c. 1.5–3, pinnatisect, with 2–5 oblong to obovate segments per side; base with well-developed auricles; margin scattered-denticulate; upper surface glabrous or sparsely hispid; lower surface somewhat densely appressed-cobwebby or woolly. Capitula numerous per stem; calycular bracteoles 3–6, 1.5–2 mm long; involucre 4–5 mm long, c. 1.5 mm diam.; bracts 12–14. Florets 20–25, all tubular. Achenes narrowly obloid, c. 2 mm long, with papillose hairs in broad bands. Pappus 5 mm long.

Occurs in the Darling Ra. of SW W.A. Habitat unknown. Flowers mostly winter–spring.

W.A.: Wooroloo, Sept. 1907, *M. Koch s.n.* (PERTH); Darling Ra., *M. Koch 1692* (MEL).

There have been no recent records of this species. The deeply pinnatisect leaves with very acute teeth and a ±dense indumentum on the lower surface are diagnostic.



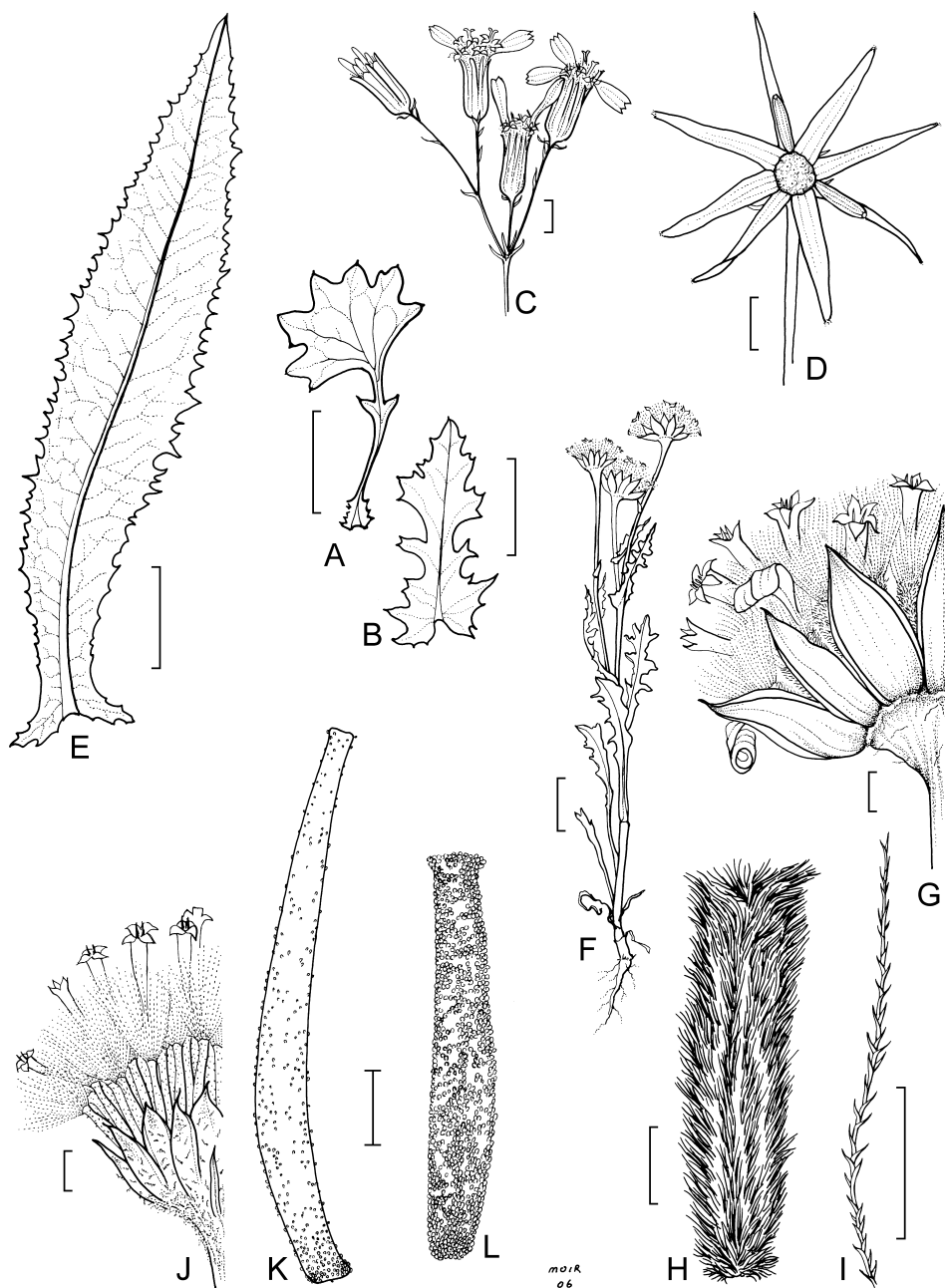


Figure 32. *Senecio*. A–D, *S. leucoglossus*. A, lower-stem leaf; B, upper-stem leaf; C, cluster of capitula; D, post-mature receptacle and involucre bracts with 2 achenes still attached (A–C, MEL2037997; D, K.Logue, 1889, MEL). E, *S. ramosissimus*, mid-stem leaf (A.Oldfield, MEL2168933). F–I, *S. platylepis*. F, habit; G, half-capitulum at flowering; H, achene; I, proximal portion of pappus bristle (F, G, J.H.Browne 271, MEL, H, I, J.H.Browne 164, MEL). J, K, *S. tuberculatus*. J, half-capitulum at fruiting; K, achene (J, K, P.S.Short 3569, MEL). L, *S. murrayanus*, achene (F.Mueller, MEL2167777). Scale bars: A, B, E, F = 20 mm; C, D, G, J = 2 mm; H, I, K, L = 1 mm. Drawn by M.Moir.

53. *Senecio ramosissimus* DC., *Prodr.* 6: 371 (1838)

T: Bald-Head hill, King George Sound, W.A., 1822, *A. Cunningham s.n.*; holo: G, microfiche seen.

S. cygnorum Steetz in J.G.C. Lehmann, *Pl. Preiss* 1: 483 (1845). T: Swan R., near Fremantle, W.A., 1843, *J.A.L. Preiss* 70; holo: MEL; iso: MEL.

Herbs to c. 1.5 m high, glabrous. Leaves to c. 17 cm long, with l:w ratio c. 3–6, undivided; base of upper-stem leaves with well-developed auricles, or truncate to sagittate; margin denticulate. Capitula numerous to 100s per stem; calycular bracteoles 2–4, c. 1 mm long; involucre 3–4.5 mm long, c. 2 mm diam., glabrous; bracts 9–13. Florets 15–20, all tubular. Achenes obloid, 1–1.5 mm long, with papillose hairs somewhat scattered. Pappus 3–4 mm long. Fig. 32E.

Occurs between Yanchep and Fitzgerald River Natl Park, SW W.A. Grows in sand and gravelly loam over limestone or granite, in coastal swamps, heathland, woodland and forest. Flowers spring–summer.

W.A.: Small un-named lake/swamp 0.5 km N of Ledge Point, *A.E. Orchard* 5931 (HO, MEL, PERTH).

The inflorescences of *S. ramosissimus* are unusual for *Senecio* in Australia in being pyramidal, i.e. with lateral clusters of capitula not reaching to the medial capitula.



54. *Senecio barkhausioides* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 24(2): 86 (1851)

T: 'Nova Hollandia' [Swan River Colony, W.A.], *J. Drummond* V, 378; iso: PERTH.

Herbs to c. 0.6 m high, with stems densely hispid basally. Leaves to c. 15 cm long, with l:w ratio c. 20–40, undivided or lobate, with 1–4 ±triangular lobes per side; base without auricles; margin entire or with a few teeth; upper surface hispid or sometimes upper-stem leaves glabrous; lower surface glabrous or with coarse hairs on midrib and major veins. Capitula several per stem; calycular bracteoles 6–8, 2–3 mm long; involucre c. 7 mm long, c. 2.5 mm diam.; bracts 12–14. Florets numerous, all tubular. Achenes narrowly obloid, c. 2.5 mm long, with papillose hairs in bands. Pappus 6–7 mm long.

Occurs in SW W.A. Ecological preferences unknown. Flowering time unknown.

W.A.: Parkers Ra., 1890, *E. Merrill* (MEL).

Not collected since the 1800s. A poorly known species that on the limited material available belongs to the *Ramosissimus* group. Resembles species in the disciform group such as *S. oldfieldii* and *S. longipilus* in terms of leaf and stem indumentum, and *S. interpositus* and *S. georgianus*, two other species of the disciform group, in terms of its involucre bracts which have a fleshy stereome and strongly recurved apex.



4. Magnificus Group

Erect, annual or perennial herbs or shrubs, not rhizomatous, often glaucous. Coarse spreading hairs sometimes present, generally not conspicuous; fine hairs ±absent. Leaves mostly somewhat fleshy. Capitula radiate, 1–several, or sometimes numerous, ecalyculate, or calyculate, with bracteoles lanceolate, 1–5 mm long, 0.2–0.5 mm wide at mid-point, with hyaline margin absent or obscure; involucre 3–10 mm diam.; bracts 12–22, free or occasionally fused; stereome flat, glabrous except in *S. tuberculatus*, with resin ducts fine, pale. Florets mostly numerous, rarely 20–30; ligulate florets (4–) 6–12 (–16), rarely sterile, with ligule yellow; disc florets with corolla limb shorter than, equal to, or longer than tube, c. 1 mm diam. at base of lobes. Achenes homomorphic, obloid or bottle-shaped, 2–10 mm

long, with ribs present or not, sometimes much raised, with papillose hairs (l:w ratio 4–20) or granular papillae; carpopodium $\frac{1}{3}$ – $\frac{1}{2}$ diam. of body. Pappus persistent, or caducous in *S. velleioides*; bristles scabridulous, or barbellate (mainly in proximal $\frac{1}{2}$), or rarely prominently barbellate.

A group of 10 endemic species, widespread in southern and central Australia, particularly in arid or semi-arid environments. The peduncles in members of this group are often markedly dilated distally, a character not seen in other Australian species.

- 1 Leaves linear, with margin entire; calycular bracteoles absent; all or most involucre bracts ±seamlessly fused to adjacent bracts for more than half their length at anthesis (splitting later into 3 or 4 sections); pappus to 30 mm long
- 2 Ligulate florets 7–11; achenes c. $\frac{1}{2}$ of length of involucre bracts; achenes 4–8.5 mm long, with papillose hairs c. 0.6–1.0 mm long; pappus 10–30 mm long at maturity **58. *S. gregorii***
- 2: Ligulate florets 5 (–7); achenes $\frac{2}{3}$ – $\frac{3}{4}$ of length of involucre bracts; achenes 5–10 mm long, with papillose hairs c. 0.3 mm long; pappus 5–17 mm long at maturity **59. *S. conferruminatus***
- 1: Leaves not as above; calycular bracteoles present or not; all involucre bracts free or fusion less complete than above at anthesis; pappus < 12 mm long
- 3 Annuals; leaves not divided, to 4 cm long; involucre bracts fused in groups **60. *S. gypsicola***
- 3: Annuals, perennials or shrubs; leaves divided or not, to 12 cm long; involucre bracts usually all free
- 4 Annuals, perennials or shrubs to 1.8 m high, usually slightly to strongly glaucous; outermost tubular florets 5–9 mm long; achenes not bottle-shaped
- 5 Inflorescences of 1–5 capitula; involucre bracts 10–15 mm long; ligules 12–20-veined; achenes 5–7.5 mm long **61. *S. megaglossus***
- 5: Inflorescences of 3–30 capitula; involucre bracts 5–11 mm long; ligules 4–13-veined; achenes 2–6 mm long
- 6 Calycular bracteoles 3–6; achenes 4–5 mm long, with pairs of ribs forming prominent ridges, long hairs arising only from grooves along summit of ridges; pappus persistent **63. *S. pilosicristus***
- 6: Calycular bracteoles 0–4; achenes not with ridges and indumentum as above, or if so then achene < 4 mm long and pappus caducous
- 7 Leaves hardly stem-clasping; inflorescences commonly with less than 20 capitula; achenes 3–7 mm long, not indumented and ridged as above; pappus persistent, > 6 mm long **62. *S. magnificus***
- 7: Leaves strongly stem-clasping; inflorescences commonly with more than 20 capitula; achenes 2–4 mm long, with hairs confined to grooves along summit of ridges; pappus caducous, c. 5 mm long **64. *S. velleioides***
- 4: Annuals to 0.5 m high, not glaucous; outermost tubular florets 4–6 mm long; achenes bottle-shaped or not
- 8 Leaf segments lobate, with lobes moderately crowded; leaves often with scattered long, somewhat caducous hairs; achenes not tapered distally, densely hairy, with hairs long **55. *S. platylepis***
- 8: Leaf segments entire or lobes well-spaced; leaves usually glabrous or nearly so; achenes bottle-shaped, with granular papillae
- 9 Leaves lobate to pinnatisect, with segment axes to 40 mm long; involucre bracts with a few coarse hairs; achenes with sparse to moderately dense often translucent papillae, often sparser on neck **56. *S. tuberculatus***
- 9: Leaves dentate to deeply lobate, with segment axes to 15 mm long; involucre bracts glabrous; achenes largely covered throughout by whitish papillae **57. *S. murrayanus***

55. *Senecio platylepis* DC., *Prodr.* 6: 371 (1838)

T: Peel's Ra. [Cocoparra Ra.], N.S.W., 1817, *A. Cunningham*; holo: G n.v.; iso: K, photo MEL.

Illustrations: N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 4: 946, fig. 193d (1999); I.R. Thompson, *Muelleria* 20: 114, fig. 1j (2004).

Annuals to c. 0.3 m high, not glaucous, usually with scattered coarse hairs. Leaves to c. 12 cm long, with l:w ratio c. 2–4, lobate to pinnatisect, with 2–4 segments per side, and segments often themselves lobed; base becoming auriculate upwards; margin with scattered teeth. Capitula few to several per stem; calycular bracteoles 3–6, 2–5 mm long; involucre c. 6–10 mm long, 7–10 mm diam.; bracts 12–20. Florets numerous; ligulate florets 8–16, functionally sterile; ligule 6–15 mm long, 4 (–8)-veined; disc florets with corolla limb c. as long as tube. Achenes narrowly obloid, 4–6 mm long, prominently ribbed, but surface obscured by hairs; l:w ratio of hairs c. 10. Pappus 5–8 mm long; bristles barbellate proximally, with length of projections c. 2–3 times diam. of bristle. Fig. 32F–I.

Occurs in western N.S.W. and far NW Vic., from the Bourke area S to Pink Lakes in Vic. Grows in red sandy-loam or in clay in interdune flats or adjacent to ephemeral water in saltbush shrubland. Flowers mostly winter–spring.

N.S.W.: Yara via Condobolin, Yara Res., SW corner just outside fence, *K. Horne ANU4242* (CANB). Vic.: Birthday Tank c. 6 km NW of Mt Crozier, c. 90 km NW of Ouyen, 2 Aug. 1968, *J.H. Willis* (MEL).

A species that occurs only in favourable years when it can form extensive colonies. Involucral bracts are relatively broad and flat and achenes are unusual in having reddish glandular material covering the surface. This glandular material is overtopped and largely obscured by a dense indumentum of relatively long, white hairs.



56. *Senecio tuberculatus* Ali, *Kew Bull.* 19: 423 (1965)

T: S of Tara, Bullock Head Creek Rd, Qld, 28 Aug. 1958, *R.W. Johnson* 538; holo: BRI; iso: NSW.

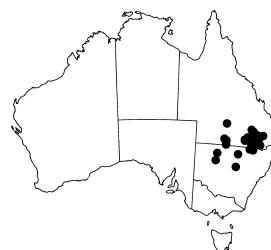
Illustrations: S.I. Ali, *op. cit.* 424, fig. 1; I.R. Thompson, *Muelleria* 20: 114, fig. 1i; 127, fig. 8 (2004).

Annuals to c. 0.5 m high, not glaucous, largely glabrous. Leaves to 15 cm long, with l:w ratio 1.5–3, pinnatisect with 2–4 segments per side, or bipinnatisect; base without auricles; margin with occasional teeth. Capitula several per stem; calycular bracteoles 2–6, 1–3 mm long; involucre (3–) 4–6 mm long, 6–10 mm diam.; bracts 14–22, with scattered coarse hairs. Florets numerous; ligulate florets 8–12; ligule 5–10 mm long, 4- or 5-veined; disc florets with corolla limb as long as tube. Achenes bottle-shaped, 4–7 mm long, orange-brown, without ribs, with scattered to moderately dense papillae, sparser distally; l:w ratio of papillae 1–1.5. Pappus 4–5 mm long; bristles scabridulous, with length of projections less than diam. of bristle. Fig. 32J–K.

Occurs from Charleville in south-central Qld S to Nevertire in central N.S.W., and ESE to Inglewood in SE Qld. Grows in sandy loam, loam and heavy grey clays in grassland, herb-field and Brigalow or Casuarina woodland. Flowers winter–spring.

Qld: 10 km W of Condamine R. on Moonie Hwy, 16 km SW of Dalby, *J. Gillieatt* 192 (BRI); 7 km N of Barrington along main road to Cunnamulla, *P.S. Short* 3569 (BRI, MEL). N.S.W.: Mt Mulyah, c. 80 km NW of Louth, *C.W.E. Moore* 7879 (CANB).

Similar to the more southerly-distributed *S. murrayanus* but differing by having leaves more deeply dissected, involucral bracts shorter and bearing scattered coarse hairs at anthesis, and achenes more sparsely covered, especially on the neck, by smaller, differently shaped, translucent granular papillae.



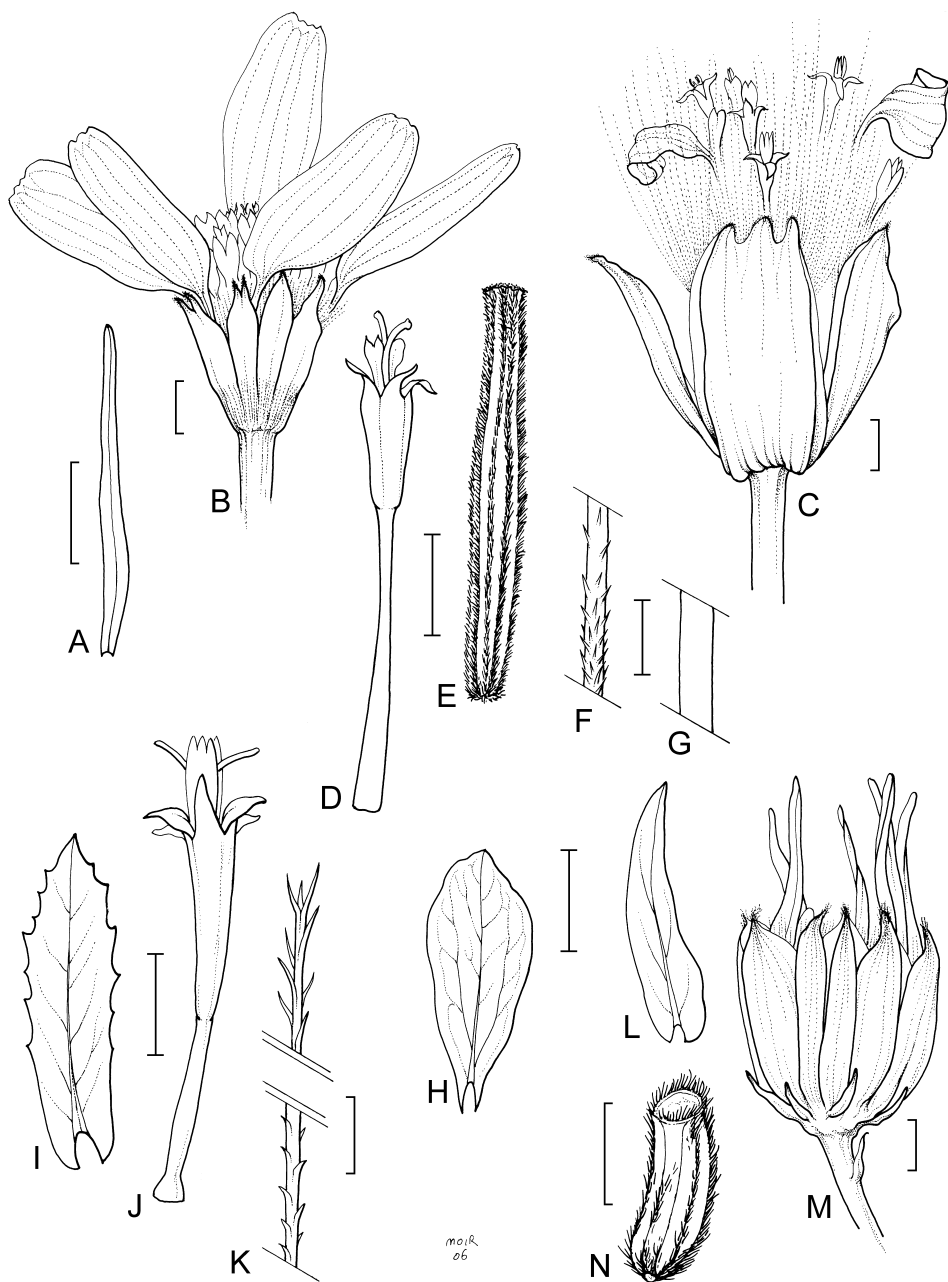


Figure 33. *Senecio*. A–F, *S. conferruminatus*. A, mid- to upper-stem leaf; B, capitulum; C, upper portion of involucre showing splitting; D, disc floret corolla; E, achene; F, lower portion of pappus bristle (A, D–F, P.S.Short 2517, MEL; B, C.Crossland, 1884, MEL; C, I.Tyson 57, MEL). G, *S. gregorii*, lower portion of pappus bristle (A.C.Beauglehole 27760, MEL). H, *S. gypsicola*, mid- to upper-stem leaf (D.E.Symon 15699, MEL). I–K, *S. magnificus*. I, mid- to upper-branch leaf; J, disc floret corolla; K, lower and apical portions of pappus bristle (I–K, M.E.Lawrence 802, MEL). L–N, *S. pilosicristus*. L, mid- to upper-stem leaf; M, capitulum; N, achene (L, A.C.Beauglehole 24907, MEL; M, M.G.Corrick 6255, MEL; N, P.D.Cheal, 9 Oct. 1978, MEL). Scale bars: A, H, I, L = 20 mm; B–E, J, M, N = 2 mm; F, G, K = 0.5 mm. Drawn by M.Moir.

57. *Senecio murrayanus* Wawra in H.R.von F.Wawra & G.R.von M.Beck, *Itin. Princ. S. Coburgi* 2: 48 (1888), as *murrayana*

T: Murray R., Vic., date unknown, *Dr Wawra* 427; holo: W n.v., *fide* R.O.Belcher, *Muelleria* 6: 176 (1986); probable iso: MEL.

Illustrations: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 952, fig. 194e (1999); I.R.Thompson, *Muelleria* 20: 114, fig. 1h (2004).

Annuals to c. 0.5 m high, not glaucous, glabrous. Leaves to 10 cm long, with l:w ratio c. 7–12, undivided or lobate, with 1–3 lobes per side; base attenuate, without auricles; margin entire. Capitula several to numerous per stem; calycular bracteoles 2–4, 2–5 mm long; involucre 4–7 mm long, 6–10 mm diam.; bracts 14–22. Florets numerous; ligulate florets c. 8; ligule 5–10 mm long, 4-veined; disc florets with corolla limb c. as long as tube. Achenes narrowly bottle-shaped, 5–7 mm long, not ribbed, with ellipsoid granules crowded throughout. Pappus 4–7 mm long; bristles scabridulous proximally, with length of projections \pm equal to diam. of bristle. Fig. 32L.

Occurs from Trangie in central N.S.W. SSW to Pine Plains in NW Vic. Habitat preferences unknown, probably on clay or loam soils. Flowers mostly winter–spring.

N.S.W.: Trangie, 27 Oct. 1942, *L.R.Clark* (CANB); 48 km NW of Balranald, *J.H.Leigh W311* (NSW). Vic.: Kerang, Oct. 1887, *J.Minchin* (MEL).

A rare species for which there are no recent records and which, although described in 1888, was not recognised in Australia until 1986. The unusual ellipsoid to obovoid granular papillae covering the surface of the achenes have a longitudinal furrow. When water is applied, hair-like structures are released and the water is absorbed to produce large amounts of mucus. This phenomenon, which also occurs in other species, is discussed by R.O.Belcher, *Muelleria* 6: 176 (1986) and M.E.Lawrence, *Austral. J. Bot.* 28: 151–165 (1985).



58. *Senecio gregorii* F.Muell., *New South Wales Parliamentary Pap., Votes & Proc. Legislative Assembly* 2: 7 (1859)

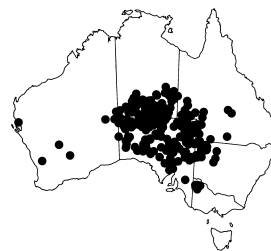
Othonna gregorii (F.Muell.) C.Jeffrey, *Kew Bull.* 41: 876 (1986). T: Coopers R. [Coopers Ck], S.A., *A.C.Gregory*; holo: MEL.

Illustrations: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 946, fig. 193a (1999); I.R.Thompson, *Muelleria* 20: 114, fig. 1a; 116, fig. 3 (2004).

Annuals to c. 0.5 m high, glaucous, glabrous. Leaves to 10 cm long, with l:w ratio c. 15–20, undivided; base attenuate, without auricles; margin entire. Capitula 1 or few per stem, ecalyculate; involucre 8–16 mm long, c. 5–9 mm diam., with secondary capitula often much smaller; bracts c. 13, all or mostly fused except at apices, finally split into 3 or 4 sections. Florets numerous; ligulate florets 7–11; ligule 12–20 mm long, 4–6-veined; disc florets with corolla limb much shorter than tube. Achenes obloid, 4–7 mm long, ribbed, with papillose hairs obscuring much of surface; l:w ratio of hairs c. 20; ray achenes sometimes underdeveloped. Pappus persistent, 10–30 mm long; bristles smooth, rather stout proximally. $n = 20$, M.E.Lawrence, *Austral. J. Bot.* 28: 153 (1980). *Fleshy Groundsel*. Fig. 33G.

Occurs from Carnarvon, W.A. through southern N.T. E to Blackall in central Qld, and S to the Whyalla area, S.A., western N.S.W. and as far S as the Big Desert area in NW Vic. Grows in various soils in river beds, plains, dunes and saline swamp margins, in herbfield, shrubland and woodland. Flowers most of year.

W.A.: c. 56 km W of Docker R. on road to Giles Weather Station, 11 Aug. 1986, *K.Menkhorst s.n.* (MEL, PERTH). N.T.: c. 16 km WNW of Santa Teresa Mission, *M.Lazarides* 5732 (CANB, DNA). S.A.: E side of road, 75 km N of Glendampo on Stuart Hwy, *J.R.Shelley* 27 & *R.McCullough* (AD, CANB, MEL, PERTH). Qld: on Birdsville Rd, 5 km W of Betoota, *K.A.Williams* 78171 (AD, BRI). N.S.W.: 8.5 km SE of Fort Grey campsite



turnoff en route to Tibooburra in Sturt Natl Park, *R.G.Coveny 13498 et al.* (AD, BRI, CANB, MEL, NSW). Vic.: 400 m S of Meridian Gate, Wyperfeld Natl Park, 24 Aug. 1983, *D.C.Cheal* (MEL).

An unusual species with several apparently unique features, although it is similar to several other radiate Australian taxa of arid or semiarid regions. Also superficially similar to members of the southern African genus *Othonna*, in which it was placed in 1986. Closest affinity is with *S. conferruminatus* based on involucre morphology. It possibly also has affinity to *S. gypsicola* based on fusion of involucral bracts, and to *S. platylepis* based on achene morphology. Readily recognised by the involucre of fused bracts, the absence of calycular bracteoles, the large achenes with an indumentum of long hairs, and the very long, basally-stout pappus bristles. Style branches are long and their apex has a crown of rather long clear narrowly triangular papillae. Capitulum size varies considerably on individuals with later-developing capitula often much smaller. This feature also occurs in *S. conferruminatus*.

Another similarity between *S. gregorii* and *S. conferruminatus*, which distinguishes them from the other members of the Magnificus group, is the morphology of the corolla of the disc florets. The limb is markedly shorter than the tube and the balusterform (flared) base of the tube is elongate. In contrast, the base is not elongate in other species, the limb in *S. magnificus* and *S. megaglossus* is longer than the tube, and in most other species it is c. as long as the tube. *Senecio gypsicola* is an exception in that the limb in this species is commonly slightly shorter than the tube.

59. *Senecio conferruminatus* I.Thomps., *Muelleria* 20: 117 (2004)

T: 13 miles [c. 21 km] E of 550 mile peg, North West Hwy, W.A., 3 July 1970, *T.E.H.Aplin 3220*; holo: PERTH.

Illustration: I.R.Thompson, *op. cit.* 114, fig. 1b; 118, fig. 4.

Annuals to c. 0.4 m high, glaucous, glabrous. Leaves to 10 cm long, with l:w ratio c. 15–30, undivided; base attenuate, without auricles; margin entire. Capitula few to several per stem, ecalyculate; involucre 7–15 mm long, c. 3–4 mm diam., with secondary capitula often much smaller; bracts c. 13, mostly fused except for apices, finally splitting into 3 or 4 sections. Florets 20–35; ligulate florets 5 (–7); ligule 8–15 mm long, 4–6-veined; disc florets with corolla limb much shorter than tube. Achenes slightly and very narrowly bottle-shaped, 5–10 mm long, ribbed, with papillose hairs in broad bands; l:w ratio of hairs c. 6. Pappus persistent, 5–12 mm long; bristles nearly smooth proximally. *n* = 20, *B.L.Turner 5371* (MEL). Fig. 33A–F.

Occurs in W.A. from the Gascoyne R. near Carnarvon S to the Murchison R. Grows in various soils in river beds, plains, dunes and saline swamp margins, in herbfield, shrubland and woodland. Flowers late winter–spring.

W.A.: 16 km W of Gascoyne Junction, *P.S.Short 2517 et al.* (AD, MEL, PERTH); c. 250 km N of Mullewa, *B.L.Turner 5371* (MEL).

This species is very similar to *S. gregorii* in terms of the texture and nature of the fusion of involucral bracts, but the capitula of *S. conferruminatus* are generally more numerous, smaller and with fewer florets. Furthermore, ligulate florets are fewer, and achenes are longer relative to the length of the involucre (c. $\frac{2}{5}$ – $\frac{3}{4}$ of length compared to c. $\frac{1}{2}$ of length in *S. gregorii*), achene hairs are much shorter, and the pappus bristles are generally shorter and less robust. The narrowly bottle-shaped achenes are reminiscent of *S. tuberculatus* and *S. murrayanus* but those of the latter two species are clothed in papillae rather than hairs.



60. *Senecio gypsicola* (R.J.Bates) I.Thomps., *Muelleria* 20: 117 (2004)

Othonna gypsicola R.J.Bates, *J. Adelaide Bot. Gard.* 15: 149 (1993). T: Gypseous clay mounds between Copper Hills and Arckaringa, S.A., 8 July 1989, *R.Bates 19171*; holo: AD; iso: NSW, PERTH.

Illustrations: R.J.Bates, *op. cit.* 150, fig. 1; I.R.Thompson, *op. cit.* 114, fig. 1c.

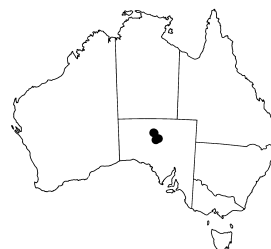
Annuals to c. 0.3 m high, often glaucous, glabrous. Leaves to 4 cm long, with l:w ratio 3–4, undivided; base attenuate to cuneate, without auricles; margin entire. Capitula 1 or few per

stem, ecalyculate; involucre 6–9 mm long, 2–4 mm diam.; bracts 12–14, with some fused to form narrow or broad sections, with sections sometimes fused basally. Florets numerous; ligulate florets 8–10; ligule 10–15 mm long, 4–10-veined; disc florets with corolla limb slightly shorter than or as long as tube. Achenes narrowly obloid, 5–8 mm long, with papillose hairs in bands; l:w ratio of hairs c. 4. Pappus persistent, 5–6 mm long; bristles scabridulous, with length of projections \pm equal to diameter of bristle. Fig. 33H.

Occurs in north-central S.A. in the Coober Pedy area and at Arkaringa. Grows on mounds of black gypseous clay in ephemeral herbfields and in gibber plains along creeklines. Flowers winter; fruits winter–spring.

S.A.: Dam on Copper Hills and Arkaringa Stn, *R.Bates* 19816 (AD); 30 km NE of Coober Pedy on the road to Oodnadatta, *D.E.Symon* 16196 & *J.Symon* (AD, CANB, MEL).

Resembles *S. gregorii* in that there is some fusion of involucre bracts, but is closer to *S. magnificus* and *S. megaglossus* in leaf, capitulum and achene morphology. Rarely collected.



61. *Senecio megaglossus* F.Muell., *Linnaea* 25: 419 (1853)

T: Burra mine, Broughton R., and between the Hutt and Hill Rivers, S.A., Oct. 1851, *F.Mueller*; lecto: MEL, *fide* I.R.Thompson, *Muelleria* 20: 123 (2004); remaining syn: MEL.

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1595, fig. 7251 (1986); I.R.Thompson, *op. cit.* 114, fig. 1f.

Shrub to c. 0.8 m high, glaucous, glabrous. Leaves to 10 cm long, with l:w ratio 2–4, undivided; base attenuate to cuneate, without auricles; margin entire or with scattered teeth. Capitula solitary or few per branch; calycular bracteoles (0–) 1–3, 1–5 mm long; involucre 8–15 mm long, 8–10 mm diam.; bracts 16–20. Florets numerous; ligulate florets 8; ligule 15–30 mm long, 12–20-veined; disc florets with corolla limb longer than tube. Achenes narrowly obloid, 5–7.5 mm long, ribbed, glabrous or with scattered papillose hairs; l:w ratio of hairs c. 4. Pappus persistent, 8–10 mm long; bristles scabridulous proximally, with length of projections \pm equal to diameter of bristle, barbellate distally.

Occurs in S.A. from the Flinders Ra. SSE to the northern Lofty Ra. Grows in sandhills and in rocky gorges in or above creeks in loam and red clay. Flowers winter–spring.

S.A.: Marne River Gorge, South Mount Lofty Ra., *F.E.Davies* 1377a & *R.B.Hadlow* (CANB, MEL); Warren Gorge, 21 km N of Quorn, Flinders Ra., *A.J.A.Sikkes* AS647 & *P.Ollerenshaw* (CANB).

Similar to *S. magnificus* but with fewer and larger capitula per inflorescence, ligules with more numerous veins, and achenes less densely hairy. Sympatric with and possibly occasionally hybridising with *S. magnificus* around Quorn, S.A. *Senecio megaglossus* and *S. magnificus* are also similar in that the peduncles of these species begin to dilate a greater distance below the base of the capitulum compared to those of related species, and in having pappus bristles barbellate distally (barbel length 2–3 times diameter of bristle).



Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act* 1999.

62. *Senecio magnificus* F.Muell., *Linnaea* 25: 418 (1853)

T: Kanyaka R. [in Flinders Ra.], S.A., *F.Mueller*; lecto: MEL, *fide* I.R.Thompson, *Muelleria* 20: 119 (2004); isolecto: MEL.

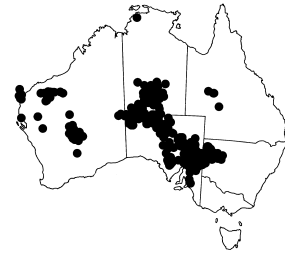
Illustrations: N.G.Walsh & T.J.Entwistle (eds), *op. cit.* 946, fig. 193b (1999); I.R.Thompson, *op. cit.* 114, fig. 1d; 120, fig. 5.

Shrub to c. 1.3 m high, glaucous, glabrous. Leaves to 11 cm long, with l:w ratio 2–4, undivided or coarsely dentate, with 3–6 coarse teeth per side, concentrated distally; base

without auricles, becoming cordate upwards; margin entire or with scattered teeth. Capitula several to numerous per branch; calycular bracteoles (0–) 1–3, 1–6 mm long; involucre campanulate, 6–11 mm long, c. 4–7 mm diam.; bracts 12–18. Florets mostly numerous; ligulate florets 4–8; ligule 7–20 mm long, 4–13-veined; disc florets with corolla limb longer than tube. Achenes obloid-ellipsoid, 3–7 mm long, weakly ribbed, with papillose hairs obscuring much of surface; l:w ratio of hairs c. 5. Pappus persistent, 6–12 mm long; bristles scabridulous proximally, with length of projections \pm equal to diameter of bristle, barbellate distally. $n = 20$, M.E.Lawrence, *Austral. J. Bot.* 28: 153 (1980). Fig. 33 I–K.

Occurs in W.A. from Exmouth and the Hamersley Ra. S to the Kalgoorlie area, and also from the Blackstone Ra. through southern N.T. and S.A. to Wilcannia in western N.S.W.; also disjunctly in western-central Qld. Grows in sand and sandy loam soils, on plains or sometimes in rocky sites, over limestone and dolerite, often associated with watercourses, in spinifex grassland, shrubland, and low open woodland. Flowers mostly winter and spring.

W.A.: c. 40 km E of Hamersley Stn HS, *A.A.Mitchell PRP714* (MEL, PERTH). N.T.: Between Red Bank Gorge and Glen Helen–Haasts Bluff road, *G.W.Carr 1672* & *A.C.Beauglehole 45451* (AD, CANB, DNA). S.A.: on way from Wilpena Pound to Brachina Gorge, 27 Aug. 1983, *V.Jaegermann* (AD, MEL). Qld: Warlus VI, Site R5, 23 km W of ‘Cork’, *R.W.Purdie 1022* (BRI). N.S.W.: c. 100 km by road from Broken Hill towards Mootwingee Natl Park, c. 10 km direct NE of The Bluff, *A.M.Lyne 1858* & *S.Donaldson* (CANB, MEL, NSW).



The pappus bristles of *S. magnificus* are distally more densely and longer barbellate than in other Australian species of *Senecio*, except for *S. megaglossus*. Populations in NW W.A. tend to have more entire leaves with a higher length:width ratio and have relatively long bracteoles; they may warrant further investigation.

63. *Senecio pilosicristus* I.Thomps., *Muelleria* 20: 121 (2004)

T: c. 8 km N of Wirra, c. 33 km N of Lamerou, S.A., 12 Oct. 1965, *D.E.Symon 3878*; holo: AD; iso: AD.

S. sp. aff. magnificus (North-west), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn 58, 249 (2003).

Illustration: I.R.Thompson, *op. cit.* 114, fig. 1e; 122, fig. 6.

Perennials to c. 0.8 m high, not or slightly glaucous, glabrous. Leaves to 12 cm long, with l:w ratio c. 3–8, undivided or coarsely dentate, with 2–5 coarse teeth per side concentrated distally; base cuneate, without auricles, becoming strongly cordate upwards. Capitula few to several per stem; calycular bracteoles 3–6, 2–3 mm long; involucre c. 6–10 mm long, c. 5–7 mm diam.; bracts 12–16. Florets mostly numerous; ligulate florets 6–10; ligule 10–20 mm long, 4- or 5-veined; disc florets with corolla limb equal to or slightly longer than tube. Achenes \pm narrowly obloid, 4–5 mm long, strongly ribbed and ridged, with papillose hairs restricted to grooves along summit of ridges; l:w ratio of hairs c. 10. Pappus persistent, 5.5–7 mm long; bristles scabridulous, with length of projections less than diameter of bristle. Fig. 33L–N.

Occurs from Kangaroo Is., S.A., to the Grampians and Manangatang in western Vic.. Grows on plains and sand hills, in woodland and low woodland, and recorded once from a swamp on Kangaroo Is. Flowers late winter–spring.

S.A.: Murray Bridge, *R.Bates 3763* (AD); Breakneck R., Kangaroo Is., 19 Nov. 1924, *J.B.Cleland* (AD). Vic.: Sunset Country, central-west, near main E–W track, 9 Oct. 1978, *P.D.Cheal* (MEL); Big Desert, 12 km S of Murrayville on Nhill Rd, *M.G.Corrick 6255* & *B.A.Fuhrer* (MEL); Manangatang, Sept. 1921, *H.B.Williamson* (CANB).



Senecio pilosicristus differs from *S. magnificus* by being non-shrubby, having broader and more numerous calycular bracteoles, peduncles that do not gradually dilate towards the capitulum, pappus bristles that are less conspicuously barbellate, basal leaves that are narrowly oblanceolate, upper-stem leaves that are triangular-lanceolate with a more acute apex, inflorescences that are less congested and of fewer capitula, ligules that are

consistently only 4- or 5-veined, and achenes that have strongly-raised ribs with longer hairs along ridges (in shallow grooves along ridge top) and glabrous between ribs. The fruit of *S. pilosicristus* is similar to that of *S. velleioides* but is much larger and with longer hairs along the ridges. The habit and morphology of the upper-stem leaves are also reminiscent of *S. velleioides*. Further investigation of the underground parts of the plant is desirable, particularly to ascertain whether the plant is rhizomatous.

64. *Senecio velleioides* A.Cunn. ex DC., *Prodr.* 6: 374 (1838)

T: Bathurst, N.S.W., *A. Cunningham*; holo: G, microfiche seen.

Illustration: N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 4: 946, fig. 193c (1999).

Perennials to c. 1.8 m high, usually glaucous, glabrous. Leaves to 20 cm long, with l:w ratio c. 2–4, undivided; base strongly cordate; margin entire or with scattered teeth. Capitula several to numerous per stem; calycular bracteoles 0–4, 1–3 mm long; involucre 5–7 mm long, c. 3–5 mm diam.; bracts 12–16. Florets numerous; ligulate florets 6–9; ligule 8–15 mm long, 4- or 5-veined; disc florets with corolla limb c. as long as tube. Achenes obloid to narrowly obloid, 2–4 mm long, strongly ribbed and ridged, glabrous, or with papillose hairs restricted to grooves along summit of ridges. Pappus caducous, 3–5 mm long; bristles scabridulous, with length of projections less than diameter of bristle. *n* = 19, M.E. Lawrence, *Austral. J. Bot.* 28: 154 (1980).

Occurs from Wingen Maid near Taree in central-eastern N.S.W. to the Otway Ra. in SW Vic., and widely distributed in Tas. Grows in loamy soils in woodland and forest. Flowers spring–autumn.

N.S.W.: Summit of Mt Imlay, *D.E. Albrecht* 194 & *B.J. Conn* (AD, MEL, NSW, PERTH); Carters Ck, Currowan State Forest, NW of Batemans Bay, *R. Pullen* 8730 & *J. Story* (BRI, CANB). Vic.: 19 km SW of Colac P.O., *A.C. Beauglehole* 67298 (MEL). Tas.: Taranna, 24 Feb. 1995, *W. Ashby* (AD, HO, MEL, NSW); Pine Cove Ck, *A. Moscal* 5393 (AD, HO).

Distinguishable from sympatric radiate species of *Senecio* by its strongly cordate, amplexicaul, glaucous leaves, the paucity of calycular bracteoles, and the relatively small strongly ridged achenes with hairs in grooves along the summit of ridges. Tasmanian forms appear to be more robust, are less glaucous, have inflorescences with a greater number of heads, and calycular bracteoles that are a little longer and slightly more numerous. *Senecio velleioides* is similar vegetatively and in achene morphology to *S. pilosicristus* but reproductive structures are more numerous and smaller, calycular bracteoles are fewer, the achenes are much smaller and the pappus is caducous.



5. *Macranthus* Group

Erect, sometimes scapiform, perennial herbs or semi-shrubs, rhizomatous or not, not glaucous. Coarse hairs sometimes present, mostly inconspicuous; fine hairs sometimes present, mostly inconspicuous. Leaves thin or slightly fleshy. Capitula radiate, calyculate, with bracteoles narrowly oblong or less often narrowly lanceolate, (2.5–) 4–10 mm long, 0.6–1.5 mm wide at mid-point, with hyaline margin absent; involucre 3–15 mm diam.; bracts 10–30, free, nearly flat or rarely ridged, glabrous, or with hairs in *S. vagus*, with resin ducts inconspicuous. Florets 20–numerous; ligulate florets (5–) 8–20; ligule yellow, or cream in *S. albogilvus*; disc florets with corolla limb equal to or slightly longer than tube, 0.7–1.0 mm diam. at base of lobes. Achenes homomorphic, ±obloid, 2–8 mm long, with ribs raised or not, glabrous, or with papillose hairs (l:w ratio 6–12) in *S. vagus*; carpodium nearly as broad as body in scapiform species, otherwise much narrower. Pappus persistent or not; bristles scabridulous.

A group of 9 species in SE Australia; all in mesic environments with the exception of *S. daltonii* which occupies semiarid regions inland from the Great Dividing Ra.

Relatively large, herbaceous, strap-shaped calycular bracteoles characterise this group, and most species have glabrous achenes. Several species of this group have leaves with a somewhat abrupt transition from a petiole or petiole-like portion to the broad laminar portion. This is not seen in other native species of *Senecio* in Australia with the exception of *S. hypoleucus* and *S. linearifolius* (in a few varieties) in the *Odoratus* group. The term scapiform means that the plant develops a persistent rosette of basal leaves and all or most leaves on the flowering stem are much reduced in size.

- 1 Larger leaves all or mostly cauline at anthesis; most leaves above mid-stem > 3 cm long (lowland to montane)
- 2 Plants extensively rhizomatous; pappus 12–20 mm long (lowland plains) **68. *S. daltonii***
- 2: Plant not extensively rhizomatous; pappus 5–10 mm long (hills and mountains)
- 3 Stem leaves with l:w ratio 1–4, deeply pinnatisect proximally (branch leaves may be undivided and then margin with occasional teeth); involucre bracts with pigmented hairs or not; ligules 7 (or 8)-veined **65. *S. vagus***
- 3: Stem leaves with l:w ratio 3–25, undivided, with margin entire or crowded-denticulate; involucre bracts glabrous; ligules 4- or 5 (–7)-veined
- 4 Leaves linear, gradually tapering to base; involucre bracts 18–22 **66. *S. macranthus***
- 4: Leaves with an abrupt transition from petiole to lamina, with lamina narrowly elliptic; involucre bracts 12–16 **67. *S. amygdalifolius***
- 1: Larger leaves all or mostly basal at anthesis; all leaves/bracts above mid-stem < 3 cm long (mostly montane to alpine)
- 5 Leaves hairy; stem leaves/bracts up to 5 (excluding distalmost 1 cm of stem)
- 6 Basal leaves spatulate, < 15 mm wide; upper surface with broad-based coarse septate hairs to c. 1.5 mm long (or their stout residual bases); lower surface with inconspicuous secondary venation; capitulum 1 **72. *S. papillosus***
- 6: Basal leaves ±sharply demarcated into petiole and blade, usually at least some > 15 mm wide; upper surface lacking broad-based coarse hairs; lower surface with raised, conspicuous secondary venation; capitula 1–4 **73. *S. primulaefolius***
- 5: Leaves ±glabrous; stem leaves/bracts 5–15 (excluding distalmost 1 cm of stem)
- 7 Leaves deeply lobate to pinnatisect, with 3–6 ±oblong segments per side, concolorous or nearly so; inflorescence of a solitary capitulum; ligules yellow **71. *S. pectinatus***
- 7: Leaves not divided or lobate, with 1–several serrations or ±triangular lobes per side, markedly discolorous; inflorescences of 1 or more capitula; ligules yellow, white or cream
- 8 Leaves 4–10 mm wide, with 3 or more teeth or lobes per side; inflorescences mostly of 3 or more capitula; ligules yellow **69. *S. leptocarpus***
- 8: Leaves 1–4 mm wide, with 1 or 2 teeth per side; inflorescence of a solitary capitulum; ligules white or cream **70. *S. albogilvus***

65. *Senecio vagus* F.Muell., *Defin. Austral. Pl.* 13 (1855)

T: Mount Dandenong Ranges, Vic., Jan. 1853, *F.Mueller*; lecto: MEL, *fide* S.I.Ali, *Kew Bull.* 19: 426 (1965); isolecto: MEL; remaining syn: MEL.

Perennials to c. 1.5 m high; rhizome not known; hairs generally sparse. Leaves usually somewhat abruptly broadening from petiole-like to broad-laminar, to 15 cm long, with l:w ratio 1–4, pinnatisect proximally, with 1–3 segments per side, reducing to lobate beyond mid-leaf (branch leaves may be undivided); base without auricles; margin entire or with occasional teeth; venation ±distinct below; scattered hairs usually present, mainly marginal and on veins. Capitula several or sometimes numerous per stem; calycular bracteoles 10–16, 5–10 mm long; involucre 7–13 mm long, c. 4–6 mm diam.; bracts 12–16, flat, with multicellular pigmented hairs, or glabrous. Florets numerous; ligulate florets 8; ligule 10–20 mm long, 7- or 8-veined. Achenes obloid, 3–4 mm long, glabrous or with papillose hairs along

summit of ridges; l:w ratio of hairs 6–12. Pappus caducous, 5–7.5 mm long. $n = 49$ (both subspecies), M.E.Lawrence, *Austral. J. Bot.* 28: 154 (1980). *Saw Groundsel*.

Occurs in N.S.W., Vic. and Tas.; there are 2 subspecies.

A species of wetter forests readily recognisable by the leaf shape, the number of veins on the ligules, and the strongly ridged achenes. The calycular bracteoles somewhat unusually tend to curl and become divergent from the capitulum.

Leaves with short coarse hairs along margin and veins; involuclral bracts, peduncle and margin of calycular bracteoles with coarse hairs; achenes usually glabrous

65a. subsp. *vagus*

Plant glabrous or nearly so; achenes usually with hairs in lines along ribs

65b. subsp. *eglandulosus*

65a. *Senecio vagus* F.Muell. subsp. *vagus*

S. vagus var. *alpestris* F.Muell., *Trans. Philos. Soc. Victoria* 1: 46 (1855). T: Mt Buller, Vic., *F.Mueller*; ?holo: MEL.

Illustrations: S.I.Ali, *Kew Bull.* 19: 427, fig. 2; 428, fig. 3 (1965); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 952, fig. 194b (1999).

Leaves with short hispid hairs along margin and veins. Capitula: calycular bracteoles with margin appearing denticulate due to coarse hair-bases; involuclral bracts and peduncles with scattered plump hairs. Achenes usually glabrous. Fig. 34A–D.

Occurs in eastern Vic. from the Dandenong Ra. E of Melbourne E to Mt Kaye; also occurs in Nullica State Forest in far SE N.S.W., and in Bass Strait on Flinders Is., Tas. Grows mostly in tall open forest. Flowers spring–autumn.

N.S.W.: Mt Comerang, 8 km c. SW of Bodalla, *E.F.Constable* 4148 (NSW). Vic.: 449 Main Rd, Mt Macedon, *D.E.Albrecht* 472 (MEL). Tas.: Walkers Hill, 495 m WSW of the summit, Flinders Is., *J.Whinray* 6 (HO).

Readily distinguishable by the dark hairs scattered over the surface of the involuclral bracts. The hairs are relatively plump and multicellular in 1–several series. The two subspecies are allopatric with subsp. *vagus* occurring to the south of subsp. *eglandulosus*.



65b. *Senecio vagus* subsp. *eglandulosus* Ali, *Kew Bull.* 19: 427 (1965)

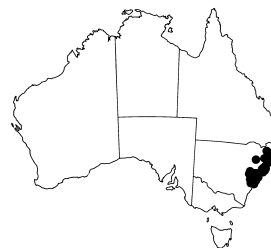
T: N.S.W., Wilson R., Bellangry S.F., NW of Wauchope, 31 Oct. 1956, *E.F.Constable* s.n.; holo: NSW.

Illustration: S.I.Ali, *op. cit.* 427, fig. 2.

Leaves glabrous or nearly so. Capitula: calycular bracteoles with margin nearly smooth; involuclral bracts and peduncle glabrous. Achenes usually with hairs in lines along ribs.

Occurs in NE and central-eastern N.S.W. from the Gibraltar Ra. S to Picton. Grows in tall open forest or closed forest. Flowers mostly spring.

N.S.W.: Ballengarra State Forest, SW of Kempsey, *P.Gilmour* 7344 (AD, CANB, MEL, NSW); Wingen Maid Nat. Res., *J.R.Hosking* 805 (CANB, MEL, NE, NSW).



66. *Senecio macranthus* A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 126 (1834)

T: Port Jackson, N.S.W. [probably collected inland from there], 1826–1829, *coll. unknown*; holo: P.

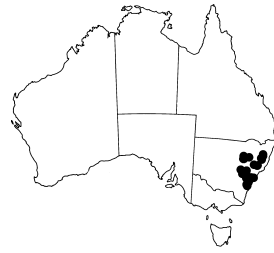
Illustration: G.J.Harden (ed.), *Fl. New South Wales* 3: 309 (1992).

Perennials to c. 1 m high, not rhizomatous, largely glabrous. Leaves gradually broadening from base, to 12 cm long, with l:w ratio 12–25, undivided; base attenuate, with narrow auricles; margin entire or serrulate; venation inconspicuous. Capitula few to several per stem; calycular bracteoles 8–12, 4–9 mm long; involucre 8–12 mm long, c. 7–8 mm diam.; bracts 14–22, ridged proximally. Florets numerous; ligulate florets 8–13; ligule 15–25 mm

long, 4–7-veined. Achenes obloid to narrowly obloid, 3–5 mm long. Pappus caducous, 8–10 mm long. *n* = 20, M.E.Lawrence, *Austral. J. Bot.* 28: 153 (1980). Plate 27.

Occurs in eastern N.S.W. from Wollomombi Falls W to the Warrumbungle Ra. and SSW to Tallong. Grows in moister gullies, often in rocky sites, including granite, sandstone and basalt, in forest. Flowers late winter–spring.

N.S.W.: Killiecrankie Pass, 9.1 km W of Goodmans Ford on the Wombeyan Caves Rd, *R.Coveny 12169 et al.* (AD, NSW); Track from Wollomombi Falls to Chandler R., Oxley Wild Rivers Natl Park, *P.Gilmour 7844* (CANB).



67. *Senecio amygdalifolius* F.Muell., *Fragm.* 1: 232 (1859)

T: Hastings R., N.S.W., *Dr Beckler*; syn: MEL.

Illustration: G.J.Harden (ed.), *Fl. New South Wales* 3: 310 (1992).

Perennials to c. 3 m high, with rhizome villous, otherwise ±glabrous. Leaves ±abruptly broadening from petiole-like to broad-laminate, to 20 cm long, with l:w ratio 3–7; base without auricles; margin crowded-serrulate; reticulate venation distinct on lower surface. Capitula several to many per stem; calycular bracteoles 5–10, 2.5–8 mm long; involucre 7–10 mm long; 3–5 mm diam.; bracts 10–12. Florets 20–35; ligulate florets 5–8; ligule 10–15 mm long, 4- or 5-veined. Achenes narrowly obloid, 4–6 mm long. Pappus caducous, 6–8 mm long. Fig. 34E–G.

Occurs within 200 km of the coast from Mt Molangul in SE Qld S to Morrisett in central-eastern N.S.W. with a disjunct occurrence at near Coonabarabran much further inland in NE N.S.W. Grows in open and closed forest. Flowers mostly winter–spring.

Qld: Mt Ballow foothills, McPherson Ra., *P.I.Forster 7459 & G.Leiper* (BRI, MEL, PERTH). N.S.W.: Undercliffe Falls, 10 km E of Liston, *A.R.Bean 6634* (BRI, MEL, NSW).



Readily distinguished by its petiolate, serrulate leaves.

68. *Senecio daltonii* F.Muell., *Fragm.* 6: 27 (1861), as *Daltoni*

T: Warrego R., Currewillighi, Qld, *J.D.Dalton*; holo: MEL.

Illustration: G.J.Harden (ed.), *Fl. New South Wales* 3: 310 (1992).

Perennials to c. 0.5 m high; rhizomes extensive, villous; stem hairs mostly inconspicuous. Leaves gradually broadening from base, to 12 cm long, with l:w ratio 8–15, undivided; base attenuate, without auricles; margin entire, or with occasional small teeth; venation inconspicuous; scattered coarse hairs sometimes present. Capitula 1 or few per stem; calycular bracteoles 6–8, 4–7 mm long; involucre 8–14 mm long, c. 7–10 mm diam.; bracts 14–25, with scattered coarse hairs. Florets numerous; ligulate florets 10–15; ligule 6–12 mm long, 4- or 5-veined. Achenes ±narrowly obloid, c. 3–5 mm long. Pappus persistent, 12–20 mm long.

Occurs from Toowoomba in SE Qld S to Forbes and Brewarrina in N.S.W. Grows in heavier soils in swampy country and in cultivated paddocks. Flowers at most times of year, dependent on rains.

Qld: Darling Downs District, 13 May 1948, *C.S.Clydesdale* (BRI). N.S.W.: Rowena district, 6 Oct. 1966, *J.Crosby* (NSW); 5 km N of Brewarrina, *J.Thompson 1870a* (BRI, NSW).

Much maligned as a weed of cultivation during the 1930s–60s as it apparently could survive ploughing. Information about its natural habitat is limited and there have been no recent reports of it being troublesome in cultivation.





Figure 34. *Senecio*. **A–D**, *S. vagus* subsp. *vagus*. **A**, upper-stem leaf; **B**, half-capitulum; **C**, close-up of hairs on involucre bract; **D**, achene lateral & basal views (**A**, G.S.Lorimer 779, MEL; **B–C**, I.Thompson 723, MEL; **D**, F.Robbins & A.C.Beaglehole 8889, MEL). **E–G**, *S. amygdalifolius*. **E**, upper-stem leaf; **F**, close-up of venation; **G**, achene (**E**, **F**, P.I.Forster 7459 & G.Leiper, MEL; **G**, C.Stuart, MEL2165665). **H**, **I**, *S. leptocarpus*. **H**, habit; **I**, rosette leaf (**H**, **I**, C.Stuart, MEL 667733). **J**, **K**, *S. albogilvus*. **J**, rosette leaf; **K**, capitulum and upper scape (**J**, **K**, P.S.Short 3446, MEL). **L**, *S. pectinatus* var. *pectinatus*, rosette leaf (F.E.Davies 881 & P.Ollerenshaw, MEL). Scale bars: **A**, **E**, **H** = 20 mm; **B**, **I–L** = 10 mm; **D**, **F**, **G** = 2 mm; **C** = 0.3 mm. Drawn by M.Moir.

69. *Senecio leptocarpus* DC., *Prodr.* 6: 372 (1838)

S. pectinatus var. *pleiocephalus* Benth., *Fl. Austral.* 3: 665 (1867). T: Mt Wellington, Tas., *R.C.Gunn* 268; holo: G n.v.; iso: NSW n.v., *fide* R.O.Belcher, *Muelleria* 9: 122 (1996).

Illustration: J.B.Kirkpatrick, *Alpine Tasmania* 78, fig. 34d (1997).

Scapiform perennials to 0.5 m high, rhizomatous, nearly glabrous except for upper peduncle. Basal leaves gradually broadening from base, to 10 cm long, with l:w ratio 3–9, undivided or lobate, with 4–7 lobes per side; base attenuate or cuneate, without auricles; secondary venation sub-parallel, generally distinct on both surfaces. Cauline leaves c. 10, undivided, becoming much smaller than basal leaves. Capitula (1–) 3–8 per stem; peduncle with coarse hairs distally; calycular bracteoles 4–8, 4–7 mm long; involucre 5–9 mm long, 3–5 mm diam.; bracts c. 13, glabrous. Florets numerous; ligulate florets 10–15; ligule 8–12 mm long, 4–6-veined. Achenes narrowly obloid, 3–4 mm long, unribbed. Pappus persistent, 4–5 mm long. Fig. 34H–I.

Occurs in central and western Tas. from St Valentines Peak in the NW to Pindars Peak in the S. Grows in alpine shrubland, heathland and herbfields. Flowers summer–autumn.

Tas.: Lake Hwy, 5.7 km N from Breona, Great Western Tiers, *F.E.Davies* 983 & *P.Ollerenshaw* (CANB, MEL); Dunning Rivulet, *A.Moscal* 12524 (HO).

Differs from *S. pectinatus* in its strongly discolorous leaves with distinct sub-parallel or very acute secondary venation. The leaves are similar to those of *S. albogilvus* but are larger and with more lobes. It also differs from *S. albogilvus* in that the inflorescences are usually not solitary and the ligules are yellow. Although there are a few old records from the mainland, there is some doubt about their provenance.

**70. *Senecio albogilvus* I.Thomps., *Muelleria* 20: 130 (2004)**

S. pectinatus var. *ochroleucus* F.Muell., *Pap. & Proc. Roy. Soc. Tasmania* 1870 16 (1871), as *ochroleuca*. T: Mt Wellington, Tas., Jan. 1869, *F.Mueller*; lecto: MEL, *fide* R.O.Belcher, *Muelleria* 9: 119 (1996); remaining syn: MEL.

Illustrations: M.Stones, *Endemic Fl. Tasmania* 4: 239, pl. 74, no. 123 (1973); J.B.Kirkpatrick, *Alpine Tasmania* 78, fig. 34g (1997), as *S. pectinatus* var. *ochroleuca*; I.R.Thompson, *op. cit.* 132.

Scapiform perennials to c. 0.3 m high, rhizomatous, nearly glabrous. Basal leaves gradually broadening from base, to 4 cm long, with l:w ratio 8–15, undivided; base attenuate, without auricles; margin entire or more often with 1 or 2 distal teeth per side; venation indistinct. Cauline leaves 10–15, becoming much smaller than basal leaves, mostly bract-like, undivided; base without auricles. Capitula 1 per stem; distal peduncle sparsely hairy, with hairs fine; calycular bracteoles 6–10, 4–9 mm long; involucre 5–11 mm long, 3–7 mm diam.; bracts 12–22, glabrous. Florets numerous; ligulate florets 10–15; ligule 8–12 mm long, cream-white, 4- or 5-veined. Achenes narrowly obloid, 2–3 mm long, unribbed, glabrous. Pappus ?persistent, 4.5–6 mm long. Fig. 34J–K.

Occurs in NW and southern Tas. from Cradle Mountain S to Pindars Peak. Grows in rocky sites in herbfield, heathland and shrubland in montane to alpine regions. Flowers summer–autumn.

Tas.: Hartz Mountain track, 500 m from base of track, Hartz Mountains Natl Park, *F.E.Davies* 878 & *P.Ollerenshaw* (AD, CANB, HO, MEL); E edge of Cradle Mtn c. 100 m below summit, Cradle Mountain Natl Park, *P.S.Short* 1786 (HO, MEL).

Previously included in *S. pectinatus* but distinct from that species in leaf morphology. The undivided, discolorous leaves are more reminiscent of those of *S. leptocarpus*, although considerably smaller. A further distinctive feature of this species is the white-cream colour of the ligules. An old specimen collected from Tas. (Dr Milligan, MEL667723) has the leaves of *S. albogilvus* but an inflorescence of 6 capitula. It is unclear from the specimen what the colour of the ligules are. This may be an aberrant plant or possibly a hybrid between *S. albogilvus* and *S. leptocarpus*.



71. *Senecio pectinatus* DC., *Prodr.* 6: 372 (1838)

T: Tas., 1832, *R.C.Gunn* 107; holo: G n.v., *fide* R.O.Belcher, *Muelleria* 9: 115–131 (1996).

Scapiform perennials to 0.5 m high, rhizomatous, nearly glabrous except for scape and peduncle. Basal leaves gradually to somewhat abruptly broadening from petiole-like portion to lamina, to 12 cm long, with l:w ratio 2–6, coarsely dentate to pinnatisect, with 3–6 major projections per side; base petiole-like, without auricles. Cauline leaves 5–12, becoming much smaller than basal leaves, mostly undivided, sometimes lobate; base without auricles or slightly dilated. Capitula 1 per stem; distal peduncle moderately hairy, with hairs to c. 1 mm long, or occasionally glabrous or nearly so; calycular bracteoles 6–12, 4–10 mm long; involucre 6–11 mm long, 5–12 mm diam.; bracts 12–30, glabrous or nearly so. Florets numerous; ligulate florets 13–22; ligule 10–20 mm long, 4- or 5-veined. Achenes narrowly obloid, 4–8 mm long. Pappus ?persistent, 4–7.5 mm long.

Occurs in the A.C.T., SE N.S.W., eastern Vic. and Tas. There are 2 varieties, differing only in their dimensions, and they are not always easy to distinguish, particularly if stunted plants are encountered. The key produced by Belcher (1996) when he described var. *major* does not adequately distinguish them. Although the variation appears almost continuous, I consider that the two varieties should be maintained. A modified key is presented below.

The typical variety occurs in Tas. whereas var. *major* is largely confined to the mainland. In Tas., var. *major* appears to occur only in the north, e.g. in Ben Lomond Natl Park, where it is sympatric with the typical variety. The high chromosome number of $2n = 80$ for var. *major* (Lawrence 1980) is suggestive of polyploidy. Unfortunately there is no chromosome count for the typical variety.

Rosette leaves 1–5 (–8) cm long, with medial zone of solid lamina not or only slightly broadening distally, 1–2 (–4) mm wide at widest; calycular bracteoles (4–) 5–6.5 mm long; involucre 6–9 mm long, 8–15 (–20) mm wide at widest point when pressed

71a. var. *pectinatus*

Rosette leaves (3–) 4–15 cm long, with medial zone of solid lamina broadening distally, 4–15 mm wide at widest in at least some leaves; calycular bracteoles 6–10 mm long; involucre 8–12 mm long, 15–30 mm wide at widest point when pressed

71b. var. *major*

71a. *Senecio pectinatus* DC. var. *pectinatus*

Illustrations: J.B.Kirkpatrick, *Alpine Tasmania* 78, fig. 34f (1997); I.R.Thompson, *Muelleria* 20: 131, fig. 10 (2004); C.Howells (ed.), *Tasmania's Nat. Fl.* 2nd edn 76 (2012).

Plants to c. 0.2 m high, with scape 0.5–1.8 mm diam. unpressed. Rosette leaves 1–5 (–8) cm long, pinnatisect, with medial zone of solid lamina of similar width throughout rachis, 1–2 (–4) mm wide at widest. Capitula: calycular bracteoles (4–) 5–6.5 mm long, 0.6–1.1 mm wide; involucre 6–8 (–9) mm long, 8–15 (–20) mm wide at widest point when pressed. Corolla of disc florets mostly < 6 mm long. Achenes 4–5 mm long. Pappus 4–5 mm long. Fig. 34L.

Occurs in Tas. from Mt Arthur in the north to Mt La Perouse in the south. Grows in alpine or sub-alpine herbfields, heathland and shrubland, commonly near streams or seepage areas. Flowers summer–autumn.

Tas.: Hamilton Crags, 1.5 km E of Legges Tor, Ben Lomond Natl Park, *F.E.Davies* 1167 (AD, CANB, HO, MEL); between Ladies Tarn and Hartz Peak, Hartz Mountains Natl Park, *P.S.Short* 1892 (MEL).



71b. *Senecio pectinatus* var. *major* F.Muell. ex Belcher, *Muelleria* 9: 120 (1996)

T: Cobberas Mtns, Vic., [1854], *F.Mueller*; holo: MEL; iso: MEL.

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 946, fig. 193e (1999).

Plants to 0.3 (–0.5) m high. Scape 1–3 mm diam. Rosette leaves 4–15 cm long, coarsely dentate to pinnatisect with medial zone of solid lamina broadening distally, usually 4–15 mm

wide at widest in at least some leaves. Capitula: calycular bracteoles 6–10 mm long, 1–2 mm wide; involucre 8–12 mm long, 15–30 mm wide when pressed. Corolla of disc florets > 6 mm long. Achenes 4–8 mm long. Pappus 5–7 mm long. $2n = 80$, M.E.Lawrence, *Austral. J. Bot.* 28: 153 (1980). *Alpine Groundsel*.

Occurs from Mt Kelly in southern A.C.T. SW through SE N.S.W. to Mt Baw Baw in southern Vic. and northern Tas. Grows in alpine or sub-alpine herbfields, heathland and shrubland, commonly near streams or seepage areas. Flowers summer–autumn.

N.S.W.: c. 1 km along Summit Rd from parking area, Mt Stillwell, Charlottes Pass, Kosciuszko Natl Park, *P.Hind 5520* & *G.D'Aubert* (MEL, NSW). A.C.T.: c. 0.5 km NW of Bimberi trig, Namadgi Natl Park, *C.Helman* & *P.Gilmore 542* (CBG). Vic.: Wall of Death, Hotham Heights, *D.E.Albrecht 4949* (MEL); beside road from 'Ruined Castle', at head of ?McKay Ck, Bogong High Plains near Mt McKay, *M.G.Corrick 11500* (CANB, MEL). Tas.: Ben Lomond Natl Park, Hamilton Crags, 1.5 km E of Legges Tor, *F.E.Davies 1167* (CBG).



72. *Senecio papillosus* F.Muell., *Trans. Philos. Inst. Victoria* 2: 69 (1857)

T: Mt La Perouse, Tas., 1 Mar. 1857, *C.Stuart 1870*; lecto: MEL, *fide* R.O.Belcher, *Muelleria* 9: 124 (1996); Mt La Perouse, Tas., *Stuart s.n.*; remaining syn: MEL.

Illustrations: M.Stones, *Endemic Fl. Tasmania* 4: 245, pl. 77, no. 128 (1973); J.B.Kirkpatrick, *Alpine Tasmania* 78, fig. 34e (1997).

Scapiform perennials to 0.3 m high, rhizomatous, somewhat hairy on most parts. Basal leaves to 4 (–7) cm long, with l:w ratio 2–7, undivided; base petiole-like; margin entire or with scattered teeth; upper surface hispid, with hairs rather robust; lower surface with long hairs along midrib; secondary venation \pm distinct on lower surface. Cauline leaves 1–5, much smaller than basal leaves, undivided; base without auricles. Capitula 1 per stem; distal peduncle and margin of bracteoles with coarse hairs; calycular bracteoles 6–8, 5–8 mm long; involucre 7–10 mm long, 3–5 mm diam.; bracts 12–24, sparsely hairy. Florets numerous; ligulate florets 12–20; ligule 10–20 mm long, 4- or 5-veined. Achenes narrowly obloid, c. 3–4 mm long, unribbed. Pappus ?persistent, c. 6 mm long.

Occurs in southern Tas. from Federation Peak to Mt La Perouse. Grows in sub-alpine areas. Flowers summer–autumn.

Tas.: Precipitous Bluff, E face, *A.M.Buchanan 11347* (HO).

Recognised by its scapiform habit and small spatulate leaves with rather coarse septate hairs on the upper surface. Very localised in mountains in SW Tas.



73. *Senecio primulaefolius* F.Muell., *Trans. Philos. Inst. Victoria* 2: 69 (1857), as *primulifolius*

T: Mt La Perouse, Tas., 1 Mar. 1857, *C.Stuart 1871*; lecto: K, *fide* R.O.Belcher, *Muelleria* 9: 125 (1996); isolecto: MEL (2 sheets).

Illustrations: M.Stones, *Endemic Fl. Tasmania* 4: 245, pl. 77, no. 129 (1973); J.B.Kirkpatrick, *Alpine Tasmania* 81, fig. 35c (1997).

Scapiform perennials to 0.3 m high, rhizomatous, somewhat hairy on leaves and scape. Basal leaves abruptly broadening from petiole-like portion to cordate-based lamina, to 22 cm long, with l:w ratio 2–6, undivided; base without auricles; margin crenate or dentate; upper surface somewhat appressed-cobwebby or woolly; lower surface somewhat woolly; secondary venation distinct. Cauline leaves 1–4, becoming much smaller than basal leaves; base becoming auriculate upwards. Capitula 1–4 per stem; peduncle hairy; calycular bracteoles 6–8, 5–8 mm long; involucre 7–10 mm long, 3–5 mm diam.; bracts 14–20, nearly glabrous. Florets numerous; ligulate florets c. 12; ligule 10–20 mm long, 4- or 5-veined. Achenes narrowly obloid, 3–4 mm long, unribbed, glabrous. Pappus persistent, 6–8 mm long.

Occurs in southern Tas. in the area of Mt La Perouse. Grows in sub-alpine areas, recorded from under shrubs and from rocky cliffs. Flowers summer–autumn.

Tas.: Moonlight Ridge, *A.M.Buchanan* 2961 (HO); Mt La Perouse, *L.Rodway* 427 (HO).

Recognised by its scapiform habit and distinctive leaf morphology. Like *S. papillosus* it has a very localised distribution in mountains in SW Tas.



6. Glossanthus Group

Erect annuals, not rhizomatous, not glaucous. Coarse hairs sometimes present, conspicuous or not; fine hairs absent. Leaves commonly slightly fleshy. Capitula radiate, with ligule short, or appearing disciform with ligule of female florets vestigial, calyculate, with bracteoles narrowly ovate to lanceolate, 0.8–3 mm long, 0.2–0.8 mm wide at mid-point, with hyaline margin absent or obscure; involucre 1–3 mm diam.; bracts 7–13, free; stereome flat, with resin ducts inconspicuous, pale. Florets 15–numerous; ligulate florets (4–) 5–13, with ligule much reduced, yellow; corolla limb of disc florets \pm as long as tube, 0.3–0.5 mm diam. at base of lobes. Achenes homomorphic or dimorphic (then ray achenes larger, hairs more robust and carpopodium broader), \pm obloid or slightly bottle-shaped, 2–5.5 mm long, with ribs \pm flat, with papillose hairs (l:w ratio 3–8); carpopodium c. $\frac{1}{3}$ –1 times diam. of body. Pappus caducous, occasionally hardly developed on outer achenes; bristles scabridulous.

A group of 4 species occurring in the southern half of Australia, distinguished from other radiate species by the short ligules of the female florets. The ligule in some specimens is vestigial but these can be distinguished from species of the Disciform group by the low proportion of female florets and their relatively short corolla, and, in 3 of the species, the dimorphism of the achenes. The group is probably most closely allied to the Lautusoid group to which it is most obviously connected by *S. condylus*, a species placed in the Lautusoid group because of its long-ligulate female florets, but with features including leaf shape and achene dimorphism that are strongly reminiscent of members of the Glossanthus group.

- 1 Achenes all similar in length; attachment points on receptacle not dimorphic as below; corolla tube of female florets distinctly longer than mature achene
- 1: Achenes of female florets longer than those of bisexual florets; attachment points on receptacle for achenes of female florets thickened and usually projecting (in contrast to attachment points for bisexual achenes); corolla tube of female florets shorter than or equal to mature achene
- 2 Involucral bracts 12 or 13 in a majority of capitula; female florets 8–13; achenes of female florets 3–6 mm long, slightly bottle-shaped
- 2: Involucral bracts 7–10, or occasionally to 13, in a majority of capitula; female florets predominantly 4–8; achenes of female florets 2–3.5 mm long, not bottle-shaped
- 3 Involucre 3.5–6 mm long; calycular bracteoles 0.2–0.5 mm wide; mature receptacle 1–2 (–2.5) mm diam.; ligules generally exceeding involucre; hairs on achenes of bisexual florets < 0.15 mm long, barely exceeding pappus ring
- 3: Involucre 5–7 mm long; calycular bracteoles 0.5–1 mm wide; mature receptacle mostly 2–3.5 mm diam.; ligules not exceeding involucre; hairs on achenes of bisexual florets > 0.2 mm long, clearly exceeding pappus ring

77. *S. serratifomis*

75. *S. productus*

74. *S. glossanthus*

76. *S. halophilus*

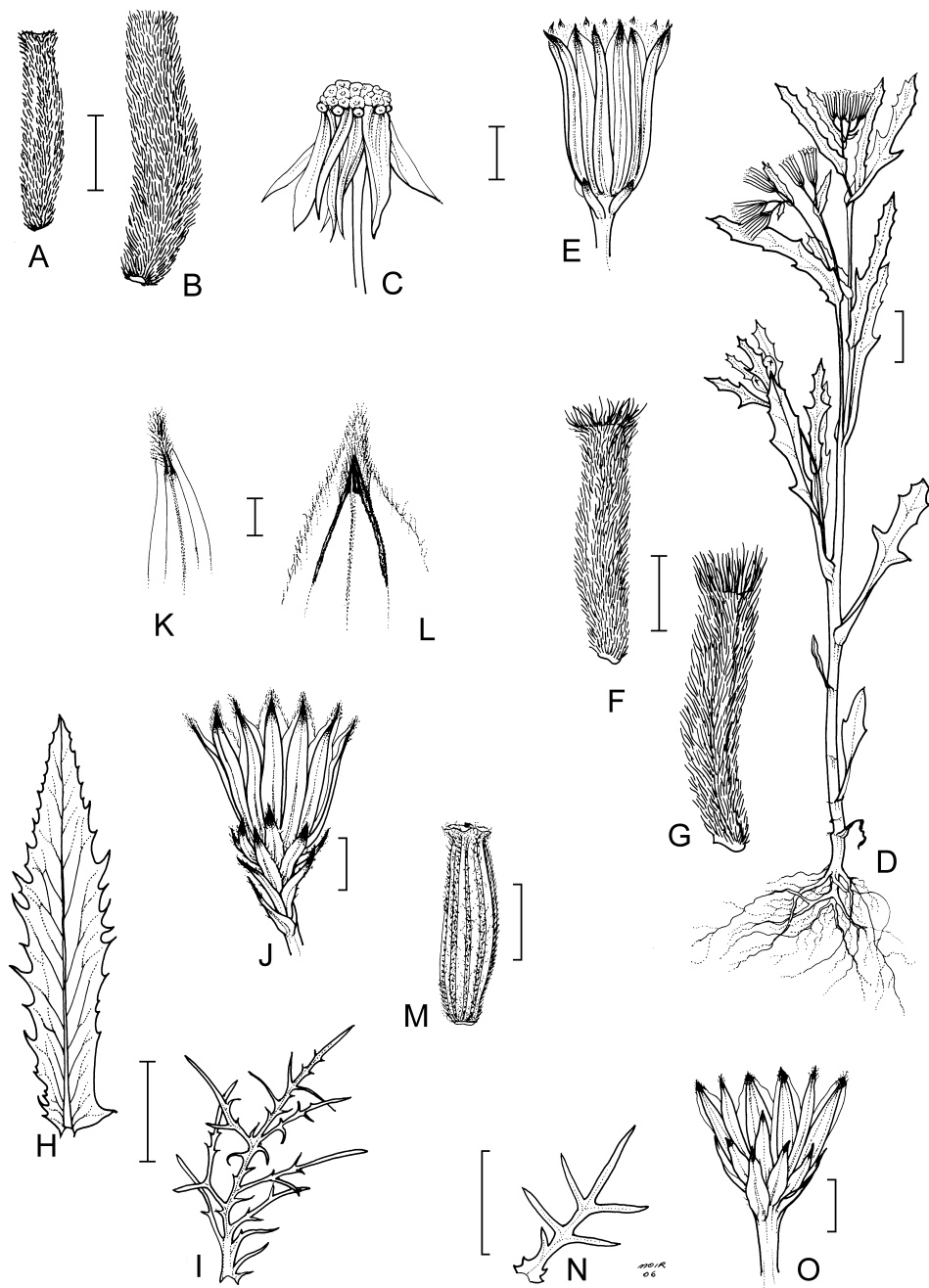


Figure 35. *Senecio*. **A–C**, *S. glossanthus*. **A**, disc achene; **B**, ray achene; **C**, receptacle post-fructescence (**A–C**, A.C.Beauglehole 8901, MEL). **D–G**, *S. halophilus*. **D**, habit; **E**, capitulum; **F**, disc achene; **G**, ray achene (**D–G**, D.E.Murfet 2508, MEL). **H–M**, *S. pinnatifolius* var. *lanceolatus*. **H**, mid-stem leaf; **I**, leaf variant; **J**, capitulum; **K**, apex of outer involucre bract; **L**, apex of inner bract; **M**, achene (**H, M**, P.C.Jobson 4002, MEL; **I**, R.Pillar, 21 Sept. 1968, MEL; **J–L**, A.C.Beauglehole 56531, MEL). **N, O**, *S. spanomerus*. **N**, upper-stem leaf; **O**, capitulum (**N, O**, R.L.Specht, Aug. 1963, MEL). Scale bars: **A, B, F–G, M** = 1 mm; **C, E, J, O** = 2 mm; **D, H, I, N** = 20 mm; **K, L** = 0.5 mm. Drawn by M.Moir.

74. *Senecio glossanthus* (Sond.) Belcher, *Ann. Missouri Bot. Gard.* 43: 80 (1956)

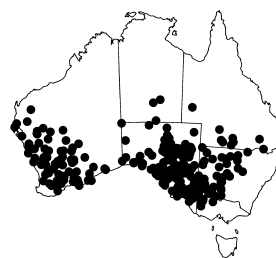
Erechtites glossantha Sond., *Linnaea* 25: 524 (1853); *S. brachyglossus* F.Muell. ex Benth., *Fl. Austral.* 3: 670 (1867), *nom. illeg. non* Turcz. (1851). T: near Adelaide, S.A., July 1848, *F. Mueller*; lecto: MEL, *fide* I.R.Thompson, *Muelleria* 21: 7 (2005).

Illustrations: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 952, fig. 194g (1999); I.R.Thompson, *op. cit.* 5, fig 1a; 9, fig. 3.

Annuals to 0.3 (–0.5) m high. Leaves to 7 cm long, undivided and then linear or very narrowly elliptic, or lobate to sub-pinnatisect; margin entire, denticulate or dentate. Capitula several to numerous per stem; calycular bracteoles 2–5, 0.8–1.5 mm long, 0.2–0.5 mm wide; involucre 3.5–6 mm long, 1–2 (–2.5) mm diam.; bracts (–5) 7–10 (–13); receptacle with marginal tubercles. Florets 8–30; female florets (4–) 5–8; corolla tube 1.5–2 mm long; ligule 1–2 mm long. Achenes narrowly obloid, dimorphic; achenes of bisexual florets 1.8–3 mm long, with papillose hairs covering 50–90% of surface, minutely exceeding pappus-ring; achenes of female florets 2.3–3.5 mm long, with hairs more robust, markedly exceeding pappus-ring. Pappus 3–3.5 mm long. Fig. 35A–C.

Occurs across mainland Australia S of 23°, from Barlee Ra., W.A., to the Darling Downs, Qld, and S to NW Vic. Grows in seasonally wet areas, on gilgai plains and clay pans, on clay, clayey sand, or sand over granite, laterite, or limestone, in shrubland and low woodland. Flowers mostly winter–spring.

W.A.: c. 2.5 km S of Binnu, *P.S.Short 2857 et al.* (AD, CANB, MEL, PERTH). N.T.: New Crown Stn, Beddome Ra., *P.K.Latz 12512* (DNA). S.A.: Corunna Hill South, 4.9 km NW of Iron Knob, *J.D.Briggs 973* (AD, CANB, MEL). Qld: 4 km N on Bulloo Development Rd, 200 m E of lake, Lake Bindegolly Natl Park, *M.Handley 197* (BRI). N.S.W.: Vacant lot opposite fuel depot, Bourke, *B.Wieczek 68 et al.* (AD, BRI, CANB, HO, MEL, NSW). Vic.: c. 44 km N of Broken Bucket bore and c. 46 km S of Murrayville on road to Nhill, Big Desert, *M.G.Corrick 6353* (MEL).



Senecio glossanthus is a very widespread species, predominantly of semiarid areas. Lawrence (*Austral. J. Bot.* 28: 153 (1980)) identified two chromosome forms: tetraploid $2n = 40$ and octoploid $2n = 80$. *Senecio glossanthus* can be distinguished from perhaps the most similar member of the *Glossanthus* group, *S. halophilus*, by the generally smaller capitula with fewer involucre bracts and florets, narrower and less pigmented calycular bracteoles, ligules exceeding the involucre bracts, achenes of bisexual florets with hairs hardly exceeding the pappus ring, and the more prominent tubercles on the receptacle.

75. *Senecio productus* I.Thomps., *Muelleria* 21: 10 (2005)

T: 7.5 km E of Kerang P.O., Vic., 2 Sept. 1979, *A.C.Beauglehole 64354*; holo: MEL.

Annuals to c. 0.3 m high. Leaves to 7 cm long, undivided and then linear or very narrowly elliptic, or lobate to sub-pinnatisect; margin entire, denticulate or dentate. Capitula several to numerous per stem; calycular bracteoles 2–5, 1–2 mm long, 0.3–0.6 mm wide; involucre 4.5–7 mm long, 1.8–3 mm diam.; bracts (10–) 12 or 13; receptacle with marginal tubercles. Florets 25–45; female florets 8–13; corolla tube 2–3 mm long; ligule c. 1 mm long or vestigial. Achenes slightly bottle-shaped, dimorphic; achenes of bisexual florets 2.5–4.5 mm long, with papillose hairs covering c. 50–90% of surface, shortly exceeding pappus-ring; achenes of female florets similar but 3–6 mm long. Pappus 3–4 mm long.

Occurs in S.A., N.S.W. and Vic. Flowers mostly winter–spring. There are 2 subspecies.

An apparently rare species, but likely to be overlooked as it grows with the similar and common *S. glossanthus*.

Ligule vestigial; achenes of female florets < 4.5 mm long

74a. subsp. *productus*

Ligule c. 1 mm long; achenes of female florets > 4.5 mm long

74b. subsp. *magnus*

75a. *Senecio productus* I.Thomps. subsp. *productus*

Illustration: I.R.Thompson, *op. cit.* 5, fig 1b; 11, fig. 4.

Involucral bracts 5–6 mm long. Female florets with vestigial ligules. Achenes of bisexual florets 2.5–3.5 mm long; achenes of female florets 3–4.5 mm long.

Occurs on plains of the Murray R. catchment in south-central N.S.W., north-central Vic. and adjacent S.A. Recorded from heavy grey clay soils and from edge of a billabong in drying mud and from chenopod shrubland.

S.A.: Murtho Forest, *R.Bates* 18421 (AD). N.S.W.: Stock route 15 miles [24 km] N of Deniliquin, 17 Sept. 1963, *W.E.Mulham s.n.* (MEL). Vic.: Ned's Corner Stn, beside access road, 7.5 km due N from Sturt Hwy at Meringur North, *N.G.Walsh* 5778 & *I.R.K.Sluiter* (MEL).

Similar to *S. glossanthus* but the latter has narrower capitula with fewer involucral bracts, fewer but better developed and exerted ligules, and shorter achenes.



75b. *Senecio productus* subsp. *magnus* I.Thomps., *Muelleria* 21: 10 (2005)

T: 0.5 km NW of Strathearn HS near wet clay pan, S.A., 23 Aug. 1978, *L.D.Williams* 9968; holo: AD.

Illustration: I.R.Thompson, *op. cit.* 12, fig. 5.

Involucral bracts 5.5–7 mm long. Female florets with ligules c. 1 mm long. Achenes of bisexual florets 3.5–5 mm long; achenes of female florets 4.5–6 mm long.

Known only from the type locality in far eastern S.A., where it was growing adjacent to clay pans.



76. *Senecio halophilus* I.Thomps., *Muelleria* 21: 13 (2005)

T: Northern extremity of L. Corangamite, S side of Foxhow Rd, 2 km W of Foxhow, Vic., 21 Sept. 2001, *I.R.Thompson* 676; holo: MEL; iso: AD, CANB, HO.

S. brachyglossus var. *major* Benth., *Fl. Austral.* 3: 670 (1867). T: Point Nepean, Vic., *F.Mueller*; lecto: K; isolecto: MEL, *fide* I.R.Thompson, *Muelleria* 21: 13 (2005) [remaining syntypes are not *S. halophilus*].

Illustration: I.R.Thompson, *op. cit.* 5, fig. 1c; 15, fig. 6.

Annuals to c. 0.4 m high. Leaves to c. 7 cm long, undivided and then narrowly elliptic or oblanceolate, or lobate to sub-pinnatisect; margin entire, denticulate or dentate. Capitula several to numerous per stem; calycular bracteoles 2–5, 1–2 mm long, 0.5–1 mm wide; involucre 5–7 mm long, 2–3.5 mm diam.; bracts 8–13; receptacle with inconspicuous or prominent marginal tubercles. Florets c. 15–30; female florets 5–8; corolla tube 2–3 mm long; ligule to 1 mm long or vestigial. Achenes narrowly obloid, dimorphic; achenes of bisexual florets 2–3 mm long, with papillose hairs covering 50–100% of surface, clearly exceeding pappus-ring and divergent at summit; achenes of female florets 2.5–3.5 mm long, otherwise similar. Pappus 3–4 mm long. Fig. 35D–G.

Occurs in SE S.A. and western and south-central Vic. Grows in saline environments at margins of inland lakes and in coastal areas. Flowers mostly winter–spring.

S.A.: Marion Bay, Yorke Penin., *R.J.Bates* 38588 (AD); Hindmarsh Is., *D.E.Murfet* 2508 (AD). Vic.: Mitre Lake Flora and Fauna Res., *A.C.Beauglehole* 86508 (MEL); Sandringham, May 1900, *C.French Jr* (MEL); eastern shore, L. Goldsmith, *N.G.Walsh* 5246 & *A.Brown* (MEL).



77. *Senecio serratiformis* I.Thomps., *Muelleria* 21: 14 (2005)

T: Eyre Penin., Fowlers Bay, just N of jetty, S.A., 15 Aug. 1980, *J.Z.Weber* 6267; holo: AD.

Annuals to c. 0.3 m high, with scattered coarse hairs on newer growth. Leaves to c. 6 cm long, undivided and then narrowly elliptic, oblanceolate or linear, or coarsely dentate; base attenuate to cuneate, sometimes becoming cordate upwards; margin denticulate or serrate, with teeth sometimes crowded. Capitula several to numerous per stem; calycular bracteoles 2–5, 1–2.5 mm long, 0.3–0.5 mm wide; involucre 5–8 mm long, 2–2.5 mm diam.; bracts 8–10 (13); receptacle lacking marginal tubercles. Florets 15–30; female florets 4–6; corolla tube 3.5–5 mm long; ligule 1.5–2.5 mm long. Achenes obloid, homomorphic, 2–2.5 mm long, with papillose hairs covering 50–100% of surface, hardly exceeding pappus-ring. Pappus 5 mm long.

Occurs in W.A. and S.A., on the coast. Flowers mostly winter and spring. There are 2 subspecies.

Differs from *S. glossanthus* by its longer capitula, homomorphic achenes, relatively long corollas of the female florets, and the absence of tubercles on the receptacle.

Mid-stem leaves with l:w ratio < 7; margin with several to many serrations; involucre 7–8 mm long

77a. subsp. *serratiformis*

Mid-stem leaves with l:w ratio > 7; margin subentire or few-toothed; involucre 6–7 mm long

77b. subsp. *stenophyllus*

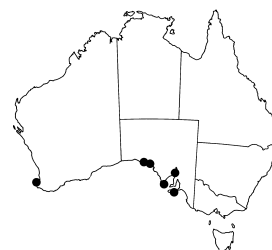
77a. *Senecio serratiformis* I.Thomps. subsp. *serratiformis*

Illustration: I.R.Thompson, *op. cit.* 5, fig. 1d; 16, fig. 7.

Mid-stem leaves with l:w ratio < 7; margin with several to many serrations. Involucre 7–8 mm long.

Occurs in southern S.A. from Fowlers Bay SE to Kangaroo Is. and disjunctly much further W in southern W.A. at Bunker Bay. Grows in sand, on dunes and overlying limestone in coastal vegetation including mallee woodland.

W.A.: Bunker Bay, *J.Pulley* 1468 (CANB). S.A.: sandhill on Cowell Rd, c. 56 km from Whyalla, 10 Sept. 1965, *J.B.Cleland* (AD); Point Davenport, Yorke Penin., Aug. 1978, *P.Coombe* (AD); Kangaroo Is., Cape Gantheaume Conservation Park, E of Point Tinline, *B.M.Overton* 1664 (AD); Fowlers Bay, 1877, *R.Tate* (AD).



77b. *Senecio serratiformis* subsp. *stenophyllus* I.Thomps.

T: By airstrip, W of HS, Dirk Hartog Is., W.A., 3 Sept. 1972, *A.S.George* 11435; holo: PERTH.

Illustration: I.R.Thompson, *op. cit.* 17, fig. 8.

Mid-stem leaves with l:w ratio > 7; margin subentire or few-toothed. Involucre 6–7 mm long.

Occurs on islands off the W coast of W.A. Ecological preferences not known.

W.A.: West Wallabi Is., Wallabi Is., Abrolhos, *J.J.Alford* 641 (CANB, PERTH); North Is., Houtman Abrolhos, 6 Sept. 1959, *G.M.Storr* (PERTH).



7. Lautusoid Group

Erect, sprawling or nearly prostrate annuals, perennials, or semi-shrubs, not rhizomatous or scapiform except for *S. pinnatifolius* var. *alpinus*, not glaucous. Coarse hairs generally caducous if present, except sometimes on peduncles, and lower surface of leaves (*S. condylus*); fine hairs absent. Leaves commonly slightly to strongly fleshy. Capitula radiate, calyculate, with bracteoles broadly ovate to narrowly lanceolate, 1–5 mm long, 0.3–2 mm wide at mid-point, with hyaline margin absent, obscure or well-developed; involucre 1.2–12 mm diam.; bracts (8–) 13–22, free; stereome flat or ridged proximally, with resin ducts broad and prominent or not, orange or pale. Florets numerous; ligulate florets 8–13 (–20), with ligule yellow; disc floret corolla limb \pm as long as tube, 0.4–0.6 mm diam. at base of lobes. Achenes homomorphic or less often dimorphic (then achenes of female florets larger, with hairs more robust and carpopodium broader), \pm obloid, 1.5–7 mm long, with ribs flat to mildly raised, with papillose hairs (l:w ratio c. 3–8) or glabrous; carpopodium mostly c. $\frac{1}{2}$ diam. of body. Pappus caducous, or persistent in *S. spathulatus*; bristles scabridulous.

A group of 11 species occurring throughout most of Australia S of latitude 20°. The introduced species *S. madagascariensis*, once confused with Australian lautusoid species such as *S. pinnatifolius*, is similar and is included in this group. The morphology of the involucre bracts in some cases helps to distinguish species and it is important therefore to be able to identify the three bract types: inner, outer and intermediate. The margin of the outer bracts overlaps the margin of the inner bracts to the outside. Intermediate bracts are half inner and half outer and one side overlaps to the inside and the other to the outside.

The following key is based predominantly on pressed herbarium material. Capitular characters will often require magnification. The involucre diameter given is for unpressed specimens and is measured mid-involucre. Pressing increases the diameter/width by up to 50%. Leaves refers to those leaves in the middle third of stems or major branches (leaves of short inflorescence branches and uppermost leaves of branches will be considerably smaller).

- 1 All or most capitula in an inflorescence with involucre bracts c. 13 or c. 20 and number of ligules several fewer than bracts, i.e. ligules 8–10, involucre bracts 13; ligules c. 13, involucre bracts c. 20 (arid, semiarid or mesic environments)
- 2 Stem and major branch leaves commonly undivided, sometimes with a few lobes per side; leaf margin with frequent often minute marginal points per side (often difficult to ascertain in pressed material); involucre bracts mostly c. 20; achenes 1.5–2.2 mm long, 0.3–0.5 mm diam. **88. *S. madagascariensis***
- 2: Stem and major branch leaves divided or not; leaf margin with few to numerous marginal points per side, but if numerous then leaves generally markedly serrate, lobate or pinnatisect; involucre bracts mostly c. 13 or mostly c. 20; achenes (1.8–) 2–5 mm long, 0.5–0.8 mm diam.
- 3 Lower surface of leaves often with numerous somewhat persistent coarse hairs or hair-bases; calyculary bracteoles with intense purple pigmentation in distal $\frac{1}{2}$ – $\frac{1}{3}$; achenes of ray florets c. 1 mm longer than those of disc florets and with a much broader carpopodial ring (Perth region and Busselton, W.A.) **78. *S. condylus***
- 3: Lower surface of leaves commonly glabrous or nearly so, sometimes occasional long hairs persistent; calyculary bracteoles with pigmentation usually not as intense and/or extensive as above; ray achenes not dimorphic as above or if ever approaching this degree of dimorphism, then only the distal $\frac{1}{4}$ or less of calyculary bracteoles pigmented
- 4 Involucre bracts > 5 mm long AND mature achenes of ray florets > 3 mm long; achenes of ray florets slightly longer than those of disc florets; attachment zones on receptacle for achenes of female florets more prominent than those for achenes of disc florets
- 5 Involucre bracts mostly c. 20; ligules mostly c. 13 (central Australia between latitudes 22° and 27° S) **85. *S. eremicola***

- 5: Involucral bracts mostly c. 13; ligules mostly c. 8; (arid Australia S of latitude 26°) **86. *S. lacustrinus***
- 4: Involucral bracts < 5 mm long AND/OR mature ray achenes < 3 mm long, or if involucral bracts and achenes slightly longer then achenes or receptacle not as above
- 6 Annuals, not developing bark on lower stems and taproot; leaves pressing thin; margin of mid-stem leaves with several to numerous teeth per side; in dried specimens paler involucre commonly contrasting with a brown to dark-brown receptacle (in some or most capitula) (southern Qld and adjacent eastern parts of N.T. and S.A.)
- 7 Involucral bracts mostly c. 18–22 (and ligules c. 13); achenes 2.5–3 mm long; achenes of female florets with surface partly obscured by fine hairs, with these hairs hardly overtopping pappus-ring (semiarid to arid SE to south-central Qld) **83. *S. brigalowensis***
- 7: Involucral bracts mostly 13 (and ligules c. 8), occasionally involucral bracts mostly c. 18; achenes 1.6–2.5 mm long; achenes of female florets with surface fully obscured by coarse papillose hairs, with these hairs strongly overtopping pappus-ring (L. Eyre basin, far SW Qld, NE S.A., also eastern N.T.) **84. *S. depressicola***
- 6: Perennials (commonly), with bark developing on lower stems and major branches and taproot; leaves pressing thin or somewhat fleshy; margin of stem/major branch leaves entire or with 1 or 2 (occasionally several) teeth per side; in dried specimens involucre and receptacles not contrasting as above or if so then marginal points on mid-stem (mid-branch) leaves few per side (NW and SE Australia)
- 8 Leaves not fleshy, pressing thin, above mid-branch tapering to subpetiolate basally; margin of leaves entire (Hamersley Ra. and environs and Cape Ra., W.A.) **87. *S. hamersleyensis***
- 8: Leaves often slightly fleshy, pressing thin or thick, above mid-branch often very narrow but generally not tapering basally; margin of leaves entire or denticulate (southern and eastern Australia)
- 9 Mid-branch leaves 2–3-pinnatisect **81. *S. pinnatifolius***
- 9: Mid-branch leaves 1-pinnatisect
- 10 Leaf segments ±filamentous (< 0.8 mm wide dried; l:w ratio > 15); calycular bracteoles 1–3 mm long, purple or black-tipped, mostly without coarse white hairs; achenes glabrous or variously hairy (dry hills, often rocky) **81. *S. pinnatifolius***
- 10: Leaf segments mostly narrowly oblong to narrowly linear (mostly > 0.8 mm wide dried; l:w ratio < 15); calycular bracteoles 1.8–3.5 mm long, generally black or brown-tipped, often with coarse white hairs; achenes ±densely hairy (semi-arid plains) **82. *S. spanomerus***
- 1: All or most capitula in an inflorescence with involucral bracts c. 13, and number of ligules similar (semiarid or mesic environments)
- 11 Leaves very fleshy, to 5 cm long; involucre 5–11 mm long; broader stereomes to 3.0 mm wide, not ridged on drying; achenes 3–7 mm long; pappus usually persistent (coastal or near-coastal dunes)
- 12 Undivided leaves with l:w ratio < 4 (rachis of divided leaves with l:w ratio < 15); leaf margins usually serrate or serrulate; calycular bracteoles not or hardly overlapping at anthesis; achenes glabrous or variously hairy (eastern Australia) **79. *S. spathulatus***
- 12: Undivided leaves with l:w ratio > 4 (rachis of divided leaves with l:w ratio > 15); leaf margins entire or nearly so; calycular bracteoles overlapping at anthesis; achenes densely hairy (SW W.A.) **80. *S. warrenensis***
- 11: Leaves thin to fleshy, to 15 cm long; involucre 3–8 mm long; broader stereomes to 1.5 mm wide, commonly ridged on drying; achenes 1.6–4.5 mm long; pappus mostly caducous

- 13** Plants ±erect, developing a stout taproot; mid-branch leaves with l:w ratio of rachis mostly > 10, undivided or pinnatisect with 1 or 2 (–3) segments per side; segments ±linear but not filamentous (rachis mostly > 0.8 mm wide; l:w ratio < 15 when dried); outer involucre bracts with hyaline margin very narrow (to c. 0.1 mm wide); calycular bracteoles narrowly ovate to lanceolate, usually ±all herbaceous and distinctly black- or brown-tipped; achenes to 2.8 mm long, less than half length of involucre bracts; ±densely papillose-hairy with hairs of achenes of ray florets exceeding pappus-ring (predominantly semiarid lowland environments of southern Australia)

82. *S. spanomerus*

- 13:** Plants not entirely as above (widespread but generally not as above)

81. *S. pinnatifolius*

78. *Senecio condylus* I.Thomps., *Muelleria* 21: 18 (2005)

T: summit of sand dune c. 1 km N of Oceanic Drive, City Beach, Perth, W.A., 25 Aug. 1979, *L.Haegi* 1871; holo: PERTH; iso: MEL, NSW.

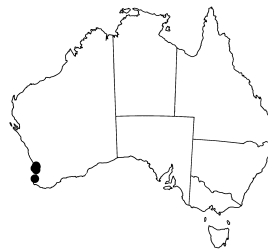
S. nebrodensis var. *glabratus* DC., *Prodr.* 6: 350 (1838). T: "...in rupibus pratisque asperis Siciliae (Guss.), Apenninis a Calabria (Ten.) ad Etruriam (Bert.), in Alpibus praec. Italiam spectantibus, Carniolia (Schouw), Croatia et Hungaria (W. et Kit.).", *n.v.*

Illustrations: I.R.Thompson, *op. cit.*, 18, fig. 9; 19, fig. 10.

Erect annuals to c. 0.4 m high. Leaves 3–8 cm long, undivided or lobate to sub-pinnatisect, slightly fleshy; base of upper-stem leaves becoming dilated, clasping; margin with few to numerous teeth; lower surface of leaves sometimes with persistent coarse hairs; undivided leaves with l:w ratio c. 6–12; divided leaves with 2–5 segments per side. Capitula several per stem; calycular bracteoles 8–12, 2–3 mm long, 0.6–1.2 mm wide, acute; involucre 4–6 mm long, 3–4 mm diam.; bracts c. 13, with broader stereomes of inner bracts 0.8–1.2 mm wide. Ligulate florets c. 8; ligule 6–10 mm long. Achenes 2–3.5 mm long, brown or dark brown, with papillose hairs mostly in bands covering 50–100% of surface; achenes of ligulate florets 0.5–0.8 mm longer than those of disc florets, with more robust hairs covering entire surface and more clearly exceeding pappus-ring; receptacular attachment areas dimorphic. Pappus 4–5 mm long.

Occurs in the Perth and Busselton regions of SW W.A. It has been collected once from Port Phillip Bay in Melbourne (identified as *S. nebrodensis* var. *glabratus*), but the lack of further collections suggests that it was adventive at this location. Grows in sand, often in disturbed sites. Flowers mostly winter–spring.

W.A.: S side, Lake Richmond Nat. Res., *A.Bellman* 27A (PERTH); Fortview Rd, Swanbourne, *R.J.Cranfield* 382 (MEL, PERTH); Fremantle, Oct. 1947, *N.Ingleton* (PERTH); Port Kennedy bushland, 15 km N of Mandurah, *G.J.Keighery* & *N.Gibson* 858 (PERTH); Busselton, Oct. 1909, *M.Koch* (PERTH).



The habit, leaf morphology, dimorphism of the achenes and the tuberculate processes on the receptacle margins suggests an affinity to the *Glossanthus* group. The apices of calycular bracteoles and involucre bracts are more strongly pigmented than in other species of the *Lautusoid* group.

79. *Senecio spathulatus* A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 125 (1834)

T: D'Entrecasteaux Channel, Tas., *A.Lesson*; holo: P *n.v.*

Sprawling to decumbent perennials to c. 0.5 m high. Leaves undivided or uncommonly lobate, 1–5 cm long, fleshy, wrinkling on pressing; base of upper-stem leaves sometimes becoming slightly dilated, weakly clasping, without narrow segments; margin usually serrate or serrulate, sometimes with few teeth or entire; undivided leaves with l:w ratio 2–3. Capitula 1–6 per stem; calycular bracteoles 8–12, 1.5–3 mm long, 1–2 mm wide, subacute to acute; involucre 5–11 mm long, 4–10 mm diam.; bracts mostly c. 13, with broader stereomes 1–3 mm wide. Ligulate florets c. 13; ligule 10–25 mm long. Achenes 3–7 mm long, orange, golden, light brown or straw coloured, with papillose hairs in narrow to broad bands, or glabrous; receptacular attachment areas homomorphic. Pappus persistent, 3–7 mm long.

Occurs in N.S.W., Vic. and Tas. A specialised coastal species growing on frontal sand dunes and forming low broad clumps. Flowers most of the year. There are 3 varieties.

Very similar to *S. pinnatifolius*, but distinguished by its short fleshy leaves, large fleshy capitula, and large fruit with a persistent pappus.

- 1 Mid-branch leaves usually tapering somewhat basally (width 3 mm from base commonly $< \frac{1}{3}$ of maximum width); achenes \pm densely hairy **79c. var. attenuatus**
- 1: Mid-branch leaves not or slightly tapering basally (width 3 mm from base commonly $> \frac{1}{3}$ of maximum width); achenes glabrous or sparsely to moderately hairy
- 2 Achenes 3–5.5 mm long, c. 0.5–0.8 mm diam., golden or dark brown, sparsely to moderately hairy or glabrous (Tas.) **79a. var. spathulatus**
- 2: Achenes 4–7 mm long, c. 0.8–1.2 mm diam., straw coloured to pale brown, glabrous or rarely with scattered hairs (eastern Vic., far SE N.S.W.) **79b. var. latifructus**

79a. *Senecio spathulatus* A.Rich. var. *spathulatus*

Illustration: C.Howells (ed.), *Tasmania's Nat. Fl.* 2nd edn 78 (2012).

Leaves in mid-region of major branches tapering slightly basally. Capitula: involucre 6–9 mm long, 3–7 mm diam.; broadest stereome 1.2–2 mm wide. Achenes 3–5.5 mm long, c. 0.5–0.7 mm diam., orange-brown or mid-brown, with ribs narrow, prominent; papillose hairs absent or sparse to dense in narrow bands. Pappus longer than achene; bristles not fused basally.

Occurs on the southern and western coasts of Tas., and on King Is. in Bass Strait.

Tas.: Ocean Beach, *A.M.Buchanan 15370* (HO); toward Green Point, near Marrawah, Tas., *E.M.Canning 1843* (CANB, NSW); Henty Dunes, c. 15 km N of Strahan, *P.C.Heyligers 93004* (CANB); Surprise Bay, *A.Moscal 901* (HO).

This variety of *S. spathulatus* is sympatric and possibly hybridises with *S. pinnatifolius* var. *maritimus* on the southern and western coastlines of Tas. and on King Is. Leaves of these taxa are similar in size, but *S. spathulatus* var. *spathulatus* typically has serrulate leaves that dry yellow, whereas *S. pinnatifolius* var. *maritimus* has entire leaves or leaves with few teeth that dry dark olive-green. The capitula of *S. spathulatus* var. *spathulatus* are larger and the achenes longer and with a persistent pappus. Further field work is needed to better understand the relationship between these two taxa.



79b. *Senecio spathulatus* var. *latifructus* I.Thomps., *Muelleria* 21: 35 (2005)

T: at westerly exit to beach from Lions Park at the end of East Beach Road, Lakes Entrance, Vic., 27 Mar. 1984, *P.C.Heyligers 84004*; holotype: MEL; isotype: CANB.

Illustrations: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 946, fig. 193f (1999), as *S. spathulatus*; I.R.Thompson, *op. cit.* 36, fig. 5.

Leaves in mid-region of major branches not tapering or tapering only slightly basally. Capitula: involucre 7–11 mm long, 5–10 mm diam.; broadest stereomes 2–3 mm wide. Achenes 4–7 mm long, c. 0.8–1.2 mm diam., pale brown or straw coloured, with ribs sometimes indistinct; papillose hairs absent or rarely scattered in lines along grooves. Pappus sometimes shorter than achene, particularly that of ray achenes; bristles sometimes fused basally.

Occurs on the E coast of Vic. E from Wilsons Promontory and in adjacent areas of far SE N.S.W.

N.S.W.: Nadgee Nat. Res., Cape Howe, 12 Nov. 2002, *J.Miles s.n.* (MEL).
Vic.: L. Tyers, \pm 6 km ENE of P.O., on frontal dunes on Ninety Mile Beach, *R.J.Adair 2240* (AD, CANB, MEL); Captain Cook Natl Park, W of Cape Everard Lighthouse, *A.C.Beauglehole 34488* (MEL); Ewing Marsh Wildlife Res., \pm 10 km SW of Orbost P.O., *A.C.Beauglehole 68188* (MEL).



This variety has the largest capitula and achenes of the three varieties. Although mostly with glabrous, sometimes unribbed achenes, occasional specimens have pale yellow achenes with scattered hairs.

79c. *Senecio spathulatus* var. *attenuatus* I.Thomps., *Muelleria* 21: 35 (2005)

T: Cronulla Recreation Res., N.S.W., 8 July 1988, *P.C.Heyligers* 88108; holo: CANB.

?*S. anacampterosotis* DC., *Prodr.* 6: 374 (1838). T: Port Jackson, N.S.W., *Fraser*; holo: G, photo CANB. [Possible synonymy is based on appearance of photograph of type, but protologue is at odds with circumscription.]

Leaves in mid-region of major branches tapering moderately basally. Capitula: involucre 6–10 mm long, 4.5–7 mm diam.; broadest stereomes 1.5–2.2 mm wide. Achenes 4–6 mm long, c. 0.5–0.7 mm diam., moderately narrowed at each end, light brown, with ribs obscured by indumentum; papillose hairs in broad bands covering all or most of surface. Pappus longer than achene; bristles not fused basally.

Occurs on the E coast of N.S.W. from Forster S to Jervis Bay (A.C.T.).

N.S.W.: Kurnell, Botany Bay, May 1906, *J.L.Boorman* (NSW); Wamberal Beach, Apr. 1911, *E.Cheel* (NSW); SE of Bombah Broadwater, Mungo Corner, Myall Lakes Natl Park, 2 Sept. 1988, *W.Greuter* (NSW); Mungo Beach, ENE of Mungo Brush, *A.N.Rodd* 3734 (NSW).

Fleshier leaves, larger capitula and longer, more densely hairy achenes distinguish this variety from coastal forms of *S. pinnatifolius* var. *pinnatifolius*, which occupies similar habitats.



80. *Senecio warrenensis* I.Thomps., *Muelleria* 21: 38 (2005)

T: Warren Drift Sands, W.A., 12 Sept. 1988, *P.C.Heyligers* 88139; holo: CANB.

Illustration: I.R.Thompson, *op. cit.* 37, fig. 6.

Sprawling to decumbent perennials to c. 0.3 m high. Leaves undivided or pinnatisect, 2–5 cm long, fleshy, wrinkling on drying; base of upper-branch leaves not or only slightly dilated toward summit, without narrow segments; margin \pm entire; undivided leaves with l:w ratio c. 8–10; pinnatisect leaves with 1–4 segments per side. Capitula 3–6 per stem; calycular bracteoles 12–18, 2.5–4.5 mm long, 1.5–2.5 mm wide, acute; involucre 7–9 mm long, 5–8 mm diam.; bracts mostly c. 13; broader stereomes 1.3–2 mm wide. Ligulate florets c. 13; ligule 8–15 mm long. Achenes 4–4.5 mm long, light brown, with papillose hairs obscuring most of surface; receptacular attachment areas homomorphic. Pappus not persistent, 5–8 mm long.

Known from the type locality c. 5 km inland from the coast and W of Northcliffe in SW W.A. and from an old record further E at Esperance Bay. Grows on unstable, drifting dunes where it is a pioneering species with *Poa poiformis*. Flowers recorded Sept.

W.A.: Esperance Bay, date unknown, *coll. unknown* (MEL 2168061); Warren Drift Sands, *P.C.Heyligers* 88140 (CANB).

Although closest to *S. spathulatus* in terms of fleshiness of the leaves and size of capitula and achenes, *S. warrenensis* is reminiscent of *S. pinnatifolius* var. *latilobus* in terms of the relatively broad, overlapping, and chevronned calycular bracteoles and the paler coloration of the involucral bracts on drying.



81. *Senecio pinnatifolius* A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 117 (1834)

S. carnulentus DC., *Prodr.* 6: 372 (1838), *nom. illeg.* (*S. pinnatifolium* in synonymy); *S. lautus* f. *pinnatifolius* (A.Rich.) Hochr., *Candollea* 5: 336 (1934). T: D'Entrecasteaux Channel, Tas., 1828–29, *A.Lesson*; *holo*: P. *S. aff. lautus*, Hj.Eichler, *Suppl. J.M.Black's Fl. S. Australia* 307 (1965).

Erect sprawling or decumbent annuals or subshrubs to c. 2 m high. Leaves undivided or variably divided, 0.5–12 cm long, slightly fleshy or not, thin on pressing or not; base of upper-branch leaves sometimes becoming dilated, narrow basal segments sometimes present, developing from a narrow or dilated base; margin entire, denticulate, dentate or serrate; undivided leaves with l:w ratio c. 1–50; divided leaves with 1–7 segments per side. Capitula 1–40 per stem or branch; calycular bracteoles 6–16, 0.5–3.5 mm long, 0.3–2.2 mm wide, subacute to acute; involucre 3–7.5 mm long, 2–5 mm diam.; bracts mostly c. 13, sometimes c. 20; broader stereomes of inner bracts 0.5–1.3 mm wide. Ligulate florets 8–13, not more than involucre bract number; ligule 6–20 mm long. Achenes (1.6–) 2.0–4.5 mm long, $\frac{1}{3}$ – $\frac{2}{3}$ length of involucre bracts, golden, light to dark brown, olive or sometimes reddish, with papillose hairs in bands, in varying densities, or glabrous. Pappus generally not persistent, 3–6 mm long.

A variable species occurring mostly within c. 300 km of the coast, from North West Cape, W.A., around southern Australia to Rodd's Penin., Qld, and Tas. It occurs predominantly in areas of moderate to high rainfall, but also in arid or semiarid environments in W.A. and on the coast of S.A. Flowers most of the year. Eight varieties are recognised.

In the following key, leaves, unless otherwise indicated, refers to leaves in the middle third of stems and major branches. Assessment of the involucre bracts and bracteoles will generally require magnification.

- 1 Leaves bi- or tri-pinnatisect; stems succulent; capitula and leaves rather crowded; ligules not or hardly longer than involucre in pressed specimens (Bass Strait Is.) **81e. var. capillifolius**
- 1: Leaves not bi-pinnatisect, or if so then stems not or hardly succulent, capitula and leaves crowded or lax; ligules generally distinctly longer than involucre in pressed specimens
 - 2 Distal portion of stereome of inner involucre bracts usually bordered by a purple chevron, more than twice as broad as stereome of outer bracts (both measured c. 1 mm below apex); margin of outer bracts c. as broad as stereome 1 mm below apex; taproot generally poorly developed (southern S.A., Vic. & SE N.S.W., northern Tas., including Bass Strait Is.) **81d. var. lanceolatus**
 - 2: Distal portion of stereome of inner involucre bracts not bordered by a purple chevron, or only faintly bordered, generally less than twice as broad as that of outer bracts (both measured c. 1 mm below apex); margin of outer bracts narrower than stereome 1 mm below apex; taproot often well-developed
 - 3 Calycular bracteoles 10–16, broadly ovate to ovate, > 0.8 mm wide at mid-point AND length less than twice the width at mid-point, largely hyaline; apex of stereome of inner involucre bracts commonly with a faint chevron (SW W.A.) **81b. var. latilobus**
 - 3: Calycular bracteoles 6–12, ovate to lanceolate, either < 0.8 mm wide at mid-point OR length more than twice the width at mid-point, usually predominantly herbaceous; chevron generally absent
 - 4 Leaves thin, markedly discolorous; marginal teeth generally 15 or more per side; upper-branch leaves with base not narrower than mid-leaf (forests of SE Qld and northern N.S.W.) **81c. var. serratus**
 - 4: Leaves usually somewhat fleshy and/or succulent, not or only slightly discolorous; marginal points fewer than 15 per side, or if more then upper-branch leaves with base narrower than mid-leaf
 - 5 Plants often rhizomatous, with aerial stems \pm unbranched; leaves oblanceolate in outline and/or marginal points and segments clearly more numerous beyond mid-leaf; usually both peduncle and margin of calycular bracteoles moderately pubescent (montane to alpine regions) **81f. var. alpinus**

- 5: Plants not rhizomatous, with stems generally branched; leaves not as above or if so then peduncle and margin of bracteole not both pubescent
- 6 Leaves crowded, fleshy, 1–2 cm long; achenes c. 4 mm long, with surface completely obscured by hairs (W.A.) **81h. var. leucocarpus**
- 6: Leaves various; achenes not entirely as above
- 7 Leaves generally only slightly fleshy, pressing fairly thin; leaves often developing straplike basal segments from a narrow rachis; rachis of upper-branch leaves generally narrower than stem at base; achenes to 4.5 mm long, usually c. $\frac{1}{2}$ – $\frac{2}{3}$ length of involucre bracts (widespread) **81a. var. pinnatifolius**
- 7: Leaves fleshy, pressing thick, and often coarsely wrinkled; leaves not developing straplike basal segments from a narrow rachis; rachis of upper-branch leaves often as broad as or broader than stem at base; achenes to 3 mm long, generally less than $\frac{1}{2}$ length of involucre bracts
- 8 Erect plants; l:w ratio of rachis of leaves 6–50; hairs of ray floret achenes not exceeding pappus-ring (W.A.) **81a. var. pinnatifolius**
- 8: Sprawling to prostrate plants; l:w ratio of rachis of leaves mostly 1–10; hairs of ray floret achenes exceeding pappus-ring (southern coast, including western Tas.) **81g. var. maritimus**

81a. Senecio pinnatifolius A.Rich. var. pinnatifolius

[The types of some of the following synonyms have not been seen or are deemed inadequate for identification. They are tentatively placed here as synonyms based on their provenance and/or on information given in R.O.Belcher, *Austral. Syst. Bot.* 7: 71–85 (1994).]

?*S. gaudichaudianus* A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 98 (1834). T: Port Jackson, N.S.W., 1819, *C.Gaudichaud-Beaupré* 7; holo: P n.v., fide R.O.Belcher, *op. cit.* 84.

S. tripartitus A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 114 (1834); *S. triplipartitus* Steud., *Nom. Bot.* 2nd edn, 2: 566 (1840), *nom. illeg.* T: Port Jackson, N.S.W., 1828–29, *A.Lesson*; lecto: P, fide R.O.Belcher, *op. cit.* 81.

S. crithmifolius A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 116 (1834), *nom illeg. non Scop.* (1772). T: 'Île des Dangarous et Îles Steriles', state unknown; holo: P n.v., fide R.O.Belcher *op. cit.* 81, 84.

S. macquariensis DC., *Prodr.* 6: 372 (1838). T: Banks of the Macquarie R., N.S.W., Apr. 1817, *A.Cunningham* 143; holo: G n.v., fide R.O.Belcher, *op. cit.* 81.

S. endlicheri DC., *Prodr.* 6: 373 (1838). T: 'Nova Hollandia' locality unknown, 1834, *Endlicher* 1; holo: G n.v., fide R.O.Belcher, *op. cit.* 81.

S. oligocephalus DC., *Prodr.* 6: 373 (1838). T: 'Nova-Hollandia', [probably N.S.W.], *Sieber* 609; G n.v.

S. sieberianus DC., *Prodr.* 6: 373 (1838). T: 'Nova-Hollandia', [probably N.S.W.], *Sieber* 643; G n.v.

[*S. lautus* subsp. *maritimus* auct. non Ali: G.J.Harden in G.J.Harden (ed.), *Fl. New South Wales* 3: 309 (1992)]

Illustration: I.R.Thompson, *Muelleria* 21: 43, fig. 8 (2005).

Erect, sprawling or decumbent plants, to c. 1.0 m high; taproot generally well-developed. Leaves to c. 10 cm long, undivided or pinnatisect, slightly to moderately fleshy, not or slightly discoloured; base of upper-branch leaves not or only slightly dilated, straplike basal segments sometimes present, developing from a narrow base; marginal points up to 20 per side, mostly \pm evenly distributed; pinnatisect leaves mostly with 2–5 segments per side; l:w ratio of segments 4–30. Capitula (1–) 3–20 per inflorescence; peduncle usually glabrous or nearly so; calycular bracteoles 6–10, 1–2.5 mm long, 0.3–1.2 mm wide; involucre 3–7.5 mm long, 2–5 mm diam.; bracts mostly c. 13, sometimes c. 20; chevron absent. Ligulate florets 8–13, \pm equal to or less than involucre bract number. Achenes 2–4.5 mm long, $\frac{2}{5}$ – $\frac{2}{3}$ length of involucre bracts, with papillose hairs in bands covering up to $\frac{2}{3}$ of surface.

Occurs from near Onslow, W.A., around southern Australia excluding the region of the Great Australian Bight, to Shoalwater Bay, Qld, mostly within 400 km of the coast. Grows in a range of environments, including dry hills and coastal dunes, in forest, woodland and scrubland.

W.A.: 2 km E of Miaboola Beach, about 10 km N of Carnarvon, *R.Story* 8225 (MEL, PERTH). S.A.: Little Dip Conservation Park, *P.Gibbons* 272 (CBG). Qld: c. 10 km W of Warwick on Cunningham Hwy, then 1 km from turnoff towards Goondiwindi, 15 Sept. 1993, *I.J.Radford s.n.* (BRI, CANB). N.S.W.: between Tuncurry Beach Caravan Park and sea, *J.R.Hosking* 739 & *R.Holtkamp* (CANB, MEL, NE, NSW). Vic.: 1 km W of Thurra R. crossing on Cape Everard Lighthouse Track; 3 km NE of Cape Everard, *G.Lucas* 41 (MEL). Tas.: Roaring Beach Bay, Tasman Penin., *A.E.Orchard* 5239 (AD, HO, MEL, NSW).



This variety represents a complex of subtly different forms that currently resist discrimination. In the Carnarvon district on the W coast of W.A., plants have a long, slender taproot, a lower stem that develops a silvery bark, relatively large capitula, small bracteoles, and relatively short achenes. A form from drier inland parts of central-eastern and NE N.S.W. and SE Qld has very narrow, often filamentous leaf segments, relatively few, small capitula and often has capitula with c. 20 involucre bracts. This form is similar to *S. spanomerus*, but the latter has leaves with a broader rachis and segments, its leaves do not develop narrow basal segments from a narrow base, its inflorescences have more, slightly larger, capitula, and calycular bracteoles are longer and often with coarse white marginal hairs. A similar form occurs in woodlands E and SE of Perth, W.A. In NE Vic. another filamentous-leaved form has relatively large capitula, commonly with c. 20 involucre bracts.

A widespread form, recognised as *S. lautus* subsp. *maritimus* sensu G.J.Harden in G.J.Harden (ed.), *Fl. New South Wales* 3: 309 (1992), extending along the coasts of southern Qld, N.S.W. and eastern Tas. has somewhat succulent leaves with the rachis of upper-branch leaves commonly narrowly oblanceolate. Achenes of this form are typically relatively long and slender, extending more than half the length of the involucre bracts. Compared to *S. pinnatifolius* var. *maritimus*, which occurs on the southern mainland coastline, its leaves are less fleshy, narrower basally, with generally more marginal points, and often with slender basal segments, and its achenes are distinctly longer and relatively more slender, with finer, shorter hairs in narrower grooves. A few collections assigned to var. *pinnatifolius* from the Cape Arid region and Mondrain Is. in southern W.A. are tall perennials (to 1.5 m high). Further collections from this area are desirable.

81b. *Senecio pinnatifolius* var. *latilobus* (Steetz) I.Thomps., *Muelleria* 21: 45 (2005)

S. carnulentus DC. var. *latilobus* Steetz in J.G.C.Lehmann, *Pl. Preiss.* 1: 485 (1845), as *latiloba*. T: near Perth, W.A., 16 July 1839, *L.Preiss* 110; lecto: W n.v., fide R.O.Belcher, *Austral. Syst. Bot.* 7: 77 (1994); isolecto: MEL.

S. carnulentus var. *angustissimus* Steetz in J.G.C.Lehmann, *Pl. Preiss.* 1: 485 (1845), as *angustissima*. T: Rottneist Is., W.A., 20 Aug. 1839, *L.Preiss* 109; lecto: MEL, fide R.O.Belcher, *loc. cit.*

Illustration: I.R.Thompson, *op. cit.* 46, fig. 9.

Erect plants to c. 0.6 m high; taproot generally well-developed. Leaves to c. 10 cm long, undivided or more often pinnatisect, sometimes bi-pinnatisect, slightly fleshy, hardly discoloured; base of upper-branch leaves not or only slightly dilated, with narrow basal segments sometimes present, sometimes developing from a narrow base; marginal points 2–12 per side, mostly \pm evenly distributed; undivided leaves linear; pinnatisect leaves with 1–4 segments per side. Capitula 3–20 per inflorescence; peduncle usually glabrous or nearly so; calycular bracteoles 10–16, 1.5–3 mm long, 0.8–2.2 mm wide; involucre 3.5–5.5 mm long, 3–4 mm diam.; bracts mostly c. 13; chevron present, inconspicuous. Ligulate florets c. 13. Achenes 2–3 mm long, $\frac{2}{5}$ – $\frac{3}{5}$ length of involucre bracts, with papillose hairs in bands covering 60–90% of surface.

Occurs in SW W.A. on or near the coast and on nearby islands, from Shark Bay S and E to Bremer Bay. Grows in sandy soils in forest, woodland, and scrubland.



W.A.: City Beach, Perth, *T.E.H.Aplin* 988 (MEL, PERTH); Mullaloo Beach Rd, *H.Demarz* 2727 (CANB, PERTH); between Gloucester Lodge and Main Rd, Yanchep Natl Park, *A.M.James* 217 (PERTH).

This variety is characterised by the numerous, relatively broad and largely hyaline calycular bracteoles, and to a lesser extent by its erect habit, well-developed taproot, and the fine chevron often outlining the stereome of the inner involucre bracts. The calycular bracteoles are frequently imbricate at anthesis. The chevron seen in var. *latilobus* is more acute than that of var. *lanceolatus*, corresponding to the shape of the stereome. It is very similar to the form of *S. pinnatifolius* var. *pinnatifolius* that occurs N of Geraldton, and the two taxa appear to intergrade where their distributions overlap. Another form occurs predominantly on islands off the W coast of W.A. in guano-rich environments. It is more succulent than the typical form, and commonly has narrowly elliptic leaves with a broad rachis and serrulate margins, and relatively congested capitula.

81c. *Senecio pinnatifolius* var. *serratus* I.Thomps., *Muelleria* 21: 47 (2005)

T: Acacia Plateau, Qld, 5 Mar. 1951, *L.J.Webb* 2464; holo: CANB.

Illustration: I.R.Thompson, *op. cit.* 48, fig. 10.

Erect plants to c. 1 m high; taproot moderately developed. Leaves to c. 15 cm long, commonly undivided, sometimes deeply lobate to pinnatisect, not fleshy, discolorous; base of upper-branch leaves becoming somewhat dilated and clasping, sometimes with straplike basal segments; marginal serrulations 10–30 per side, \pm evenly distributed; divided leaves with 1–3 segments per side; l:w ratio of rachis of segments 3–5. Capitula 3–20 per inflorescence; peduncle glabrous or somewhat hairy; calycular bracteoles 6–10, 1.5–2.5 mm long, 0.8–1.3 mm wide; involucre 4–6 mm long, 3–4 mm diam.; bracts mostly c. 13; chevron absent. Ligulate florets 8–13. Achenes 2.5–3.2 mm long, $\frac{1}{2}$ – $\frac{3}{5}$ length of involucre bracts, glabrous or with papillose hairs usually somewhat sparse in narrow bands.

Occurs in SE Qld S from the Bunya Mtns and in NE to central-eastern N.S.W. S to Barrington Tops. Grows in forests, often at margins of rainforest, and sometimes in cleared areas.

Qld: Great Dividing Ra. E of Warwick, a few km W of Queen Mary Falls on road from Killarney, 15 Sept. 1993, *I.Radford s.n.* (BRI, CANB); O'Reilly's, Lamington Natl Park, *L.S.Smith & L.J.Webb* 3586 (BRI, CANB). N.S.W.: New England Natl Park, Darkie Point, *P.Gilmour* 7085 (CANB, NSW).

The leaf morphology of var. *serratus* is similar to that of var. *lanceolatus*. However, the former has different involucre bract morphology and its inflorescences generally have fewer capitula. Variety *serratus* is also similar to var. *alpinus* but the leaves differ in the shape and position of marginal points. In Barrington Tops, N.S.W., the leaves of this variety are generally less conspicuously serrulate than in populations further north.



81d. *Senecio pinnatifolius* var. *lanceolatus* (Benth.) I.Thomps., *Muelleria* 21: 49 (2005)

S. lautus var. *lanceolatus* Benth., *Fl. Austral.* 3: 667 (1867); *S. lautus* subsp. *lanceolatus* (Benth.) Ali, *Austral. J. Bot.* 17: 173 (1969). T: Port Phillip, Vic., *Adamson*; lecto: K, photo CANB, *fide* S.I.Ali, *loc. cit.*; remaining syn: K, photo CANB.

S. pinnatifolius var. 2, N.G.Walsh in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 948 (1999), *p.p.*

S. pinnatifolius var. 3, N.G.Walsh in N.G.Walsh & T.J.Entwistle (eds), *op. cit.* 949.

Illustration: I.R.Thompson, *op. cit.* 50, fig. 11.

Erect or sprawling plants to c. 1.5 m high; taproot poorly developed. Leaves to c. 15 cm long, undivided or lobate to pinnatisect, rarely bi-pinnatisect, slightly fleshy or not, discolorous or not; base of upper-branch leaves often becoming somewhat dilated and clasping, with basal segments; marginal points 8–40 per side, \pm evenly distributed; pinnatisect leaves with mostly 2–5 segments per side; lobate leaves sometimes with numerous antrorse triangular lobes. Capitula 3–40 per inflorescence; peduncle glabrous or with long hairs; calycular bracteoles 6–14, 2–3.5 mm long, 0.8–1.6 mm wide; involucre

4–7 mm long, 3–6 mm diam.; bracts mostly c. 13; chevron present. Ligulate florets mostly c. 13. Achenes (1.6–) 2–3 mm long, $\frac{2}{5}$ – $\frac{1}{2}$ length of involucre bracts, glabrous or with papillose hairs in narrow to broad bands. Fig. 35H–M.

Occurs in SE S.A., throughout southern Vic., in SE N.S.W., and northern Tas. including islands in Bass Strait. Grows in forest, woodland and shrubland in lowland to hilly environments.

S.A.: State Forest, National Trust Lease, adjacent to W side of Lower Glenelg Natl Park, *J.Z. Weber* 7783 (AD). N.S.W.: near the mouth of Saltwater Ck, S of Eden, *D.E. Albrecht* 722 (MEL, NSW). Vic.: Mt Dundas, Grampians, c. 25 km NE of Cavendish, *P.C. Jobson* 3931 *et al.* (BRI, CANB, MEL); 11.5 km NW of Foster on road to Meeniyan, *M.E. Lawrence* 1093 (AD). Tas.: Blackmans Lagoon, *A. Moscal* 4549 (CANB, HO).



This variety differs from the other varieties most significantly in its involucre bract morphology, in particular in having inner bracts marked with a purple chevron, the relatively large disparity in width between the stereomes of the inner and outer bracts (measured c. 1 mm below apex), and the relatively broad hyaline distal margin of the outer bracts. The leaves commonly have a relatively high number of marginal points, the number of capitula per inflorescence is often high, and the taproot is poorly developed. The chevron in var. *lanceolatus* can be discernible with the naked eye. In dried specimens, the relatively broad distal portion of the stereome that the chevron outlines is green centrally, but there is usually a pale zone between this green portion and the chevron.

81e. *Senecio pinnatifolius* var. *capillifolius* (Hook.f.) I.Thomps., *Muelleria* 21: 51 (2005)

S. capillifolius Hook.f. in W.J.Hooker, *London J. Bot.* 6: 123 (1847). T: Tas., *R.C. Gunn* 705; holo: K, photo MEL.

S. lautus var. *capillifolius* F.Muell., *Contr. Phytogr. Tas.* 34 (1877), *nom. nud.*, *nom. inval.*

Illustration: I.R.Thompson, *op. cit.* 53, fig. 12.

Erect or sprawling plants to c. 0.8 m high; taproot moderately developed. Leaves to c. 10 cm long, bi- or tri-pinnatisect, moderately fleshy, concolorous; base of upper-branch leaves commonly becoming somewhat dilated and clasping, with basal segments; marginal points 6–40 per side, \pm evenly distributed; divided leaves with 2–7 primary segments per side. Capitula 3–15 per inflorescence; peduncle glabrous or nearly so; calycular bracteoles 8–12, 1.5–3.0 mm long, 0.7–1.2 mm wide; involucre 4–7 mm long, 3–6 mm diam.; bracts c. 13 or c. 20; chevron absent. Ligulate florets mostly c. 13. Achenes 2–3 mm long, $\frac{1}{3}$ – $\frac{2}{5}$ length of involucre bracts, with papillose hairs in broad bands.

Occurs on islands of the Bass Strait, Tas., notably of the Furneaux and Kent groups. Grows in often rocky environments on or near the coast.

Tas.: Round Islet, Hogan Group, *N.P. Brothers* 85 (HO); Little Chalky Is., *A.M. Buchanan* 11210 (HO, MEL); North Middle Pasco Is., off W coast of Flinders Is., 14 Dec. 1986, *S. Harris* (HO); W slope of summit, Boxen Is., *J.S. Whinray* 8723 (AD, CANB, HO, MEL).



This variety is characterised by succulent branches (generally quite flattened after pressing), congested corymbiform inflorescences that are held only a short distance above the often congested upper-branch leaves, ligules not or hardly longer than the involucre, and relatively short achenes. There are two distinct extremes of leaf forms but there are also numerous specimens of an intermediate nature. The type specimen has leaves with long, filiform primary and secondary segments, whereas another form has smaller intricately divided often tri-pinnatisect leaves with segments rather crowded. This variety and var. *pinnatifolius* are the two varieties of *S. pinnatifolius* to develop capitula with c. 20 involucre bracts. Forms of var. *lanceolatus* with bi-pinnatisect leaves, some of which occur on Bass Strait Is., resemble var. *capillifolius* but these forms have different involucre bract morphology, less congested inflorescences and upper-branch leaves, and ligules much longer than the involucre.

81f. *Senecio pinnatifolius* var. *alpinus* (Ali) I.Thomps., *Muelleria* 21: 52 (2005)

S. lautus subsp. *alpinus* Ali, *Austral. J. Bot.* 17: 167 (1969). T: Mount Buffalo Natl Park, on SW margin of L. Catani, Vic., 21 Feb. 1963, J.H. Willis; holo: MEL.

?*S. rupicola* A.Rich. in J.S.C. Dumont d'Urville, *Voy. Astrolabe* 2: 119, t. 37 (1834). T: Tas., 1828, A. Lesson 19; holo: P.

S. pinnatifolius var. *pleiocephalus* Belcher, *Muelleria* 9: 127 (1996), *nom. inval.*

Illustration: I.R. Thompson, *op. cit.* 55, fig. 13.

Erect plants to c. 1 m high, sometimes rhizomatous; taproot poorly to moderately developed. Leaves to c. 10 cm long, undivided, or more often lobate to pinnatisect, usually slightly fleshy, not or slightly discoloured; base of upper-branch leaves not or only slightly dilated, hardly clasping, basal segments only from a dilated base; marginal points 5–25 per side, more numerous beyond midleaf; divided leaves with up to 6 segments per side. Capitula mostly 3–15 per inflorescence; peduncle hairy; calycular bracteoles 6–12, 1.5–3 mm long, 0.6–1.2 mm wide; involucre 3.5–6 mm long, 3–4 mm diam.; bracts mostly c. 13; chevron absent, rarely weakly developed. Ligulate florets mostly c. 13. Achenes 2.5–3.5 mm long, $1/2$ – $3/4$ length of involucre bracts, glabrous or with papillose hairs in narrow bands.

Occurs in SE Australia from the Brindabella Ra. in A.C.T. and N.S.W. S to the Kosciuszko region and SE to the highlands of eastern Vic., and in north-central and SE Tas. Grows at moderate to high altitudes in forest, woodland and alpine meadows.

N.S.W.: opposite Blue L. on main track from Charlotte Pass to Mt Kosciusko via Club L., Mount Kosciusko Natl Park, *P.S. Short 4000 et al.* (AD, CANB, MEL, NSW). A.C.T.: summit plateau area of Mt Gingera, Bimberi Ra., *R. Schodde 1246* (AD, CANB, NSW). Vic.: Bogong High Plains, near Wilkinson Lodge, *T.B. Muir 2810* (MEL). Tas.: cross-country track E of ski village, Ben Lomond Natl Park, *R.J. Bayer Tas-00010 et al.* (CANB, HO).



Variety *alpinus* is largely separated geographically and altitudinally from other varieties. It has oblanceolate leaves with relatively distally positioned marginal points or segments, however smaller-leaved forms are sometimes difficult to distinguish from those of var. *pinnatifolius*. Variety *alpinus* is generally also recognisable by the moderately dense pubescence on both the peduncle and bracteole margins, and sometimes by its rhizomatous, scapiform habit.

81g. *Senecio pinnatifolius* var. *maritimus* (Ali) I.Thomps., *Muelleria* 21: 54 (2005)

S. lautus subsp. *maritimus* Ali, *Austral. J. Bot.* 17: 168 (1969). T: D'Estrees Bay [Kangaroo Is.], S.A., c. 1880, *R. Tate s.n.*; holo: AD [Ali's type citation mistakenly places D'Estrees Bay on the W coast of S.A. S of Ceduna].

Illustration: I.R. Thompson, *op. cit.* 57, fig. 14.

Sprawling, decumbent or prostrate plants to c. 0.4 m high; taproot poorly to moderately developed. Leaves to c. 4 cm long; undivided or occasionally lobate, fleshy; base of upper-branch leaves usually slightly to moderately dilated, slightly clasping, straplike basal segments never developed; marginal points 0–8 per side, often more numerous beyond midleaf; divided leaves with 1 or 2 lobes per side. Capitula mostly 1–7 per inflorescence; peduncle \pm glabrous; calycular bracteoles 6–10, 1.5–2.5 mm long, 0.8–1.5 mm wide; involucre 4–7 mm long, 3–6 mm diam.; bracts mostly c. 13; chevron absent. Ligulate florets mostly c. 13. Achenes 2–3 mm long, $2/5$ – $1/2$ length of involucre bracts, with papillose hairs in broad bands.

Occurs on the coast of southern Australia from near Perth, W.A., to Cape Otway in western Vic., and in coastal western Tas. Grows on rocky cliffs, in rocky crevices and in sand dunes, commonly associated with limestone on the mainland.

W.A.: c. 14 km E of the mouth of Oldfield R., *A.E. Orchard 1477* (AD, PERTH). S.A.: Pennington Bay, Kangaroo Is., *D. Symon 14292* (AD). Vic.: Petrified forest area, Cape Duquesne, *I.R. Thompson 734* & *J. Stubbings* (AD, MEL). Tas.: Pegg Ck, Hartwell Cove, *A. Moscal 10008* (AD, HO).



This variety can be difficult to distinguish from coastal forms of var. *lanceolatus* and var. *pinnatifolius*, and from *S. spanomerus* q.v. Variety *maritimus* intergrades and/or hybridises with *S. spanomerus* along the S.A. coast. Similarities in leaf and achene morphology suggest a close relationship between these taxa. In the Tas. form of var. *maritimus*, the uppermost leaves are more dilated basally, the calycular bracteoles are smaller and the achenes are differently coloured (achenes of ray florets olive-brown rather than reddish, achenes of disc florets golden rather than brown) compared to the mainland form. The Tas. form can be difficult to distinguish from *S. spathulatus* var. *spathulatus*, which occupies similar coastal habitats (see notes under the latter). Variety *maritimus* differs from the coastal form of var. *pinnatifolius* that is widespread along the eastern coast of Australia including Tas. (and previously identified as *S. lautus* subsp. *maritimus*) by having fleshier leaves, generally fewer leaf segments (if present) and with a lower length:width ratio, shorter achenes relative to the length of the involucre bracts, and the rachis of upper-branch leaves broader near the base and never developing strap-like basal segments.

81h. *Senecio pinnatifolius* var. *leucocarpus* I.Thomps., *Muelleria* 21: 58 (2005)

T: Dempster Inlet, Middle Mount Barren, W.A., 21 Sept. 1948, *C.A.Gardner 9194*; holo: PERTH; iso: PERTH.

Illustration: I.R.Thompson, *op. cit.* 59, fig. 15.

Sprawling, decumbent or prostrate plants to c. 0.2 m high; taproot not known. Leaves to 2 cm long, undivided or lobate, fleshy; base of upper-branch leaves not or slightly dilated, hardly clasping, straplike basal segments not developed; marginal points 0–2 per side; divided leaves with 1 lobe per side. Capitula mostly 1–5 per inflorescence; peduncle and margin of bracteoles glabrous; calycular bracteoles 8–10, 2–3 mm long, 0.8–1.5 mm wide; involucre 5–6 mm long, c. 4 mm diam.; bracts mostly c. 13; chevron absent. Ligulate florets c. 13. Achenes 4–4.5 mm long, c. $\frac{2}{3}$ length of involucre bracts, with papillose hairs obscuring entire surface.

Known only from the type collection at Dempster Inlet E of Esperance, W.A. There is no habitat information but it is likely to be a specialised coastal plant.

This variety is readily recognised by a combination of small, crowded fleshy leaves and long, densely hairy achenes. The hairs of the achene clearly exceed the pappus ring.



82. *Senecio spanomerus* I.Thomps., *Muelleria* 21: 58 (2005)

T: 4 miles [c. 7 km] E of Kiki, S.A., Aug. 1961, *R.L.Specht*; holo: MEL.

S. lautus subsp. *dissectifolius* Ali, *Austral. J. Bot.* 17: 168 (1969). T: Vic., Wyperfeld Natl Park, NW Mallee, 16 July 1961, *J.H.Willis*; holo: MEL.

S. pinnatifolius var. 1, N.G.Walsh in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 948 (1999).

Illustration: I.R.Thompson, *op. cit.* 62, fig. 17.

Erect subshrubs to c. 1 m high. Leaves undivided or pinnatisect, 2–10 cm long, mostly slightly fleshy; base of upper-branch leaves sometimes becoming dilated, never with narrow segments from an undilated base; margin mostly entire or nearly so; undivided leaves with l:w ratio c. 10–50; pinnatisect leaves with 1 or 2, rarely 3, segments per side. Capitula 3–20 per branch; calycular bracteoles 6–12, 2–3.5 mm long, 0.6–1 mm wide, peracute; involucre 4–6 mm long, 3–4 mm diam.; bracts c. 13, or c. 20; broader stereomes of inner bracts 0.5–1 mm wide. Ligulate florets 8–13, commonly fewer than number of involucre bracts; ligule 6–12 mm long. Achenes 1.8–2.8 mm long, c. $\frac{2}{5}$ – $\frac{1}{2}$ length of involucre bracts, brown or reddish, with papillose hairs obscuring 50–100% of surface; achenes of ligulate florets usually reddish rather than brown, with longer hairs exceeding pappus-ring more clearly. Pappus not persistent, 4–5 mm long. Fig. 35N–O.

Occurs in southern Australia from Pallinup R., W.A. E through S.A. to the Weddin Mtns in south-central N.S.W.; also in NW Vic. Grows predominantly in semi-arid environments in sandy and loamy soils in lowland plains and sandhills, including coastal dunes. Flowers mostly late winter–spring.

W.A.: Balladonia, 16 Aug. 1958, *R.Filson* (MEL). S.A.: Pine Point, c. 18 km S of Ardrossan, Yorke Penin., *R.V.Smith* 89/11 (AD, CANB, MEL); E side of Murray Rd from Murray Bridge to Mannum on corner of road to Bow Hill, *D.J.E.Whibley* 8683 (AD, MEL). N.S.W.: 30 km W of Euston, *W.E.Mulham* 1348 (CANB). Vic.: Glenlee Flora and Fauna Res., *A.C.Beaglehole* 84321 (AD, MEL).



Senecio spanomerus can be distinguished from most varieties of *S. pinnatifolius* using a combination of the following characters: the shape, pigmentation, texture and indumentum of the calycular bracteoles, the number and positioning of leaf-segments, the lack of development of straplike basal segments from a narrow base, the lack of marginal points, involucre bract number and the narrower hyaline margin of involucre bracts, and the relatively short achenes with hairs overtopping the pappus-ring. Forms of *S. pinnatifolius* var. *pinnatifolius* occurring on the tablelands of N.S.W. and southern Qld and also in SW W.A. are particularly close to *S. spanomerus* but they have finer leaf rachides and segments, their leaves often have straplike basal segments arising from a narrow base, their capitula and calycular bracteoles are generally smaller, and the bracteoles are often purple-tipped.

Along the coast of S.A. the distributions of *S. spanomerus* and *S. pinnatifolius* var. *maritimus* tend to overlap, and these taxa may be difficult to distinguish, especially because of the stunting effect of the coastal environment. *Senecio spanomerus* is an erect plant with less fleshy leaves; its leaf rachides and segments have a higher length:width ratio and generally do not develop marginal points in the distal third; the involucre bracts have a narrower hyaline margin; and it generally has more capitula per inflorescence. Hybrids between these taxa are also likely to occur.

Senecio spanomerus is also similar to *S. lacustrinus* which replaces it in more arid regions to the north and west. Differences between these species are discussed under the latter.

83. *Senecio brigalowensis* I.Thomps., *Muelleria* 21: 63 (2005)

T: 5 km N of 'Mooramin' Stn, Qld, 12 Aug. 1964, *L.G.Adams* 1267; holo: BRI; iso: CANB.

Illustration: I.R.Thompson, *op. cit.* 65, fig. 18.

Erect annuals to c. 0.5 m high. Leaves mostly lacerately lobate or pinnatisect, 3–12 cm long, thin on pressing; base of upper-stem leaves often becoming dilated, with long basal segments; margin with occasional teeth; undivided leaves with l:w ratio c. 5–10; divided leaves with 2 or 3 segments per side. Capitula few to several per stem; calycular bracteoles 6–8, 1–2 mm long, 0.5–0.8 mm wide, peracute; involucre 4–5 mm long, 2.5–4 mm diam.; bracts mostly c. 20; broader stereomes of inner bracts mostly 0.5–0.8 mm wide. Ligulate florets c. 13; ligule 6–8 mm long. Achenes 2–3 mm long, c. $\frac{1}{5}$ length of involucre bracts, golden, brown, olive-brown or green, with papillose hairs obscuring c. 50% of surface, hardly exceeding pappus-ring. Pappus not persistent, c. 4 mm long. Fig. 36A–B.

Occurs in southern and central Qld from Castle Rock NW of Quilpie E to Nanango and NE to near Mackay. Flowers most of year.

Qld: 30 km N of Tambo, *R.Duthie* 401 (CANB); 64.5 km N of Injune, just N of Wallaroo Stn turnoff, *D.L.Jones* 6277 & *B.E.Jones* (CANB); Warren Point Stn, Mitchell, 24 Aug. 1968, *P.N.Martensz* (CANB); c. 400 m on side road from Callide Valley Rly Line through to Burnett Hwy, c. 6 km NNW of Biloela, 16 Sept. 1993, *I.Radford s.n.* (BRI, CANB, MEL, NSW, PERTH); Sawmill Rd, 1 km off road to Brigalow Research Stn, Glenmoral Gap, E foot of Dawson Ra., *I.R.Telford* 11927 (BRI, CANB, NSW).



Senecio brigalowensis is an annual with leaves pressing thin, narrow to broad leaf segments, short capitula with many involucre bracts, and achenes with short appressed papillose hairs. A form of *S. pinnatifolius* var. *pinnatifolius* that occurs further to the E and S than *S. brigalowensis* has similar capitula, however it is commonly perennial, its leaf rachides and segments are all filamentous, the peduncle is longer, and the involucre bracts are more herbaceous (drying green or olive rather than yellow-green), with resin ducts more

pronounced, margins of outer bracts distinctly broader, and bracteoles often purple-tipped. The annual species *S. tuberculatus*, although not lautusoid, is superficially similar to and sympatric with *S. brigalowensis*, but the former is distinguished by the coarse hairs on the involucre bracts and the much coarser pappus bristles, as well as by the greater length and narrow bottle-shape of the achenes.

84. *Senecio depressicola* I.Thomps., *Muelleria* 21: 64 (2005)

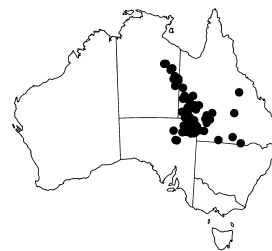
T: Goyder Lagoon, 25 km NNE of Clifton Hills HS, S.A., 18 July 1984, *F.J.Badman* 1362; holo: CANB; iso: AD, MEL.

Illustration: I.R.Thompson, *op. cit.* 67, fig. 19.

Erect annuals to c. 0.5 m high. Leaves mostly lacerately lobate, pinnatisect or sub-bipinnatisect, 3–8 cm long, generally thin following pressing; base of upper-stem leaves often becoming dilated, with long basal segments; margin toothed or denticulate; undivided leaves with l:w ratio 5–8; divided leaves with 3–5 divisions per side. Capitula several to many per stem; calycular bracteoles 4–8, 1–2 mm long, 0.3–0.7 mm wide, peracute to filamentous apically; involucre 3–5 mm long, 2.5–4 mm diam.; bracts mostly c. 13, less often c. 20; broader stereomes of inner bracts mostly 0.7–1.2 mm wide. Ligulate florets c. 8, less often c. 13, fewer than number of involucre bracts; ligule 4–7 mm long. Achenes 1.6–2.5 mm long, $\frac{2}{5}$ – $\frac{1}{2}$ length of involucre bracts; olive-brown or dark brown, with papillose hairs obscuring most or all of surface; achenes of ligulate florets reddish, but with surface mostly fully obscured, with hairs longer than those of achenes of disc, clearly exceeding pappus-ring. Pappus not persistent, 2–4 mm long.

Occurs in NE S.A., SW Qld and in central-eastern N.T. Grows in sands and grey clays, beside swamps and billabongs, and on flood plains of eastern central Australia, particularly those in the L. Eyre basin NE of L. Eyre. Flowers mostly late autumn–spring.

N.T.: c. 29 km SW of Brunette Downs, 18 June 1960, *G.Chippendale* (BRI, CANB, DNA, MEL). S.A.: Cooroomunchera Waterhole, Cooper Ck, *F.J.Badman* 1290 (AD, MEL); Innamincka Regional Res.; track to Coongie Lakes, c. 54 km from Innamincka–Cordillo road, *R.W.Purdie* 4530 (CANB). Qld: Mt Howitt Stn, *S.T.Blake* 11958 (AD, BRI); Birdsville, *D.E.Boyland* 180 (BRI, MEL).



Similar to other lautusoid species of central Australia but characterised by its more numerous small capitula with short ligules, achenes and pappus. Robust specimens develop large pinnatisect to bipinnatisect leaves with numerous marginal points.

85. *Senecio eremicola* I.Thomps., *Muelleria* 21: 66 (2005)

T: 5 km W of Ross River HS, N.T., 12 Sept. 1978, *A.S.Mitchell* 438; holo: DNA; iso: CANB.

Illustration: I.R.Thompson, *op. cit.* 69, fig. 20.

Erect annuals to c. 0.8 m high. Leaves mostly lacerately lobate, pinnatisect or sub-bipinnatisect, 3–12 cm long, generally thin following pressing; base of upper-stem leaves often becoming markedly dilated upwards, with long basal segments; margin toothed or denticulate; undivided leaves with l:w ratio c. 5–10; divided leaves with 3–5 primary divisions per side. Capitula few to several per stem; calycular bracteoles 6–12, 1.5–3 mm long, 0.3–1 mm wide, peracute to filamentous apically; involucre 5–7 mm long, 4–6 mm diam.; bracts mostly c. 20; broader stereomes of inner bracts 0.5–1.2 mm wide. Ligulate florets c. 13; ligule 8–14 mm long. Achenes 3.0–5.0 mm long, c. $\frac{3}{5}$ of length of involucre bracts; golden, or brown, olive-brown, green or reddish brown, with papillose hairs in bands obscuring c. 50–70% of surface; achenes of ligulate florets c. 0.5 mm longer than those of disc florets, reddish brown, with papillose hairs more clearly exceeding pappus-ring; receptacular attachment areas dimorphic. Pappus not persistent, 5–6 mm long.

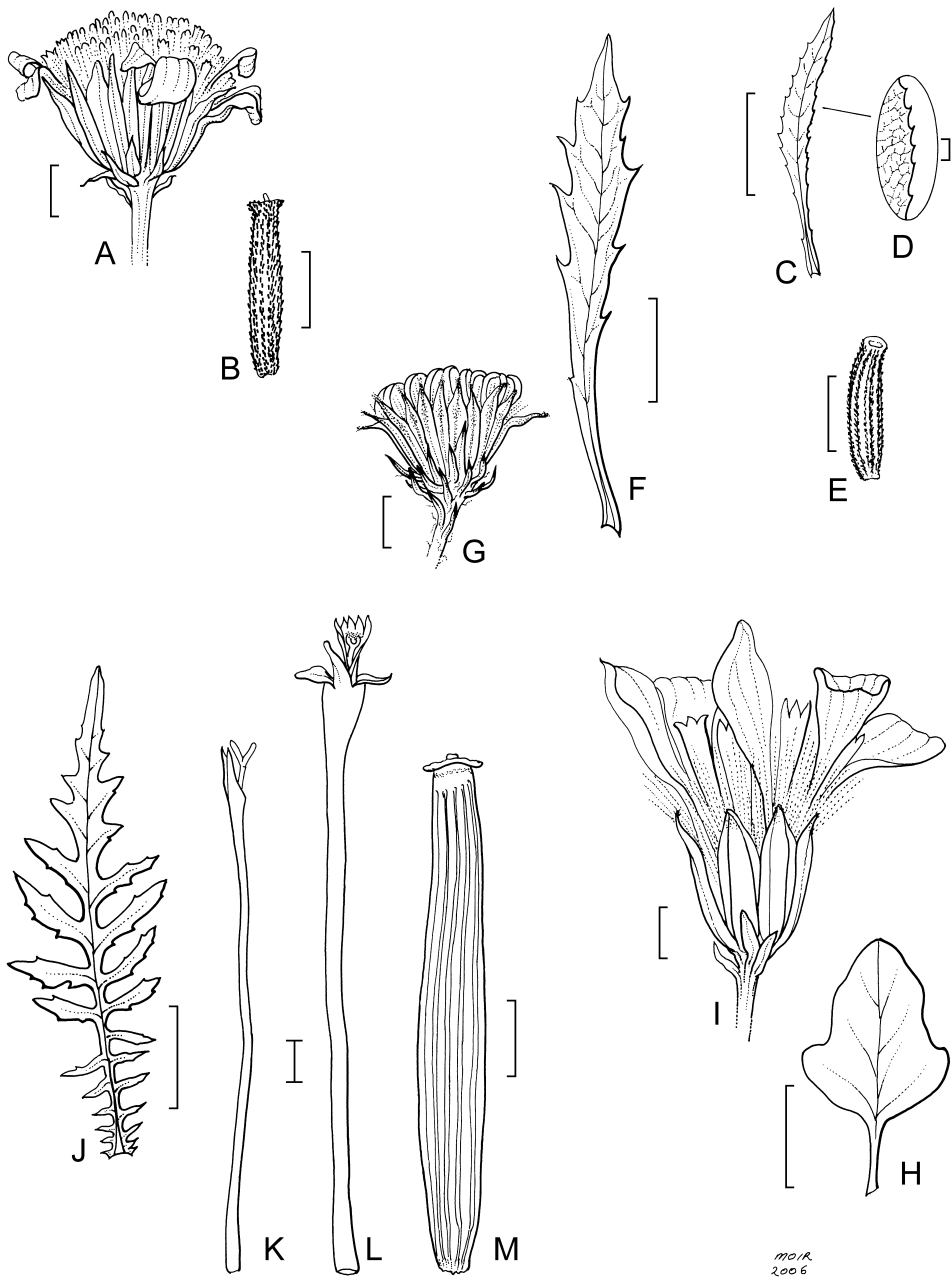


Figure 36. A–B, *Senecio bragalowensis*. A, capitulum; B, achene (A–B, S.T.Blake 18227, MEL). C–E, *S. madagascariensis*. C, mid-branch leaf; D, margin detail; E, achene (C, D, C.E & D.T.Woolcock, 10 July 1985, MEL; E, L.Pedley 6000, MEL). F, G, *S. pterophorus*. F, mid-stem leaf; G, capitulum (F, G, R.J.Adair 2328, MEL). H, I, *S. angulatus*. H, leaf; I, capitulum (H, I, K.Harris, 5 July 1992, MEL). J–M, *Arrhenechthites mixtus*. J, mid-stem leaf; K, ray corolla; L, disc corolla; M, achene (J–M, W.Hunter, Feb. 1943, MEL). Scale bars: A, D, G, I = 2 mm; B, E, K–M = 1 mm; C, F, H, J = 20 mm. Drawn by M.Moir.

Occurs in central Australia from Harts Ra. in southern N.T. S to Mt Illbillie in northern S.A. and disjunctly further W at Giles Rock in far eastern W.A. Grows in stream beds and beside water-holes in sandy and gravelly soils. Flowers mostly winter–early spring.

W.A.: Giles Rock between Warburton Mission and Blackstone Ra. on Docker Mission Rd, *A.C.Beauglehole* 60206 (MEL). N.T.: Stokes Ck, George Gill Ra., *A.C.Beauglehole* 23393 (MEL); Mt Cavenagh, c. 17 km SW of Kulgera HS, *N.N.Donner* 4279 (DNA); 10 km S of Harts Range Police Stn, Harts Ra., *I.R.Noble* 33 (CANB). S.A.: 1 km E of Marys Well, De Rose Hill Stn, *F.J.Badman* 6077 (AD).



Senecio eremicola is characterised by large lacerately-dissected leaves, a high number of involucre bracts per capitulum, and long achenes that are mildly dimorphic. It is similar to *S. depressicola* in leaf morphology, similar to *S. lacustrinus* in achene characters, and similar to *S. brisgalowensis* in involucre bract number. The leaf morphology is also reminiscent of that of *S. pinnatifolius* var. *lanceolatus* and *S. pinnatifolius* var. *serratus*, however it differs from those taxa in capitular morphology.

86. *Senecio lacustrinus* I.Thompson, *Muelleria* 21: 68 (2005)

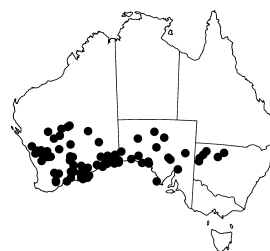
T: Strzelecki Track, c. 40 km E of Murnpeowie, S.A., 16 Aug. 1968, *D.J.E.Whibley* 2325; holo: AD.

Illustration: I.R.Thompson, *op. cit.* 71, fig. 21.

Erect annuals to c. 0.8 m high. Leaves mostly pinnatisect, 3–8 cm long, generally thin following pressing; base of upper-stem leaves sometimes becoming slightly dilated upwards, sometimes with narrow basal segments; margin mostly entire; undivided leaves with l:w ratio c. 8–15; pinnatisect leaves with 1–3 segments per side. Capitula few to several per stem; calycular bracteoles 5–8, 1.5–3 mm long, 0.4–1 mm wide, peracute; involucre 5–8 mm long, 3–5 mm diam.; bracts mostly c. 13; broader stereomes of inner bracts 0.8–1.5 mm wide. Ligulate florets c. 8; ligule 10–15 mm long. Achenes 2.8–4.5 mm long, c. $\frac{1}{2}$ – $\frac{3}{5}$ length of involucre bracts; golden, brown, olive-brown, green or reddish brown, with papillose hairs in bands obscuring c. $\frac{1}{2}$ – $\frac{2}{3}$ of surface; achenes of ligulate florets 0.2–0.5 mm longer than those of disc, reddish brown, with papillose hairs more clearly exceeding pappus-ring; receptacular attachment areas dimorphic. Pappus not persistent, 5–7 mm long.

Occurs across southern Australia in a band between latitudes 26° S and 32° S, and extending from near Geraldton W.A. E through central S.A. to Bourke in NW N.S.W. Grows in sandy or loamy soils, usually associated with ephemeral lakes and other water sources. Flowers mostly winter–early spring.

W.A.: eastern edge of L. Moore, c. 54 km from Paynes Find along road to Cleary, *P.S.Short* 2589 *et al.* (AD, BRI, CANB, HO, MEL, NSW, PERTH); 68 km N of Cleary on road to Mouroubra, *B.H.Smith* 745 (AD, CANB, HO, MEL, PERTH). S.A.: c. 43 km S of Marree, *A.C.Beauglehole* 28140 (MEL); 1–1.5 km E of Mt Gunson, *B.Lay* 1587 (AD, CANB, MEL). N.S.W.: Tero Creek Stn, N of White Cliffs, 3 Dec. 1968, *P.Martensz* (CANB).



Similar to the more northerly-distributed *S. eremicola* in habit and achene morphology but with fewer involucre bracts per capitulum and narrower leaf segments with fewer marginal points. Also similar to the more southerly- and easterly-distributed *S. spanomerus* but differing in the following ways: capitula slightly longer with never more than c. 13 involucre bracts per capitulum; calycular bracteoles smaller relative to the involucre; achenes longer and the achenes of the ray florets generally longer than those of the disc florets. Furthermore, in *S. lacustrinus* the stereome of the involucre bract is not as succulent (drying yellowish or greenish rather than coppery-brown) and its resin ducts are less prominent. The species appears to be mostly annual, but it can become shrub-like and develop semi-woody lower stems. *Senecio spanomerus*, on the other hand, is usually a perennial.

Specimens from L. Throssell and Mt Elvire in south-central W.A. have capitula 8–9 mm long, and the specimen from L. Throssell is unusual in that it appears to be perennial. Both populations warrant further investigation.

87. *Senecio hamersleyensis* I.Thomps., *Muelleria* 21: 72 (2005)

T: Hamersley Ra., c. 19 km SE of Mt Hiditch, 138 km SE of Mt Tom Price, W.A., 13 Aug. 1994, *W.R.Archer* 1308941; holo: MEL.

Illustration: I.R.Thompson, *op. cit.* 74, fig. 22.

Erect subshrubs to c. 1.5 m high. Leaves undivided or pinnatisect, 3–8 cm long, generally thin following pressing; base of upper-stem leaves not dilated, rarely with narrow segments; margin usually entire; undivided leaves with l:w ratio c. 8–15; pinnatisect leaves with 1 or 2 segments per side. Capitula few to several per branch; calycular bracteoles 6–10, 1.0–2.0 mm long, 0.5–1 mm wide, acute to peracute; involucre (4–) 5–7 mm long, c. 3 mm diam.; bracts c. 13; broader stereomes of inner bracts 0.8–1.2 mm wide. Ligulate florets c. 8; ligule 8–15 mm long. Achenes 2.5–3 mm long, c. $2/5-1/2$ length of involucre bracts, brown, olive-brown, green or reddish brown, with papillose hairs obscuring most of surface; receptacular attachment areas homomorphic. Pappus not persistent, c. 5 mm long.

Occurs in W.A., mainly in the Hamersley Ra. but also further W in Cape Ra. near Exmouth and further E around Newman. Grows in sandy alluvial soils usually associated with gorges. Flowers mostly winter–early spring.

W.A.: Knox Gorge, Hamersley Ra., *A.C.Beauglehole* 11515 (MEL, PERTH); Hancock Gorge, Hamersley Range Natl Park, *G.W.Carr* 4946 & *A.C.Beauglehole* 48724 (MEL, PERTH); Yardie Ck, *A.S.George* 10303 (MEL, PERTH); Wittenoom, *McGuire* 23 (PERTH); Savory Ck, Kearsland district, *G.J.Morse* 39 (AD, CANB, PERTH).



Closest in morphology to *S. lacustrinus* but having leaves with an entire margin, upper-stem leaves with an attenuate base, outer involucre bracts with a broader margin, and achenes homomorphic and shorter haired. Reportedly pungently fragrant.

88. **Senecio madagascariensis* Poir. in J.B.A.P.M de Lamarck, *Encycl.*, suppl. 5: 130 (1817)

T: Madagascar, *Commerson, Herb. Desf.* T: ?P n.v.

S. sp. *K* (aff. *lanceolatus*), S.J.W.Jacobs & J.Pickard, *Pl. New South Wales* 86 (1981).

Erect subshrubs to c. 0.6 m high. Leaves undivided or occasionally deeply lobate, 3–10 cm long, generally thin following pressing; base of upper-branch leaves sometimes becoming dilated above mid-stem; margin regularly denticulate or callus-denticulate; undivided leaves with l:w ratio c. 6–20; lobate leaves with 1 or 2 segments per side. Capitula few to several per branch; calycular bracteoles 8–12, 1.5–2 mm long, 0.5–0.8 mm wide, acute to peracute; involucre 4–6 mm long, 3–5 mm diam.; bracts c. 20; broader stereomes of inner bracts 0.5–0.8 mm wide. Ligulate florets c. 13; ligule 5–10 mm long. Achenes 1.5–2.2 mm long, c. $2/5$ length of involucre bracts, brown, with papillose hairs obscuring 20–50% of surface; receptacular attachment areas homomorphic. Pappus not persistent, 3–5 mm long. Fig. 36C–E.

Native to S. Africa and Madagascar. Naturalised in eastern Australia, from S of Cairns Qld to eastern Vic. Grows in various soils, usually in disturbed sites especially roadsides and farm paddocks. Flowers most of the year.

Qld: 1 km N of Mt Maroon, *P.I.Forster* 6841 *et al.* (BRI, MEL); Tomewin, 10 July 1985, *C.E. & D.T.Woolcock* (MEL). N.S.W.: along-side Karuah State Forest, S of Stroud, *J.R.Hosking* 1279, (CANB, MEL, NE, NSW); Port Macquarie, *L.Pedley* 5543 (AD, BRI, DNA, MEL, NSW, PERTH). Vic.: Balnarring, on road verge of Hastings–Flinders Rd, 14 July 1991, *R.J.Adair s.n.* (MEL).



Senecio madagascariensis can be distinguished from *S. pinnatifolius*, *S. brigalowensis* and other lautusoid species by a combination of characters: more numerous involucre bracts; leaves thin, mostly undivided yet with numerous marginal points (mostly as tiny denticulations); and achenes mostly shorter and always more slender with relatively short fine papillose hairs. The achenes also tend to be more tapered basally and sometimes more so apically.

The Australian form matches forms occurring in S. Africa rather than Madagascar according to I.J.Radford *et al.*, *Austral. Syst. Bot.* 13: 409–423 (2000) and L.J.Scott *et al.*, *Plant Syst. Evol.* 213: 251–257 (1998). A noxious weed in N.S.W. and Qld.

8. The Exotic Species

The nine exotic species grouped here, predominantly from S. Africa, are somewhat diverse but are placed together for convenience. They are radiate except for the discoid *S. vulgaris* and the group contains three climbing species. All naturalised species in Australia are placed here, except for *S. madagascariensis* which has been placed in the Lautusoid Group.

Senecio articulatus (Haw.) Sch.Bip., a species from Africa with succulent stems, has been recorded as naturalised in N.S.W., but this is not substantiated by herbarium collections.

- | | | |
|----|--|----------------------------|
| 1 | Erect annuals to c. 0.5 m high; capitula discoid | 97. <i>S. vulgaris</i> |
| 1: | Annuals or perennials, erect or not, sometimes climbing, to c. 3 m high; capitula radiate | |
| 2 | Scrambling or climbing plants; leaves (excluding uppermost leaves) with a petiole-like portion comprising nearly half of its length, abruptly widening into an undivided or lobate lamina \leq twice as long as broad | |
| 3 | Basal lateral lobes of leaves with apex acute; margin of leaves entire or nearly so between basal lobes and apex; inflorescences of 1–3 capitula; calycular bracteoles c. 10 mm long; ligulate florets c. 12 | 94. <i>S. macroglossus</i> |
| 3: | Basal lateral lobes of leaves with apex acute to rounded; margin of leaves usually dentate or lobed between basal lobes and apex; inflorescences mostly of 10 or more capitula; calycular bracteoles 1–3 mm long; ligulate florets 3–6 | |
| 4 | Corolla of disc florets 9–12 mm long | 93. <i>S. tamoides</i> |
| 4: | Corolla of disc florets 5–6 mm long | 95. <i>S. angulatus</i> |
| 2: | Plants habit not as above; leaves not entirely as above | |
| 5 | Ligule white, pink or purple | |
| 6 | Leaves pinnatisect with primary segments dilated distally; calycular bracteoles > 1 mm wide; involucre bracts 12–16 | 91. <i>S. elegans</i> |
| 6: | Leaves usually lobate with lobes/segments not dilated distally; calycular bracteoles < 1 mm wide; involucre bracts 20–22 | 92. <i>S. glastifolius</i> |
| 5: | Ligule yellow | |
| 7 | Plants grey, woolly throughout; leaves entire; involucre 12–16 mm long | 96. <i>S. crassiflorus</i> |
| 7: | At least part of plants green; leaves usually toothed or deeply dissected; involucre 3.5–5 mm long | |
| 8 | Leaves dentate, sometimes appearing entire; lower surface \pm completely obscured by a close, dense indumentum; calycular bracteoles 14–20; involucre bracts 18–22 | 89. <i>S. pterophorus</i> |
| 8: | Leaves pinnatisect; lower surface not or slightly obscured by hairs; calycular bracteoles 3–6; involucre bracts 11–13 | 90. <i>S. jacobaea</i> |

89. *Senecio pterophorus DC., *Prodr.* 6: 389 (1838)

S. pterophorus var. *verus* Harv. in W.H.Harvey & O.W.Sonder, *Fl. Cap.* 3: 386 (1865), *nom. inval.*
T: Southern Africa, *Drege*; holotype: G, microfiche seen.

S. pterophorus var. *apterus* Harv. in W.H.Harvey & O.W.Sonder, *Fl. Cap.* 3: 386 (1865), *nom. illeg.*
T: Southern Africa, *Drege*; *n.v.*

Erect perennials to c. 2 m high, with fine hairs sparse, denser on leaves. Leaves narrowly oblanceolate or narrowly to very narrowly elliptic, to 14 cm long, with l:w ratio c. 4–8, shallowly to deeply serrate, occasionally ±entire or appearing so, with 2–7 projections per side; base attenuate, often decurrent; upper surface sometimes sparsely tuberculate; lower surface appressed-woolly. Capitula several to many per stem; calycular bracteoles 14–20, 2–3 mm long, 0.3–0.5 mm wide; involucre 3.5–5 mm long, 3.5–4 mm diam.; bracts 18–22, glabrous. Florets numerous; ligulate florets 8–13; ligule 4–7 mm long, 4-veined, yellow. Achenes obloid, 1.5–1.8 mm long, pale brown, tapering more marked basally, with papillose hairs forming bands or evenly dispersed. Pappus caducous, 4–5 mm long. *n* = 10, M.E.Lawrence, *Austral. J. Bot.* 28: 156 (1980). *African Daisy, Rough Senecio.* Fig. 36F–G.

Native to S. Africa. Naturalised from the Eyre Penin. ESE to Garfield in south-central Vic., and disjunctly in central-eastern N.S.W. from Newcastle SW to the Blue Mtns E of Sydney. Grows mostly in disturbed sites in grasslands, woodland, and forest. Flowers mostly summer.

S.A.: Cleland Natl Park, 10 km E of Adelaide, *S.L.Everist* 9995 (AD, BRI).
N.S.W.: Mt Druitt, *R.G.Coveny* 13911 (AD, BRI, CANB, MEL, NSW).
Vic.: on Hamilton–Horsham hwy adjacent to Cattle Station Ck, 7 Jan. 1986, *J.M.Pollock* (AD, CANB, MEL).

Readily distinguished by the usually acutely-lobed leaves, sublustrous above and appressed-woolly below, which are often decurrent down the stems. Hybridises with disciform species, e.g. *S. hispidulus* and *S. picridioides* and discoid species, *S. hypoleucus*, in the Lofty Ra., S.A. A noxious weed in Vic. and a declared schedule III weed in S.A.

**90. *Senecio jacobaea** L., *Sp. Pl.* 2: 870 (1753)

T: Europe, *Herb. Linn. No.* 996.44; lecto: LINN, *fide* J.K.Kadereit & P.D.Sell, *Watsonia* 16: 22 (1986).

Erect biennials or perennials to c. 1.8 m high, with sparse to moderately dense cobwebby hairs. Leaves elliptic to narrowly elliptic, to 25 cm long, with l:w ratio c. 1.5–3, complexly 2–3-pinnatisect with c. 5–10 major segments per side; base attenuate or slightly auriculate, with auricles pinnatisect, slightly clasping. Capitula numerous to 100s per stem; calycular bracteoles 3–6, 2–3.5 mm long, 0.2–0.3 mm wide; involucre 3.5–5 mm long, c. 4 mm diam.; bracts 11–13, glabrous. Florets numerous; ligulate florets 10–15; ligule 6–10 mm long, 4-veined, yellow. Achenes obloid, 1.6–2.2 mm long, pale brown, tapering more marked basally; achenes of disc florets with papillose hairs in rows; achenes of ligulate florets glabrous. Pappus caducous, 4–5 mm long. *Ragwort.*

Native to Europe. Naturalised near Walpole, SW W.A., from the Mt Lofty Ra. in SE S.A. E to Sale in eastern Vic, and in NW and eastern Tas. Also previously reported for N.S.W. but specimens not seen for this treatment. A common weed in other temperate parts of the world. Grows in forest and in agricultural and disturbed land such as roadsides. Flowers summer–autumn.

W.A.: Walpole, *R.D.Royce* 2566 (PERTH). S.A.: Sturt Ck, 15 Nov. 1954, *V.Lohmeyer s.n.* (AD). N.S.W.: Goulburn, 9 May 1938, *A.T.R.Brown s.n.* (NSW). Vic.: township of Beech Forest, *R.V.Smith* 75/5 (AD, BRI, CANB, HO, MEL, NSW, PERTH). Tas.: Pine L., northern Central Plateau, *A.E.Orchard* 5820 (AD, HO, MEL).



A species with large intricately dissected leaves and inflorescences of numerous crowded capitula with relatively narrow ligules. In its first season it persists as a rosette of leaves. A declared noxious weed in all states of Australia except Qld. Currently appears to be

established only in Tas. and southern Vic. Poisonous to grazing animals causing liver damage. The pyrrolizidine alkaloids that cause this damage are found in many species of *Senecio*, but in Australia, *S. jacobaea* is considered the most serious risk to stock.

91. **Senecio elegans* L., *Sp. Pl.* 2: 869 (1753)

T: 'Aethiopia', *Herb. Linn. No. 996.31*; lecto: LINN, *fide* R.Kippist in W.H.Harvey & O.W.Sonder (ed.), *Fl. Cap.* 3: 361 (1865).

S. elegans var. *diffusus* Ewart, *Fl. Victoria* 1173 (1931). T: not designated.

S. elegans var. *erectus* Ewart, *Fl. Victoria* 1173 (1931). T: not designated.

Erect or sprawling annual, to 1.0 m high, nearly glabrous. Leaves to 20 cm long, with l:w ratio c. 2–4, sub-pinnatisect with 2–5 major segments per side; segments typically broadest distally and irregularly lobed; base slightly to moderately auriculate, slightly clasping. Capitula few to numerous per stem; calycular bracteoles 12–16, 3–5 mm long, c. 1.5–2 mm wide; involucre 7–8 mm long, c. 5–7 mm diam.; bracts 12–16, glabrous. Florets numerous; ligulate florets usually 12–17; ligule 7–15 mm long, 4-veined, rich magenta, occasionally pink or white. Achenes narrowly obloid, 2.5–3.2 mm long, brown or olive, with papillose hairs forming lines. Pappus caducous, 5–7 mm long. *Purple Groundsel*.

Native to S. Africa. Naturalised along the southern coastline; in SW W.A. from Perth S and E to Ledge Point E of Albany; in SE Australia from Yorke Penin. S.A. ESE to Orbost in SE Vic.; and in Tas. on Bass Strait Is and E coast. Grows in coastal sites on sand dunes and among rocks, in shrubland. Flowers mostly spring–summer.

W.A.: Small unnamed lake/swamp 0.5 km N of Ledge Point, *A.E.Orchard* 5930 (HO, PERTH). S.A.: Lower Coorong, 40 km S of Salt Ck, almost due W of Pitlockry Stn, *D.E.Symon* 10460 (AD, PERTH). Vic.: Pea Soup Shearwater Colony, Port Fairy, *J.C.Reid* 2184 (CANB, MEL). Tas.: South Arm, *A.Buchanan* 14278 (HO).

Widespread along southern coastlines and readily recognised by virtue of its purple ligules and pinnatifid leaves. The capitula of *S. glastifolius* q.v. are similar but the shape of its leaves is very different. Hybrids between *S. elegans* and *S. pinnatifolius* have been recorded. Plants with paler or white ligules or doubled ligules have occasionally been recorded.



92. **Senecio glastifolius* L.f., *Suppl. Pl.* 372 (1782)

T: Cape of Good Hope, South Africa, *Thunberg*; n.v.

Erect perennials to c. 1.5 m high, glabrous. Leaves oblanceolate to narrowly elliptic, to 12 cm long, with l:w ratio c. 2–4, lobate, with lobes antrorse; base hardly to moderately narrower; margin dentate or denticulate. Capitula few to numerous per stem; calycular bracteoles 10–16, 3–4 mm long, c. 0.8 mm wide; involucre c. 7 mm long, c. 5–8 mm diam.; bracts 20–22. Florets numerous; ligulate florets c. 13; ligule 10–20 mm long, 4-veined, pink to purple. Achenes narrowly obloid, 2–2.5 mm long, brown or olive-brown, with papillose hairs in narrow bands. Pappus caducous, c. 7 mm long. *Holly-leaved Senecio*.

Native to S. Africa. Naturalised at Albany in SW W.A. and on the central coast of N.S.W. at Bundeena. Also naturalised in New Zealand. Grows in coastal sites on sand dunes and among rocks, in heathland and shrubland. Flowers spring–summer.

W.A.: SE slopes of Mt Adelaide, especially along Hare St, Albany, *G.J.Keighery* 8327 (AD, CANB, MEL, PERTH). N.S.W.: S from Eric St, Bundeena, 29 Oct. 1999, *A.Horton* s.n. (NSW).



93. *Senecio tamoides DC., *Prodr.* 6: 403 (1838)

T: 'Omsamwoubu', southern Africa, *Drege*; holo: G, microfiche seen.

Climber to c. 2 m high, glabrous. Leaves to c. 12 cm long, with petiole c. half of length; lamina \pm orbicular to ovate, with l:w ratio c. 1–1.5, with 1–3 lobes per side; margin entire or sparsely denticulate. Capitula several to numerous per branch; calycular bracteoles 3–5, 1–1.5 mm long, c. 0.3 mm wide; involucre 7–8 mm long, c. 2.5 mm diam.; bracts 5–8. Florets 15–20; ligulate florets 3–6; ligule 10–20 mm long, 4-veined, yellow. Achenes not seen at maturity, glabrous. Pappus ?persistent, 6–7 mm long.

Native to S. Africa. Naturalised in far SE Qld. Grows at margins of rainforest. Flowers autumn–winter.

Qld: Mt Glorious Rd just S of Mt Glorious village, near lower end of Bryce's Rd, *S.P. Phillips* 381 (BRI, MEL).

An occasional garden escape. The relatively long corolla of the disc florets (corolla c. 10 mm compared to 5–7 mm long) and relatively small calycular bracteoles distinguish this species from *S. macroglossus* and *S. angulatus*.

**94. *Senecio macroglossus** DC., *Prodr.* 6: 404 (1838)

T: Table Mtn, Cape of Good Hope, S. Africa, *Zeyher*; syn: *n.v.*; 'Zwarte Omsamcaba and Omsamcubo', *Drege*; syn: *n.v.*; 'Albany', *Drege*; syn: *n.v.*

Climber to c. 3 m high, glabrous. Leaves to c. 6 cm long, with petiole c. half of length; lamina \pm triangular, with l:w ratio 0.9–1.2, with a basal lobe on each side; margin entire or with small teeth usually only near base. Capitula 1–3 per branch; calycular bracteoles 8–12, c. 10 mm long, c. 1.5 mm wide; involucre 9–11 mm long, c. 5 mm diam.; bracts c. 10. Florets numerous; ligulate florets c. 12; ligule 10–20 mm long, 8–10-veined, yellow. Achenes \pm narrowly obloid, c. 2.5–3 mm long, pale brown, glabrous. Pappus persistence unknown, 7–8 mm long. *Natal Ivy*, *Wax Vine*.

Native to S. Africa. Naturalised in SE Qld and N.S.W. near the coast. Grows in sandy soils in low coastal rainforest, woodland and mangroves. Flowers most of the year.

Qld: Boonooroo, *S.P. Phillips* 601 (BRI). N.S.W.: near N end of Grevillea Rd, off Tamarind Ave., Cudgen Nat. Res., Bogangar, *J.R. Hosking* 2023 (CANB, MEL, NE, NSW); Sawtell, *B. Kemp* 227 (MEL, NSW).

The triangular leaf lamina, fewer and larger capitula and much larger bracteoles distinguish this species from *S. tamoides* and *S. angulatus*.

**95. *Senecio angulatus** L.f., *Suppl. Pl.* 369 (1782)

T: Cape of Good Hope, South Africa, *Thunberg*; *n.v.*

Scrambling or climbing plants to c. 3 m high, glabrous. Leaves to c. 10 cm long, with petiole c. half of length; lamina ovate, with l:w ratio c. 1–2, usually with 1–3 commonly obtuse lobes per side; margin entire or sparsely denticulate. Capitula several to numerous per branch; calycular bracteoles 3–6, 1.5–2.5 mm long, c. 0.5 mm wide; involucre 5–6 mm long, c. 3 mm diam.; bracts 7–10. Florets 15–20; ligulate florets 3–6, mostly 5; ligule 8–12 mm long, 4-veined, yellow. Achenes narrowly obloid, 2–2.5 mm long, brown, with papillose hairs. Pappus caducous, 5–7 mm long. *n* = c. 182, M.E. Lawrence, *Austral. J. Bot.* 28: 155 (1980). Fig. 36H–I.

Native to S. Africa. Naturalised in southern Australia mostly in urban areas including the cities of Perth, Adelaide, Melbourne



and Sydney. Grows in various soils in shrubland and woodland in disturbed environments. Flowers late autumn–winter.

W.A.: Swan R., Nedlands, *G.J.Keighery 13775* (PERTH). S.A.: 4 km N of Palmer, *R.Bates 9898* (AD). N.S.W.: E side of Carlisle Ave, Mt Druitt, *R.G.Coveny 16539* (MEL, NSW). Vic.: Red Bluff, Sandringham, *D.E.Albrecht 1838* (CANB, MEL).

96. **Senecio crassiflorus* (Poir.) DC., *Prodr.* 6: 412 (1838)

Cineraria crassiflora Poir. in J.B.A.P.M de Lamarck, *Encycl. suppl.* 2: 267 (1811). T: Buenos Aires, Brazil, *Commerson*; holo: ?P (Herb. Lam.) *n.v.*, *fide* J.L.M.Poiret, *loc. cit.*

Sprawling subshrub forming mounds to c. 2 m high, densely appressed-woolly throughout. Leaves undivided, spatulate to oblanceolate, to c. 8 cm long, with l:w ratio c. 2–6; base attenuate; margin ±entire or distally crenulate or denticulate. Capitula 1–8 per branch; calycular bracteoles 3–6, 2–6 mm long, c. 1 mm wide; involucre 12–16 mm long, c. 10 mm diam.; bracts 20–22. Florets numerous; ligulate florets 12–22; ligule 15–30 mm long, 4-veined, yellow. Achenes narrowly obloid, 4–7 mm long, pale brown, strongly ribbed, with papillose hairs forming broad bands. Pappus caducous, 10–15 mm long.

Native to S America. Naturalised in central and NE N.S.W. on the coast from Sawtell S to Cowan. Grows on coastal dunes. Flowers most of year.

N.S.W.: Sawtell Beach, 10 May 1967, *C.Burgess* (CANB).

A silvery-grey plant grown as an ornamental and also once planted for coastal erosion control. Naturalised in a few places along the N.S.W. coast.



97. **Senecio vulgaris* L., *Sp. Pl.* 2: 867 (1753)

T: Europe, *Herb. Clifford*: 406, *Senecio 1*; lecto: BM, *fide* C.Jeffrey in C.E.Jarvis *et al.*, *Regnum Veg.* 127: 87 (1993).

Annuals to c. 0.5 m high, glabrous except for cobwebby newer growth. Leaves commonly lobate to subpinnatisect, to 10 cm long, with l:w ratio c. 2–5; primary segments c. oblong to triangular; base auriculate, moderately stem-clasping; margin denticulate. Capitula discoid, several to many per stem; calycular bracteoles 8–16, 1.5–3 mm long, 0.4–0.6 mm wide; involucre 5–7 mm long, c. 2–3 mm diam.; bracts 13–22, glabrous. Florets numerous. Achenes narrowly obloid-ellipsoid, 2–3 mm long, light brown, with papillose hairs in bands. Pappus caducous, 5–6 mm long. *Common Groundsel*.

Native to Europe. Naturalised mostly in southern Australia in all capital cities and a few provincial towns. A widespread weed of cool-temperate regions. Grows mostly in urban environments, in garden beds and footpaths. Also occurring in orchards and occasionally invading woodland and forest. Flowers most of year.

W.A.: Western Australian Herbarium grounds, Kensington, *B.J.Lepschi 1931* (CANB, MEL, PERTH). S.A.: Mitcham, *R.V.Southcott B1082* (AD, MEL). Qld: Forest Hill, *M.Bodman* (BRI, NSW). N.S.W.: Nashdale, Central Tablelands, *M.Dally 2222* (NSW). A.C.T.: CSIRO grounds, Black Mtn, Canberra, *M.Gray 6229* (CANB). Vic.: corner of Pumps Rd and Axford Rd, Wantirna, *T.B.Muir 6548* (MEL). Tas.: Hobart, 21 Jan. 1930, *F.H.Long* (HO).

In Australia mostly confined to urban environments, particularly garden beds. Differs from native discoid species by being a small annual, having capitula with more numerous florets, and involucre bracts and calycular bracteoles that are conspicuously jet-black for much of their length. Similar in habit and leaf shape to *S. glossanthus*, *S. halophilus* and *S. productus* but in these native species the marginal florets are female and minutely ligulate, and the achenes are dimorphic.



Doubtful or excluded names*Senecio apargiaefolius* Walp., *Linnaea* 14: 309 (1840)

Erechtites apargiifolia (Walp.) Sond., *Linnaea* 25: 524 (1853), as *apargiaefolia*. T: Locality unknown [Maneroo region, N.S.W. according to G.Bentham, *Fl. Austral.* 3: 659 (1867)], *Lhotsky*; *n.v.* [probably destroyed; originally KIEL, *fide* R.O.Belcher, *Ann. Missouri Bot. Gard.* 43: 72 (1956)]

The identity of the type specimen remains unclear. Walpers described it as a species with homogamous capitula and glabrous achenes, and it differs in several other ways from the specimen cited by Sonder as an example of *E. apargiifolia*, which is in fact a specimen of *S. phelleus*.

Senecio australis Willd. var. *edentatus* DC., *Prodr.* 6: 374 (1838)

T: Locality unknown 'e Nova-Holland', *coll. unknown*; *n.v.*

From the description, this appears to be *S. linearifolius*, but it is unclear to which variety it might belong.

Senecio australis Willd. var. *unidentatus* DC., *Prodr.* 6: 374 (1838)

T: New Zealand and Tas. 'e Nova-Zeelandia et ins. Van Diemen', *coll. unknown*; *n.v.*

From the description, this appears to be *S. linearifolius* but, as for the preceding variety, it is unclear to which variety it might belong.

Senecio ciliolatus DC., *Prodr.* 6: 374 (1838)

T: L. George, N.S.W., *A. Cunningham*; *holo*: G *n.v.*

The type specimen has not been examined. From the description and microfiche, it cannot be matched with confidence to any known species of *Senecio*.

Senecio dryadeus Ewart, *Fl. Victoria* 1176 (1931)

T: not designated.

This is a synonym of *S. linearifolius* but as no type was designated by Ewart, it is unclear to which variety it is referable.

Senecio laticostatus Belcher, *Ann. Missouri Bot. Gard.* 43: 64 (1956)

Erechtites arguta var. *microcephala* Benth., *Fl. Austral.* 3: 659 (1867). T: Flats beyond the Brodribb R., Vic., Jan. 1855, *F. Mueller*; *holo*: MEL.

The specimen on which these names are based, although resembling *S. glomeratus* subsp. *longifructus*, appears to be an aberrant specimen with several features discordant with *Senecio* morphology and with apparently non-viable achenes.

Senecio latifolius DC., *Prodr.* 6: 387 (1838)

T: Umsikaba, southern Africa, *Drege*; *n.v.*

This name was given in the *Agric. Gazette New South Wales* 28: 850 (1917), and referred to as poison weed. There are no other references to this species occurring in Australia.

Senecio lautus G.Forst. ex Willd., *Sp. Pl.* 4th edn, 3: 1981 (1800)

T: New Zealand; *n.v.*

This species does not occur in Australia, but the name has been widely misapplied to species in the Lautusoid group.

Senecio lautus var. *pilosus* J.M.Black, *Trans. & Proc. Roy. Soc. S. Australia* 52: 230 (1928)

T: S.A., Franklin Is., Jan. 1922, *T.G.B.Osborn*; holo: AD; iso: NSW.

This specimen has a relatively dense cover of coarse hairs. It is perhaps closest to *S. spanomerus* but the achenes have shorter, more closely-appressed papillose hairs than is typical of this species. If further collections and field observations show that it forms populations that are consistent morphologically in terms of the indumentum, it will possibly deserve taxonomic recognition.

Senecio meyeri Regel, *Ind. Sem. Hort. Bot. Imp. Petrop.* 25 (1856)

T: grown from seeds sent by F.Mueller from Australia; *n.v.*

The identity of this species is unknown although the author subsequently states in *Gartenflora* 6 (1857) that it is close to *S. odoratus*.

Senecio odoratus Hornem. var. *laciniatus* F.Muell., *Rep. Pl. Babbage Exped.* 14 (1859)

T: 'Wirrawirraloo', S.A., *coll. unknown*; *n.v.*

Possibly refers to *S. lanibracteus*, but the type specimen, if one exists, has not been seen.

Senecio orarius J.M.Black, *Trans. & Proc. Roy. Soc. S. Australia* 52: 230 (1928)

T: 'Beachport, S.E. – Southern Victoria'; not designated.

This is a sterile hybrid between *S. biserratus* or other disciform species and varieties of *S. pinnatifolius*, commonly var. *lanceolatus*. Hybrids have been recorded from coastal areas of Vic. and S.A.

Senecio pauciligulatus A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 121, t. 38 (1834)

T: Port Jackson, N.S.W., 1826–29, *A.Lesson*; P.

Although resembling *S. linearifolius*, the presence of only 1–3 ligules per capitulum, the unusual anther appendages, and the whorled arrangement of peduncles in the single specimen is not typical of this species. There have been no further collections made and the specimen may be aberrant.

Senecio warszewiczii A.Braun & Bouche, *Ind. Sem. Hort. Berol.* 13 (1851)

T: Guatemala; *n.v.*

This species, native to central America and not recorded for Australia, was treated by R.O.Belcher, *Ann. Missouri Bot. Gard.* 43: 46 (1956), as a synonym of *S. minimus* (as *S. minimus* var. *minimus*), but his rationale for including it is unclear.

10. ERECHTITES

Erechtites Raf., *Fl. Ludov.* 65 (1817); an ancient name used by Dioscorides for a species of *Senecio*.

T: *E. praealtus* Raf.

Annual or perennial herbs. Leaves sessile, pinnately veined. Capitula disciform, pedunculate, calyculate; involucre bracts free. Florets: corolla limbs greenish white or pinkish; anthers not known; style branches recurved, with a short conical apical appendage. Achenes obloid-ellipsoid. Pappus caducous.

A genus of 6 species, all native to the New World; one naturalised species in Australia.

R.O.Belcher, A revision of the genus *Erechtites* (Compositae) with inquiries into *Senecio* and *Arrhenechthites*, *Ann. Missouri Bot. Gard.* 43: 1–85 (1956).

**Erechtites valerianifolius* (Wolf) DC., *Prodr.* 6: 295 (1838), as *valerianaefolia*

f. *valerianifolius*

Senecio valerianaefolius Wolf, *Ind. Sem. Hort. Berol.* 59 (1825). T: cult, '*Senecio valerianaefolius* ex Herb. Raffeliano, 1825', *Herb. Reichenbach f.* 16256; neo: W, *fide* R.O.Belcher, *Ann. Missouri Bot. Gard.* 43: 26 (1956).

Illustrations: R.E.Woodson Jr & R.W.Schery, *Ann. Missouri Bot. Gard.* 62: 1252, fig. 95 (1975). B.A.Auld & R.W.Medd, *Weeds* 101 (1987); W.L.Wagner *et al.*, *Fl. Pl. Hawai'i* 1: 311, t. 25 (1990).

Annuals to c. 2 m high. Hairs rather sparse on mature stems, peduncles and leaves. Leaves to c. 20 cm long, with l:w ratio c. 2–3, usually deeply lobed to pinnatisect, petiole-like basally; margin serrate. Capitula numerous per stem; mature peduncle to c. 20 mm long; calycular bracteoles 6–10, linear, 1.5–3 mm long; involucre 7–10 mm long, 2–3 mm diam.; bracts c. 12–14; stereome flat, with 4 or 5 resin ducts; mature receptacle with pits raised, concave. Florets numerous; corolla c. 8 mm long, exceeding involucre bracts by c. 1–2 mm; basal cone much elongated, c. 0.3 mm diam.; limb $\frac{1}{4}$ – $\frac{1}{3}$ of total length, very narrowly obconical, pink, usually pale yellow when dry; style branches purple. Achenes narrowly obloid-ellipsoid, 2.5–4 mm long, with c. 10 narrow convex ribs, pale brown, darker in grooves, with scattered hairs in grooves. Pappus 8–12 mm long, pink to mauve; bristles minutely and sparsely scabrid-barbellate. *Brazilian Fireweed*. Plate 28; Fig. 37A–C.

Native to Central and S America, but widespread as a weed. Naturalised in eastern Australia from Cooktown, Qld, S to Sydney, N.S.W. Grows in disturbed sites in mesic environments, including forests. Flowers mostly summer–autumn.

Qld: Utchee Ck, *D.R.Bailey* 50 (BRI); Near Brummies Lookout, SE of Tyalgum, *A.R.Bean* 14559 (BRI). N.S.W.: Lane Cove Natl Park, *M.Gray* 5209 (CANB); Tooloom Falls, *N.S.Lander* 322 (BRI, NSW).

Erechtites valerianifolius is similar to the Australian disciform species of *Senecio*, once placed in *Erechtites*, but has lyrate divided leaves, raised receptacular pits, corolla bases tapering very gradually upwards from the base, different style branch morphology, and a pink pappus. It is occasionally confused with the sometimes sympatric *Crassocephalum crepidioides*.



Doubtful or Excluded Names

Erechtites muelleri Lange, *Ind. Sem. Hort. Acad. Haunensi* 28 (1862), as *Mulleri*

T: locality unknown, Australia; *n.v.*

Belcher (1956) discusses this species under *Senecio hispidulus* × *Senecio quadridentatus* in his treatment of Australian disciform (erechitoid) species. Although he did not see the type, specimens from Vienna determined as *E. muelleri* and said to have been raised from seed from Copenhagen were examined by him. From his description these specimens may be *Senecio tenuiflorus*, but there is some doubt about this.

Erechtites argutus (A.Rich.) DC. var. *glabratus* Hook.f. in W.J.Hooker, *London J. Bot.* 6: 122 (1847), as *arguta* var. *glabrata*

T: Tas.; K, photo MEL.

The specimen on which this variety is based is a native *Senecio* in the Australian disciform group, but its identity is uncertain. Belcher identified the specimens on the type sheet as hybrids between *S. glomeratus* and *S. hispidulus*.

Erechtites praealtus Raf., *Fl. Ludov.* 65 (1817), as *praealta*

T: n.v.

This species is listed as occurring in Australia by W.Hartley, Standardized Plant Names, *Bulletin (CSIRO)* 272: 30 (1953). There is no indication of where it was found, and the record is not supported by herbarium specimens.

11. ARRHENECHTHITES

Arrhenechthites Mattf., *Bot. Jahrb. Syst.* 69(2): 288 (1938); from Greek *arrhen* (male), and *Erechtites*, a related genus, referring to the functionally male disc florets of the first-described species.

T: *A. tomentellus* Mattf.

Erect perennial herbs. Leaves alternate, sessile, pinnately veined. Capitula disciform, pedunculate, calyculate; involuclral bracts free. Florets: outer florets with corolla zygomorphic (in Australia) with a rudimentary ligule; central florets functionally male (not in Australia) or bisexual, with corolla limbs yellow or tinged purple; anthers ecaudate; style branches erect, truncate or obtuse, crowned with papillae, without terminal appendage. Achenes homomorphic, narrowly obloid. Pappus caducous.

A genus of 5 species from New Guinea and Australia; the single Australian species is endemic.

Arrhenechthites mixtus (A.Rich.) Belcher, *Ann. Missouri Bot. Gard.* 43: 75 (1956)

Senecio mixtus A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 112 (1834); *Erechtites mixtus* (A.Rich.) DC., *Prodr.* 6: 297 (1838), as *mixta*. T: Port-Jackson, N.S.W., *C. Gaudichaud-Beaupré*; holo: P.

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 967, fig. 198b (1999).

Plants to c. 0.9 m high, with fleshy subtuberous roots, with scattered hairs; hairs multicelled, pale or purplish basally, terminating in a long fine whitish portion that is soon lost. Leaves often somewhat abruptly broadening from petiole-like to broad-laminate, to 12 cm long, with l:w ratio c. 3–5, lobate to pinnatisect, with degree of dissection reducing distally, with 3–9 segments per side; base often with 1 or 2 narrow segments; margin entire or with few teeth; lamina ±glabrous except for short coarse hairs on or near margins (new growth briefly cobwebby); secondary venation evident; lower surface purple. Capitula few to c. 20 per stem; mature peduncle mostly to c. 50 mm long; calycular bracteoles 3–6, 4–6 mm long, 0.4–0.6 mm wide; involucre 12–20 mm long, 2–3 mm diam.; bracts 7–10, flat, glabrous or hairy. Florets 10–15; outer florets 8–10; ligule c. 1 mm long, irregularly deeply and peracutely-lobed, pale yellow or purplish. Achenes narrowly obloid, 6–8 mm long, prominently ribbed, glabrous. Pappus c. 12 mm long. *Purple Fireweed*. Fig. 36J–M.

Occurs in SE Australia from Mt Spirabo in NE N.S.W. S to eastern Vic. Grows on soils of various derivation including granite, greywacke, quartzite and conglomerate, in open forest, at moderate altitudes (to 1560 m). Flowers mid-spring–late summer.

N.S.W.: 12 km S of Tantawangalo, S of Chalkhills Fire Trail, Tantawangalo S.F., *I.Crawford* 2255 (CANB, MEL, NSW). Vic.: Fork Track area, between Tulach Ard Rd and Snowy River Gorge, *A.C.Beauglehole* 37347 (MEL).



Arrhenechthites mixtus is a peculiar species which was originally described as a *Senecio*, then transferred to *Erechtites*, and finally transferred to *Arrhenechthites*, an otherwise entirely New Guinean genus. It differs from other species of *Arrhenechthites* in having fewer-headed inflorescences, sometimes bisexual central florets, outer florets with a more pronounced ligule, markedly longer fruits and capitula, leaves intensely purple on the lower surface, and pigmented multicellular hairs on the involuclral bracts. This casts some doubts as to its placement in *Arrhenechthites*, and ultimately it may be best placed in a genus of its own.

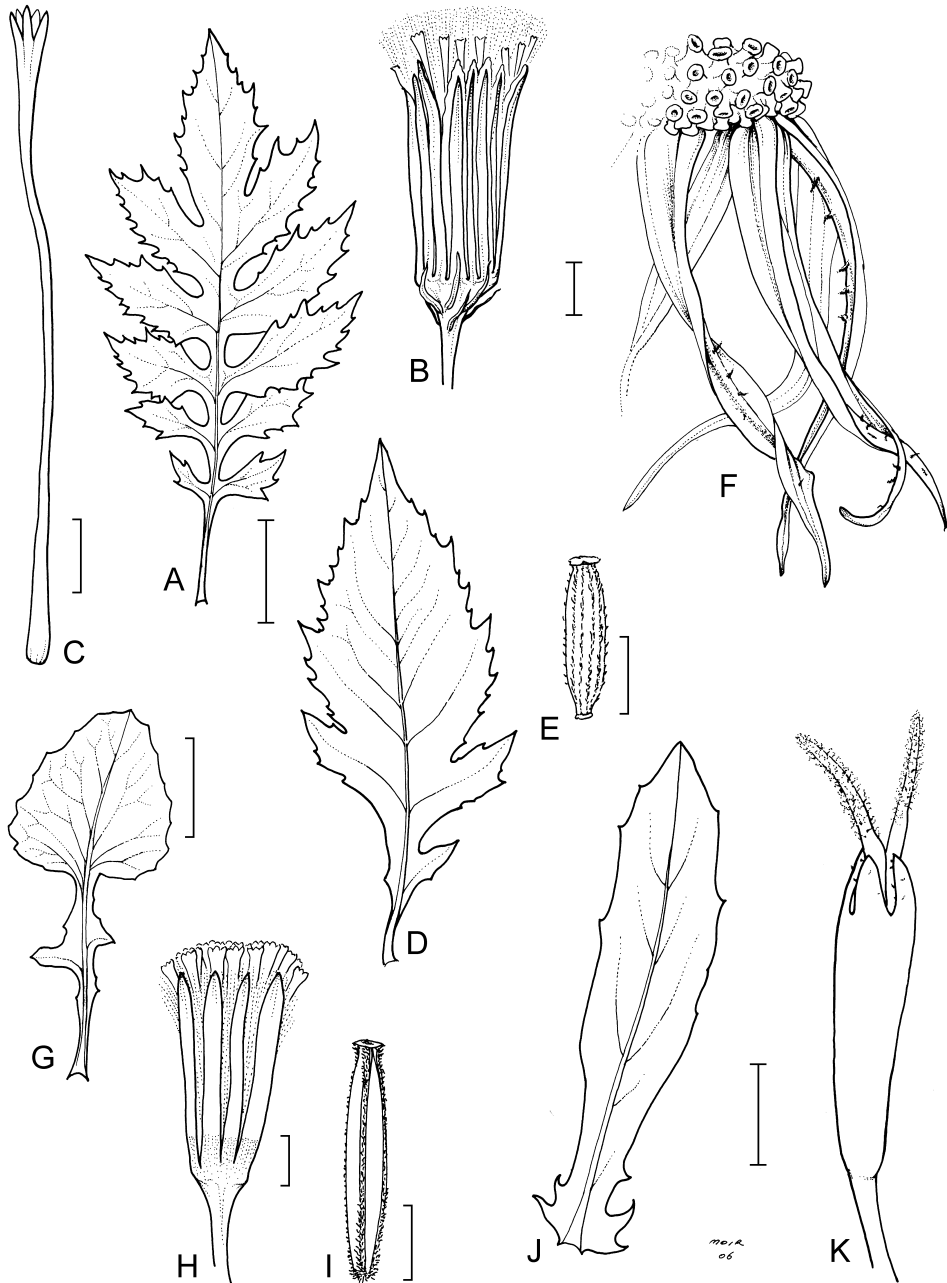


Figure 37. A–C, *Erechites valerianifolius* f. *valerianifolius*. A, mid-stem leaf; B, capitulum; C, corolla (A, I.R.Thompson 880, MEL; B, C, G.N.Batianoff 31066, MEL). D–F, *Crassocephalum crepidioides*. D, lower- to mid-stem leaf; E, achene; F, raised pits on mature receptacle (D, F, P.C.Jobson 689, MEL; E, P.I.Forster 17979 & T.Spokes, MEL). G–I, *Emilia sonchifolia* var. *sonchifolia*. G, mid-stem leaf; H, capitulum; I, achene (G, A.C.Beauglehole 55144, MEL; H, R.W.Johnson 5037, MEL; I, P.I.Forster 8925, MEL). J, K, *Gynura drymophila* var. *drymophila*. J, mid-stem leaf; K, upper corolla with protruding style extensions (J, P.I.Forster 6622, MEL; K, Bowman s.n., MEL2128376). Scale bars: A, D, G, J = 20 mm; B, H = 2 mm; C, E–F, I, K = 1 mm. Drawn by M.Moir.

Morphologically, *A. mixtus* resembles *Gynura drymophila* in involucre bract and fruit morphology, but its style branch morphology is significantly different. Curiously, it combines features of two Australian species of *Senecio* with which it is ±sympatric. It resembles the radiate species *Senecio vagus* subsp. *vagus* in leaf morphology and by having similar pigmented multicellular hairs, and it resembles the disciform species *S. prenanthoides* in its leaf pigmentation, slender capitula, low numbers of florets per capitulum and its slightly tuberous secondary roots. The minutely ligulate female florets could also be interpreted as intermediate in morphology between these species.

12. CRASSOCEPHALUM

Crassocephalum Moench, *Methodus* 516 (1794); from the Latin *crassus* (thick) and the Greek *kephale* (a head), alluding to the broad capitulum in the type species.

Type: *C. cernuum* (L.f.) Moench

Annual herbs. Leaves sessile, pinnately veined. Capitula discoid (in Australia) or radiate, pedunculate, calyculate; involucre bracts free or rarely fused. Florets: corolla limbs variously coloured; anthers ecaudate; style branches angled upwards, crowned with papillae, with a long tapering terminal appendage. Achenes homomorphic, obloid. Pappus caducous.

A genus of c. 40 species native to Arabia, tropical Africa and Madagascar; 1 species naturalised in Australia.

R.O.Belcher, The typification of *Crassocephalum* Moench and *Gynura* Cass., *Kew Bull.* 10: 455 (1955).

**Crassocephalum crepidioides* (Benth.) S.Moore, *J. Bot.* 50: 211 (1912)

Gynura crepidioides Benth. in W.J.Hooker, *Niger Fl.* 438 (1849). T: Sierra Leone, *G.Don*; lecto: BM, *fide* A.J.C.Grierson in M.D.Dassanayake & F.R.Fosberg (eds), *Revis. Handb. Fl. Ceylon* 1: 248 (1980).

Illustrations: R.J.F.Henderson, *Proc. Roy. Soc. Queensland* 84: t. 5 (facing p. 60) (1973); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 573, fig. 801 (1986); B.A.Auld & R.W.Medd, *Weeds* 99 (1987).

Annual herbs to c. 1.2 m high. Hairs moderately dense on most parts except leaves. Leaves to 20 cm long, with l:w ratio mostly c. 2–3, undivided or lobate to pinnatisect in proximal half; base petiole-like or sub-basal segments present; margins irregularly serrate. Inflorescence of few–several discoid capitula (capitula nodding at anthesis); mature peduncle to c. 40 mm long; calycular bracteoles 8–12, narrowly linear, 2–5 mm long; involucre 8–12 mm long, 3–5 mm diam.; bracts commonly c. 16, sparsely pubescent, becoming glabrous; stereome ±flat, with 1 or 2 inconspicuous resin ducts, with coarse hairs or glabrous; mature receptacle with pits strongly elevated. Florets numerous; corolla c. 10 mm long, exceeding involucre bracts by 2–3 mm, c. 0.2 mm diam. at base; limb c. 2/5 of total length, very narrowly obconical, orange to reddish brown (drying pink); style appendage purple. Achenes obloid-ellipsoid, 2.0–2.3 mm long, with c. 10 narrow convex ribs, purple, with scattered hairs in grooves. Pappus 8–14 mm long; bristles minutely and sparsely scabrid-barbellate. *Thickhead.* Fig. 37D–F.

Naturalised in eastern Australia from Mt Mulligan in N Qld to Wollongong, N.S.W. Native to tropical Africa. A widespread weed extending from India ESE through SE Asia to northern Australia. Grows in predominantly disturbed and cultivated sites in various soils in woodland, forest, and grassland. Flowers most of year.

Qld: Amys Peak, Kroombit Tableland, c. 60 km SW of Gladstone, *M.D.Crisp* 2847 (BRI, CANB); creek behind Cannon Park Racecourse, Cairns City, *R.L.Jago* 4244 (BRI, DNA, MEL). N.S.W.: Formerly Ring's property, above Mt Keira Scout Camp, c. 8 km W of Wollongong, *P.C.Jobson* 4305 (BRI, CANB, NSW); Tweed R., Duranbah, *H.S.McKee* 11651 (CANB).



Crassocephalum crepidioides has raised receptacular pits identical to those seen in *Erechtites valerianifolius*. These two species have often been confused, however they are easily distinguished by the colour of the pappus, and their leaf morphology is significantly different. Phylogenetic studies using molecular data by P.B. Pelser *et al.*, *Amer. J. Bot.* 89(6): 935–936 (2002) show *Crassocephalum* and *Erechtites* to be closely related and this corresponds to the similar receptacular morphology seen in naturalised species in Australia.

13. EMILIA

Emilia Cass., *Bull. Sci. Soc. Philom. Paris 1817* 68 (1817); possibly named after a friend or relative of Cassini.

Type: *E. sonchifolia* (L.) DC.

Annual to perennial herbs. Leaves sessile, pinnately veined. Capitula discoid (in Australia) or radiate, pedunculate, ecalyculate; involucre bracts free. Florets: corolla limbs pink, red, sometimes yellow; anthers ecaudate; style branches truncate to obtuse, crowned with papillae, with or without terminal appendage. Achenes homomorphic, narrowly obloid. Pappus caducous.

A genus of c. 100 species in Africa S of the Sahara, Asia and the Pacific Is; 2 introduced species in Australia. The hyaline margin of the involucre bracts of species of *Emilia* in Australia are narrow and of similar width on all involucre bracts in contrast to other species in the Senecioneae in Australia which exhibit dimorphism of the margin, i.e. they are alternately narrow and broad.

D.H. Nicolson, Summary of cytological information on *Emilia* and the taxonomy of four Pacific taxa of *Emilia* (Asteraceae: Senecioneae), *Syst. Bot.* 5(4): 391–407 (1980).

Developing stems not densely hairy; leaves often with lateral segments; upper-stem leaves strongly cordate or sagittate; corolla with limb 2–3.5 mm long, pale purple, not reaching to apex of involucre bracts or exceeding them by up to 2 mm; achenes 2.2–3.8 mm long

1. *E. sonchifolia*

Developing stems densely hairy; leaves lacking lateral segments; upper-stem leaves not strongly cordate or sagittate; corolla with limb 4–5 mm long, brick-red, exceeding involucre bracts by 2–4 mm; achenes 4–5 mm long

2. *E. fosbergii*

1. **Emilia sonchifolia* (L.) DC. in R. Wight, *Contr. Bot. India* 24 (1834)

Cacalia sonchifolia L., *Sp. Pl.* 2: 835 (1753); *E. sonchifolia* var. *typica* Domin, *Biblioth. Bot.* 89: 1240 (1930), *nom. inval.* type var. T: *Herb. Hermann* 2: 25; 4: 36; 4: 66, no. 305; lecto: BM, *fide* A.J.C. Grierson in M.D. Dassanayake & F.R. Fosberg (eds), *Revis. Handb. Fl. Ceylon* 1: 252 (1980).

Annuals to c. 0.5 m high; stems and leaves sparsely hairy, becoming glabrous. Leaves to c. 8 cm long, with l:w ratio c. 2–4, undivided or sometimes lobate to pinnatisect, sometimes petiole-like with lamina much broader distally; margin dentate; upper-stem leaves becoming lanceolate, auriculate. Inflorescences of 1–several capitula; mature peduncle to c. 80 mm long, ecalyculate; involucre 7–12 mm long, 2–4 mm diam.; bracts c. 6–8; stereome flat, with 3–5 resin ducts, with a few coarse hairs or glabrous; receptacular pits not or very slightly raised. Florets c. 30; corolla 6–10 mm long, slightly shorter than, equal to, or exceeding involucre by up to 2.5 mm; base c. 0.3 mm diam.; limb $\frac{1}{3}$ – $\frac{2}{5}$ of total length, narrowly obconical, pink; style branch appendage purple. Achenes narrowly obloid, 2.2–3.8 mm long, with 5 broad ±flat ribs, brown or straw-coloured, with scattered hairs in grooves. Pappus 5–8 mm long; bristles minutely scabrid-barbellate.

Native in Asia and the Pacific; naturalised in northern and eastern Australia. There are 2 varieties.

Aberrant, probably diseased, plants have been collected that develop green inflorescences characterised by several vegetative shoots developing from capitula instead of florets (the so-called ‘hen and chicken’ effect).

Apex of involucre bracts with dark border to c. 1 mm long or absent; corolla 1 mm shorter than or up to 1 mm longer than involucre bracts; corolla lobes < 1 mm long; achenes 2.2–3.2 mm long

1a. var. *sonchifolia*

Apex of involucre bracts commonly with dark border 2–3 mm long; corolla usually exceeding involucre bracts by up to 2.5 mm; corolla lobes > 1 mm long; achenes 3.0–3.8 mm long

1b. var. *javanica*

1a. **Emilia sonchifolia* (L.) DC. var. *sonchifolia*

[*E. purpurea* auct. non Cass.; F.Mueller, *Fragm.* 12: 21 (1882)]

Illustration: D.H.Nicolson, *Syst. Bot.* 5(4): 393, fig. 3 (1980).

Capitula: length of involucre commonly > 2.5 times diameter mid-involucre; apex of bracts without a dark border or border to c. 1 mm long; stereome often with scattered coarse hairs especially distally. Corolla 1 mm shorter than or up to 1 mm longer than involucre bracts; lobes < 1 mm long. Achenes 2.2–3.2 mm long. Plate 29; Fig. 37G–I.

Probably native to southern Asia. Naturalised in northern W.A., northern N.T., and in northern and eastern Qld, predominantly on or near the coast. A widespread weed of tropical regions. Grows in moist, sandy soils e.g. cays, sand dunes, and in grassland. Flowers mostly autumn–winter.

W.A.: Mitchell Plateau mining camp, *P.A.Fryxell 4013* & *L.A.Craven* (MEL). N.T.: Kakadu Natl Park, *C.R.Dunlop 8562* & *P.F.Munns* (CANB, DNA, MEL); Little Lagoon, Groote Eylandt, *R.L.Specht 419* (CANB). Qld: Beames St, Mareeba, *J.R.Clarkson 4594* (DNA, PERTH, QRS); Red Beach, Weipa area, *K.Herrman s.n.* (CANB).



The most reliable character distinguishing this variety from var. *javanica* is the length of the corolla lobes. Subtle differences are also apparent in capitular proportions, and var. *sonchifolia* commonly has scattered hairs on the distal half of involucre bracts, whereas var. *javanica* almost always has glabrous involucre bracts.

1b. **Emilia sonchifolia* var. *javanica* (Burm.f.) Mattf., *Bot. Jahrb. Syst.* 62: 445 (1929)

Hieracium javanicum Burm.f., *Fl. Indica* 174, t. 57, fig. 1 (1768). T: Java, *Garcin s.n.*; holo: G n.v., fide D.H.Nicolson, *Syst. Bot.* 5(4): 399 (1980).

Illustration: D.H.Nicolson, *loc. cit.* 393, fig. 4.

Capitula: length of involucre < 2.5 times diameter mid-involucre; apex of bracts commonly with a dark border 2–3 mm long; stereome usually glabrous; corolla usually exceeding involucre bracts by up to 2.5 mm; lobes > 1 mm long. Achenes 3.0–3.8 mm long.

Naturalised in eastern Qld and NE N.S.W. Native to eastern Asia and the western Pacific. Grows mostly in sandy soils in coastal dunes, also in woodland and forest. Flowers mostly autumn–winter.

Qld: Bruce Hwy, 12 km S of Mackay, *A.R.Bean 16271* (BRI); Brisbane, 4 Dec. 1938, *H.Tryon* (BRI). N.S.W.: Kingscliff, *R.G.Coveny 12437 et al.* (NSW).



2. **Emilia fosbergii* Nicolson, *Phytologia* 32: 33 (1975)

T: Bahamas, New Providence, near Nassau, 26 Dec. 1902, *Curtiss 6*; holo: US n.v., fide D.H.Nicolson, *loc. cit.*

Illustrations: D.H.Nicolson, *Syst. Bot.* 5(4): 393, fig. 2 (1980); R.E.Woodson Jr & R.W.Schery, *Ann. Missouri Bot. Gard.* 62: 1248, fig. 94 (1975).

Annuals to 0.5 m high, transiently densely coarse-hairy on new growth. Leaves to c. 8 cm long, with l:w ratio c. 2–4, undivided; base becoming truncate to auriculate upwards; margin

dentate. Capitula solitary or few; mature peduncle to c. 80 mm long; involucre 7–12 mm long, 3–7 mm diam.; bracts c. 6–8, glabrous; stereome flat, with 3–5 resin ducts; receptacular pits not or slightly raised. Florets c. 30–numerous; corolla 7–11 mm long, exceeding involucre by 2–4 mm, c. 0.4 mm wide at base; limb c. $\frac{1}{2}$ of total length, very narrowly campanulate, purple-red; style appendage purple. Achenes obloid, with 5 broad \pm flat ribs, 4–5 mm long; ribs brown or stramineous, scattered short papillose hairs in grooves. Pappus 5–8 mm long.

Possibly native to Africa. Naturalised in far NE Qld, also across the Pacific region. Flowers mostly autumn–winter.

Qld: Vicinity of Lockhart River township, *J.F.Grimshaw 97C* (BRI, DNA, MEL).



Excluded name

Emilia flammea Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 14: 406 (1819)

T: Java; *n.v.*

This species is listed as occurring in Australia by W.Hartley, Standardized Plant Names, *Bulletin (CSIRO)* 272: 29 (1953). There is no indication of where it was found, and the record is not supported by herbarium specimens.

14. GYNURA

Gynura Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 34: 391 (1825), *nom. cons.*; from the Greek *gyne* (female) and *ourus* (tail), in allusion to the tail-like style branches of the florets.

Type: *G. auriculata* Cass.

Annual or perennial herbs. Leaves sessile, pinnately veined. Capitula discoid, pedunculate, calyculate; involucre bracts free. Florets: corolla limbs yellow, orange, red, purplish, white or greenish; anthers ecaudate; style branches \pm erect, truncate, without crown of papillae, with terminal appendage long, tapering. Achenes homomorphic, narrowly obloid. Pappus ?caducous.

A genus of c. 40 species occurring in Asia and Africa with most species in SE Asia; one endemic species in Australia.

F.G.Davies, The genus *Gynura* (Compositae) in Malesia and Australia, *Kew Bull.* 35(4): 711–734 (1980); P.I.Forster & A.Thongpukdee, Variation in *Gynura drymophila* (F.Muell.) F.G.Davies (Asteraceae: Senecioneae), *Austrobaileya* 2(5): 557–566 (1988); R.O.Belcher, *Gynura* (Compositae) in Australia and Malesia, emended, *Kew Bull.* 44(3): 533–542 (1989).

***Gynura drymophila* (F.Muell.) F.G.Davies, *Kew Bull.* 35(4): 733 (1980)**

Senecio drymophilus F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 69 (1857). T: Brisbane River, Qld, Oct. 1856, Hill & F.Mueller; lecto: K *n.v.*, *fide* P.I.Forster & A.Thongpukdee, *Austrobaileya* 2(5): 560 (1988); isolecto: K, MEL.

Succulent, tuberous-rooted herbs to c. 0.5 m high, coarse-hairy on most parts, or glabrous. Leaves mostly oblanceolate, to 15 cm long, with l:w ratio c. 3–5, entire, denticulate, or lobate; base weakly to strongly auriculate. Capitula few to several; mature peduncle to c. 50 mm long; calycular bracteoles 4–8, linear, 6–10 mm long; involucre 10–15 mm long; bracts c. 13; stereome flat, with resin ducts obscure, with coarse hairs or glabrous; receptacular pits slightly raised. Florets numerous; corolla 8–14 mm long, exceeding involucre by c. 3–4 mm, c. 0.6 mm wide at base; limb c. $\frac{1}{3}$ of total length, yellow to orange-red; style branch appendages yellowish. Achenes narrowly obloid-ellipsoid, 5–8 mm long,

with c. 10 narrow convex ribs, dark brown, glabrous. Pappus c. 10 mm long; bristles minutely and sparsely scabrid-barbellate.

Occurs in eastern Qld and N.S.W.; there are 2 varieties.

The broad succulent roots of this species are distinctive.

Plants with spreading, coarse hairs

a. var. *drymophila*

Plants glabrous

b. var. *glabrifolia*

a. *Gynura drymophila* (F.Muell.) F.G.Davies var. *drymophila*

Senecio shirleyanus Domin, *Biblioth. Bot.* 89: 686 (1929). T: Tambourine Mtns, Qld, Mar. 1910, *K.Domin* 9143 & 9144; syn: PR *n.v.*, fide R.O.Belcher, *Kew Bull.* 44(3): 533 (1989).

[*Gynura pseudochina* auct. non (L.) DC.; G.Bentham, *Fl. Austral.* 3: 661 (1867)]

Illustration: P.I.Forster & A.Thongpukdee, *Austrobaileya* 2: 561, fig. 2; 563, fig. 3 (1988).

Plants with spreading multicellular hairs on stems, leaves, peduncles, bracts, bracteoles and involucre bracts. Plate 30; Fig. 37J–K.

Occurs from Lizard Is., NE Qld, S to Ballina, NE N.S.W. Grows on sandstone among granite boulders, and in near-coastal lowland situations, on cliff tops, and in rocky and sandy sites in woodland, forest, vine thicket, closed heath, vine forests, and hoop pine rainforest. Flowers all year round.

Qld: Mt Walsh, 6 km S of Biggenden, *M.D.Crisp* 2635 (BRI, CANB, NSW); 1 km NW of L. Elphinstone outlet, Carborough Ra., *I.R.Telford* 11120 & *R.J.Rudd* (BRI, CANB, NSW). N.S.W.: Mt Nullam, Sept. 1896, *W.Bauerlen* (NSW).



b. *Gynura drymophila* var. *glabrifolia* P.I.Forster & Thongp., *Austrobaileya* 2(5): 564 (1988)

T: cultivated specimen ex 2 km SW of Boolbunda Rock, Qld, 15 May 1986, *P.I.Forster* 2425; holo: BRI.

Illustration: P.I.Forster & A.Thongpukdee, *op. cit.* 565, fig. 4; 566, fig. 5.

Plants glabrous.

Occurs in central-eastern and SE Qld and NE N.S.W. Ecological and phenological details as for the type variety.

Qld: Mt Moon, 5 km SW of Mt Alford township, *P.I.Forster* 6621 *et al.* (BRI, MEL); Brigalow Research Stn, 32 km NW of Theodore, *R.W.Johnson* 2670 (BRI). N.S.W.: Three Tops, Mount Warning Natl Park, July 1955, *A.Benwell s.n.* (NSW).



Similar in all details to the typical variety except for the absence of hairs. Recorded as growing side by side with typical variety.

Excluded name

Gynura ovalis (Ker Gawl.) DC., *Prodr.* 6: 300 (1838)

Cacalia ovalis Ker Gawl., *Bot. Reg.* 2: t. 101 (1816). T: fig. 101 in J.B.Ker Gawler, *Bot. Reg.* 2 (1816).

This species, now synonymised under *G. pseudochina*, is native to Asia. It was listed as occurring on Sinclair Is. Qld by F.Mueller in *Essay Pl. collected by E.Fitzalan during Lieut. Smith's Exped. Estuary Burdekin* 18 (1860). As Mueller labelled a few sheets of *G. drymophila* var. *drymophila* as *G. ovalis*, it is possible that the specimen from Sinclair Is. was the former.

ASTERACEAE

Trib. 2. CALENDULEAE

A. Ghaffoor

Asteraceae trib. *Calenduleae* Cass., *J. Phys. Chim. Hist. Nat.* 88: 161 (1819)

Type: *Calendula* L.

Annual or perennial herbs (shrubs or small trees elsewhere). Leaves alternate (opposite elsewhere). Capitula radiate, epaleate. Ray florets female, fertile (sterile or rarely neuter elsewhere); ligules shortly 2- or 3-lobed, or acute, white or yellow, sometimes blue on undersurface. Disc florets bisexual or functionally male, actinomorphic, 5-lobed, yellow, red, brownish or with purplish black lobes; anther appendages flat, triangular-ovate; style branches often short (branches fused in female-sterile florets), often with a subapical collar of sweeping hairs. Pappus absent.

A fairly well understood tribe comprising 12 genera and c. 120 species, distributed mainly in southern Africa, but extending to the Middle East and southern Europe. Six genera naturalised in Australia.

T.Norlindh, Studies in the Calenduleae. 1. Monograph of the Genera *Dimorphotheca*, *Castalis*, *Osteospermum*, *Gibbaria* and *Chrysanthemoides* (1943); T.Norlindh, Additions to the monograph on *Osteospermum*, *Bot. Not.* 113: 385–399 (1960); T.Norlindh, Studies in *Calendula maderensis* DC. with a discussion on the delimitation of *Calendula* L. from *Gibbaria* Cass. and *Osteospermum* L., *Bot. Not.* 115: 437–445 (1962); T.Norlindh, Chromosome numbers in the Calenduleae 1. with discussion on relationships, hybridisation, and phyto-geography, *Bot. Not.* 116: 193–209 (1963); T.Norlindh, Calenduleae—systematic review, in V.H.Heywood, J.B.Harborne & B.L.Turner (eds), *Biol. Chem. Compositae* 2: 961–987 (1977); B.Nordenstam, *XIII. Tribe Calenduleae Cass. (1819)*, in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 241–245 (2007); B.Nordenstam & M.Källersjö, Calenduleae, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 527–538 (2009).

1 Achenes polymorphic, some curved and/or rostrate

2 Disc florets with undivided styles; outer achenes cymbiform, straight or incurved; inner achenes strongly incurved and sometimes annular

1. CALENDULA

2: Disc florets with shortly bilobed styles; achenes straight or very slightly curved, winged or not, angled, some rostrate

5. OLIGOCARPUS

1: Achenes homomorphic or dimorphic, rarely rostrate

3 Large bushy shrubs; fruits drupaceous, globose to ovoid, with purplish black fleshy layer surrounding hard stone

2. CHRYSANTHEMOIDES

3: Herbs or small subshrubs; achenes dry, hard, angular, flattened, winged or not

4 Disc florets bisexual, fertile, with flattened achenes

3. DIMORPHOTHECA

4: Disc florets functionally male, not producing achenes

5 Involucral bracts with broad scarious margins; achenes homomorphic, with 3 broad membranous wings and unifenestrate apical cavity

4. MONOCULUS

5: Involucral bracts with narrow scarious margins; achenes dimorphic, straight or curved, angular, winged or not, and an efenestrate apical cavity

6. OSTEOSPERMUM

ASTERACEAE

1. CALENDULA

Calendula L., *Sp. Pl.* 2: 921 (1753); from Latin *calende* (the first day of each month), probably because *C. officinalis* may flower throughout the year.

Type: *C. officinalis* L.

Annual or perennial herbs, mostly glandular-hairy and aromatic. Stems procumbent to erect, occasionally woody at base. Leaves simple, alternate, \pm sessile, entire or dentate to \pm pinnatifid. Capitula heterogamous, radiate, 1–3 at apices of stem and branches. Involucre 1–2 (–3)-seriate; bracts with narrowly scarious margins; receptacle flat, naked, pitted. Ray florets 1–3 (–4)-seriate, female, fertile; ligules yellow or orange; style branches linear. Disc florets tubular, 5-lobed, yellow-red or brownish; peripheral florets bisexual; innermost functionally male; anthers tailed; styles undivided, apically acute and surrounded by a ring of short hairs. Achenes polymorphic within same capitulum, incurved to various degrees; ray achenes cymbiform, straight to curved, rostrate, winged; disc achenes usually small, strongly curved, sometimes \pm annular and transversely rugose.

A small genus of c. 10–15 species, mainly distributed in Macronesia, N Africa, the Mediterranean region, southern and central Europe, Arabia, Iraq, Iran, and Pakistan. In Australia, 3 species are naturalised.

1 Involucral bracts uniseriate; achenes with beak longer than body

3. *C. palaestina*

1: Involucral bracts biseriate; achenes with beak not longer than body or unbeaked

2 Basal leaves oblong to obovate; capitula 10–15 (–20) mm diam.; involucral bracts (6–) 8–10 mm long; ray florets 12–22; ligules as long as or slightly longer than involucral bracts

1. *C. arvensis*

2: Basal leaves oblanceolate to \pm spathulate; capitula 25–50 mm diam.; involucral bracts (8–) 10–15 mm long; ray florets usually more than 30; ligules twice as long as involucral bracts

2. *C. officinalis*

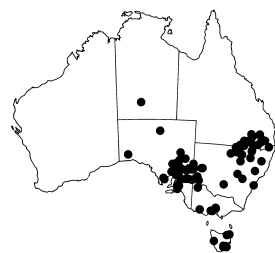
1. **Calendula arvensis* L., *Sp. Pl.* 2nd edn, 2: 1303 (1763)

T: 'Habitat in Europae arvis', *Loefling s.n., Herb. Linn. No. 1035.1*; lecto: LINN, *fide* C.C. Heyn *et al.*, *Israel J. Bot.* 23: 182 (1974).

Illustrations: T.D. Stanley & E.M. Ross (eds), *Fl. S.E. Queensland* 2: 577, fig. 81D (1986); J.P. Jessop & H.R. Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1586, fig. 721A (1986); N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 4: 833, fig. 167d (1999).

Annual, much branched herb, 15–30 (–40) cm tall, glandular-pubescent, yellowish green. Basal and lower leaves oblong, narrowly elliptic, oblanceolate to obovate, (2–) 3–6 (–8) cm long, 0.5–1.8 (–2.2) cm wide, basally semiamplexicaul, remotely denticulate or entire, obtuse, glandular and eglandular-hairy. Capitula solitary, 10–15 (–20) mm diam.; peduncle to 5 cm long; involucre 2 (–3)-seriate; bracts linear-lanceolate to narrowly ovate, (6–) 8–10 mm long, apically purplish-tinged, densely glandular. Ray florets 12–22, 2–3-seriate; ligules orange-yellow, apically 3-fid, as long as or slightly exceeding involucral bracts. Disc florets yellow or orange. Achenes trimorphic, glabrous to \pm hairy; outer-most strongly incurved, c. 8–10 mm long, dorsally spinose, narrowly beaked; inner achenes 6–8 mm long, broadly cymbiform; innermost c. 4–5 mm long, strongly curved and dorsally ridged or tuberculate. *Field Marigold*. Fig. 38G–I.

Native to the Mediterranean region; naturalised in S.A., SE Qld, N.S.W., Vic. and Tas. A weed of disturbed, loamy sands and sandy-clayey habitats, pastures, woodlands, wasteland, orchards and crops. Flowers and fruits July–Jan.



S.A.: township of Hawker, *R.V.Smith* 89/39 (A, AD, CANB, MEL, MO, NSW, RSA). Qld: Barwon Hwy, 65 km W of Goondiwindi, *A.R.Bean* 17807 (BRI, MEL, NSW). N.S.W.: wasteland alongside N side of Lightning Ridge Airport, *J.R.Hoskings* 2350 (CANB, MEL, NE, NSW). Vic.: Underbool, Nature Res., *R.V.Smith* 72/51 (CANB, K, MEL, NSW). Tas.: Hobart, Red Chapel Res., 10 Sept. 1977, *J.Gibson s.n.* (NE).

2. **Calendula officinalis* L., *Sp. Pl.* 2: 921 (1753)

T: 'Habitat in Europae arvis', *Herb. Linn.* 1035.4: lecto: LINN, *fide* S.A.Alavi in S.M.H.Jafri & A.El-Gadi (eds), *Fl. Libya* 107: 195 (1983).

Illustrations: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 833, fig. 167e (1999); Hu Qi-Ming & Wu De-Lin (eds), *Fl. Hongkong* 3: 280, fig. 249 (2009); V.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 531, fig. 35.2 A; 532, fig. 35.3 A, B (2009).

Erect to ascending, basally ±woody, ±perennial herb, (20–) 25–50 (–60) cm tall, much-branched, densely glandular-hairy. Leaves oblanceolate, narrowly obovate, oblong or ±spatulate, (3–) 5–10 (–15) cm long, (1–) 1.5–4.5 (–6) cm wide, basally attenuate, entire or repand-dentate, acute to obtuse. Capitula solitary, usually 2.5–5 cm diam.; peduncle 5–10 cm long; involucre biseriate; bracts lanceolate or oblong-lanceolate, (0.8–) 1.0–1.5 cm long, 3.5–4 mm wide, acute, glandular and simple-hairy. Ray florets usually more than 30, 2–3 (–4)-seriate; ligules narrowly oblanceolate, 2–3.5 cm long, apically 3-fid, pale yellow to golden orange. Disc florets 3–5 mm long, yellow to orange. Achenes polymorphic, with or without an outermost row of incurved, rarely patent fruits; outer achenes 2–2.5 cm long, shortly beaked, alternating with cymbiform, much shorter achenes; inner achenes smaller, curved, wrinkled. *Pot Marigold*, *Garden Marigold*. Fig. 38J–K.

Probably native to the Mediterranean region, widely cultivated throughout the world; a naturalised weed of orchards and roadsides in S.A., Qld, N.S.W., Vic. and Tas. Flowers and fruits July–Mar.

S.A.: Goyder, Burra, *R.J.Bates* 32974 (AD). Qld: Cairns, *H.Flecker CAIRNS* 03578 (QRS). N.S.W.: Silver City Hwy, 235 km S (by road) of Broken Hill, 2 Aug. 1995, *A.Fairweather s.n.* (MEL). Vic.: S. Geelong, Drysdale Rail Res. between Wilsons Rd and Boundary Rd, 2 Sept. 1995, *D.Frood s.n.* (MEL). Tas.: Matsuyker Is., 8 Mar. 1992, *S.Harris s.n.* (HO).



A species highly variable in flower colour and shape and size of achenes. It has been used in horticulture and medicine since ancient times. It is said to be effective against chilblains and warts, and is used in cosmetics and to colour butter and thicken soups, and its rays to garnish salads (D.J.Mabberley, *The Plant Book*, 3rd edn 133 (2008).

3. **Calendula palaestina* Boiss., *Diagn. Pl. Orient.* 1(10): 83 (1849)

T: 'Hab. in declivibus inter. Jerusalem et Jericho in monte Carmelo, legi vere 1846', holo: G-Boiss. *n.v.*; iso: Palestina inter Jerusalem et Jericho, Apr. 1846, *E. Boissier s.n.*; P (2 sheets), photo seen.

Illustrations: C.C.Heyn *et al.*, *Israel J. Bot.* 23: 191, fig. 11 (1974); M.Zohary, *Fl. Palestine* 3: 359, pl. 605 (1978); G.J.Harden (ed.), *Fl. New South Wales* 3: 314 (1992).

Annual, erect, sparsely-branched herb, 20–40 cm tall, glandular-pubescent and sparsely pilose. Leaves narrowly elliptic to oblong-spatulate, 2.5–10 cm long, to 2 cm wide, repand-dentate, acute, pubescent to scabrid; basal leaves cuneate; upper leaves smaller, auriculate. Capitula solitary, 1.5–2.5 cm diam.; peduncle to 2 cm long; involucre shallowly saucer-shaped, uniseriate; bracts 5–10 mm long, scabrous to pubescent. Ray florets 15–20, biseriate; ligules 1–1.2 cm long, light yellow. Disc florets yellow, with tube longer than limb. Achenes dimorphic; some outer achenes 2.5–4 cm long including 1.5–2 cm long, straight, sparsely hairy beak, winged or wingless, occasionally crested or toothed; median achenes much inflated, keeled; inner achenes cymbiform, numerous, muricate, with scattered hairs. *Palestine Marigold*. Plate 31; Fig. 38A–F.



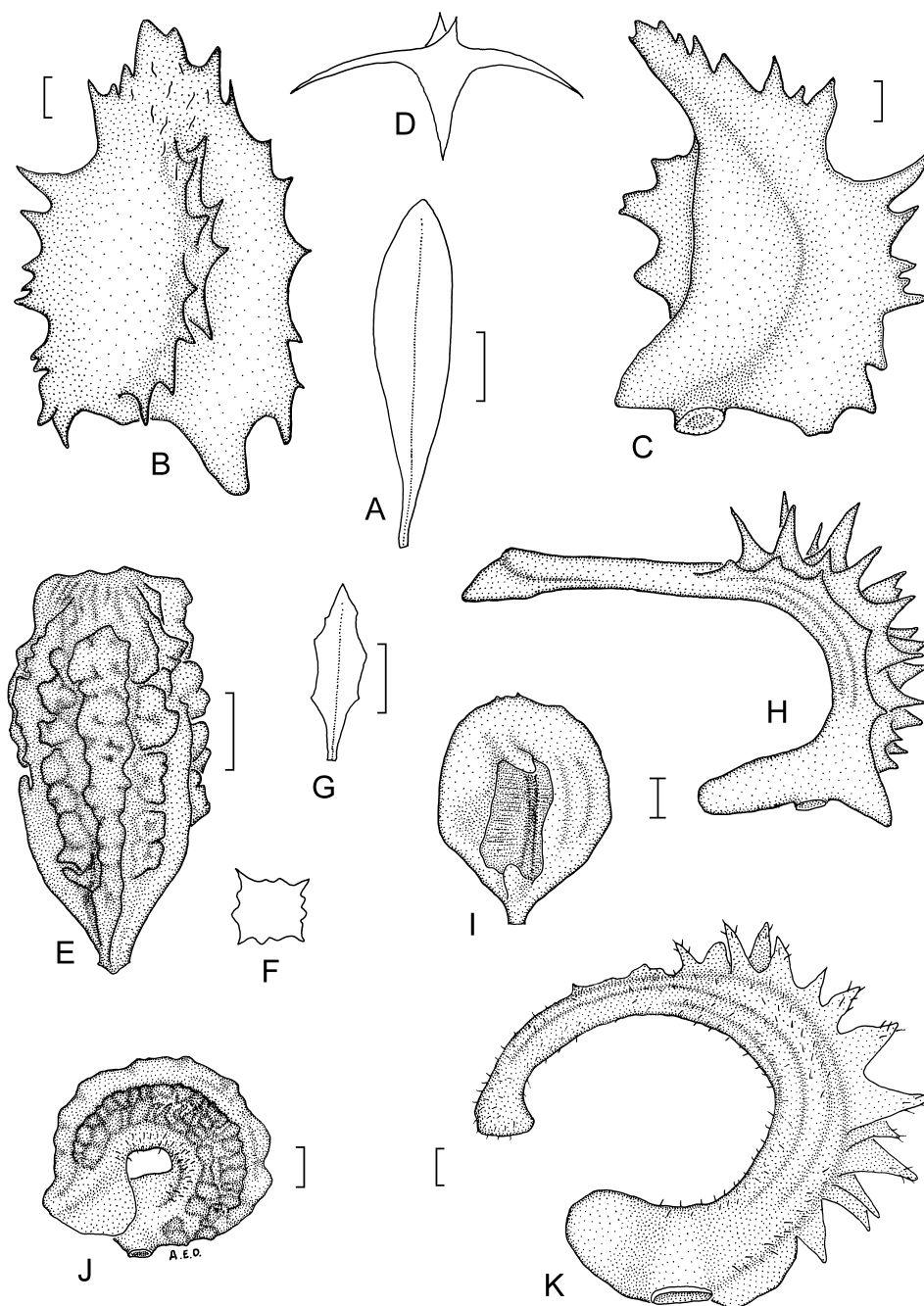


Figure 38. *Calendula*. A–F, *C. palaestina*. A, leaf; B, crested achene, abaxial view; C, crested achene, adaxial view; D, crested achene, diagrammatic TS; E, unwinged achene; F, unwinged achene, diagrammatic TS (A, E, R.W.Purdie 8186, CANB; B–D, J.Atley 1464, CANB). G–I, *C. arvensis*. G, leaf; H, beaked achene; I, inflated achene (G–I, Hj.Eichler 15689, CANB). J, K, *C. officinalis*. J, inner curved achene; K, outer beaked incurved achene (J, K, M.Gray 7010, CANB). Scale bars: A, G = 1 cm; B–C, E, H–K = 1 mm. Drawn by A.E.Orchard.

A native of the eastern Mediterranean region (Egypt, Israel, Jordan, Lebanon, Palestine, Syria); naturalised in southern N.S.W. Flowers and fruits Nov.–Dec.

N.S.W.: Prungle–Marma road, c. 2 km S from turnoff to Prungle HS, *R.W.Purdie 8186* (CANB); Zara Wanganella, *E. Officer 356* (NSW); Zara Stn, Wanganella, *J. Atley 1464* (CANB).

2. CHRYSANTHEMOIDES

Chrysanthemoides Fabr., *Enum.* 79 (1759); from chrysanthemum and the greek *-eides* (like, resembling), from a superficial resemblance to some species of *Chrysanthemum*.

Type: *C. monilifera* (L.) Norl.

Perennial shrubs. Leaves alternate, glabrous to arachnoid-hairy, entire to dentate. Capitula heterogamous, radiate, in terminal corymbs or corymb-like panicles; involucre broadly campanulate; 2–3-seriate; bracts unequal, reflexed in fruit. Receptacle \pm convex, pitted. Ray florets 10–14, uniseriate, female, fertile; ligules yellow. Disc florets bisexual, female-sterile or functionally male; corolla yellow, 5-lobed; anthers sagittate-tailed; styles shortly 2-fid. Ray achenes drupaceous, with a blue-black or orange-red outer fleshy layer surrounding a bony endocarp; disc achenes, when present, similar to ray achenes.

A genus of 2–6 species in southern and east-tropical Africa. One species naturalised in Australia: a declared noxious weed.

**Chrysanthemoides monilifera* (L.) Norl., *Stud. Calend.* 1: 374 (1943)

Osteospermum moniliferum L., *Sp. Pl.* 2: 923 (1753). T: ‘Habitat in Aethiopia’; lecto: the illustration ‘*Chrysanthemoides* African, populi albae foliis Tourn.’ in J.J.Dillenius, *Hort. Eltham* 1: 80, t. 68, f. 79 (1732), *vide* T.Norlindh, *op. cit.* 375.

Shrubs, prostrate to erect, much-branched, 1–2 (–3) m tall; branchlets ribbed, cottony white-hairy when young but soon \pm glabrous. Leaves narrowly obovate to broadly elliptic, (2–) 3–7 (–9) cm long, 1–5.5 cm wide, attenuate, entire to 3–9-toothed on each side, acute or obtuse, \pm leathery, glabrous. Capitula 2–3 (–3.5) cm diam., in a panicle of corymbs; bracteoles subulate, to 6 mm long; involucre c. 8–10 mm diam., 3-seriate; bracts acute, sparsely hairy and glandular; outer bracts linear-lanceolate to narrowly triangular, 2–3 mm long; inner bracts ovate-triangular-ovate, 4–6 mm long, membranous-margined. Ray florets (4–) 5–12 (–14); ligules 8–12 (–14) mm long, bright yellow. Disc florets several, functionally male; corolla lobes suberect. Fruits drupaceous, subglobose or obovoid to ellipsoid, 6–8 mm diam., purplish black.

A native of southern and south-eastern coastal areas of S. Africa where there are 6 subspecies, 2 of which have been introduced to Australia and some other countries (U.S.A., Sicily, France and New Zealand).

Leaves narrowly obovate to elliptic, 1–3.5 cm wide, gradually attenuate to base; margins toothed

a. subsp. **monilifera**

Leaves obovate to broadly obovate or broadly elliptic, usually more than 3.5 cm wide (up to 5.5 cm), abruptly attenuate at base; margins mostly entire

b. subsp. **rotundata**

a. **Chrysanthemoides monilifera* (L.) Norl. subsp. **monilifera**

Illustrations: J.M.Black, *Fl. S. Australia* 4: 614, fig. 276 (1929); W.T.Parsons, *Noxious Weeds Victoria* 99, fig. 84 (1976); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 830, fig. 167a (1999).

Shrub, 1–3 m tall. Leaves narrowly obovate to elliptic, 2–6 cm long, 1–3.5 cm wide, gradually attenuate to base, with 3–9 often apiculate teeth on each side. Inner row of involucre bracts broadly ovate-lanceolate; margins lacerate, woolly. Ray florets 4–8; ligules 7–14 mm long. Fruits ovoid to subglobose. *African Boneseed*, *Boneseed*. Fig. 39A–B.

Introduced as an ornamental plant in 1850, now commonly naturalised and a serious weed in coastal vegetation, cleared lands and heath scrub in N.S.W., Qld, Vic., Tas., S.A. and W.A. Flowers and fruits Aug.–Dec.

W.A.: Shenton Rd, c. 500 m S of intersection of Shenton and Robinson East Rds, *H.Cherry WA14* (PERTH). S.A.: York Penin., First St, turning S from Moonta Bay to Moonta Rd, *B.Copley 710* (AD, NE). N.S.W.: N side of South Lawson tip, at end of Ridge St, *J.R.Hosking 2334* (CANB, MEL, NE, NSW). Vic.: Little Desert, 35.6 km N of Natimuk-Gorke road, on Nhill road, 25 Sept. 1991, *J.T.Hunter s.n.* (NE). Tas.: Glamorgan-Spring Bay, E of Bicheno, *D.J.Mallinson 4832* (CANB).



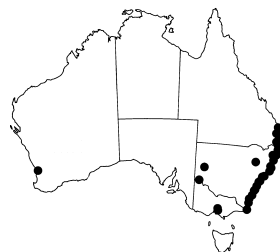
b. *Chrysanthemoides monilifera* subsp. *rotundata* (DC.) Norl., *Stud. Calend.* 1: 391 (1943)

Osteospermum rotundatum DC., *Prodr.* 6: 461 (1837). T: Port Natal, S. Africa, *Drège s.n.*; holo: G-DC.

Illustrations: T.Norlindh, *op. cit.* 392, figs 44d & 46a; G.J.Harden (ed.), *Fl. New South Wales* 3: 315 (1992); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 832, fig. 167b (1999).

Rambling or sprawling to erect shrub, to 1.5 (–2) m tall. Leaves obovate to broadly obovate-subtrifid or broadly elliptic, 3–7 (–9) cm long, usually more than 3.5 cm wide except the uppermost, abruptly attenuate at base, mostly entire or subentire. Inner row of involucre bracts narrowly ovate to lanceolate; margins subentire, glabrous. Ray florets (5–) 10–13; ligules 8–10 mm long. Fruits obovoid to ellipsoid. *Bitou Bush*. Plate 32.

A serious weed, particularly on sand dunes and forest margins near beaches and inland savannah in N.S.W, Qld, Vic. and S.A., with a single record from W.A., competing with associates like *Banksia integrifolia*, *Casuarina equisetifolia*, and in woodlands associated with *Eucalyptus tereticornis* and *E. intermedia*. Also on Lord Howe Is. Flowers and fruits Aug.–Dec.



W.A.: Reserve bounded by Peet Rd, High St and Contour Rd, *H.Cherry & S.Lloyd WA2* (PERTH). Qld: Golden Beach, Caloundra, opposite Gregory St esplanade, *G.N.Batianoff 93091 & J.Batianoff* (AD, BRI, DNA, MEL). N.S.W.: 4.5 km S of Yamba along road to Angourie, *J.Trotman 16* (NE); Ballina, 17 May 1977, *L.Laird s.n.* (NE). Vic.: Studley Park, S of Eastern Freeway on S and E bank of Yarra, 5 Sept. 1985, *R.W.Robinson s.n.* (MEL).

Bitou Bush is spread by birds which eat the fruit and is a serious threat to native sand dune vegetation.

3. DIMORPHOTHECA

Dimorphotheca Vaill., *Könlgl. Akad. Wiss. Paris Anat. Abh.* 5: 547 (1754), *nom. cons.*; from the Greek, *di* (two), *morphe* (form or shape) and *thece* (case, container), referring to the different shapes of the ray and disc achenes.

Type: not designated.

Annual or perennial herbs or shrubs, with glandular and eglandular hairs. Stems erect or ascending, simple or branched. Leaves alternate, simple, toothed to pinnatifid, rarely entire, commonly scabrous and glandular-hairy. Capitula radiate, terminal, solitary or corymbose, on short to long peduncles; involucre broadly campanulate, uniseriate; bracts linear to lanceolate, ±equal; receptacle flat, becoming ±convex. Ray florets uniseriate, female and fertile (in Australia) or sterile or neuter; ligules patent, concolorous or discolorous, white, purple, yellow or orange, adaxially darker. Disc florets bisexual or inner ones functionally male, tubular, 5-toothed; lobes yellowish adaxially, dark purple abaxially; styles filiform, shortly 2-lobed. Achenes dimorphic; outermost ray achenes (when developed) triquetrous, or ±terete, winged or not, sometimes tuberculate; disc achenes flattened, with thickened margins.

A genus of about 20 species, mainly in southern Africa, Zimbabwe and Angola; 2 naturalised species in Australia.

Ligules white above, usually violet-bluish or purple or rarely coppery beneath

1. *D. pluvialis*

Ligules yellow or orange-yellow on both sides

2. *D. sinuata*

1. **Dimorphotheca pluvialis* (L.) Moench, *Methodus* 585 (1794)

Calendula pluvialis L., *Sp. Pl.* 2: 921 (1753). T: 'Habitat in Aethiopia'; not designated.

Illustrations: D.Lanza, *Monogr. Gen. Calendula* L., tab. 1, fig. 14 & 15; tab. 2, fig. 15 & 16 (1919); T.Norlindh, *Stud. Calend.* 1: 47, fig. 2 (1943); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1588, fig. 722 (1986).

Annual herb, to 40 cm tall, with ascending, glandular-pubescent, laxly foliated branches. Leaves sessile, narrowly obovate to oblanceolate, decreasing in size up stem and becoming \pm linear-lanceolate, 1–6 (–7) cm long, 3–18 (–25) mm wide, basally cuneate, very shallowly and remotely sinuate-dentate to shallowly pinnatifid, rarely entire, \pm obtuse-subacute, densely pubescent. Capitula 3.5–4.5 cm diam., solitary; peduncle robust, 5–12 cm long, striate, glandular; involucre campanulate; bracts lanceolate or linear-lanceolate, 6–10 (–12) mm long, 1.5–3 mm wide, marginally scarious, acuminate. Ray florets female, fertile; ligules 2–3 cm long, white above, violet-bluish or purple (rarely coppery) beneath. Disc florets bisexual, yellow; lobes acute, bluish to purplish. Ray achenes obpyramidal, 4–6 mm long, tuberculate; disc achenes ovate, 6–8 mm long, 5–6 mm wide, with 2 lateral wings, apically emarginate. *Cape Marigold, African Moonflower, White African Daisy.* Fig. 39C–H.

Native to S. Africa; introduced to Australia as an ornamental plant and now a naturalised weed in disturbed areas in eastern N.S.W., S.A. and Vic. Flowers and fruits Aug.–Nov.

S.A.: Tatura, c. 3 km S of southern boundary of Nagarkat Cons. Park, along Pinnaroo to Bordertown road, *D.E.Symon 17417* (MEL); Kingston, Cape Jaffa, *P.C.Heyligers 83015* (AD, CANB). N.S.W.: Waverley, headland between Bronte and Ramarama beaches, *R.G.Coveny 7771* (K, L, MO, NSW, PRE, RSA). Vic.: Coode Is., 9 Sept. 1908, *J.R.Tovey s.n.* (MEL).



2. **Dimorphotheca sinuata* DC., *Prodr.* 6: 72 (1837)

T: Zilverfontein, Namaqualand, S. Africa, *Drège 6386*; holo: G-DC.

Illustrations: L.H.Bailey, *Stand. Cycl. Hort.* 2: 1011 (1917); T.Norlindh, *loc. cit.* 59, fig. 3, a–f. (1943).

Annual, erect herb, (15–) 20–35 (–45) cm tall, simple or branched, laxly to densely foliated with sparsely glandular-pubescent, striate, ascending, reddish stems. Leaves sessile, \pm thick, basally attenuate, coarsely sinuate-dentate on margins, obtuse; lower leaves oblong-oblanceolate, 6–7 cm long, 2–2.5 cm wide; upper leaves oblanceolate, 20–50 mm long, 5–20 mm wide. Capitula 6–8 cm diam., solitary; peduncle robust; involucre campanulate; bracts lanceolate, broadly scarious-margined, acuminate. Ray florets female, fertile; ligules 1.5–2.5 cm long, yellow or orange on both sides; style branches violet. Disc florets bisexual, yellow; lobe apices variable. Ray achenes obpyramidal-triangular, 4–5 mm long, \pm rugose and tuberculate; disc achenes broadly obcordate-suborbiculate, 6–7 mm long, 5–7 mm wide, brownish, membranous. *Sun Marigold.*

Native to S Africa, widely cultivated in gardens, occasionally naturalised in sandy soils in W.A., S.A., Qld and N.S.W. Flowers and fruits July–Nov.

W.A.: Merredin, railroad reserve, *G.J. & B.J.Keighery 160* (MEL, PERTH). S.A.: c. 1.6 km from turnoff at Narridy Telecom Exchange towards main Cowell–Cleve road *R.D.Pearce 371* (AD, ADW, CANB, K, MEL, NSW, PERTH). Qld: 4 miles [c. 6.5 km] NNE of Theodore, *R.W.Johnson 2819* (CANB). N.S.W.: South Bungan Head, Newport, *W.Bishop 750* (MEL, NSW, PRC).



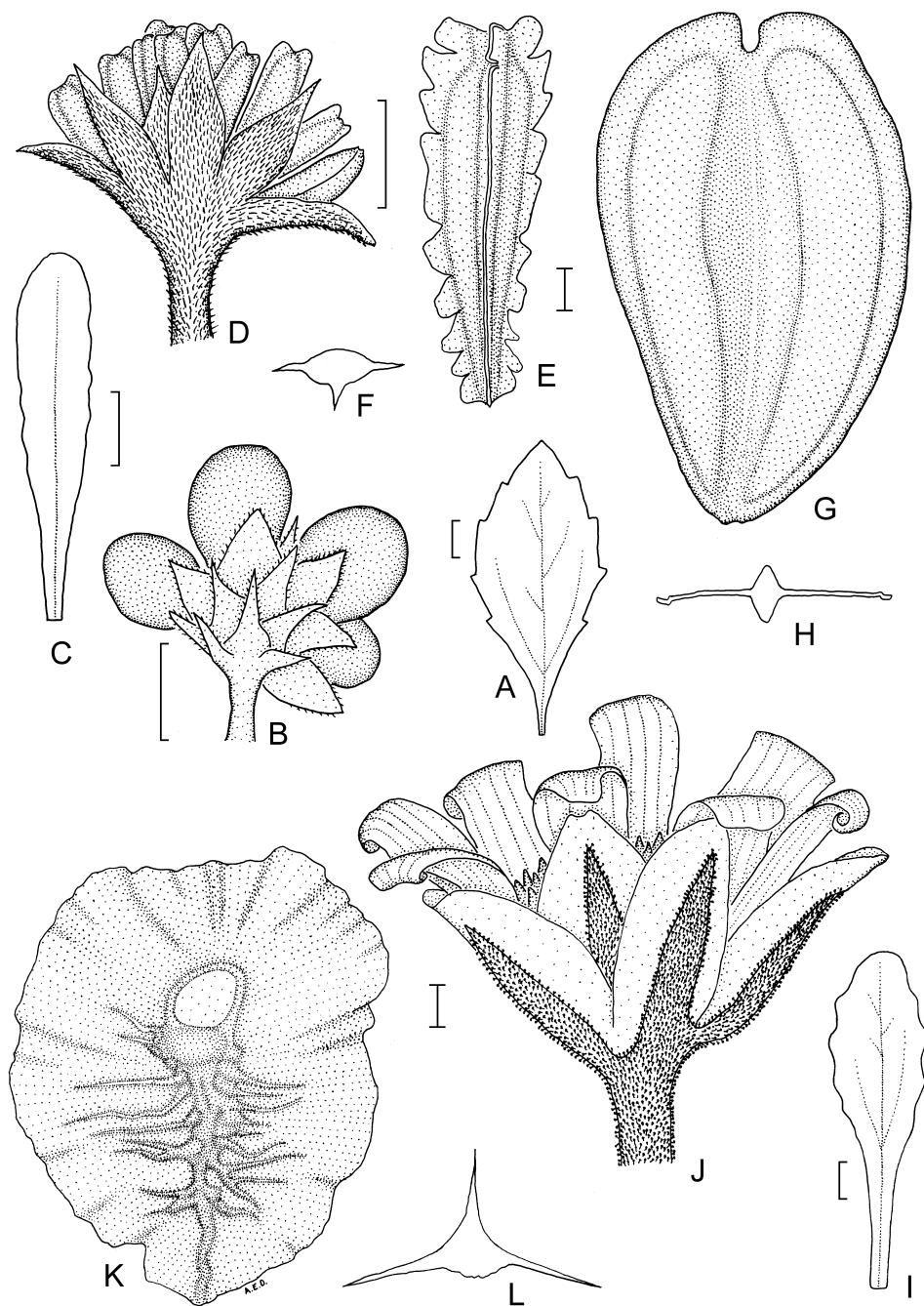


Figure 39. A, B, *Chrysanthemoides monilifera* subsp. *monilifera*. A, leaf; B, fruiting capitulum (A, B, H.Cherry & D.Ebsary WA5, CANB). C–H, *Dimorphotheca pluviialis*. C, leaf; D, capitulum with young achenes; E, outer triquetrous achene; F, outer achene, diagrammatic TS; G, flattened disk achene; H, disc achene, diagrammatic TS (C–H, P.C.Heyligers 99036, CANB). I–L, *Monoculus monstrosus*. I, leaf; J, flowering capitulum; K, achene; L, achene, diagrammatic TS (I–L, R.Coveny 12592 *et al.*, CANB). Scale bars: A, C, I = 1 cm; B, D = 5 mm; E, G, J, K = 1 mm. Drawn by A.E.Orchard.

This species is very closely allied to *D. pluvialis* in general morphology but is distinguished by its ray florets being yellow or orange-yellow on both sides while in *D. pluvialis* the ligules of the ray florets are usually white above and blue, violet or purple beneath.

4. MONOCULUS

Monoculus B.Nord., *Compositae Newslett.* 44: 39 (2006); from the Latin, *mono* (one) and *oculus* (eye), alluding to the apical cavity and single 'window' on the achenes.

Type: *M. monstrosus* (Burm.f.) B.Nord.

Osteospermum sect. *Unifenestrata* Norl., *Stud. Calend.* 1: 321 (1943). T: *O. clandestinum* (Less.) Norl.

Annual herbs, glandular-hairy or glabrous. Leaves alternate, petiolate or sessile, sinuately dentate or lobed, herbaceous. Capitula radiate, usually borne in lax corymbs, or solitary, terminal; involucre bracts \pm biseriate, with broad scarious margins. Ray florets female, fertile; corolla tube hairy; ligule yellow or orange. Disc florets bisexual, functionally male; upper part of corolla tube and lobes blackish purple, with sclerenchymatous strands joining below base of lobes and continuing half way down tube; anther filaments inserted at junction of corolla tube and lobes, with triangular, acute, blackish apical appendages; styles shallowly bifid. Achenes homomorphic, 3-angled, 3-winged; apical cavity with a single window on tangential face.

A genus of 2 species distributed in S. Africa and Namibia; 1 naturalised species in Australia.

****Monoculus monstrosus* (Burm.f.) B.Nord., *Compositae Newslett.* 44: 39 (2006)**

Calendula monstrosa Burm.f., *Fl. Indica* 28 (1768). T: S. Africa, *Thunberg s.n.*; holotype: UPS, photo seen.

Tripteris clandestina Less., *Linnaea* 6: 97 (1831); *Osteospermum clandestinum* (Less.) Norl., *Stud. Calend.* 1: 328 (1943). T: S. Africa, *Thunberg s.n.*; holotype: UPS, photo seen.

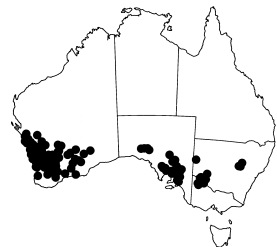
Tripteris atropurpurea Turcz., *Bull. Soc. Imp. Naturaliste Moscou* 24: 212 (1851). T: Nova Hollandia, *J.Drummond 131*; holotype: KW, photo seen.

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1589, fig. 723A (1986); N.G.Marchant *et al.*, *Fl. Perth Region* 2: 695 (1987); N.G.Walsh & T.Entwistle (eds), *Fl. Victoria* 4: 831, fig. 167c (1999).

Erect herb, aromatic, basally woody, 20–50 (–60) cm tall; shoots shortly stipitate, sticky glandular-hairy. Leaves sparsely glandular to subglabrous; basal and lower leaves shortly petiolate, oblong-elliptic to oblanceolate, 3–9 (–12 or more) cm long, 1–2.5 (–5) cm wide, cuneate, sinuate-dentate, acute; upper leaves subsessile, semiamplexicaul, narrowly oblong or lanceolate, 10–20 mm long, 2–5 mm wide, entire or shortly toothed, acute. Capitula laxly corymbose, rarely solitary, 1.5–2 cm diam.; peduncles 2–5 cm long, glandular; involucre cupuliform, c. 8–10 mm long; bracts 10–12, oblong-ovate, 5–8 (–10) mm long, 2.5–4.5 (–5) mm wide, acute, purplish and glandular centrally. Ray florets 8–10; ligules 6–8 mm long, yellow or distally orange and purplish near base. Disc florets yellow; lobes purplish black. Achenes oblong, 8.5–9 (–9.5) mm long, wrinkled, pale violet; wings to 3 mm wide, membranous. Fig. 39 I–L.

Native to the SW Cape region of S. Africa; naturalised in W.A., S.A., Vic., and N.S.W. A common weed of cultivated fields and wastelands, along roadside fencelines, flat sandplain, disturbed edges of bushlands and open woodland. Flowers and fruits Oct.–Dec.

W.A.: E from Ravensthorpe, *E.Tink 389* (PERTH); Yalgoo, 9 km S of Jingemarra Stn, 2 km W of Anniversary Bore, *R.J.Cranfield 6060* (PERTH). S.A.: Mt Finke, *R.J.Bates 234* (AD). N.S.W.: Mitchell Hwy, 15.7 km W of Dubbo on route to Nyngan, *R.G.Coveny 12592 et al.* (NSW). Vic.: Wyperfeld Natl Park, Meridian Track, S of Casuarina Camp, *R.J.Fletcher 335* (MEL).



ASTERACEAE

5. OLIGOCARPUS

Oligocarpus Less., *Syn. Gen. Compos.* 90 (1832); from the Greek *oligo* (few) and *karpos* (fruit), referring to the relatively few achenes in the capitulum.

Type: *O. calendulaceus* (L.f.) Less.

Annual, glandular-puberulous herbs. Leaves alternate, simple, basal and lower stem leaves shortly petiolate, entire to dentate or shallowly lobed, glandular-pubescent. Capitula solitary, small, radiate; involucre \pm uniseriate. Ray florets female, fertile; ligules short, yellow. Disc florets functionally male, yellow; styles shortly bilobed. Achenes polymorphic, variable in shape and size, straight or slightly curved, not annular, irregularly winged or wingless or to 6-angled, some rostrate, smooth or rugose to aculeate.

A genus of 2 species, 1 endemic to St Helena Is. (South Atlantic Ocean) and the other native to S. Africa; the latter naturalised in Australia.

****Oligocarpus calendulaceus* (L.f.) Less., *Syn. Gen. Compos.* 90 (1832)**

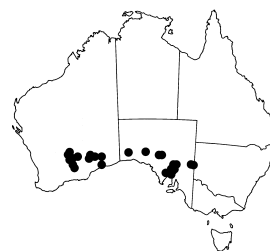
Osteospermum calendulaceum L.f., *Suppl. Pl.* 386 (1782). T: 'Habitat in Cap. Bonnae spei Thunberg'; n.v.

Illustrations: T.Norlinth, *Stud. Calend.* 1: 349, fig. 36 a-i (1943); J.W.Kadereit & C.Jeffery (eds), *Fam. Gen. Vasc. Pl.* 8: 242, fig. 58, 1-N (2007).

Herb to 60 cm tall, with several ascending to trailing, branched stems, with glandular and non-glandular hairs. Basal and lower leaves lanceolate to elliptic-lanceolate, 5–8 cm long, 1–2.5 cm wide, irregularly toothed, arachnoid-pubescent and densely glandular-hairy; upper leaves linear, 1–4 cm long, 2–5 mm wide, subsessile, basally cuneate. Capitula terminal or axillary, 5–8 mm diam.; involucre c. 4 mm long; bracts lanceolate, c. 3 mm long, glandular in middle part, scarious and membranous-margined, acute. Ray florets suberect, navicular; ligules 1.5–1.75 mm long. Disc floret corollas 1.75–1.9 mm long; lobes c. 0.5 mm long. Ray achenes obconical with an inflated cupulate beak, some beakless, with faces wrinkled to smooth, some 3-angled or minutely 3-winged; body transversely ridged; wings membranous. Fig. 40A–C.

Native to S. Africa; naturalised in W.A. and S.A. where it is a weed of agriculture, lagoon shores, on flat marine plain with red clay loam and on well drained, shallow calcareous pale-brown sandy loam, mainly in arid areas. Also naturalised in the Hawaiian Is. Flowers and fruits Sept.–Apr.

W.A.: Rowl's Lagoon, *G.Byrne* 1998 (PERTH); Bineronca Nat. Res., N of Higginsville along the gas pipeline track, *G.Byrne* 2183 (PERTH); Angove St, Norseman, *B.J.Lepschi et al.* 4406 (CANB). S.A.: 0.9 km SSE of Carappee Hill Cons. Park, *P.J.Lang & P.D.Canty* BS 128-2273 (AD); along Transcontinental Railway Line, W of Mount Christie Siding, *D.J.Duval & T.D.Jury* 1670 (AD).



6. OSTEOSPERMUM

Osteospermum L., *Sp. Pl.* 2: 923 (1753), from the Greek *osteon* (bone) and *sperma* (seed), an allusion to the hard achenes of some species.

Type: *O. spinosum* L.

Annual or perennial herbs, subshrubs or shrubs. Stems straggling to erect, usually hairy and basally \pm woody. Leaves simple, alternate, or occasionally opposite, entire or toothed to pinnatisect. Capitula radiate, terminal, solitary or in lax panicles or corymbs; involucre broadly campanulate; bracts 1–3 (–4)-seriate, membranous on margins; receptacles flat to \pm convex, pitted. Ray florets female, fertile; ligules patent, yellow, white, orange, purple, pinkish-mauve or white above and purple beneath. Disc florets functionally male; anthers

sagittate; style bifid. Achenes homomorphic or dimorphic, straight or slightly curved, terete or acutely or obtusely angled or winged, glabrous.

Around 45 species in southern and tropical Africa, Somalia and SW Arabia; 5 species naturalised in Australia.

- | | | |
|----|--|--------------------------------|
| 1 | Capitula small, less than 2 cm diam.; ligules less than 10 mm long | |
| 2 | Plants rhizomatous, non-spinescent; leaves oblong-lanceolate or linear-lanceolate; achenes 3–5 mm long, wingless, muricate on back | 2. <i>O. muricatum</i> |
| 2: | Plants not rhizomatous, spinescent; leaves linear-oblong-lanceolate to clavate, 1–4 mm wide; achenes 8–10 mm long, 3-winged, glabrous and not muricate | 5. <i>O. spinescens</i> |
| 1: | Capitula large, more than 2 cm diam.; ligules more than 10 mm long | |
| 3 | Ligules reddish on both sides; achenes 5 (–6) mm long | 1. <i>O. jucundum</i> |
| 3: | Ligules white above or shades of blue to purple on both sides; achenes 6–7 mm long | |
| 4 | Plants robust, erect; ligules white or pinkish white above, indigo or blue to violet with white margins beneath; disc florets bright blue or purplish blue | 3. <i>O. ecklonis</i> |
| 4: | Plants decumbent to straggling; ligules white above, bluish or violet, without white margins beneath; disc florets bluish purple to almost black | 4. <i>O. fruticosum</i> |

1. **Osteospermum jucundum* (E.Phillips) Norl., *Stud. Calend.* 1: 259 (1943)

Dimorphotheca jucunda E.Phillips in I.B.Pole-Evans, *Fl. Pl. S. Africa* 16 (1936). T: Van Der Wal.; holo: PRE205669.

Illustrations: E.P.Phillips, *loc. cit.* Pl. 629; T.Norlindh, *loc. cit.*, fig. 23d (1943); R.Spencer, *Hort. Fl. SE Australia* 3: 430 (2002).

Perennial subshrub, 20–50 cm tall, with several erect or ascending, terete shoots from rhizome or base of main stem, glandular-hairy. Leaves sessile, narrowly oblong to oblanceolate, 3–8 (–15) cm long, 1–2.5 cm wide, with 2–5 mucronulate, remote teeth or sometimes entire, obtuse, membranous, glandular-hairy. Capitula solitary, 3–4 cm diam.; peduncle ebracteate, 10–20 cm long, glandular-pubescent; involucre hemispherical, 7–9 mm high, 12–15 mm wide, ±uniseriate; bracts lanceolate, acuminate, dorsally glandular with wide, white-scarious or purple margins. Ray floret ligules reddish on both sides. Disc florets yellow inside, blackish purple outside; lobes of central florets gibbous. Achenes triangular-obovoid to ellipsoid, acutely 3-angled, 5 (–6) mm long, 2–3 mm wide.

A native of S. Africa; naturalised in SE Tas. on low foreshore associated with *Acacia melanoxylon*, *Bursaria spinosa*, *Rosa canina*, grass species, and *Allocasuarina*; and in coastal Vic. where it grows close to the sea shore in sandy and sandy loam soils. Flowers and fruits July–Aug.

Vic.: on W side of Moonee Ponds Ck at confluence with Yarra R., *V.Stajsic* 319 & *A.Cochrane* (MEL); Labertouche area, Labertouche Rd at the Tarago R., *J.A.Jeans* 1485 & *H.Romelaar* (MEL). Tas.: Orielton Lagoon, Pittwater, *A.Moscal* 29149 (HO).



2. **Osteospermum muricatum* E.Mey. ex DC., *Prodr.* 6: 464 (1838)

T: S. Africa, *Drège* 869; holo: G-DC.

Illustrations: H.G.A.Engler & K.A.E.Prantl, *Nat. Pflanzenfam.* 4 (5): 304, fig. 140 C (1892); T.Norlindh, *Stud. Calend.* 1: 185, fig. 17 f–k (1943).

Perennial herbs or shrublets, 20–60 cm tall, basally ±woody and moderately branched, with c. 2 cm thick rhizome, rigid, viscid-glandular-hairy to ±glabrous. Leaves sessile, oblong to oblong-lanceolate or linear-lanceolate, (0.5–) 1–4 cm long, to c. 5 (–8) mm wide, denticulate to dentate-pinnatifid with acute lobes, glandular-viscid, grey-green. Capitula small, solitary, rarely becoming corymbose; involucre ±biseriate at anthesis, becoming uniseriate in fruit;

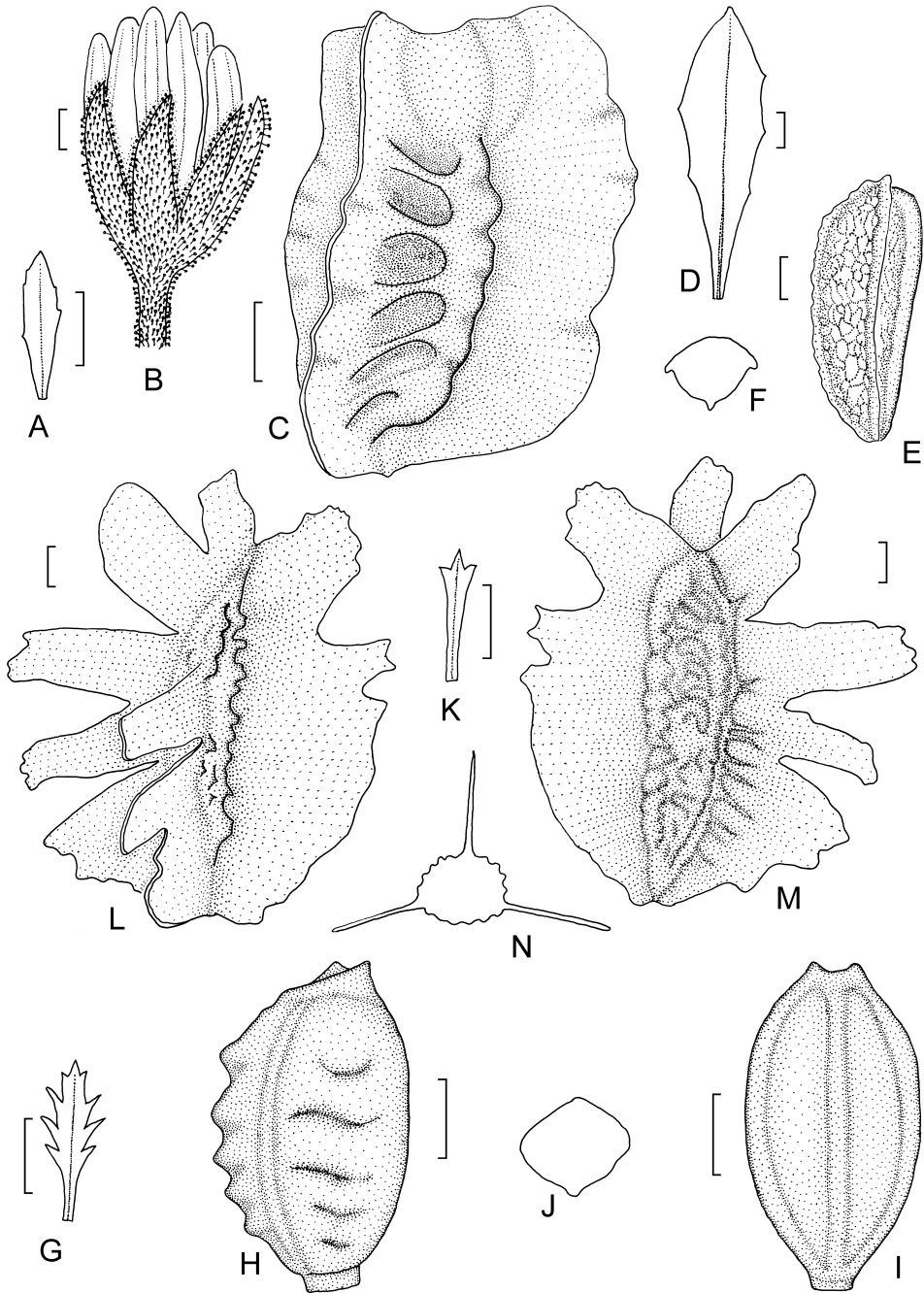
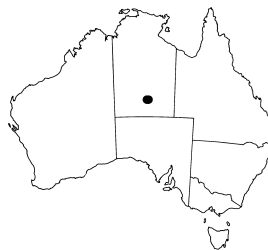


Figure 40. A–C, *Oligocarpus calendulaceus*. A, leaf; B, young flowering capitulum; C, achene (A–C, B.J.Lepschi 4406 *et al.*, CANB). D–F, *Osteospermum ecklonis*. D, leaf; E, achene; F, achene, diagrammatic TS (D–F, J.R.Hoskings 1644, CANB). G–J, *Osteospermum muricatum*. G, leaf; H, achene abaxial view; I, achene adaxial view; J, achene, diagrammatic TS (G–J, D.J.Nelson 2372, CANB). K–N, *Osteospermum spinescens*. K, leaf; L, achene, adaxial view; M, achene, abaxial view; N, achene, diagrammatic TS (K–N, D.J.Mallinson 1033, CANB). Scale bars: A, D, G, K = 1 cm; B, C, E, H, I, L, M = 1 mm. Drawn by A.E.Orchard.

bracts linear-lanceolate, 3–6 mm long, 1–2.5 mm wide, acuminate, whitish scarious on margins, with stipitate glands abaxially. Ray floret ligules 4–7 mm long, \pm longer than involucre bracts, yellow. Disc florets yellow; tube c. 2–3 mm long. Achenes obovoid-obpyramidal, 3-angled, 3–5 mm long, 1.5–2 mm wide, muricate on back, with scattered stipitate glands near rounded apices. Fig. 40G–J.



Native to Namibia, Botswana, Somalia, Zambia, Angola and Yemen. According to the Australian Plant Census (2011) this species occurs in the N.T., S of Alice Springs (doubtfully naturalised), growing in sandy-loam soil of cultivated fields as a weed and on sandy roadsides. Flowers and fruits May–Sept.

The present author has not seen any of the specimens cited below which are listed in Australia's Virtual Herbarium (<http://avh.chah.org.au>).

N.T.: Arid Zone Research Station, c. 5 km S of Alice Springs, *R.Pullen* 10534 (AD, CANB, NT); AZRI, 6 miles [c 10 km] S of Alice Springs, *D.J.Nelson* 2372 (CANB); AZRI Farm Area, *P.Latz* 9395 (DNA); 10 km SSE of Alice Springs, AIB Farm, *D.Nelson* 2496 (DNA).

3. **Osteospermum ecklonis* (DC.) Norl., *Stud. Calend.* 1: 244 (1943)

Dimorphotheca ecklonis DC., *Prodr.* 6: 71 (1838). T: S. Africa, *Ecklon* 1853; holo: G-DC.

Illustrations: J.D.Hooker (ed.), *Curtis's Bot. Mag.* 123: Tab. 7535 (1897); G.J.Harden (ed.), *Fl. New South Wales* 3: 316 (1992); R.Spencer, *Hort. Fl. SE Australia* 3: 430 (2002).

Perennial upright subshrub, 20–100 (–125) cm tall, corymbosely branched, basally woody; young shoots glandular-pubescent, becoming glabrous. Leaves thick, basally cuneate, glandular-puberulous; lower leaves obovate to elliptic-oblong, 5–8 cm long, 1–2 cm wide, coarsely remotely toothed; upper leaves oblanceolate-oblong, 2–3 cm long, 3–5 mm wide, \pm semi-amplexicaul, \pm entire. Capitula solitary and terminal at apices of branches, or in lax corymbs, 2.5–3 cm diam.; peduncles ebracteate, 5–15 cm long; involucre campanulate, 1–1.5 cm high, \pm biseriate; bracts lanceolate or linear-lanceolate, (8–) 10–15 mm long, 2–3.5 mm wide, scarious-margined, acuminate, glandular-puberulous, brownish. Ray florets up to 20 (–22); ligules 1.5–3 cm long, white or pinkish-white above, indigo or blue to violet with white margin beneath. Disc florets bright blue or \pm purplish-blue; lobes hooded. Achenes 3-angled, 6.5–7 mm long, narrowly winged, slightly reticulate-rugulose. Plate 34; Fig. 40D–F.

Native to S. Africa; naturalised in W.A., Qld and N.S.W. with isolated records from Vic., possibly also in S.A. and Tas. (no specimens seen); in skeletal and red-brown clay loam soils among *Eucalyptus albens*, *Schinus areira*, *Ligustrum lucidum*, *Pyracantha angustifolia* and *Notolaea microcarpa*. Flowers and fruits Sept.–Apr.



W.A.: Challenger Drive, City Beach, *G.J.Keighery* 10373 (CANB, PERTH). Qld: Highfield, 15 km NE of Toowoomba, *G.Batianoff* 200842 (BRI, NSW). N.S.W.: Tamworth Lookout, Oxley Park, *J.R.Hosking* 1644 (CANB, MEL, NE, NSW); Mangrove Creek Dam Site, 21 Aug. 1978, *D.S.Gibbons* s.n. (NE). Vic.: Warrandyte, vacant house block between Pound Rd and Everard Rd, *A.C.Cochrane* 963 (MEL).

4. **Osteospermum fruticosum* (L.) Norl., *Stud. Calend.* 1: 250 (1943)

Calendula fruticosa L., *Pl. Rar. Afr.* 25 (1760); *Dimorphotheca fruticosa* (L.) DC., *Prodr.* 6: 71 (1838). T: not designated.

Illustrations: J.M.Wood, *Natal Pl.* 6: 4, tab. 581 (1912); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1590, fig. 723B (1986); T.Norlindh, *loc. cit.*, figs 1 e & 23 a (1943).

Perennial subshrub, straggling, mat-forming, 25–45 (–60) cm tall, basally woody, with decumbent or ascending shoots. Leaves \pm fleshy, narrowly obovate to oblanceolate, 3–6 (–10) cm long, 1.2–2.5 (–3) cm wide, basally cuneate to semi-amplexicaul, remotely 3–7-toothed on

each side, rounded or obtuse and often mucronate, glandular-hairy to \pm glabrous; upper leaves smaller and almost entire. Capitula solitary, 4–6 (–7) cm diam.; peduncle 3–10 cm long; involucre hemispherical, 1–1.2 cm high, 1–2-seriate; bracts lanceolate, acute to acuminate, green and glandular-puberulous centrally, whitish scarious-margined. Ray floret ligules white above, bluish or violet beneath. Disc florets bluish-purple to almost black; lobes minutely gibbous. Achenes narrowly triangular-obovoid, 6–7 mm long, 2.75–3 mm wide, wrinkled or faintly reticulate. *Trailing African Daisy*.

A native of S. Africa, introduced into Europe, Australia, New Zealand and elsewhere as a garden plant. Becoming widely naturalised in S.A., Vic. and Tas.; in sandy coastal areas and along sandy roadsides, on very weedy disturbed slopes of sand dunes associated with *Coprosma repens* and *Genista linifolia*. Flowers and fruits Apr.–Oct.

Vic.: Black Rock, beach opposite Arkaringa Cres., S from Half Moon Bay Car Park, *V.Stajestic 3432* (CANB, MEL); Park Orchards, along Warrandyte Ringroad, *A.C.Cochrane 1017* (MEL). Tas.: Stieglitz, St. Helens, *A.M.Buchanan 17319* (HO); Binalong Bay green waste site, Reids Rd, *M.L.Baker 1998* & *G.Stewart* (HO); South Arm Neck, South Arm, *M.L.Baker 1818 et al.* (HO).



5. **Osteospermum spinescens* Thunb., *Prodr. Pl. Cap.* 2: 166 (1800)

T: S. Africa, Sutherland, Roggeveld, folio 1, *Thunberg s.n.*; holo: UPS *n.v.*

Illustration: T.Norlindh, *Stud. Calend.* 1: 227, fig. 22 a–d (1943).

Shrub, 50–100 cm tall; stem divaricately branched; branches rigid, \pm viscid, densely leafy, becoming \pm spiny. Leaves coriaceous, linear-oblongate to clavate, 5–20 mm long, 1–4 (–5) mm wide, cuneate, entire or distally 2- or 3-toothed or pinnatifid-pinnatipartite; both surfaces \pm arachnoid-hairy, becoming glabrous, distally with stipitate and sessile glands, glaucous. Capitula solitary, terminal, 10–20 mm diam.; peduncle rigid, 5–15 mm long, becoming spinous after fruiting; involucre bracts uniseriate, (5–) 8 (–12), oblong-obovate to oblong-lanceolate, 5–8 mm long, margins and apices often stipitate-glandular, obtuse-acute, mucronulate. Ray florets as many as involucre bracts; ligules yellow to orange, 4–8 mm long. Disc florets yellow to orange, 3–4 mm long. Achenes glabrous, 3-winged, 8–10 mm long, not beaked. Fig. 40K–N.

Native to S Africa; naturalised near Griffith, N.S.W., in waste and disturbed sites along roadsides near cultivated fields in association with *Acacia salicina* and other weeds in sandy-loam soil. Also naturalised in N America. Flowers and fruits Sept.–Feb.

N.S.W.: near Griffith, 16 Jan. 2000, *E.Atkinson s.n.* (CANB); outskirts of Griffith, Thorne Rd, 1 km W of intersection with Old Willbrigie Rd, 20 Sept. 2007, *D.J.Mallinson 1033* (AD, BRI, CANB, CDA, MEL, NSW, PRE).



ASTERACEAE

Trib. 3. ANTHEMIDEAE

I.R.Thompson

Asteraceae trib. *Anthemideae* Cass., *J. Phys. Chim. Hist. Nat. Arts* 88: 192 (1819)

Type: *Anthemis* L.

Herbs, subshrubs or shrubs, with or without taproot, often aromatic and glandular, sometimes spinescent (not in Australia); latex lacking. Hairs simple. Leaves alternate (in Australia), occasionally opposite or rosulate, pinnate-veined, not spiny. Capitula disciform, discoid or radiate, pedunculate, or ±sessile in *Artemisia* and *Soliva*; involucre generally 2–multi-seriate; bracts imbricate, all of similar size or more often grading to longer inwards, free, without outgrowths; receptacle commonly convex to conical, epaleate or paleate. Florets of radiate capitula: ray florets female (or neuter in *Ursinia*), with ligules usually weakly 2- or 3-lobed, usually yellow or white; disc florets bisexual. Florets of disciform capitula: outer florets female, sometimes lacking corolla; inner florets bisexual or functionally male. Florets of discoid capitula bisexual. Anthers mostly without spurs or tails; apical appendage usually rounded to acute. Style glabrous; style branches short to long, not tapering, often penicillate apically, with hairs obtuse. Achenes homomorphic or dimorphic, terete, angular or compressed, not beaked, ribbed or not. Pappus small, membranous (of showy scales in *Ursinia*), or absent.

A tribe of over 100 genera and c. 1800 species, predominantly in Eurasia and Africa, with some in N America and Australasia. Nineteen genera and 43 species in Australia, with only *Cotula* and *Leptinella* containing native species. Many species in the tribe are only weakly naturalised, in most cases having escaped from gardens, and are only found close to human habitation.

Several endemic genera once included in this tribe, *Centipeda*, *Ceratogyne*, *Dimorphocoma*, *Elachanthus* and *Isoetopsis*, have now been placed elsewhere.

Members of the Anthemideae are much used horticulturally and as medicinal or culinary herbs. Features commonly seen in members of the tribe include a capitular disc and receptacle that become markedly conical as they mature, involucre bracts with the hyaline margin prolonged apically, a corona-like pappus or lack of a pappus, truncate-penicillate style branches, and aromatic and glandular stems and leaves. Most species in Australia are glandular in the sense that minute golden or orange globular structures are present on the surface of various structures, including stems, leaves, bracts, corollas and achenes. In many radiate species, e.g. in *Chamaemelum* and *Anthemis*, the ligules tend to persist and become deflexed to form an apron below a domed disc.

Leptinella, *Cotula* and *Soliva* form a distinctive group with a strong southern hemisphere emphasis. These genera are dwarf herbs with compressed, unribbed achenes, commonly with sheathing leaf-bases, and with the involucre bracts all of similar length. In the latter two genera the outer florets mostly lack a corolla and in *Cotula* the florets are sometimes pedicellate.

K.Bremer & C.J.Humphries, Generic monograph of the Asteraceae-Anthemideae, *Bull. Nat. Hist. Mus. Lond. (Bot.)* 23(2): 71–77 (1993); C.Oberprieler, R.Vogt & L.E.Watson, *XVI. Tribe Anthemideae Cass. (1819)*, in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 342–374 (2007); C.Oberprieler *et al.*, *Anthemideae*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 631–666 (2009).

KEY TO GENERA

- 1 Capitula radiate, with ligules 1–50 mm long (if < 4 mm long then ≥ 2 mm wide)
- 2 Receptacle paleate
- 3 Leaves entire or 1-pinnatisect with a few entire segments, sericeous; involucre bracts < 10, with inner bracts fused and copiously villous

14. ERIOCEPHALUS

ASTERACEAE

- 3: Leaves 1–3-pinnatisect, not sericeous; involucre bracts > 10, with inner bracts free, glabrous or nearly so
- 4 Plants rhizomatous; mid-stem leaves with l:w ratio 4–7 and mostly with 15–25 primary segments per side; inflorescences dense, corymbiform, of numerous capitula; ligules c. 5 per capitulum, 1–3 mm long **4. ACHILLEA**
- 4: Plants not rhizomatous or if so capitula 1–few per inflorescence; mid-stem leaves not entirely as above; inflorescences various; ligules > 5 per capitulum, > 3 mm long
- 5 Involucre bracts of outer and middle series ovate, conspicuously delineated by a darker margin; paleae forming a cylinder around disc florets; achene with a pappus of ovate white scales c. 4 mm long **1. URSINIA**
- 5: Involucre bracts of outer and middle series variously shaped, not delineated by a darker margin; paleae not forming a cylinder around disc florets; achene with pappus not as above or absent
- 6 Paleae c. 2–4 mm wide; ligules yellow †**ANACYCLUS**
- 6: Paleae c. 0.3–1 mm wide; ligules white or yellow
- 7 Peduncle commonly > 10 cm long; stereome of involucre bracts 1.5–2 mm wide; palea with a red longitudinal resin duct; achenes copiously woolly **5. LASIOSPERMUM**
- 7: Peduncle < 10 cm long; stereome of involucre bracts 0.5–1 mm wide; palea lacking a red longitudinal resin duct; achenes glabrous
- 8 Rhizomatous, ascending perennials; involucre somewhat lustrous, sparsely hairy; paleae with apex subacute to obtuse; achenes 3-ribbed **6. CHAMAEMELUM**
- 8: ±Erect annuals to perennials; involucre dull to slightly lustrous, variably hairy; paleae with apex peracute to spine-like; achenes c. 8–10-ribbed **7. ANTHEMIS**
- 2: Receptacle epaleate
- 9 Leaves 2- or 3-pinnatisect, with rachides and segments < 1 mm wide
- 10 Involucre 5–7 mm long; mature receptacle hemispherical; achenes 1.8–2.2 mm long, prominently 3-ribbed on one face, with a prominent pair of large glands distally **12. TRIPLEUROSPERMUM**
- 10: Involucre 2–3 mm long; mature receptacle narrowly conical to ovoid; achenes c. 1 mm long, 4- or 5-ribbed on one face, without prominent glands **13. MATRICARIA**
- 9: Leaves undivided, lobed, or if 1- or 2-pinnatisect then at least the rachis > 1 mm wide
- 11 Plants to c. 0.3 m tall; ray florets sterile, with a white ligule and a corona c. 2 mm long **10. MAURANTHEMUM**
- 11: Plants to c. 1 m tall; ray florets fertile, with a white or yellow ligule, but no corona
- 12 Involucre 3–5 mm long, with bracts weakly keeled; inner bracts with hyaline extension c. 0.2 mm long **2. TANACETUM**
- 12: Involucre 7–12 mm long, with bracts not keeled; inner bracts with hyaline extension 1–5 mm long
- 13 Ligules white; ray achenes ±terete, c. 1 mm diam. **11. LEUCANTHEMUM**
- 13: Ligules yellow or white; ray achenes with lateral wings, 1.2–4 mm diam.
- 14 Shrubs; base of leaves ≤ diam. of adjacent stem; ligules white **8. ARGYRANTHEMUM**
- 14: Perennial herbs; at least the upper-stem leaves with base > diam. of adjacent stem; ligules yellow **9. GLEBIONIS**

ASTERACEAE

1: Capitula discoid or disciform (if ligules/ligule-like processes evident then these < 1 mm long or not in marginal series)

15 Plants mostly > 50 cm high; capitula disciform

16 Leaves \pm green on both sides, ≥ 10 more primary segments per side; inflorescences corymbiform; capitula clearly pedunculate, not grey-tomentose

2. TANACETUM

16: Leaves silvery or grey on one or both surfaces, ≤ 5 primary segments per side; inflorescences pyramidal to spiciform; capitula sessile or nearly so and/or grey-tomentose

3. ARTEMISIA

15: Plants < 50 (–60) cm high; capitula discoid or disciform

17 Plants herbaceous, prostrate or if erect then at least outer florets pedicellate; involucre bracts all \pm equal in length; capitula disciform

18 Capitula sessile; style persisting as a spine in fruit

19. SOLIVA

18: Capitula pedunculate; style not persisting as a spine in fruit

19 Plants erect, sprawling or prostrate, not truly stoloniferous; leaves eglandular; disc florets fertile

17. COTULA

19: Plants prostrate, stoloniferous; leaves glandular; disc florets sterile

20 Plants glabrous; marginal florets lacking a corolla

17. COTULA

20: Plants with sparse to dense hairs, but sometimes quickly becoming glabrous; marginal florets with a corolla (corolla persisting in fruit)

18. LEPTINELLA

17: Plants woody or herbaceous, erect or sprawling; florets not pedicellate; involucre bracts gradational or all \pm equal in length; capitula discoid

21 Woody sub-shrubs; leaves often greyish, 1- or 2-pinnatisect; primary segments of leaves 0.5–2 (–4) mm long

22 Leaves < 1 cm long; receptacle epaleate; corolla 1.5–2 mm long

16. PENTZIA

22: Leaves > 1 cm long; receptacle paleate; corolla 3–4 mm long

††SANTOLINA

21: Annual herbs; leaves green, 2- or 3-pinnatisect; primary segments of at least larger leaves > 4 mm long

23 Plants glabrous; capitula ovoid, with disc greenish yellow; corolla c. 1 mm long

13. MATRICARIA

23: Plants with scattered hairs; capitula globose or sub-globose, with disc yellow; corolla c. 2 mm long

15. ONCOSIPHON

†*Anacyclus radiatus* Lois., native to southern Europe and NW Africa, was collected from a rubbish dump in Adelaide in 1918 and has been described in South Australian floras. There is no evidence that it ever became naturalised.

††*Santolina chamaecyparissus* L. (Cotton Lavender), native to southern Europe, was collected from the Stanthorpe district in far SE Qld in 1971, but it is unknown whether the plant was from a naturalised population. Other collections in herbaria are of cultivated origin.

1. URSINIA

Ursinia Gaertn., *Fruct. Sem. Pl.* 2: 462 (1791); named in honour of Johannes Heinrich Ursinus (1608–1667), a German botanical author.

Type: *U. chrysanthemoides* (Less.) Harv.

Annual or perennial herbs or subshrubs, erect or sprawling. Leaves 1- or 2-pinnatisect. Capitula 1–several per stem, radiate (in Australia) or discoid; involucre multi-seriate, with bracts gradational in length; receptacle paleate. Ray florets neuter or female, sterile or fertile. Disc florets bisexual; corolla 5-lobed. Achenes \pm homomorphic, \pm terete, 5-ribbed. Pappus present.

A genus of 38 species mainly from S. Africa, but also from Namibia, Botswana and Ethiopia. Two species naturalised in Australia.

The genus can be distinguished from other Anthemideae in Australia by the cylindrical paleae around the disc florets, the long hairs arising from the base of the achenes, and the pappus morphology. The margin of the outer and middle series of involucre bracts is conspicuously pigmented, and the ligules are generally purplish abaxially.

M.Prassler, Revision der gattung *Ursinia*, Mitt. Bot. Staatssamml. München 6: 363–478, 531–539 (1967).

Annuals; apex of outermost involucre bracts with hyaline extension not or hardly developed, usually hairy; paleae truncate apically; achenes 5–8 mm long, with a basal tuft of hairs; pappus of 5 broad scales

1. *U. anthemoides*

Perennials; apex of outermost involucre bracts with hyaline extension 2–4 mm long, ±glabrous; paleae with a rotund apical extension; achenes c. 3 mm long, without a basal tuft of hairs; pappus of 5 broad scales and 5 filiform scales

2. *U. speciosa*

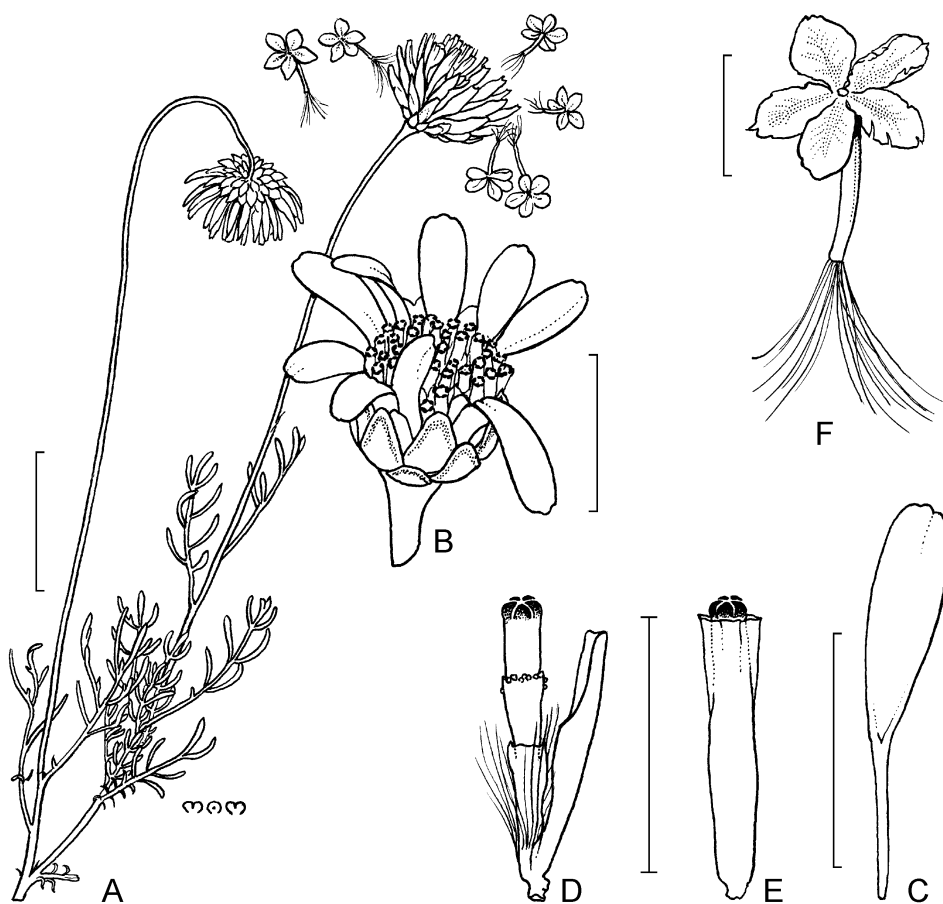


Figure 41. *Ursinia anthemoides* subsp. *anthemoides*. A, flowering branch; B, capitulum; C, ray floret; D, E, disc florets; F, achene (A–F, voucher not recorded). Scale bars: A = 20 mm; B = 10 mm; C–F = 5 mm. Drawn by M.A.Wilson. Reproduced with permission from N.G.Marchant *et al.*, *Fl. Perth Region* 2: 710 (1987).

1. *Ursinia anthemoides (L.) Poir. in J.B.A.P. de M. de Lamarck, *Encycl.* 8: 257 (1808)
subsp. **anthemoides**

T: Locality unknown, *Herb. Linn.* 1036.22; lecto: LINN *n.v.*, *fide* M.Prassler, *Mitt. Bot. Staatssamml. München* 6: 429 (1967).

Illustration: N.G.Marchant *et al.* (eds), *Fl. Perth Region* 2: 710, fig. 263 (1987).

Annuals to c. 0.5 m high, sparsely or sometimes moderately hairy on stems and leaves. Leaves to c. 5 cm long; rachides and ultimate segments < 1 mm wide, with acicular tips if present c. 0.1 mm long; primary segments up to 10 per side. Capitulum 1 per stem, 12–25 mm diam.; peduncle 5–15 cm long, sparsely hairy or glabrous at anthesis; involucre 5–8 mm long, patchily cobwebby; outer bracts c. 2 mm long, without a hyaline extension, hairy distally; inner bracts with hyaline extension 1–2 mm long; paleae narrowly oblong, c. 10 mm long, 0.5–1 mm wide, truncate apically, golden-brown. Ray florets 7–12, neuter; ligule c. 5–15 mm long, orange or yellow adaxially (pale when dried). Disc florets: corolla c. 3 mm long; tube longer and much narrower than limb; lobes c. 0.3 mm long, usually purplish. Achenes narrowly obloid, 5–8 mm long, pale or dark, glabrous on body, with a basal tuft of capillary hairs. Pappus of 5 ovate spreading scales, c. 4 mm long, white with a triangular brown or purple patch baso-medially. Plate 33; Fig. 41.

Native to S. Africa. Naturalised in W.A. S from Shark Bay. Grows in disturbed sites such as roadsides and wasteland on a variety of soils. Flowers Aug.–Sept.

W.A.: Graham Rock, c. 18 km E of Hyden, *E.N.S.Jackson* 3393 (AD, PERTH); 26 km S of Yalingup on Caves Rd, *N.S.Lander* 1192 (PERTH); NE foot of Peak Charles, Fitzgerald Peaks, *J.Taylor* 702 *et al.* (CANB, MEL).

The other subspecies, subsp. *versicolor* (DC.) Prassler, has capitula with ligules that are longer and with a dark basal patch.



2. *Ursinia speciosa DC., *Prodr.* 5: 690 (1836)

T: Locality unknown, southern Africa, *Drege* 6368; lecto: G, *fide* M.Prassler, *Mitt. Bot. Staatssamml. München* 6: 462 (1967).

[*U. chrysanthemoides* auct. non (Less.) Harv.: J.R.Tovey, *Proc. Roy. Soc. Victoria* 22(1): 25 (1907); S.W.L.Jacobs & J.Pickard, *Pl. New South Wales* 87 (1981)]

Illustration: J.R.Wheeler *et al.*, *Fl. South West* 2: 532 (2002).

Perennials to c. 40 cm high, \pm glabrous. Leaves to c. 4 cm long; rachides and ultimate segments < 1 mm wide, with acicular tips commonly 0.3–0.5 mm long; primary segments up to 5 per side. Capitulum 1 per stem, 25–40 mm diam.; peduncle 5–15 cm long; involucre 7–9 mm long, glabrous; outer bracts 2–4 mm long, with hyaline extension 2–4 mm long, glabrous; inner bracts with hyaline extension; paleae narrowly oblong, c. 5 mm long, 0.5–1 mm wide, with rotund hyaline apical extension, pale to golden. Ray florets 15–25, neuter; ligule c. 15 mm long, orange adaxially (drying yellow). Disc florets: corolla c. 3 mm long; tube longer and narrower than limb; lobes c. 0.6 mm long, purplish. Achenes obovoid, c. 3 mm long, pale or reddish, glabrous, without a basal tuft of capillary hairs. Pappus comprising an outer series of 5 ovate spreading scales c. 4 mm long, white with a pale baso-medial patch, and an inner series of 5 filiform scales.

Native to southern Africa. Naturalised predominantly in SW W.A. but also established in Stockton, eastern N.S.W. There are old records from Melbourne, Vic., but populations do not appear to have persisted. Grows in grey or white sand, and has been recorded from woodland. Flowers spring.

W.A.: East Katanning, 21 Sept. 1958, *A.Browne* (PERTH); 2 km E of Hamelin Bay, *G.J.Keighery* 9201 (PERTH). N.S.W.: alongside 'Stanley Park', Fullerton Cove Rd, *J.R.Hosking* 2531 & *G.C.Pritchard* (CANB, MEL, NSW). Vic.: Coode Is., Oct. 1908, *J.R.Tovey* & *C.French Jr* (MEL).



Excluded name

Ursinia nana DC. subsp. *nana*, *Prodr.* 5: 690 (1836)

T: Locality unknown, *Drege* 2782; holo: G n.v., *fide* M.Prassler, *Mitt. Bot. Staatssamml. München* 6: 445 (1967).

A specimen collected by Meebold from Karahatta [Karrakatta] in W.A. was cited by M.Prassler, *op. cit.* 448, as this species. This specimen has not been seen and there have been no other records of this species in Australia.

2. TANACETUM

Tanacetum L., *Sp. Pl.* 2: 843 (1753); from Medieval Latin *tanazita*, derived from the Greek *athanasia* (immortality).

Type: *T. vulgare* L.

Perennial herbs, erect. Leaves lobed or 1- or 2-pinnatisect. Capitula several to numerous per stem, radiate or disciform; involucre multi-seriate, with bracts gradational in length; receptacle epaleate. Marginal florets female, fertile. Disc florets bisexual; corolla 5-lobed. Achenes ±homomorphic, ±quadrangular, regularly 5–12-ribbed, glabrous. Pappus present.

A genus of c. 150 species predominantly in Europe and Asia, but also northern Africa and N America. Two naturalised species in Australia, both of which are rhizomatous, odorous on crushing, with weakly keeled involucre bracts, linear peduncular bracts, and achenes bearing a minute corona.

1 Leaves green

2 Leaves with 3–7 primary lobes/segments per side; ligules present

1. *T. parthenium*

2: Leaves with 10–20 primary segments per side; ligules lacking

2. *T. vulgare*

1: Leaves grey

3 Plants < 50 cm high; capitula solitary

†*T. cinerariifolium*

3: Plants usually > 50 cm high; capitula several–numerous per inflorescence

††*T. ptarmiciflorum*

†*Tanacetum cinerariifolium* (Trevir.) Sch.Bip., native to Yugoslavia and Albania, has been recorded from a roadside in north-eastern Tas. but is not considered naturalised. It is radiate like *T. parthenium* but its leaves have narrower segments and are silky silvery-grey rather than green, and it has solitary capitula. It is cultivated in some parts of the world, including Tas., to obtain pyrethrum, a natural insecticide.

††*Tanacetum ptarmiciflorum* (Webb & Berthel.) Sch.Bip., a popular horticultural species native to the Canary Is. with distinctive lacy foliage and white ligules, has been recorded from a roadside near Rhynie S.A. but is not considered naturalised.

1. **Tanacetum parthenium* (L.) Sch.Bip., *Tanaceteen* 55 (1844)

Matricaria parthenium L., *Sp. Pl.* 2: 890 (1753); *Chrysanthemum parthenium* (L.) Bernh., *Syst. Verz.* 145 (1800). T: not designated.

Illustrations: S.Ross-Craig, *Drawings Brit. Pl.* 16: t. 9 (1961), as *C. parthenium*; N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 925, fig. 188a (1999).

Plants to c. 70 cm high, rhizomatous, hairy on stems and leaves. Leaves to c. 9 cm long, 1- or 2-pinnatisect; major rachides usually 3–8 mm wide; primary segments 3–7. Capitula few to numerous per stem, generally not congested, radiate, 12–20 mm diam.; peduncle to c. 5 cm long; involucre 3–5 mm long, cobwebby or glabrous; inner bracts with hyaline extension c. 0.2 mm long. Ray florets 10–numerous; ligule 4–8 mm long, white. Disc florets: corolla 1.5–2 mm long; tube ±as broad as and as long as limb; limb yellow. Achene of disc florets obovoid, 1–1.5 mm long, 5–8-ribbed, pale brown. *Feverfew*. Fig. 42A–E.

Native to Europe. Naturalised in SE S.A., eastern N.S.W., southern Vic., and Tas. Grows in disturbed sites such as road-sides. Flowers spring–autumn.

S.A.: along Torrens at St. Peters, *R.J.Bates* 35629 (AD, MEL). N.S.W.: Moss Vale, 28 Feb. 1971, *E.J.McBarron* (NSW). Vic.: near the Chalet, Mt Buffalo, *A.R.Bean* 9459 (BRI, MEL); E side of Yarrowee R., Ballarat, *V.Stajsis* 1168 (CANB, MEL). Tas.: Russell Falls, Mount Field Natl Park, 13 Jan. 1943, *W.M.Curtis* (HO).

A garden escape that appears to be only weakly naturalised. Horticultural variants include plants with increased numbers of ligulate florets. Discoid forms also occur but these have not been recorded in Australia.



2. **Tanacetum vulgare* L., *Sp. Pl.* 2: 844 (1753)

Chrysanthemum vulgare (L.) Bernh., *Syst. Verz.* 144 (1800). T: *Herb. Clifford* 398, *Tanacetum* no. 3; lecto: BM, *vide* C.J.Humphries in C.E.Jarvis *et al.* (eds), *Regnum Veg.* 127: 92 (1993).

T. boreale Fisch. ex DC., *Prodr.* 6: 128 (1838). T: Ukraine and Russian Federation; *n.v.*

[*T. huronense* auct. non Nutt.: J.M.Black, *Nat. Fl. S. Australia* 83 (1909)]

Illustrations: S.Ross-Craig, *Drawings Brit. Pl.* 16: t. 13 (1961); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 925, fig. 188b (1999).

Plants to c. 150 cm high, rhizomatous, transiently pubescent on stems and leaves. Leaves to c. 25 cm long, 1–sub-3-pinnatisect; rachides and ultimate segments c. 1–3 mm wide; primary segments 10–20 per side, variously dissected. Capitula several–numerous per stem, moderately congested, disciform, 5–9 mm diam.; peduncle to c. 5 cm long; involucre 3–5 mm long, slightly cobwebby or glabrous; inner bracts with hyaline extension c. 1 mm long. Marginal florets with corolla 3-lobed, yellow. Disc florets: corolla 1.5 mm long; tube as broad as and as long as limb; limb yellow. Achene of disc florets obovoid, 1.2–1.8 mm long, 5-ribbed, pale brown. *Common Tansy*. Plate 35.

Native to Europe, northern Asia and northern N America. Naturalised in SE S.A., SE Qld, eastern N.S.W., A.C.T., southern Vic., and eastern Tas. Flowers summer–autumn.

S.A.: Port MacDonnell, c. 25 km S of Mt Gambier, 14 Feb. 1948, *J.B.Cleland* (AD). Qld: c. 6 km W of Mudgeeraba, 22 Jan. 1969, *M.Sampe* (BRI). N.S.W.: c. 1 km E of East Kangaloon, *P.G.Kodala* 141 *et al.* (CANB, MEL, NE, NSW). A.C.T.: Victoria St, near Hall, *E.M.Canning* 6858 (AD, CANB, MEL, NSW). Vic.: Genoa, *R.V.Smith* 68/73 (MEL). Tas.: crossing of Clyde R., Bothwell, *A.E.Orchard* 5349 (HO, MEL).



An occasional garden escape. In S.A. there appears to be a distinctive form with leaves that are more deeply dissected, often moderately hairy, and with ultimate teeth/segments that are strongly infolded on pressing. This has been identified as *T. boreale*, a taxon in any case recently treated as a synonym in *T. vulgare*, but it appears more likely to be one of the numerous horticultural forms of *T. vulgare* s. *str.*

3. ARTEMISIA

Artemisia L., *Sp. Pl.* 2: 845 (1753); from the Greek and Latin *artemisia*, the classical name of several species of daisy (from either the goddess Artemis or Queen Artemisia of Caria).

Type: *A. vulgaris* L.

Annual or perennial herbs, subshrubs or shrubs, erect. Leaves entire, lobed or variously pinnatisect. Capitula commonly numerous per stem, disciform, pedunculate or sessile; involucre 2- or 3-seriate, with bracts gradational in length or not; receptacle epaleate. Outer florets female, fertile, 2–4-lobed. Disc florets bisexual (in Australia), sometimes functionally male; corolla 5-lobed. Achenes ±homomorphic, quadrangular, ±smooth or 2-ribbed, glabrous. Pappus absent.

A genus of 388 species predominantly from the Northern Hemisphere. Two naturalised species in Australia.

Capitula are small and the female florets of the outer series have an obliquely tubular corolla not exceeding the involucre. Also distinctive in this genus is the apical appendage of the anthers which is peracute to subulate.

1 Leaves densely hairy on lower surface only

2. *A. verlotiorum*

1: Leaves densely hairy on both surfaces

2 Capitula 3–7 mm diam., with many distinctly pedunculate; uppermost leaves and panicle-bracts pinnatisect

1. *A. arborescens*

2: Capitula 1.5–2 mm diam., subsessile; uppermost leaves and panicle-bracts entire

†*A. ludoviciana*

†*Artemisia ludoviciana* Nutt. subsp. *albula* (Wooton) D.D.Keck, native to N America, was briefly naturalised in Oxley Park, Tamworth in NE N.S.W., but the only known population has been extirpated.

1. **Artemisia arborescens* L., *Sp. Pl.* 2nd edn, 1188 (1763)

T: Italy, *Turra, Herb. Linn. No. 988.10*; lecto: LINN, *fide* Y.R.Ling in C.Jarvis & N.Turland (ed.), *Taxon* 47: 353 (1998).

Illustration: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1609, fig. 730 (1986).

Perennial, rhizomatous herbs to c. 2 (–3) m high, densely appressed-woolly on stems and branches. Leaves 1- or 2-pinnatisect, to c. 10 cm long, petiole-like basally, entire, ±concolorous; rachides and ultimate segments usually 1–2 mm wide; primary segments commonly 2 or 3 per side; both surfaces completely obscured by appressed hairs. Capitula in leafy panicles, 3–7 mm diam., subsessile or with peduncle to c. 2 cm long; involucre 3–5 mm long, densely woolly; most bracts of similar length; receptacle densely hairy. Marginal florets c. 10; corolla c. 1.2 mm long. Disc florets numerous; corolla c. 1.5 mm long; tube as broad as and as long as limb, becoming firm, creamy-white; limb yellow. Achene of disc florets obovoid, c. 0.7 mm long. *Silver Wormwood*. Fig. 42F–J.

Native to the Mediterranean region and Middle East. Sparingly naturalised in SW W.A., SE S.A., southern N.S.W., and Vic. Grows in disturbed sites and often persists as a hedge near abandoned farmhouses. Flowers spring–summer.

W.A.: Layman Block, Tuart Forest, *G.J.Keighery 14034* (PERTH). S.A.: Clayton Rd, road to Kangarilla from Blewitt Springs, *H.P.Vonow 542* (AD, NSW). N.S.W.: 10 km SE of Deniliquin, *W.E.Mulham 1453* (CANB). Vic.: near Sturgess Point on public land, Port Campbell, *G.W.Carr 0207-86* (AD, CANB, HO, MEL).

Artemisia absinthium L., which is used horticulturally in Australia, is similar to *A. arborescens* but is lower-growing (generally less than 1 m high) and tends to sprawl, and is less densely sericeous so that plants look slightly greener. Furthermore, the leaves have relatively broader segments, panicles are laxer, and capitula are smaller (3–5 mm diam.) and with a greenish yellow disc. It has been collected a few times but all appear to be from planted specimens.



2. **Artemisia verlotiorum* Lamotte, *Mém. Acad. Sci. Clermont-Ferrand* 511 (1876)

T: *n.v.*

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 925, fig. 188c (1999).

Perennial, rhizomatous herbs to c. 2 m high, short-pubescent on stems and branches. Leaves mostly 1- or 2-pinnatisect, to c. 8 cm long, petiole-like basally except for small pinnatisect auricles, entire, strongly discoloured; rachides and ultimate segments usually 2–6 mm wide; primary segments 1–5 per side; upper surface glabrous or nearly so; lower surface appressed-woolly. Capitula in leafy panicles, c. 2 mm diam.; sessile or with peduncle to c. 2 mm long;

involucre 2.5–4 mm long, cobwebby; bracts gradational in length; receptacle glabrous. Marginal florets c. 8–12; corolla c. 1.2 mm long. Disc florets c. 8–12; corolla c. 2.5 mm long; tube narrower than and as long as limb; limb purple. Achene of disc florets ellipsoid, c. 0.8 mm long. *Chinese Wormwood*.

Native to SW China, the Himalayas and Malaysia. Naturalised in SE Australia in SE Qld, N.S.W. A.C.T. and Vic. Also naturalised in Europe, northern Africa and S America. Grows adjacent to watercourses, mostly in disturbed environments. Flowers summer–early winter.



Qld: Zealey Rd, Nambour, *A.R.Bean 19043* (BRI, CANB, MEL, NSW). N.S.W.: alongside Dumaresq Ck, upstream of Marsh St bridge, *J.R.Hosking 1575* & *E.L.Cottage* (CANB, MEL, NSW). A.C.T.: Farrer, Canberra, *M.Gray & E.D'Arnay 6486* (CANB, NSW). Vic.: quarry on Myers Creek Rd, Healesville district, *M.G.Corrick 2718* (MEL).

There appears to be a few forms of this species in Australia. Plants collected in Canberra (e.g. *M.Gray & E.D'Arnay 6486*) have inflorescences that have a high number of relatively narrow capitula that are extremely congested along branchlets. Plants in southern Qld (e.g. *A.R.Bean 19043*) have relatively few, less congested and smaller capitula with a yellow-green disc, and the indumentum of the branchlets differs in being spreading and curly. In Vic. the capitula are relatively large, with the involucre 3–3.5 mm long, and c. 2 mm diam.

Artemisia vulgaris is similar to *A. verlotiorum* but lacks rhizomes and overwintering rosettes. Collections from Melbourne, Vic. from the early 1900s may be *A. vulgaris* L.—they have slightly more dissected leaves, inflorescences with fewer capitula, and larger involucre than Australian records of *A. verlotiorum*, but the definitive evidence regarding rhizomes is lacking. There is no evidence that these populations have persisted.

Excluded Names

Artemisia abrotanum L., *Sp. Pl.* 2: 845 (1753)

T: *Herb. Clifford*: 403, *Artemisia 4*; lecto: BM, *fide* Y.R.Ling in C.E.Jarvis & N.J.Turland (eds), *Taxon* 47: 353 (1998).

Recorded for Vic. in a list of new exotic species by J.W.Audas *et al.*, *Victorian Naturalist* 49: 153 (1932), however, there are no records to confirm that it ever became established there.

Artemisia scoparia Waldst. & Kit., *Descr. Icon. Pl. Hung.* 1: 66 (1801)

T: Eastern Europe; *n.v.*

Recorded for southern Qld (see T.D.Stanley & E.M.Ross (eds), *Fl. S.E. Queensland* 2: 571 (1986)). The specimen at BRI identified as this species is not in genus *Artemisia*.

4. ACHILLEA

Achillea L., *Sp. Pl.* 2: 896 (1753); named after Achilles who is said to have used this herb to staunch the wounds of Telephus.

Type: *A. millefolium* L.

Perennial herbs, subshrubs or shrubs, erect. Leaves 1–3-pinnatisect. Capitula commonly numerous per stem, radiate (in Australia) or discoid; involucre c. 3-seriate, with bracts gradational in length; receptacle paleate. Ray florets female, fertile. Disc florets bisexual, sometimes functionally male; corolla 5-lobed; anthers caudate. Achenes ±homomorphic, compressed, 2-ribbed, glabrous. Pappus absent.

A genus of c. 85 species from Europe and Asia. Three species naturalised in Australia.

Readily recognised by their dense corymbiform inflorescences, small capitula with involucre longer than broad and with keeled bracts, and short c. orbicular ligules. The pinnatisect leaves are also distinctive in the combination of a relatively high length:width ratio (mostly 4–7) and a high number of primary segments (15–25).

1 Ligules white or pink to purple

2 Leaves \pm planar in fresh state; leaf-rachis mostly 1.3–2.5 mm wide; ligules purple

1. *A. distans*

2: Leaves with a 3-dimensional arrangement of segments in fresh state; leaf-rachis mostly 0.6–1.2 mm wide; ligules commonly white, occasionally pink to purple

2. *A. millefolium*

1: Ligules yellow

3 Leaves with a 3-dimensional arrangement of segments in fresh state; 2- or 3-pinnatisect; involucre c. 2.5 mm diam.; ligules 1–2 mm long

3. *A. tomentosa*

3: Leaves planar in fresh state, 1- or sub-2-pinnatisect; involucre c. 1.8 mm diam.; ligules c. 1 mm long

†*A. filipendulina*

†*Achillea filipendulina* Lam., a horticultural species native to central Asia, has been collected near Adelaide, S.A. (*R.Bates* 9234, AD), and from the Snowy Mtns, far SE N.S.W. (*M.E.Phillips s.n.*, CANB, NSW), but is not yet considered naturalised.

1. **Achillea distans* Waldst. & Kit. ex Willd., *Sp. Pl.* 4th edn, 3: 2207 (1803)

T: *n.v.*

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 925, fig. 188e (1999), as *A. distans* subsp. *tanacetifolia*.

Rhizomatous perennial herbs, to c. 60 cm high, moderately pubescent. Leaves to c. 8 cm long, 1- or 2-pinnatisect, \pm planar in fresh state; rachis of mid-stem leaves 1.3–2.5 mm wide, often dentate between primary segments. Capitula in dense corymbiform inflorescences, 6–9 mm diam.; peduncle to c. 0.7 cm long, moderately hairy; involucre 4.0–5.5 mm long; bracts keeled; outer and middle series of bracts with margin unpigmented or brown; inner bracts with hyaline extension c. 0.3 mm long; paleae c. 5 mm long. Ray florets c. 5; ligule 1.5–3 mm long, purple. Disc florets 8–20; corolla c. 2.5 mm long; tube narrower than and \pm as long as limb; limb purple. Achenes c. 2 mm long. Fig. 42K–O.

Native to Europe. Naturalised in SE S.A., SE Qld, eastern N.S.W., A.C.T., southern Vic. and eastern Tas. Grows in disturbed sites such as roadsides, often at moderate altitudes. Flowers spring–summer.

S.A.: Stirling East, 6 May 1944, *J.B.Cleland* (AD). Qld: Killarney, 25 Nov. 1917, *C.T.White* (BRI). N.S.W.: Eucumbene Dam, Snowy Mtns, 13 Jan. 1965, *M.E.Phillips* (CANB). A.C.T.: Uriarra Ck, N of Uriarra Stn, on road to Brookvale Stn, Jan. 1966, *M.Gray* (CANB). Vic.: S of Aberfeldy, *J.R.Hosking* 1070 (CANB, MEL, NE, NSW). Tas.: Hayes, Jan. 1944, *W.M.Curtis* (HO, MEL).



An occasional garden escape. Australian material is uniform in morphology but it is not clear to which of the subspecies of *A. distans* it is referable. Based on the length of ligules and the presence of teeth on the winged rachis between primary segments, it is referable to subsp. *distans*, but that subsp. is considered to normally have white florets. In recent Australian floras, specimens have been recognised as subsp. *tanacetifolia*.

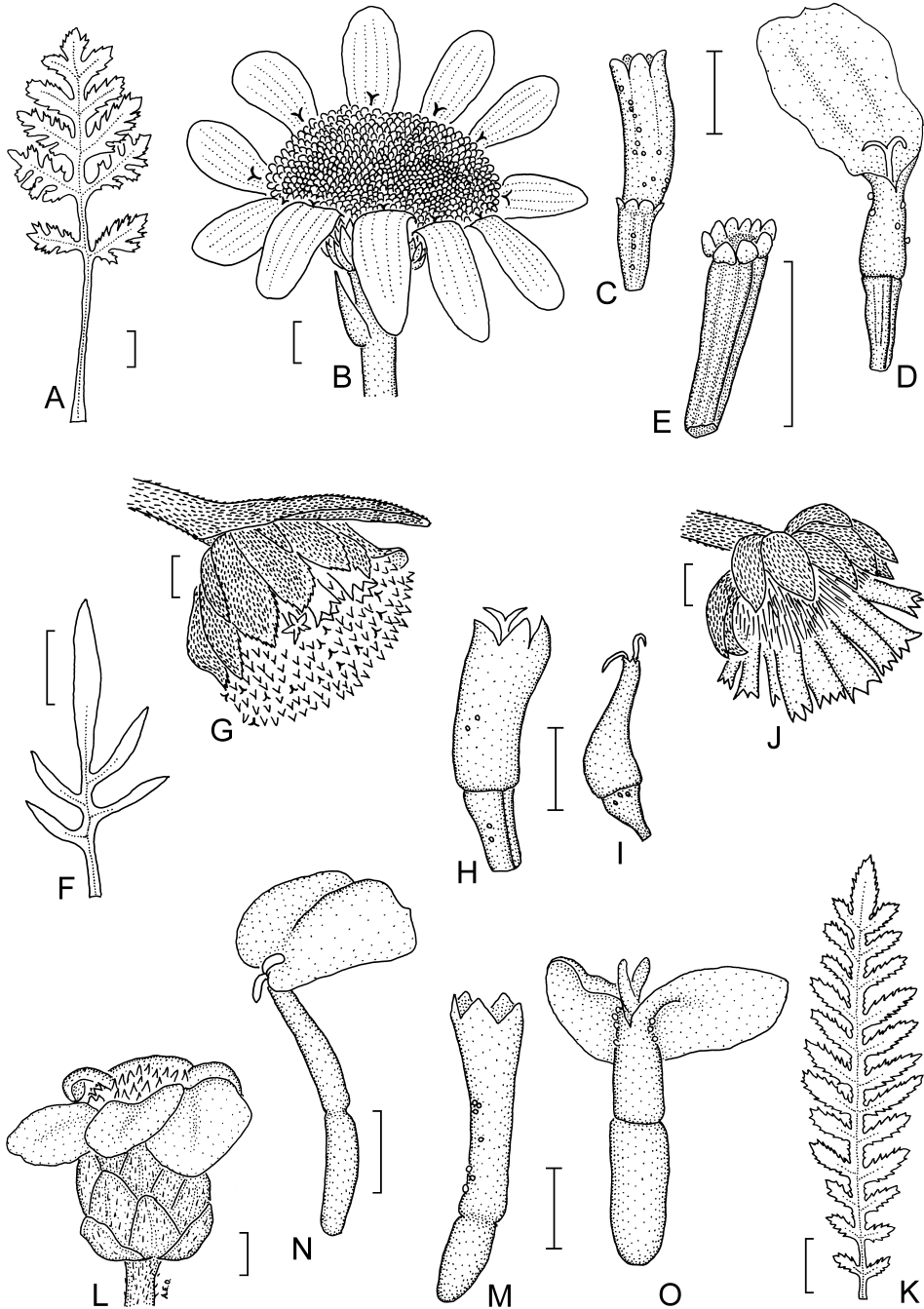


Figure 42. A–E, *Tanacetum parthenium*. A, leaf; B, capitulum; C, disc floret; D, ray floret; E, achene (A–E, P.W.Michael s.n., CANB503695). F–J, *Artemisia arborescens*. F, leaf; G, capitulum in flower; H, I, florets; J, disintegrating capitulum showing dense hairs on receptacle (F–J, A.C.Beauglehole 29757, CANB). K–O, *Achillea distans*. K, leaf; L, capitulum; M, disc floret; N, ray floret, lateral view; O, ray floret, adaxial view. (K–O, J.R.Hosking 2660, CANB). Scale bars: A, F, K = 1 cm; B–D, G–J, L–O = 1 mm. Drawn by A.E.Orchard.

2. **Achillea millefolium* L., *Sp. Pl.* 2: 899 (1753)

T: Europe, *Herb. Linn. No. 1017.20*; lecto: LINN, *fide* A.Huber-Morath, *Ber. Schweiz. Bot. Ges.* 84: 154 (1975).

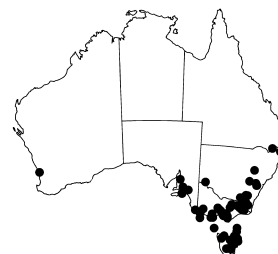
Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 925, fig. 188d (1999).

Rhizomatous perennial herbs, to c. 60 cm high, moderately pubescent. Leaves to c. 8 cm long, 2- or 3-pinnatisect, with segments arranged 3-dimensionally in fresh state; rachis of mid-stem leaves 0.6–1.2 mm wide, mostly entire between primary segments, sometimes dentate. Capitula in dense corymbiform inflorescences, 4–8 mm diam.; peduncle to c. 1.0 cm long, slightly to moderately hairy; involucre 3.0–4.5 mm long; bracts keeled; outer and middle series of bracts with margin light or often dark brown; inner bracts with hyaline extension c. 0.3 mm long; paleae 3–4 mm long. Ray florets c. 5; ligule 2–3 mm long, white or less often pink to purple. Disc florets c. 8; corolla c. 2 mm long; tube narrower than and \pm as long as limb; limb white. Achenes c. 2 mm long. *Milfoil*, *Yarrow*. Plate 36.

Native to Europe. Naturalised in SE S.A., SE N.S.W., A.C.T., southern Vic., and Tas. Isolated records also from Perth in SW W.A. and Stanthorpe in far SE Qld. Grows in disturbed sites such as roadsides, often at moderate to high altitudes. Flowers late spring–autumn.

W.A.: Vincent St, Leederville, *G.J.Keighery 11445* (PERTH). S.A.: on road to Nelson, c. 5 km S of Mt Gambier, *R.J.Bates 40461* (AD). Qld: Stanthorpe, 14 Dec. 1986, *P.S.Crew* (BRI). N.S.W.: Cabramurra township, *P.C.Jobson 4621 et al.* (AD, BRI, CANB). A.C.T.: 3.5 km N of Piccadilly Circus, Brindabella Ra., *B.J.Lepschi 112* (CANB). Vic.: Howmans Gap, c. 3 km NW of Falls Ck Village, *I.C.Clarke 3042* (CANB, MEL). Tas.: W side of Ridgley Rd, 6 km S of Burnie, *P.C.Jobson 3453* (HO, MEL, NSW).

Pink-flowered forms of *A. millefolium* can be difficult to distinguish from *A. distans*, especially some that are intermediate in leaf morphology. The two species probably co-occur at a number of localities and hybridisation and introgression is the likely reason for these difficult specimens.



3. **Achillea tomentosa* L., *Sp. Pl.* 2: 897 (1753)

T: Europe, central Asia, *Herb. Linn. No. 1017.3*; lecto: LINN, *fide* J.Dabrowska, *Acta Univ. Wratislav., Prace Bot.* 24: pl. IX (1982).

Rhizomatous perennial herbs, to c. 40 cm high, moderately pubescent. Leaves to c. 8 cm long, 2- or 3-pinnatisect, with segments arranged 3-dimensionally in fresh state; rachis of mid-stem leaves c. 1 mm wide, entire between primary segments. Capitula in dense corymbiform inflorescences, 4–6 mm diam.; peduncle to 0.5 cm long, hairy; involucre c. 4 mm long; bracts keeled; outer and middle series of bracts not pigmented on margin; inner bracts with hyaline extension c. 0.5 mm long; paleae 2–3 mm long. Ray florets 5; ligule 1–2 mm long, yellow. Disc florets c. 20; corolla c. 2.5 mm long; tube narrower than and \pm as long as limb; limb yellow. Achenes c. 3 mm long. *Woolly Yarrow*.

Native to Europe. Naturalised in SE S.A. Grows in disturbed sites such as roadsides. Flowers late spring–summer.

S.A.: Hope Valley, 6 Dec. 1947, *J.B.Cleland* (AD); Rly line between Owen and Mallala, *A.E.Orchard 6169* (AD).



An occasional garden escape that is only weakly naturalised. Apart from the colour of the ligules, *A. tomentosa* can be distinguished from the other two species of *Achillea* in Australia by the more numerous disc florets and the entirely stramineous involucre bracts with an unpigmented hyaline margin.

ASTERACEAE

5. LASIOSPERMUM

Lasiospermum Lag., *Gen. Sp. Pl.* 31 (1816); from the Greek *lasios* (wool) and *spermum* (seed), alluding to the woolly fruits.

Type: *L. pedunculare* Lag.

Annual to perennial herbs, ascending to erect. Leaves 1- or 2-pinnatisect. Capitula 1 per stem or branch, radiate (in Australia) or discoid; involucre 2- or 3-seriate, with bracts mostly of similar length but a few outer ones shorter; receptacle paleate. Ray florets female, fertile. Disc florets bisexual; corolla 5-lobed. Achenes \pm homomorphic, terete, 8–10-ribbed, hairy. Pappus absent.

A genus of 4 species from S. Africa, Namibia and Egypt. One naturalised species in Australia.

****Lasiospermum bipinnatum*** (Thunb.) Druce, *Bot. Soc. Exch. Club. Brit. Isles* 1916: 631 (1917)

Lidbeckia bipinnata Thunb., *Prodr. Pl. Cap.* 161 (1800). T: not designated.

Lasiospermum radiatum Trevir., *Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur.* 13(1): 205 (1824). T: n.v.

Perennials to c. 40 cm high, glabrous, with eglandular stems and leaves. Leaves to c. 5 cm long, fleshy; primary segments to c. 10 per side; rachides and ultimate segments 0.8–1.5 mm wide. Capitula 20–25 mm diam.; peduncle 10–30 cm long; peduncular bracteoles several, ovate-lanceolate; disc c. 7–10 mm diam.; involucre 4–5 mm long; bracts not keeled nor with pigmented margin; inner bracts with hyaline extension 1–2 mm long; mature receptacle convex; paleae \pm narrowly oblong, c. 2.5 mm long, c. 1 mm wide, acute, hyaline, with a red resin duct medially. Ray florets 15–20; ligule c. 10–15 mm long, white. Disc florets: corolla c. 3 mm long; tube narrower and slightly shorter than limb; limb yellow. Achenes narrowly obloid, c. 4 mm long, completely hidden by a dense long tan-coloured wool.

Native to S. Africa. Naturalised in SE Tas. in and around Hobart. Flowers spring.

Tas.: Hayes, *W.M.Curtis* (HO); Municipal Tip, Campania, *D.I.Morris 8441* (AD, HO, MEL, NSW).

Readily distinguished in fruit by its woolly achenes. The involucre bracts are distinctive compared with other radiate species in Australia. They are \pm oblong and have a relatively broad green stereome, which helps distinguish this species from similar-sized white ligulate species such as *Chamaemelum nobile*, *Anthemis cotula* and *A. arvensis*.



6. CHAMAEMELUM

Chamaemelum Mill., *Gard. Dict.* abr. edn 4 (1754); from the Greek *chamai* (lowly) and *melon* (apple), alluding to the low habit and apple-like scent of *C. nobile*.

Type: *C. nobile* (L.) All.

Annual or perennial herbs or sub-shrubs, erect, ascending or decumbent. Leaves 1- or 2-pinnatisect. Capitula radiate (in Australia), disciform or discoid, solitary or few; involucre 2–4-seriate, with bracts gradational in length; receptacle paleate. Ray florets female, fertile or sterile. Disc florets bisexual; corolla 5-lobed. Achenes slightly dimorphic in length, slightly compressed, with inner face ribbed, glabrous. Pappus absent.

A genus of 6 species from the Canary Is, Mediterranean, and Middle East. One naturalised species in Australia.

****Chamaemelum nobile* (L.) All., *Fl. Pedem.* 1: 185 (1785)**

Anthemis nobilis L., *Sp. Pl.* 2: 894 (1753). T: Europe, *Herb. Clifford:* 415, *Anthemis* 1; lecto: BM, fide C.J.Humphries in C.E.Jarvis & N.J.Turland (eds), *Taxon* 47: 352 (1998).

Illustration: N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 925, fig. 188f (1999).

Ascending perennial herbs to c. 30 cm high, rhizomatous, odorous on crushing, usually sparsely hairy on stems and leaves. Leaves to c. 5 cm long; primary segments mostly 6–10 per side, arising along entire length of leaf, markedly larger in distal half; rachis < 1 mm wide; secondary rachides and ultimate segments < 0.5 mm wide. Capitulum 20–25 mm diam.; peduncle moderately hairy distally; involucre 4–5 mm long, cobwebby; bracts not keeled nor with pigmented margin; inner bracts with hyaline extension 1–1.5 mm long; mature receptacle obovoid; paleae narrowly obovate or oblong-elliptic, c. 0.8 mm wide, subacute to obtuse, sometimes lobed. Ray florets 10–20, fertile; ligule 8–12 mm long, white. Disc florets: corolla 2.5–3 mm long; tube longer than and as broad as limb; limb yellow, swollen at base. Achenes obovoid, 1–1.5 mm long, with 3 slender pale ribs, grey-brown. *Chamomile*.

Native to south-western Europe. Naturalised near Adelaide in SE S.A., in southern Vic. and in eastern Tas. Grows in roadsides, waste areas and lawns. Flowers late spring–autumn.

S.A.: Bridgewater, c. 20 km SE of Adelaide, 27 Nov. 1937, *E.H.Ising* (AD).
Vic.: roadside between Trentham and East Trentham, 9 Apr. 1990, *K.Dormouse* (MEL). Tas.: Westbury, 20 Feb. 1948, *W.M.Curtis* (HO).

Similar to species of *Anthemis* in having hairy stems and leaves, denser on the peduncle, gland-dotted leaves and a paleate receptacle. Used horticulturally as a herb and in lawns and used medicinally and in beverages. The involucre is generally moderately lustrous due to the relatively well-developed hyaline margins. Ligules persist and become deflexed post-anthesis. This feature is also evident in the genera *Anthemis*, *Matricaria*, *Tripleurospermum* and *Argyranthemum*.



7. ANTHEMIS

Anthemis L., *Sp. Pl.* 2: 893 (1753); from the Greek *anthemon* (flower). Pliny used this name for a species of Chamomile.

Type: *A. maritima* L.

Annual to perennial herbs or subshrubs, erect. Leaves 1–3-pinnatisect. Capitula radiate (in Australia) or discoid, solitary or not; involucre 2- or 3-seriate, with bracts gradational in length; receptacle paleate (in Australia). Ray florets female or sterile. Disc florets bisexual; corolla mostly 5-lobed. Achenes ±homomorphic, sometimes compressed, 4- or 5-angled and/or 10-ribbed, glabrous (in Australia). Pappus present or absent.

A genus of 211 species, from Europe, Asia and northern Africa; 3 species naturalised in Australia.

Anthemis is characterised by obconical, thick-walled fruits and a basally swollen corolla-tube. The indumentum frequently contains dolabriform (axe-shaped) hairs. The Australian species are distinguished from other genera by having the disc much broader than the length of the generally hairy involucre, the mature receptacle narrowly conical and the paleae with a peracute or spine-like apex. Involucral bracts are not keeled as is seen in species of *Oncosiphon* and *Tanacetum*, and the margin is not pigmented brown as is seen in species of *Tripleurospermum* and *Mauranthemum*.

1 Ligules yellow; pappus a small corona

3. *A. tinctoria*

1: Ligules white; pappus absent

2 Plant hardly odorous when crushed; capitula (15–) 20–35 mm diam.; peduncle with hairs ±evenly appressed; involucre 4–6.5 mm long; involucre bracts with hyaline extension 1–2 mm long; paleae 0.5–1 mm wide, arising throughou receptaclet; achenes 1–2 mm diam., with ribs smooth; ray florets fertile

1. *A. arvensis*

2: Plant strongly odorous when crushed; capitula 15–25 mm diam.; peduncle with hairs somewhat divergent and untidily arranged; involucre c. 4 mm long; involucre bracts with hyaline extension 0.5–1 mm long; paleae 0.3–0.7 mm wide, only associated with inner group of disc florets and arising only from upper half of receptacular cone; achene of disc florets c. 0.8 mm diam., with ribs usually tuberculate; ray florets sterile

2. *A. cotula*

1. **Anthemis arvensis* L., *Sp. Pl.* 2: 894 (1753)

T: Europe, *Herb. Linn. No. 1016.15*; lecto: LINN, *fide* R.R.Fernandes, *Anales Inst. Bot. Cavanilles* 32: 1472 (1975).

Illustrations: G.J.Harden (ed.), *Fl. New South Wales* 3: 285 (1992); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 925, fig. 188g (1999).

Annual herbs to c. 60 cm high, hardly odorous when crushed, sparsely to moderately hairy. Leaves to c. 5 cm long, sub-2 to 3-pinnatisect. Capitulum (15–) 20–35 mm diam.; peduncle with largely appressed hairs distally at anthesis, ±sericeous when dense; involucre 4–6.5 mm long, hairy; inner bracts with hyaline extension 1–2 mm long; paleae associated with all disc florets, narrowly elliptic, to 0.5–1 mm wide. Ray florets 15–20, female, fertile; ligule 8–16 mm long, white. Disc floret corolla 2.5–3 mm long, swollen at base. Achenes of disc florets obovoid, c. 2 mm long, commonly c. 1 mm diam., sometimes c. 2 mm diam., slightly 4-angled, smooth along ribs. Pappus absent or a vestigial ring. *Field Chamomile*. Fig. 43F.

Native from Europe E to Iran. Naturalised in eastern N.S.W. and Tas. Grows in disturbed areas near human habitation. Flowers summer.

N.S.W.: Bannaby Travelling Stock Res., 12.5 km ESE of Taralga, *I.Crawford* 5228 (CANB, NSW). Tas.: Tarraleah, 7 Feb. 1945, *W.M.Curtis* (HO).

The paleae are distinctly broader than those of *A. cotula* and compared to *Chamaemelum nobile* the paleae have a more acute apex and are relatively longer. In the absence of fruit and odour characters, *A. arvensis* and *A. cotula* are best distinguished by size of florets, indumentum of peduncles and the length of the hyaline extensions of the inner involucre bracts.



2. **Anthemis cotula* L., *Sp. Pl.* 2: 894 (1753)

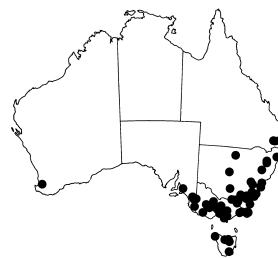
T: Europe, *Gerber, Herb. Linn. No. 1016.16*; lecto: LINN, *fide* Z.Yavin, *Israel J. Bot.* 19: 145 (1970).

Illustrations: W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 255 (1992); G.J.Harden (ed.), *Fl. New South Wales* 3: 285 (1992); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 925, fig. 188h (1999).

Annual herbs to c. 60 cm high, strongly odorous when crushed, usually sparsely to moderately hairy. Leaves to c. 5 cm long, 2- or 3-pinnatisect. Capitulum 15–25 mm diam.; peduncle with an untidy indumentum of mainly divergent to spreading hairs distally at anthesis; involucre 4–5 mm long, hairy; inner bracts with hyaline extension 0.5–1 mm long; paleae arising only from upper half of receptacle, linear to linear-lanceolate, 0.3–0.7 mm wide. Ray florets 10–15, sterile; ligule 5–9 mm long, white. Disc floret corolla 2–3 mm long, swollen at base. Achenes obovoid, 1.2–1.5 mm long, c. 0.8 mm wide, ±terete, usually tuberculate along ribs, sometimes nearly smooth. Pappus absent. *Stinking Mayweed*. Fig. 43A–E.

Native to Europe, western Asia and N Africa. Naturalised in SE S.A., SE Qld, N.S.W., Vic. and Tas. There is also a single old record from W.A. Grows in disturbed environments such as agricultural land and wasteland. Flowers late spring–summer.

W.A.: Mumballup, 21 Jan. 1933, *K.Wilson* (PERTH). S.A.: Hundred of Comaum, Coonawarra area, *M.Gartner* 7754 (AD). Qld: Gatton, Nov. 1916, *E.W.Burch* (BRI). N.S.W.: 'Tawarri', 12 km from Orange on Pinnacle Rd, *R.Medd* 160383 (NSW). Vic.: between Wodonga and Albury, 1.3 km SSW of Murray R., *I.C.Clarke* 3038 (CANB, MEL). Tas.: Gilbertson's abattoirs, Longford, *D.I.Morris* 8516 (HO, MEL).



A noxious weed in Tas. (secondary category). *Anthemis cotula* has been confused with *Tripleurospermum maritimum* subsp. *inodorum* q.v. which, apart from its distinctive fruits, differs in having a broader and more gently convex disc, longer involucre bracts, more sparsely hairy peduncle, and in being epaleate.

Chamaemelum nobile has similar-looking capitula to *A. cotula* but the former is a rhizomatous perennial, its leaves have a higher length:width ratio, its involucre bracts are more lustrous and less hairy, and its achenes have 3 fine ribs rather than c. 10 tuberculate ribs. A specimen from Woolnorth, Tas. (*A.C.Rozefelds* 1307, HO), is like *A. cotula* but has achenes that are not tuberculate and the corolla is differently shaped, and with longer lobes. It is tentatively identified as *A. lithuanica* Besser ex DC., native to Russia. It is unknown whether it persists at this location.

3. **Anthemis tinctoria* L., *Sp. Pl.* 2: 894 (1753)

T: 'Sueciae, Germaniae' [approximately modern Sweden and Germany], *Herb. Clifford*: 414, *Buphthalmum* 2; lecto: BM, *fide* M.Iranshahr in K.H.Rechinger (ed.), *Fl. Iranica* 158: 18 (1986).

Biennial to perennial herbs to c. 60 cm high, with odour not known, moderately hairy. Leaves to c. 7 cm long, 1- or sub-2-pinnatisect. Capitulum 20–40 mm diam.; peduncle with appressed hairs at anthesis; involucre 5–6 mm long, densely hairy; inner bracts with hyaline extension c. 1 mm long; paleae subtending all florets, narrowly lanceolate, c. 1 mm wide. Ray florets c. 15, female, fertile; ligule c. 10 mm long, golden-yellow. Disc floret corolla c. 3 mm long, swollen at base. Achenes obovoid, c. 2 mm long. Pappus a membranous corona. *Yellow Chamomile*, *Dyer's Chamomile*.

Native to Europe and western to central Asia. Sparingly naturalised in SE S.A. and northern Tas.; also naturalised in N America. Flowers summer–autumn.

S.A.: E of Tanunda, *R.J.Bates* 29571 (AD). Tas.: Launceston, Mar. 1961, *J.Somerville* (HO).

A popular species in horticulture that appears to be only weakly naturalised. The source of Chamomile tea and also used as a yellow dye. There are several subspecies of *A. tinctoria*. Collections in Australia may be referable to subsp. *australis* R.R.Fern., *Bot. J. Linn. Soc.* 70(1): 14 (1975), but this requires further investigation.



8. ARGYRANTHEMUM

Argyranthemum Webb ex Sch.Bip. in P.B.Webb & S.Bertholot, *Hist. Nat. Iles Canaries* 2: 245 (1844); from the Greek *argyros* (silver) and *antheon* (flower), possibly alluding to the white-rayed capitula.

Type: *A. frutescens* (L.) Webb ex Sch.Bip.

Shrubs and subshrubs, with stems and leaves eglandular. Leaves 1- or 2-pinnatisect. Capitula solitary or few, radiate; involucre multi-seriate, with bracts gradational in length; receptacle epaleate. Ray florets female, fertile. Disc florets bisexual; corolla 5-lobed. Achenes dimorphic; ray achenes trigonous, incurved with lateral wings and a posterior keel; disc achenes obconical-compressed, 1-winged. Pappus present.

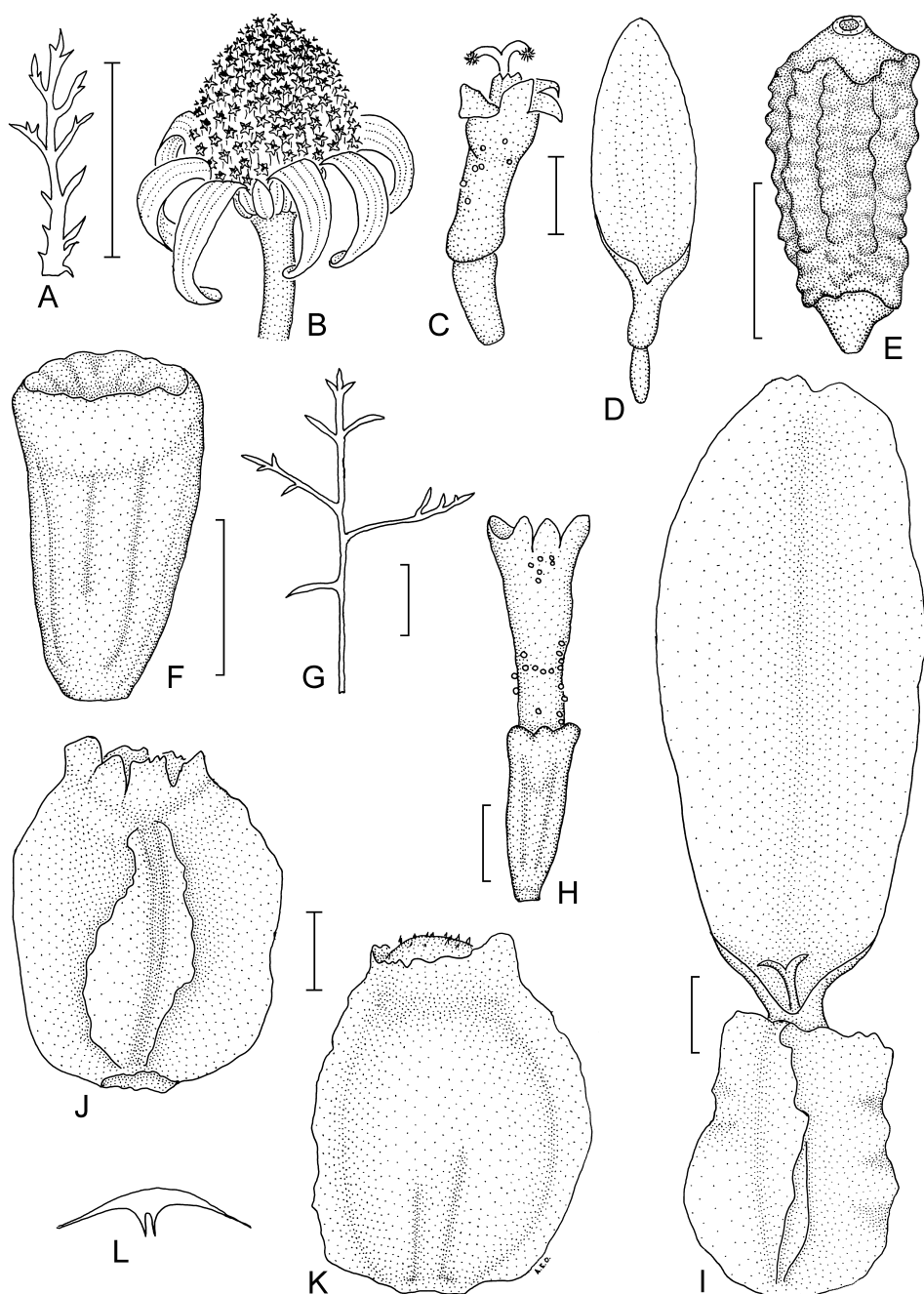


Figure 43. A–E, *Anthemis cotula*. A, leaf; B, capitulum; C, disc floret; D, ray floret; E, achene (A–E, E.M.Canning 1408, CBG). F, *A. arvensis*, achene (I.Crawford 4604, CANB). G–L, *Argyranthemum frutescens* subsp. *foeniculaceum*. G, leaf; H, disc floret; I, ray floret; J, ray achene, adaxial view; K, ray achene, abaxial view; L, ray achene, diagrammatic X-section (G–K, H.J.Eichler 18070, CBG). Scale bars: A, B, G = 1 cm; C–F, H–K = 1 mm. Drawn by A.E.Orchard.

A genus of 22 species endemic to Macaronesia (Canary Is, Madeira and the Salvage Is in the N Atlantic Ocean). One species naturalised in Australia.

C.J.Humphries, A revision of the Macaronesian genus *Argyranthemum* Webb ex Schultz Bip. (Compositae–Anthemideae), *Bull. Brit. Mus. (Nat. Hist.), Bot.* 5: 145–240 (1976).

****Argyranthemum frutescens* (L.) Webb ex Sch.Bip. in P.B.Webb & S.Berthelot, *Hist. Nat. Iles Canaries* 2: 264 (1844)**

Chrysanthemum frutescens L., *Sp. Pl.* 2: 887 (1753). T: *Herb. Clifford*: 417, *Chrysanthemum* 5; lecto: BM, fide C.J.Humphries, *Bull. Brit. Mus. (Nat. Hist.), Bot.* 5: 181 (1976).

Plants to c. 1 m high, glabrous or nearly so, often glaucous. Leaves 1- or 2-pinnatisect, narrow at base, with rachides and segments 0.5–4 mm wide; primary segments 1–5 per side, usually in distal half, entire or with secondary lobes or segments. Capitula few, 3–6 cm diam.; peduncle 4–12 cm long; involucre 7–10 mm long; outer bracts 2–5 mm long, with brown margin; inner bracts with hyaline extension 3–4 mm long; mature receptacle conical, slightly taller than wide. Ray florets c. 15–20; ligule 8–35 mm long, white. Disc florets numerous; corolla 2.5–3 mm long. Achenes dimorphic, 3–7 mm long; ray achenes 2–5 mm wide, with broad firm lateral wings and an adaxial wing; disc achenes 2.5–4 mm long, 1–2 mm wide, with inner series ±quadrangular, ribbed, and outer series with a moderate adaxial wing. Pappus an oblique adaxially longer corona to 2 mm long, of similar texture to achenes. *Marguerite*.

There are two forms naturalised in Australia, both probably of horticultural origin. These are referred with some uncertainty to two subspecies.

Plants not glaucous; mid-branch leaves with rachis 2–4 mm wide; ligules 15–30 mm long

a. subsp. *frutescens*

Plants usually slightly to moderately glaucous; mid-branch leaves with rachis 1–2 mm wide; ligules 8–15 mm long

b. subsp. *foeniculaceum*

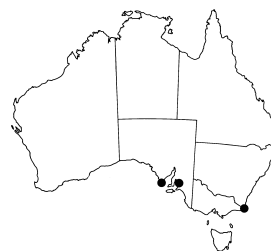
a. **Argyranthemum frutescens* (L.) Webb ex Sch.Bip. subsp. *frutescens*

Plants green, not glaucous. Leaves: rachis of mid-branch leaves 2–4 mm wide; primary segments commonly 3 or 4 per side. Ligules > 15 mm long.

Naturalised in southern S.A. and eastern Vic. Grows in various soils including sand dunes and over limestone, mostly on or near the coast. Flowers spring–autumn.

S.A.: 10 km S of Port Lincoln, *R.J.Bates* 37126 (AD). Vic.: Gabo Is., 6 Oct. 1993, *K.Twyford* s.n. (MEL).

Probably only weakly naturalised.



b. **Argyranthemum frutescens* subsp. *foeniculaceum* (Pit. & Proust) Humphries, *Bull. Brit. Mus. (Nat. Hist.), Bot.* 5: 187 (1976)

Argyranthemum frutescens var. *foeniculaceum* Pit. & Proust, *Iles Canaries* 230 (1909). T: Agulo, La Gomera, Canary Is, 13 Apr. 1905, *C.-J.M.Pitard* 195; holo: G; iso: L, Z, all n.v., fide C.J.Humphries, *loc. cit.*

[*Chrysanthemum anethifolium* auct. non Brouss. ex Willd.: J.M.Black, *Fl. S. Australia* 2nd edn, 4: 878 (1957)]

[*C. foeniculaceum* auct. non Willd.: H.J.Eichler, *Suppl. J.M.Black's Fl. S. Australia* 303 (1965)]

[*A. foeniculaceum* auct. non (Willd.) Webb ex Sch.Bip.: N.S.Lander in N.G.Marchant *et al.*, *Fl. Perth Region* 2: 659 (1987)]

Illustration: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1608, fig. 729B (1986).

Plants usually slightly to moderately glaucous. Leaves: rachis of mid-branch leaves 1–2.5 mm wide; primary segments 1 or 2 (3) per side. Ligules 8–12 mm long. Fig. 43G–L.

Naturalised in SW W.A. and southern S.A. Grows in various soils including sand dunes and over limestone, mostly on or near the coast. Flowers spring–autumn.

W.A.: Peppermint Grove, *A.S.George 14839* (PERTH). S.A.: Coffin Bay to Port Lincoln tramway track, c. 10 km SW of Coffin Bay, *H.P.Vonow 889* (AD, BRI, CANB).

This subspecies is far more common than subsp. *frutescens*. Ligules are longer than described for plants in their native habitat. Naturalised plants in Australia are likely to be of garden origin and bred for larger capitula. There are numerous horticultural forms but only one appears to be naturalised.



9. GLEBIONIS

Glebionis Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 41: 41 (1826); derivation unknown.

Type: *G. coronaria* (L.) Cass. ex Spach

Annual herbs, erect, eglandular. Leaves undivided, lobed or 1- or 2-pinnatisect. Capitula solitary or few, radiate; involucre c. 3-seriate, with bracts gradational in length; receptacle epaleate. Ray florets female, fertile. Disc florets bisexual; corolla 5-lobed. Achenes slightly dimorphic; ray achenes winged-trigonous; disc achenes terete or slightly trigonous, winged or not. Pappus absent.

A genus of 2 species native to Europe, Asia and N Africa; both weakly naturalised in Australia.

Formerly included in *Chrysanthemum* which was originally a large diverse genus of species with radiate, epaleate capitula, now split into many smaller genera. Other segregate genera include *Leucanthemum*, *Argyranthemum* and *Mauranthemum*. *Chrysanthemum* s. str. includes the chrysanthemum of horticulture.

Leaves 1- or 2-pinnatisect; disc achenes with an adaxial wing

1. *G. coronaria*

Leaves dentate, lobed or entire; disc achenes cylindrical, without adaxial wing

2. *C. segetum*

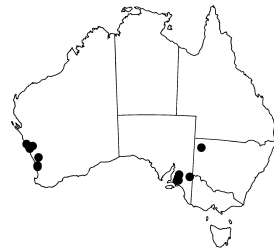
1. **Glebionis coronaria* (L.) Cass. ex Spach, *Hist. Nat. Vég.* 10: 181 (1841)

Chrysanthemum coronarium L., *Sp. Pl.* 2: 890 (1753). T: Greece. Kriti (Crete): Nomos Irakliou, Eparhia Kenourgiou, 500 m E of Gangales, E side of road to Vali, 13 Apr 2003, *Kyriakopoulos & Turland sub Turland 1166*; neo: UPA, *fide* N.Turland, *Taxon* 53: 1072 (2004).

[*C. segetum* auct. non L.: S.W.L.Jacobs & J.Pickard, *Pl. New South Wales* 75 (1981)]

Illustration: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1613, fig. 733B (1986), as *C. coronarium*.

Plants to c. 90 cm high, glabrous apart from transient hairs on newer growth. Leaves obovate to ovate in outline, to c. 12 cm long, 1- or 2-pinnatisect, with up to 10 primary divisions per side; base half-clasping; margin entire or with occasional teeth; uppermost leaves similar. Capitula few; 4–6 cm diam.; peduncle c. 3–8 cm long; involucre 8–10 mm long; outer bracts 4–5 mm long, with margin light brown; inner bracts with hyaline extension c. 4 mm long; mature receptacle convex. Ray floret ligule c. 15–25 mm long, yellow. Disc florets numerous; corolla 4–5 mm long; tube narrower and slightly shorter than limb. Achenes c. 3 mm long, with body hardly compressed, c. 8-ribbed, with some ribs expanded into wings, brown, glandular; ray achenes 3–4 mm wide, with prominent lateral and adaxial wings; disc achenes c. 2 mm diam., with only adaxial wing prominent. *Summer Chrysanthemum*. Fig. 44A–E.



Native to the Mediterranean region and NW Iran. Naturalised in SW W.A., SE S.A. and far NW N.S.W. Grows in disturbed sites. Flowers spring–summer.

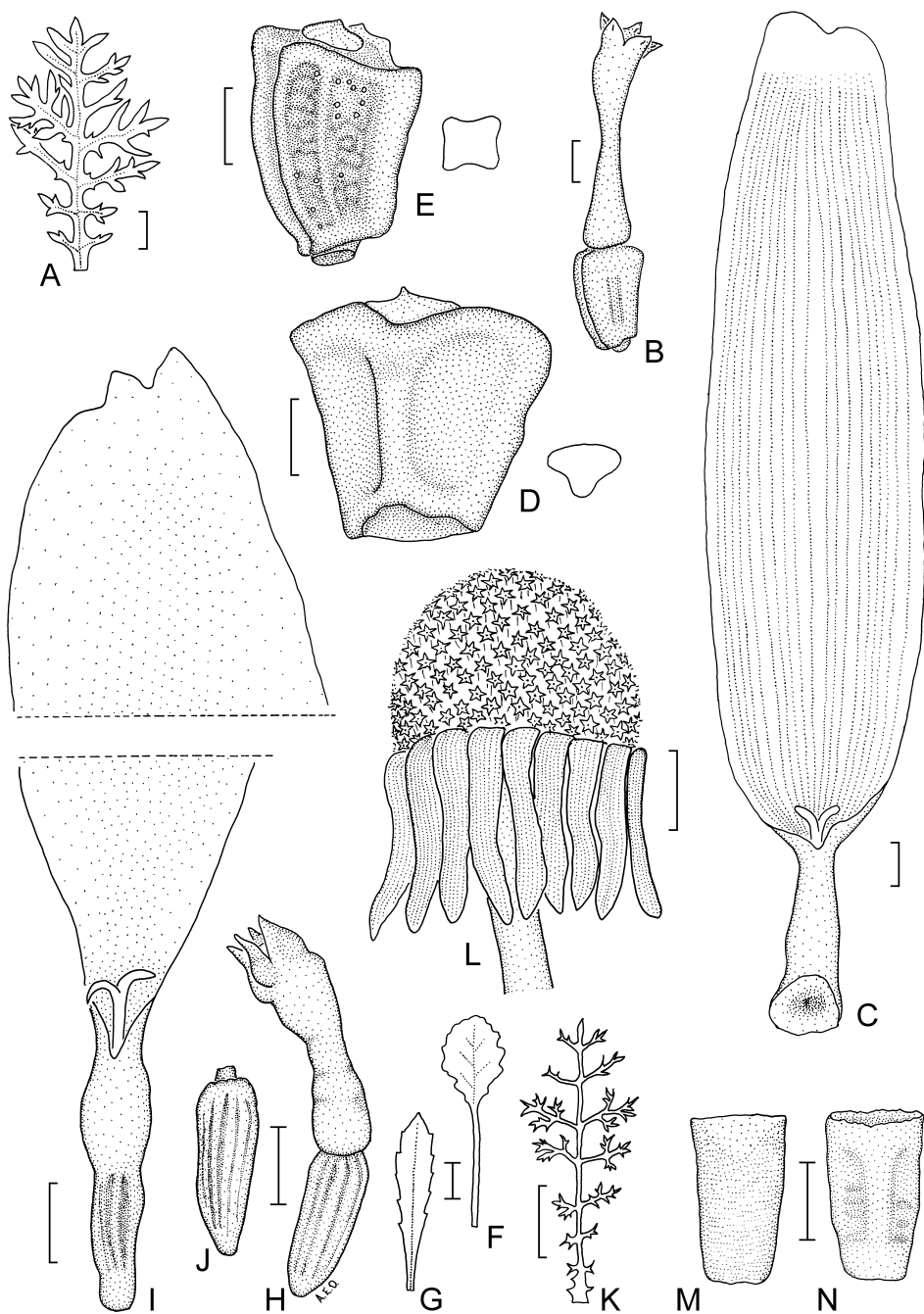


Figure 44. A–E, *Glebionis coronaria*. A, leaf; B, disc floret; C, ray floret corolla; D, disc achene; E, ray achene (A–E, R.M.King 9530 & R.M.Garvey, CANB). F–J, *Leucanthemum vulgare*. F, rosette leaf; G, cauline leaf; H, disc floret; I, ray floret; J, achene (F–J, J.R.Hosking 2210, CANB). K–N, *Tripleurospermum maritimum* subsp. *inodorum*. K, leaf; L, capitulum; M, achene, abaxial view; N, achene, adaxial view (K–N, J.R.Hosking 1147 & G.R.Hosking, CANB). Scale bars: A, F, G, K, L = 1 cm; B–E, H–J, M, N = 1 mm. Drawn by A.E.Orchard.

W.A.: Vincent St, Leederville, Perth, *G.J.Keighery 11459* (MEL, PERTH); near beach, town limits of Dongara, *R.M.King 9530* & *R.M.Garvey* (CANB, PERTH). S.A.: Prospect, 29 Sept. 1907, *S.A.White ex S.A. Museum* (AD). N.S.W.: Paldrumatta Bore, Oct. 1901, *P.Corbett* (NSW).

A garden escape that is only weakly naturalised. The adaxial wing of the achenes is broadest apically and often forms an acute point.

2. **Glebionis segetum* (L.) Fourr., *Ann. Soc. Linn. Lyon* 17: 90 (1869)

Chrysanthemum segetum L., *Sp. Pl.* 2: 889 (1753). T: Europe, *Herb. Clifford: 416*, *Chrysanthemum* 2; lecto: BM, *fide* A.Grierson in M.D.Dassanayake & F.R.Fosberg (ed.), *Revised Handb. Fl. Ceylon* 1: 237 (1980).

Illustration: J.R.Wheeler *et al.*, *Fl. South West* 2: 500 (2002), as *C. segetum*.

Plants to c. 80 cm tall, glabrous. Leaves oblong or obovate in outline, to c. 7 cm long, acutely dentate to deeply lobed, with up to 4 primary divisions per side, concentrated distally; base hardly or half-clasping; margin entire or with occasional teeth; uppermost leaves often entire. Capitula few, 3–5 cm diam.; peduncle c. 3–8 cm long; involucre 8–12 mm long; outer bracts c. 4 mm long, with margin light brown; inner bracts with hyaline extension 3–5 mm long; mature receptacle convex. Ray floret ligule c. 10–20 mm long, yellow. Disc florets numerous; corolla 4 mm long; tube narrower and slightly shorter than limb. Achenes 2–3 mm long, with body hardly compressed, several-ribbed, without adaxial wings, pale, eglandular; ray achenes 1.2–2.5 mm wide, with lateral wings; disc achenes c. 1 mm diam., regularly ribbed, without wings. *Corn Marigold*.

Probably native to the Mediterranean. Naturalised in SW W.A. Grows as a garden escape near human habitation. Flowers late winter–spring.

W.A.: Bunbury, *C.V.Cahill 1* (PERTH); New Norcia, Nov. 1963, *F.T.Hardy* (PERTH).



10. MAURANTHEMUM

Mauranthemum Vogt & Oberpr., *Taxon* 44(3): 377 (1995); from the Greek *mauros* (dark) and *anthemon* (flower), perhaps alluding to the dark hyaline margins of the involucral bracts.

Type: *M. paludosum* (Poir.) Vogt & Oberpr.

Annual herbs, erect. Leaves lobed. Capitula solitary, radiate; involucre multi-seriate, with bracts gradational in length; receptacle epaleate. Ray florets sterile (in Australia) or female. Disc florets bisexual; corolla 5-lobed. Achenes homomorphic, ±terete, 7–10-ribbed. Pappus present on ray florets.

A genus of 4 species from Europe. One species naturalised in Australia.

In fruit the corolla-tube is basally swollen. Achenes have dark red secretory canals.

R.Vogt, Die Gattung *Leucanthemum* Mill. (Compositae-Anthemideae) auf der Iberischen Halbinsel, *Ruizia* 10: 1–261 (1991).

**Mauranthemum paludosum* (Poir.) Vogt & Oberpr., *Taxon* 44(3): 377 (1995)

Chrysanthemum paludosum Poir., *Voy. Barbarie* 2: 241 (1789); *Leucoglossum paludosum* (Poir.) B.H.Wilcox, K.Bremer & Humphries, *Bull. Nat. Hist. Mus. London Bot.* 23: 142 (1993). T: not designated.

Plants to c. 30 cm tall, eglandular, glabrous. Leaves to c. 6 cm long, lacerately lobed; base developing lobes above mid-stem; margin serrate; apex peracute. Capitulum 2–3 cm diam.; involucre 4–6 mm long; outer bracts 2–3 mm long, not keeled, with margin darkly pigmented; inner bracts with blackish hyaline extension 0.5–1 mm long; mature receptacle conical. Ray florets sterile; ligule c. 10 mm long, white with green base. Disc florets numerous; corolla 2–2.5 mm long, 5-lobed, basally swollen in fruit. Achenes obovoid, c. 2 mm long, red between very prominent pale ribs. Pappus of ray florets a corona to c. 2 mm long. Fig. 45A–E.

Native to Europe. Naturalised in SW W.A., SE S.A., SE N.S.W. and south-central Vic. Grows in disturbed sites such as roadsides. Flowers summer.

W.A.: Cargill St, Victoria Park, Perth, *B.J.Lepschi* 2090 (CANB, PERTH). S.A.: track into Chambers Gully, c. 400 m from Waterfall Gully Rd, *A.G.Spooner* 15409 (AD). N.S.W.: Princes Hwy N of Milton, 3 July 1998, *K.Mills s.n.* (NSW). Vic.: paddock at end of Neale Rd c. 50 m down Opie Rd, Deer Park, 25 Aug. 1986, *C. Le Breton* (MEL); Yan Yean, 45 km N of Melbourne, *D.Senyschyn* 27 (MEL).



A weakly naturalised garden escape. Similar to *Leucanthemum vulgare* but *M. paludosum* is an annual with lighter green leaves with peracute lobes and teeth, cordate-based outer involuclal bracts, smaller capitula, and sterile ray florets with a well-developed corona.

11. LEUCANTHEMUM

Leucanthemum Mill., *Gard. Dict.* abr. edn 4 (1754); from the Greek *leukos* (white) and *anthemon* (flower), alluding to the white ligules present in most species.

Type: *L. vulgare* Lam.

Perennial herbs, erect. Leaves undivided or lobed. Capitula solitary or several, radiate (in Australia) or discoid; involucre multi-seriate, with bracts gradational in length; receptacle epaleate. Ray florets female, fertile. Disc florets bisexual; corolla 5-lobed. Achenes sometimes dimorphic, ±terete, 10-ribbed. Pappus present on ray florets, sometimes minute.

A genus of 33 species from Europe and N Africa. Two species naturalised in Australia.

A key defining character for this genus is the anthocyanin red coloration of the root tips. Plants have eglandular stems and leaves, the corolla-tube is basally swollen and spongy at maturity, and the achenes have red secretory canals.

Leaves variably toothed or crenulate, sometimes also lobed; margin of involuclal bracts delineated by pigment throughout; capitula 4–6 cm diam. including rays; outer involuclal bracts mostly 3–5 mm long; achene of ray florets 1.5–2.5 mm long, with corona c. 0.5 mm long

1. *L. vulgare*

Leaves ±evenly serrulate; margin of involuclal bracts not delineated by pigment throughout; capitula mostly 6–10 cm diam. including rays; outer involuclal bracts 5–8 mm long; achene of ray florets 3–4 mm long, with corona c. 2 mm long

2. *L. ×superbum*

1. **Leucanthemum vulgare* Lam., *Fl. Franç.* 2: 137 (1779)

Chrysanthemum leucanthemum L., *Sp. Pl.* 2: 888 (1753). T: Europe, *Herb. Clifford*: 416, *Chrysanthemum* 3; lecto: BM, *fide* T.W.Böcher & K.Larsen, *Watsonia* 4: 15, t. 6, f. 1 (1957).

Illustrations: W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 290 (1992); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 929, fig. 189a (1999).

Plants to c. 100 cm high, eglandular, with scattered coarse hairs on lower parts of stems and on lower-stem leaves, becoming glabrous. Leaves with few–several lobes or undivided; base developing basal lobes above mid-stem; margin dentate to crenulate, with up to c. 15 teeth/crenulations per side; mid-stem leaves oblanceolate to narrow-oblong, to c. 4 cm long. Capitula 1–3, 3–6 cm diam.; peduncle glabrous; involucre 7–10 mm long, glabrous; outer bracts lanceolate, 2.5–7 mm long, not keeled, with margin brown; inner bracts with hyaline extension c. 1 mm long; mature receptacle convex. Ray floret ligule c. 10–15 mm long, white. Disc florets numerous; corolla 2–2.5 mm long; tube as long as and becoming as wide as limb; limb yellow. Achenes obovoid, c. 1.5–2.5 mm long, mid to dark red between raised pale ribs. Pappus on ray florets a minute corona c. 0.5 mm long. *Ox-eye Daisy*. Plate 37; Fig. 44F–J.

Native to Europe. Naturalised in SE S.A., eastern N.S.W., southern Vic. and Tas. Grows in disturbed sites such as road-sides. Flowers spring–summer.

S.A.: Mount Lofty township, *F.M.Hilton 1223A* (AD). N.S.W.: alongside New England Hwy, 2 km S of the intersection with Duri Dungowan Rd, S of Timbumburi, *J.R.Hosking 1826* (CANB, NSW). Vic.: summit of Mt Skene, 48 km from Jamieson on road to Licola, *D.E.Albrecht 120* (CANB, MEL). Tas.: Longley, Dec. 1943, *W.M.Curtis* (HO); Leven Gorge, *L.Richley 163* (HO).



One of the most widespread weeds in the tribe. A noxious weed in Vic., excluding the Melbourne metropolitan area.

2. **Leucanthemum* ×*superbum* (Bergmans ex J.W.Ingram) D.H.Kent, *Watsonia* 18(1): 89 (1990)

Chrysanthemum ×*superbum* Bergmans ex J.W.Ingram, *Baileya* 19: 167 (1975). T: cult. at Ithaca, New York, grown from seed, D[reer] 1948, 26 June 1921, *L.H.Bailey s.n.; n.v.*

[*C. lacustre* auct. non Brot.: J.H.Willis, *Handb. Pl. Victoria* 2: 741 (1972)]

[*L. maximum* auct. non (Ramond) DC.: J.A.Jeanes in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 929; E.A.Brown in G.J.Harden (ed.), *Fl. New South Wales* 3: 288 (1992); D.A.Cooke in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1618 (1986)]

Illustrations: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 929, fig. 189b (1999); J.R.Wheeler *et al.*, *Fl. South West* 2: 513 (2002), both as *L. maximum*.

Plants to c. 150 cm high, eglandular, nearly glabrous or with occasional coarse hairs on stems and leaves. Leaves undivided; base not developing basal lobes; margin strongly serrulate, with 15–30 teeth per side; mid-stem leaves narrowly elliptic, to c. 14 cm long. Capitula 1 (–3), 5–10 (–13) cm diam.; peduncle glabrous; involucre 9–12 mm long; outer bracts narrowly ovate to lanceolate, 4–7 mm long, not keeled, with margin pale or tinged brown; inner bracts with hyaline extension 3–4 mm long, pale or tinged brown; mature receptacle convex. Ray floret ligule c. 20–45 mm long, white. Disc florets numerous; corolla 4–4.5 mm long; tube as long as and becoming as wide as limb; limb yellow. Achenes obovoid, c. 2–4 mm long, with thick raised pale ribs, sometimes red between ribs. Pappus of ray florets a corona, c. 2 mm long. *Shasta Daisy*.

Naturalised in SW W.A., SE S.A., SE N.S.W. and southern and eastern Vic. Grows in disturbed sites near human habitation or activity. Flowers summer–autumn.

W.A.: N margin of Broadwater, near Busselton, *G.J.Keighery 8030* (PERTH). S.A.: Mt Compass, Feb. 1967, *T.Smith* (AD). N.S.W.: Mt Boyce, 3.4 km SE of Mt Victoria, *R.Coveny 7363 et al.* (NSW). Vic.: Upper Kiewa Rd, 3.8 km NW of Falls Creek Village, *R.J.Adair 981* (MEL).



An occasional garden escape naturalising in areas of moderate to high rainfall. Considered to be a hybrid between *Leucanthemum lacustre* (Brot.) Samp. and *L. maximum* (Ramond) DC. A cultivar with deeply dissected ligules has been recorded from far eastern Vic.

12. TRIPLEUROSPERMUM

Tripleurospermum Sch.Bip., *Tanaceteeen* 31 (1844); from the Greek *tri* (three), *pleuron* (rib) and *sperma* (seed), in reference to the achenes.

Type: *T. inodorum* (L.) Sch.Bip.

Annual or perennial herbs, erect. Leaves commonly 3-pinnatisect. Capitula solitary or few, radiate (in Australia) or discoid; involucre multi-seriate, with bracts gradational in length; receptacle epaleate. Ray florets female, fertile. Disc florets bisexual; corolla 4- or 5-lobed. Achenes ±homomorphic, c. 4-angled, 3-ribbed, with prominent apical glands. Pappus present.

A genus of c. 30 species from Europe, Asia and northern Africa. One species weakly naturalised in Australia.

A genus distinguished most decisively by its achene morphology.

****Tripleurospermum maritimum* (L.) Koch.**, *Syn. Fl. Germ. Helv.* 2nd edn, 1026 (1845)

subsp. ***inodorum* (L.) Appleq.**, *Taxon* 51: 760 (2003)

Matricaria inodora L., *Fl. Suec.* 2nd edn, 297 (1753); *T. inodorum* (L.) Sch.Bip., *Tanaceteeen* 32 (1844). T: Sweden, *Herb. Linn. No. 1012.12*; lecto: LINN, *fide* C.J.Humphries in C.E.Jarvis & N.L.Turland (eds), *Taxon* 47: 364 (1998).

Matricaria perforata Mérat, *Nouv. Fl. Env. Paris* 332 (1812); *T. perforatum* (Mérat) Láinz, *Anales Jard. Bot. Madrid* 39(2): 412 (1983). T: not designated.

Illustrations: S.Ross-Craig, *Drawings Brit. Pl.* 16: t. 10 (1961), as *M. maritima* subsp. *inodora*; G.J.Harden (ed.), *Fl. New South Wales* 3: 287 (1992), as *T. inodorum*.

Erect herbs to c. 100 cm high, glabrous except for transient scattered hairs, with stems and leaves eglandular. Leaves to c. 15 cm long, 3-pinnatisect, with rachides and ultimate segments generally < 1 mm wide. Capitula solitary or few, 3–5 cm diam.; peduncle sparsely hairy; involucre 5–7 mm long; outer and middle series of bracts not keeled, sometimes with margin brown; inner bracts with hyaline extension c. 0.5 mm long; receptacle hemispherical. Ray florets c. 12; ligule 8–18 mm long, white. Disc florets: corolla c. 2 mm long; tube c. as long as and narrower than limb; limb 5-lobed, yellow. Achenes obovoid, 1.8–2.2 mm long, with 3 prominent pale ribs on one face, generally dark and minutely wrinkled between ribs, with 2 large glands distally. Pappus a scarious rim c. 0.2 mm long. *Scentless Mayweed*, *Scentless False Chamomile*. Fig. 44K–N.

Native to Europe. Naturalised in NE N.S.W. with isolated records from southern Vic. and NW Tas. Grows in disturbed environments such as roadsides. Flowers mostly spring–summer.

N.S.W.: c. 40 km S of Glen Innes on Guyra–Glen Innes road, *N.S.Lander* 519 (BRI, NSW). Vic.: NE corner of intersection of Punt Rd & Swan St, Richmond, *J.C.Reid* 2470 (MEL). Tas.: Brittons Swamp, May 1975, *B.J.Collins* (CANB).

A pair of large glands embedded in the achene are visible from both the side (unribbed face) and from above. Although the achene is 3-ribbed, the achene appears somewhat quadrangular when viewed from above. The corolla-lobes are yellow but have an oval gland (orange-red on dried specimens) near the apex. This character, and the relative lack of hairs on branches and leaves, further distinguishes this species from vegetatively similar white-rayed species such as *Matricaria recutita*, *Anthemis cotula*, *A. arvensis* and *Chamaemelum nobile*.



13. MATRICARIA

Matricaria L., *Sp. Pl.* 2: 891 (1753); from the Latin *matrix* (womb) and *caries* (decay), in reference to the use of species of this genus to treat uterine infections.

Type: *M. recutita* L.

Chamomilla Gray, *Nat. Arr. Brit. Pl.* 2: 454 (1821). T: not designated.

Annual herbs, erect. Leaves 2- or 3-pinnatisect. Capitula solitary or few, rarely subsessile, radiate or discoid; involucre \pm 3-seriate, with all or nearly all bracts \pm equal in length; receptacle epaleate. Ray florets female, fertile. Disc florets bisexual; corolla 4- or 5-lobed. Achenes \pm homomorphic, terete or slightly compressed, with 4 or 5 ribs concentrated adaxially. Pappus present.

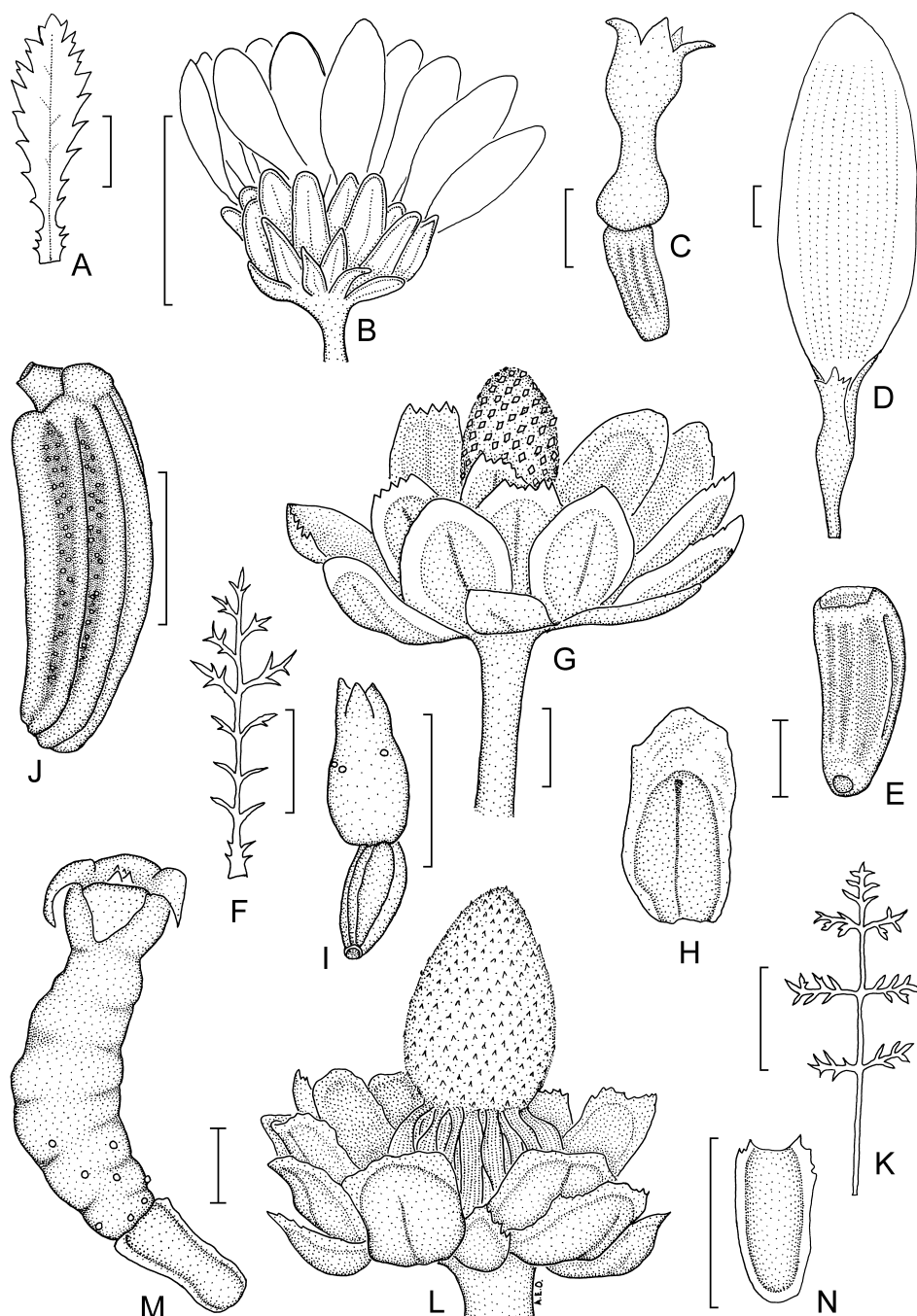


Figure 45. A–E, *Mauranthemum paludosum*. A, leaf; B, capitulum; C, disc floret; D, ray floret; E, achene (A–E, B.J.Lepschi 2090, CANB). F–J, *Matricaria matricarioides*. F, leaf; G, old capitulum with naked elongated receptacle; H, involucre bract; I, disc floret; J, achene (F–J, R.V.Smith 73/55, CANB). K–N, *Oncosiphon suffruticosum*. K, leaf; L, old capitulum with reflexed bracts and naked elongated receptacle; M, disc floret; N, achene (K–N, J.Dodd 487, CANB). Scale bars: A, B, F, K = 1 cm; C–E, G–J, L–N = 1 mm. Drawn by A.E.Orchard.

A genus of 7 species, widespread in the Northern Hemisphere, with some species widely distributed in the Southern Hemisphere as weeds. Two species naturalised in Australia.

Species in Australia have eglandular stems and leaves, have at least 2-pinnatisect leaves with rachides and ultimate segments < 1 mm wide, and capitula with a prominently domed disc. Red longitudinal resin canals are often evident in the midline of involucre bracts and in achenes.

Capitula radiate; peduncle usually > 2 cm long

1. *M. recutita*

Capitula discoid; peduncle mostly < 2 cm long

2. *M. matricarioides*

1. **Matricaria recutita* L., *Sp. Pl.* 2: 891 (1753)

Chamomilla recutita (L.) Rauschert, *Folia Geobot. Phytotax.* 9: 255 (1974). T: Czech Rep., in ruderalis ad urbem Brno, 15 Jun 1925, *Podpera in Fl. Exsicc. Reip. Boh.-Slov. No. 946.II*; neo: K, fide C. Jeffrey in C.E. Jarvis (ed.), *Taxon* 41: 566 (1992).

Illustration: S. Ross-Craig, *Drawings Brit. Pl.* 16, t. 11 (1961).

Plants to c. 60 cm high, glabrous. Leaves to c. 7 cm long; segments linear. Capitula solitary or few, radiate, 10–25 mm diam.; peduncle 3–9 cm long; involucre 2–3 mm long; inner bracts with hyaline extension c. 0.5 mm long; mature receptacle ovoid. Ray florets 9–15; ligule 6–10 mm long, white. Disc florets: corolla c. 1.5 mm long; tube c. as long as and slightly narrower than limb; limb 5-lobed, yellow. Achenes obovoid, 1.0 mm long, c. 0.8 mm wide. Pappus of ray achenes an oblong scale c. 1 mm long; pappus of disc achenes a minute scarious rim. *Wild Chamomile*.

Native to Europe. Sparingly naturalised in SW W.A., SE S.A., eastern N.S.W., A.C.T. and Tas. Grows in disturbed sites, usually on roadsides. Flowers spring–summer.

W.A.: Coorow, 23 Sept. 1998, *P. Stubbs* (PERTH). S.A.: Grange, 14 Jan. 1964, *J.B. Cleland* (AD). N.S.W.: E of Forbes on Eugowra Rd, 28 Oct. 1959, *C.K. Ingram* (NSW). A.C.T.: Canberra, *H.S. McKee 8855* (NSW). Tas.: Scotts Rd, Risdon Vale, *D.I. Morris 86494* (CANB, HO).



2. **Matricaria matricarioides* (Less.) Porter, *Mem. Torrey Bot. Club* 5: 341 (1894)

Artemisia matricarioides Less., *Linnaea* 6: 210 (1831). T: 'Unalaschka', *Chamisso*; syn. n.v.; 'Kamtschatka', [former U.S.S.R.], *J. Redowski*; syn. n.v.

Santolina suaveolens Pursh, *Fl. Amer. Sept.* 2: 520 (1814); *Chamomilla suaveolens* (Pursh) Rydb., *N. Amer. Fl.* 34: 232 (1916). T: n.v.

Matricaria discoidea DC., *Prodr.* 6: 50 (1838). T: California, U.S.A., *Douglas*; n.v.

Illustration: N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 4: 929, fig. 189e (1999).

Plants to c. 45 cm high but mostly 5–20 cm high, glabrous. Leaves to c. 4.5 cm long; segments linear. Capitula solitary or few, discoid, 5–9 mm diam.; peduncle to c. 1 cm long; involucre 3–4.5 mm long; inner bracts with hyaline extension c. 1 mm long; mature receptacle ovoid. Disc florets: corolla c. 1 mm long; tube usually slightly longer and broader than limb; limb 4-lobed, greenish. Achenes obovoid, 1.2–1.5 mm long. Pappus a minute scarious rim. *Rounded Chamomile*, *Rayless Chamomile*, *Pineapple Weed*. Fig. 45F–J.

Native to Europe, Asia and possibly N America. Naturalised in eastern N.S.W., southern and central Vic. and eastern Tas.; also naturalised in New Zealand. Grows in waste areas in urban environments. Flowers spring–summer.

N.S.W.: C.I.G. footpath, Orange, *R. Medd 161187* (NSW). Vic.: outside Melbourne Cricket Ground, Jolimont, *D.E. Albrecht 4599* (AD, CANB, MEL). Tas.: St Helens, *T. Shea 10* (HO).

Generally compact, much-branched plants, with distinctive greenish, domed capitula on short peduncles. Pineapple-scented.



ASTERACEAE

14. ERIOCEPHALUS

Eriocephalus L., *Sp. Pl.* 2: 926 (1753); from the Greek *erion* (wool) and *kephale* (head), alluding to the woolly capitula.

Type: *E. africanus* L.

Perennial shrubs, erect. Leaves entire or 1-pinnatisect. Capitula solitary or few, radiate (in Australia) or disciform; involucre 2-seriate, with bracts similar in length; inner bracts densely villous, often connate; receptacle paleate. Ray florets female, fertile. Disc florets bisexual or functionally male; corolla 5-lobed. Achenes homomorphic, dorsiventrally compressed, with 2 lateral ribs, hairy. Pappus absent.

A genus of 26 species from S. Africa and Namibia. One species naturalised in Australia.

Leaves of axillary shoots are commonly crowded together with the subtending leaf, giving the foliage a fasciculate appearance.

**Eriocephalus africanus* L., *Sp. Pl.* 2: 926 (1753)

T: not designated.

Illustration: G.J.Harden (ed.), *Fl. New South Wales* 3: 284 (1992).

Plants to c. 60 cm high, sericeous. Leaves to c. 2 cm long, entire and linear or 1-pinnatisect with few segments. Capitula radiate, solitary but grouped to appear corymbiform, 6–8 mm diam.; involucre c. 3 mm long, silky-hairy; outer bracts 4 or 5, free, ovate, with margin brown; inner bracts 3, fused; paleae 3–4 mm long, 0.8 mm wide, hairy; mature receptacle not seen. Ray florets 3 or 4; ligule ±orbicular, 3–4 mm long, white. Disc florets: corolla c. 2.5 mm long; tube ±equal limb and much narrower; limb 5-lobed, deep purple. Achenes obovate in profile, c. 3 mm long, pale, woolly.

Native to S. Africa. Naturalised in south-central N.S.W. Ecological preferences not known. Flowers winter.

N.S.W.: Nerathong area, Condobolin, *G.M.Cunningham & P.L.Milthorp* 2600 (NSW).

It is unknown whether the Condobolin population has persisted.



15. ONCOSIPHON

Oncosiphon Källersjö, *Bot. J. Linn. Soc.* 96: 310 (1988); from the Greek *onco* (thick, swollen) and *siphon* (tube), alluding to the corolla-tube.

Type: *O. piluliferum* (L.f.) Källersjö

Annual herbs, erect. Leaves 2- or 3-pinnatisect. Capitula 1 to numerous per stem, discoid (in Australia) or radiate; involucre 3-seriate, with bracts gradational in length; receptacle epaleate. Ray florets female, fertile. Disc florets bisexual; corolla 4-lobed. Achenes ±homomorphic, ±terete, regularly 4-ribbed, glabrous. Pappus present.

A genus of c. 8 species from S. Africa and Namibia. Two species naturalised in Australia.

Features of these species include the globose capitula and the inflated and brittle corolla-tube.

M.Källersjö, A generic re-classification of *Pentzia* Thunb. (Compositae–Anthemideae) from southern Africa, *Bot. J. Linn. Soc.* 299–322 (1988).

Capitula 3–5 mm diam. at anthesis; receptacle conical to obloid at maturity, c. 1 mm diam.

1. *O. suffruticosum*

Capitula 5–8 mm diam. at anthesis; receptacle ellipsoid at maturity, 2–2.5 mm diam.

2. *O. piluliferum*

1. **Oncosiphon suffruticosum* (L.) Källersjö, *Bot. J. Linn. Soc.* 96: 313 (1988)

Tanacetum suffruticosum L., *Sp. Pl.* 2: 843 (1753); *Matricaria multiflora* Fenzl ex Harv. in W.H.Harvey & O.W.Sonder, *Fl. Cap.* 3: 166 (1865), *nom. illeg.*; *Matricaria suffruticosa* (L.) Druce, *Bot. Soc. Exch. Club Brit. Isles* 1913: 421 (1914); *Pentzia suffruticosa* (L.) Hutch. & Merxm., *Mitt. Bot. Staatssamml. München* 6: 486 (1967). T: Africa, *Herb. Linn.* 987:11; lecto: LINN, *fide* D.O.Wijnands, *Bot. Commelins* 80 (1983).

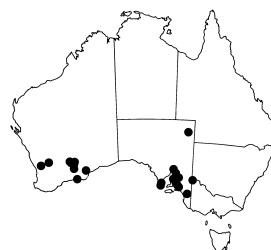
Illustrations: W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 297 (1992), as *P. suffruticosa*; N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 929, fig. 189c (1999).

Erect annuals to c. 60 cm high; stems and leaves glandular, pubescent. Leaves to c. 4 cm long, 2- or 3-pinnatisect, with rachis and ultimate segments < 1 mm wide; segments 4–6 per side. Capitula numerous to 100s per stem, congested, 3–5 mm diam.; peduncle with scattered flattened hairs distally at anthesis; involucre 2–3 mm long, ±glabrous; bracts of outer and middle series keeled; inner bracts with hyaline extension to 1 mm long; mature receptacle conical to obloid, c. 1 mm diam. Disc florets: corolla c. 2 mm long; tube longer than and ±as wide as limb; limb yellow. Achenes obovoid, c. 1 mm long, c. 3-angled, gland-dotted between ribs, grey-brown. Pappus a corona to c. 0.3 mm long, with margin usually lobed. *Calomba Daisy*. Fig. 45K–N.

Native to S. Africa. Naturalised in southern W.A., S.A., mainly in the south, and far NW Vic. Grows in disturbed sites. Flowers summer.

W.A.: 21.5 km SSW of Nanambinia HS, Parmango Track, *W.R.Archer 1011907* (MEL). S.A.: 1 km SE of Dublin on the Adelaide Rd, *S.W.L.Jacobs 6633* (MEL, NSW). Vic.: SW of L. Walla Walla, 13 Nov. 1986, *D.C.Cheal* (MEL).

A class 2 noxious weed in S.A. The common name comes from *Calomba* in SE S.A. where it was presumably first recorded in Australia. Sometimes grows with *O. piluliferum*.



2. **Oncosiphon piluliferum* (L.f) Källersjö, *Bot. J. Linn. Soc.* 96: 314 (1988)

Cotula pilulifera L.f., *Suppl. Pl.* 378 (1781); *Matricaria pilulifera* (L.f.) Druce, *Bot. Soc. Exch. Club Brit. Isles* 1916: 635 (1917). T: Locality not given, *Nordenstam 161*; neo: S, *fide* M.Källersjö, *loc. cit.*

Cotula globifera Thunb., *Prodr. Pl. Cap.* 2: 162 (1800); *Matricaria globifera* (Thunb.) Fenzl ex Harv. in W.H.Harvey & O.W.Sonder, *Fl. Cap.* 3: 165 (1865); *Pentzia globifera* (Thunb.) Hutch., *Bull. Misc. Inform.* 1916: 251 (1917). T: n.v.

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 929, fig. 189d (1999).

Similar to *O. suffruticosum* but differing in the following respects: plants to c. 40 cm high; leaves to c. 2 cm long, 2-pinnatisect; capitula several to numerous per stem, 5–8 mm diam.; receptacle ellipsoid at maturity, 2–2.5 mm diam.; achenes 3- or 4-angled. *Globe Chamomile*.

Native to S. Africa. Naturalised in SW W.A. There are old collections from Port Philip Bay in Vic. and Stockton in eastern N.S.W., but populations are presumed not to have become established at these localities. Grows on rocky rises in woodland and in farmland. Flowers spring.

W.A.: 12 km SSE of Trayning, *J.Dodd 487* (BRI, PERTH); North Miling, *J.Dodd 519* (BRI, PERTH).

Oncosiphon piluliferum has a distinctive globose capitulum with the involucre confined to the proximal quarter of the capitulum. The capitula of *O. suffruticosum* are similar but smaller and convex rather than hemispherical in the distal half.



16. PENTZIA

Pentzia Thunb., *Prodr. Pl. Cap.* 2: 145 (1800); named after C.J.Pentz, a Swedish botanist and colleague of C.P.Thunberg.

Type: *P. crenata* Thunb.

Shrubs, erect. Leaves 1- or 2-pinnatisect. Capitula 1–few per branch (in Australia), discoid; involucre c. 3-seriate; bracts gradational in length; receptacle epaleate. Florets bisexual; corolla 4- or 5-lobed. Achenes \pm homomorphic, quadrangular, regularly 5-ribbed, glabrous. Pappus present.

A genus of 23 species mostly from S. Africa, but also from Namibia, Morocco and Algeria. Two species weakly naturalised in Australia, readily recognisable by their small leaves.

Leaves commonly greyish, with 1 or 2 (–3) primary segments per side, commonly confined to distal half; outer involucre bracts ovate

1. *P. incana*

Leaves green, with 3–5 primary segments per side, arising \pm evenly along length; outer involucre bracts linear-lanceolate

2. *P. globosa*

1. **Pentzia incana* (Thunb.) Kuntze, *Revis. Gen. Pl.* 3: 166 (1898)

Chrysanthemum incanum Thunb., *Prodr. Pl. Cap.* 2: 161 (1800); *Pentzia virgata* Less., *Syn. Gen. Compos.* 266 (1832), *nom. illeg.* T: not designated.

Illustration: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1621, fig. 737A (1986).

Low shrub to c. 40 cm high, with younger stems and leaves usually tomentose. Leaves to c. 1 cm long, 1-pinnatisect, with rachis and ultimate segments < 1 mm wide; segments 1 or 2 (–3) per side, confined to distal half of leaf (excluding auricles if present). Capitula 1–few per branch, 4–7 mm diam.; peduncle appressed-tomentose distally at anthesis; involucre 2.5–3 mm long; bracts of outer and middle series ovate, keeled, with margin usually brown, slightly cobwebby or glabrous; inner bracts with hyaline extension 0.5–1 mm long; mature receptacle shallowly domed. Florets: corolla 1.5–2 mm long, with tube c. equal in length but slightly narrower than the 5-lobed, yellow or purplish limb. Achenes obovoid, 1–1.5 mm long, 5-ribbed, grey-brown. Pappus an oblique white corona c. 1 mm long. *African Sheep Bush*. Fig. 47A–C.

Native to southern Africa. Naturalised in central-eastern S.A., with an old record from Nyngan in central N.S.W. Grows in arid saltbush shrublands. Flowers at various times.

S.A.: c. 60 km N of Yunta, Koonamore Stn, *M.D.Crisp* 307 (CANB). N.S.W.: Nyngan, Nov. 1913, *J.H.Maiden* (NSW).

Deliberately introduced by the CSIR, now CSIRO, at Koonamore in S.A. in the 1930s. The single old collection from Nyngan differs from the S.A. material in having leaf segments less consistently concentrated distally.



2. **Pentzia globosa* Less., *Syn. Gen. Compos.* 266 (1832)

T: not designated.

Similar to *P. incana* but differing in the following: leaves \pm glabrous, sometimes 2-pinnatisect; primary segments of leaves 3–5 per side, arising regularly along length; involucre bracts of outer and middle series linear-lanceolate, without a hyaline margin; inner bracts with hyaline extension c. 0.2 mm long; mature receptacle conical; corolla tube much narrower than limb; corona c. 0.3 mm long.

Native to southern Africa. Naturalised near Jamestown in SE S.A., with an old record from Gosford on the central coast of N.S.W. Ecological preferences unknown. Flowers recorded in autumn.



S.A.: near Bundaleer Picnic Ground, near Jamestown, *R.Bates 14272* (AD). N.S.W.: Gosford, Feb. 1894, *coll. unknown* (NSW).

The S.A. population has persisted since at least 1897 when it first collected (*J.H.Maiden* NSW). The tiny secondary segments of 2-pinnatisect leaves arise at or near the base of the primary segments.

17. COTULA

Cotula L., *Sp. Pl.* 2: 891 (1753); from the Greek *cotyle* (small cup), alluding to the shape of the involucre.

Type: *C. coronopifolia* L.

Ctenosperma Hook.f., *London J. Bot.* 6: 115 (1847). T: *C. alpinum* Hook.f.

Strongylosperma Less., *Syn. Gen. Compos.* 261 (1832). T: *S. australe* (Sieber ex Spreng.) Less.

Gymnogyne Steetz in J.G.C.Lehmann, *Pl. Preiss.* 1: 431 (1845). T: *G. cotuloides* Steetz

Pleiogyne K.Koch in S.L.Endlicher, *Bot. Zeitung (Berlin)* 1: 40 (1843). T: not designated

Annual to perennial herbs, erect or sprawling. Leaves entire, lobed, or 1- or 2-pinnatisect, stem-sheathing (in Australia). Capitula solitary, disciform (in Australia) or discoid, with ligulate florets present in *C. turbinata*; involucre 2- or 3-seriate, with bracts all of similar length; receptacle epaleate. Florets often pedicellate. Outer florets 1–several-seriate, female; corolla usually lacking. Disc florets mostly bisexual, sometimes functionally male; corolla mostly 4-lobed. Achenes usually dimorphic, dorsally compressed, unribbed, hairy or not. Pappus absent.

A genus of c. 50 species, mostly from the Southern Hemisphere; 7 species in Australia, 4 of them native and 3 of these endemic.

The species in Australia are eglandular except for *C. alpina*. The involucre bracts are often tinged purple and do not have an elongate hyaline apex. The marginal florets, and to a lesser extent the disc florets, are in some species pedicellate. The marginal florets lack a corolla except for a weakly developed one in *C. bipinnata*. Disc florets are bisexual except in *Cotula alpina* and *C. cotuloides*.

- | | | |
|----|---|--------------------------------|
| 1 | All leaves entire, filiform, to c. 1 mm wide, with hairs on basal sheath | |
| 2 | Marginal florets on slender pedicels in 1 series or absent; disc florets numerous, bisexual, with corolla lobes purple (SE Australia) | 1. <i>C. vulgaris</i> |
| 2: | Marginal florets raised on tubercle-like projections in several series; disc florets several, ?functionally male, with corolla lobes yellow (W.A.) | 2. <i>C. cotuloides</i> |
| 1: | Some or all leaves divided, or if all entire then not filiform, > 1 mm wide and/or entirely glabrous | |
| 3 | Plants scapose; leaves dotted with minute glands; female florets sessile in several series | 7. <i>C. alpina</i> |
| 3: | Plants with cauline leaves; leaves without glands; female florets pedicellate in 1 or several series, or absent | |
| 4 | Peduncle becoming obconical in distalmost 3–8 mm following anthesis; intermediate series of florets with white and usually abaxially purple ligules | 4. <i>C. turbinata</i> |
| 4: | Peduncle not becoming obconical or at least not as conspicuously as above; intermediate series of ligulate florets lacking | |
| 5 | Stems and leaves usually moderately hairy; female florets in several series; achenes of female florets papillose on both faces | 3. <i>C. australis</i> |
| 5: | Stems and leaves glabrous or with hairs rather sparse; female florets in 1 series or absent; achenes of female florets papillose only on inner face | |

- 6 Largest leaves entire, lobed, or 1- to sub-2-pinnatisect; peduncle mostly > 2 cm long, glabrous; female florets numerous, with corolla absent, with pedicel tapering distally
- 6: Largest leaves 1- or 2-pinnatisect; peduncle mostly < 2 cm long, with scattered hairs at anthesis; female florets absent or up to c. 10, with corolla present, with pedicel not tapering

5. *C. coronopifolia*6. *C. bipinnata*1. *Cotula vulgaris* Levyns, *J. S. African Bot.* 7: 133 (1941)var. *australasica* J.H.Willis, *Victorian Naturalist* 73: 201 (1957)

T: Swamps, Shire of Dimboola, Vic., 25 Sept. 1892, *F.M.Reader*; holo: MEL; iso: AD, NSW.

[*C. filifolia* auct. non Thunb.: J.M.Black, *Fl. S. Australia* 606 (1929); A.Ewart, *Fl. Victoria* 1167 (1931)]

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1615, fig. 734E (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 933, fig. 190a (1999).

Annuals to c. 20 cm high. Stems with sparse antrorse hairs, becoming glabrous. Leaves to c. 4 cm long, entire and narrowly linear, glabrous except for hairs on sheath. Capitulum 3–5 mm diam.; peduncle mostly 2–6 cm long, c. 0.3 mm wide (pressed specimens), with distalmost 1–2 mm sometimes obconical at maturity, usually sparsely to moderately hirsute at anthesis, with hairs antrorse to divergent; involucre bracts 5–8; outer bracts broadly ovate, 2–3 mm long, rounded apically. Marginal florets up to c. 8, 1-seriate, sometimes absent, with pedicels 0.3–0.6 mm long. Disc florets bisexual, numerous, with pedicels hardly longer than wide; corolla c. 1 mm long; limb usually purplish. Achenes of marginal florets c. 1.5 mm long; faces broadly elliptic, glabrous; wings papery, as broad as or broader than body. Achenes of disc florets 1.2–1.5 mm long; faces elliptic, glabrous. *Slender Cotula*.

Endemic to southern Australia from south-central S.A. to eastern Vic., Bass Strait Is and in eastern Tas. Grows in damp saline areas such as the margin of salt lakes and coastal marshes. Flowers late winter–summer.

S.A.: Butchers Gap, South Kingston, *P.Gibbons* 219 (AD). Vic.: Murtnagurt Lagoon, Lake Connewarre Game Res., 15 Sept. 1983, *J.Z.Yugovic* (MEL). Tas.: Croppies Point, *A.M.Buchanan* 1609 (HO).

The type variety from S. Africa has glabrous peduncles and longer corollas. The achenes of the female florets are both cordate-based and apically-notched due to the large thin wings.

2. *Cotula cotuloides* (Steetz) Druce, *Bot. Soc. Exch. Club Brit. Isles for 1916*, suppl. 2: 617 (1917)

Gymnogyne cotuloides Steetz in J.G.C.Lehmann, *Pl. Preiss.* 1: 432 (1845); *C. gymnogyne* F.Muell. ex Benth., *Fl. Austral.* 3: 549 (1867), *nom. illeg.* T: Perth, W.A., 1839, *J.A.L.Preiss* 101; holo: MEL; iso: MEL.

Annuals to c. 20 cm high. Stems with scattered long hairs. Leaves to c. 6 cm long, entire and narrowly linear, glabrous except for hairs on sheath. Capitulum 4–12 mm diam.; peduncle 2–10 cm long, 0.3–0.5 mm wide (pressed specimens), not obconical distally at maturity, hirsute at anthesis with hairs antrorse to almost spreading; involucre bracts c. 10; outer bracts broadly ovate, 2–3 mm long, rounded apically. Marginal florets numerous, multi-seriate, attached to raised tubercles. Disc florets several, ?functionally male, sessile; corolla c. 1 mm long; limb pale yellow. Achenes of marginal florets c. 1.5 mm long; faces ±orbicular, glabrous; wings papery, much broader than body. *Smooth Cotula*.

Endemic to SW W.A. from N of Kalbarri SE to Israelite Bay. Grows in a variety of soils in swampy areas, the margin of salt lakes and around granitic outcrops. Flowers spring to early summer.



W.A.: 19.5 km ESE of Mt Newmont, *W.R.Archer 14119213* (MEL); c. 54 km from Paynes Find along road to Cleary, eastern edge of L. Moore, *P.S.Short 2590 et al.* (AD, MEL, PERTH).

Similar vegetatively to *C. vulgaris* var. *australasica* but having the proportions of marginal female to disc florets reversed. The disc florets of *C. cotuloides* do not appear to produce achenes and they become hidden below the achenes of marginal florets as they develop. A single collection containing numerous plants, *P.S.Short 2240 & L.R.Haegi* (AD, MEL, PERTH) from near Australind, has relatively small capitula with significantly narrower involucre bracts than typical *C. cotuloides* and may warrant taxonomic recognition.

3. *Cotula australis* (Sieber ex Spreng.) Hook.f., *Fl. Nov.-Zel.* 1: 128 (1852)

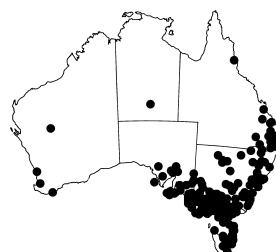
Anacyclus australis Sieber ex Spreng., *Syst. Veg.* 3: 497 (1826); *Strongylosperma australe* (Sieber ex Spreng.) Less., *Syn. Gen. Compos.* 261 (1832); *Pleiogyne australis* (Sieber ex Spreng.) K.Koch in D.F.L.Schlechtendal & H.Mohl (eds), *Bot. Zeitung (Berlin)* 1: 40 (1843). T: 'Nov. Holl.' [Sydney area], 1823, *F.W.Sieber 331*; n.v.

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1615, fig. 734A (1986); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 280 (1992); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 933, fig. 190c (1999).

Annuals or short-lived perennials to c. 10 cm high. Stems moderately hairy, with hairs antrorse-divergent to spreading. Leaves to c. 4 cm long, 1- or 2-pinnatisect, moderately hairy. Capitulum 2–8 mm diam.; peduncle mostly 2–8 cm long, c. 0.1–0.6 mm wide (pressed specimens), hardly obconical at maturity, moderately hirsute at anthesis, with hairs antrorse, appressed to divergent; involucre bracts 5–20, oblong to oblong-ovate, 1.5–3 mm long, rounded apically. Marginal florets numerous, multi-seriate, with pedicels 0.5–1 mm long. Disc florets bisexual, 15–25, with pedicels hardly longer than wide; corolla c. 0.5 mm long; limb pale yellow to white. Achenes of marginal florets c. 1–1.5 mm long; faces oblong, minutely papillose; wings fleshy, slightly narrower than face. Achenes of disc florets c. 1 mm long; faces oblong, glabrous. *Common Cotula*, *Carrot Weed*.

Native, widespread in southern Australia and occurring in all states and territories. Also native to New Zealand. Grows in moist environments. A common weed of urban environments. Flowers at most times of the year.

W.A.: Road bore, Yoothapinna Stn, E block, *R.J.Cranfield 5667* (CANB, PERTH). N.T.: Desert Springs Motel, Alice Springs, *P.K.Latz 12975* (MEL). S.A.: Ravine des Casoars, 8 km E of Cape Borda, Kangaroo Is., *P.G.Wilson 686* (AD). Qld: Warren Point Stn, Mitchell, 22 Aug. 1968, *P.Martensz s.n.* (BRI, CANB). N.S.W.: Joe's tank, Bundella Stn near Elura mining lease, 42.5 km NNW of Cobar, *M.D.Crisp 4222* (AD, CANB, NSW). A.C.T.: Black Mtn, Canberra, *F.Davies 20 & I.R.Telford* (CANB, MEL, NSW). Vic.: near Long Forest Rd, 6 km ENE of Bacchus Marsh and 1.2 km N of Western Hwy, *T.B.Muir 6227* (CANB, MEL). Tas.: Andersons Ck, N of Broadmarsh, *P.Collier 3461* (HO).



Placed by G.Bentham (*Fl. Austral.* 3: 548 (1867)) in Sect. *Strongylosperma*, along with *C. cotuloides* (as *C. gymnogyne*) and *C. alpina*, based on the several series of female florets. Leaves of *C. australis* often have small near-basal lobes. This species has a single prominent resin canal in the midline of the involucre bracts whereas other species have indistinct resin canals or 2 or more distinct ones. The involucre bracts also differ sometimes in having scattered hairs.

4. **Cotula turbinata* L., *Sp. Pl.* 2: 892 (1753)

T: Africa, *Herb. Clifford*: 417, *Cotula* 1; lecto: BM, *fide* C.J.Humphries in C.E.Jarvis & N.L.Turland (eds), *Taxon* 47: 359 (1998).

Annuals to c. 40 cm high. Stems moderately hairy, with hairs spreading. Leaves to c. 5 cm long, 1- or 2-pinnatisect, with spreading hairs. Capitulum 5–10 mm diam.; peduncle mostly 4–10 cm long, c. 0.5 mm wide (pressed specimens), with distalmost 3–8 mm obconical at maturity, hirsute at anthesis with hairs antrorse-divergent, glabrous distally; involucre bracts c. 10, broadly ovate, 2–3 mm long, acute to obtuse. Marginal florets numerous, c. 1-seriate, with pedicels to c. 1 mm long. Intermediate florets numerous, c. 1-seriate, bisexual; ligule

c. 2 mm long, white and usually abaxially purple. Disc florets bisexual, very numerous, with pedicels hardly longer than wide; corolla tubular, c. 1 mm long; limb yellow. Achenes of female florets c. 1.5–2 mm long; faces broadly elliptic, glabrous or papillose; wings fleshy, c. as broad as body. Achenes of disc florets 1.0–1.3 mm long; faces obovate-oblong, glabrous. *Ferny Cotula*. Fig. 46H–N.

Native to Southern Africa. Naturalised in SW W.A., with a single record from coastal N.S.W. Grows in sandy and loamy soils, in disturbed sites including roadsides, and lawns. Flowers winter to mid-spring.

W.A.: c. 1 km N of Australind on Mandurah Rd, *P.S.Short* 2245 & *L.Haegi* (AD, CANB, MEL, PERTH); roadside (along the ocean road) just N of Bunbury, *B.L.Turner* 5485 (MEL). N.S.W.: top of cliffed dune terrace, near playschool, Stockton, *P.C.Heyligers* 98010 (MEL, NSW).

A readily recognisable species in flower with its series of ligulate florets and its turbinate distal peduncle. As in *C. vulgaris* var. *australasica* the involucre and peduncle are sometimes glaucous. The margin of the achenes of the female florets is often minutely papillose.

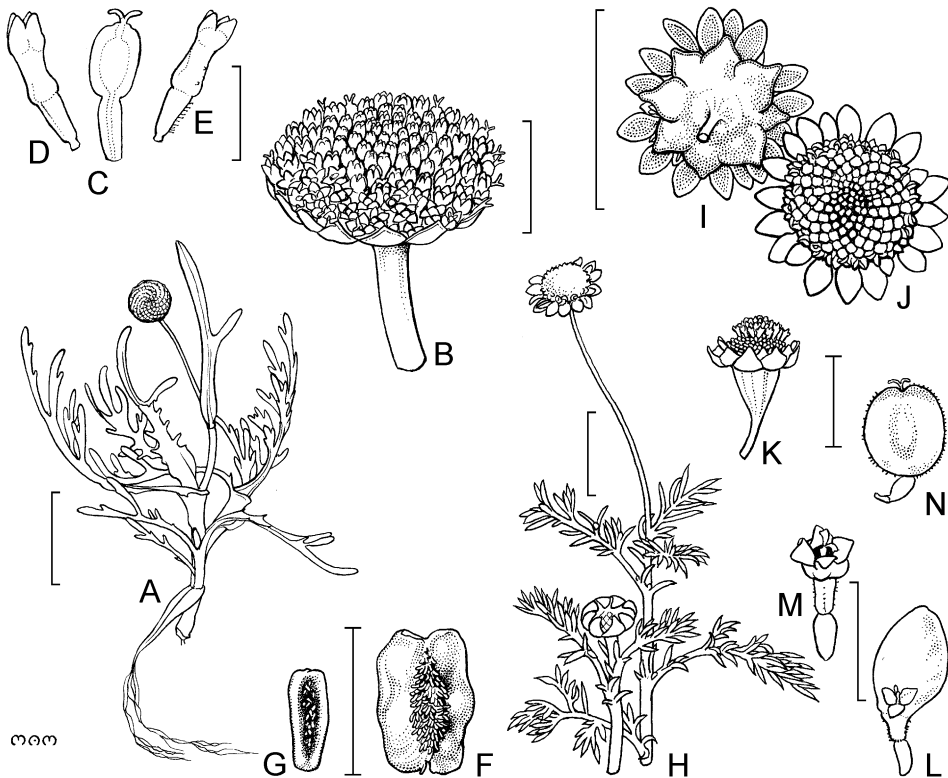


Figure 46. *Cotula*. A–G, *C. coronopifolia*. A, flowering branch; B, capitulum; C, marginal floret; D, E, disc florets; F, marginal floret achene; G, disc floret achene (A–G, voucher not recorded). H–N, *C. turbinata*. H, flowering branch; I, J, K, three views of capitulum; L, ray floret; M, disc floret; N, achene (H–N, voucher not recorded). Scale bars: A = 2 cm; B = 5 mm; C–E = 1 mm; F, G, L, M = 2 mm; H–K = 10 mm; N = 1.5 mm. Drawn by M.A.Wilson. Reproduced with permission from N.G.Marchant *et al.*, *Fl. Perth Region* 2: 675 (1987).

5. **Cotula coronopifolia* L., *Sp. Pl.* 2: 892 (1753)

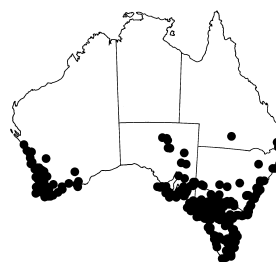
T: 'Aethiopia...prope Emdon', *Herb. Linn. No. 1014.13*; lecto: LINN, *fide* M.O.Dillon, *Fieldiana, Bot.*, n.s. 7: 6 (1981).

C. integrifolia Hook.f., *Fl. Tasman.* 1: 192 (1856), *nom. illeg. non* Burch (1822). T: Tas., *R.C.Gunn 1153*; *n.v.*

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1615, fig. 734C (1986); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 933, fig. 190b (1999).

Perennials to c. 30 cm high, glabrous. Leaves to c. 8 cm long, acutely lobed or 1-pinnatisect, rarely entire with l:w ratio up to 8, or sub-2-pinnatisect. Capitulum 5–12 mm diam.; peduncle mostly 2–8 cm long, 0.3–1.0 mm wide (pressed specimens), not obconical distally; involucre bracts numerous; outer bracts narrowly ovate or oblong, 3–5 mm long, rounded at apex. Marginal florets numerous, c. 1-seriate, with pedicels 1–1.8 mm long tapering distally. Disc florets bisexual, numerous, with pedicels longer than wide; corolla c. 1 mm long; limb bright yellow. Achenes of marginal florets 1.5–2 mm long; faces broadly oblong, papillose on inner face; wing spongy, c. as broad as body. Achenes of disc florets c. 1.3 mm long, ±oblong, papillose on inner face. *Water-buttons*. Fig. 46A–G.

Native to S. Africa. Naturalised and widespread in southern Australia and occurring in all states; also naturalised in New Zealand. Grows in damp or wet places in both saline and fresh water. Flowers mainly winter–spring.



W.A.: un-named lake/swamp 0.5 km N of Ledge Point, *A.E.Orchard 5929* (HO, PERTH). S.A.: The Big Point, Bool Lagoon, *J.Z.Weber 7553* (AD, CANB). Qld: Claverton Stn, 20 km S of Wyandra, 3 Sept. 1996, *S.Moffat* (BRI). N.S.W.: Jerseyville, Trial Bay, near Arakoon, *P.Martensz Q185* (NSW). Vic.: Point Wilson, Sperm Whale Head, *T.B.Muir 2273* (MEL). Tas.: Ocean Beach, 5 km W of Strahan, *A.E.Orchard 5362* (AD, CANB, HO, MEL, NSW).

More succulent than other species of *Cotula* in Australia. Grows in shallow water or mud and stems readily take root at nodes. Rarely, depauperate specimens may have entire leaves < 1 mm wide. These plants can be distinguished from *C. vulgaris* and *C. cotuloides* vegetatively because they are glabrous. A dwarf form occurs on islands in southern W.A. with smaller leaves that have more crowded lobes. These differences are probably ecological. A probable hybrid between *C. coronopifolia* and *C. australis* has been recorded from Mt Chappell Is. in Bass Strait (*J.S.Whinray 223* CANB).

There has been some conjecture about whether this species is native based on the number and extent of early records in Australia.

6. **Cotula bipinnata* Thunb., *Prodr. Pl. Cap.* 162 (1800)

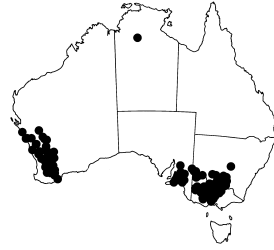
T: not designated.

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1615, fig. 734B (1986); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 933, fig. 190a (1999).

Annuals to c. 40 cm high. Stems glabrous or with occasional appressed to spreading hairs. Leaves to c. 6 cm long, 1- or 2-pinnatisect, or uppermost leaves sometimes entire, sparsely hairy or glabrous. Capitulum 6–8 mm diam.; peduncle 0.5–2 (–3) cm long, c. 0.3 mm wide (pressed specimens), hardly obconical at maturity, sparsely hirsute at anthesis, with hairs antrorse to spreading; involucre bracts numerous; outer bracts oblong-ovate or oblong, 2–3 mm long, rounded to truncate. Marginal florets up to c. 10, 1-seriate, with weakly developed corolla and pedicels c. 1 mm long, or absent. Disc florets bisexual, numerous, with pedicels much longer than wide; corolla c. 1 mm long; limb pale yellow. Achenes of marginal florets 1–1.5 mm long, broadly oblong, with inner face papillose; wings thin to slightly spongy, as broad as body. Achenes of disc florets c. 1–1.5 mm long, oblong, glabrous or inner face sparsely papillose. *Ferny Cotula*.

Native to S. Africa. Naturalised in SW W.A., southern S.A., western N.S.W. and western and northern Vic., with a single record from N.T. Grows mostly in seasonally moist saline areas. Flowers late winter–summer.

W.A.: W of Northern Inland Hwy on Perenjori Rd, *A.M.Ashby* 5218 (CANB, PERTH). N.T.: c. 200 km N of Tennant Ck (between Elliot and Renner Springs), *C.R.Alcock* 7210 (AD, BRI, DNA). S.A.: 10 km NW of Nuriootpa, *R.J.Bates* 29155 (AD). N.S.W.: 1 km NW along Oxley Rd from the Hay–Maude road, *R.G.Coveny* 18676 *et al.* (AD, BRI, MEL, NSW). Vic.: E side of Hume Freeway, 100 km N of Melbourne, *I.C.Clarke* 3062 (CANB, MEL).



Although depauperate specimens of *C. coronopifolia* can look similar to this species, *C. bipinnata* has a shorter and more often purple peduncle bearing scattered hairs at anthesis, a differently coloured disc, and fewer female florets. The involucre bracts are also more frequently purple in *C. bipinnata*. Unlike in other species of *Cotula* in Australia, marginal florets develop a small corolla. Both this species and *C. turbinata* are commonly called Ferny Cotula.

7. *Cotula alpina* (Hook.f.) Hook.f., *Fl. Tasman.* 1: 192 (1856)

Ctenosperma alpinum Hook.f. in W.J.Hooker, *London J. Bot.* 6: 115 (1847). T: Marlborough, Tas., *R.C.Gunn*; n.v.

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 933, fig. 190d (1999).

Scapose annuals or short-lived perennials to c. 10 cm high, stoloniferous, glabrous. Rosette leaves to c. 4 cm long, 1-pinnatisect, minutely glandular. Capitulum 3–7 mm diam.; peduncle to 5 cm long, 1–3 mm wide (pressed specimens), not obconical distally at maturity; involucre bracts numerous; outer bracts broadly oblong or ovate, 2–3 mm long, rounded apically. Marginal florets numerous, 3- or 4-seriate, sessile. Disc florets few, functionally male, sessile; corolla c. 1.0 mm long; limb yellow-green. Achenes of marginal florets 1.5–2 mm long; faces ±obovate, glabrous or papillose; wings fleshy, nearly as broad as body. *Alpine Cotula*.

Endemic in far SE N.S.W., eastern Vic. and Tas. Grows mostly at high altitudes in various soils including basalt-derived loam, in grassland, sedgeland, and forest. Flowers summer–autumn.

N.S.W.: S along internal road, c. 2 km S of Kydra Reefs, *R.G.Coveny* 19004 & *A.E.Orme* (MEL, NSW). Vic.: 1.25 km SE of Mt Jim, Bogong High Plains, *R.J.Adair* 1613 (MEL). Tas.: junction Boat Ramp & Central Plateau roads, E side of Great Lake, *A.Brown* 189 (HO); Bluff R., *A.Moscal* 8215 (HO).



Sits uncomfortably taxonomically between *Cotula* and *Leptinella* as it has functionally male central florets, multiseriate female florets, glandular leaves, and a stoloniferous habit as in the latter genus, but without a corolla on the female florets as in the former. Often confused with *Leptinella filicula* which occupies similar habitats, but close inspection for hairs will always discriminate them. The hyaline margin of *C. alpina* is often pigmented purple or brown apically; this is a feature of a number of species of *Leptinella* from New Zealand, but is not generally evident in Australian species.

18. LEPTINELLA

Leptinella Cass., *Bull. Sci. Soc. Philom. Paris* 127 (1822); from the Greek *leptos* (slender) and *ella*, a diminutive suffix, alluding to the slender prostrate habit of most species.

Cotula sect. *Leptinella* (Cass.) Hook.f., *Handb. N. Zeal. Fl.* 140 (1864). T: *L. scariosa* Cass.

Symphomera Hook.f., *London J. Bot.* 6: 116 (1847). T: *S. filicula* Hook.f.

Perennial herbs, prostrate, stoloniferous. Leaves 1–3-pinnatisect. Capitula solitary, disciform; involucre 2- or 3-seriate, with bracts all of similar length; receptacle epaleate. Outer florets 2–4-seriate, female. Disc florets functionally male; corolla mostly 4-lobed. Achenes compressed, unribbed, glabrous. Pappus absent.

A genus of c. 33 species, mostly from New Guinea, Australia, New Zealand and S America. Four species in Australia, all endemic.

Characterised by stoloniferous growth, female marginal florets in a few series, more numerous than the disc florets and with an inflated macroscopic corolla, and by functionally male disc florets with an unbranched style. Plants are generally less than 10 cm high, with fleshy roots.

Leptinella maniototo, native to New Zealand, has been recorded from a bowling green in Parndana, Kangaroo Is., S.A. but is not considered naturalised. It has entire or 1-pinnatisect leaves with very short pinnae. Two further collections from southern Tas., from Turua Beach (*A.M.Buchanan* 9721, HO) and Ummarra Ck (*A.M.Buchanan* 7910, HO), may also represent species of *Leptinella*; their identity requires further investigation. They may be undescribed species or species already recognised from New Zealand.

D.G.Lloyd & C.J.Webb, The reinstatement of *Leptinella* at generic rank, and the status of the 'Cotuleae' (Asteraceae, Anthemideae), *New Zealand J. Bot.* 25: 99–105 (1987).

- 1 Leaves 1-pinnatisect, with a gradual transition from rachis to sheath; peduncle relatively short and stout at anthesis (length:width ratio < 40); achenes oblong-elliptic; corolla longer than wide **1. *L. filicula***
- 1: Leaves 1–3-pinnatisect, with an abrupt transition from rachis to sheath; peduncle relatively long and slender at anthesis (length:width ratio > 40); achenes obovate (not seen in *L. drummondii*); corolla wider than long
- 2 Leaves 1-pinnatisect to sub-2-pinnatisect with secondary segments mostly arising only from middle to distal thirds of primary segment; achenes 2–3 mm long **4. *L. longipes***
- 2: Leaves 2- or 3-pinnatisect, with secondary segments arising throughout length of primary segments; achenes 1–2 mm long
- 3 Stems transiently villous, soon glabrous **2. *L. reptans***
- 3: Stems persistently densely villous **3. *L. drummondii***

1. *Leptinella filicula* (Hook.f.) Hook.f., *Fl. Tasman.* 1: 194 (1856)

Symphomera filicula Hook.f. in W.J.Hooker, *London J. Bot.* 6: 116 (1847); *Cotula filicula* (Hook.f.) Benth., *Fl. Austral.* 3: 551 (1867). T: n.v.

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 936, fig. 191e (1999).

Plants with stems villous. Leaves to c. 6 cm long, l:w ratio c. 2–4, 1-pinnatisect, gradually dilating basally to form sheath, with scattered or sparse hairs; primary segments \pm restricted to distal $\frac{1}{2}$, mostly \pm elliptic, sometimes lobed. Capitula 3–6 mm diam.; peduncle to 3 cm long at anthesis, c. 0.8 mm diam., villous; involucre bracts c. 10–20, broadly elliptic or slightly obovate, 2.0–2.5 mm long, rounded apically, usually hairy. Marginal floret corolla longer than wide, persistent in fruit. Disc florets several; corolla c. 1 mm long. Achenes (excluding corolla) 1.5–2 mm long, 0.7–1.0 mm wide; faces oblong-elliptic, brown with a pale margin. *Mountain Cotula*. Fig. 47G–L.

Endemic in SE Australia from Barrington Tops in central-eastern N.S.W. SSW to eastern Vic. and Tas. Grows in wet forest. Flowers summer–autumn.

N.S.W.: E side of Barrington Trail, Barrington Tops Natl Park, *J.R.Hosking* 2315 & *J.M.Bakoni* (CANB, MEL, NE, NSW). A.C.T.: between Blackfellows Gap & Upper Cotter R., *N.Burbidge* 6354 (CANB, MEL). Vic.: Blue Rag Ra., c. 15 km SE of Mt St. Bernard on Hotham to Dargo road, *L.Haegi* 1640 (MEL, NSW). Tas.: Tarraleah, 7 Feb. 1945, *W.M.Curtis* (HO).



Similar to *Cotula alpina* but hairy, densely so at growing points, and with conical glandular corollas present on marginal florets and persisting on fruits. The leaf is commonly infected with the fungus *Febraea rhytismoides*, resulting in a conspicuous black mark on each pinna (illustrated in M.G.Corrick & B.A.Fuhrer, *Wildfl. Victoria* 25, fig. 89 (2000)). The basal leaf-sheath is sometimes lobed.

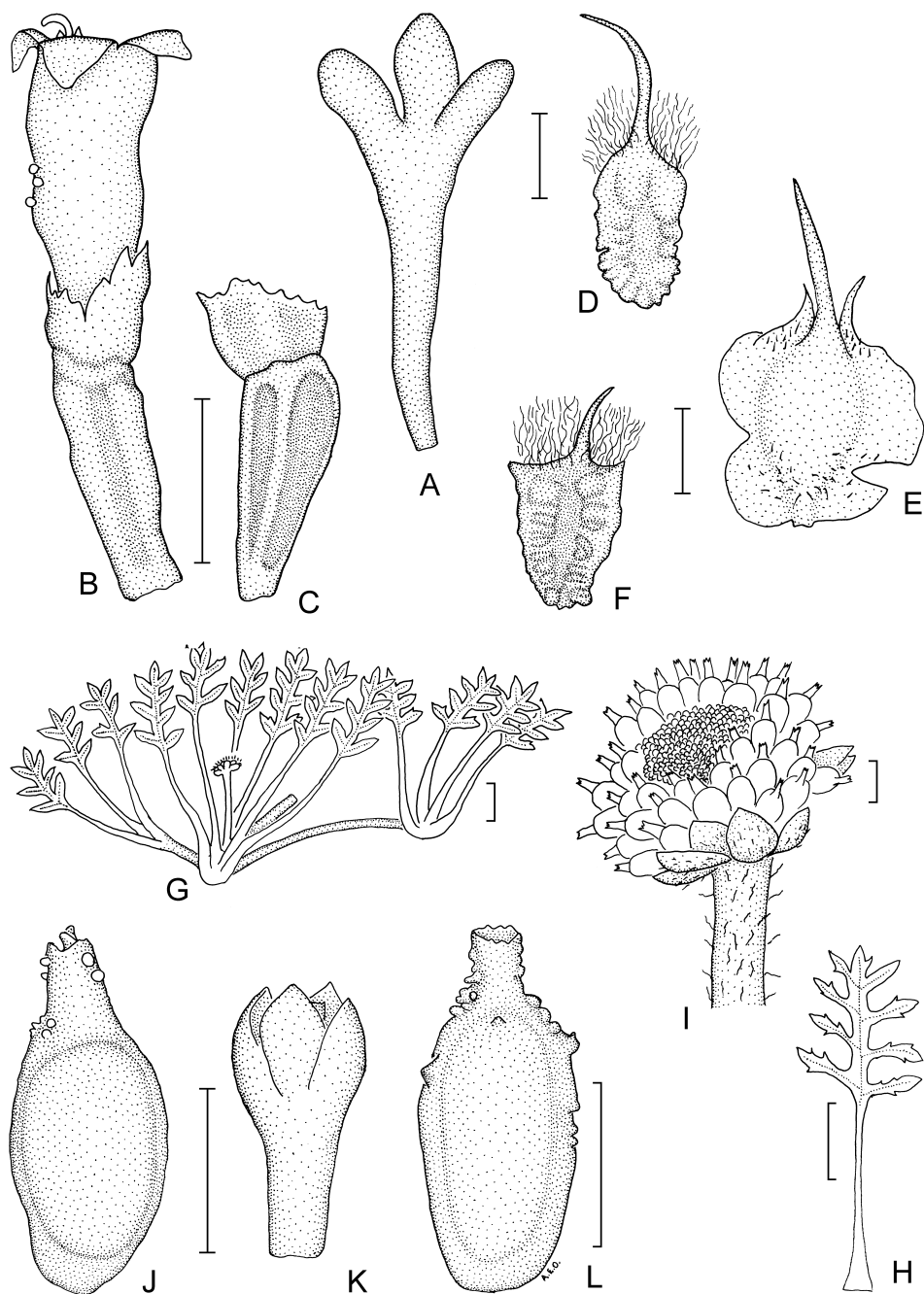


Figure 47. A–C, *Pentzia incana*. A, leaf; B, floret; C, achene (A–C, M.Crisp 656, CANB). D, *Soliva anthemifolia*, achene (Hj.Eichler 24110, CANB). E, *S. sessilis*, achene (B.J.Lepschi 2089, CANB). F, *S. stolonifera*, achene (J.R.Hosking 1172, CANB). G–L, *Leptinella filicula*. G, habit, plant with mainly 1-pinnatisect leaves; H, larger leaf from same population, mainly 2-pinnatisect; I, capitulum; J, outer female floret; K, inner male floret; L, achene (G–L, R.Schodde 3444, CANB). Scale bars: A–F, I–L = 1 mm; G, H = 1 cm. Drawn by A.E.Orchard.

2. *Leptinella reptans* (Benth.) D.G.Lloyd & C.J.Webb, *New Zealand J. Bot.* 25: 103 (1987)

Strongylosperma reptans Benth. in S.L.Endlicher *et al.*, *Enum. Pl.* 60 (1837), as *Strongylospermum*; *Pleiogyne reptans* (Benth.) K.Koch in D.F.L.Schlechtendal & H.Mohl (eds), *Bot. Zeitung (Berlin)* 1: 40 (1843); *Cotula reptans* (Benth.) Benth., *Fl. Austral.* 3: 551 (1867). T: Locality unknown, 'Ferd. Bauer'; n.v.

L. intricata Hook.f. in W.J.Hooker, *London J. Bot.* 6: 117 (1847). T: South Cape, Tas., R.C.Gunn; n.v.

L. multifida Hook.f. in W.J.Hooker, *London J. Bot.* 6: 118 (1847); *Pleiogyne multifida* (Hook.f.) Sond., *Linnaea* 25: 484 (1852); *L. intricata* var. *multifida* (Hook.f.) Hook.f., *Fl. Tasman.* 1: 194 (1856). T: 'Kangaroo Point', Tas.; n.v.

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 936, fig. 191f (1999).

Plants with sparse to scattered hairs c. 0.5–1 mm long but often soon glabrous. Leaves to c. 10 cm long, l:w ratio c. 3–5, 2- or 3-pinnatisect, abruptly dilated basally to form sheath, with scattered hairs or glabrous; primary segments restricted to distal $\frac{1}{3}$ – $\frac{1}{2}$, ovate, elliptic or sub-orbicular in outline; secondary segments arising throughout length of primary segments. Capitula 2–4 mm diam.; peduncle to c. 7 cm long at anthesis, c. 0.5 mm diam., sparsely to moderately hairy, becoming glabrous; involucre bracts c. 6–12, broadly elliptic or orbicular, 1.5–2 mm long, rounded apically, glabrous or hairy. Marginal floret corolla broader than long, persistent in fruit. Disc floret corolla c. 1 mm long. Achenes (excluding corolla) 1–2 mm long; faces obovate, pale tan to brown, usually with paler margin.

Endemic in SE S.A., southern Vic., and Tas., with a disjunct population in NE N.S.W. Grows beside water typically, sometimes in saline environments such as seashores, in grassland, sedgeland and forest. Flowers spring–summer.

S.A.: SW banks, southern arm of L. Bonney, N.N.Donner 9640 (AD, HO). N.S.W.: Werrikimbe Natl Park, 6 Dec. 1987, J.R.Hosking s.n. (NSW). Vic.: Gunyah Gunyah Rainforest Res., Grand Ridge Rd, J.Yugovic 460 (MEL). Tas.: Granville Harbour, A.E.Orchard 5628 (AD, HO, MEL, NSW, PERTH).



3. *Leptinella drummondii* (Benth.) D.G.Lloyd & C.J.Webb, *New Zealand J. Bot.* 25: 103 (1987)

Cotula drummondii Benth., *Fl. Austral.* 3: 550 (1867). T: W.A., Drummond 3rd coll., 113; syn: MEL; Don R., W.A., A.F.Oldfield; syn: MEL.

Plants with stems villous. Leaves to c. 7 cm long, l:w ratio c. 3–5, 2- or 3-pinnatisect, abruptly dilated basally to form sheath, with scattered or sparse hairs; primary segments in distal $\frac{1}{3}$ – $\frac{1}{2}$, elliptic to sub-orbicular in outline, with secondary segments arising throughout length of primary segments. Capitula 2–4 mm diam.; peduncle to 7 cm long at anthesis, c. 0.5 mm diam., sparsely to densely villous; involucre bracts c. 6–12, broadly elliptic or orbicular, 1.5–2 mm long, rounded apically, glabrous or sparsely hairy. Marginal floret corolla broader than long. Disc floret corolla c. 1.5 mm long. Achenes not seen.

Endemic in SW W.A. Grows in red clay-loam on river banks in woodland. Flowers late spring–autumn.

W.A.: Willgarup R. crossing with Tick Rd, C.Day & A.Annels MJ 75.1 (PERTH); Blackwood R. near bridge, Sue's Rd, Nillup, E of Karridale, R.D.Royce 10498 (PERTH).

A poorly known species very similar to *Cotula reptans*.



4. *Leptinella longipes* Hook.f. in W.J.Hooker, *London J. Bot.* 6: 117 (1847)

Cotula longipes (Hook.f.) W.M.Curtis, *Stud. Fl. Tasmania* 2: 463 (1963); *C. reptans* var. *major* Benth., *Fl. Austral.* 3: 551 (1867). T: Circular Head, Tas., R.C.Gunn; n.v.

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1615, fig. 734D (1986), as *Cotula reptans*; N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 936, fig. 191d (1999).

Plants glabrous or with transient hairs mostly 0.1–0.5 mm long. Leaves to c. 30 cm long, l:w ratio c. 3–6, 1- or sub-2-pinnatisect, abruptly dilated basally to form sheath, glabrous apart from inconspicuous mostly early-caducous hairs; primary segments restricted to distal $\frac{1}{2}$ – $\frac{1}{3}$ ($-\frac{1}{4}$), elliptic to sub-orbicular or obovate in outline; secondary segments if present usually only arising from middle to distal $\frac{1}{3}$. Capitula c. 3–5 mm diam.; peduncle to 10 cm long at anthesis, c. 0.5 mm diam., with transient hairs sometimes present distally; involucre bracts c. 6–8, broadly elliptic or orbicular, 2.0–2.5 mm long, rounded apically, glabrous or sparsely hairy. Marginal floret corolla wider than long, persistent in fruit. Disc florets several to numerous; corolla c. 1 mm long. Achenes (excluding corolla) 2–3 mm long, 1.0–1.5 mm wide; faces obovate, pale throughout. Plate 38.

Endemic in far SE Qld, eastern N.S.W., southern Vic., far SE S.A., and northern and eastern Tas. Grows on margin of wet often saline areas. Flowers spring–autumn.

Qld: Currumbin, *C.T.White 8729* (BRI). S.A.: across Glenelg R. from Donovan's Landing, c. 30 km SE of Mt Gambier, *B.Copley 3015* (AD). N.S.W.: near the mouth of Little Ck, Nadgee Nat. Res., *D.E.Albrecht 1472* (MEL). Vic.: W bank of Wallagaraugh R., c. 1 km downstream from Gipsy Point settlement, East Gippsland, *N.G.Walsh 3136* (BRI, CANB, HO, MEL). Tas.: mouth of Curries R., Beechford, *A.M.Buchanan 10589* (HO).

The fruits of this species are relatively large, somewhat trigonous, and pale throughout, and pressed specimens are usually wrinkled, probably indicating that it has a relatively fleshy pericarp. Very similar to and occupying similar habitats to *L. reptans*. Without mature fruit *L. longipes* can be distinguished from *L. reptans* by a combination of being earlier-glabrescent with shorter hairs, having longer leaves with a relatively longer petiolar portion, and by having less-dissected leaves. Leaves of both species are of variable length depending on environmental conditions.



19. SOLIVA

Soliva Ruiz & Pav., *Fl. Peruv. Prodr.* 113, t. 24 (1794); after the 18th century Spanish botanist, Dr Salvador Soliva.

Type: *S. sessilis* Ruiz & Pav.

Annual herbs, \pm prostrate. Leaves 1–3-pinnatisect. Capitula solitary, sessile, disciform; involucre 1- or 2-seriate, with bracts all of similar length; receptacle epaleate. Outer florets multi-seriate, female, lacking corolla; style persistent in fruit. Disc florets bisexual but functionally male; corolla 3- or 4-lobed. Achenes compressed, unribbed, glabrous or hairy. Pappus absent.

A genus of c. 9 species from S America; 4 species naturalised in Australia.

Species are low-growing, rosetted, and develop prostrate stems after the initial flowering. They are eglandular and are readily recognised by the strongly flattened fruits with a persistent spiny style. The disc florets are relatively few in number and their styles are unbranched.

H.I.Aston, New Victorian records: *Soliva* (Compositae), *Victorian Naturalist* 99: 190–194 (1982); C.J.Webb, Variation in achene morphology and its implications for taxonomy in *Soliva* subgenus *Soliva* (Anthemideae, Asteraceae), *New Zealand J. Bot.* 24: 665–669 (1986).

1 Achenes c. 2.5–4 mm wide, with broad scarious wings, not villous apically

1. *S. sessilis*

1: Achenes 1–1.5 mm wide, without broad scarious wings, woolly apically or not

2 Achenes smooth, glabrous

2. *S. valdiviana*

2: Achenes transversely corrugated, woolly apically

- 3 Leaves to c. 13 cm long, 2- or 3-pinnatisect; achene wings obtuse to rounded apically

3. *S. anthemifolia*

- 3: Leaves to c. 4 cm long, 1- or 2-pinnatisect; achene wings acute apically

4. *S. stolonifera*

1. **Soliva sessilis* Ruiz & Pav., *Fl. Peruv. Prodr.* 113, t. 24 (1794)

T: not designated.

Gymnostyles pterosperma Juss., *Ann. Mus. Natl. Hist. Nat.* 4: 262, t. 61, fig. 3 (1804); *S. pterosperma* (Juss.) Less., *Syn. Gen. Compos.* 268 (1832). T: *n.v.*

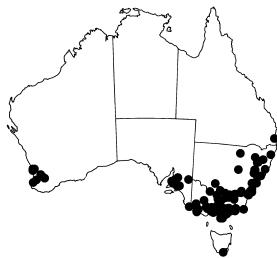
Illustrations: H.I.Aston, *Victorian Naturalist* 99: 192, fig. 2a–b (1982); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 309 (1992); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 936, fig. 191a, excluding achene upper left (1999).

Plants with scattered hairs c. 0.5–1 mm long. Leaves to c. 5 cm long, 2-pinnatisect, with primary segments elliptic to orbicular in outline; hairs largely abaxial. Capitulum 3–6 mm diam.; involucre 3–6 mm long; bracts 5–8, ovate to lanceolate, acute, with hyaline margin lacking; mature receptacle narrowly conical. Marginal florets 12–30. Disc floret corolla c. 2 mm long, c. 0.5 mm diam. Achenes (excluding spine) ±rotund to oblate in profile, 2–2.5 mm long, 2.5–4 mm wide, not woolly apically; body c. 1 mm wide, with scattered tubercle-based papillose hairs on both sides; wings 0.7–1.5 mm wide, incurved, entire or more often slightly to deeply notched towards base, forming an acute spine-like process apically, scarious, smooth; stylar spine 1.8–2.6 mm long. *Jo-Jo*, *Onehunga*, *Bindyi*. Plate 39; Fig. 47E.

Native to S America. Naturalised in SW W.A., SE S.A., southern Qld, N.S.W., A.C.T., Vic., and SE Tas. Grows in lawns and other disturbed sites. Flowers most of the year.

W.A.: Cargill St, Victoria Park, Perth, *B.J.Lepschi* 2089 (CANB, MEL, PERTH). S.A.: Upper Waterfall Gully, c. 11.5 km ESE of Adelaide, *Hj.Eichler* 18905 (AD). Qld: Tozer Gully, Cootharaba Rd, Gympie, *A.R.Bean* 17041 (BRI). N.S.W.: Barraba, Sept. 1929, *F.A.Rodway* (NSW). A.C.T.: off Dryandra St, Canberra, *M.Gray* 4611 (CANB). Vic.: Strathmerton, *H.I.Aston* 2354 (HO, MEL). Tas.: Cloudy Bay Lagoon, South Bruny Is., *A.M.Buchanan* 4547 (HO).

C.J.Webb, *New Zealand J. Bot.* 24: 665–669 (1986) suggested that because of their ability to interbreed, members of subgenus *Soliva* including *S. pterosperma*, *S. sessilis* and *S. valdiviana* be treated as one species. This was based on populations introduced to and occurring around Auckland, New Zealand. All specimens of *S. sessilis* collected in Australia, with the exception of a few from Melbourne, Vic., have deeply notched wings near the base. They therefore correspond to *S. pterosperma*, a species that is currently considered a synonym of the unnotched *S. sessilis*.



2. **Soliva valdiviana* Phil., *Linnaea* 33: 168 (1864)

T: province of Valdivia, Chile; *n.v.*

Illustration: H.I.Aston, *Victorian Naturalist* 99: 192, fig. 2e (1982).

Similar to *S. sessilis* but with achenes glabrous, without wings, often purple at maturity.

Native to S America. Naturalised in Melbourne, Vic., and Hobart, Tas. Recorded from lawns. Flowers most times of year.

Vic.: Queen Victoria Gardens, between St Kilda Rd and the Floral Clock, *H.I.Aston* 2150 (CANB, HO, MEL); beside Camberwell Town Hall, Camberwell, *H.I.Aston* 2231 (MEL). Tas.: Rose Bay, 21 Dec. 1981, *R.B.Pears* (MEL).

According to notes for one specimen from Vic. (*H.I.Aston* 2150, MEL), the leaves of this species are a deeper green than in *S. sessilis*. Quite possibly more common than the records indicate.



3. **Soliva anthemifolia* (Juss.) Sweet, *Hort. Brit.* 243 (1826)

Gymnostyles anthemifolia Juss., *Ann. Mus. Natl Hist. Nat.* 4: 262, t. 61, fig. 1 (1804). T: n.v.

Illustration: H.I.Aston, *op. cit.* 192, fig. 2c.

Plants with scattered hairs c. 0.5–1.5 mm long. Leaves to c. 13 cm long, 2- or 3-pinnatisect, with primary segments elliptic to orbicular in outline. Capitulum 5–12 mm diam.; involucre 2.5–3 mm long; bracts numerous, narrowly oblong to narrowly oblong-elliptic, rounded apically, with a narrow pale or purplish hyaline margin. Marginal florets to c. 100. Disc floret corolla c. 2 mm long, c. 0.3 mm diam. Achenes (excluding spine) obovate in profile, c. 1.8–2.2 mm long, woolly apically; body 0.5 mm wide; wings/margins c. 0.6 mm wide, plane, entire, obtuse to rounded apically, thick, prominently transversely ridged; stylar spine c. 2–3.5 mm long. Fig. 47D.

Native to S America. Naturalised from eastern Qld to eastern N.S.W., with a few records from near the Murray R. in Vic. and S.A. Grows in loam and sandy loam in lawns and on margins of watercourses in woodland. Flowers winter–spring.

S.A.: c. 3.5 km downstream from Lock 6, Murray R., environs of Chowilla, *C.R.Alcock 10313* (AD). Qld: 28 km W of Bollon, *H.I.Aston 2421* (BRI, MEL). N.S.W.: O'Briens Ck where crossed by Newell Hwy, c. 2.5 km SW of Narrabri, *H.I.Aston 2414* (AD, BRI, MEL, NSW); Salt Caves Dam, Denbollie State Forest, *J.R.Hosking 1894* (CANB, MEL, NSW). Vic.: near Murray R. 3 km S of Tocumwal P.O., *A.C.Beauglehole 63962* (MEL).

This species and *S. stolonifera* are members of subgenus *Gymnostyles*, and they differ most obviously from *S. sessilis* and *S. valdiviana* (subg. *Soliva*) in having achenes with thickened transversely wrinkled margins and with long apical hairs.



4. **Soliva stolonifera* (Brot.) Sweet, *Hort. Brit.* 243 (1826)

Hippia stolonifera Brot., *Phytogr. Lusitan. Select.* no. 14 (1800). T: n.v.

Illustration: H.I.Aston, *op. cit.* 192, fig. 2d.

Plants with few to scattered hairs to c. 0.3 mm long or ±glabrous. Leaves to c. 4 cm long, 1-pinnatisect, with segments oblong or elliptic, entire or with 1 or 2 lobes. Capitulum 4–7 mm diam.; involucre 2.5–3 mm long; bracts 15–20, narrowly oblong to narrowly oblong-elliptic, rounded, with a narrow pale or purplish hyaline margin. Marginal florets numerous. Disc floret corolla c. 1.2 mm long, c. 0.2 mm diam. Achenes (excluding spine) obovate in profile, c. 1.8–2.2 mm long, woolly apically; body 0.1–0.2 mm wide; wings/margins c. 0.6 mm wide, acute apically, thick, prominently transversely ridged; stylar spine 1–2 mm long. Fig. 47F.

Native to S America. Naturalised inland from SE Qld SW to central Vic. Grows in woodland, shrubland and *Eucalyptus camaldulensis* forest. Flowers winter–spring.

Qld: Texas Lagoon, southern outskirts of Texas township, *A.R.Bean 17919* (BRI). N.S.W.: Peak Hill, between Dubbo and Parkes, *H.I.Aston 2389* (HO, MEL, NSW). Vic.: S of Glenluce Springs and Loddon R., 4 Nov. 1989, *E.Perkins s.n.* (MEL).

This name has been attributed to various authors, but the combination in *Soliva* was validly made by R.Sweet, with an indirect reference (Persoon's *Synopsis*) to the basionym *Hippia stolonifera* Brot.



ASTERACEAE

Trib. 4. INULEAE

A.E.Orchard

Asteraceae trib. *Inuleae* Cass., *J. Phys. Chim. Hist. Nat.* 88: 193 (1819)

Type: *Inula* L.

Inulaceae Bercht. & J.Presl, *Prir. Rostlin* 254 (1820). T: *Inula* L.

Asteraceae subtrib. *Plucheinae* Benth. & Hook.f., *Gen. Pl.* 2(1): 166, 180 (1873), as *Plucheineae*; *Asteraceae* trib. *Plucheeae* (Benth. & Hook.f.) A.Anderb., *Canad. J. Bot.* 67: 2293 (1989). T: *Pluchea* Cass.

Shrubs or perennial or annual herbs, without latex. Leaves alternate. Capitula radiate, disciform or discoid; receptacle paleate or epaleate; paleae various (if present), sometimes hairs or glands present on receptacle. Ray florets usually female; corolla ligulate with 3 lobes, or tubular and filiform, yellow, pink, violet or white. Disc florets usually bisexual, actinomorphic; corolla 5-lobed, yellow, pink, violet or white; anther appendages acute; anther thecae caudate; style branches rounded to acute.

A tribe of about 62–66 genera and 680–690 species, principally Eurasian and eastern and southern African in distribution, although some genera (e.g. *Pluchea*) are worldwide. In Australia, 13 genera and c. 50 species, almost all native.

Two subtribes are usually recognised; both occur in Australia.

A.A.Anderberg *et al.*, Evolutionary relationships in the Asteraceae tribe Inuleae (incl. Plucheeae) evidenced by DNA sequences of *ndhF*; with notes on the systematic positions of some aberrant genera, *Organisms, Diversity & Evolution* 5: 135–146 (2005); A.A.Anderberg & P.Eldenäs, *XVII. Tribe Inuleae Cass. (1819)*, in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 374–391 (2007); A.A.Anderberg, *Inuleae*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 667–680 (2009).

KEY TO SUBTRIBES

Achenes with an elongated crystal in each epidermal cell; sweeping hairs on style acute, ending above bifurcation; capitula usually radiate (disciform in *Blumea*, *Carpesium*); florets usually yellow, rarely pink to purple

subtrib. 1. **INULINAE**

Achenes lacking an elongated crystal in epidermal cells; sweeping hairs on style usually obtuse (rarely acute, but not in Australia) and extending below bifurcation; capitula usually disciform (miniradiate in *Streptoglossa*, *Allopterigeron*); florets usually pink to purple, rarely white

subtrib. 2. **PLUCHEINAE**

Subtrib. 1. INULINAE

A.E.Orchard

(Authors of genera as indicated)

Asteraceae subtrib. *Inulinae* Dumort., *Fl. Belg.* 67 (1827), as *Inuleae*

Type: *Inula* L.

Capitula usually radiate (disciform in *Blumea* and *Carpesium*). Florets yellow, rarely pink to purple; sweeping hairs on style acute, ending above bifurcation. Achenes with an elongated crystal in each epidermal cell.

A subtribe of 28 genera and c. 410 species, found mainly in Europe, and temperate and tropical regions of Africa and Asia. Four genera in Australia: 1 native, 3 naturalised.

ASTERACEAE

KEY TO GENERA

- 1 Pappus of bristles or scales
 - 2 Pappus of bristles; receptacle epaleate
 - 3 Capitula with outer tubular filiform female florets **1. BLUMEA**
 - 3: Capitula with outer radiate female florets **2. DITTRICHIA**
 - 2: Pappus of triangular scales; receptacle paleate **3. ASTERISCUS**
- 1: Pappus absent **4. CARPESIMUM**

1. BLUMEA

C.R.Dunlop & A.E.Orchard

Blumea DC., *Arch. Bot. (Paris)* 2: 514 (1833), *nom. cons.*; after Carl Ludwig Blume (1796–1862), German-born Dutch botanist, first director of the Rijksherbarium, Leiden.

Type: *B. balsamifera* (L.) DC.

Annual, biennial or perennial herbs or shrubs, rarely climbers, often aromatic, variously pubescent with glandular and eglandular septate hairs. Leaves alternate, cauline, or rosulate and cauline. Capitula many-flowered, solitary (not in Australia), paniculate or scattered, disciform, heterogamous; involucre bracts in several series, herbaceous to leathery, reflexed in old heads; receptacle epaleate, glabrous or less often pubescent or pilose. Florets yellow or pink to purple. Marginal florets female, many-seriate, filiform, 2-, 3- or 4-lobed. Disc florets usually fewer than marginal ones, bisexual or functionally male or (not in Australia) functionally female; corolla usually 5-lobed; anthers tailed; style branches linear, obtuse. Achenes terete or oblong, usually sparsely pubescent, with or without superficial ribs. Pappus plumose-setose, persistent or caducous.

An Old World genus with c. 100 species, most of which occur in tropical Asia, with small numbers in Africa and Australia. Of the 11 Australian species, all but 2 are confined to the tropics; 5 are endemic. Two further species, *B. balsamifera* (L.) DC. and *B. lanceolaria* (Wall. ex Roxb.) Druce, are found on Christmas Is.

A.J.Randeria, The composite genus *Blumea*, a taxonomic revision, *Blumea* 10: 176–317 (1960).

- 1 Perennial, erect or scandent shrubs
 - 2 Erect shrub; leaves glandular, vernicose; of arid habitats **1. B. pungens**
 - 2: Scandent shrub; leaves eglandular or almost so; rainforest species **2. B. riparia**
- 1: Annual or biennial, herbaceous
 - 3 Capitula crowded in loose to dense panicles
 - 4 Herbs to 2 m high; leaves discolorous; rainforest species **3. B. milnei**
 - 4: Herbs to 1 m high; leaves concolorous; of open habitats
 - 5 Florets purple or pink
 - 6 Leaves and stems velutinous or sericeous; involucre villous; glands obscured by indumentum **4. B. axillaris**
 - 6: Leaves, stems and involucre bracts pilose, overtly densely glandular **6. B. benthamiana**
 - 5: Florets yellow
 - 7 Involucres villous; disc corolla lobes with glandular and eglandular hairs **5. B. lacera**
 - 7: Involucres glabrescent or pilose; disc corolla lobes glandular but lacking eglandular hairs **7. B. saxatilis**

3: Capitula scattered

8 Florets purple or pink

6. *B. benthamiana*

8: Florets yellow

9 Disc corolla lobes eglandular; disc florets functionally male

10 Disc corollas yellow in dried specimens; involucre with glandular and eglandular hairs

8. *B. integrifolia*

10: Disc corollas colourless in dried specimens; involucre glandular, without eglandular hairs

9. *B. psammophila*

9: Disc corolla lobes glandular; disc florets bisexual

11 Achenes 0.5 mm long; peduncles to 150 mm long

10. *B. diffusa*

11: Achenes c. 1 mm long; peduncles to 80 mm long

11. *B. tenella*

1. *Blumea pungens* W.Fitzg., *J. Proc. Roy. Soc. W. Australia* 3: 221 (1918)

T: vicinity of Barker R., W.A., *W.V.Fitzgerald* 1520; holo: NSW; iso: BM, PERTH.

Erect shrub to c. 1 m high. Stems, leaves and involucre bracts glandular, vernicose; eglandular hairs rare or absent; stems striate; older stems rough with persistent leaf bases. Leaves tapering gradually to a sessile base, narrowly elliptic, 10–80 mm long, 2–10 mm wide, distantly and pungently toothed, pungent at apex, with apex and lateral teeth mucronate, slightly discolourous. Capitula 7–9 mm long, on short lateral branches in upper axils, forming long narrow or narrowly pyramidal bracteate panicles; involucre bracts linear, green, with dense sessile glands; receptacle flat, pubescent. Florets yellow; corollas 5–5.6 mm long; disc corolla lobes eglandular, glabrous. Achenes 1.2–1.5 mm long, ribbed. Fig. 48.

An Australian endemic known from scattered locations from Cape Leveque in the Kimberley, W.A., to the Keep River and Gregory Natl Parks in the N.T.; in heath on sandstone plateaus. Flowers June–July, fruits Aug.–Sept.

W.A.: Osmond Plateau, *I.D.Cowie* 1912 (AD, DNA, MEL, MO, PERTH); King George River Falls, *L.A.Craven & J.McD.Stewart* 9330 (CANB); Bungle Bungle Natl Park, *K.A.Menkhurst* 696 (DNA, PERTH). N.T.: Gregory Natl Park, *I.D.Cowie* 7323 & *C.P.Mangion* (CANB, DNA, MEL, NSW, PERTH); Keep R. area, *P.F.Munns* 5 (DNA).



Blumea pungens is unique amongst the Australian species of *Blumea*, and probably the genus as a whole, in possessing lifeform characteristics typical of taxa of the sandstone heath communities: it is a relatively long-lived, woody shrub with vernicose foliage, vulnerable to periodic hot fires. On floral characters *B. pungens* appears to be well placed in *Blumea* though its habitat and pyric lifeform would indicate a long separation from all other species. Further studies are needed to confirm its placement in *Blumea*.

2. *Blumea riparia* DC., *Prodr.* 5: 444 (1836)

f. *riparia*

Conyza riparia Blume, *Bijdr.* 899 (1826), *nom. illeg., non* Humb., Bonpl. & Kunth (1820). T: Java, *C.L.Blume* s.n.; holo: L.

B. pubigera (L.) Merr., *sensu* E.D.Merrill, *Philipp. J. Sci.* 14: 250 (1919), *non Conyza pubigera* L.

[*B. pubigera* auct. non (L.) Merr.: C.T.White, *Proc. Roy. Soc. Queensland* 47: 66 (1936)]

Scandent shrub to 2.5 m high. Vegetative parts mostly glabrous or becoming so with age, eglandular; inflorescence branches often rusty-grey-tomentose. Leaves shortly petiolate, ovate to oblong, 110–125 mm long, 10–95 mm wide, slightly asymmetric and obtuse at base, with fine, widely and regularly spaced shortly attenuate teeth, acute or acuminate, discolourous. Capitula c. 6 mm long, in narrow panicles to 70 mm long; outer involucre bracts indurate,

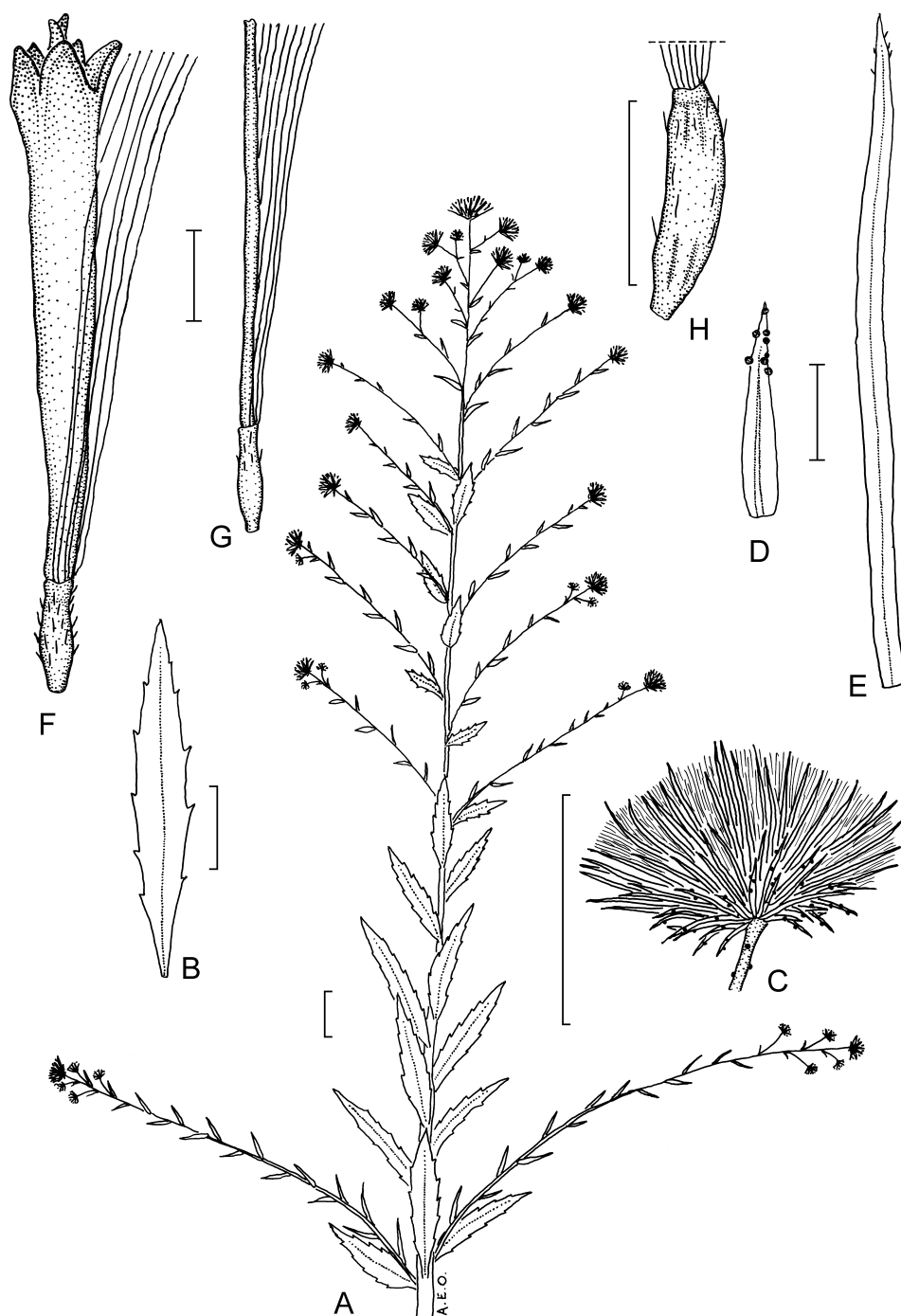


Figure 48. *Blumea pungens*. A, habit; B, leaf; C, capitulum; D, involucral bract; E, palea; F, disc floret; G, filiform floret; H, achene. (A, B, L.A.Craven & J.McD.Stewart 9330, CANB; C–H, I.Cowie 7323 & C.Mangion, CANB). Scale bars: A–C = 2 cm; D–H = 2 mm. Drawn by A.E.Orchard.

lanceolate or ovate-lanceolate, densely grey-villous or sericeous; inner bracts linear-lanceolate or oblong; receptacle slightly convex, pubescent. Florets yellow; corolla 4–5 mm long; lobes of corollas of marginal florets usually with 1 to several septate hairs; disc corolla lobes glandular, hirsute with septate hairs. Achenes c. 1.2 mm long, ribbed. Fig. 49A, B.



Widespread from India through southern China to New Guinea and northern Australia; in Australia recorded from rainforests in NE Qld between the Endeavour R. and Ingham. Flowers and fruits July.

Qld: Mena Creek Rd, SW of Innisfail, *A.R.Bean* 26564 (CANB); Bellenden Kerr Ra., *E.Cowley* s.n. (MEL611458A); Stony Ck, *E.Cowley* 72B (BRI); Johnstone R., Aug. 1917, *N.Michael* s.n. (BRI); between Cairns and Herberton, 1891, *C.J.Wild* s.n. (BRI).

Koster (*Blumea* 20: 212 (1972)) stated: “As the name *Blumea riparia* (Blume) DC. is based on a later homonym, it is illegitimate. The present author had not the opportunity to seek out the legitimate name as not all taxonomic synonyms have been studied”. Authors subsequent to De Candolle (*Prodr.* 5: 444 (1836)), e.g. Randeria (1960), have wrongly attributed the epithet *riparia* to Blume. Under Art. 7.4 of the International Code of Nomenclature for algae fungi and plants, *B. riparia* DC. must be considered a new name, typified by the type of the rejected name, *Conyza riparia* Blume.

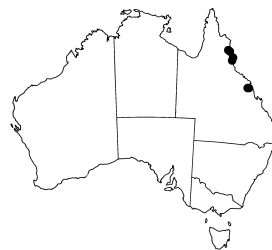
Although Merrill made the combination *B. pubigera* (L.) Merr. he then misapplied the name to material of *B. riparia* DC.

3. *Blumea milnei* Seem., *Fl. Vit.* 141, t. 27 (1866)

T: Interior of Viti Levu, 1860, *B.C.Seemann* 273; lecto: K; isolecto: BM, G-BOIS, NSW, P, *fide* C.R.Dunlop, *Fl. Australia* 37: 607 (2015).

Suffruticose (?annual) erect herb to 2 m high. Stems striate, minutely glandular, grey-tomentose; inflorescence branches and peduncles villous or closely tomentose. Leaves petiolate, elliptic or oblanceolate, 20–190 mm long, 1–40 mm wide, finely to coarsely dentate or serrate, acute, discolorous, sparsely strigose or becoming glabrous above, minutely grey-tomentose below. Capitula 7–8 mm long, sessile or shortly pedunculate in open or contracted, leafy terminal panicles to 30 cm long; involucre bracts linear-lanceolate, villous to pilose; receptacle flat or convex, fimbriate, pilose. Florets yellow; marginal corollas glabrous; disc corollas c. 5.3 mm long, with lobes glandular, usually with a few septate and simple hairs. Achenes 1.0–1.2 mm long, ribbed. Fig. 49C, D.

Distributed from New Guinea to New Caledonia, Fiji, Samoa and Qld, Australia. In Qld known from wet tropical rainforest in disjunct localities at Mt. Spurgeon, the Babinda area and the Eungella Ra. Flowers and fruits Aug.–Sept.



Qld: Fishery Ck, 16 Aug. 1936, *H.Flecker* s.n. (QRS); Eungella Ra., 1922, *W.D.Francis* s.n. (BRI); Mt Spurgeon, *C.T.White* 10635 (BRI, QRS); Eungella Ra., *C.T.White* 12876 (BRI, CANB).

4. *Blumea axillaris* (Lam.) DC., *Prodr.* 5: 434 (1836)

Conyza axillaris Lam., *Encycl.* 2: 84 (1786). T: Mauritius, *P.Commerson*; holo: P-LA n.v., *fide* A.J.Scott in J.Bosser *et al.*, *Fl. Mascareignes*, 109, Composées, 58 (1993).

Erigeron molle D.Don, *Prodr. Fl. Nepal* 172 (1825); *B. mollis* (D.Don) Merr., *Philipp. J. Sci.* 5: 395 (1910). T: Nepal, *D.Don* s.n.; holo: ?BM n.v.

B. diplotricha Domin, *Biblioth. Bot.* 89: 1214 (1930). T: Arnhem Land [N.T.], *F.Mueller* s.n.; holo: K.

B. cunninghamii DC., *Prodr.* 5: 435 (1836). T: Regents R., NW coast of Australia [W.A.], Oct. 1820, *A.Cunningham* s.n.; holo: G-DC? n.v.; iso: MEL; possible iso: NY, photo seen.

B. viminea DC., *Prodr.* 5: 442 (1836). T: Timor, *coll. unknown*; holo: G-DC.

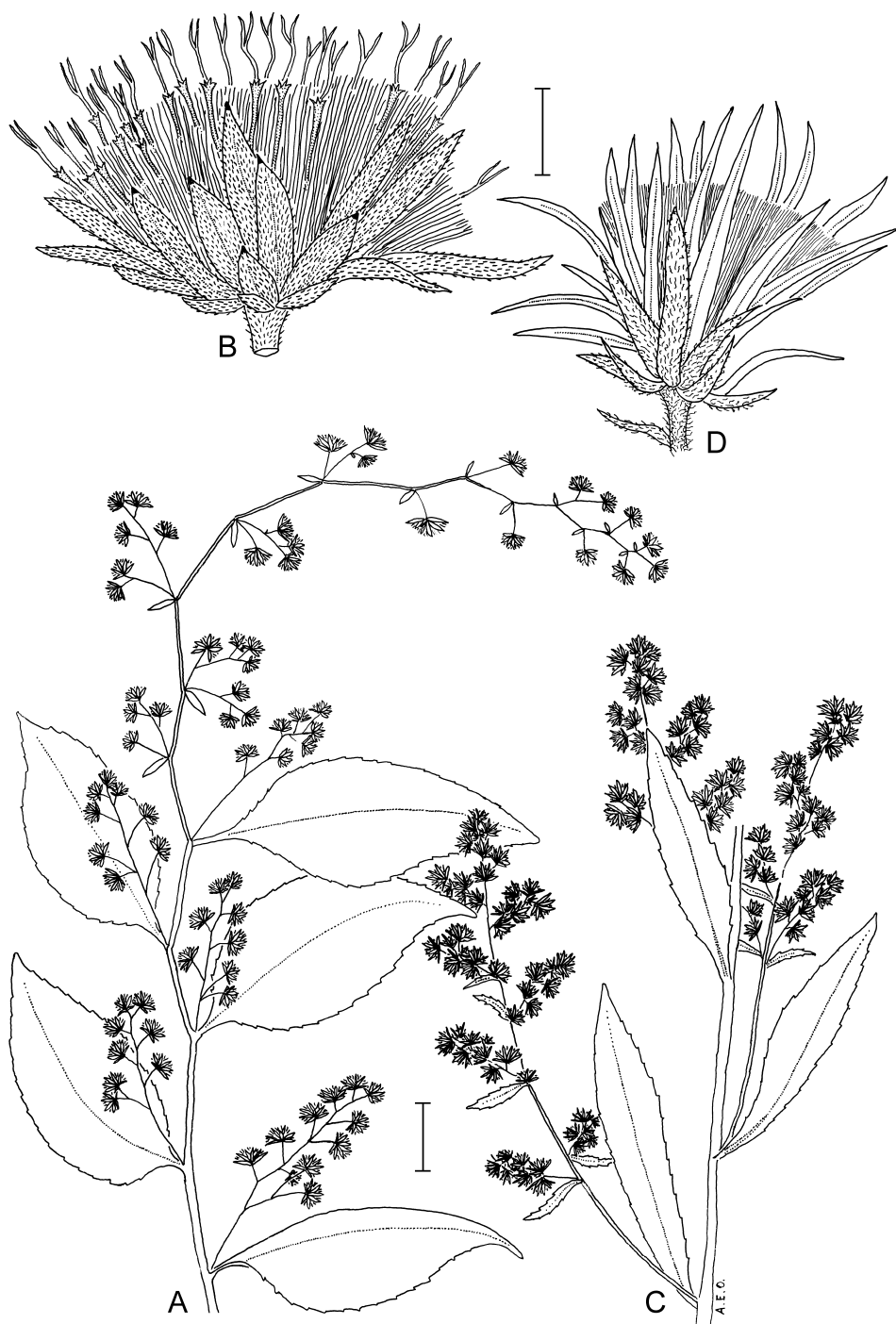


Figure 49. *Blumea*. **A, B,** *B. riparia* f. *riparia*. **A,** habit; **B,** capitulum (**A, B,** A.R.Bean 26564, CANB). **C, D,** *B. milnei*. **C,** habit; **D,** capitulum (**C, D,** C.T.White 12876, CANB). Scale bars: **A, C** = 2 cm; **B, D** = 2 mm. Drawn by A.E.Orchard.

B. wightiana DC. in R.Wight, *Contr. Bot. India* 14 (1834). T: In India prope Madras et ex Belanger prope Pondichery, *Wight cat. n.* 1427; syn: E 179469–179474, P 181606, 181607, photos seen.

Illustration: I.D.Cowie *et al.*, *Floodplain Fl.* 179 (2000).

Annual, erect, aromatic herb to 90 cm high. Vegetative parts glandular, sericeous, velutinous. Leaves sessile or basal ones petiolate or all petiolate; sessile leaves firmly textured, elliptic, lanceolate or oblanceolate, 10–80 mm long, 4–22 mm wide, irregularly serrate, dentate or rarely lobed, acute to obtuse, concolorous or slightly discolorous; petiolate leaves often thin-textured, ovate, elliptic, obovate or oblanceolate, 20–170 mm long, 4–70 mm wide, denticulate or irregularly serrate or dentate, acute, discolorous. Capitula 3.5–6 mm long, in open, contracted or spiciform panicles, usually with smaller panicles on axillary branches; involucre bracts glandular, villous, rarely glabrous with age; receptacle convex, glabrous or pilose. Florets pink or purple; corolla of disc florets 2.1–3.8 mm long, with lobes glandular, glabrous or pilose with simple or septate hairs or both. Achenes c. 1 mm long, not or faintly ribbed.

Widespread in the Old World tropics. In Australia associated with stream banks and seasonally flooded sites on a variety of soil types; on the heavy clay soils of the coastal floodplains it often occurs in dense colonies. Occurs from the W coast of the Kimberley, W.A., to Cape York, Qld, extending S as far as Moreton Bay, and just into NE N.S.W. Flowers and fruits year round.

W.A.: King Leopold Ra., *L.A.Craven* 8452 (DNA); Mitchell Plateau, *K.F.Kenneally* 11104 (DNA). N.T.: Kakadu Natl Park, *K.G.Brennan* 1717 (DNA). Qld: Shoalwater Bay, [Aug.–Sept. 1802], *R.Brown s.n.* (BM, CANB); 6 km S of Mt Isa, *A.Schmid* 241 (BRI, DNA). N.S.W.: Little Back Ck, Kyogle to Cawongla, *H.Salasoo* 2553 (NSW).



5. *Blumea lacera* (Burm.f.) DC. in R.Wight, *Contr. Bot. India* 14 (1834)

Conyza lacera Burm.f., *Fl. Indica* 180 (1768). T: Java, *N.L.Burman*; holo: G-DC.

[*B. hieracifolia* auct. non (D.Don) DC.: G.Bentham, *Fl. Austral.* 3: 526 (1867), *quoad spec.* between Providence Hill and McAdams Ra. [N.T.], *F.Mueller s.n.*; K]

[*B. acutata* auct. non DC.: F.J.H.Mueller, *Fragm.* 9: 160 (1875)]

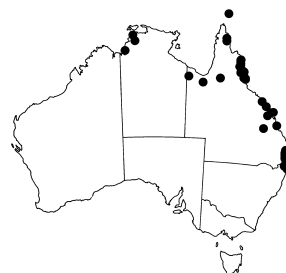
Illustration: G.J.Harden (ed.), *Fl. New South Wales* 3: 200 (1992).

Annual erect herb to 50–80 (–120) cm high. Vegetative parts sericeous or pannose, rarely subglabrous with age. Leaves sessile or petiolate, spatulate or oblanceolate, 30–260 mm long, 5–50 mm wide, variously dentate or serrate or rarely lyrate lobed, concolorous. Capitula 6–8 mm long, in open, contracted or spiciform terminal panicles to 150 mm long, rarely exceeding 300 mm; involucre bracts linear, glandular, villous, rarely subglabrous with age; receptacle convex, glabrous. Florets yellow; disc corollas 3.7–5 mm long, with lobes glandular, conspicuously hairy with simple or simple and septate hairs. Achenes ribbed; c. 1 mm long.

Widespread in the Old World tropics. In Australia in mainly coastal localities in a variety of habitats from the Victoria R., N.T., to Torres Strait, N Qld, extending to SE Qld and NE N.S.W. Flowers and fruits year round.

N.T.: East Baines R., *R.Booth* 1291 (DNA); Alligator R., 1890, *M.Holtze s.n.* (MEL). Qld: Murray Is., Torres Strait, *M.Lawrie* 21 (BRI); Coombabah, 21 Aug. 1969, *C.Middleton s.n.* (BRI). N.S.W.: Head of Macleay R., *C.Moore s.n.* (K).

Blumea lacera is very variable in its pubescence and degree of lobing of the leaves. The treatment here follows Randeria (1960) who has considered the variation to be continuous across its range and has consequently not recognised the multitude of varietal names attributable to the species.



6. Blumea benthamiana Domin, *Biblioth. Bot.* 89: 1214 (1930)

T: Broad Sound, Peaked West hill [Qld], 1802, *R. Brown* [Bennett No. 2096]; lecto: K; isolecto: BM, CANB, NSW, *vide* C.R. Dunlop, *Fl. Australia* 37: 607 (2015).

B. glandulosa var. *minor* Benth., *Fl. Austral.* 3: 525 (1867); *B. benthamiana* var. *minor* (Benth.) A.D. Chapm., *Austral. Pl. Name Index* 420 (1991), *nom. inval.* T: Port Molle [Qld], Dec. 1847, *J. MacGillivray s.n.*; syn: K; Keppel Bay [Qld], *A. Thozet s.n.*; syn: K.

[*B. glandulosa* auct. non DC.: G. Bentham, *Fl. Austral.* 3: 525 (1867)]

Annual, erect, aromatic herb to 40 cm high. Vegetative parts with sparse to scattered long multiseptate hairs, densely glandular, often slightly vernicose. Leaves sessile, oblanceolate, spatulate or elliptic, concolorous; uppermost leaves bracteate and linear, 10–70 mm long, 2–20 mm wide, coarsely or finely dentate, often entire towards base. Capitula 5–7 mm long, on peduncles to 20 mm long, solitary or more usually few together in leafy panicles terminating upper branchlets; involucre bracts densely glandular, with non-glandular hairs absent or sparse on outer bracts; receptacle flat, glabrous. Florets pink or purple. Disc corollas 3.2–4.1 mm long; lobes glandular, glabrous. Achenes c. 1 mm long, faintly ribbed.

An Australian endemic, occurring sporadically from the eastern Kimberley, W.A. to the Alligator Rivers region in the N.T. and to coastal Qld as far south as Keppel Bay; in silty and clayey soils, often on stream banks. Flowers and fruits June–Dec.

W.A.: Purnululu Natl Park, *A. Thomson TH01* 338 (DNA). N.T.: Van Diemens Gulf, *A. Cunningham* 297 (BM); 16 miles [c. 25.5 km] S Goyder R. crossing, *P.K. Latz* 2797 (DNA). Qld: Port Mackay, *A. Dietrich* 2499 (MEL); Marrett R., Princess Charlotte Bay, *J.A. Elsol* 714 & *T. Stanley* (BRI).



Domin did not take up Bentham's *B. glandulosa* var. *minor* when proposing the new name, *B. benthamiana*, stating that Bentham's variety differed only slightly from the new species. A.D. Chapman, *Australian Plant Name Index A–C* 420 (1991) misinterpreted Domin's text, and credited him, incorrectly, with making the combination *B. benthamiana* var. *minor*. This combination should be attributed to Chapman alone, but as he specifically stated (*op. cit.* xii) that any new combinations in his work were inadvertent (and thus not accepted by the author) the combination is invalid.

7. Blumea saxatilis Zoll. & Moritz, *Natuur-Geneesk. Arch. Ned.-Indië* 2: 243 (1845)

T: Java, *Zollinger* 2233; holotype: P, photo seen; isotype: BM, photo seen, G, G-BOIS, M, photo seen.

Placus solandri S. Moore, *J. Bot.* 43: 141 (1905). T: Endeavour R. [Qld], 1770, *Banks & Solander s.n.*; syn: BM (5 sheets), CANB, G; Shoalwater Bay [Qld], *R. Brown s.n.*; syn: BM, CANB.

B. dentata var. *rigida* Domin, *Biblioth. Bot.* 89: 1216 (1930). T: Savannenwalder bei Mareeba, Qld, *K. Domin*; syn: PR.

B. dentata var. *glabrescens* Domin, *Biblioth. Bot.* 89: 1216 (1930). T: Savannenwalder bei Yarraba, Qld, *K. Domin* 8947; syn: PR; prope deltam fl. Russel River locis arenosis, Qld, *K. Domin* 8945; syn: PR.

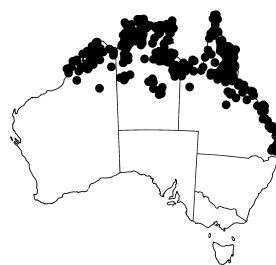
B. dentata var. *glandulosa* Domin, *Biblioth. Bot.* 89: 1216 (1930). T: Roper R. [N.T.], *F. Mueller s.n.*; holotype: K, *p.p.*

B. dentata var. *schultzei* Domin, *Biblioth. Bot.* 89: 1216 (1930). T: Port Darwin, N.T., *F. Schultz* 362; holotype: K; isotype: MEL.

Annual erect herb to 60 cm high. Stems sparsely glandular, sparsely pilose, usually leafy in lower 1/3 to 1/2, ebracteate or bracteate above or leafless from base and scapiform. Leaves rosulate and cauline (rosette rarely absent), sessile, with cauline leaves often amplexicaul or semiamplexicaul, oblanceolate, spatulate, elliptic, becoming linear distally, 10–160 mm long, 1–50 mm wide, finely to coarsely serrate or dentate, acute, concolorous, pilose or glabrescent, with lower axils often white-lanuginose. Capitula 6–8 mm long, in lax, few-many-flowered terminal panicles; peduncles to c. 35 mm long, rarely longer; involucre bracts sparsely glandular, glabrescent or pilose; receptacle slightly convex, glabrous. Florets yellow. Disc corolla lobes glandular, usually glabrous. Achenes c. 1 mm long, usually ribbed.

Widespread and common, from Broome, W.A., across northern Australia and southward along the coastal strip to Brisbane, Qld; in the N.T. extending as far inland as Davenport Ra. Also in Indonesia. Found in grassland and in the understorey of open woodland, shrubland and vine thickets, usually on damp to seasonally inundated clay soils. Flowers and fruits Apr.–Aug.

W.A.: Isdell R., *W.V.Fitzgerald* 919 (BM); Edgar Ra., *K.F.Kenneally* 5445 (PERTH). N.T.: Nicholson R. area, *A.Kanis* 1762 (CANB, DNA); Bickerton Is., *R.L.Specht* 614 (AD, BRI, CANB, NSW). Qld: Brisbane R., *F.Mueller* s.n. (MEL 611449A).



Distinguished amongst the Australian species by the scape-like stems arising from a basal rosette.

8. *Blumea integrifolia* DC., *Prodr.* 5: 433 (1836)

T: Port Keats [N.T.], 7 Sept. 1819, *A.Cunningham* s.n. [468]; holo: G-DC; iso: BM, K.

B. prostrata W.Fitzg., *J. Proc. Roy. Soc. W. Australia* 3: 221 (1918). T: Isdell R., W.A., *W.V.Fitzgerald* 1022; holo: NSW; iso: E, PERTH.

B. dentata var. *foliosa* Domin, *Biblioth. Bot.* 89: 1216 (1930). T: Upper Victoria R. [N.T.], *F.Mueller* s.n.; holo: K.

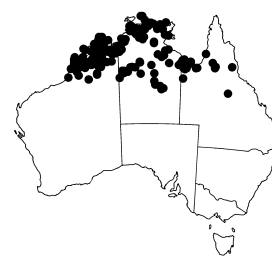
B. integrifolia var. *pumila* Domin, *Biblioth. Bot.* 89: 1216 (1930). T: Victoria R. [N.T.], *F.Mueller* s.n.; holo: K; iso: MEL.

B. integrifolia var. *simplex* Domin, *Biblioth. Bot.* 89: 1215 (1930). T: Port Darwin, N.T., Mar. 1870, *F.Schultz* 427; holo: K; iso: MEL.

B. integrifolia var. *normalis* Domin, *Biblioth. Bot.* 89: 1215 (1930), *nom. inval.*, type var.

Annual or longer-lived herb, erect to 40 cm high or prostrate. Vegetative parts glandular, pilose, villous or arachnoid, becoming glabrous with age; axils of radical leaves often white-tomentose. Leaves sessile, with cauline leaves often semiamplexicaul; radical leaves (may be withered at time of flowering) oblanceolate, 10–120 mm long, 4–18 mm wide, entire or finely dentate, acute or obtuse; cauline leaves linear-lanceolate to elliptic, the lower larger leaves often oblanceolate, 5–95 mm long, 1–10 mm wide, entire or distantly toothed, acute to attenuate. Capitula solitary, 5–7 mm long, on peduncles to 10 cm long; involucre bracts glandular, pilose; receptacle flat to slightly convex, glabrous. Florets yellow, 3.2–4.5 mm long. Disc florets functionally male; corolla lobes eglandular with 1–many simple or septate hairs. Achenes 0.5–0.9 mm long, without ribs or ribs obscure.

An Australian endemic; widespread across northern Australia, occurring from Cape Leveque in the western Kimberley, W.A., to the Ravenshoe area of N Qld; in the N.T. occurs as far south as the Davenport Ra. Found in a variety of soil types in open habitats, such as savanna, which are subject to drought conditions and grass fires during the dry season. Flowers and fruits June–Sept.



W.A.: 4.7 km SE of Pentecost R. crossing, *S.J.Forbes* 2704 (DNA); near Mt. Hann, *C.A.Gardner* 1568 (NSW, PERTH). N.T.: c. 5 km from Port Keats, *C.R.Dunlop* 6485 & *G.M.Wightman* (AD, BRI, CANB, DNA, MEL, NSW); 74 miles W Oenpelli, *P.K.Latz* 3048 (CANB, DNA, NSW). Qld: 28 km N of the Gulf Development Rd, *J.R.Clarkson* 2541 & *N.B.Byrnes* (DNA).

This species is variable in its foliage; the prostrate form (*B. prostrata*), although often distinctive with uniform sized elliptic or narrowly elliptic leaves and rooting at the nodes, exhibits intermediate states with the erect form and has not been accorded separate status. In its first year of growth, *B. integrifolia* develops a basal rosette of leaves and a strong taproot with the facility to reshoot from the base of the plant after dry season fires. The rosette has usually withered and fallen by the second season.

9. *Blumea psammophila* Dunlop, *Fl. Australia* 37: 607 (2015)

T: Winnama Gorge, Mabel Downs, W.A., 14 May 1984, *E.A.Chesterfield* 209; holo: PERTH; iso: DNA

B. sp. Psammophila (*E.A.Chesterfield* 209) Dunlop, Australian Plant Census, <http://www.cpbr.gov.au/chah/apc/>, accessed 12 May 2014.

B. psammophila Dunlop in G.Paczkowska & A.R.Chapman, *W. Austral. Fl.* 156 (2000), *nom. inval.*

Annual erect herb to 45 cm high. Vegetative parts densely glandular, pilose, becoming glabrous with age. Leaves sessile; lower leaves oblanceolate or spatulate, to 70 mm long, to 25 mm wide, obtuse, dentate; upper leaves oblong, narrowly oblong, lanceolate to linear-lanceolate, 5–40 mm long, 2–6 mm wide, entire or dentate, acute to attenuate. Capitula 4–6 mm long, solitary, scattered, on peduncles to 160 mm long; involucre bracts glandular, glabrous; receptacle almost flat to convex, glabrous. Florets yellow, with marginal corollas rarely purplish in dried specimens; corollas 2.5–3.5 mm long. Disc florets functionally male, colourless in dried specimens; corolla lobes eglandular, glabrous, rarely with a single simple or septate hair. Achenes 0.6–0.8 mm long, faintly ribbed. Fig. 50A–C.

An Australian endemic found from the Carson Escarpment, W.A. to Kakadu Natl Park, N.T.; in sheltered habitats on sandy soils associated with sandstone outcrops; Flowers Mar.–Apr.; fruits Apr.–June.

W.A.: Carson Escarpment, *S.J.Forbes* 2329 (DNA); Gibb River Road, *P.G.Wilson* 253 (DNA). N.T.: 5 miles [8 km] NE of Mudginbarry Stn, *L.G.Adams* 2774 (CANB, DNA); Waterfall Ck, *G.Wightman* 1287 & *C.Dunlop* (CANB, DNA); Upper Katherine R., *G.M.Wightman* 4492 (CANB, DNA).

Closely related to *B. integrifolia* but more ephemeral, lacking the well-developed taproot and basal rosette of that species.

**10. *Blumea diffusa* R.Br. ex Benth., *Fl. Austral.* 3: 525 (1867)**

Blumea integrifolia var. *diffusa* (R.Br. ex Benth.) Domin, *Biblioth. Bot.* 89: 1215 (1930). T: Carpentaria Islands (North Is.) [N.T.], 18 Dec. 1802, *R.Brown s.n.*; lecto: BM, *fide* C.R.Dunlop, *Fl. Australia* 37: 607 (2015); isolecto: CANB, K; remaining syn: towards McAdam Ra. [N.T.], *F.Mueller s.n.*; K, MEL.

B. dentata Domin var. *dentata*, *Biblioth. Bot.* 89: 1215 (1930). T: towards McAdam Ra. [N.T.], *F.Mueller s.n.*; lecto: K; isolecto: MEL, *fide* C.R.Dunlop, *Fl. Australia* 37: 608 (2015).

B. scapigera Domin, *Biblioth. Bot.* 89: 1215 (1930). T: Port Darwin, N.T., *F.Schultz* 279; holo: K; iso: MEL.

Annual herb, erect to 25 cm high or decumbent or prostrate. Vegetative parts glandular, pilose or arachnoid, becoming glabrous with age; axils of radical leaves white-lanuginose. Leaves sessile; radical leaves spatulate, oblanceolate or obovate, 10–60 mm long, 5–20 mm wide, entire or variously toothed, obtuse or acute; cauline leaves elliptic, ovate, obovate, oblong, lanceolate or oblanceolate, becoming bract-like distally, 3–28 mm long, 2–10 mm wide, entire or toothed, obtuse or acute. Capitula 5–10 mm long, solitary, on fine peduncles to 15 cm long; involucre bracts pilose to villous, becoming glabrous with age; receptacle flat to slightly convex, glabrous. Florets yellow; disc floret corolla lobes glandular. Achenes 0.5 mm long, faintly ribbed. Fig. 50D–F.

An Australian endemic. Distributed from the Drysdale R. in the Kimberleys, W.A., through the N.T. to the Etheridge R. area of N Qld; usually on sandy soils and often associated with sandstone. Flowers and fruits Apr.–July.

W.A.: Carson Escarpment, *S.J.Forbes* 2330 (DNA); Drysdale River Natl Park, *K.F.Kenneally* 4524 (PERTH). N.T.: Bessie Springs, McArthur R., *L.A.Craven* 3965 (CANB); Mudginbarry, *R.Pullen* 9438 (BRI, CANB, DNA, NSW, PERTH). Qld: 28 km N of Gulf Development Rd, *J.R.Clarkson* 2542 & *N.B.Byrnes* (BRI, DNA, QRS).

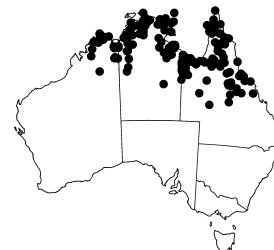




Figure 50. *Blumea*. **A–C**, *B. psammophila*. **A**, habit; **B**, capitulum; **C**, achene (**A–C**, G.Wightman 1287 & C.Dunlop, CANB). **D–F**, *B. diffusa*. **D**, habit; **E**, capitulum; **F**, achene (**D–F**, L.A.Craven 3965, CANB). Scale bars: **A**, **D** = 1 cm; **B**, **C**, **E**, **F** = 1 mm. Drawn by A.E.Orchard.

11. *Blumea tenella* DC. in R.Wight, *Contr. Bot. India* 13 (1834)

T: Timor, *Baudin s.n.*; lecto: G-DC, *vide* A.J.Randeria, *Blumea* 10: 290 (1960); isolecto: Timor, *Anonymous n.* 5; P, photo seen.

B. pannosa O.Schwarz, *Repert. Spec. Nov. Regni Veg. Beih.* 24: 109 (1927). T: 4 miles NE of Port Darwin, N.T., *F.A.K.Bleeser* 306; holo: B *n.v.*

B. arabidea Domin, *Biblioth. Bot.* 89: 1214 (1930). T: Rockhampton, Qld, *Thozet*; holo: K.

[*B. amplexans* auct. non DC.: G.Bentham, *Fl. Austral.* 3: 525 (1867)]

Illustration: I.D.Cowie *et al.*, *Floodplain Fl.* 179 (2000).

Annual herb, erect to 35 cm high or decumbent. Vegetative parts glandular, pilose to villous, arachnoid or white-lanuginose. Leaves sessile, with larger cauline leaves amplexicaul or semi-amplexicaul; radical and lower cauline leaves oblanceolate, spatulate or oblong, 10–70 mm long, 5–20 mm wide, serrate, dentate or entire; cauline leaves oblong, ovate-oblong, elliptic or oblanceolate (upper smaller leaves often oblong-linear, linear or narrow-lanceolate), 5–60 mm long, 2–13 mm wide, acute to attenuate, finely to coarsely serrate or dentate, with smaller leaves often entire. Capitula solitary, 6–8 mm long; peduncles to 80 mm long; involucre bracts pilose or villous, becoming glabrous; receptacle flat to convex, glabrous. Florets yellow. Disc corolla lobes glandular, glabrous. Achenes c. 1 mm long, faintly ribbed.

Distributed through the Indonesian Archipelago, Borneo, New Guinea, New Caledonia and northern Australia. In Australia occurs from the Pilbara, W.A. to SE Qld, frequently in clay or alluvial soils on river banks, in swamps, or along drainage lines; less often reported from drier sandstone habitats. Flowers and fruits Apr.–Sept.

W.A.: 4 km W of Carson River HS, *P.A.Fryxell* 4075 & *L.A.Craven* (DNA). N.T.: 35 miles [56 km] NNW of Cresswell Stn, *R.A.Perry* 1637 (AD, CANB, DNA). Qld: Wernadinga Stn, *R.Pullen* 9004 (CANB, DNA); near Biloela, *L.S.Smith* 3530 (BRI).



Blumea tenella has a number of distinctive indumentum forms ranging from white-lanuginose to glandular, apparently linked to habitat, but with no clear discontinuities which would warrant taxonomic recognition. Although the type of *B. pannosa* has not been seen, Schwarz's description fits well the white-lanuginose form.

Excluded names

Blumea hieraciifolia var. *holosericea* (DC.) Benth., *Fl. Hongkong.* 178 (1861)

B. holosericea DC., *Prodr.* 5: 442 (1836). T: in India or. prov. Marrabia ad ripas flum. Saluen propi Phanoc, *Wallich*; *n.v.*

This name was misapplied by Bentham to villous Australian specimens collected by R.Brown at Broad Sound, Qld, and by F.Mueller near McAdam Ra., N.T. These specimens are now variously identified as *Blumea axillaris*, *B. lacera*, *B. integrifolia*, *B. saxatilis* and *B. diffusa*.

Blumea solidaginoides (Poir.) DC., *Prodr.* 5: 443 (1836)

Gnaphalium solidaginoides Poir. in J.B.A.P.M.de Lamarck & J.L.M.Poiret, *Encycl. Suppl.* 2(2): 804 (1812). T: Antilles, *herb. Desfontaines*; *n.v.*

The name *B. solidaginoides* has apparently only been used in Australia as a synonym of *B. axillaris*, in J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 936 (1992).

ASTERACEAE

2. DITTRICHIA

Paul G. Wilson

Dittrichia Greuter, *Exsicc. Genav. Conserv. Bot. Distrib. Fasc.* 4: 71 (1973); named after the German botanist Manfred Dittrich (1934–).

Type: *D. viscosa* (L.) Greuter

Cupularia Godr. in J.C.M.Grenier & D.A.Godron, *Fl. France* 2: 180 (1850), *nom. illeg. non* Link (1833). T: not designated.

Glandular puberulous herbs. Leaves alternate, simple, entire or dentate. Capitula small, terminal to branchlets of inflorescence, radiate, heterogamous; involuclral bracts c. 5-seriate, chartaceous; receptacle epaleate. Ray florets female, 1- or 2-seriate; ligule oblong, shortly 3-lobed; achene and pappus as in bisexual florets. Disc florets bisexual; corolla cylindrical, 4- or 5-lobed; anthers with slender branched tails; style branches linear or narrowly oblong, obtuse. Achenes narrowly obovoid or cylindrical with slender bidentate twin hairs and short glandular hairs, slightly constricted below pappus; pericarp papery. Pappus of numerous barbellate bristles connate at base, persistent.

A genus of 2 species, native to the Mediterranean area but now widespread; both species naturalised in Australia.

Leaves narrowly oblong-elliptic to linear; ray florets slightly exceeding involucre

1. *D. graveolens*

Leaves oblong-elliptic, semi-amplexicaul; ray florets well exceeding involucre

2. *D. viscosa*

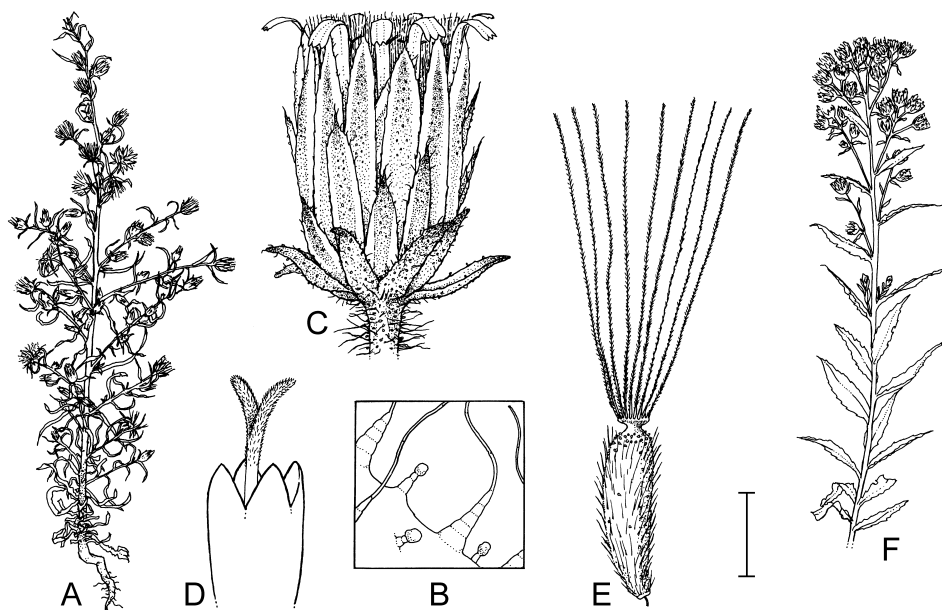


Figure 51. *Dittrichia*. **A–E**, *D. graveolens*. **A**, habit; **B**, hairs on branch; **C**, capitulum; **D**, corolla apex and stigma of bisexual floret; **E**, achene and pappus (**A–E**, G.J.Keighery 8688, PERTH). **F**, *D. viscosa*, habit (K.R.Newbey 11850, PERTH). Scale bar: **A**, **F** = 20 mm; **B** = 0.2 mm; **C** = 2 mm; **D** = 3 mm; **E** = 1 mm. Drawn by A.Menadue.

1. *Dittrichia graveolens (L.) Greuter, *Exsicc. Genav. Conserv. Bot. Distrib. Fasc. 4: 71* (1973)

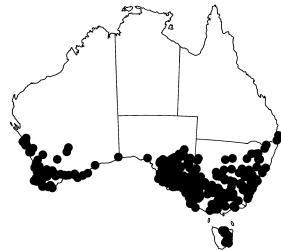
Erigeron graveolens L., *Cent. Pl.* 1: 80 (1755); *Inula graveolens* (L.) Desf., *Fl. Atlant.* 2: 275 (1799). T: Habitat Monspelii [Montpellier], France, *Hasselquist, Herb. Linn. No. 994.4*; lecto: LINN, *fide* A.J.C.Grierson in P.Davis (ed.), *Fl. Turkey* 5: 72 (1975).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1511, fig. 687B (1986); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 725, fig. 140a (1999).

Erect, viscid, aromatic annual, to 40 cm high. Leaves narrowly oblong-elliptic and remotely dentate, to linear and entire, to 4 cm long, glandular-puberulous and sparsely villous. Capitula in an open pyramidal panicle; involucre cylindrical, c. 6–8 mm long, subtended by short foliage leaves; outer bracts lanceolate, recurved, green, glandular and pilose; intermediate bracts narrowly oblong, apiculate, with green glandular stereome and broad scarious margins. Ray florets c. 6, uni-seriate; ligule c. 4 mm long, shortly exceeding bracts, yellow. Disc florets c. 12; corolla shortly 4-lobed, yellow or reddish with age; style branches short, narrowly oblong, obtuse. Achene narrowly obovoid, c. 2 mm long. *Stinkwort*. Fig. 51A–E.

Native to the Mediterranean area; found as a weed of disturbed areas in all States and Territories except N.T. Flowers Mar.–Apr.

W.A.: 10 km S of Mandurah, *G.J.Keighery 8629* (PERTH). S.A.: Waite Inst., Adelaide, *D.E.Symon 1222* (BRI). Qld: Brisbane, Mar. 1917, *C.T.White* (BRI). N.S.W.: Near Paramatta, *C.E.Hubbard 8155* (BRI). A.C.T.: Canberra, *E.M.Canning 6350* (CANB). Vic.: Portland, Gorae West, *A.C.Beauglehole 673* (MEL). Tas.: Bridgewater, *A.M.Buchanan 15699* (HO).



2. *Dittrichia viscosa (L.) Greuter, *Exsicc. Genav. Conserv. Bot. Distrib. Fasc. 4: 71* (1973)

Erigeron viscosus L., *Sp. Pl.* 2: 863 (1753); *Inula viscosa* (L.) Desf., *Fl. Atlant.* 2: 274 (1799). T: Habitat Narbonensi [Narbonne, France], Hispania [Spain], Italia; *Herb. Clifford: 409, Aster 19*; lecto: BM, *fide* N.Turland in C.Jarvis & N.Turland (eds), *Taxon* 47: 360 (1998).

Spreading, virgate, viscid, aromatic, perennial herb to 1.5 m high, glandular-puberulous, villous. Leaves oblong-elliptic, 5–8 cm long, semi-amplexicaul, dentate, acute. Capitula in narrow terminal pyramidal racemes; involucre turbinate, 7–10 mm long; outer bracts lanceolate, green, glandular; intermediate bracts narrowly oblong, apiculate, with green glandular linear stereome and scarious margins. Ray florets c. 13, biseriate; ligule narrowly oblong, 10–13 mm long, considerably exceeding bracts, yellow. Disc florets c. 42; corolla narrowly cylindrical, shortly 5-lobed, yellow; style branches spreading, linear, obtuse. Achene cylindrical, c. 2 mm long, constricted below pappus. Fig. 51F.

Native to southern Europe; naturalised in the far SW of W.A. principally near the coast, colonising disturbed, often wet, areas. Flowers Mar.–July.

W.A.: 2 km S of Jerramungup, *K.R.Newbey 11850* (PERTH); Albany, *R.D.Royce 5034* (PERTH); Walpole-Nornalup Natl Park, *J.R.Wheeler 3870* (PERTH).



ASTERACEAE

3. ASTERISCUS

Paul G. Wilson

Asteriscus Mill., *Gard. Dict. abr.* edn 4, 1 (1754); from the name *Aster* and the Greek suffix *-iscus*, a diminutive.

Type: *A. spinosus* (L.) Sch.Bip.

Pallenis Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 23: 566 (1822). T: *P. spinosa* (L.) Cass.

Shrubs or herbs, villous with soft hairs. Leaves alternate, sessile, semiamplexicaul. Capitula solitary, terminal, radiate; involucre campanulate, subtended by several foliage leaves; bracts 1–4-seriate; outer bracts foliaceous, mucronate or pungent; inner bracts coriaceous with scarious margins; receptacle flat or convex, paleate; paleae folded around disc florets. Ray florets female, ligulate, yellow; pappus of short scales. Disc florets bisexual; corolla narrowly cylindrical, 5-lobed; anthers shortly tailed; style branches semi-terete, obtuse; achene sub-cylindrical or compressed; pappus of triangular scales.

A genus of 3 species of Mediterranean origin; one species naturalised in S.A. and Vic.

A. Wiklund, The genus *Asteriscus* (Asteraceae-Inuleae), *Nordic J. Bot.* 5: 299–314 (1985).

****Asteriscus spinosus* (L.) Sch.Bip.** in P.B.Webb & S.Berthelot, *Hist. Nat. Iles Canaries* 3 (2:2): 230 (1844)

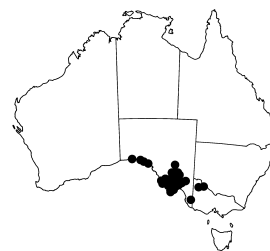
Bupthalmum spinosum L., *Sp. Pl.* 2: 903 (1753); *Pallenis spinosa* (L.) Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 37: 276 (1825). T: *Herb. Clifford p.* 414.10; lecto: BM n.v., fide A. Wiklund, *Nordic J. Bot.* 5: 309 (1985).

Illustration: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1565, fig. 708 (1986) as *Pallenis spinosa*.

Erect branched perennial, villous or becoming glabrous with age. Basal leaves rosetted; stem leaves narrowly obovate, to 10 cm long, auriculate, entire or dentate towards apex, obtuse, mucronulate. Capitula sessile or pedunculate; involucre campanulate; outer bracts c. 7, linear-lanceolate, 1.5–4 cm long, spreading, rigid, hirsute, with pungent mucro; inner bracts 2–3-seriate, oblong, 6–10 mm long, mucronate; paleae firm, navicular, 4–8 mm long, mucronate. Ray florets 25–90, 2- or 3-seriate; corolla tube compressed, narrowly winged; ligule oblong, 3-lobed, yellow. Disc florets 60–250; corolla narrowly winged, pale yellow. Achenes 3-angled, obovoid or compressed, 1–2 mm long, appressed-hispid. Pappus scales numerous, c. 0.5 mm long, acute. Fig. 52A–F.

Native to southern Europe and SW Asia from the Canary Is to Iran. Naturalised in southern S.A. and NW Vic. as a roadside weed. Flowers Nov.–May.

S.A.: Mount Dutton Bay, *C.R.Alcock 6686* (AD); Thrington, *B.Copley 156* (AD); 7 km E of Truro, *D.E.Symon 14232* (BRI). Vic.: 20 km E of Ouyen, Dec. 1992, *N.Vallance* (MEL).



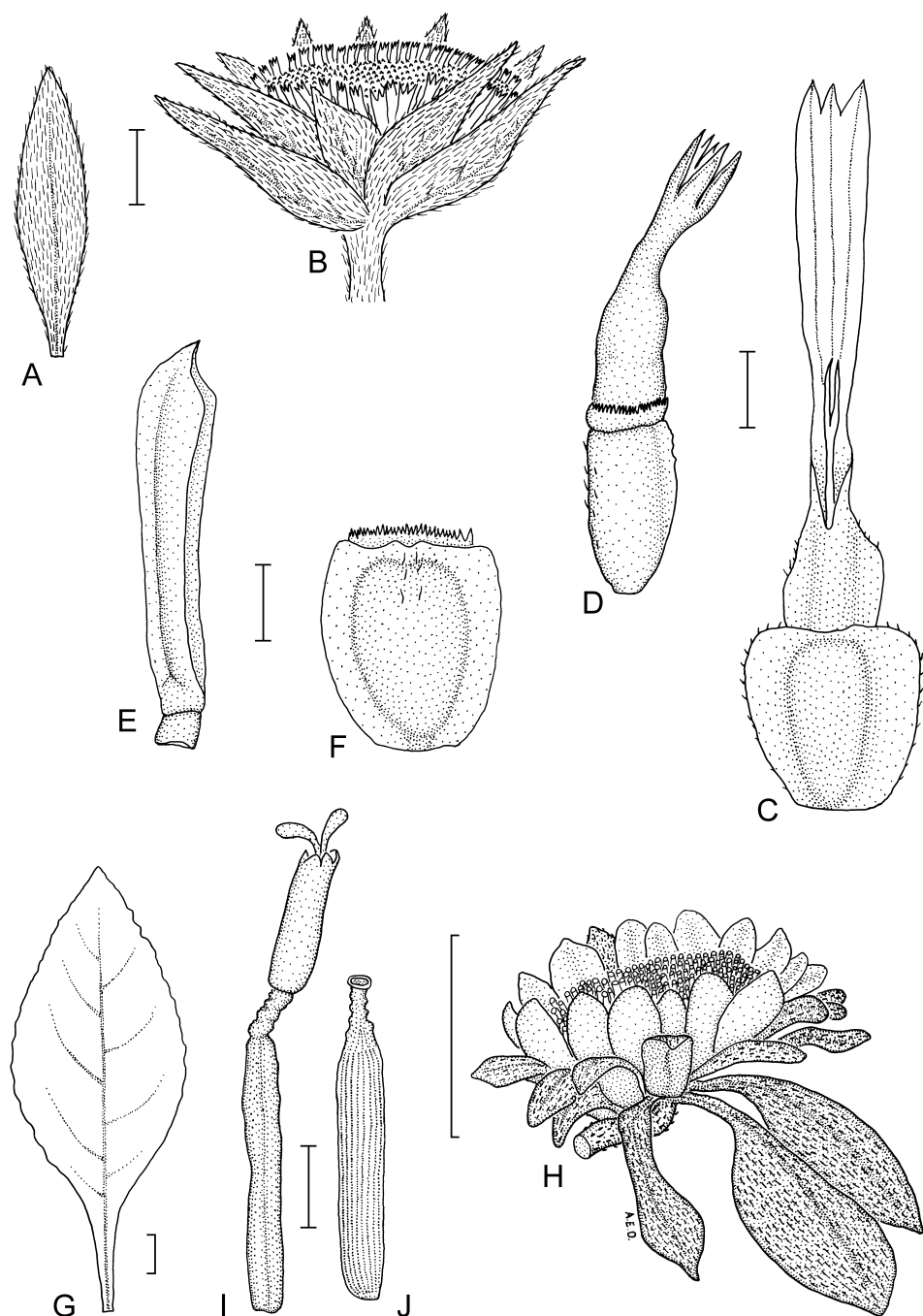


Figure 52. A–F, *Asteriscus spinosus*. A, leaf; B, capitulum; C, ray floret; D, disc floret; E, palea; F, achene (A–E, M.D.Crisp 4706, CBG; F, G.Hollamby *s.n.*, CANB298241). G–J, *Carpesium cernuum*. G, leaf; H, capitulum; I, floret; J, achene. (G–J, R.Henderson H364, CANB). Scale bars: A, B, G, H = 1 cm; C–F, I, J = 1 mm. Drawn by A.E.Orchard.

ASTERACEAE

4. CARPESIUM

Paul G. Wilson

Carpesium L., *Sp. Pl.* 2: 859 (1753); *Gen. Pl.* 5th edn 369 (1754); from the Greek *karpesion*, a name given to an aromatic plant.

Type: *C. cernuum* L.

Annual, biennial or perennial herbs. Leaves alternate, petiolate, simple, pubescent. Capitula usually solitary, axillary or terminal, discoid, heterogamous; involucre mostly campanulate; bracts 3-seriate; outer bracts herbaceous towards apex; inner bracts coriaceous to scarious; receptacle honeycombed, epaleate, flat or convex. Outer florets female, in several rows; corolla tubular, yellow. Inner florets bisexual; corolla tubular with funnel-shaped limb, 5-lobed, yellow; anthers tailed; style branches linear-spathulate, obtuse. Achene ellipsoid, narrowed above into a neck, prominently ribbed, glabrous, with sessile spherical glands. Pappus absent.

A genus of about 25 species, native to southern Europe eastwards to eastern Asia; one species in eastern Australia where probably introduced.

**Carpesium cernuum* L., *Sp. Pl.* 2: 859 (1753)

T: Italy, *Herb. LINN 991.1*; lecto: LINN, *vide* A.J.C.Grierson in M.D.Dassanayake & F.R.Fosberg (eds), *Revised Handb. Fl. Ceylon* 1: 201 (1980).

C. cernuum var. *queenslandicum* Domin, *Biblioth. Bot.* 89: 1232 (1930). T: Tweed R., Qld, *Dr J.Shirley*; holo: PR? *n.v.*

Illustration: G.J.Harden (ed.), *Fl. New South Wales* 3: 266 (1992).

Annual or biennial herb 20–50 cm high with cottony branches. Leaves broadly elliptic to obovate, slightly dentate, appressed-cottony, glandular; lower leaves slender-petiolate, to 12 cm long; upper leaves sessile, to 5 cm long. Capitula terminal, nodding, subtended by several small leaves; involucre campanulate, c. 2 cm diam.; outer bracts recurved, narrowly spatulate, c. 10 mm long, herbaceous, pubescent; inner bracts coriaceous with scarious denticulate margins, glabrous. Female florets multiseriate; corolla c. 2 mm long. Bisexual florets numerous; corolla c. 2.5 mm long with short tube and expanded limb; lobes glandular abaxially. Achene c. 5 mm long with densely glandular neck. Fig. 52G–J.

Native to southern Europe and western Asia; naturalised in NE N.S.W. and eastern Qld where found in eucalypt forests and roadsides. Flowers Nov.–May.

Qld: Mt Wilson, *R.Henderson* 364 (BRI); Numinbah, *C.T.White* 10229 (BRI). N.S.W.: Ewingar State Forest, *A.Benwell* 22 (NSW); Tweed Heads, Jan. 1908, *J.Keys* (BRI).



Subtrib. 2. PLUCHEINAE

A.E.Orchard

(*Authors of genera as indicated*)

Asteraceae subtrib. *Plucheinae* Dumort., *Anal. Fam. Pl.* 31 (1829), as *Plucheae*

Type: *Pluchea* Cass.

Capitula usually disciform (miniradiata in *Streptoglossa*, *Allopterigeron*). Florets usually pink to purple, rarely white; sweeping hairs on style frequently obtuse and extending below bifurcation. Achenes lacking an elongated crystal in epidermal cells.

ASTERACEAE

A subtribe of 34 genera and c. 273 species, found worldwide, but with a large number of taxa in Africa and smaller numbers in the Americas, Asia and Australasia. Ten genera and 50 species in Australia, all native.

A. Anderberg, Taxonomy and Phylogeny of the Tribe Plucheeae (Asteraceae), *Pl. Syst. Evol.* 176: 145–177 (1991).

KEY TO GENERA

- 1 Capitula in congested spherical or spike-like or raceme-like secondary heads
 - 2 Pappus of capillary bristles **2. PTEROCAULON**
 - 2: Pappus absent **8. SPHAERANTHUS**
- 1: Capitula solitary, or if congested, not in spherical, spike-like or raceme-like secondary heads
 - 3 Functionally dioecious shrubs **1. CRATYSTYLIS**
 - 3: Herbs or subshrubs, monoecious
 - 4 Capitula disciform with filiform female florets
 - 5 Pappus of capillary bristles **5. PLUCHEA**
 - 5: Pappus absent, a short rim, or a few scale-like bristles
 - 6 Capitula axillary near base of stem; achenes with uncinat hairs **6. THESPIDIUM**
 - 6: Capitula not axillary near base of stem; achenes lacking uncinat hairs
 - 7 Pappus of 10 or more scale-like bristles connate into a basal tube **7. COLEOCOMA**
 - 7: Pappus a small corona, sometimes with 1–6 bristles
 - 8 Corolla pink to purple; achenes cylindrical **3. SPHAEROMORPHAEA**
 - 8: Corolla white; achenes lunate **4. ETHULIOPSIS**
 - 4: Capitula radiate or disciform with minutely radiate or almost tubular female florets
 - 9 Florets numerous (15–190); disc florets bisexual, with corolla 4- or 5-lobed, style branches free, and anthers tailed **9. STREPTOGLOSSA**
 - 9: Florets few (c. 6); disc florets sterile, with corolla 3-lobed, style branches fused, and anthers tailless **10. ALLOPTERIGERON**

1. CRATYSTYLIS

Paul G. Wilson

Cratystylis S.Moore, *J. Bot.* 43: 138 (1905); from the Greek *cratys* (strong) and *stylos* (style), referring to the thick, solid style branches.

Type: *C. conocephala* (F.Muell.) S.Moore

Stera Ewart, *Proc. Roy. Soc. Victoria* ser. 2, 24: 263, t. 55 (1912). T: not indicated.

Shrubs, dioecious. Leaves crowded, alternate, simple, small, entire, pubescent. Capitula terminal, sessile, homogamous, discoid; involucre cylindrical or turbinate; bracts imbricate in several rows, oblong, cartilaginous, the inner recurved when mature, deciduous; receptacle small, naked. Florets 1–5 (–6). Male florets: corolla slender-terete, dilated above, with 5 narrow oblong acute lobes, glabrous; style branches exerted, appressed to each other; anthers shortly exerted with appendages lanceolate, base calcarate or tailed; achene abortive; pappus bristles numerous, shortly plumose or scabrid. Female florets: corolla

slender-terete; staminodes minute, enclosed; style branches spreading, narrowly semiterete, papillose externally with a thick vascular strand; achene narrowly cylindrical, multinerved, glabrous or sparsely glandular. Pappus of barbellate bristles.

A genus of 4 species endemic in southern and central Australia.

The fertile anthers in *C. centralis*, *C. conocephala* and *C. microphylla* are calcarate and, if tailed, only minutely so, whereas in *C. subspinescens* the anthers have prominent tails.

G.J.Keighery, Dioecy in *Cratystylis* S.Moore (Asteraceae-Inuleae), *Flora* 175: 75–77 (1984); A.A.Anderberg, P.Karis & G.El-Ghazaly, *Cratystylis*, an isolated genus of the Asteraceae-Cichorioideae, *Austral. Syst. Bot.* 5: 81–94 (1992); P.G.Wilson & D.Albrecht, Notes on the genus *Cratystylis* (Asteraceae), including one new species, *Nuytsia* 14: 445–452 (2002).

- | | | |
|----|--|--|
| 1 | Plant appressed-villous with medifixed hairs; branchlets spinescent | 4. <i>C. subspinescens</i> |
| 1: | Plant tomentose, sometimes minutely so; branchlets not spinescent | |
| 2 | Glandular hairs seemingly absent (involucral bracts resinous); leaves obovate, spreading, 5–10 mm long; capitula (4) 5 (6)-flowered | 1. <i>C. conocephala</i> |
| 2: | Globular sessile glandular hairs obvious; leaves from subterete and appressed to spatulate and spreading; capitula 1–4-flowered | |
| 3 | Leaves 1–2 mm long, semi-terete, closely appressed to branch, resinous; capitula 1-flowered | 2. <i>C. microphylla</i> |
| 3: | Leaves 2–6 mm long, elliptic to obovate or narrowly so, not closely appressed to branch, tomentose to somewhat resinous; capitula 2–4-flowered | |
| 4 | Capitula 2-flowered [W.A.] | <i>C. conocephala</i>
× <i>C. microphylla</i> |
| 4: | Capitula 3- or 4-flowered [N.T.] | 3. <i>C. centralis</i> |

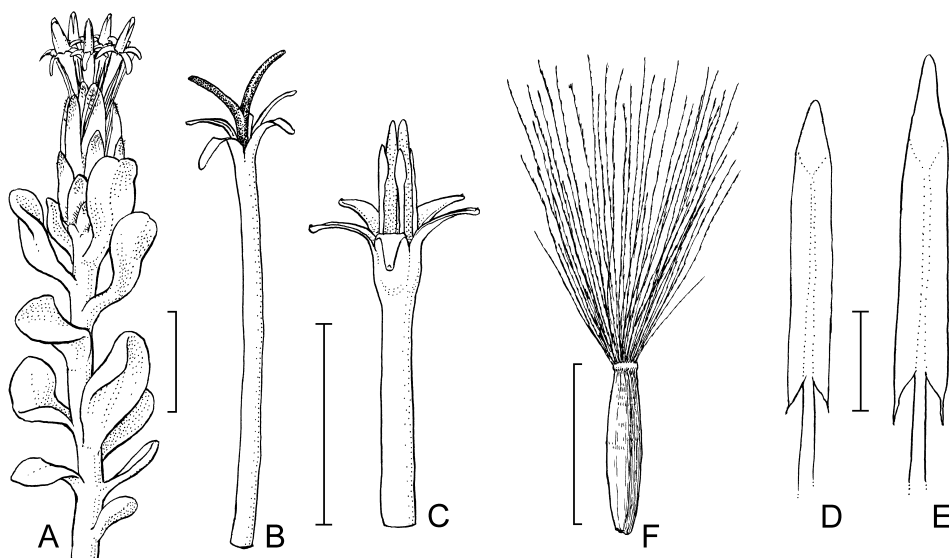


Figure 53. *Cratystylis conocephala*. **A**, flowering branchlet, male; **B**, female corolla; **C**, male corolla; **D**, antherode; **E**, anther; **F**, achene and pappus (**A**, **C**, **E**, **F**, K.Newbey 8106, PERTH; **B**, **D**, N.N.Donner 3100, PERTH). Scale bars: **A–E** = 5 mm. Drawn by A.Menadue.

1. *Cratystylis conocephala* (F.Muell.) S.Moore, *J. Bot.* 43: 138 (1905)

Eurybia conocephala F.Muell., *Trans. & Proc. Vict. Inst. Advancem. Sci.* 36 (1855); *Aster conocephala* (F.Muell.) F.Muell., *Fragm.* 5: 79 (1865); *Olearia conocephala* (F.Muell.) Benth., *Fl. Austral.* 3: 480 (1867); *Pluchea conocephala* (F.Muell.) F.Muell., *Bot. Centralbl.* 32: 150 (1887); *Stera conocephala* (F.Muell.) Ewart & B.Rees, *Proc. Roy. Soc. Victoria* ser. 2, 24: 264 (1912). T: Near Morunde, Murray R., S.A., Oct. 1848, *F.Mueller*; lecto: MEL, *fide* P.G.Wilson & D.E.Albrecht, *Nuytsia* 14: 450 (2002); Desert of the Murray River, S.A., 1848, *F.Mueller*, syn: MEL.

Pteronia australiensis J.Hutchinson, *Biol. Meddel. Kongel. Danske Vidensk. Selsk.* 3: 131 (1921). T: Kalgoorlie, W.A., 7 Oct. 1914, *C.H.Ostenfeld* 858; holo: C, photo seen; iso: PERTH.

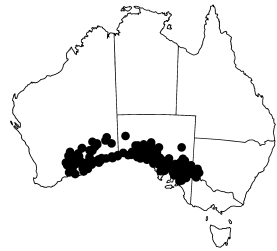
Illustration: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: fig. 687A (1986).

Rounded densely branched shrub to 1 m tall, finely grey-tomentose with curled hairs; branchlets not spinescent. Leaves congested, spreading, obovate, 5–10 mm long, cuneate basally, obtuse to rounded apically, leathery, not resinous. Involucre narrowly cylindrical, spreading above, c. 10 mm long; bracts scarious, pale green with darker tips, sparsely tomentose, markedly ciliate, pale yellow-resinous. Florets (4) 5 (6); corolla c. 10 mm long, white. Male florets: anthers partly exserted, calcarate but not tailed; sterile achene c. 3 mm long. Female florets: style branches spreading; achene narrowly cylindrical, 6–7 mm long, glabrous; pappus bristles shortly plumose, \pm equal to corolla. *Bluebush*, *Bluebush Daisy*. Fig. 53.

Occurs in SE W.A., southern S.A., far SW N.S.W., and far NW Vic.; usually growing in mallee woodland in calcareous soil. Flowers Sept.–Nov.

W.A.: 1 mile [c. 1.6 km] N of Mundrabilla HS, *A.S.George* 8538 (PERTH); Norseman, *K.Newbey* 6287 (PERTH). S.A.: 15 km S of Port Wakefield, *T.R.N.Lothian* 1502 (AD). N.S.W.: Garston Stn, *G.Harrington* 1460 (NSW). Vic.: 13 km SW of Werimull, Oct. 1989, *D.Parkes et al.* (MEL).

Male plants usually predominate in a population by a ratio of about 6:1 (Keighery, 1984).



2. *Cratystylis microphylla* S.Moore, *J. Bot.* 43: 139 (1905)

T: Near L. Lefroy, W.A., *R.Helms*; lecto: K, *fide* P.G.Wilson & D.E.Albrecht, *Nuytsia* 14: 451 (2002); isolecto: PERTH.

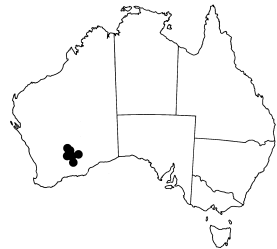
Pluchea conocephala var. *microphylla* F.Muell. & Tate, *Trans. Proc. & Rep. Roy. Soc. S. Australia* 16: 365 (1896) *p.p.*, *nom. inval.*, *nom. nud.*

Illustration: B.J.Grieve & W.E.Blackall, *How to Know W. Austral. Wildfl.* IV: 836 (1975).

Rounded densely branched shrub to 1 m tall, finely tomentose; branchlets not spinescent. Leaves congested, erect and appressed to branch, semiterete, 1–2 mm long, finely grey-tomentose, resinous. Involucre narrowly cylindrical, spreading above, c. 10 mm long; bracts scarious with green tip, sparsely tomentose, markedly ciliate, pale yellow-resinous. Floret 1; corolla c. 10 mm long, white. Male floret: anthers partly exserted, calcarate but not tailed; sterile achene c. 3 mm long. Female floret: style branches spreading; achene narrowly cylindrical, c. 5 mm long, glabrous; pappus bristles sparsely denticulate or smooth towards apex, equal to or slightly shorter than corolla.

Occurs in inland W.A. from c. 100 km N of Kalgoorlie S to Norseman and E to Karonie; growing in eucalypt or *Acacia* woodland or saltbush shrubland in reddish soil, calcareous or somewhat saline. Flowers Sept.–Nov.

W.A.: 21 km N of Kalgoorlie, *B.Nordenstam & A.Anderberg* 613 (PERTH); L. Lefroy, *R.Coveny* 8432 (PERTH); 26 km SE of Karonie, *K.R.Newbey* 8507 (PERTH).



3. *Cratystylis centralis* Albr. & Paul G.Wilson in P.G.Wilson & D.E.Albrecht, *Nuytsia* 14: 447 (2002)

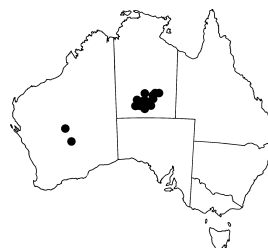
T: 2 km WNW of Glen Helen, West MacDonnell Natl Park, N.T., 16 Oct. 1997, *M.J.A.Barritt 3000*; holo: NT; iso: PERTH.

Illustration: P.G.Wilson & D.E.Albrecht, *op. cit.* 448, fig. 1A–C.

Much-branched, brittle, greyish shrub to 1 m tall, sparsely tomentose; branchlets not spinescent. Leaves not congested, spreading, narrowly obovate to spatulate, 3–6 mm long, covered with small globular glands and a thin greyish tomentum. Involucre narrowly turbinate, c. 10 mm long; bracts cartilaginous, woolly-ciliate, resinous and shortly tomentose towards apex. Florets 3 or 4; corolla c. 4.5 mm long, white. Male florets: anthers calcarate and very shortly tailed; sterile achene c. 2 mm long. Female florets: style branches spreading; achene narrowly cylindrical, c. 3 mm long (not seen in mature state); pappus bristles densely barbellate to apex, c. $\frac{2}{3}$ length of corolla.

Occurs in central W.A. and the central northern and central southern regions of N.T. Principally found in breakaway country on leached or somewhat saline soil. Flowers mainly Aug.–Nov.

W.A.: Leonora–Laverton road, *P.G.Armstrong 07897* (PERTH). N.T.: Waterhouse Ra., 23 Oct. 1991, *G.Griffin s.n.* (DNA); Tylers Pass, *P.K.Latz 10263* (DNA, MEL); 4 km S of Alkara Bore, Mt Riddock Stn, *B.W.Strong 779* (NT).



4. *Cratystylis subspinescens* S.Moore, *J. Bot.* 43: 139 (1905)

T: Near Hunt's Well, W.A., 8 Nov. 1891, *R.Helms s.n.*; holo: K n.v.; iso: C (fragment), photo seen.

Stera subspinescens Ewart & B.Rees, *Proc. Roy. Soc. Victoria* ser. 2, 24: 265 (1912). T: L. Lefroy, W.A., Dec. 1891, *R.Helms s.n.*; n.v.

Pluchea conocephala var. *subspinescens* F.Muell. & Tate, *Trans. Proc. & Rep. Roy. Soc. S. Australia* 16: 365 (1896), *nom. inval.*, *nom. nud.*

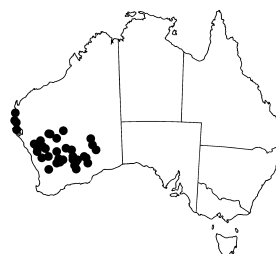
Illustration: B.J.Grieve & W.E.Blackall, *How to Know W. Austral. Wildflowers* IV: 836 (1975).

Rounded, divaricately branched, grey shrub to 1 m tall; hairs appressed-villous, medifixed; branchlets spinescent. Leaves well-spaced, spreading, narrowly elliptic to narrowly spatulate, 3–12 mm long, appressed-villous with medifixed hairs (not resinous). Female involucre narrowly cylindrical, c. 10 mm long; bracts scarious, pale green, appressed-villous, ciliate, not resinous. Male involucre similar but turbinate, with bracts spreading above. Florets 3–6; corolla c. 10 mm long, white fading to pink. Male florets: anthers partly exserted, calcarate and conspicuously tailed; sterile achene c. 1 mm long. Female florets: style branches spreading; achene narrowly cylindrical, c. 6 mm long, with sessile globular glands; pappus bristles scabrid, \pm equal to corolla.

Found in semiarid areas of W.A., from the central west coast at Pt Quobba SE to Kalgoorlie and eastwards to Plumridge Lake; associated with calcareous or saline soil and frequently found around salt lakes, sometimes forming a dominant cover in saltbush steppe. Flowers Sept.–Nov.

W.A.: Mt Jackson, *G.J.Keighery 4377A* (PERTH); Queen Victoria Spring, *D.J.Pearson 3135* (PERTH); 56 km N of Cleary, *P.S.Short 2382* (PERTH); 6 km E of Carnarvon, *P.G.Wilson 12696* (PERTH).

P.S.Short (*in sched.*) has indicated that at one locality male plants outnumber females by 10:1. While Keighery (1984) recorded sex ratios of 1 female to 1.5–2 males, he also noted that new plants form from root buds, giving rise to clumps of male or female shrubs, and suggested that this would affect the apparent sex ratios.



Natural Hybrid

Cratystylis conocephala × C. microphylla

Stera microphylla Ewart & B.Rees, *Proc. Roy. Soc. Victoria* ser. 2, 24: 264, t. 55, fig. b (1912). T: L. Lefroy, W.A., 7 Nov. 1891, *R.Helms*; holo: MEL; iso: BM.

Pluchea conocephala var. *microphylla* F.Muell. & Tate, *Trans. Proc. & Rep. Roy Soc. S. Australia* 16: 365 (1896), *p.p.*, *nom. inval.*, *nom. nud.*

[*Cratystylis microphylla* auct. non S.Moore: S.Moore, *J. Bot.* 43: 139 (1905), *p.p.*, as to LH specimen on type sheet; excl. lectotype]

Leaves somewhat spreading, elliptic to obovate, 2–4 mm long, tomentose, somewhat glandular with globular sessile hairs. Capitula 2-flowered. Pappus bristles very shortly plumose to apex.

Found in southern central W.A. between Coolgardie and Norseman.

W.A.: 5 km E of Norseman, *P.G.Wilson 6044 bis* (PERTH); 30 km SSW of Coolgardie, *A.Chapman & G.Landwehr 5/91* (PERTH); Three Mile Hill, Coolgardie, *J.Bale 44* (PERTH).

Intermediate in morphology between *C. microphylla* and *C. conocephala* and presumably of hybrid origin since both these species grow in areas where it is found.

2. PTEROCAULON*A.R.Bean*

Pterocaulon Elliott, *Sketch Bot. S. Carolina [Elliott]* 2: 323 (1823); from the Greek *pteron* (wing) and *kaulos* (stem), alluding to the decurrent wings at the base of the leaves.

Type: *P. pycnostachyum* (Michaux) Elliott

Annually resprouting or perennial forbs or shrubs, often aromatic. Stems conspicuously winged due to decurrent leaf margins, with wings extending for 1 and 2 nodes. Leaves alternate, sessile, decurrent; indumentum of uniseriate, multicellular hairs; broad-based glandular hairs sometimes present; lower surface with yellow shining globose sessile glands. Capitula aggregated in dense, terminal (but appearing sessile and axillary in some species due to shallow angle of branching and lateral displacement of inflorescence), monochasially cymose inflorescences, globose, ellipsoid, cylindrical or spiciform; involucre bracts in 2 series; outer bracts persistent, all similar in size, lanate-hairy and sometimes glandular-hairy; inner bracts caducous, with ±straight, spreading to antrorse marginal cilia; receptacle epaleate, glabrous. Outer florets female, numerous, filiform, pink to purple. Disc floret hermaphrodite, functionally male, solitary (rarely 2), tubular, pink to purple; corolla 5-lobed; anthers tailed; style bifid. Achenes narrowly ellipsoid to obovoid, with a conspicuous white ring-shaped carpodium; twin hairs antrorse, appressed. Pappus a single row of barbellate capillary bristles, united at base, persistent.

A genus of 26 species in N and S America, Asia, Malesia, Melanesia and Australia; 13 species native in Australia.

All Australian species belong to *Pterocaulon* sect. *Monenteles* (Labill.) Kuntze.

A.L.Cabrera & A.M.Ragonese, Revisión del género *Pterocaulon* (Compositae), *Darwiniana* 21: 185–257 (1978); A.J.G.Wilson, *Pterocaulon* in J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 951–954 (1992); A.R.Bean, A taxonomic revision of *Pterocaulon* sect. *Monenteles* (Labill.) Kuntze (Asteraceae: Inuleae-Pluchaeinae), *Austrobaileya* 8: 280–334 (2011).

- 1 Inflorescences globose to ellipsoid, 0.7–2.1 times longer than wide
- 2 Some inflorescences on each plant appearing axillary or laterally placed
- 3 Stem wings broad, 2.8–5.5 mm wide **6. *P. tricholobum***
- 3: Stem wings narrow, 0.3–2 mm wide
- 4 Upper leaf surface with dense to very dense lanate indumentum; inner involucre bracts pink in dried specimens **9. *P. niveum***
- 4: Upper leaf surface with sparse lanate indumentum; inner involucre bracts white in dried specimens
- 5 Inflorescences 11–13 mm wide; pappus 2.6–3.4 mm long **7. *P. discolor***
- 5: Inflorescences 8.5–10 mm wide; pappus 1.3–1.8 mm long **8. *P. globuliflorum***
- 2: All inflorescences terminal with side branchlets diverging at 20–90°
- 6 Stem wings serrate or dentate
- 7 Leaf upper surface conspicuously bullate; few or no cilia visible on protruding part of inner involucre bracts; inner bracts pink **3. *P. sphaeranthoides***
- 7: Leaf upper surface not or scarcely bullate; many cilia visible on protruding part of inner involucre bracts; inner bracts white or greenish white **11. *P. serrulatum***
- 6: Stem wings entire or sparsely toothed
- 8 Female florets 8–17 per capitulum; achenes hairs 1–25; leaves narrowly elliptic to elliptic, broadest near middle **5. *P. intermedium***
- 8: Female florets 16–44 per capitulum; achenes hairs 25–50 or more; leaves oblanceolate to obovate, broadest towards apex
- 9 Corolla lobes of hermaphrodite floret 0.5–0.8 mm long; numerous cilia visible on protruding part of inner involucre bracts, but none exceeding apices **4. *P. paradoxum***
- 9: Corolla lobes of hermaphrodite floret 0.35–0.6 mm long; cilia on protruding part of inner involucre bracts either few or absent, or cilia abundant with some exceeding bract apices
- 10 Stem wings 0.3–0.5 mm wide; longest inner involucre bracts 4.8–5.6 mm long **10. *P. xenicum***
- 10: Stem wings 0.7–3 mm wide; longest inner involucre bracts 3.4–4.6 mm long
- 11 Protruding part of inner involucre bracts with abundant cilia, some exceeding bract apices; inner bracts straw coloured; leaves 2.1–3.5 times longer than wide **1. *P. ciliosum***
- 11: Protruding part of inner involucre bracts with few or no cilia; inner bracts pink to violet; leaves 3.3–5.8 times longer than wide **2. *P. sphacelatum***
- 1: Inflorescences cylindrical or spicate, 2.2–5.8 times longer than wide
- 12 Stem wings serrate; achenes 0.7–1 mm long; outer involucre bracts with broad-based glandular hairs and lanate hairs **11. *P. serrulatum***
- 12: Stem wings entire; achenes 0.5–0.7 mm or 1.1–1.3 mm long; outer involucre bracts with lanate hairs only
- 13 Inflorescences 8–14 mm wide at anthesis; hermaphrodite corolla 2.5–3 mm long; achenes 0.5–0.7 mm long **12. *P. redolens***
- 13: Inflorescences 17–30 mm wide at anthesis; hermaphrodite corolla 4–6.5 mm long; achenes 1.1–1.3 mm long **13. *P. verbascifolium***

1. *Pterocaulon ciliosum* A.R.Bean, *Austrobaileya* 8: 291 (2011)

T: 7.1 km by road NNW of Kalpowar Railway Station towards Many Peaks, Qld, 30 Aug. 1975, *R.Coveny 6847* & *P.Hind*; holotype: BRI; isotype: L, NSW.

Illustrations: A.R.Bean, *op. cit.* 285, fig. 2B; 286, fig. 4E–H; 292, fig. 5.

Shrub 40–100 cm high; branches diverging at 30–90°; stem wings entire, 1.2–3.0 mm wide. Leaves oblanceolate to obovate, 32–56 mm long, 11–21 mm wide, 2.1–3.5 times longer than wide; glandular hairs absent; upper surface moderately bullate; lanate hairs sparse to moderately dense on upper surface, moderately dense to dense on lower surface. Inflorescences globose to ellipsoid, 10–16 mm long, 10–13 mm wide at anthesis, 0.9–1.2 times longer than wide; peduncles 0–7 mm long. Longest inner bracts 3.4–4.3 mm long; many cilia visible. Female florets 16–23; corolla 2.2–3.0 mm long. Hermaphrodite floret solitary; corolla 2.9–3.5 mm long; corolla lobes 0.35–0.5 mm long, with globose sessile glands present and eglandular trichomes absent or present. Achenes 0.7–0.9 mm long, with 25–50 twin hairs. Pappus 2.3–3.1 mm long.

Occurs throughout eastern Qld, S to Brisbane, also in NE N.T., on sandy to clayey soils where drainage is good. Also known from the island of Flores in Indonesia. Flowers and fruits Apr.–Oct.

N.T.: 8.7 miles [c. 14 km] S of Dunmurra, *G.M.Chippendale 3751* (BRI, CANB, DNA); Caledon Bay, *P.K.Latz 2691* (DNA). Qld: near junction of Delubra and Cadarga Creeks, 35 km SW of Mundubbera, *A.R.Bean 27963* (BRI); 10 km S of Isla Gorge lookout, 37 km S of Theodore, *L.A.Johnson 7169* & *B.Briggs* (BRI, NSW); Spear Ck, c. 1 mile [1.6 km] N of Mt Molloy, *R.Schodde 3355* (A, AD, B, BRI, E, L).



Distinguished from *P. sphacelatum* by the many cilia surrounding the inner involucre bracts, the often straw-coloured involucre bracts, and the broader leaves.

2. *Pterocaulon sphacelatum* (Labill.) F.Muell., *Syst. Census Austral. Pl.* 79 (1882)

Monoteles sphacelatus Labill., *Sert. Austro-Caledon.* 43 (1825). T: New Caledonia, [June 1792], *J.J.H.Labillardière s.n.*; lectotype: FI, *fide* A.R.Bean, *Austrobaileya* 8: 314 (2011); isotype: FI, P.

Illustrations: G.J.Harden (ed.), *Fl. New South Wales* 3: 204 (1992); J.Milson, *Pasture Pl. NW Queensland* 21 (2000); P.Moore, *Guide Pl. Inland Australia* 126 (2005).

Shrub 40–100 cm high; branches diverging at 30–60°; stem wings entire or sparsely toothed, 0.7–2.0 mm wide. Leaves oblanceolate to obovate, 20–66 mm long, 4–15 mm wide, 3.3–5.8 times longer than wide; glandular hairs absent; upper surface moderately bullate; lanate hairs sparse to moderately dense on upper surface, moderately dense to dense on lower surface. Inflorescences globose or ellipsoid, 10–15 mm long, 10–14 mm wide at anthesis, 1–1.4 times longer than wide; peduncles 0–22 mm long. Longest inner bracts 3.5–4.6 mm long; few or no cilia visible. Female florets 17–29; corolla 2.4–3.2 mm long. Hermaphrodite floret solitary; corolla 2.5–3.7 mm long; corolla lobes 0.4–0.6 mm long, with globose sessile glands present and eglandular trichomes absent. Achenes 0.7–1.0 mm long, with 25–50 twin hairs. Pappus 2.3–3.3 mm long. *n* = 10, K.Watanabe *et al.*, *Austral. Syst. Bot.* 12: 790 (1999). *Fruit Salad Plant*, *Apple Bush*.

Occurs throughout the drier parts of Australia, absent only from A.C.T., Vic. and Tas. Grows on a wide range of soils, geologies and landforms. In arid areas, it is found mostly near creeks and lakes. Also occurs in New Caledonia and Timor. Flowers and fruits June–Oct. (northern parts) and Aug.–Dec. (southern parts).

W.A.: Rocky Pool, Gascoyne R., c. 850 km N of Perth, *K.F.Kenneally 4641* (PERTH). N.T.: c. 4.5 km by road N of Gilbert Ck crossing by Stuart Hwy, between Wauchope and Tennant Creek, *N.N.Donner 6232* (AD, CANB, NT). S.A.: Stuart Ck, 18 km WSW of Stuart Creek HS, *F.J.Badman 1597* (AD, DNA). Qld: 32 km N of Bedourie along road to Boulia, *D.Halford Q2626* (BRI). N.S.W.: Homestead Gorge, Mootwingee Natl Park, 112 km NE of Broken Hill, *I.Crawford 1028* (AD, CANB, NSW).



The most widespread and variable species of *Pterocaulon* in Australia.

3. *Pterocaulon sphaeranthoides* (DC.) F.Muell., *Syst. Census Austral. Pl.* 79 (1882)

Monenteles sphaeranthoides DC., *Prodr.* 5: 456 (1836). T: Enderby Is., Dampier Archipelago [W.A.], 25 Feb. 1818, *A. Cunningham s.n.*; holo: G-DC; iso: BM, K, PERTH.

Illustrations: A.R.Bean, *Austrobaileya* 8: 313, fig. 16 I–L; 318, fig. 18 (2011).

Shrub 30–120 cm high; branches diverging at 30–60°; stem wings prominently toothed, 0.5–3 (–4) mm wide. Leaves narrowly oblanceolate to linear, 12–48 mm long, 2–10 mm wide, 3.5–13 times longer than wide; glandular hairs present; upper surface conspicuously bullate; lanate hairs absent or sparse on both surfaces. Inflorescences globose, 11–16 mm long, 11–14 mm wide at anthesis, 1–1.2 times longer than wide; peduncles 1–20 mm long. Longest inner bracts 3.5–4.0 mm long; few or no cilia visible. Female florets 14–20; corolla 2.3–2.8 mm long. Hermaphrodite floret 1, rarely 2; corolla 2.7–3.4 mm long; corolla lobes 0.4–0.5 mm long, with globose sessile glands present and eglandular trichomes absent. Achenes 0.8–0.95 mm long, with 25–50 twin hairs. Pappus 2.2–2.9 mm long.

Endemic to W.A., where it is common along coastal parts of the Pilbara region, but also with scattered occurrences further inland. It grows in grassland or shrubland on coastal sand dunes, rocky hillsides or rocky water-courses. Flowers and fruits June–Dec.

W.A.: Yardie Ck, Cape Range Natl Park, *J.J.Alford 816* (PERTH); Rosemary Is., Dampier Archipelago, *R.D.Royce 7451* (PERTH); Karrawingina Pool, Harding R., *A.S.Weston 12772* (PERTH).

Distinctive because of its bright-green foliage and blistered upper leaf surface.



4. *Pterocaulon paradoxum* A.R.Bean, *Austrobaileya* 8: 303 (2011)

T: 15 km ESE of Winnama yards by Samin mining exploration track, c. 8 km E Palms yard, SE Kimberley, W.A., 15 May 1984, *S.J.Forbes 2017*; holo: DNA; iso: CANB, MEL.

Illustrations: K.F.Kenneally *et al.*, *Broome & Beyond* 67 (1996), as *P. sphacelatum*; A.R.Bean, *op. cit.* 302, fig. 11E–H; 304, fig. 12.

Shrub 60–120 cm high; branches diverging at 20–50°; stem wings entire, 1.5–4.5 mm wide. Leaves oblanceolate to obovate, 30–65 mm long, 10–20 mm wide, 2.6–4.6 times longer than wide; glandular hairs absent; upper surface moderately bullate; lanate hairs moderately dense to very dense on upper surface, dense to very dense on lower surface. Inflorescences ellipsoid, 14–28 mm long, 12–15 mm wide at anthesis, 1.2–2.1 times longer than wide; peduncles 0–20 mm long. Longest inner bracts 3.5–4.8 mm long; many cilia visible. Female florets 18–24; corolla 2.5–3.4 mm long. Hermaphrodite floret solitary; corolla 2.9–3.7 mm long; corolla lobes 0.5–0.8 mm long, with globose sessile glands present and eglandular trichomes absent. Achenes 0.9–1.2 mm long, with 25–50 or more twin hairs. Pappus 2.5–3.5 mm long.

Found throughout the northern Kimberley region of W.A., and along the N coast of N.T.; also recorded from P.N.G. It inhabits alluvial flats, scree slopes or coastal dunes, where the soils are relatively sandy. Flowers and fruits Apr.–Sept.

W.A.: upper reaches of Barker R., 2 km N of Mount Hart HS, *D.J.Edinger 423* (BRI, PERTH); King Edward R., 100 km S of Kalumburu, *G.J.Keighery 9018* (PERTH). N.T.: Middle Beach swamp, West Alligator Head, *K.Brennan Bre646* (DNA); near Maningrida, Anamayirra Ck, *I.D.Cowie 5909* (CANB, DNA, MEL).

The inflorescences in this species may be almost globular, or markedly ellipsoid.



5. *Pterocaulon intermedium* (DC.) A.R.Bean, *Austrobaileya* 8: 298 (2011)

Monenteles intermedium DC., *Prodr.* 5: 456 (1836). T: Sandy shores of Cape Cleveland [Qld], 14 June 1819, *A.Cunningham* 52; holotype: G-DC; isotype: K.

M. globiferus DC., *Prodr.* 5: 455 (1836). T: Lockyer's Ck, Brisbane R., Moreton Bay [Qld], July 1829, *A.Cunningham* 51; holotype: G-DC; isotype: K.

P. sp. A, A.J.G.Wilson in J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 954 (1992).

Illustrations: K.F.Kenneally *et al.*, *Broome & Beyond* 67 (1996), as *P. sp. A*, *Kimb. Flora*; A.R.Bean, *op. cit.* 297, fig. 8E–H; 299, fig. 9.

Shrub 20–60 cm high; branches diverging at 30–90°; stem wings entire, 0.2–1.4 mm wide. Leaves narrowly elliptic or elliptic, 12–52 mm long, 3.5–18 mm wide, 2.6–4.6 times longer than wide; glandular hairs absent; upper surface faintly to moderately bullate; lanate hairs moderately dense to very dense on upper surface, moderately dense to dense on lower surface. Inflorescences globose, 10–15 mm long, 10–14 mm wide at anthesis, 1–1.2 times longer than broad; peduncles (5–) 7–25 mm long. Longest inner bracts 4.0–4.8 mm long; few or no cilia visible. Female florets 8–17; corolla 2.7–3.6 mm long. Hermaphrodite floret solitary; corolla 3.1–3.8 mm long; corolla lobes 0.6–0.9 mm long, with globose sessile glands present and eglandular trichomes absent. Achenes 0.6–0.75 mm long, glabrous or with 1–25 twin hairs. Pappus 2.5–3.1 mm long.

Widely distributed in northern Australia from Port Hedland, W.A., to Ipswich, Qld; also known from Kisar Is. in Indonesia, and one location in P.N.G. It grows on swales or dunes in shrubland or low woodland, or in eucalypt woodland, always on sandy soils. Flowers and fruits Apr.–Oct.

W.A.: Sir Graham Moore Is., *P.G.Wilson* 11263 (PERTH). N.T.: Elcho Is., Warangaya, *J.Russell-Smith* 3282 & *D.Lucas* (BRI, DNA). Qld: Galloway Plains, c. 28 km SW of Calliope, *E.R.Anderson* 4623 (BRI); 1.5 km N of North Kennedy R. on the Laura–Musgrave road, *J.R.Clarkson* 7996 & *V.J.Neldner* (BRI, DNA, K, L).

**6. *Pterocaulon tricholobum* A.R.Bean, *Austrobaileya* 8: 319 (2011)**

T: East Alligator, N.T., 10 June 1971, *G.C.Taylor* 75; holotype: BRI; isotype: CANB, DNA.

Illustrations: A.R.Bean, *op. cit.* 320, fig. 19; 322, fig. 20A–D.

Shrub 50–120 cm high; branches diverging at 0–80°; stem wings entire, 2.8–5.5 mm wide. Leaves elliptic to obovate, 25–92 mm long, 8–30 mm wide, 2.1–3.7 times longer than wide; glandular hairs absent; upper surface moderately bullate; lanate hairs sparse to moderately dense on upper surface, dense to very dense on lower surface. Inflorescences globose to broadly ellipsoid, (8–) 10–16 mm long, 10–14 mm wide at anthesis, (0.7–) 0.9–1.3 times longer than wide, sometimes sessile and apparently axillary; peduncles 0–11 mm long. Longest inner bracts 4.0–4.8 mm long; many cilia visible. Female florets 15–21; corolla 2.3–2.9 mm long. Hermaphrodite floret solitary; corolla 2.9–3.6 mm long; corolla lobes 0.8–1.2 mm long, with globose sessile glands present and 2–8 eglandular trichomes per lobe. Achenes 0.8–0.9 mm long, with 0–25 twin hairs. Pappus 2.1–3.0 mm long. Fig. 54C, D.

Endemic in northern Australia, widespread in the Kimberley region of W.A., and the ‘Top End’ of the N.T., extending to the extreme NW of Qld. It grows on sandstone gorges, hills and escarpments, in sandy soils. Flowers and fruits May–Sept.

W.A.: Sunday Is., Buccaneer Archipelago, *K.F.Kenneally* 8250 (DNA, MEL, PERTH). N.T.: Mt Brockman near Koongarra Saddle, 2 km N of Koongarra, *M.Lazarides* 8905 (CANB, DNA). Qld: Westmoreland, Big Amphitheatre, *P.I.Forster* PIF21039 & *R.Booth* (BRI, DNA).

Eglandular trichomes are consistently present on the corolla lobes of the hermaphrodite floret.





Figure 54. *Pterocaulon*. **A, B,** *P. verbascifolium*. **A,** flowering branch; **B,** inflorescence (**A, B,** A.R.Bean 29874, BRI). **C, D,** *P. tricholobum*. **C,** flowering branch; **D,** inflorescence (**C, D,** M.Lazerides 3071, BRI). Scale bar: **A, C** = 40 mm; **B** = 20 mm; **D** = 5 mm. Drawn by W.A.Smith.

7. *Pterocaulon discolor* A.R.Bean, *Austrobaileya* 8: 293 (2011)

T: 3 km N of Adelaide R. bridge on Stuart Hwy, N.T., 3 May 1983, *J.D.Briggs* 819; holo: CANB; iso: MEL.

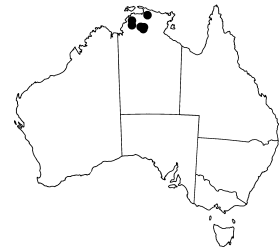
Illustration: A.R.Bean, *op. cit.* 290, fig. 4 I–L; 294, fig. 6.

Shrub 50–80 cm high; branches diverging at 0–60°; stem wings entire, 1.0–2.5 mm wide. Leaves elliptic, 35–68 mm long, 13–31 mm wide, 2.0–2.7 times longer than wide; glandular hairs absent; upper surface moderately bullate; lanate hairs sparse on upper surface, very dense on lower surface. Inflorescences globose to ellipsoid, 12–15 (–19) mm long, 11–13 mm wide at anthesis, 1–1.2 (–1.5) times longer than wide, sometimes sessile and apparently axillary; peduncles 0–12 mm long. Longest inner bracts 4.5–5.0 mm long; many cilia visible. Female florets 7–14; corolla 2.7–3.2 mm long. Hermaphrodite floret solitary; corolla 3.3–4.0 mm long; corolla lobes 0.7–1.1 mm long, with globose sessile glands present and 1–5 eglandular trichomes per lobe. Achenes 0.8–0.9 mm long, with 25–50 twin hairs. Pappus 2.6–3.4 mm long.

Endemic to the ‘Top End’ of the N.T., where it grows on sandstone or quartzite ridges, in sandy soils. Flowers and fruits Apr.–May.

N.T.: Tin Camp Ck, c. 20 miles [32 km] S of Nabarlek mining camp, *T.Hartley* 13824 (CANB, DNA, L); 11 km E of Katherine Gorge ranger station, *P.K.Latz* 24367 & *Quarmby* (DNA, K, NT).

Distinctive by virtue of its strongly discolorous leaves, the relatively few florets per capitulum, and the inflorescences that often appear to be sessile and axillary.



8. *Pterocaulon globuliflorum* W.Fitzg., *J. & Proc. Roy. Soc. W. Australia* 3: 223 (1918)

T: Devil's Pass, Napier Ra., W.A., May 1905, *W.V.Fitzgerald* 60; holo: PERTH; iso: K, NSW.

Illustrations: A.R.Bean, *Austrobaileya* 8: 296, fig. 7; 297, fig. 8A–D (2011).

Shrub to 60 cm high; branches diverging at 0–50°; stem wings entire, 0.3–1.5 mm wide. Leaves elliptic, 18–51 mm long, 7–24 mm wide, 2.0–2.6 times longer than wide; glandular hairs absent; upper surface moderately bullate; lanate hairs sparse on upper surface, dense to very dense on lower surface. Inflorescences globose or globose-truncate, 6–10 mm long, 8.5–10 mm wide at anthesis, 0.7–1.1 times longer than broad, sometimes sessile and apparently axillary; peduncles 0–4 mm long. Longest inner bracts 3.1–3.5 mm long; numerous cilia visible. Female florets 16–20; corolla 1.7–2.0 mm long. Hermaphrodite floret solitary; corolla 2.5–2.8 mm long; corolla lobes 0.7–1.2 mm long, with globose sessile glands present and eglandular trichomes absent or 1 or 2 per lobe. Achenes 0.7–0.8 mm long, with 25–50 twin hairs. Pappus 1.3–1.8 mm long.

Endemic to the Kimberley region of W.A., where it is confined to stony ranges and hills. Flowers and fruits May–July.

W.A.: Yammera Gap, Napier Ra., 9 km NE of Lennard R. crossing on Gibb River Rd, *H.Streimann* 8269 (A, B, CANB, L); Old Fossil Downs Stn, *T.O.Wolfe* & *W.Martin* 72 (CANB).



9. *Pterocaulon niveum* Cabrera & A.M.Ragonese, *Darwiniana* 21: 249 (1978)

T: Mt Amherst, W.A., 13 May 1951, *C.A.Gardner* 10206; holo: PERTH; iso: SI.

Illustrations: A.R.Bean, *Austrobaileya* 8: 301, fig. 10; 302, fig. 11A–D (2011).

Shrub 40–100 cm high; branches diverging at 0–70°; stem wings entire, 0.5–1.5 (–2.5) mm wide. Leaves elliptic or obovate, 39–70 mm long, 21–38 mm wide, 2.1–2.6 times longer than wide; glandular hairs absent; upper surface moderately bullate; lanate hairs very dense on both surfaces. Inflorescences globose to globose-truncate, 10–15 mm long, 10–15 mm wide at anthesis, 0.7–1.1 times longer than wide, sometimes sessile and apparently axillary; peduncles 0–8 mm long. Longest inner bracts 4.5–5.4 mm long; many cilia visible. Female

florets 11–17; corolla 3.0–3.7 mm long. Hermaphrodite floret solitary; corolla 3.3–4.0 mm long; corolla lobes 0.7–1.1 mm long, with globose sessile glands present and 2–8 eglandular trichomes per lobe. Achenes 0.9–1.0 mm long, with 25–50 or more twin hairs. Pappus 2.0–3.1 mm long.

Endemic in the drier more-inland parts of the Kimberley Region of W.A., and adjacent areas of the N.T., on sandstone, quartzite or limestone substrate. Flowers and fruits Apr.–Aug.

W.A.: 19 miles [31 km] NW of Turner River Stn, *R.A.Perry & M.Lazarides 2410* (CANB, DNA); Mt House Stn, *R.D.Royce 3304* (PERTH). N.T.: Gregory Natl Park, 28 km SW of Bullita outstation, *C.Coles 28 & Barritt* (DNA, MEL).



10. *Pterocaulon xenicum* A.R.Bean, *Austrobaileya* 8: 325 (2011)

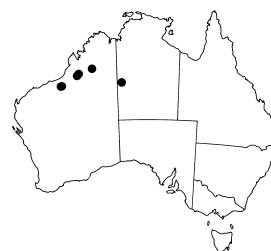
T: McLarty Hills, Great Sandy Desert, W.A., 5 Aug. 1977, *A.S.George 14628*; holo: PERTH; iso: CANB.

Illustrations: A.R.Bean, *op. cit.* 322, fig. 201–L; 326, fig. 22.

Shrub 25–40 cm high; branches diverging at 30–80°; stem wings entire, 0.3–0.5 mm wide. Leaves oblanceolate or obovate, 18–52 mm long, 7–17 mm wide, 2.6–4.7 times longer than wide; glandular hairs absent; upper surface moderately bullate; lanate hairs sparse to dense on upper surface, very dense on lower surface. Inflorescences globose to ellipsoid, 13–18 mm long, 13–16 mm wide at anthesis, 1.0–1.3 times longer than wide; peduncles 0–14 mm long. Longest inner bracts 4.8–5.6 mm long; few or no cilia visible. Female florets 26–44; corolla 3.2–4.1 mm long. Hermaphrodite floret solitary; corolla 3.5–4.3 mm long; corolla lobes 0.3–0.5 mm long, with globose sessile glands present and eglandular trichomes absent or present. Achenes 0.8–0.9 mm long, with 25–50 or more twin hairs. Pappus 3.3–4.2 mm long.

Endemic, known from a few localities in the Pilbara and Great Sandy Desert, W.A., and as far E as the Tanami Desert in N.T. It grows on open plains in shrubland. Flowers and fruits Aug.–Oct.

W.A.: 21.1 km ESE of Warrawagine Stn HS, Pilbara IBRA (Site PHYE07), *S.van Leeuwen et al. 0028* (BRI, PERTH). N.T.: 46 miles [74 km] WSW of The Granites, *C.R.Dunlop 1830* (DNA).



11. *Pterocaulon serrulatum* (Montrouz.) Guillaumin, *Bull. Soc. Bot. France* 84: 56 (1937)

Monenteles serrulatus Montrouz., *Mém. Acad. Roy. Sci. Lyon, Sect. Sci.* 10: 225 (1860). T: Art Is., New Caledonia, *J.X.Montrouzier 125*; holo: LY, destroyed.

M. glandulosus Benth., *Fl. Austral.* 3: 523 (1867); *P. glandulosum* (Benth.) F.Muell., *Syst. Census Austral. Pl.* 79 (1882). T: Gilbert R. [Qld], Oct. 1856, *F.Mueller s.n.*; lecto: K 000373279, *fide* A.L.Cabrera & A.M.Ragonese, *Darwiniana* 21: 254 (1978).

Shrub 35–150 cm high; branches diverging at 20–45°; stem wings serrate, 2.5–8 mm wide. Leaves elliptic, ovate or broadly lanceolate, 20–82 mm long, 8–28 mm wide, 2.1–4.3 times longer than wide; glandular hairs present or absent; upper surface not or scarcely bullate; lanate hairs absent to dense on upper surface, sparse to very dense on lower surface. Inflorescences ellipsoid or cylindrical, rarely almost globose, 14–52 mm long, 13–17 mm wide at anthesis, 1.1–3.5 times longer than wide; peduncles 0–15 mm long. Longest inner bracts 3.9–6.3 mm long; many cilia visible. Female florets 29–52; corolla 2.8–4.2 mm long. Hermaphrodite floret solitary; corolla 3.6–4.7 mm long; corolla lobes 0.4–0.6 mm long, with globose sessile glands present and eglandular trichomes absent. Achenes 0.7–1.0 mm long, with 25–50 twin hairs. Pappus 2.8–4.5 mm long.

Found in W.A., N.T., Qld and northern S.A.; also in New Caladonia. There are 2 varieties.

A strongly aromatic shrub with serrate stem-wings and glandular involucrel bracts. The inflorescence is almost always cylindrical.

Winged stems and leaf surfaces with many broad-based glandular hairs 0.1–0.2 mm long; lanate hairs absent from upper leaf surface and sparse on lower leaf surface, stem wings and stems

11a. var. *serrulatum*

Winged stems and leaf surfaces without broad-based glandular hairs; lanate hairs sparse to very dense on leaves, wings and stems

11b. var. *velutinum*

11a. *Pterocaulon serrulatum* (Montrouz.) Guillaumin var. *serrulatum*

Illustrations: A.R.Bean, *Austrobaileya* 8: 310, fig. 14; 313, fig. 16A–D (2011).

Winged stems and leaf surfaces with many broad-based glandular hairs 0.1–0.2 mm long; lanate hairs absent from upper leaf surface, sparse on lower leaf surface, stem wings and stems. Outer involucre bracts with broad-based glandular hairs and lanate hairs.

Found in the Kimberley Region of W.A., and in eastern Qld. Also on Art Is., New Caledonia. Flowers and fruits Apr.–Nov.

W.A.: Little Is., off Long Is., Buccaneer Archipelago, *Hopkins BA0115* (PERTH). Qld: Corisande Hills, Stanage Bay road, N of Rockhampton, *A.R.Bean 12063* (BRI, MEL); along Kuranda Hwy, c. 10 miles [16 km] E of Mareeba, *R.Hoogland 8486* (BRI, CANB).



11b. *Pterocaulon serrulatum* var. *velutinum* (Ewart & O.B.Davies) Guillaumin, *Bull. Soc. Bot. France* 84: 57 (1937)

P. glandulosum var. *velutinum* Ewart & O.B.Davies, *Fl. N. Territory* 277 (1917). T: Haast's Bluff, N.T., 17 May 1911, *G.F.Hill 184*; holotype: MEL.

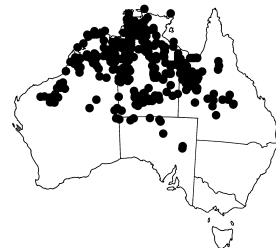
P. serratum O.Schwarz, *Repert. Spec. Nov. Regni Veg.* 24: 108 (1928). T: N.T., Port Darwin, 10 miles NE, *F.A.K.Bleeser 712*; holotype: B, destroyed.

Illustration: A.R.Bean, *Austrobaileya* 8: 312, fig. 15 (2011).

Winged stems and leaf surfaces without broad-based glandular hairs; lanate hairs sparse to very dense on leaves, wings and stems. Outer involucre bracts with lanate hairs only. Plate 40.

Widespread in northern W.A., N.T. and western Qld., extending into northern S.A. Also in New Caledonia. Flowers and fruits Apr.–Oct.

W.A.: McLarty Hills, Great Sandy Desert, *A.S.George 14625* (CANB, PERTH). N.T.: 4.5 km from Stuart Hwy on Edith Falls road, *R.Elick 222* (CANB, CNS); 23 miles [37 km] NW of Rabbit Flat, Tanami, *C.R.Dunlop 2131* (BRI, DNA). S.A.: Nilpinna Stn, Peake ruins, *N.M.Smith 2316* (AD). Qld: Ortona Stn, 102 km by road S of Forsayth, *A.R.Bean 29878* & *K.R.McDonald* (BRI, MEL, NSW).



12. *Pterocaulon redolens* (Willd.) Fern.-Vill., *Nov. App.* 3rd edn, 4(3): 116 (1880)

Conyza redolens Willd., *Sp. Pl.* ed. 3(3), 1951 (1804); *Tessaria redolens* (Willd.) Less., *Linnaea* 6: 151 (1831); *Monoteles forsteri* Endl., *Ann. Wiener Mus. Naturgesch.* 1: 168 (1836), *nom. illeg.*; *M. redolens* (Willd.) DC., *Prodr.* 5: 455 (1836). T: New Caledonia, 1774, *J.R.Forster & J.G.A.Forster*; holotype: B-W; isotype: K.

Monoteles spicatus Labill., *Sert. Austro-Caledon.* 43 (1825); *P. cylindrostachyum* C.B.Clarke, *Compos. Ind.* 98 (1878), *nom. illeg.*, *M. spicatus* in syn.; *P. billardierei* F.Muell., *Descr. Notes Papuan Pl.* 8: 43 (1886), *nom. nov.*; *P. spicatum* (Labill.) Domin, *Biblioth. Bot.* 89: 1218 (1930), *nom. illeg. non DC.* (1836). T: New Caledonia, [June 1792], *J.J.H.Labillardière*; lectotype: FI, *fide* A.R.Bean, *Austrobaileya* 8: 306 (2011); isotype: FI, P.

Illustrations: T.D.Stanley & E.M.Ross, *Fl. SE Queensland* 2: 532 (1986); G.J.Harden (ed.), *Fl. New South Wales* 3: 204 (1992); A.R.Bean, *op. cit.* 302, fig. 11 I–L; 307, fig. 13.

Shrub 40–100 cm high; branches diverging at 20–45°; stem wings entire, 1.4–3.3 mm wide. Leaves oblanceolate to obovate, 16–45 mm long, 6.5–16 mm wide, 2.1–3.4 times longer than

wide; glandular hairs absent; upper surface moderately bullate; lanate hairs sparse to moderately dense on upper surface, moderately dense to dense on lower surface. Inflorescences spiciform, 33–75 mm long, 8–14 mm wide at anthesis, 2.8–5.8 times longer than wide; peduncles 5–25 mm long. Longest inner bracts 3.0–3.6 mm long; many cilia visible. Female florets 27–45; corolla 2.3–2.8 mm long. Hermaphrodite floret solitary; corolla 2.5–3.0 mm long; corolla lobes 0.25–0.5 mm long, with globose sessile glands present and eglandular trichomes absent. Achenes 0.5–0.7 mm long, with 0–25 or 25–50 twin hairs. Pappus 2.2–3.0 mm long.

Widely distributed in eastern Qld S from Lakefield Natl Park, and extends into far NE N.S.W. Also widespread outside Australia, with native occurrences in China (Hainan), Myanmar, Thailand, Laos, Cambodia, Vietnam, Philippines, Indonesia, Papua New Guinea, New Caledonia and Vanuatu. It inhabits grassy eucalypt woodland at low altitudes in hilly or flat terrain, with sandy to clay-loam soil. Flowers and fruits throughout the year, but mostly Apr.–Sept.

Qld: Rifle Range Res., Goodna, E of Ipswich, *A.R.Bean* 1512 (BRI); Bulleringa Natl Park, 80 km NW of Mt Surprise, *P.I.Forster* PIF22541 & *R.Booth* (BRI, DNA, MEL); 9 km SE of Mt Perry (town), *A.N.Rodd* & *M.Hardie* 4378 (BRI, CANB, NSW). N.S.W.: hill 60 km N of Cobar on road to Bourke, 5 Oct. 1989, *C.Lebretton* s.n. (MEL).



13. *Pterocaulon verbascifolium* (Benth.) F.Muell., *Syst. Census Austral. Pl.* 79 (1882)

Monenteles verbascifolius Benth., *Fl. Austral.* 3: 523 (1867). T: Fitzmaurice R. [N.T.], undated, *F.Mueller* s.n.; lecto: K, *fide* A.L.Cabrera & A.M.Ragonese, *Darwiniana* 21: 245 (1978).

Illustrations: *A.R.Bean*, *Austrobaileya* 8: 322, fig. 20E–H; 324, fig. 21 (2011).

Shrub 50–130 cm high; branches diverging at 30–90°; stem wings entire, 2.5–6 (–8) mm wide. Leaves elliptic, ovate or obovate, 37–70 mm long, 20–43 mm wide, 1.6–2.3 times longer than wide; glandular hairs absent; upper surface moderately bullate; lanate hairs very dense on both surfaces. Inflorescences spiciform or cylindrical, 35–105 mm long, 17–30 mm wide at anthesis, 2.2–4.3 times longer than wide; peduncles 3–40 mm long. Longest inner bracts 5.3–9.2 mm long; many cilia visible. Female florets 25–58; corolla 3.7–7.5 mm long. Hermaphrodite floret 1 (rarely 2); corolla 4.0–6.5 mm long; corolla lobes 0.6–1.0 mm long, with globose sessile glands absent and eglandular trichomes absent. Achenes 1.1–1.3 mm long, with 25–50 or more twin hairs. Pappus 3.5–6.9 mm long. Fig. 54A, B.

Occurs in the northern Kimberley of W.A., sub-coastal N.T., and a few places in N Qld. Outside Australia, it is known only from Sumbawa Is. in Indonesia. It inhabits laterite plateaux or rocky hill-slopes in eucalypt or *Terminalia* dominated open woodland, on basalt or sandstone rocks. Flowers and fruits May–Aug.

W.A.: Dillie Gorge, Charnley River Stn, *G.Byrne* 1584 (PERTH). N.T.: Cave Creek Stn, Snake Track, *J.A.Risler* 1908 (DNA). Qld: 100 m from Georgetown–Forsyth road, 13 km S of Georgetown, *A.R.Bean* 29861 & *K.R.McDonald* (AD, BRI, NSW).

A silvery-leaved species with broad stem-wings and spicate inflorescences.



3. SPHAEROMORPHEA

A.R.Bean

Sphaeromorphaea DC., *Prodr.* 6: 140 (1838); etymology unknown, but perhaps given in reference to the capitula that are more or less globose when immature.

Type: *S. russeliana* DC.

Annual or perennial herbs. Indumentum of crisped, multicellular, eglandular hairs. Sessile to very shortly stalked resin globules frequently present on stems, leaves, involucre bracts, corolla and achenes. Stems terete, not winged. Leaves alternate, sessile, spreading, attenuate at base, denticulate, dentate or lyrate. Capitula axillary or leaf-opposed, solitary or in pairs, on often short peduncles, disciform, heterogamous, broadly hemispherical, hemispherical or cupular; involucre bracts subequal in length, cartilaginous, incurved, in 3–4 rows; innermost row conspicuously narrower; receptacle flat, glabrous, epaleate. Marginal florets female, white or pink to purple at anthesis; lobes 3, tiny. Disc florets bisexual, producing achenes, but in some species infertile; corolla cylindrical to narrowly campanulate, 4- or 5-lobed, pink to maroon. Achenes cylindrical, longitudinally ribbed; carpopodium ring-like, white, prominent; twin hairs (when present) straight, antrorse to appressed, in a basal whorl, and sometimes also scattered on body of achene. Pappus comprising a stiff, transverse or erect annular corona, sometimes produced into short slender persistent bristles.

A genus of 6 species, all occurring in Australia, and extending to New Caledonia and southern Asia; characterised by the hemispherical capitula, ribbed cylindrical achenes and toothed, spatulate leaves. The pappus bristles are frequently absent, but some species may have up to 5 bristles per floret. The genus has for many years been included in synonymy with *Epaltes* Cass.

A.P.de Candolle, *Sphaeromorphaea*, *Prodr.* 6: 140 (1838); G.Bentham, *Epaltes*, in *Fl. Austral.* 3: 529–530 (1867); C.R.Dunlop, *Sphaeromorphaea*, in I.Cowie *et al.*, *Floodplain Fl.* 185–187 (2000); A.R.Bean, Reinstatement and revision of *Sphaeromorphaea* DC. and *Ethuliopsis* F.Muell. (Asteraceae: Plucheinae), *Austrobaileya* 9: 30–59 (2013).

- 1 Corolla of female florets bottle-shaped
- 2 Coronal pappus 0.02–0.05 mm wide, obscure; leaves ±glabrous; female corolla with few to numerous resin globules; pappus bristles always absent; achene hairs usually absent, or 1–4 present at base 2. *S. australis*
- 2: Coronal pappus 0.05–0.08 mm wide, obvious; leaves persistently hairy; female corolla with few or no resin globules; pappus bristles frequently present; hairs 5–20 at base of achene 3. *S. harrisii*
- 1: Corolla of female florets conical or filiform
- 3 Fully expanded leaves sparsely to densely hairy; achenes with several resin globules
- 4 Leaves dentate or denticulate, with teeth present on basal half of leaf; peduncles 1–14 mm long; achenes with 10–40 hairs, mainly at base 5. *S. littoralis*
- 4: Leaves denticulate, with teeth absent from basal half of leaf; peduncles 1.5–3.5 mm long; achene hairs usually absent, or rarely 1–4 present at base 6. *S. subintegra*
- 3: Fully expanded leaves glabrous; achenes without resin globules, or rarely with 1 or 2
- 5 Pappus bristles present on some florets; all stems and leaves glabrous; fertile achenes 1.0–1.3 mm long 1. *S. major*
- 5: Pappus bristles absent; young stems and leaves sparsely hairy; fertile achenes 0.45–0.7 mm long 4. *S. ephemera*

1. *Sphaeromorphaea major* A.R.Bean, *Austrobaileya* 9: 37; 38, fig. 1A–D (2013)

T: 100 m from Huttonvale track, SE of Sabina Point, Shoalwater Bay Training Area, Qld, 8 Apr. 2011, *A.R.Bean 30830* & *D.Halford*; holo: BRI; iso: BM, CANB, MEL, MO.

Illustration: A.R.Bean, *loc. cit.*

Prostrate or procumbent perennial shrub; resin globules absent. Leaves linear to narrowly oblanceolate, 11–85 mm long, 2–15 mm wide, dentate to denticulate, with teeth 0.1–0.7 mm long, pale green, glabrous. Capitula hemispherical, 4.5–8 mm diam.; peduncles 2–28 mm long. Corolla of marginal florets filiform, 1.5–2.4 mm long, white. Disc florets functionally male; corolla cylindrical to narrowly campanulate, 2.0–2.5 mm long; lobes 4 or 5, 0.4–0.5 mm long. Achenes formed from all florets, but disc achenes infertile. Marginal achenes 1.0–1.3 mm long, with 5–10 ribs; twin hairs absent or 1–4. Pappus corona almost erect, 0.02–0.05 mm high; margin entire or fimbriate; pappus bristles absent or 1–3, to 1.9 mm long.

Known from some coastal locations near Rockhampton, Qld, and at 3 inland locations in central Qld. It grows in coastal salt marsh, and on the margins of artesian springs in open salt-affected areas. Flowers and fruits Sept.–Apr.

Qld: Bay of Inlets, Jun 1770, *J.Banks* & *D.Solander* (BM); Ramsay Crossing, squatters camp, 40 km NW of Gladstone, near Curtis Is., *G.N.Batianoff 0412502* & *D.Halford* (BRI); Second Spring, Edgbaston Res., NE of Aramac, *A.R.Bean 31643* (A, BRI, DNA, G, HO, MEL, NSW).



Distinguished from other species in the genus by the relatively long achenes and florets, the narrow leaves lacking resin globules, and the frequent presence of pappus bristles.

2. *#Sphaeromorphaea australis* (Less.) Kitam., *Acta Phytotax. Geobot.* 6(2): 80 (1937)

Epaltes australis Less., *Linnaea* 5: 148 (1830); *Erigerodes australe* (Less.) Kuntze, *Revis. Gen. Pl.* 1: 335 (1891). T: Myall Creek road, Bungawalbin Natl Park, c. 22 km SSE of Casino, N.S.W., 30 Dec. 2011, *A.R.Bean 31450*; neo: BRI; isoneo: CANB, E, K, MEL, NSW, RSA, US, W, *fide* A.R.Bean, *Austrobaileya* 9: 40 (2013).

Sphaeromorphaea petiolaris DC., *Prodr.* 6: 140 (1838). T: Port Jackson, N.S.W., [1819], *C.Gaudichaud*; syn: G-DC, P; Port Jackson, N.S.W., [1823], *F.W.Sieber 697*; syn: G-DC.

Illustration: A.R.Bean, *op. cit.* 38, fig. 1E–I.

Prostrate to ascending perennial herb. Leaves obovate or oblanceolate, 26–70 mm long, 7–21 mm wide, dentate to denticulate with teeth to 5 mm long, dark green, ±glabrous; resin globules present. Capitula broadly hemispherical, 4–5.5 mm diam.; peduncles 1–6 mm long. Corolla of marginal florets bottle-shaped, 0.5–0.9 mm long, pink to purple; resin globules few–numerous. Disc florets bisexual or functionally male; corolla narrowly campanulate, 1.0–1.3 mm long; lobes 4, c. 0.2 mm long; resin globules present throughout. Achenes formed from all florets, but disc achenes sometimes infertile. Marginal achenes 0.65–0.9 mm long, with 8–12 ribs; twin hairs absent or 1–4 at base; resin globules few to numerous. Pappus corona transverse, 0.02–0.05 mm wide; pappus bristles absent.

Native in eastern Australia and in New Caledonia. In Australia it extends from Ulladulla, N.S.W. to Townsville, Qld (with an outlier further N near Cooktown). Naturalised in Taiwan (first collection in 1864) and near Perth, W.A. (first collection in 1985). It occupies sunny places that are permanently or intermittently moist, occurring with a range of dominant species and on a wide variety of soil types. Flowers and fruits throughout the year.

W.A.: 1 km N of Serpentine, *G.Keighery 7182* (PERTH). Qld: Hay's Landing, Wivenhoe Dam, N of Fernvale, *A.R.Bean 17303* (BRI); Western edge of L. Buchanan, Yarrowmere Stn, *J.Kemp 3362H* & *A.Kutt* (BRI). N.S.W.: Trial Bay to Laggery Point, NE of Kempsey, Jan 1953, *E.F.Constable* (NSW, US); 3 miles [5 km] along Currambean Creek Rd, 5 miles [8 km] S of Nowra, Mar 1951, *N.C.Ford* (NSW).



Distinguished by the dark green \pm glabrous leaves with some long lobes or teeth, and the bottle-shaped corolla of the marginal florets.

3. *Sphaeromorphaea harrisii* (F.Muell.) A.R.Bean, *Austrobaileya* 9: 41–42 (2013)

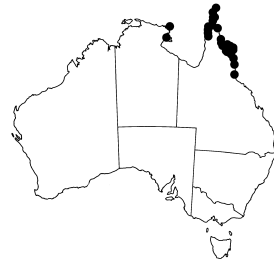
Epaltes harrisii F.Muell., *Fragm.* 11: 101 (1880); *Erigerodes harrisii* (F.Muell.) Kuntze, *Revis. Gen. Pl.* 1: 335 (1891). T: Possession Is., Qld, 1880, *C.C.Harris s.n.*; lecto: K; isolecto: MEL, NSW, *vide* A.R.Bean, *op. cit.* 41.

Illustration: A.R.Bean, *op. cit.* 43, fig. 2A–E.

Erect annual or perennial herb. Leaves spatulate to oblanceolate, 22–61 mm long, 7–21 mm wide, dentate to lyrate, rarely denticulate, with teeth to 5 mm long, pale green, persistently hairy; resin globules present. Capitula hemispherical to cupular, 4.5–6 mm diam.; peduncles 1–3 mm long. Corolla of marginal florets bottle-shaped, 0.9–1.3 mm long, maroon to purple; resin globules few or none. Disc florets bisexual; corolla cylindrical, 1.25–1.4 mm long; lobes 4, 0.2–0.25 mm long; resin globules scattered throughout. Achenes formed from all florets, but disc achenes sometimes infertile. Marginal achenes 0.7–1.1 mm long, with 6–10 ribs; twin hairs 5–20 at base; resin globules numerous. Pappus corona transverse, 0.05–0.08 mm wide; pappus bristles absent or present and 1–6 per floret, slender, 0.1–1.0 mm long, without barbellae.

Distributed along the E coast of Qld from Cardwell to Cape York, and on several of the Torres Strait islands; also in NE N.T. and in southern New Guinea. Grows on a wide range of soil types, from sand to black clay, on floodplains and riverbanks; also occurs at the base of sand dunes, and in *Sporobolus virginicus* grassland adjacent to mangrove communities. Flowers and fruits throughout the year.

N.T.: Nhulunbuy Lagoon, *J.Egan 2804* (DNA). Qld: Edmund Kennedy Natl Park, near Cardwell, *A.R.Bean 3912* (BRI, DNA, MEL); 18.6 km from Running Ck on the track to Old Port Stewart, *J.R.Clarkson 10103* & *V.J.Neldner* (BRI, DNA, L, MEL); Bolt Head, Temple Bay, *P.I.Forster PIF8985* (BRI, DNA, MEL).



4. *Sphaeromorphaea ephemera* A.R.Bean, *Austrobaileya* 9: 44; 43, fig. 2F–J (2013)

T: Bladensburg Natl Park, S of Winton, Opalton Rd, Qld, 19 Mar. 1998, *P.I.Forster PIF22217* & *R.Booth*; *holo*: BRI.

Illustration: A.R.Bean, *loc. cit.*

Prostrate to ascending herb. Leaves spatulate to oblanceolate, 14–53 mm long, 5–17 mm wide, dentate to denticulate with teeth mostly < 0.5 mm long but some to 2 mm long, dark green, glabrous at maturity, sparsely hairy when young; resin globules present. Capitula broadly hemispherical, 4–5 mm wide; peduncles 1–7 mm long. Corolla of marginal florets conical, 0.6–0.7 mm long; few to several resin globules present. Disc florets bisexual; corolla cylindrical to narrowly campanulate, 1.0–1.1 mm long; lobes 4, c. 0.2 mm long; resin globules present throughout. All achenes fertile. Marginal achenes 0.45–0.7 mm long, with 10–14 ribs, white; twin hairs absent; resin globules absent, or rarely 1 or 2. Pappus corona transverse, 0.01–0.04 mm wide; pappus bristles absent.

Endemic to inland Qld, between Adavale and Winton. Most occurrences are along drainage lines with *Acacia aneura* or *Eucalyptus populnea*, in red clayey soils. Flowers and fruits Mar.–Aug.

Qld: Cudmore, *R.Fensham 3130* (BRI); 60 km NW [actually WSW] of Charleville, off the Diamantina Developmental Rd, *R.W.Purdie 373D* (BRI); Road reserve, S of Biloolia HS, 2 km off Adavale Rd, W of Charleville, *J.Wang JW0180* (BRI).

Similar in appearance to *S. australis*, but differing by the conical female florets, annual habit, and the shorter achenes that lack resin globules.



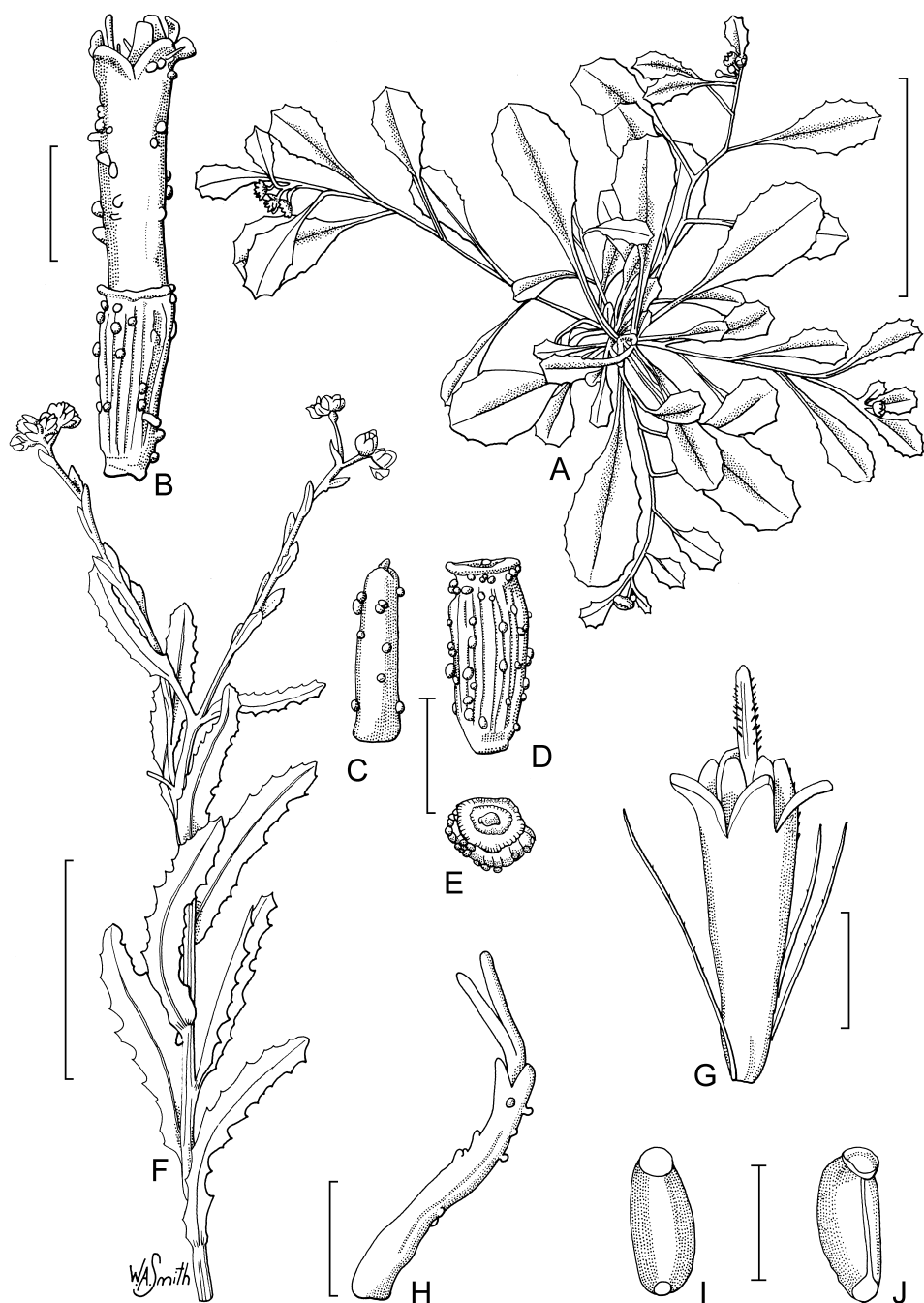


Figure 55. A–E, *Sphaeromorphaea subintegra*. A, flowering plant; B, disc floret; C, marginal floret; D, achene, lateral view; E, achene, plane view (A, A.R.Bean 29617, BRI; B–E, R.McFadyen 453, BRI). F–J, *Ethuliopsis cunninghamii*. F, flowering branchlet; G, disc floret; H, marginal floret; I, achene, abaxial view; J, achene, adaxial view (F, D.Cowan 81, BRI; G, C.Mitchell 824, BRI; H–J, B.Emerson s.n., BRI AQ501325). Scale bars: A = 5 cm; B–E, H–J = 0.5 mm; F = 3 cm; G = 1 mm. Drawn by W.A.Smith. Reproduced with permission from *Austrobaileya* 9: 49, fig. 4 (2013).

5. *Sphaeromorphaea littoralis* (Retz.) A.R.Bean, *Austrobaileya* 9: 45 (2013)

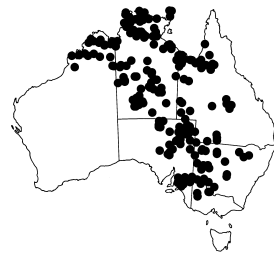
Artemisia littoralis Retz., *Observ. Bot.* 5: 28 (1788); *Epaltes littoralis* (Retz.) Less., *Linnaea* 6: 151 (1831). T: seashores of eastern India, undated, *J.G.Koenig s.n.*; lecto: C, *fide* A.R.Bean *loc. cit.*

Illustrations: G.M.Cunningham *et al.*, *Pl. W. New South Wales* 685 (2011), as *Epaltes australis*; A.R.Bean, *op. cit.* 9: 46, fig. 3.

Prostrate to procumbent perennial herb. Leaves spatulate to oblanceolate or obovate, 9–60 mm long, 4–15 mm wide, dentate to denticulate with teeth usually < 1 mm long but occasionally to 2 mm long, acute, pale green, sparsely to densely hairy at maturity; resin globules present. Capitula broadly hemispherical, 3.5–7 mm diam.; peduncles 1–14 mm long. Corolla of marginal florets conical, 0.7–1.2 mm long, pink to purple; resin globules numerous. Disc florets bisexual; corolla cylindrical, 1.1–1.4 mm long; lobes 4, 0.2–0.3 mm long; resin globules present throughout. All achenes fertile. Marginal achenes 0.7–1.3 mm long, with 8–14 ribs; twin hairs 10–40, mainly at base but with some scattered above; resin globules numerous. Pappus corona transverse, 0.05–0.09 mm wide; pappus bristles usually absent, rarely present.

Native in all mainland states and N.T., also widely distributed in southern Asia, with native occurrences in India, Thailand, Vietnam, Malaya, Philippines and SE China. Inhabits sunny places on the margins of creeks and dams, saline coastal flats and swamps, extending into areas receiving very low annual rainfall, on a range of soils. Flowers and fruits throughout the year.

W.A.: Drysdale R. above Mogurnda Ck, Drysdale River Natl Park, *A.S.George 13570* (CANB, PERTH). N.T.: 1.5 km NE of Fish River Gorge in China Wall, Barkly Tableland, *A.Kanis 1823* (CANB, DNA, L, US). S.A.: Carruranna Waterhole, Cooper Ck, 32 km WNW of Etadunna HS, *F.J.Badman 1473* (AD, BRI, CANB, MEL, NSW). Qld: Yalleroi, Mar. 1946, *M.Clemens* (BRI, GH). N.S.W.: Cobar, *Abrahams 387* (NSW). Vic.: Post No 7 on Hattah Nature Drive, Hattah Natl Park, *G.D'Aubert 483* (MEL, NSW).



A widespread and variable species characterised by the broad coronal pappus, the conical corolla of the marginal florets and the numerous twin hairs of the achenes.

6. *Sphaeromorphaea subintegra* A.R.Bean, *Austrobaileya* 9: 48; 49, fig. 4A–E (2013)

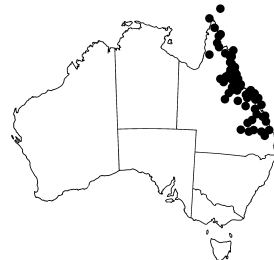
T: Lambert Beach, Slade Point, Mackay, Qld, 16 July 1992, *G.N.Batianoff 9207103* & *H.A.Dillewaard*; holo: BRI; iso: MEL.

Illustration: A.R.Bean, *loc. cit.*

Prostrate to ascending perennial herb. Leaves spatulate to obovate, 14–50 mm long, 4–19 mm wide, denticulate in distal 1/2, with small teeth < 0.5 mm long, obtuse, pale green, sparsely to densely hairy at maturity; resin globules present. Capitula broadly hemispherical, 5–6 mm diam.; peduncles 1.5–3.5 mm long. Corolla of marginal florets conical, 0.6–0.9 (–1.0) mm long, mauve to purple; resin globules few to numerous. Disc florets bisexual; corolla cylindrical to narrowly campanulate, 0.9–1.3 mm long; lobes 4, 0.15–0.25 mm long; resin globules numerous. All achenes fertile. Marginal achenes 0.7–0.9 mm long, with 10–14 ribs; twin hairs absent or 1–4 at base; resin globules numerous. Pappus corona transverse, 0.05–0.08 mm wide; pappus bristles absent or very rarely present. Fig. 55A–E.

Widespread in eastern Qld from the Torres Strait islands to Mundubbera; also recorded from southern lowland parts of New Guinea and from New Caledonia. Grows on wet or moist microhabitats in woodland, on a range of soils. Flowers and fruits throughout the year.

Qld: 45.8 km from Taroom, on road to Bauhinia Downs, *A.R.Bean 29617* (BRI); Facing Is., c. 0.7 km NW of Catcombe, *D.Halford Q8670* (BRI); Mareeba, Jan 1918, *C.T.White* (BRI).



The distribution of this species overlaps considerably with *S. australis*, but there is no evidence of hybrids or intergrades. In the field, it is distinguished by its pale green, spatulate leaves with relatively small marginal teeth.

4. ETHULIOPSIS

A.R.Bean

Ethuliopsis F.Muell., *Fragm.* 2: 154 (1861); the name refers to a resemblance between this genus and *Ethulia* L.

Epaltes sect. *Ethuliopsis* (F.Muell.) F.Muell., *Fragm.* 10: 100 (1877). T: *Ethuliopsis dioica* F.Muell.

Gynaphanes Steetz in W.C.H.Peters, *Naturw. Reise Mossambique* 6(2): 457 (1864). T: *G. australis* Steetz

Perennial herbs. Latex absent. Stems terete, not winged. Leaves alternate, sessile, toothed, spreading, not decurrent. Capitula pedunculate, in terminal panicles, on some plants disciform and heterogamous, on other plants homogamous, with disc florets only; involucre bracts in 3–6 rows, variable in length, cartilaginous; receptacle glabrous, epaleate. Marginal florets fertile, female, white, without rays; corolla lobes 3, tiny; style base not bulbous, with branches divergent; resin globules present throughout. Disc florets bisexual, functionally male, white; anthers tailed, apically obtuse; style with sweeping hairs obtuse, extending well down shaft, not branched, not bulbous at base; ovary vestigial, not producing achenes; resin globules present throughout. Achenes lunate, with a single longitudinal rib on adaxial side; carpodium annular, white, prominent. Pappus on marginal florets comprising a persistent erect cylindrical corona; on disc florets comprising 2–6 barbellate pappus bristles, slightly flattened, often bent or twisted near apex.

A monotypic genus, endemic to Australia.

A.R.Bean, Reinstatement and revision of *Sphaeromorphaea* DC. and *Ethuliopsis* F.Muell. (Asteraceae: Plucheinae), *Austrobaileya* 9: 30–59 (2013).

***Ethuliopsis cunninghamii* (Hook.) F.Muell., *Key Vict. Pl.* 1: 313 (1888)**

Ethulia cunninghamii Hook. in T.Mitchell, *J. Exped. Trop. Australia* 62 (1848); *Ethuliopsis dioica* F.Muell., *Fragm.* 2: 155 (1861), *nom. illeg.*; *Gynaphanes australis* Steetz in W.C.H.Peters, *Naturw. Reise Mossambique* 6(2): 458 (1864), *nom. illeg.*; *Epaltes cunninghamii* (Hook.) Benth., *Fl. Austral.* 3: 530 (1867); *Erigerodes cunninghamii* (Hook.) Kuntze, *Revis. Gen. Pl.* 1: 335 (1891). T: Swampy banks of the Lachlan R., N.S.W., 26 June 1817, *A.Cunningham* 290/1817; lecto: K; isolecto: G-DC, *fide* A.R.Bean, *Austrobaileya* 9: 50 (2013).

Illustration: G.M.Cunningham *et al.*, *Pl. W. New South Wales* 685 (2011), as *Epaltes cunninghamii*.

Erect herb to 100 cm high. Stems glabrous. Leaves oblong to oblanceolate, 20–69 mm long, 4.5–17 mm wide, cuneate to obtuse at base, denticulate to dentate, obtuse or acute, bright green, glabrous or with sparse multicellular hairs. Capitula with peduncles 0–4.5 mm long. Homogamous capitula: capitula cylindrical to campanulate at anthesis, 3.5–5 mm long; median involucre bracts 3.1–3.5 mm long; receptacle flat; disc florets 20–35, bisexual; corolla 2.0–3.1 mm long; pappus bristles 1.9–2.6 mm long. Heterogamous capitula: capitula globose at anthesis, 2.5–3 mm long; median involucre bracts 2–2.7 mm long; receptacle hemispherical; marginal florets 100–200, female, with corolla filiform, 0.8–1.3 mm long; disc florets 2–16, bisexual, with corolla 1.2–1.5 mm long and ovary vestigial; pappus bristles 0.8–1.1 mm long. Achenes formed only from marginal florets, 0.6–0.7 mm long; twin hairs absent; resin globules absent. Pappus corona obliquely placed, erect, cylindrical, 0.03–0.05 mm high, entire, white; pappus bristles absent. Fig. 55F–J.

Widely distributed in arid to semi-arid eastern Australia, in S.A., Qld, N.S.W. and Vic. Grows in heavy clay soil on alluvial flats, and around ephemeral swamps and lakes. Flowers and fruits Mar.–Dec.



S.A.: Katarapko Res., N of Loxton, *C.R.Alcock 10249* (AD, MEL, NSW, NY); 7 km W of Mundondna HS, *F.J.Badman 1022* (AD, CANB, MEL, NSW). Qld: Cuttaburra Channels, Eyre Development Rd, S of Bedourie, *A.R.Bean 26385* (BRI, MEL). N.S.W.: Yantara Lake, Oct 1887, *W.Baeuerlen* (NSW). Vic.: Kings Billabong Wildlife Res., near Red Cliffs, *A.C.Beauglehole 50256* (AD, MEL).

A sub-dioecious species. Specimens of the “male” and “female” plants can be readily distinguished by capitulum shape and size, or by floret size. The corollas of both marginal and disc florets are white.

5. PLUCHEA

A.R.Bean

Pluchea Cass., *Bull. Sci. Soc. Philom. Paris* 1817: 31 (1817); named after Noël-Antoine Pluche (1688–1761), a French priest and naturalist.

Type: *P. marilandica* (Michx.) Cass.

Eyrea F.Muell., *Linnaea* 25: 403 (1853), *nom. illeg., non* Benth. (1851); *Pluchea* sect. *Eyrea* Benth., *Fl. Austral.* 3: 527 (1867). T: *E. rubelliflora* F.Muell.

Annual or perennial forbs or shrubs, aromatic, bisexual (all plants with heterogamous capitula) or subdioecious (some plants with only disc florets, other plants with mainly marginal florets, but also a few disc florets). Stems terete, or winged due to decurrent leaf bases. Leaves simple, alternate, sessile or petiolate; margins entire, toothed or angled; indumentum of uniseriate, multicellular eglandular hairs; glandular hairs sometimes present; lower surface often with yellow shining globose sessile glands. Capitula in terminal clusters or solitary, disciform, homogamous or heterogamous; involucre bracts in several whorls; inner bracts longer than outer ones; receptacle epaleate, verrucose, flat to concave. Marginal florets filiform, female, very numerous, outnumbering disc florets, white to pink. Disc florets bisexual or functionally male; corolla tube white to pink; lobes 4 or 5, triangular; anthers tailed; style shortly divided, with acute or obtuse sweeping hairs, extending beyond the bifurcation. Achenes of disc florets in some species well developed and fertile, in other species vestigial, infertile, glabrous or with scattered appressed twin hairs; carpodium prominent, annular, white. Pappus uniseriate, or rarely in 2 or 3 whorls, capillary bristles all of similar length, barbellate; persistent or caducous. $2n = 20$ for all Australian species, S.Hunger, *op. cit.* 27: 208 (1997).

A genus of about 50 species, found in tropical and subtropical parts of the world; 13 species occurring in Australia, 12 of them endemic.

S.Hunger, The *Pluchea tetranthera* complex (*Compositae*, *Plucheeae*) from Australia, *Willdenowia* 26: 273–282 (1996); S.Hunger, A survey of the genus *Pluchea* (*Compositae*, *Plucheeae*) in Australia, *Willdenowia* 27: 207–223 (1997); S.King-Jones, Revision of *Pluchea* Cass. (*Compositae*, *Plucheeae*) in the Old World, *Englera* 23: 1–136 (2001); A.R.Bean, Two new species of *Pluchea* Cass. (*Asteraceae*: *Plucheeinae*) from Queensland, Australia, *Austrobaileya* 8: 340–346 (2011); A.R.Bean, Three new species of *Pluchea* Cass. (*Asteraceae*: *Inuleae*-*Plucheeinae*) from northern Australia, *Austrobaileya* 9: 66–74 (2013).

- 1 Leaves and stems glabrous (disregarding sessile glands) or with very few scattered hairs
- 2 Pappus bristles 8.2–9.2 mm long, in 2 or 3 whorls; leaves fleshy 13. *P. longiseta*
- 2: Pappus bristles 1.8–5 mm long, in a single whorl; leaves not fleshy
- 3 Leaves narrow, 4.5–23 times longer than wide
- 4 Leaves without punctate glands; stems narrowly winged 5. *P. rubelliflora*
- 4: Leaves with dark punctate glands; stems terete, not winged
- 5 Capitula 7–10 mm long; disc florets 4-lobed; leaves 18–54 mm long; margins of involucre bracts with stalked glands 8. *P. punctata*

- 5: Capitula 5.5–7 mm long; disc florets 5-lobed; leaves 7–24 mm long; margins of involucre bracts fimbriate, eglandular 9. *P. baccharoides*
- 3: Leaves broad, 1.5–5 times longer than wide
- 6: Stems winged; leaf glands absent 4. *P. alata*
- 6: Stems terete, not winged; leaf glands present
- 7: Leaves not resinous; capitula 4–5.5 mm long, clustered into sessile groups of (1–) 2–4 1. *P. indica*
- 7: Leaves resinous; capitula 6.5–8.5 mm long, usually solitary; some peduncles on any given plant more than 3 mm long 10. *P. tetranthera*
- 1: Leaves and stems with frequent to abundant eglandular hairs or with stalked glandular hairs
- 8: Hairs on leaves extremely dense, obscuring leaf surfaces 12. *P. ferdinandi-muelleri*
- 8: Hairs on leaves sparse to dense, leaf surfaces readily visible
- 9: Hairs on leaves and stems predominantly gland-tipped
- 10: Most or all leaves with pinnatifid lobes; shortest peduncle on any given plant 3–34 mm long; disc florets 9–40 6. *P. dentex*
- 10: Most or all leaves entire; shortest peduncle on any given plant 30–100 mm long; disc florets 35–100 7. *P. macdonnellensis*
- 9: Hairs on leaves and stems all or mostly eglandular
- 11: Leaves narrowly elliptic or oblanceolate, 3.4–6.4 times longer than wide
- 12: Leaf margins entire or with 1 or 2 pairs of teeth; leaf surface glands absent or sparse, not yellow; receptacle hairy 2. *P. mesotes*
- 12: Leaf margins denticulate throughout; leaf surfaces with abundant, yellow glands; receptacle glabrous 3. *P. xanthina*
- 11: Leaves obovate, 1.5–3.3 times longer than wide; glands transparent
- 13: Capitula 4–5.5 mm long, clustered into sessile groups of (1–) 2–4; leaves not resinous 1. *P. indica*
- 13: Capitula 5.5–7.5 mm long, not clustered, at least some peduncles more than 2 mm long; leaves resinous 11. *P. dunlopia*

1. *Pluchea indica* (L.) Less., *Linnaea* 6: 150 (1831)

Baccharis indica L., *Sp. Pl.* 2: 861 (1753). T: India, *Herb. Linn.* 992.8; lecto: LINN, *fide* S.Hunger, *Willdenowia* 27: 221 (1997), incorrectly cited there as 922.8.

Woody shrub to 2 m high, bisexual. Stems terete. Leaves sessile, obovate to narrowly obovate, 20–70 mm long, 10–30 mm wide, 1.7–3.3 times longer than broad, denticulate or dentate, acute, not resinous; both surfaces glabrous or with sparse to moderate cover of non-glandular hairs; glands present, transparent. Capitula narrowly campanulate, 4–5.5 mm long, in clusters of (1–) 2–4; peduncles absent; outer involucre bracts pilose, sometimes glandular, with fimbriate margins; inner bracts linear, 3.5–4.5 mm long, 0.2–0.3 mm wide, acute or obtuse, glabrous on outer surface, with upper margins fimbriate. Disc florets 1–4; corolla tube expanded towards apex, 3.0–4.5 mm long, pink; lobes 5, 0.5–0.6 mm long, glandular. Fertile achenes produced only by marginal florets, cylindrical, 0.6–1.0 mm long. Pappus bristles of marginal florets 18–25, 2.4–3.7 mm long.

In Australia, confined to far northern N.T. and Qld, but widespread in southern Asia and Malesia. Grows in saline areas at the edge of the mangrove zone or in coastal *Melaleuca* forest in damp sandy soils. Flowers and fruits Apr.–Nov.



N.T.: near Maningrida, Anamayirra Ck, *I.D.Cowie 5905* (BRI, CANB, DNA, MEL, PERTH); South Alligator River bridge, *J.Russell-Smith 5181* & *D.Lucas* (BRI, DNA). Qld: Boigu Is., Torres Strait, *L.Hucks LAH058* (BRI, CANB, MEL); Weipa, S side of Andoom Ck, *A.Morton 645* (BRI).

Characterised by its short peduncles, with capitula often in sessile clusters, and its broad, toothed leaves. The leaves may be quite densely hairy, or sometimes glabrous.

2. *Pluchea mesotes* A.R.Bean, *Austrobaileya* 9: 71; 73, fig. 3 (2013)

T: Connexion Is., off Groote Eylandt, N.T., 29 Sept. 1988, *P.K.Latz 10901*; holotype: BRI; isotype: DNA.

Illustration: A.R.Bean, *loc. cit.*

Shrub to 1.0 m high, bisexual. Stems terete. Leaves sessile, narrowly elliptic to spatulate, 24–55 mm long, 4–16 mm wide, 3.4–6.2 times longer than broad, entire or occasionally with 1–3 pairs of teeth, acute, not resinous; both surfaces with sparse non-glandular hairs. Capitula narrowly campanulate, 5.5–7 mm long, not clustered; peduncles 0–7 mm long; outer involucre bracts glabrous, with ciliate margins; inner bracts linear, 4.8–5.2 mm long, 0.2–0.3 mm wide, glabrous on outer surface, with upper margins ciliate. Disc florets 2–5; corolla tube cylindrical, 4.0–4.3 mm long, white to pale yellow; lobes 5, 0.4–0.7 mm long, glandular. Fertile achenes produced only by marginal florets, narrowly ellipsoid, 0.9–1.0 mm long. Pappus bristles of marginal florets 12–15, 3.8–4.1 mm long. Fig. 56G–I.

Endemic to coastal parts of NE N.T. Grows on coastal dunes and in gravelly soil adjacent to the mangrove zone. Flowers and fruits Sept.–Nov.

N.T.: Bennett Bay, Eastern Arnhem Land, *J.Russell-Smith 4219* & *D.Lucas* (BRI, DNA); Roper R., Sept. 1867, *B.Gulliver s.n.* (MEL).



3. *Pluchea xanthina* A.R.Bean, *Austrobaileya* 8: 340; 342, fig. 1 (2011)

T: Llanarth Back Range Rd, 9.4 km S of jctn with Scartwater Rd, Qld, 15 May 1991, *V.J.Neldner 3479* & *E.J.Thompson*; holotype: BRI; isotype: AD, K.

[*P. dioscoridis* auct. non (L.) DC.: A.Holland in R.J.F.Henderson (ed.), *Queensland Vasc. Pl. Names Distr.* 31 (1997)]

Illustration: A.R.Bean, *loc. cit.*

Woody shrub to 1.5 m high, bisexual. Stems terete. Leaves narrowly elliptic to oblanceolate, 24–68 mm long, 4–17 mm wide, 3.8–6.4 times longer than broad, denticulate or occasionally dentate, acute, not resinous; both surfaces with sparse to moderate cover of non-glandular hairs; sessile globular yellow glands common; petioles 3–15 mm long. Capitula solitary, campanulate, 7–8 mm long; peduncles 1–6 (–16) mm long; outer involucre bracts with sessile glands and eglandular hairs, with entire margins; inner bracts linear, 6–6.7 mm long, 0.4–0.8 mm wide, acute, glabrous on outer surface, with upper margins entire. Disc florets 4–8; corolla tube cylindrical, 4.5–6 mm long, pink; lobes 5, 0.7–1 mm long, glandular. Fertile achenes produced by all florets, cylindrical, 0.9–1.2 mm long. Pappus bristles of marginal florets 9–13, 4.5–5.1 mm long. Fig. 56K.

Endemic to Qld, where it is found in the central-eastern part of the state, as far S as Monto. Grows in hilly terrain in eucalypt woodland, in sandy-loam to clay-loam soils. Flowers and fruits May–Nov.

Qld: Cole's Lookout, Coomanglah S.F., W of Monto, *A.R.Bean 8856* (BRI, MEL); c. 30 miles [48 km] WSW of Springsure, *S.L.Everist 7939* (BRI); Lynd Scrub, c. 64 km SW to SSW of Mt Garnet, *L.S.Smith 3857* (BRI).

Notable for its non-resinous petiolate leaves that have numerous shining yellow glands on both surfaces.



4. *Pluchea alata* A.R.Bean, *Austrobaileya* 9: 66–68, fig. 1 (2013)

T: First Spring, Edgbaston Res., NE of Aramac, Qld, 6 Apr. 2012, *A.R.Bean 31641*; holo: BRI; iso: CANB, MEL.

Illustration: A.R.Bean, *loc. cit.*

Woody shrub to 80 cm high, bisexual. Stems winged. Leaves sessile, elliptic, 15–30 mm long, 4.5–7 mm wide, 3.5–4.7 times longer than broad, entire or denticulate, acute, not resinous; both surfaces glabrous; sessile glands absent. Capitula cylindrical, 5.0–6.5 mm long, in clusters of 2–4; peduncles 0–1 mm long; outer involucre bracts glabrous, not glandular, with margins entire; inner bracts linear, 3.7–4.0 mm long, 0.8–0.9 mm wide, acute, glabrous on outer surface, with upper margins entire. Disc florets 5–13; corolla lobes cylindrical, 3–3.4 mm long, pink; lobes 5, 0.4–0.6 mm long, not glandular. Fertile achenes produced only by marginal florets, narrowly ellipsoid, 0.7–0.85 mm long. Pappus bristles of marginal florets 4–12, 2.4–2.8 mm long. Fig. 56A–C.

A rare endemic species confined to a small area of central Qld. It inhabits the margins of artesian springs, in soils that have a very high level of salts. Flowers and fruits recorded in Apr. and Sept.

Qld: Measuring Spring, Edgbaston Res., NE of Aramac, *A.R.Bean 31648* (BRI, NSW, US); Big Spring, Edgbaston Stn, N of Aramac, Apr. 2005, *R.Fairfax s.n.* (BRI).

Distinguished from other Australian *Pluchea* by the glabrous non-resinous stems and leaves, the cylindrical sessile capitula and the winged stems.



5. *Pluchea rubelliflora* (F.Muell.) B.L.Rob., *Proc. Amer. Acad. Arts* 47: 206 (1911)

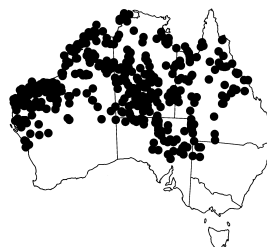
Eyrea rubelliflora F.Muell., *Linnaea* 25: 403 (1853); *Pluchea eyrea* F.Muell., *Rep. Pl. Babbage's Exped.* 12 (1859), *nom. illeg.* T: Nickol R. between Karratha and Roebourne, NW Coastal Hwy, W.A., 19 Sept. 1995, *S.Hunger & N.Kilian 3726*; holo: MEL; iso: B, BM, CANB, K, PERTH; *type cons.*, *fide* S.Hunger, *Taxon* 46: 803–4 (1997).

Illustrations: G.J.Harden (ed.), *Fl. New South Wales* 3: 202 (1992); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1567 (1986); S.Hunger, *Willdenowia* 27: 211 (1997).

Woody shrub to 60 cm high, bisexual. Stems narrowly winged. Leaves sessile, narrowly oblanceolate to broadly oblanceolate, 9–50 mm long, 2–7 mm wide, 4.5–12 times longer than broad, denticulate or dentate, acute, glabrous, not resinous; sessile glands absent. Capitula solitary, hemispherical to broadly campanulate, 4–5 mm long; peduncles 1–12 mm long; outer involucre bracts glabrous or with mixture of glandular and eglandular hairs; inner bracts linear, 3.0–4.2 mm long, 0.3–0.4 mm wide, acute, glabrous. Disc florets 5–30; corolla tube cylindrical, 2–3 mm long, pink; lobes 5, 0.2–0.35 mm long, not glandular. Fertile achenes produced by all florets, cylindrical, 0.6–0.8 mm long. Pappus bristles of marginal florets 10–13, 1.8–2.5 mm long.

Widespread in lower rainfall areas of Australia, mainly in the tropics, but extending S almost to Port Augusta, S.A. Inhabits creek flats and valleys, and frequently occurs on salt-affected terrain, including sites adjacent to coastal mangroves. Flowers and fruits May–Nov.

W.A.: Jimblebar Ck, c. 60 km E of Newman, *A.R.Bean 25251* (BRI, MO, PERTH). N.T.: Conder Point, Melville Is., *P.I.Forster PIF6087* & *J.Russell-Smith* (BRI, DNA, MEL, PERTH). S.A.: Dulkaninna HS waterhole, vicinity of junction with Birdsville Track, *H.T.Smyth 231* (AD, BRI). Qld: 4 km NW of Doongmabulla HS on road to Carmichael HS, *E.J.Thompson GAL22* & *B.K.Simon* (AD, BRI, MEL, NSW). N.S.W.: near Fort Grey HS, *W.E.Mulham 1219* (NSW).



Distinguished from other Australian *Pluchea* species by the glabrous non-resinous stems and leaves, the relatively small capitula and the decurrent leaves. Putative hybrids between this species and *P. dentex* have been recorded.

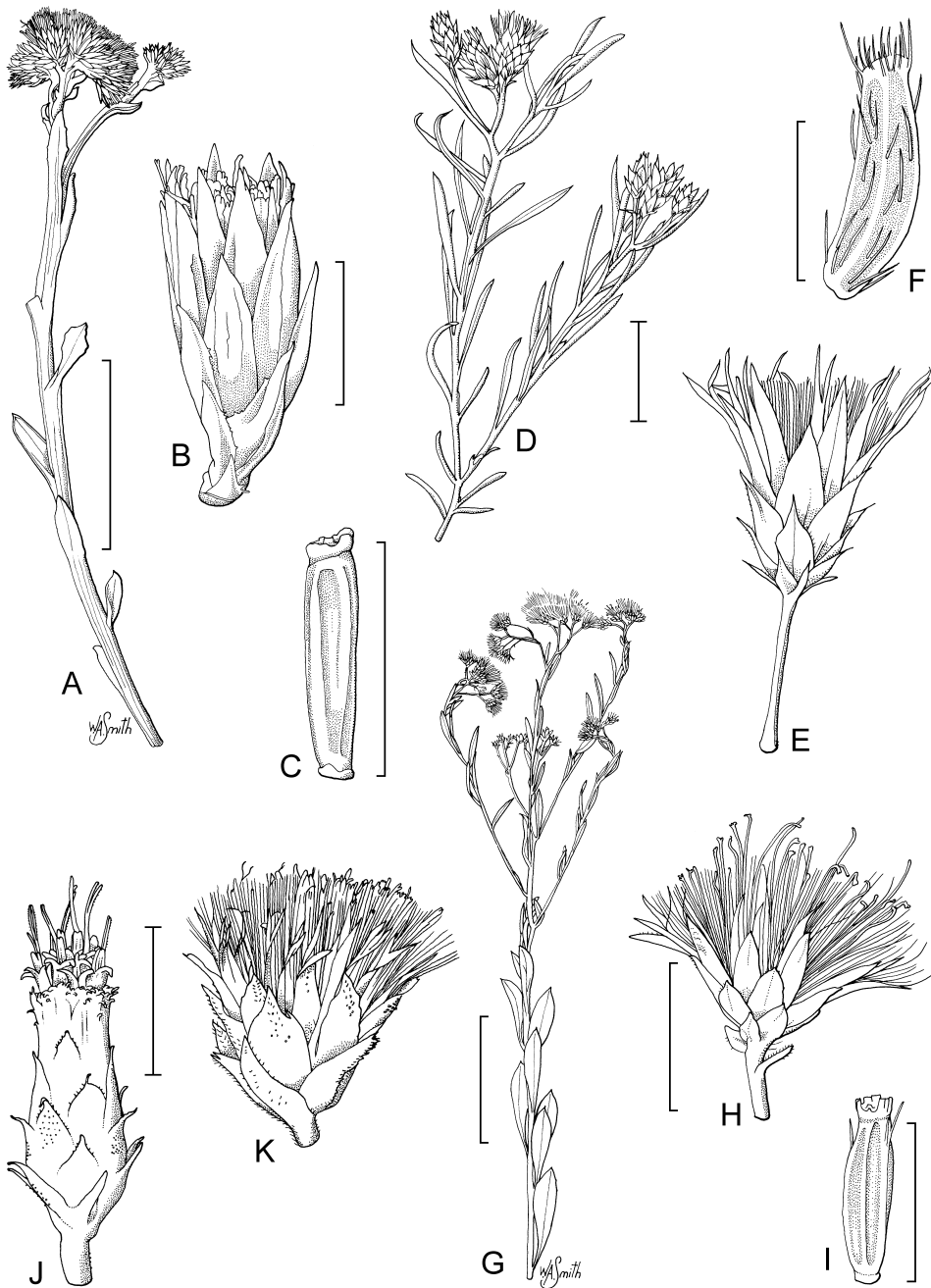


Figure 56. *Pluchea*. **A–C**, *P. alata*. **A**, flowering branchlet; **B**, capitulum; **C**, achene (**A**, A.R.Bean 31648, BRI; **B**, A.R.Bean 31641, BRI; **C**, R.Fairfax s.n., BRI AQ875934). **D–F**, *P. longiseta*. **D**, flowering branchlet; **E**, capitulum; **F**, achene (**D**, G.Byrne 1374, PERTH; **E**, K.F.Kenneally 9526A, PERTH; **F**, K.F.Kenneally 11573, PERTH). **G–I**, *P. mesotes*. **G**, flowering branchlet; **H**, capitulum; **I**, achene (**G–I**, P.K.Latz 10901, BRI). **J**, *P. punctata*, capitulum (A.R.Bean 29877 & K.R.McDonald, BRI). **K**, *P. xanthina*, capitulum (D.Halford Q9690, BRI). Scale bars: **A**, **G** = 5 cm; **B** = 2 mm; **C**, **F**, **I** = 1 mm; **D** = 2 cm; **E**, **H**, **J**, **K** = 5 mm. Drawn by W.A.Smith. Reproduced with permission from *Austrobaileya* 8: 342, 344 (2011); 9: 67, 70, 73 (2013).

6. *Pluchea dentex* Benth., *Fl. Austral.* 3: 259 (1867)

T: Thirsty Sound, outer entrance, Broad Sound [Qld], 3 Sept. 1802, *R. Brown [Bennett No 2101]*; lecto: BM; isolecto: K, *fide* S.Hunger, *Willdenowia* 27: 215 (1997).

P. squarrosa Benth., *Fl. Austral.* 3: 259 (1867). T: Murchison R., W.A., *A.F. Oldfield*; syn: A, K, PERTH; W.A., *J. Drummond ser. 6, 150*; syn: A, BM, P, PERTH.

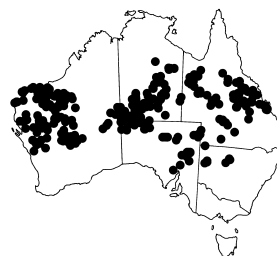
P. eyrea var. *major* Benth., *Fl. Austral.* 3: 259 (1867); *P. rubelliflora* var. *major* (Benth.) J.M.Black, *Fl. S. Australia* 616 (1929). T: Crystal Brook, S.A., *F. Mueller*; syn: MEL; Arkaba, S.A., *F. Mueller*; syn: MEL; Darling River, N.S.W., Victorian Expedition; syn: ?.

Illustrations: G.J.Harden (ed.), *Fl. New South Wales* 3: 202 (1992); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1567 (1986); S.Hunger, *Willdenowia* 27: 216 (1997).

Woody shrub to 1 m high, bisexual. Stems terete. Leaves sessile, linear to narrowly oblanceolate, 15–70 mm long, 2–7 mm wide, 4.5–7.5 times longer than broad, dentate to pinnatifid, acute, not resinous; both surfaces with sparse to moderate cover of stalked glandular hairs; sessile glands absent. Capitula solitary, campanulate, 5–8 mm long; peduncles 10–80 mm long; outer involucre bracts densely glandular-hairy, with eglandular antrorse hairs on margins; inner bracts linear, 5.5–7.5 mm long, 0.3–0.5 mm wide, acute to attenuate, smooth and glabrous on outer surface, with eglandular antrorse hairs on margins. Disc florets 14–25; corolla tube cylindrical, 4–5 mm long, pink; lobes 5, 0.4–0.55 mm long, glandular. Fertile achenes produced by all florets, narrowly ellipsoid, 0.8–1.2 mm long. Pappus bristles of marginal florets 10–15, 3.3–4.5 mm long. Plate 41; Fig. 57A–C.

Found throughout the arid and semi-arid parts of Australia, and extending almost to the E coast near Rockhampton, Qld. It grows on stony ridges, creek flats and floodplains, usually on sandy soil. Flowers and fruits May–Oct.

W.A.: 4.2 km S of Rubin Jctn, E of Goldsworthy and c. 140 km E of Port Hedland, *A.R.Bean 25047* (BRI, PERTH). N.T.: 11 miles [18 km] NE of Alexandria Stn, *R.A.Perry 1475* (BRI, CANB). S.A.: Billeroo Ck area, c. 45 km ENE of Frome Downs HS, *D.J.Whibley 3468* (AD, BRI). Qld: near repeater tower, 122 km W of Charleville, adjacent to Charleville–Quilpie road, *A.R.Bean 29932* (BRI, MEL, US). N.S.W.: Gunderbooka Ra., S of Bourke, *D.F.Blaxell 581* (BRI, NSW).



Distinctive by virtue of its abundant stalked glandular hairs, but also the long peduncles and the dentate to pinnatifid leaves.

7. *Pluchea macdonnellensis* Albr. & A.R.Bean, *Muelleria* 32: 4–7, figs 1, 2 (2014)

T: Ormiston Pound, 5 km due W of Mt Giles, N.T., 6 June 2010, *D.E.Albrecht 13465*; holo: DNA, iso: AD, BRI, CANB, MEL.

Pluchea sp. *Ormiston* (H.D.V.Prendegast 66), *D.E.Albrecht et al., Vasc. Pl. Checklist S Bioregions N. Terr.* 2nd edn, 83 (2007).

Illustration: A.R.Bean, *loc. cit.*

Perennial subshrub to 35 cm high, bisexual. Stems terete. Leaves sessile, linear to narrowly oblanceolate or narrowly elliptic, 10–40 mm long, 0.4–3 mm wide, 13–25 times longer than broad, entire or rarely with a few small teeth, acute, not resinous; both surfaces sparsely to moderately densely covered with stalked or sessile glandular hairs. Capitula solitary, campanulate, 6–8 mm long; peduncles 30–140 mm long; outer involucre bracts densely glandular-hairy; inner bracts linear-lanceolate, 4.5–6 mm long, 0.15–0.5 (–0.6) mm wide, entire or slightly fimbriate distally, acute, glabrous on outer surface. Disc florets 35–100; corolla tube cylindrical, 4–5 mm long, deep pink; lobes 5, 0.5–0.7 mm long, glandular. Fertile achenes produced by all florets, narrowly ellipsoid, 0.65–1 mm long. Pappus bristles of marginal florets 8–11, 3.0–3.8 mm long.

Nearly all records are from the Macdonnell Ranges to the E and W of Alice Springs (N.T.), but there is one record from S.A., in



the Tomkinson Ra. The species is restricted to gravelly or rocky creek-beds or drainage lines, and adjacent footslopes. Flowers and fruits throughout the year.

N.T.: Hugh R., c. 2 km downstream of Hugh Gorge, *D.E.Albrecht* 5856 (NT, DNA); 4 km NW of Jay Ck, 38 km WSW of Alice Springs, *P.K.Latz* 25100 (AD, DNA, MEL, NT). S.A.: Tomkinson Ra., *R.Bates* 58744 (AD).

8. *Pluchea punctata* A.R.Bean, *Austrobaileya* 8: 343–344, fig. 2 (2011)

T: Gilbert River Holding, 78 km by road S of Forsayth, Qld, 13 Aug. 2010, *A.R.Bean* 29877 & *K.R.McDonald*; holotype: BRI; isotype: AD, B, CNS, MEL, NSW, US.

Illustration: A.R.Bean, *loc. cit.*

Woody shrub to 80 cm high, bisexual. Stems terete. Leaves sessile, linear to very narrowly oblanceolate, 18–54 mm long, 1–2.5 mm wide, 13–23 times longer than broad, entire, acute, glabrous, resinous; both surfaces with dark punctate glands. Capitula solitary, narrowly ovoid to campanulate, 7–10 mm long; peduncles 1–10 mm long; outer involucre bracts glabrous, resinous, with stalked glandular hairs on margins; inner bracts linear, 5–6.3 mm long, 0.4–0.6 mm wide, acute, glabrous or with a few stalked glandular hairs near apex. Disc florets 8–12; corolla tube cylindrical, 5.2–6.5 mm long, pink; lobes 4, 0.6–0.7 mm long, glandular. Fertile achenes produced by all florets, narrowly ellipsoid, 0.8–1.0 mm long; pappus bristles of marginal florets 13–17, 3.7–5 mm long. Fig. 56J.

Endemic, known from a single locality near Forsayth in north Qld. It grows on hill-slopes with *Eucalyptus microneura* and *Triodia* spp. Flowers and fruits Aug.–Oct.

Qld: Gilbert River holding, 40 km by road from Cobbold Gorge turnoff, *K.R.McDonald* KRM6961 (BRI, CANB).

Superficially similar to *P. baccharoides*, but *P. punctata* is bisexual and has disc florets with four glandular corolla lobes, and achenes only 0.8–1 mm long.



9. *Pluchea baccharoides* (F.Muell.) Benth., *Fl. Austral.* 3: 528 (1867)

Spiropodium baccharoides F.Muell., *Fragm.* 1: 34 (1858). T: Suttor R. [Qld], *F.Mueller*; lectotype: MEL; isotype: K, *fide* S.Hunger, *Willdenowia* 27: 219 (1997).

Epaltes pleiochaeta F.Muell., *Fragm.* 10: 100 (1877). T: Darling R., near Wilcannia, N.S.W., undated, *F.Bonney*; holotype: MEL.

Illustrations: G.J.Harden (ed.), *Fl. New South Wales* 3: 201 (1992); S.Hunger, *op. cit.* 220.

Woody shrub to 100 cm high, subdioecious. Stems terete. Leaves sessile, linear, 7–24 mm long, 1–3 mm wide, 10–16 times longer than broad, entire to denticulate, acute, glabrous, resinous; both surfaces with dark punctate glands. Capitula solitary, campanulate, 5.5–7 mm long; peduncles 1–5 mm long; outer involucre bracts glandular, with eglandular fimbriate hairs on margins; inner bracts linear, 3.5–5 mm long, 0.1–0.3 mm wide, acute, glandular on outer surface, with upper margins fimbriate. Disc florets 1, 2 or 13–18; corolla tube cylindrical, 3.0–4.5 mm long, pink; lobes 5, 0.4–0.5 mm long, eglandular. Fertile achenes produced only from marginal florets, cylindrical, 1.4–1.7 mm long. Pappus bristles of marginal florets 15–22, 2.5–3.5 mm long. Fig. 57G.

Endemic, occurs in central and southern Qld and NW N.S.W. Grows on creek banks and flood-plains, on a variety of soils from sandy loam to cracking clay. Flowers and fruits July–Nov.

Qld: bed of Paroo R. channel, c. 1 km N of Hungerford, *R.J.Henderson* H2054 & *D.E.Boyland* (AD, BRI, NT, US); Eight Mile Ck, 15 km W of Moray Downs, *E.J.Thompson* 50 & *R.J.Henderson* (BRI, K); 1.4 km W of Eulo Pub, on Bulloo Developmental Rd, W side of Paroo R., *P.G.Wilson* UNS14213 & *C.F.Puttock* (BRI). N.S.W.: Waverley Downs to Hungerford, Oct 1912, *J.L.Boorman* (NSW).



This species is subdioecious. Some plants are entirely male i.e. capitula comprising only disc florets; other plants are effectively female with capitula comprising mostly marginal florets but with 1 or 2 disc florets as well.

10. *Pluchea tetranthera* F.Muell., *Rep. Pl. Babbage's Exped.* 12 (1859)

T: Victoria R. [N.T.], Sept. 1855, *F.Mueller*; lecto: MEL, *fide* S.Hunger, *Willdenowia* 26: 274 (1996).

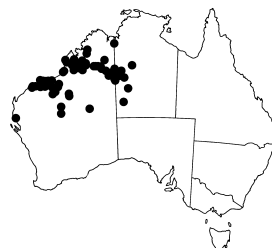
Illustrations: S.Hunger, *op. cit.* 276.

Woody shrub to 100 cm high, subdioecious. Stems terete. Leaves sessile, elliptic or obovate, 20–40 mm long, 4–10 mm wide, 2.7–5 times longer than broad, denticulate to dentate, acute to apiculate, glabrous, resinous; both surfaces with transparent sessile glands. Capitula solitary, narrowly campanulate, 6.5–8.5 mm long; peduncles 1–5 mm long; outer involucre bracts densely glandular, resinous, with margin entire or glandular; inner bracts linear, 5.4–6.4 mm long, 0.2–0.6 mm wide, acute, glabrous on outer surface, with upper margins entire. Disc florets 2–6 or 25–30; corolla tube cylindrical or expanded towards apex, 4–6 mm long, white; lobes 4, 0.5–0.7 mm long, glandular. Fertile achenes produced only from marginal florets, narrowly ellipsoid, 0.7–0.9 mm long. Pappus bristles of marginal florets 20–28, 3.8–5.0 mm long.

Endemic to NW Australia, from about Karratha, W.A., to Tanami, N.T.. Grows in red sandy soil on plains, on alluvium, or on lateritic breakaways. Flowers and fruits Aug.–Nov.

W.A.: c. 7 miles [11 km] S of Port Hedland, *S.L.Everist* 9185 (BRI); E of Whim Ck, Pilbara, *S.Hunger & N.Kilian* 3762 (PERTH); 16 miles [26 km] N of Noonkanbah Stn, *M.Lazarides* 6529 (BRI, CANB). N.T.: S of Mongrel Downs Stn, *P.K.Latz* 6565 (AD).

Some plants of this species have capitula with disc florets only; other plants have capitula with mainly marginal florets, but with a few disc florets at the centre.



11. *Pluchea dunlopia* Hunger, *Willdenowia* 26: 276 (1996)

T: Munjina Roy Hill Rd, between Marillana HS and Roy Hill HS, c. 100 km SSW of Nullagine, W.A., 22 Sept. 1995, *S.Hunger & N.Kilian* 3910; holo: PERTH; iso: B, MEL, K.

[*P. tetranthera* auct. non F.Muell.: G.M.Cunningham *et al.*, *Pl. W. New South Wales* 684 (1981)]

Illustrations: G.M.Cunningham *et al.*, *loc. cit.*, as *P. tetranthera*; J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1567 (1986), as *P. tetranthera* var. *tetranthera*; S.Hunger, *op. cit.* 278.

Woody shrub to 100 cm high, bisexual. Stems terete. Leaves sessile, obovate, 9–32 mm long, 4–16 mm wide, 1.7–2.9 times longer than broad, denticulate to dentate, acute or obtuse, with moderate to dense non-glandular hairs, resinous; sessile glands transparent. Capitula solitary, narrowly campanulate to cylindrical, 5.5–7.5 mm long; peduncles 0–5 mm long; outer involucre bracts pilose and densely glandular, resinous, with margin slightly fimbriate; inner bracts linear to lanceolate, 5–6 mm long, 0.3–0.6 mm wide, acute, glabrous on outer surface, with upper margins entire. Disc florets 3–8; corolla tube cylindrical, 5–6 mm long, pink; lobes 4, 0.4–0.6 mm long, glabrous or glandular. Fertile achenes produced only by marginal florets, ellipsoid, 0.6–0.9 mm long. Pappus bristles of marginal florets 20–25, 4–5 mm long. Fig. 57D–F.

Widespread in low rainfall parts of Australia, from Carnarvon, W.A., to Rockhampton, Qld. Grows in a wide variety of habitats including stony gullies, sandplain, clay plains and laterite plateaux. Flowers and fruits Aug.–Nov.

W.A.: 72 km E on the Gascoyne Junction road from its junction with the NW Coastal Hwy to Carnarvon, *N.F.Norris* 914 (PERTH). N.T.: 40 km S of Smith Bore, Field R., Tobermorey Stn, *P.K.Latz* 18219 (BRI, NT). S.A.: Coongie sandhills, Lake Eyre Basin, *P.E.Conrick* 1957 (AD, BRI). Qld: 14.5 km S of Listowel Valley turn-off on Blackall–Adavale road, *M.E.Ballingall* MEB1601 (AD, BRI). N.S.W.: “Waka”, SE of Fort Gray, *P.L.Milthorpe* 887 (BRI, NSW).

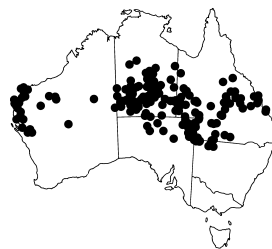




Figure 57. *Pluchea*. **A–C**, *P. dentex*. **A**, leaf; **B**, glandular hairs on leaf; **C**, capitulum (**A–C**, A.R.Bean 7482 & P.I.Forster, BRI). **D–F**, *P. dunlopii*. **D**, flowering branchlet; **E**, marginal floret; **F**, disc floret (**D–F**, P.Foreman CP90, BRI). **G**, *P. baccharoides*, mature achene and pappus (M.P.Bolton 44, BRI). Scale bars: **A** = 10 mm; **B**, **G** = 1 mm; **C** = 5 mm; **D** = 20 mm; **E**, **F** = 2 mm. Drawn by W.A.Smith.

12. *Pluchea ferdinandi-muelleri* Domin, *Biblioth. Bot.* 89: 1217 (1930)

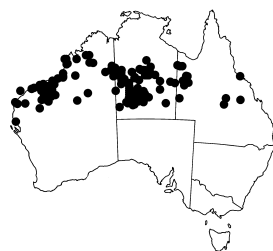
P. tetranthera var. *tomentosa* Benth., *Fl. Austral.* 3: 528 (1867). T: Arnhems Land [N.T.], *F. Mueller*; holo: MEL; iso: K.

P. tetranthera var. *cinerea* W.Fitzg., *J. & Proc. Roy. Soc. W. Australia* 3: 222 (1918). T: Isdell R., W.A., Sept. 1905, *W.V. Fitzgerald s.n.*; holo: PERTH; iso: BM.

Illustration: S.Hunger, *Willdenowia* 26: 281 (1996).

Woody shrub to 150 cm high, subdioecious. Stems terete. Leaves obovate to broadly obovate, 25–40 mm long, 10–23 mm wide, 1.4–2.7 times longer than broad, entire or denticulate, obtuse, with very dense non-glandular hairs, not resinous; sessile glands present; petioles 0–6 mm long. Capitula solitary, narrowly to broadly campanulate, 6.5–7.5 mm long; peduncles 2–4 mm long; outer involucre bracts pilose and densely glandular, resinous, with margin fimbriate; inner bracts linear, 5.0–6.2 mm long, 0.3–0.6 mm wide, acute, with eglandular hairs on outer surface, entire on upper margins. Disc florets 3–10 or 30–50; corolla tube cylindrical, 5.0–5.7 mm long, pink; lobes 4, 0.6–0.7 mm long, glandular. Fertile achenes produced only by marginal florets, ellipsoid, 0.7–0.9 mm long. Pappus bristles of marginal florets 20–25, 3.8–5.5 mm long.

Endemic, found in a broad band running east-west across the continent, mostly N of the Tropic of Capricorn, and excluding the far north. Inhabits stony hillsides, sand plains and scalded areas with *Melaleuca bracteata*. Flowers and fruits Sept.–Dec.



W.A.: 124 miles [200 km] SW of Anna Plains, SW of Broome, *A.C. Beauglehole 11329* (CANB, PERTH). N.T.: 6.1 miles [9.8 km] N of Georgina Downs HS, *G.M. Chippendale 3804* (AD, BRI, CANB, PERTH); 35 miles [56 km] S of Napperby Stn, *M. Lazarides 6084* (AD, BRI, CANB, PERTH). Qld: Edgbaston, NE of Aramac, *R.J. Fensham 5551* (BRI); 10 km S of Mt Isa, Diamantina Development Rd, *A. Schmid 740* (BRI, NT).

The very dense indumentum on the leaves and stems of this species is unique among Australian *Pluchea* species.

13. *Pluchea longiseta* A.R.Bean, *Austrobaileya* 9: 68–70, fig. 2 (2013)

T: North shore of Willie Creek inlet, Dampierland Penin., W.A., 6 Sept. 1985, *K.F. Kenneally 9526A*; holo: BRI; iso: PERTH.

Pluchea sp. A, A.J.G. Wilson in J.R. Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 950 (1992).

Pluchea sp. B, A.J.G. Wilson in J.R. Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 950 (1992).

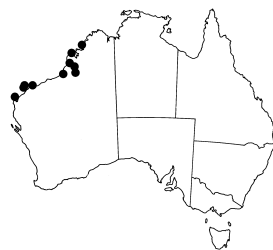
Illustration: A.R.Bean, *loc. cit.*

Woody shrub to 60 cm high, bisexual. Stems terete. Leaves fleshy, sessile, linear to narrowly oblanceolate, 28–52 mm long, 2–5.5 mm wide, 9–14 times longer than broad, entire, acute, glabrous or with very few scattered hairs, not resinous; sessile glands absent. Capitula solitary, narrowly campanulate to cylindrical, 12–15 mm long; peduncles 2–27 mm long; outer involucre bracts glabrous, not resinous, with margins entire and ciliate; inner bracts linear, 10.5–12 mm long, 0.7–1.1 mm wide, lacinate at apex, glabrous. Disc florets 12–22; corolla tube cylindrical, 7.9–9.3 mm long, pink; lobes 4 (5), 0.5–0.6 mm long, glandular. Fertile achenes produced by all florets, narrowly ellipsoid, 1.3–1.5 mm long. Pappus bristles of marginal florets 25–40, in 2 or 3 whorls, 8.2–9.2 mm long. Fig. 56D–F.

Endemic, known from NW W.A., between Broome and Port Hedland, mainly along the coast, but also at a few sites away from the coast. Grows in samphire communities, and on the margins of salty lagoons. Flowers and fruits May–Feb.

W.A.: Buckley Plain, N of town boundary, Broome, *G. Byrne 1374* (PERTH); just N of Dragon Tree Soak, Great Sandy Desert, *A.S. George 14747* (BRI, PERTH); Montgomery Is., E of Koolan Is., *A.A. Mitchell 5381* (PERTH).

A distinctive species by virtue of its fleshy leaves, the large capitula, and the pappus in two or three whorls.



ASTERACEAE

6. THESPIDIUM

A.R.Bean

Thespidium F.Muell. ex Benth., *Fl. Austral.* 3: 534 (1867); named for its resemblance to the genus *Thespis* from SE Asia.

Type: *T. basiflorum* (F.Muell.) Benth.

Capitula clustered, axillary, retained on plant for several seasons and then appearing basal, disciform, heterogamous; involucre bracts in several whorls, with inner ones longer than outer ones; receptacle flat, verrucose, epaleate. Marginal florets filiform, female, numerous, outnumbering disc florets. Disc florets with tailed anthers; style bifid, with acute or obtuse sweeping hairs. Achenes longitudinally ribbed, with scattered circinate twin hairs; carpodium prominent, annular, white. Pappus of persistent, uniseriate, capillary bristles without barbellae.

A monotypic genus endemic to northern Australia.

A.Anderberg, Taxonomy and Phylogeny of the Tribe Plucheeae (Asteraceae), *Pl. Syst. Evol.* 176: 145–177 (1991).

***Thespidium basiflorum* (F.Muell.) Benth., *Fl. Austral.* 3: 534 (1867)**

Pluchea basiflora F.Muell., *Rep. Pl. Babbage's Exped.* 12 (1859). T: sandy banks of the rivers Nicholson and Yappar [Qld]; holo: ?MEL *n.v.*

Illustration: I.D.Cowie *et al.*, *Floodplain Fl.* 188, fig. 37 (2000).

Erect or procumbent woody sub-shrub to 30 cm high. Leaves narrowly elliptic to oblanceolate, 10–60 mm long, 2–12 mm wide, 6–12 times longer than broad, irregularly dentate or denticulate, acute; both surfaces with sparse cover of non-glandular hairs, glabrescent; resin globules present, but often not apparent on older leaves. Capitula sessile, campanulate to cylindrical, 5–6 mm long; outer involucre bracts entire, with dense eglandular hairs; inner bracts lanceolate, 4.2–6.0 mm long, 0.7–1.1 mm wide, acuminate, entire on upper margins, hairy on outer surface. Disc florets 1–6; corolla 4-lobed, cylindrical, 1.9–2.1 mm long, pink; lobes 0.2–0.3 mm long, glandular. Achenes cylindrical, 1.7–2.3 mm long, 12–16-ribbed. Pappus bristles 9–13, 0.3–1.9 mm long.

Endemic, found in coastal or near-coastal northern Australia, from Cape Melville, Qld, to Coburg Penin., N.T., and with reported occurrences near Broome in W.A. (not seen). Grows on floodplains and riverbanks, often where the water is brackish, associated with various sedges or *Sporobolus virginicus* grassland. Flowers and fruits Apr.–Nov.

N.T.: 10 miles [16 km] SW Cape Arnhem, *P.K.Latz 2877* (BRI, CANB, DNA, NSW); Truant Is., English Company Is., *G.J.Leach 3027* (BRI, DNA, K, MO). Qld: Normanton, *S.T.Blake 12511* (BRI); Coastal flat E of Coen, *K.Paijmans 2715* (BRI, CANB); Bentinck Is., South Wellesley Group, Gulf of Carpentaria, *M.B.Thomas BE114* (BRI).



Notable features of this species are the short persistent pappus bristles and the frequently occurring clusters of capitula at the base of the plant, which represent the accumulation of capitula from several flowering seasons.

7. COLEOCOMA

C.R.Dunlop & A.E.Orchard

Coleocoma F.Muell., *Hooker's J. Bot. Kew Gard. Misc.* 9: 19 (1857); from the Greek *coleon* (sheath) and *come* (hair of the head), alluding to the pappus of the marginal florets which forms an open sheath.

Type: *C. centaurea* F.Muell.

Shrubshrubs, glabrous except for axillary hairs. Leaves alternate. Capitula of numerous (> 50–60) florets, solitary, disciform, heterogamous; involucre bracts in several series, horn-like, remaining erect; receptacle flat, with a central boss, epaleate, glabrous. Florets purple (inflorescence appearing pinkish white). Marginal florets female, 1–2-seriate; corollas filiform, regularly 3- or 4-lobed. Disc florets functionally male; corollas mostly 5-lobed; anthers tailed; styles essentially undivided (on a minute entire or 5-lobed stipe). Achenes quadrangular with several narrow ribs, glabrous except for a few basal hairs. Pappus of slightly flattened marginally ciliate bristles, straw-coloured; of marginal florets a sheath c. 3 mm long, sub-entire to long-toothed; of disc florets stiff, subplumose scales, often partly united towards base.

An endemic monotypic Australian genus confined to semi-arid tropical N.T. and W.A.

Coleocoma centaurea F.Muell., *Hooker's J. Bot. Kew Gard. Misc.* 9: 20 (1857)

T: Sturt's Ck, [N.T.], *F.Mueller*; holotype: MEL *n.v.*; isotype: M (fragment), photo seen.

Erect, short-lived, perennial subshrub to 50 cm high. Branching sympodial, with branches terminated by a capitulum. Leaves sessile, oblong or oblanceolate, 8–30 mm long, 2–6 mm wide, dentate with teeth widely spaced, acute at apex. Capitula sessile or nearly so, compact, urn-shaped, indehiscent, 10–15 mm long; involucre bracts in 3–4 series, ovate, mucronate to cuspidate, straw-coloured, with margins shortly lacerate. Disc corollas 6–7 mm long. Achenes 2.5–3 mm long, pale brown or red-brown, shining, closely and finely ribbed. Fig. 58.

Found mainly in the N.T., where it is centred in the Tanami Desert, with a single record from W.A. On brackish soils on the margins of clay pans and seasonal swamps. Flowers and fruits Jan.–July.

W.A.: Sturt Ck, c. 2 km SE of Billiluna, *D.Albrecht 10391* (NT, PERTH).
N.T.: Sangsters Bore area, *D.E.Albrecht 6194* (DNA); 17.2 miles [c. 27.5 km] NW of The Granites, *G.Chippendale NT 4222* (CANB); 14 miles [c. 22.4 km] SE Willowra HS, *G.Chippendale NT 4734* (CANB); 7 miles [c. 11 km] NNE of Willowra HS, *P.K.Latz 1243* (CANB); S of Mongrel Downs Stn., *P.K.Latz 6561* (AD, DNA, MEL).



From label data (*Albrecht 6194*) it appears *C. centaurea* is a clonal species, producing root suckers. Herbarium specimens, including material which has been collected after drying off, show plants with intact capitula of one or two seasons, with no sign of shedding or reflexing of the involucre. The species seems to be a 'tumbleweed', with seed dispersal effected through wind dispersal of the entire plant, once it dries off and detaches.



Figure 58. *Coleocoma centaurea*. **A**, habit; **B**, tip of leafy shoot; **C**, capitulum. **D**, female marginal floret; **E**, functionally male disc floret; **F**, achene with remains of corolla and sheathing pappus; (**A**, **C**, **F**, Chippendale NT4222, CANB; **B**, **D**, **E**, P.K.Latz 1243, CANB). Scale bars: **A** = 2 cm; **B** = 1 cm; **C** = 2 mm; **D–F** = 1 mm. Drawn by A.E.Orchard.

8. SPHAERANTHUS

A.R.Bean

Sphaeranthus L., *Sp. Pl.* 2: 927 (1753); *Gen. Pl.* 5th edn 399 (1754); from the Greek *sphaera* (spherical) and *anthos* (flower).

Type: *S. indicus* L.

Erect branching annual or perennial shrubs. Stems usually winged. Leaves alternate, usually with decurrent bases, aromatic, with numerous sessile yellow glands. Capitula heterogamous, disciform, sessile, few-flowered, aggregated into terminal or leaf-opposed solitary glomerules; involucre bracts few to numerous, subequal, membranous; receptacle naked. Marginal florets few–numerous, female, 3-lobed. Inner florets 1–7, hermaphrodite, tubular, 5-dentate. Anther bases sagittate. Style undivided or minutely bifid, with obtuse sweeping hairs reaching below furcation. Achenes oblong, angular and often glandular. Pappus absent.

A genus of about 33 species occurring mainly in Africa, but extending E to China and the Philippines and S to Australia; 2 species native to Australia.

S.Ross-Craig, A revision of the genus *Sphaeranthus*, *Hooker's Icon. Pl.* ser. 5. 6: 1–117 (1955); C.R.Dunlop, *Sphaeranthus*, in I.D.Cowie *et al.*, *Floodplain Fl.* 184–6 (2000).

Margins of leaves and wings entire or denticulate; involucre bracts glabrous or almost so; glomerules leaf-opposed, 7–11 mm diam.; florets white

1. *S. africanus*

Margins of leaves and wings irregularly and sharply toothed; involucre bracts ciliate on upper margins; glomerules terminal, 11–19 mm diam.; florets pink to purple

2. *S. indicus*

1. *Sphaeranthus africanus* L., *Sp. Pl.* 2nd edn, 2: 1314 (1762)

T: Africa, Asia; not designated.

S. microcephalus Willd., *Sp. Pl.* 4th edn, 3(1): 2395 (1804). T: 'Habitat in Java'; n.v.

S. glaber DC., *Prodr.* 5: 370 (1836). T: Alligator R., Van Diemen Gulf [N.T.], *A.Cunningham*; holo: G-DC.

Illustration: I.D.Cowie *et al.*, *Floodplain Fl.* 185, fig. 36 (2000).

Spreading shrub 40–80 cm high. Stem wings entire or denticulate, glabrous or pubescent. Leaves narrowly elliptic to obovate, 20–100 mm long, 8–32 mm wide, entire or denticulate, obtuse or acute, aromatic, with sparse eglandular hairs; sessile glands abundant. Glomerules globose, 7–11 × 7–11 mm, leaf-opposed; peduncles 3–15 (–20) mm long; bract subtending each capitulum lanceolate, c. 4 mm long, acute; involucre bracts obovate to oblanceolate, 1.7–2.5 mm long, glabrous or almost so. Female florets 6–15, corolla bottle-shaped, 1.0–1.6 mm long, white, with sparse sessile glands. Disc florets 1–3, fertile, bottle-shaped to cylindrical, 1.4–2.0 mm long; corolla lobes 0.3–0.6 mm long; globose sessile glands present. Achenes 0.9–1.4 mm long, densely glandular and with sparse twin hairs. Plate 44.

A widespread species ranging from tropical east Africa and Madagascar to China and the Philippines, then south to tropical Australia. In Australia, it occurs near Wyndham in far northern W.A., in the Top End of the N.T. and northern Qld as far S as Airlie Beach. Inhabits brackish areas close to tidal estuaries, or other permanently moist areas close to the coast. Flowers and fruits Mar.–Nov.

W.A.: Wyndham, *G.W.Carr* 3268 & *A.C.Beauglehole* 47046 (PERTH). N.T.: NW of Dhurputjipi, c. 200 km SSW of Nhulunbuy, eastern Arnhem Land, *A.A.Mitchell* 8143 (BRI, CANB). Qld: near Station Ck, 1 km E of Inkerman HS, *V.J.Neldner* 2898 & *J.R.Clarkson* (BRI, CANB, L); base of Mt Burrumbush, Bowling Green Bay Natl Park, S of Townsville, *A.R.Bean* 3659 (BRI, MEL).



2. *Sphaeranthus indicus* L., *Sp. Pl.* 2: 927 (1753)

T: India; lecto: the illustration '*Sphaeranthos purpurea, alata, serrata*' in J.Burman, *Thes. Zeylan.* 220, t. 94, f. 3, 1737 (lecto: the illustration), *vide* A.A.Anderberg in C.E.Jarvis *et al.* (ed.), *Regnum Veg.* 127: 90 (1993).

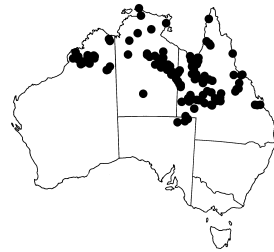
S. hirtus Willd., *Sp. Pl.* 4th edn, 3(1): 2395 (1804). T: 'Habitat in Java'; n.v.

Illustrations: I.D.Cowie *et al.*, *Floodplain Fl.* 185, fig. 36 (2000); J.Milson, *Pasture Pl. NW Queensland* 22 (2000); P.Moore, *Guide to Plants of Inland Australia* 126 (2005), as *Pterocaulon serrulatum*.

Spreading shrub 25–80 cm high. Stem wings irregularly dentate, pubescent. Leaves narrowly elliptic to obovate, 35–90 mm long, 7–25 mm wide, irregularly dentate, obtuse or acute, aromatic, densely pubescent, with glandular and non-glandular hairs; sessile glands abundant. Glomerules globose, 11–19 × 11–19 mm, terminal; peduncles 3–70 mm long; bract subtending each capitulum linear, c. 3.5 mm long, ciliate on upper margins, acute; involucre bracts obovate to oblanceolate, 3.9–4.5 mm long, ciliate on upper margins. Female florets 3–10, corolla filiform, 1.6–2.5 mm long, pink to purple, with sparse glandular hairs. Disc florets 1–3, sterile, bottle-shaped, 3.3–3.5 mm long; corolla lobes 0.3–0.5 mm long; globose sessile glands present. Achenes 1.1–1.3 mm long, with glands sparse or absent, and sparse twin hairs. *Minty Pom-poms*.

A widespread species extending from India to China and S to Australia. In Australia, it is rather common in the lower rainfall areas, mostly N of the Tropic of Capricorn, but extending into northern S.A. Inhabits alluvial plains and creek channels on heavy cracking-clay soils. Flowers and fruits Mar.–Nov.

W.A.: Large crossing, Fitzroy R., 11 km S of Yeeda HS, *T.E.Aplin* 5132 (PERTH). N.T.: Buchanan Ck, 11.7 miles [18.8 km] SE of Alexandria, *G.Chippendale* 7181 (BRI, DNA). S.A.: Dickeree Waterhole, Pandie Pandie Stn, *F.J.Badman* 4963 (AD, BRI). Qld: Thomson R. channels, c. 5 km NNW of Longreach, *A.R.Bean* 22165 (BRI, DNA, MEL); c. 5 km S of Flinders R. crossing, Normanton–Cloncurry road, *S.Jacobs* 1261 (BRI, NSW).



This species is a traditional medicinal plant in India, said to be beneficial in the treatment of jaundice, fever and mental illness, as a hepatoprotector, and having an antimicrobial function.

9. STREPTOGLOSSA

C.R.Dunlop & A.E.Orchard

Streptoglossa Steetz in F.J.H.Mueller, *Edinburgh New Philos. J.* n.s. 17: 228 (1863); from the Greek *streptos* (twisted) and *glossa* (tongue), alluding to the twisted ligules of the ray florets in dried specimens.

Type: *S. steetzii* F.Muell.

Erigeron sect. *Pterigeron* DC., *Prodr.* 5: 293 (1896). T: *E. decurrens* DC.

Pterigeron (DC.) Benth., *Fl. Austral.* 3: 531 (1867). T: *P. decurrens* (DC.) Benth.

Pluchea sect. *Rhodanthemum* F.Muell., *Rep. Pl. Babbage's Exped.* 12 (1859). T: *P. ligulata* F.Muell.

Shrubs or perennial or annual herbs. Vegetative parts often aromatic. Leaves simple, cauline, alternate, sessile, with bases decurrent, stem-clasping or attenuate, pilose to glabrescent, often glandular. Capitula corymbose to solitary, heterogamous, radiate to disciform, sessile to pedunculate, with 15–100 (–190) florets; involucre bracts numerous, in several series, subequal, rigid; outermost bracts herbaceous; innermost scarious, persistent, recurved on drying, never wholly reflexed; receptacle flat, epaleate, glabrous or pilose, sometimes glandular. Florets all fertile; corolla pink to purple. Marginal florets female, in several series; corolla ligulate, filiform or variously lobed. Disc florets bisexual, usually fewer than marginal ones; corolla 5- or 4-lobed; stigmatic branches short, strongly papillate distally; anthers tailed. Achenes terete, often with superficial ribs; carpodium pale, annular. Pappus setae numerous, in 1–3 series, about as long as corolla, connate at base, plumose-setose, persistent.

An endemic Australian genus with 8 species; in all mainland states excepting Vic., and the N.T.

The genus has two natural groups of species. Four species, *S. bubakii*, *S. macrocephala*, *S. decurrens* and *S. odora* are pungently odorous, long-lived shrubs or sub-shrubs. The remaining species, *S. adscendens*, *S. cylindriceps*, *S. liatroides* and *S. tenuiflora* are mildly odorous, herbaceous, annuals or short-lived perennials.

C.R.Dunlop, A revision of the genus *Streptoglossa* (Asteraceae: Inuleae), *J. Adelaide Bot. Gard.* 3(2): 167–182 (1981).

- | | | |
|-----|--|----------------------------------|
| 1 | Leaves, at least those of primary stem, markedly decurrent (more than 4 mm) or stem-clasping | |
| 2 | Involucres at least 15 mm long; marginal florets without ligules | 1. <i>S. macrocephala</i> |
| 2: | Involucres < 15 mm long; marginal florets ligulate | |
| 3 | Leaves on primary stem 8–23 mm wide; florets 45–80 per capitulum; capitula usually in loose corymbs | 2. <i>S. decurrens</i> |
| 3: | Leaves on primary stem rarely > 10 mm wide; florets 15–30 (rarely > 45) per capitulum; capitula scattered | 3. <i>S. odora</i> |
| 1: | Leaves attenuate at base (simply sessile or only slightly decurrent (< 2 mm) on stem) | |
| 4 | Leaves all narrowly linear or oblanceolate, to 3 mm wide | 3. <i>S. odora</i> |
| 4: | Leaves not all linear or if oblanceolate then broader than 3 mm | |
| 5 | Median involucre bracts densely glandular; fresh plants strongly aromatic | |
| 6 | Outer and median involucre bracts without non-glandular multiseptate hairs; involucre bracts straw-coloured, never purple-tipped; involucres at least 15 mm long | 1. <i>S. macrocephala</i> |
| 6: | Outer and median involucre bracts villous; involucre bracts green, often purple-tipped; involucres < 15 mm long | 4. <i>S. bubakii</i> |
| 5: | Median involucre bracts with few scattered glands or non-glandular; plants never strongly aromatic | |
| 7 | Involucres < 13 mm long | |
| 8 | Receptacle non-glandular | 5. <i>S. tenuiflora</i> |
| 8: | Receptacle glandular | |
| 9 | Capitula terminating branches > 30 mm long; plants sparsely and openly branched; ligules conspicuous, 3–6.7 mm long | 6. <i>S. liatroides</i> |
| 9: | Capitula terminating branches to 30 mm long; plants much-branched, compact; ligules inconspicuous, 1–2 mm long | 7. <i>S. adscendens</i> |
| 7: | Involucres at least 13 mm long | |
| 10 | Median involucre bracts glabrescent to villous; receptacles glandular | 6. <i>S. liatroides</i> |
| 10: | Median involucre bracts glabrous; receptacles non-glandular | 8. <i>S. cylindriceps</i> |

1. *Streptoglossa macrocephala* (F.Muell.) Dunlop, *J. Adelaide Bot. Gard.* 3(2): 170 (1981)

Pluchea macrocephala F.Muell., *Rep. Pl. Babbage's Exped.* 12 (1859); *Pterigeron macrocephalus* (F.Muell.) Benth., *Fl. Austral.* 3: 532 (1867). T: Gulf of Carpentaria [Qld], 1856, *F.Mueller s.n.*; lecto: MEL, *fide* C.R.Dunlop, *loc. cit.*

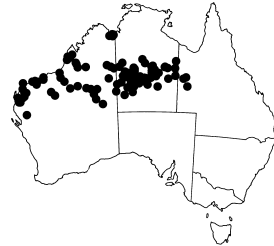
Pterigeron microglossus Benth., *Fl. Austral.* 3: 532 (1866). T: Fitzmaurice R. [N.T.], Oct. 1855, *F.Mueller s.n.*; lecto: K, *fide* C.R.Dunlop & A.E.Orchard, *Fl. Australia* 37: 608 (2015).

Illustration: J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 952, fig. 2891 (1992).

Erect shrub 30–100 cm high. Vegetative parts strongly aromatic, pilose to glabrescent, densely glandular, sometimes vernicose. Leaves ovate, elliptic, oblong or oblanceolate, 10–38 mm long, 4–15 mm wide, stem-clasping or rarely attenuate at base, entire, serrate or shallowly lobed, acute or obtuse. Capitula in loose corymbs, often enveloped by upper leaves; involucre 15–20 mm long; outer and median bracts straw-coloured, glandular, glabrous; receptacle glabrous, eglandular. Florets 60–100. Marginal florets filiform, 4–6-lobed, with lobes subequal, glabrous, eglandular. Disc floret corollas 9–12 mm long, 5-lobed, glabrous, sparsely glandular. Achenes 3–4.5 mm long, 7–9-ribbed, sericeous.

Endemic, found on the red sand plains of the Tanami Desert in the N.T., and the Gibson and Great Sandy Deserts of W.A., with scattered occurrences on sandy or gravelly soils from the Kimberley to Shark Bay in W.A. and from Tennant Creek in the N.T. to western Qld. Flowers July–Sept.; fruits July–Oct. (–Dec.).

W.A.: 16 miles [c. 26 km] E of Carlton Stn, *R.A.Perry* 2657 & *M.Lazarides* (AD, BRI, CANB, DNA, MEL, NSW, PERTH). N.T.: 56 miles [c. 89 km] E of Frewena Roadhouse, *N.M.Henry* 196 (BRI, CANB, DNA, PERTH); 20 miles [c. 32 km] S of Tennant Creek, *D.J.Nelson* 1524 (AD, CANB, DNA, NSW). Qld: Oban, *S.L.Everist* 3366 (BRI, CANB); Alderley Stn, *R.W.Purdie* 1168 (DNA).



See Dunlop, *op. cit.* 171 for a discussion of variation in leaf shape.

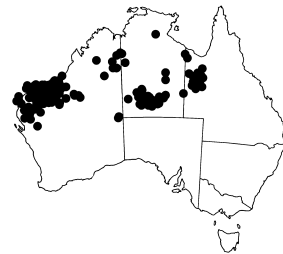
2. *Streptoglossa decurrens* (DC.) Dunlop, *J. Adelaide Bot. Gard.* 3(2): 171 (1981)

Erigeron decurrens DC., *Prodr.* 5: 293 (1836); *Pterigeron decurrens* (DC.) Benth., *Fl. Austral.* 3: 531 (1867). T: “cote occidentale N(ouv)elle Hollande” [W.A.], 1800–1803, *N.Baudin s.n.*; holo: P 1816114, photo DNA.

Erect shrub (20–) 30–70 (–100) cm high. Vegetative parts strongly aromatic, pilose to villous, densely glandular. Leaves oblong, elliptic or rarely oblanceolate, those of main branches 20–60 mm long, 8–23 mm wide (upper leaves smaller), decurrent at base, entire or serrate, acute. Capitula usually in corymbose clusters on lateral branches; involucre 8–14 mm long; outer and median bracts pilose, densely glandular; receptacle glabrous, eglandular. Florets 45–80. Marginal florets ligulate; ligule 1.5–3 mm long, regularly or irregularly 3- or 4-lobed; corolla glabrous, non-glandular. Disc floret corollas 6–7 mm long, 5-lobed, glabrous, non-glandular. Achenes 2–2.5 mm long, without ribs, sericeous. Fig. 59.

Found in W.A. N of about 25° S, western and southern N.T. and western Qld. On well-drained, rocky, upland sites, on dry, sandy, rocky soils with *Triodia* tussocks and scattered *Eucalyptus* and *Acacia* species, *Eremophila*, and *Senna* shrubs. Flowers July–Sept. (–Nov.); fruits July–Nov.

W.A.: White Mountain Hills, *I.D.Cowie* 1978 (DNA); 79 km from NW Coastal Hwy along private railway road to Tom Price, *P.S.Short* 4289 (CANB). N.T.: Elkedra Stn, *T.S.Henshall* 2746 (DNA); vicinity of Haasts Bluff, *N.T.Burbidge* 4280 & *M.Gray* (CANB, DNA, PERTH). Qld: Ardmore, *S.L.Everist* 3251 (BRI, CANB).



Similar to and confusable with *S. odora*, distinguished by its mainly broader leaves.

3. *Streptoglossa odora* (F.Muell.) Dunlop, *J. Adelaide Bot. Gard.* 3(2): 172 (1981)

Pluchea odora F.Muell., *Rep. Pl. Babbage's Exped.* 12 (1859); *Pterigeron odoros* (F.Muell.) Benth., *Fl. Austral.* 3: 532 (1867). T: On the sandstone tableland at the Victoria R., and near its tributaries; lecto: Depot Ck, Victoria R. [N.T.], Mar. 1856, *F.Mueller s.n.* MEL 42595 *p.p.*, *fide* C.R.Dunlop, *loc. cit.*; remaining syn: MEL42956, MEL42543.

Streptoglossa steetzii F.Muell., *Edinburgh New Philos. J.* n.s. 17: 226 (1863). T: not designated [possibly one of the syntypes of *Pluchea odora* F.Muell.].

Pterigeron odoros var. *major* Benth., *Fl. Austral.* 3: 532 (1867), *p.p. quoad specim.* Albert R. [Qld], ?*Henne s.n.*; syntype: K n.v.; probable isosyn: Albert R., 1861, *Anonymous s.n.*; MEL 42597.

Illustration: J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 952, fig. 289J (1992).

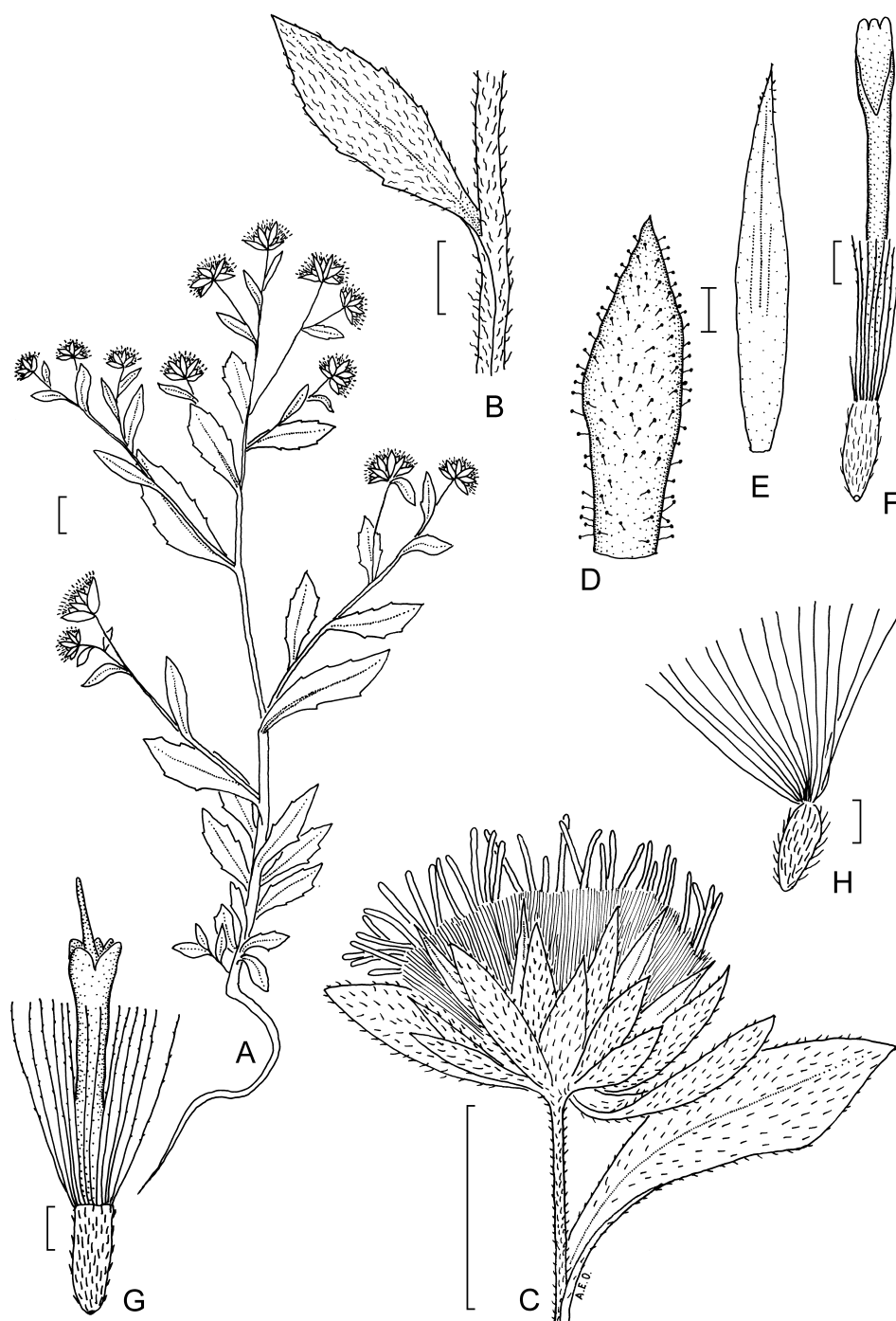
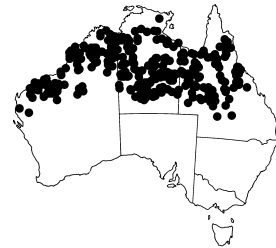


Figure 59. *Streptoglossa decurrens*. **A**, habit; **B**, leaf with decurrent base; **C**, capitulum; **D**, involucral bract; **E**, palea; **F**, ray floret; **G**, disc floret; **H**, achene (**A–G**, P.S.Short 4289, CANB; **H**, N.T.Burbidge 4280 &M.Gray, CANB). Scale bars: **A–C** = 1 cm; **D–H** = 1 mm. Drawn by A.E.Orchard.

Perennial suffruticose erect herbs (10–) 20–60 cm high. Vegetative parts strongly aromatic, pilose to villous, densely glandular. Leaves of main branches oblanceolate, rarely linear, 15–55 mm long, 4–8 (–15) mm wide (leaves of branchlets smaller), decurrent at base (sometimes attenuate in linear leaves), entire or serrate, acute; rarely all leaves linear. Capitula scattered, on long or short branches; involucre 8–11 mm long; outer bracts pilose, glandular; median bracts glabrous or glabrescent, glandular; receptacle glabrous, non-glandular. Florets 15–30 (–60). Marginal florets ligulate; ligule 1–3 mm long, 2–4-lobed, glabrous; corolla usually non-glandular. Disc floret corollas 5–6.5 mm long, 5-lobed, glabrous, usually non-glandular. Achenes 2–3 mm long, without ribs, sericeous.

Found in northern Australia, from the Kimberley in W.A., through the northern N.T. into western and central Qld. In open situations in shrubland and sparse woodland, often on claypans or alluvial sandy clays, including saline depressions. Flowers July–Aug.; fruits Aug.–Oct.



W.A.: Goody Goody, *W.V.Fitzgerald* 242 (PERTH). N.T.: c. 5 miles [c. 8 km] W of Anitowa HS, *G.M.Chippendale* NT3145 (BRI, CANB, MEL, NSW, NT, PERTH); c. 5 miles [c. 8 km] E of Undoolya Gap, *P.K.Latz* 3145 (DNA, MEL, NSW, NT). Qld: New Highland Plains HS, *P.K.Latz* 1615 (MO, NT); 18 miles [c. 29 km] W of Canobie, *N.H.Speck* 4780 (BRI, CANB, MEL, NSW, NT).

See Dunlop, *op. cit.* for discussion of typification.

4. *Streptoglossa bubakii* (Domin) Dunlop, *J. Adelaide Bot. Gard.* 3(2): 173 (1981)

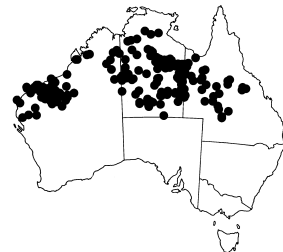
Pterigeron bubakii Domin, *Biblioth. Bot.* 89: 1217 (1930). T: north west Aust. between Ashburton and De Grey Rivers, W.A., *E.Clement s.n.*; holo: K.

Pterigeron odoratus var. *major* Benth., *Fl. Austral.* 3: 532 (1867), *p.p., quoad specim.* Suttor R. [Qld], *E.Bowman* 102; syn.: K n.v.; isosyn: MEL 42598.

Illustrations: J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 952, fig. 289H; 955, fig. 290E (1992).

Perennial, suffruticose, erect herb to 70 cm high. Vegetative parts strongly aromatic, pilose to villous, densely glandular. Leaves oblanceolate or obovate, 10–70 mm long, 2–18 mm wide, attenuate at base, entire or serrate, acute, obtuse or rounded. Capitula usually solitary, on long, rarely short, branches; involucre 10–15 mm long; outer and median bracts villous, densely glandular; receptacle sparsely pilose, rarely glabrous, non-glandular. Florets 40–100. Marginal floret corollas usually 3–6-lobed, with lobes equal or rarely shortly ligulate or 1 lobe deeply incised, glabrous or sparsely pilose, glandular. Disc floret corollas 5–7 mm long, 5-lobed; lobes sparsely pilose, glandular. Achenes 2.5–3.5 mm long, 8–10-ribbed, sericeous.

Usually associated with clay plains, especially the Mitchell Grass (*Astrebla* spp.) plains of the Barkly Tableland, N.T. and adjacent areas in Qld; also in W.A. Flowers & fruits in all months.



W.A.: c. 5 km W of Marrilana H.S., *A.A.Mitchell* 569 (DNA). N.T.: 11 miles [c. 18 km] NW of Alexandria, *G.M.Chippendale* NT7148 (AD, CANB, K, MEL, NSW, NT, TTC); Tanami Bore, *G.M.Chippendale* 5596 (DNA); Tarlton Ra., *C.R.Dunlop* 2549 (MO, NSW, NT). Qld: N of Hughenden, *S.T.Blake* 12662 (BRI).

5. *Streptoglossa tenuiflora* Dunlop, *J. Adelaide Bot. Gard.* 3(2): 174 (1981)

T: De Grey Stn, W.A., 28 July 1941, *N.T.Burbidge* 1584; holo: PERTH.

Illustrations: C.R.Dunlop, *op. cit.* 175; J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 952, fig. 289K, (1992).

Annual erect herb to 30 cm high. Vegetative parts slightly aromatic, pilose to villous, glandular. Lower leaves with decurrent midrib, oblanceolate, 25–40 mm long, 3–8 mm wide, attenuate at base, irregularly serrate; upper leaves oblanceolate to linear, 6–25 mm long,

0.5–3 mm wide. Capitula in loose corymbs; involucre c. 10 mm long; outer bracts cuspidate with glabrous tips, densely ciliate, pilose (villous) and glandular below tip; median bracts cuspidate to acuminate, glabrous or villous–glabrescent; receptacle glabrous, non-glandular. Florets c. 90. Marginal florets ligulate, glabrous, glandular; ligules 1–2 mm long, 2-lobed. Disc floret corollas c. 6 mm long, 4- or 5-lobed; lobes glandular. Achenes c. 2 mm long, \pm 8-ribbed, sparsely sericeous.

Endemic to W.A. Known from scattered collections from just N of Carnarvon to the Kimberley region, on coastal and subcoastal clay plains and silty stream edges. Flowers and fruits July–Aug.

W.A.: Pardoo Stn, *N.T.Burbidge* 1521 (PERTH); De Grey Stn, *A.A.Mitchell* 1939 (DNA); NW of Ethel Creek HS, *A.A.Mitchell* 444 (DNA).



The involucre bracts in this species are often tipped purple.

6. *Streptoglossa liatroides* (Turcz.) Dunlop, *J. Adelaide Bot. Gard.* 3(2): 176 (1981)

Erigeron liatroides Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 24(1): 172 (1851); *Pterigeron liatroides* (Turcz.) Benth., *Fl. Austral.* 3: 532 (1867). T: Nova Hollandia [W.A.], *J.Drummond* iv. 222; holo: KW 1004477, photo seen; iso: MEL, P, PERTH.

Pluchea ligulata F.Muell., *Rep. Pl. Babbage's Exped.* 12 (1859). T: L. Torrens (L. Gregory, Wonnomulla, Blanchwater), S.A., 1858, *G.Hawker s.n.*; syn: MEL.

Pterigeron liatroides var. *humilis* Benth., *Fl. Austral.* 3: 532 (1867). T: Interior of Australia, 1859, *J.McD.Stuart s.n.*; syn: K; L. Gregory, S.A., *G.Hawker s.n.*; syn: K n.v.

Pterigeron liatroides var. *repens* S.Moore, *J. Linn. Soc., Bot.* 34: 196 (1898). T: between Gibraltar and Coolgardie, W.A., Oct. 1895, *S.Moore s.n.*; lecto: BM, photo DNA, *fide* C.R.Dunlop, *J. Adelaide Bot. Gard.* 3(2): 176 (1981).

Streptoglossa sp. B, in S.W.L.Jacobs & J.Pickard, *Pl. New South Wales* 86 (1981).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1581, fig. 717A (1986); G.M.Cunningham *et al.*, *Pl. W. New South Wales* 683 (1992); G.J.Harden (ed.), *Fl. New South Wales* 3: 203 (1992).

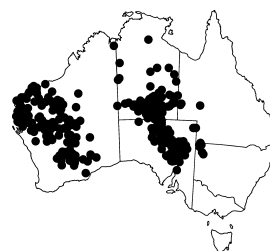
Annual or short-lived perennial herb, sparsely and openly branched, erect to c. 50 cm tall or stems prostrate. Vegetative parts slightly aromatic, pilose, glandular. Leaves oblanceolate to spatulate, 10–50 mm long, 2–15 mm wide, attenuate at base, serrate or entire, acute to obtuse. Capitula solitary, on branches > 30 mm long; involucre 11–17 mm long; outer and median bracts glabrescent to villous, sparsely glandular; receptacle glandular. Florets 50–190. Marginal florets ligulate, 2–4-lobed, glandular; ligule 3–6.7 mm long. Disc floret corollas 6–9 mm long, 5-lobed, glandular. Achenes 2.5–4 mm long, 10–13-ribbed, densely or sparsely sericeous. $n = 10$, B.L.Turner, *Amer. J. Bot.* 57: 382–389 (1970). *Wertaloona* Daisy.

Arid regions of W.A., N.T., S.A., SW Qld and NW N.S.W., usually on heavy clays, including those of semi-saline soils. Flowers & fruits most months.

W.A.: 1 km SW of Mardie HS, *A.A.Mitchell* 823 (DNA); Doonawarrah, *T.E.H.Aplin* 5385 (PERTH). N.T.: Tobermorey Stn, *C.R.Dunlop* 2590 (DNA, NSW). Qld: c. 10 km E of Scott's Tank, Diamantina Natl Park, *M.Mostert* 254 (BRI). S.A.: Mt Sarah, *T.R.N.Lothian* 1944 (AD, NSW, NT). N.S.W.: Yandaroo [Yandaroo], *W.Bauerlen* 197 (BRI).

See Dunlop, *op. cit.* 177 for a discussion of typification.

Pterigeron microglossus Benth. was described with two syntypes, one of which is referable to *S. liatroides*. However Bentham's name is now lectotypified (this volume) on the other syntype, referable to *S. macrocephala* (F.Muell.) Dunlop, and the specimen Sturt Ck, *F.Mueller s.n.*, K, MEL becomes an excluded syntype of *P. microglossus* Benth.



7. *Streptoglossa adscendens* (Benth.) Dunlop, *J. Adelaide Bot. Gard.* 3(2): 177 (1981)

Pterigeron adscendens Benth., *Fl. Austral.* 3: 533 (1867). T: Suttor, Roper, and Flinders rivers, *F. Mueller*; Cape River, Bowman: Belyando river, Mitchell; lecto: Suttor R., 1856, *F. Mueller s.n.*; K, *fide* C.R.Dunlop, *loc. cit.*; isolecto: MEL; remaining syn: Cape R., *E. Bowman s.n.*, K; Flinders R., *F. Mueller s.n.*, K; Belyando R., *T.L. Mitchell s.n.*, K n.v.

Streptoglossa sp. A, S.W.L.Jacobs & J.Pickard, *Pl. New South Wales* 86 (1981).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1581, fig. 717B (1986); G.M.Cunningham *et al.*, *Pl. W. New South Wales* 683 (1992); G.J.Harden (ed.), *Fl. New South Wales* 3: 202 (1992).

Annual or short-lived perennial herb, with stems densely branched, compact, prostrate, decumbent or erect to 40 cm high. Vegetative parts slightly aromatic, pilose, glandular. Leaves oblanceolate, rarely spatulate, 10–50 mm long, 1–17 mm wide, attenuate at base, serrate or entire, acute. Capitula almost sessile or on short, rarely long (but < 30 mm), branches, scattered; involucre 7–11 mm long; outer bracts pilose, glandular; median bracts pilose or glabrescent, non-glandular or sparsely glandular; receptacle glandular. Florets 20–40. Marginal florets ligulate; ligules 1–2 mm long, glabrous, glandular. Disc floret corollas 4–6 mm long, 4- or 5-lobed, glabrous, glandular. Achenes 2–3 mm long, sericeous, 6–8-ribbed. *Desert Daisy*.

Distributed in N.T. and all mainland states except Vic., usually on clayey or silty soils, and in watercourses. Flowers & fruits Mar.–Oct.

W.A.: Wandagee, *C.A.Gardner* 3238 (PERTH). N.T.: NNW of Ranken, *G.M.Chippendale* NT7190 (AD, DNA, K, PERTH). S.A.: Lake Eyre, *W.B.Spencer s.n.* (NSW). Qld: Julia Ck, *S.T.Blake* 6335 (BRI, DNA). N.S.W.: Mt. Poole, *W.Bauerlen* 300 (MEL).

The Roper River syntype of *P. adscendens* was excluded from this taxon by Dunlop, *op. cit.* (= *S. odora*).



8. *Streptoglossa cylindriceps* (J.M.Black) Dunlop, *J. Adelaide Bot. Gard.* 3(2): 178 (1981)

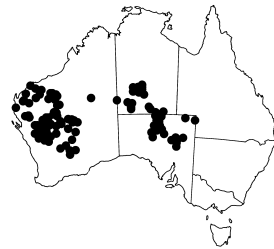
Pterigeron cylindriceps J.M.Black, *Trans. & Proc. Roy. Soc. S. Australia* 39: 839 (1915). T: Moorilyanna Waterhole, S.A., 7 July 1914, *S.A.White s.n.*; lecto: AD, *fide* C.R.Dunlop, *loc. cit.*

Illustration: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1581, fig. 717C (1986).

Annual or short-lived perennial, prostrate herb. Vegetative parts slightly aromatic, pilose, glandular. Leaves oblanceolate to spatulate or obovate, 4–35 mm long, 1–20 mm wide, attenuate at base, entire or serrate, acute to obtuse. Capitula solitary, on long or short branches; involucre 15–23 mm long; bracts green or purplish; outer bracts glabrous or glabrescent, non-glandular; median and inner bracts glabrous, non-glandular; receptacle non-glandular. Florets 35–80. Marginal florets ligulate; ligule 1–2 mm long, glabrous, non-glandular. Disc floret corollas 7–9 mm long, 5- or 4-lobed, glabrous, glandular. Achenes curved, 3.5–5 mm long, sparsely sericeous, 7–9-ribbed. Plate 43.

In arid regions of W.A., the N.T. and S.A., on a variety of soil types; often associated with periodically flooded swamps and saline depressions. Flowers & fruits most months.

W.A.: Wiluna, *T.E.H.Aplin* 2424 (DNA, PERTH); 20 miles [c. 32 km] S of Mundiwindi, *N.T.Burbridge* 6059 (AD, CANB, PERTH). N.T.: Ayers Rock, *C.R.Dunlop* 2974 (AD, BRI, CANB, DNA, MEL, NSW); Napperby, *P.K.Latz* 5950 (BRI, CANB, DNA, L). S.A.: Mabel Creek Stn, *A.C.Robinson* 925 (DNA).



10. ALLOPTERIGERON

A.R.Bean

Allopterigeron Dunlop, *J. Adelaide Bot. Gard.* 3(2): 183 (1981); named for its resemblance to the genus *Pterigeron*, now known as *Streptoglossa*.

Pluchea sect. *Oliganthemum* F.Muell., *Trans. Philos. Instit. Victoria* 3: 56 (1859). T: *A. filifolius* (F.Muell.) Dunlop

Annual herb. Leaves simple, cauline, alternate, sessile, not decurrent. Capitula solitary, heterogamous, miniradiate; involucre bracts in several series, the inner ones longer than the outer, imbricate; receptacle flat, epaleate. Marginal florets female, fertile, ligulate. Disc florets bisexual, functionally male; corolla lobes 3, triangular; stamens 3; anthers without tails; ovary vestigial; style undivided, with obtuse sweeping hairs. Achenes terete, longitudinally ribbed; carpodium oblique. Pappus of free, persistent, barbellate, capillary bristles, in 2 or 3 whorls.

A monotypic genus endemic to northern Australia.

C.R.Dunlop, *Allopterigeron*, a new genus in Asteraceae (Inuleae), *J. Adelaide Bot. Gard.* 3(2): 183–186 (1981).

***Allopterigeron filifolius* (F.Muell.) Dunlop, *J. Adelaide Bot. Gard.* 3(2): 183 (1981)**

Pluchea filifolia F.Muell., *Trans. Philos. Inst. Victoria* 3: 56 (1859); *Oliganthemum filifolium* F.Muell., *loc. cit.*, *nom. inval.*, *pro. syn.*; *Pterigeron filifolius* (F.Muell.) Benth., *Fl. Austral.* 3: 533 (1867). T: Arnhem Land, salsola plains of the Roper R. [N.T.], 19 July 1856, *F.Mueller s.n.*; *holo*: MEL.

Illustrations: C.R.Dunlop, *loc. cit.*

Annual erect herb to 40 cm high. Stems and leaves with sparse multicellular trichomes and minute glandular hairs. Leaves filiform, 9–45 mm long, 0.4–0.6 mm wide; margins revolute. Capitula terminal. Outer involucre bracts spreading, narrowly lanceolate, acuminate, glabrous or with scattered minute glandular hairs; inner involucre bracts 9.5–11 long. Marginal florets 3–5; corolla filiform but expanded at base, 5.5–6.5 mm long, ligulate; ligule 1–1.6 mm long, white, 2-lobed. Disc florets 1–3; corolla cylindrical, 6.3–6.9 mm long, white, sparsely glandular; lobes deltate, c. 0.5 mm long, glabrous; ovary vestigial. Achenes flattened-obovoid, 2–2.4 mm long; densely sericeous. Pappus bristles of unequal lengths, longest ones 5.3–6.5 mm long.

Found in northern Qld from Torres Strait to S of Croydon; also around the Gulf of Carpentaria, and W as far as Darwin in the N.T., growing on lower hill-slopes or creek flats in woodland dominated by *Melaleuca* or *Eucalyptus* spp., always on sandy soils. Flowers and fruits Apr.–Nov.

N.T.: Darwin, *P.K.Latz 3605* (BRI, CANB, DNA, K, NSW); Berry Springs, *M.O.Rankin 1218* (CANB, DNA). Qld: Thursday Is., Jun 1897, *F.M.Bailey s.n.* (BRI); Westmoreland Stn, 40 km N of HS, *R.Booth 4118* & *E.J.Thompson* (BRI); Wenlock, Batavia R., *L.J.Brass 19714* (BRI, CANB).

Distinguished by the capitula with few flowers and spreading involucre bracts.



ASTERACEAE

Trib. 5. ARTHROISMEAE

A.E.Orchard

Asteraceae trib. *Athroismeae* Panero in J.L.Panero & V.A.Funk, *Proc. Biol. Soc. Washington* 115: 917 (2002)

Type: *Athroisma* DC.

Aromatic annual or perennial herbs (shrubs or small trees elsewhere), without latex. Leaves alternate. Capitula disciform or radiate, epaleate (paleate elsewhere). Ray (peripheral) florets female and fertile; florets tubular, or ligules (when present elsewhere) often reduced, 3-lobed, creamy white, yellow, greenish or purplish. Disc florets bisexual (functionally male elsewhere), actinomorphic, 4-lobed (5-lobed elsewhere), creamy white, yellow, greenish or purplish; anther appendages when present ovate; style branches with papillose apices. Pappus absent (a crown of twin hairs or tiny fused scales elsewhere).

A tribe of 6 genera and c. 59 species, mostly in Africa (particularly E Africa), extending to India, Madagascar, SE Asia and Malesia. Three subtribes are recognised. All Australian representatives belong in *Centipeda*, of the monogeneric subtribe *Centipedinae* Panero, which extends from Australia to New Zealand, SE Asia, Madagascar and southern South America.

J.L.Panero, *XVIII. Tribe Athroismeae Panero* (2002), in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 395–400 (2007); A.A.Anderberg, *Arthroismeae*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 680–688 (2009).

CENTIPEDA

N.G.Walsh

Centipeda Lour., *Fl. Cochinch.* 492 (1790); from the Latin *centipede* (centipede), a reference to the creeping habit of the first-named species, *C. orbicularis* (= *C. minima*).

Type: *C. minima* (L.) A.Braun & Asch.

Myriogyne Less., *Linnaea* 6: 219 (1831). T: *M. elatinoides* Less.

Sphaeromorphaea DC., *Prodr.* 6: 140 (1838), *p.p.* T: not designated.

Annual or facultatively perennial herbs, glandular and aromatic. Leaves alternate, cauline, sessile, toothed to entire, glandular-punctate, glabrous to densely cottony. Inflorescences mostly terminal and solitary, but appearing axillary by sympodial growth of subtending shoots, rarely racemose or truly axillary. Capitula heterogamous, sessile to shortly pedunculate, globular, biconvex, hemispherical, cup-shaped or campanulate; involucre bracts in c. 2 rows, herbaceous, with margins membranous; receptacle slightly concave to distinctly convex, glabrous, epaleate, with pithy tissue present to some degree below surface. Outer florets female; corolla tubular, narrowed above and minutely 3-lobed, green to yellow-green, glandular; style branches linear, glabrous. Inner florets bisexual; corolla funnelform, 4-lobed, sometimes purplish, glandular; anthers shortly tailed, sometimes with short ovate apical appendages; style branches oblong, broadly rounded and papillose apically. Achenes of female and bisexual florets similar, clavate to cylindric, 4–6 (–16)-ribbed, mostly with a swollen, pithy or spongy apical portion; glandular trichomes generally present between ribs; eglandular hairs usually present along ribs, acute and straight or tightly inrolled at apex. Pappus absent. *Sneezeweed*.

A genus of 10 species, with 9 native species in Australia, 4 or 5 of them endemic.

Centipeda has been used in traditional medicines and as a type of snuff (hence the common name sneezeweed) in India, China and Australia. Latz (1995) reported the use of *C. minima*, *C. cunninghamii* and *C. thespidioides* by Central Australian aborigines for the treatment of colds, and as a pituri substitute when wild tobacco is unavailable. Recently named *C. crateriformis*,

C. nidiformis and *C. pleiocephala*, previously included within the above three species, are probably used in similar ways. In south-eastern Australia, an infusion of *C. cunninghamii* is still used in aboriginal medicine as a general tonic and for the treatment of colds and other chest complaints, including tuberculosis, and for skin complaints (Zola & Gott 1992).

Sometimes reported as being avoided by stock, or if eaten, causing sickness or death. Bailey (1906) and Hurst (1942) provided anecdotal information of stock being poisoned by species of *Centipeda*. McKenzie (2012) reported it capable of inducing nitrate/nitrite poisoning to ruminant stock, but no examples of this were known. Everist (1974) did not include it amongst known poisonous Australian plants.

The seeds of all species are buoyant (due at least partly to the spongy apical process of most of the species) and 'strand-lines' of germinants are often found around the shores of inland lakes.

F.M.Bailey, *Weeds & Suspected Poisonous Pl. Queensland* (1906); E.Hurst, *Poisonous Pl. New South Wales* (1942); S.L.Everist, *Poisonous Pl. Australia* (1974); C.J.Webb, W.R.Sykes & P.J.Garnock-Jones, *Fl. New Zealand* 4: 164–165 (1988); D.Gupta & J.Singh, Triterpenoid Saponins from *Centipeda minima*, *Phytochemistry* 28 (4): 1197–1201 (1989); N.Zola & B.Gott, *Koorie Places, Koorie People* (1992); P.K.Latz, *Bushfires & Bushtucker* (1995); J.A.Sánchez Rodríguez & M.J.Elías Rivas, *Centipeda cunninghamii* (DC.) A. Braun & Ascherson (Asteraceae), una planta adventicia nueva Europa, *Anales Jard. Bot. Madrid* 56: 167 (1998); N.G.Walsh, A revision of *Centipeda* (Asteraceae), *Muelleria* 15: 33–64 (2001); R.A.McKenzie, *Australia's Poisonous Plants, Fungi and Cyanobacteria* (2012).

- 1 Achenes ±narrowly obovate in outline (broadest about $\frac{2}{3}$ of their length from base), usually somewhat flattened, rounded to obtuse at apex, the ribs not terminating in a thickened, spongy or corky apical process; plants creeping, often rooting at lower nodes, wholly glabrous or with short arachnoid hairs near growing tip; capitula distinctly (but shortly) pedunculate (SE Australia)
- 1: Achenes linear or narrowly cuneate in outline (broadest at or very near apex), ±isodiametric, truncate or abruptly tapered at apex, the ribs terminating in a somewhat thickened, spongy or corky apical process; plants erect to prostrate, but rarely rooting at lower nodes (except *C. crateriformis* subsp. *compacta*), subglabrous to distinctly hairy; capitula often sessile
- 2 Achenes ≤ 1.1 mm long (rarely to 1.3 mm in *C. pleiocephala* which has a shortly racemose axillary inflorescence); capitula solitary or in short racemes
- 3 Achenes broadly obcuneoid, ±half as wide as long, often narrowly winged at angles, with intervening faces concave; corolla of female florets 0.35–0.5 mm long; plants distinctly cottony (mainland Australia, not Tas.)
- 3: Achenes variously shaped, at least 3 times as long as wide, ribbed but not winged, with intervening faces flat or convex; corolla of female florets 0.1–0.3 mm long (except in *C. crateriformis* subsp. *compacta* which has firm, somewhat persistent fruiting capitula); plants ±glabrous to cottony
- 4 Inflorescence a single terminal, axillary or leaf-opposed capitulum
- 5 Fruiting capitula firm, not readily breaking up, with fruiting involucre bowl- or cup-shaped; receptacle ±flat to slightly domed; achenes with pericarp thickish, often obscuring the brown testa of the underlying seed (southern mainland Australia)
- 5: Fruiting capitula soft, readily disintegrating; involucre bracts at fruiting widely spreading or reflexed; receptacle distinctly convex; achenes with pericarp thin between ribs, brown testa of underlying seed clearly apparent
- 6 Plants annual (rarely perennial in permanently moist sites), tufted (rarely producing adventitious roots near base), ±glabrous to cottony; leaves generally under 10 mm long, mostly less than 3 times as long as wide; capitula hemispherical to subglobular; receptacle ±hemispherical (widespread, but rare N of 20°S)

1. *C. elatinoides*

4. *C. nidiformis*

8. *C. crateriformis*

2. *C. minima*

- 6: Plants mostly perennial, rhizomatous, densely white-cottony on at least young growth; leaves generally > 10 mm long, mostly more than 3 (usually 4) times as long as wide; capitula \pm globular; receptacle \pm matchhead-shaped, mostly as high as or higher than wide (N Australia) 3. *C. borealis*
- 4: Inflorescence (sometimes very shortly) racemose, of 2–7 capitula (rarely the lowermost inflorescences a single capitulum)
- 7 Usually slightly woody perennial (but usually dying down annually to perennating rootstock; inflorescences terminal (sometimes also in upper axils then sometimes appearing subpaniculate), 0.5–1.2 (–2) cm long, of 2–7 capitula; capitula highly domed to globular; leaf margins recurved 5. *C. racemosa*
- 7: Herbaceous annual; inflorescences axillary, to c. 0.5 cm long, of 2–4 capitula, the lowest capitulum usually sessile or subsessile; capitula hemispherical to biconvex; leaf margins (except sometimes of immature leaves) plane 6. *C. pleiocephala*
- 2: Achenes > 1.1 mm long; capitula always solitary (very rarely 2 in *C. thespidioides*)
- 8 Fruiting involucre cup-shaped to campanulate; achenes with hairs confined to a basal ring and a subapical band; plants strictly annual, usually erect (mostly inland areas of mainland Australia) 9. *C. thespidioides*
- 8: Fruiting involucre bowl-shaped, or involucre bracts widely spreading or deflexed; achenes with hairs scattered along ribs (and sometimes on faces); plants annual or perennial
- 9 Receptacle slightly concave to slightly convex; fruiting involucre \pm bowl-shaped 8. *C. crateriformis*
- 9: Receptacle prominently raised (\pm hemispherical); involucre bracts at fruiting widely spreading or deflexed
- 10 Achenes rounded or truncate at apex, at least 3 times as long as wide; corollas of female florets 0.3 mm long or more; plants usually \pm glabrous (rarely cottony); fruiting capitula usually remaining intact until after stems senesce (central and southern Australia) 7. *C. cunninghamii*
- 10: Achenes truncate, less than 3 times as long as wide; corollas of female florets under 0.3 mm long; plants overall cottony-pubescent; fruiting capitula readily breaking up before stems senesce (northern Australia) 8. *C. minima*

1. *Centipeda elatinoides* (Less.) Benth. & Hook. ex O.Hoffm. in H.G.A.Engler & K.Prantl, *Nat. Pflanzenfam.* 4(5): 280 (1892)

Myriogyne elatinoides Less., *Linnaea* 6: 219 (1831). T: Chile, ad Concepcion, 1782, *Dombey s.n.*; lecto: P; isolecto: P, G-DC, *fide* N.G.Walsh, *Muelleria* 15: 38 (2001).

C. sp. 1, N.G.Walsh in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 721 (1999).

Illustrations: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 722, fig. 139b (1999), as *Centipeda sp. 1*; N.G.Walsh, *Muelleria* 15: 39, fig. 2; 42, fig. 4a; 44, fig. 6a (2001).

Prostrate annual or perennial to c. 30 cm diam., usually rooting from lower nodes, glabrous or shortly arachnoid near growing tips. Leaves obovate, (6–) 10–20 mm long, 2.5–8 mm wide, entire or shallowly serrate. Inflorescence a solitary capitulum, usually leaf-opposed; peduncle 0.5–3 mm long. Capitula biconvex to hemispherical, 3–5 mm diam.; involucre bracts obovate, 1–1.5 mm long; receptacle convex. Female florets 40–80, in 2–4 rows; corolla 0.2–0.4 mm long. Bisexual florets 4–14; corolla 0.5–0.7 mm long. Fruiting capitula disintegrating; bracts spreading to slightly deflexed; receptacle 1.5–2 mm diam., with pith layer barely developed. Achenes narrowly flattened-obovoid, 1.2–2.0 mm long, 0.5–0.8 mm wide, rounded to obtuse, with 3 or 4 primary ribs, these usually alternating with indistinct ribs, at least the primary ribs with short ascending to appressed hairs; pericarp between ribs membranous,

slightly thickened at and shortly below apex. $2n = 20$, P.J.De Lange & B.G.Murray, *New Zealand J. Bot.* 40: 10 (2002). Plate 42; Fig. 60D–F.

Occurs on damp ground in cool-temperate areas of SE Australia from near Stanthorpe (SE Qld) to near Hobart (Tas.) and as far W as Adelaide, from near sea-level to c. 1200 m altitude. Also native in New Zealand and Chile. Flowers mostly Oct.–Mar.

S.A.: Glenshera, *D.E.Murfet* 644 (AD). Qld: Stanthorpe, Dec. 1875, *F.M.Bailey s.n.* (BRI). N.S.W.: Kosciuszko Natl Park, Cave Ck, *F.E.Davies* 1584 (AD, CBG, HO, MEL, PERTH). Vic.: Rowville, Tirhatuan Swamp, beside Dandenong, *N.G.Walsh* 6840 (MEL, S). Tas.: Greens Beach Rd, *A.M.Buchanan* 15164 (HO).



2. *Centipeda minima* (L.) A.Braun & Asch. in A.Braun & C.D.Bouché, *Append. Sp. Nov. Hort. Berol.* 1867, 6 (1867)

Artemisia minima L., *Sp. Pl.* 2: 849 (1753); *Centipeda orbicularis* Lour., *Fl. Cochinch.* 2: 493 (1790), *nom. illeg.* *A. minima* in syn. T: China, *Lagerström, Herb. Linn. No.* 988.48; lecto: LINN, *fide* A.J.C.Grierson in M.D.Dassanayake & F.R.Fosberg (eds), *Revised Handb. Fl. Ceylon* 1: 236 (1980).

Cotula minuta G.Forst., *Fl. Ins. Austral.* 57 (1786); *Myriogyne minuta* (G.Forst.) Less., *Linnaea* 6: 219 (1831). T: New Caledonia; *n.v.*

Myriogyne minuta var. *lanuginosa* DC., *Prodr.* 6: 139 (1838); *Centipeda minima* var. *lanuginosa* (DC.) Domin, *Biblioth. Bot.* 89: 683 (1930); *Centipeda orbicularis* var. *lanuginosa* (DC.) F.M.Bailey, *Queensland Fl.* 3: 869 (1900). T: 'in India orientali, Wallich'; 'in Java, Blume'; syn: G-DC.

Artemisia sternutatoria Roxb., *Fl. Ind.* 3: 423 (1832); *Cotula sternutatoria* (Roxb.) Wall. ex DC., *Prodr.* 6: 139 (1838); *Centipeda orbicularis* var. *sternutatoria* (Roxb.) F.M.Bailey, *Queensland Fl.* 860 (1900). T: *Roxburgh*, Wallich herbarium; lecto: K, *fide* N.G.Walsh, *Muelleria* 15: 43 (2001).

Prostrate to suberect annual or facultative perennial, to c. 20 cm high, occasionally rooting from lower nodes, \pm glabrous to cottony. Leaves obtrullate to spatulate, 3–12 (–27) mm long, 1.5–6 (–11) mm wide, variably serrate to shallowly incised. Inflorescence a solitary sessile or subsessile capitulum, (peduncles to c. 1 mm long), appearing axillary or leaf-opposed. Capitula hemispherical to subglobular, 1.5–5 mm diam.; involucre bracts obovate, 1–1.6 mm long; receptacle \pm hemispherical. Female floret corolla 0.1–0.25 mm long. Bisexual floret corolla 0.3–0.4 mm long. Fruiting capitula disintegrating; bracts spreading to deflexed. Achenes narrowly cuneate (l:w ratio c. 2.5–4), 0.6–1.5 mm long, truncate or obtusely rimmed and very slightly impressed at apex, 4–6 (–8)-ribbed, with intervening faces membranous; ribs with short ascending bristles; pericarp pithy in distal $\frac{1}{4}$. *Inteng-inteng, Karengkal, Kata-palkalpa, Munyu-parnti-parnti.*

Occurs in all mainland States and Territories. Two subspecies are recognised.

The common names are of Central Australian Aboriginal origin. It is unclear however if these names are restricted to this species. Latz (1995) suggests these same names are used for *C. cunninghamii* and *C. thespidioides* which are similarly used medicinally. The same is probably also true of the more recently described *C. crateriformis* and *C. pleiocephala*.

Achenes ≤ 1.1 mm long; capitula at anthesis 1.5–3 (–3.5) mm diam. (mostly S of 20° S)

2a. subsp. *minima*

Achenes > 1.1 mm long; capitula at anthesis 3–5 mm diam. (mostly N of 16° S)

2b. subsp. *macrocephala*

2a. *Centipeda minima* (L.) A.Braun & Asch. subsp. *minima*

Centipeda minima subsp. *A94915 N'Dhala Gorge*, D.E.Albrecht *et al.*, *Vasc. Pl. Checklist S Bioregions N. Terr.* 2nd edn, 78 (2007).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1610, fig. 731b (1986); G.J.Harden (ed.), *Fl. New South Wales* 3: 293, 294 (1992); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 722, fig. 139a (1999).

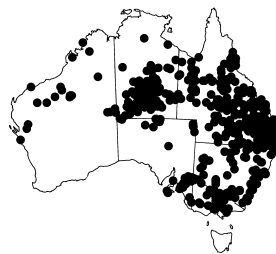
Plants \pm glabrous to moderately cottony. Leaves 3–12 (–27) mm long, 1.5–6 (–11) mm wide. Capitula at anthesis 1.5–3 (–3.5) mm diam.; involucre bracts c. 1 mm long; receptacle 1–1.2 (–1.5) mm diam. Female florets 75–200. Bisexual florets 10–20. Achenes 0.7–1.1 mm

long, c. 0.3 mm wide. $2n = 20$, P.J.De Lange & B.G.Murray *New Zealand J. Bot.* 40: 20 (2002). Fig. 60A–C.

In all mainland states and N.T. Mostly south of 17° S, rather rare in W.A.; on margins of lakes, dams, billabongs and floodplains and in rock-holes. Also native through Pakistan, Afghanistan, SE Russia, India, SE Asia and Pacific Islands, including New Zealand. Occasionally a weed of agricultural land. Flowers through the year.

W.A.: Carnarvon Basin, Wardawara Pool, *G.J.Keighery & N.Gibson 690* (PERTH). N.T.: West MacDonnell Natl Park, Ellery Creek Big Hole, *N.G.Walsh 4968 & D.E.Albrecht* (MEL, NT). S.A.: R. Murray opposite Newena Is., *W.R.Barker 3778 & R.M.Barker* (AD, MEL). Qld: Leeks Dam, *G.N.Batianoff 9348* (BRI, K, NSW, US). N.S.W.: Warrabah Natl Park, alongside Namoi R., *J.R.Hosking 3053* (CANB, MEL, NE, NSW). Vic.: Sale Common, *H.I.Aston 2617* (CANB, MEL).

The extreme (bracketed) measurements are from plants growing in permanently moist and/or shaded sites. Young and/or incomplete specimens of hairier forms of the taxon may be difficult to distinguish from *C. borealis*, but except in Papua New Guinea (and perhaps Irian Jaya), the two do not appear to be sympatric. Although the name *C. minima* var. *lanuginosa* (DC.) Domin is sometimes applied to very cottony specimens, there seems to be no discontinuity between these and ±glabrous forms as represented by the type of the species.



Used in traditional medicines in India, China and Australia (see notes under genus description).

2b. *Centipeda minima* subsp. *macrocephala* N.G.Walsh, *Muelleria* 15: 48, figs 4c, 6c (2001)

T: W.A., Fortescue Botanical District, creek crossing, 45 km from Tom Price along Marandoo Development Rd, 30 Aug. 1995, *P.S.Short 4280*; holo; MEL; iso: PERTH, TI.

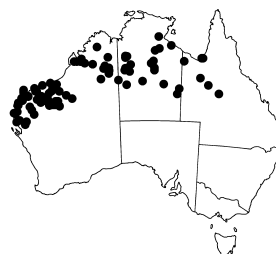
C. minima subsp. *A59820 Elkedra*, *D.E.Albrecht et al.*, *Vasc. Pl. Checklist S Bioregions N. Terr.* 2nd edn, 78 (2007).

Illustrations: N.G.Walsh, *loc. cit.*

Plants cottony. Leaves 5–13 mm long, 2–5 mm wide. Capitula at anthesis 3–5 mm diam.; involucre bracts 1.2–2 mm long; receptacle 1.5 mm diam. at anthesis. Female florets (60–) 120–250. Bisexual florets (7–) 16–21. Achenes 1.15–1.7 mm long, 0.4–0.45 mm wide.

Occurs in northern Australia between latitudes c. 16° and c. 25° S, but apparently only N of c. 22° S (around Barrow Ck) in Central Australia. Records are concentrated in the Carnarvon and Pilbara areas of W.A.; in sandy or clayey soils at margins of and in dry beds of watercourses, around pools, dams, springs etc. Flowers mostly Apr.–Oct.

W.A.: Coondewanna Flats, 18.4 km ESE of Mt Meharry, *S.van Leeuwen 4681* (MEL, PERTH). N.T.: Limmen Natl Park, c 3 km SSE of Ngkurr, *I.D.Cowie 12471 & B.M.Stuckey* (B, BRI, MEL, NT, NY). Qld: Near Karumba, c. 32 km NW of Normanton Township, *M.Lazarides 3950* (BRI, CANB, DNA, MEL, NSW).



Apart from the larger capitula and achenes, subsp. *macrocephala* is typically twiggy, more robust and more densely white-cottony than subsp. *minima*. Fruiting specimens are often conspicuous in having fallen achenes retained within the cottony indumentum.

3. *Centipeda borealis* N.G.Walsh, *Muelleria* 15: 49, figs 3d, 4d, 6d (2001)

T: Qld, 12.1 km from Peninsula Development Rd on track following telegraph line to Weipa, 2 Aug. 1983, *J.R.Clarkson 4873*; holo; MEL; iso: BRI, DNA, K, L, MO, NSW, QRS.

Centipeda sp. *D14869 borealis*, *P.S.Short et al.*, *Checklist Vasc. Pl. N. Terr. Sp.*, 16 (2011).

[*C. minima* auct. non (L.) A.Braun & Asch.: *C.Dunlop in I.D.Cowie et al.*, *Floodplain Fl.* 182 (2000)]

Illustrations: N.G.Walsh, *loc. cit.*

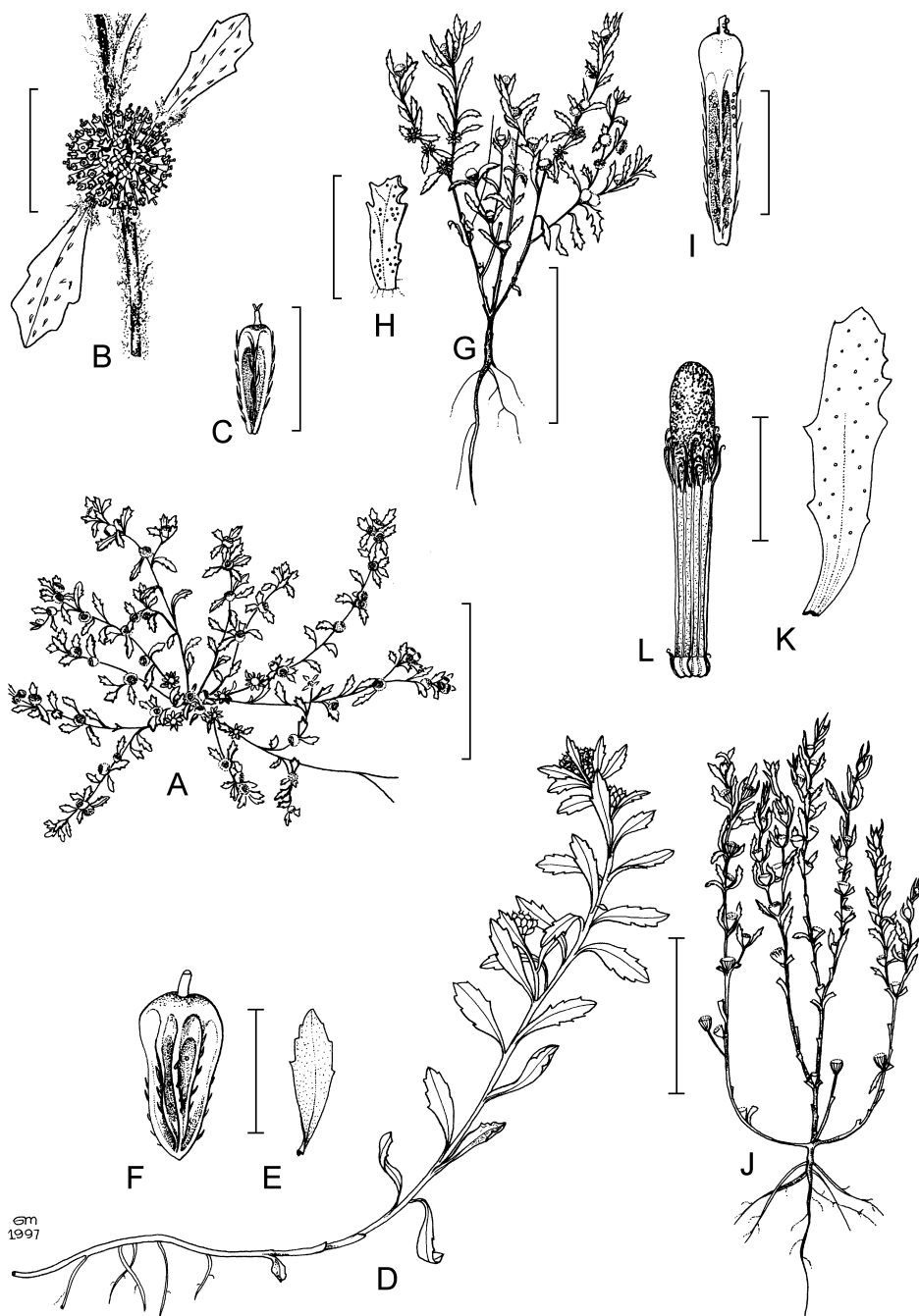
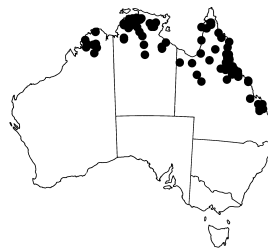


Figure 60. *Centipeda*. **A–C**, *C. minima* subsp. *minima*. **A**, habit; **B**, capitulum; **C**, achene (**A–C**, D.C.Cheal s.n., 3 Oct. 1982, MEL). **D–F**, *C. elatinoides*. **D**, habit; **E**, leaf; **F**, achene (**D–F**, A.Piesse 832, MEL). **G–I**, *C. cunninghamii*. **G**, habit; **H**, leaf; **I**, achene (**G–I**, D.G.Cameron 8687, MEL). **J–L**, *C. thespidioides*. **J**, habit; **K**, leaf; **L**, achene (**J–L**, P.S.Short 3004, MEL). Scale bar: **A**, **G**, **J** = 5 cm; **B** = 5 mm; **C**, **F**, **I**, **L** = 1 mm; **E**, **H**, **K** = 10 mm. Drawn by E.Mayfield. ©Royal Botanic Gardens Melbourne. Reproduced with permission from N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 722 (1999).

Procumbent to ascending, usually shortly rhizomatous perennial, to c. 30 cm high, usually many-branched from near base, densely white- or grey-cottony at least on young growth. Leaves narrowly oblanceolate to ±oblong, 6–20 mm long, 1.5–2.5 (–4) mm wide, distally with 3–5 (–7) teeth or narrow lobes, ±concolorous. Inflorescence a single sessile capitulum, terminal at anthesis, but subtending vegetative buds often growing out and overtopping capitulum in fruit. Capitula ±globular, 1.5–3 (–4) mm diam.; involucre bracts obovate, 0.7–1 mm long; receptacle ±matchhead-shaped (usually as high as or higher than wide). Female florets c. 160–250 in 6–10 rows; corolla c. 0.2 mm long. Bisexual florets 11–20; corolla c. 0.4 mm long. Fruiting capitula readily disintegrating; bracts reflexed; receptacle 0.9–1.3 mm diam., with a pith layer contained entirely within the dome. Achenes narrowly clavate to narrowly cuneoid, 0.8–1.1 mm long, 0.2–0.3 mm wide, truncate at apex, smooth or scabridulous, weakly to strongly 4 (–6)-angled, with angles ciliate; pericarp very thin between ribs with brown seed testa apparent, thickened and opaque in distal 20%. Fig. 61G–H.

In northern Australia from near-coastal areas of the Kimberley, W.A., S and E to near Rockhampton, Qld. Also in western Papua New Guinea and perhaps Irian Jaya; in seasonally inundated depressions and on floodplains, commonly around lagoons, billabongs and beside watercourses, mostly on alluvial silts. Flowers mostly Mar.–Nov.

W.A.: King Edward R. floodplain, *A.A.Mitchell* 3247 (MEL, PERTH). N.T.: 1.8 km W of Annaburroo on Arnhem Hwy, *B.J.Lepschi* 4855 & *J.R.Connors* (AUA, CANB, CUV, DNA, MEL, MU). Qld: Cape York, Archer Bend Natl Park, *A.Morton* 1309 (BRI, MEL).



Distinguished from *C. minima* by the perennial, rhizomatous, more robust habit, conspicuous white-cottony indumentum and longer, relatively narrow leaves. A collection from Leila Lagoon, near Borroloola, N.T. (*G.Chippendale s.n.*, 12 Mar. 1959 (MEL, NT)) is remarkable for being almost glabrous. It is tentatively referred to *C. borealis* on the basis of having the other attributes of the species.

4. *Centipeda nidiformis* N.G.Walsh, *Muelleria* 15: 51, figs 4e, 6e (2001)

T: N.T., Barkly Tableland, Waterhole on Morphet Ck, c. 200 m W of Stuart Hwy crossing, 21 June 1999, *N.G.Walsh* 4982; holo: MEL; iso: CANB, NT.

Centipeda sp. aff. *minima* (Mallee), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn, 49, 155 (2003).

Centipeda sp. D17777 Sanctuary Swamp NT Herbarium, D.E.Albrecht *et al.*, *Vasc. Pl. Checklist S Bioregions N. Terr.* 2nd edn, 78 (2007).

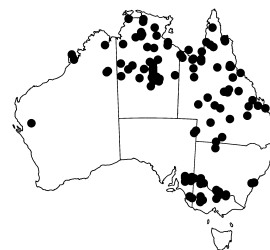
Illustration: N.G.Walsh, *loc. cit.*

Decumbent to ascending, usually distinctly cottony annual, to c. 15 cm diam. and 15 cm high; adventitious roots rarely produced. Leaves ±spatulate, 3–10 mm long, 1–5 mm wide, usually with very slender petiole-like bases, shallowly toothed or subentire. Inflorescence a single sessile capitulum, terminal and/or cauline, closely subtended by 1–4 leaves or leaf-like bracts. Capitula ±globular, 2.5–5 mm diam.; involucre bracts 1–1.6 mm long; receptacle depressed-hemispherical. Female florets c. (50–) 110–230; corolla 0.35–0.5 mm long. Bisexual florets (6–) 9–11; corolla 0.6–0.7 mm long. Fruiting capitula readily disintegrating; bracts widely spreading to slightly deflexed; receptacle 1–1.5 mm diam., with a thin pith layer contained entirely within the dome, not extending below base of involucre. Achenes broadly cuneiform, 0.8–1.1 mm long, c. 0.4–0.5 mm wide, depressed-truncate at apex, usually acutely 4-angled or almost narrowly winged (rarely 5- or 6-angled), with short subappressed hairs on angles, the intervening faces concave; pericarp prominently thickened and opaque in distal c. 40%.

Chiefly in tropical Australia, but scattered occurrences in the eastern half of the continent S to near Naracoorte, S.A. with a disjunct occurrence inland of Carnarvon, W.A.; margins of streams, waterholes etc. usually on clayey soils. Flowers through the year.

W.A.: Bunguaduk waterhole, Dampierland Penin., *K.F.Kenneally* 9454 (PERTH). N.T.: near Nourlangie Rock, *J.Burrell* 1257 (CANB, DNA). S.A.: Innamincka Stn, *P.E.Conrick* 2245 (AD). Qld: Wairuna Lake, *M.Lazarides* 8164 (BRI, CANB). N.S.W.: 2 km S of Deniliquin, *W.E.Mulham* 1201 (NSW). Vic.: Hattah Natl Park, Chalka Ck, 3 Oct. 1982, *D.C.Cheal* s.n. (MEL).

Distinguished from *C. minima* by the longer corollas and relatively broader, strongly angular achenes that typically have concave faces between the ribs. The 'pseudopetiolate' leaves are characteristic. Specimens from the southern part of the range are often less cottony than typical.



5. *Centipeda racemosa* (Hook.) F.Muell., *Syst. Census Austral. Pl.* 84 (1883)

Myriogyne racemosa Hook. in T.L.Mitchell, *J. Exped. Trop. Australia* 353 (1848). T: Qld, Maranoa R., 17 Oct. 1846, T.L.Mitchell: lecto: K; iso: K, fide N.G.Walsh, *Muelleria* 15: 38 (2001).

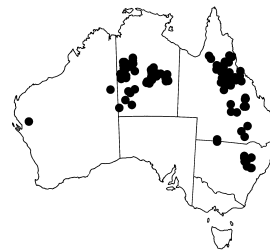
Centipeda racemosa var. *lanata* F.M.Bailey, *Queensland Agric. J.* 28: 276 (1912). T: Herberston, Qld, Dr. F.Hamilton Kenny; holo: BRI.

Illustrations: G.J.Harden (ed.), *Fl. New South Wales* 3: 293 (1992); N.G.Walsh, *Muelleria* 15: 40, fig. 3e; 42, fig. 4f; 44, fig. 6f (2001).

Erect perennial to c. 45 cm high, usually many-branched from base, glabrous to quite cottony on new growth. Leaves \pm oblong, slightly tapered to base, 3–14 mm long, 1–2 mm wide; margins recurved, evenly serrate or sometimes toothed distally only. Inflorescences racemose, 0.5–1.2 (–2) cm long, terminal and sometimes also in upper axils (then sometimes appearing sub-paniculate), of 2–7 capitula; peduncles 0.5–5 (–8) mm long. Capitula highly subglobose to globose, 1.8–4 mm diam.; involucre bracts obovate, 1–1.5 mm long; receptacle distinctly convex. Female florets c. 80–150 in 5–8 rows; corolla c. 0.3 mm long. Bisexual florets 9–18; corolla 0.7–0.8 mm long. Fruiting capitula readily disintegrating; bracts widely spreading or reflexed; receptacle 0.8–1.2 mm diam., with a pith layer contained entirely within the dome. Achenes narrowly cuneoid, 0.8–1.1 mm long, at least 3 times as long as wide, truncate, strongly 4-angled to apex, appressed-ciliate on angles, the intervening faces with row of similar hairs down centre; apical process of pericarp not conspicuously thickened. Fig. 61 I–J.

Occurs in the N.T. and adjacent W.A., mainly south of 18°S and in eastern Qld from near the Gulf of Carpentaria S to the Warrumbungle Ra. area in N.S.W., with a very disjunct occurrence near Carnarvon, W.A.; floodplains and margins of watercourses, gilgais, or other water-retentive sites, with clayey, sandy or rocky substrates. Flowers mostly May–Oct.

W.A.: Towrana Stn, *R.J.Cranfield* 2105 (PERTH). N.T.: 107 km NE of Tanami Bore, *J.R.Maconochie* 1109 (CANB, K, MEL, NT, PERTH). Qld: Minerva N of Springsure, *S.T.Blake* 7023 (BRI). N.S.W.: Binnaway, 21 Dec. 1960, *E.J.McBarron* s.n. (NSW).



There are very few contemporary collections from Qld and N.S.W., suggesting that its habitat has been severely modified through this part of its range.

Centipeda racemosa var. *lanata* is known only from the type specimen from near Herberston. It differs from other specimens of *C. racemosa* in being particularly lanate and in having slightly broader, less dentate leaves than typical. Further collections of this form may suggest that it warrants recognition, but it is here regarded as an extreme form only.

6. *Centipeda pleiocephala* N.G.Walsh, *Muelleria* 15: 54, figs 1, 3b, c, 5a, 6a (2001)

T: Qld, Currawinya Natl Park, NE of Karatta Bore, 21 Mar. 1997, *P.I.Forster* 20546 & *M.Watson*; holo: MEL; iso: BRI, DNA, NSW.

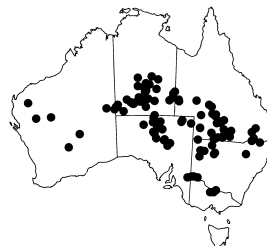
Centipeda sp. 92472 *Toko Range*, D.E.Albrecht et al., *Vasc. Pl. Checklist S Bioregions N. Terr.* 67 (1997).

Illustrations: G.W.Cunningham *et al.*, *Pl. W New South Wales* 671 (1992), as *C. minima* var. *minima*; N.G.Walsh, *loc. cit.*; V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae*, 684, fig. 40.3B (2009), as *C. minima*.

Erect slender annual, to 30 (–40) cm high, often several-branched from base, glabrous, or with a few cottony hairs on new growth and axils. Leaves oblong to narrowly obovate, 8–25 mm long, 2–7 mm wide, serrate. Inflorescences axillary, racemose, of (1–) 2–4 capitula, the lowest capitulum usually sessile or subsessile, and the upper 1–3 with peduncles to c. 5 mm long. Capitula hemispherical to biconvex, 2–4.5 mm diam.; involucre bracts spatulate to obovate, 1–1.5 mm long; receptacle convex. Female florets c. 100–170 in 3–5 rows; corolla 0.2–0.3 mm long. Bisexual florets (4–) 10–18; corolla c. 0.6–0.8 mm long. Fruiting heads readily disintegrating; bracts widely spreading; receptacle 1–1.5 mm diam., with a pith layer contained entirely or nearly within the dome. Achenes obloid, narrowly obovoid, or narrowly cuneoid, 0.8–1.1 (–1.3) mm long, at least 3 times as long as wide, obtuse or rounded (female florets) or truncate (bisexual florets) at apex, finely 2–4-ribbed; ribs with short appressed hairs, sometimes inrolled at apex; pericarp thickened and spongy in distal 25%. Fig. 61D–F.

Scattered through inland Australia, between latitudes 20° and 32°, with scattered occurrences near the Murray R. further south; moist sandy, silty or clay soils (rarely in rock crevices) at margins of waterholes, dams and creek-lines, and on floodout and gilgai landforms. Flowers Mar.–Nov.

W.A.: Barlee Range Nat. Res., *S.van Leeuwen* 5051 (MEL, PERTH). N.T.: Watarrka Natl Park, Wanya Creek Gorge, *N.G.Walsh* 4949 (MEL, NT). S.A.: c. 30 km W of Coward Springs, *J.Z.Weber* 8763 (AD, BRI, NSW). Qld: Langlo Crossing between Charleville and Adavale, *A.V.Slee* 3296 & *B.J.Lepschi* (BRI, CANB, MEL). N.S.W.: E side of Brigalow Park Nat. Res., c. 21 km SE of Narrabri, *J.R.Hosking* 2979 (CANB, MEL, NE, NSW). Vic.: c. 12 km WSW of Nathalia, *J.A.Jeanes* 2459 & *N.G.Walsh* (CANB, K, MEL, S).



Distinctive in the axillary, several-headed inflorescences.

7. *Centipeda cunninghamii* (DC.) A.Braun & Asch. in A.Braun & C.D.Bouché, *Append. Sp. Nov. Hort. Berol.* 1867, 6 (1867)

Myriogyne cunninghamii DC., *Prodr.* 6: 139 (1838); *Cotula cunninghamii* F.Muell., *Fragm.* 8: 143 (1874), *nom. inval. pro. syn.* T: N.S.W., 'inundated banks of the Lachlan River', 29 Apr. 1817, *A.Cunningham*; lecto: G-DC; isolecto: K, *fide* N.G.Walsh, *Muelleria* 15: 56 (2001).

Illustrations: G.W.Cunningham *et al.*, *Pl. W New South Wales* 671 (1992); G.J.Harden (ed.), *Fl. New South Wales* 3: 293 (1992); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 722, fig. 139c (1999).

Erect or ascending perennial (annual in hard sites) to c. 30 cm high, glabrous or cottony on new growth, rarely cottony overall. Leaves oblong or narrowly obovate, 7–30 mm long, 2.5–7 mm wide, serrate. Inflorescence a single sessile capitulum, often in branch axils. Capitula biconvex, hemispherical or subglobular, 4–6 (–8) mm diam.; involucre bracts obovate, 1.5–3 mm long; receptacle ±hemispherical. Female florets c. 200–350, in 7–12 rows; corolla 0.3–0.5 (–0.7) mm long. Bisexual florets c. 20–50 (–70); corolla 0.7–0.8 mm long. Fruiting heads usually remaining intact until stems senesce; bracts widely spreading; fruiting receptacle 1.8–2.5 (–3.5) mm diam., with a pith layer entirely contained within the dome. Achenes oblong, 1.2–1.6 (–2) mm long, at least 3 times as long as wide, truncate or rounded at apex, with 4 prominent ribs, occasionally with 1 or 2 minor ribs; ribs with antrorse hairs, usually tightly inrolled at apices; pericarp spongy or corky in distal 25%, very thin between ribs below with brown testa of seed apparent. $2n = 20$, P.J.De Lange & B.G.Murray, *New Zealand J. Bot.* 40: 10 (2002). *Gukwonderuk*, *Old Man Weed*. Fig. 60G–I.

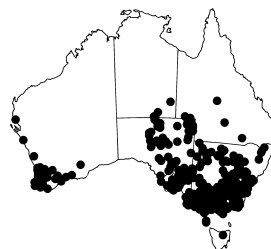
Common and widespread through SE mainland Australia, rare in southern N.T., southern Qld and northern Tas. and uncommon through SW W.A.; banks of perennial rivers, lakes and dams, on sandy, silty or clayey soils. Flowers mostly Oct.–Mar.

W.A.: Collie R., c. 4 km NE of Collie, *B.J.Lepschi* 3351 & *T.Lally* (AD, CANB, MEL, PERTH). N.T.: Andado Stn, *D.E.Albrecht* 9429 & *R.A.Kerrigan* (MEL, NT). S.A.: Nalan Ck, Mundulla, *D.N.Kraehenbuehl* 5560 (AD, CANB). Qld: Diamantina R., *R.B.Filson* 3351 (MEL). N.S.W.: c. 1 km from 'Mahgunyah'

(at Blakney Ck) toward Benendale, *E.M.Canning* 6460 (CANB, MEL, MO, NSW, P). A.C.T.: Uriarra Crossing on Murrumbidgee R., *E.M.Canning* 931 (CBG). Vic.: Merrimu Reservoir, *V.Stajsic* 3352 & *P.Włodarczyk* (AD, CANB, HO, MEL, NSW). Tas.: Sea Elephant R., Trevallyn State Recreation Area, 18 Dec. 1991, *A.V.Ratkowsky* (HO).

Regarded by Webb *et al.*, *Fl. New Zealand* 4: 164 (1988) as naturalised in New Zealand, but possibly native there. A single 1910 collection purportedly from New Caledonia exists at L, but only *C. minima* subsp. *minima* is represented at NOU. Naturalised in Spain (Sánchez Rodríguez & Elías Rivas 1998).

Many specimens from W.A. have achenes with thicker ribs, so that the testa of the seed is largely obscured. The receptacle of these specimens is less prominently convex than in most eastern specimens. There may be some introgression in this area with *C. crateriformis* subsp. *compacta*.



Bracketed measurements above are from inland specimens that have large reproductive parts, and are generally distinctly cottony. They may be hybrids with sympatric *C. crateriformis* subsp. *crateriformis*.

8. *Centipeda crateriformis* N.G.Walsh, *Muelleria* 15: 58 (2001)

T: N.T., Surprise Dam, Andado Stn, 23 Oct. 1980, *P.K.Latz* 8508; holo: DNA; iso: BRI, NT.

Annual or perennial, commonly several-branched from base, \pm glabrous to cottony-pubescent. Leaves narrowly obovate to spatulate, serrate, or rarely entire. Inflorescence a single sessile or minutely pedunculate capitulum, sometimes terminal on ultimate branchlets, not leaf-opposed. Capitula bowl-shaped to cup-shaped or sub-globular, domed or flat-topped; involucre bracts ovate to obovate; receptacle slightly convex, flat, or slightly concave. Fruiting heads firm to hard, persistent to some degree; bracts spreading; receptacle with an underlying pith layer extending slightly below base of involucre. Achenes linear or narrowly cuneoid, obtuse at apex, smooth or scabridulous, 4- or 5-angled with prominent ribs at each angle; ribs terminating in a spongy apical portion usually slightly wider than body of achene; hairs antrorse, subappressed, confined to ribs, often with minutely inrolled or thickened apices.

Occurs in all mainland States. Two subspecies are recognised.

Fruiting capitula 3.5–7 mm diam., hard and not readily disintegrating (often remaining intact on dead stems); achenes \pm linear, ≥ 5 times longer than wide, (1.5–) 1.8–2.5 mm long, with pericarp thin and translucent between ribs in lower $\frac{1}{2}$

8a. subsp. *crateriformis*

Fruiting capitula 2.5–5 mm diam., usually readily disintegrating; achenes narrowly cuneoid, ≤ 5 times longer than wide, 1–1.7 mm long, with pericarp usually opaque between ribs in lower $\frac{1}{2}$, or not apparent between the thickish ribs

8b. subsp. *compacta*

8a. *Centipeda crateriformis* N.G.Walsh subsp. *crateriformis*

Centipeda sp. D18576 Andado, D.E.Albrecht *et al.*, *Vasc. Pl. Checklist S Bioregions N. Terr.* 67 (1997).

Centipeda sp. aff. *thespidioides* (North-west), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn, 49, 155 (2003).

Illustrations: N.G.Walsh, *Muelleria* 15: 40, fig. 3a; 43, fig. 5d; 45, fig. 7d (2001); V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 684, fig. 40.3A (2009), as *C. crateriformis*.

Decumbent to erect annuals to c. 20 cm high, not producing adventitious roots. Leaves 3–8 (–12) mm long, 2–4 (–6) mm wide. Capitula slightly domed or flat-topped, 3.5–7 mm diam.; involucre bracts 1.5–4 mm long; receptacle flat to very slightly concave or convex. Female florets c. 100–200. Bisexual florets (7–) 12–22. Fruiting heads hard, remaining intact until long after stems senesce; receptacle 2–3.5 (–4) mm diam. Achenes linear, (1.5–) 1.8–2.5 mm long, at least 5 times longer than wide; pericarp thickened and corky in distal $\frac{1}{3}$. Fig. 61A–C.

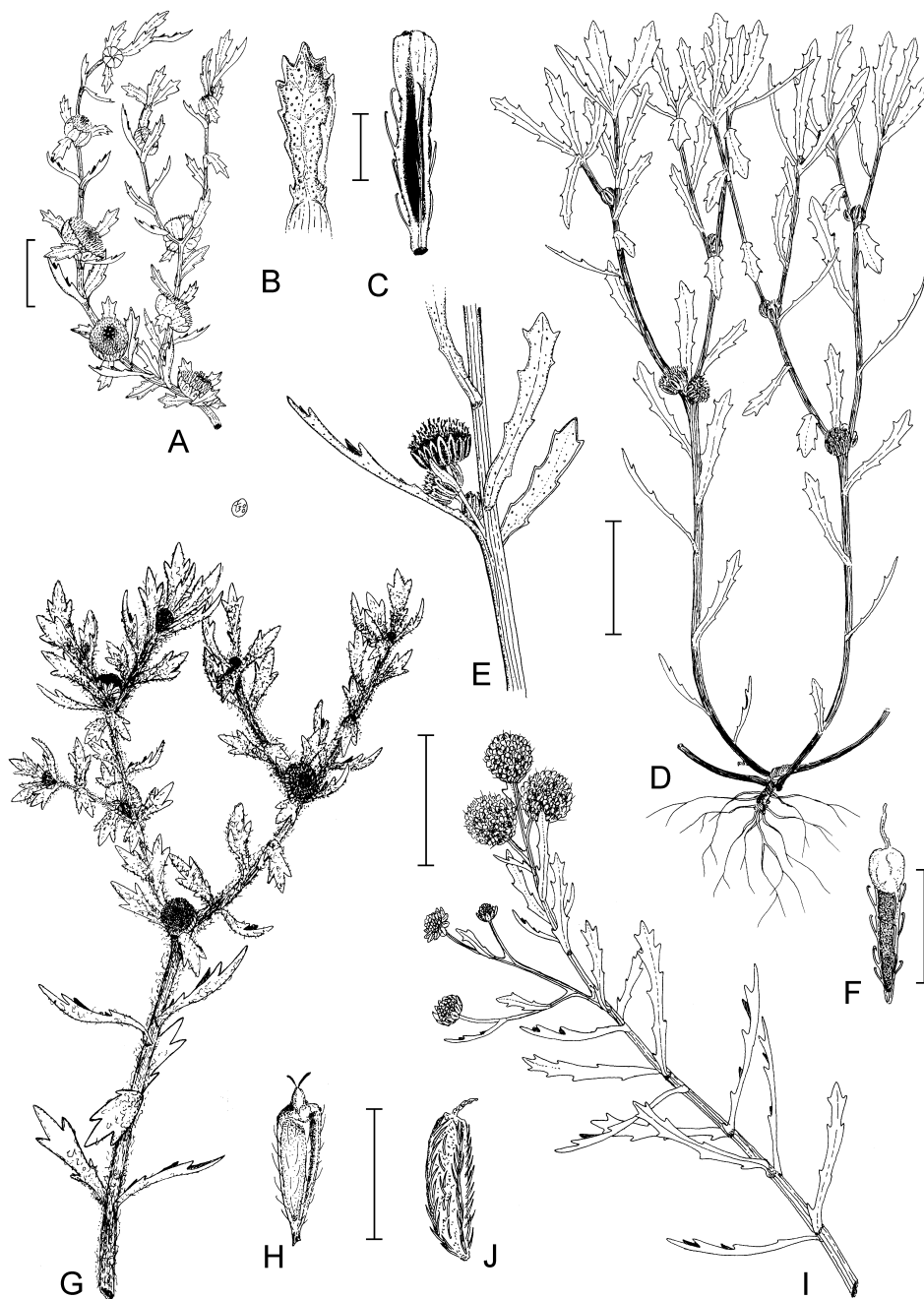
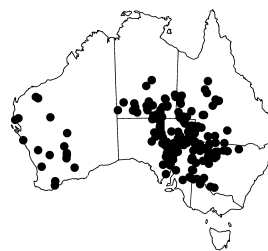


Figure 61. *Centipeda*. **A–C**, *C. crateriformis* subsp. *crateriformis*. **A**, habit; **B**, leaf; **C**, achene (**A–C**, D.E.Symon 4076, AD). **D–F**, *C. pleiocephala*. **D**, habit; **E**, inflorescence; **F**, achene (**D–F**, N.G.Walsh 4967, MEL). **G, H**, *C. borealis*. **G**, habit; **H**, achene (**G, H**, J.Clarkson 4873, MEL). **I, J**, *C. racemosa*. **I**, habit; **J**, achene (**I, J**, J.Willis s.n., MEL 2057177). Scale bars: **A, D, G, I** = 10 mm; **B** = 4 mm; **C, F, H, J** = 1 mm; **E** = 5 mm. Drawn by T.Brosch. ©Royal Botanic Gardens Melbourne. Reproduced with permission from *Muelleria* 15: 40, fig. 3 (2001).

Occurs in arid and semi-arid areas of all mainland States and N.T., but in Vic., only along the Murray R. in the far NW; on clayey soils prone to occasional inundation. Flowers mostly June–Nov.

W.A.: Hamersley Stn, Caves Ck, at Cockies Soak, *N.G.Walsh 6520 et al.* (MEL, PERTH). N.T.: 18 km NW Idracowra HS, *P.K.Latz 16728* (MEL, NT). S.A.: SW end of L. Arcoona, *R.J.Chinnock 7767* (AD, MEL). Qld: 30 km N of Longreach, *D.Davidson 291* (BRI). N.S.W.: Sturt Natl Park, Fort Grey, *R.G.Coveny 13480* (AD, BRI, MEL, NSW). Vic.: Neds Corner Stn, 14 km ESE of Neds Corner HS, *N.G.Walsh 5813a* (MEL).



Like *C. thespidioides*, intact fruits are usually retained on plants until long after aerial stems are dead and leaves have fallen, but the bowl-shaped, rather than campanulate, capitula, and the different hair distribution on the achenes are diagnostic. A few specimens from the southern parts of the range (e.g. Narrogin, W.A., upper Murray R. area of S.A. and NW Vic.) approach subsp. *compacta* and there may be some intergradation between them in these parts, but in general, the subspecies are quite distinct.

8b. *Centipeda crateriformis* subsp. *compacta* N.G.Walsh, *Muelleria* 15: 60, 61, figs 5e, 7e (2001)

T: W.A., Eucla Division, Esperance district, c. 18 km NNW of Young R. crossing on Ravensthorpe–Esperance main road, 16 Oct. 1968, *E.N.S.Jackson 1438*; holo: AD; iso: ?CANB (not found), PERTH.

Centipeda sp. aff. *thespidioides* (North-west), J.H.Ross & N.G.Walsh, *Census Vasc. Pl. Victoria* 7th edn, 49, 155 (2003).

Illustrations: N.G.Walsh, *loc. cit.*

Tufted or loosely mat-forming perennial, sometimes shortly rhizomatous, to c. 10 cm high, 20 cm diam., commonly several-branched from base, often producing roots from lower nodes. Leaves 4–10 (–14) mm long, 1–2 (–3.5) mm wide. Capitula domed, rarely flat-topped, 2.5–5 mm diam.; involucre bracts 1.5–1.8 (–2) mm long; receptacle slightly convex or flat. Female florets c. 90–150. Bisexual florets c. 10–21. Fruiting heads firm, somewhat persistent, but usually disintegrating within growing season; receptacle 1.3–1.6 (–2.5) mm diam. Achenes narrowly cuneoid, 1–1.7 mm long, not more than 5 times longer than wide; pericarp rather thick and opaque throughout, but more prominently thickened and corky in distal $\frac{1}{3}$.

Occurs in southern W.A. between Perth and Balladonia and inland N to Kookynie, and from SE S.A. to western N.S.W. and western Vic.; chiefly on shores and drying beds of lakes, claypans, stream-beds, dams, and seasonally inundated depressions. Flowers mostly Sept.–Mar.

W.A.: c. 26 km N of Esperance–Ravensthorpe road, *P.G.Wilson 7950* (MEL, PERTH). S.A.: E of Lake Gillies Cons. Park boundary, *A.G.Spooner 11194* (AD). N.S.W.: Prungle Stn, 75 km NNE from Wentworth, 3 Dec. 2008, *I.R.K.Sluiter s.n.* (MEL). Vic.: Yarrara Flora and Fauna Res., *V.Stajsic 6153* & *J.A.Jeanes* (BRI, MEL).



In W.A. it is recorded as occurring on wetter soils of granitic outcrops and their peripheries and plants from these habitats are distinctive in having a dense, domed habit and \pm entire leaves.

See notes under subsp. *crateriformis*.

9. *Centipeda thespidioides* F.Muell., *Fragm.* 8: 143 (1874)

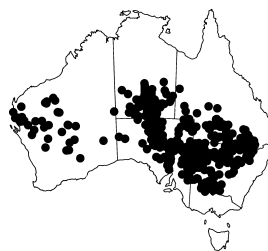
T: ‘On the River Finke’ [N.T. or S.A.], [1861 or 1862], *J. Macd. Stuart*; lecto: MEL, *fide* N.G.Walsh, *Muelleria* 15: 61 (2001).

Ascending to erect annual to c. 20 cm high, typically several-branched from base, \pm glabrous, but usually slightly cottony in upper axils and just below capitula. Leaves \pm oblong, 4–22 mm long, 2–6 (–8) mm wide, serrate. Inflorescence of a single (very rarely twinned) sessile

capitulum, commonly in branch axils. Capitula cup-shaped to broadly campanulate or broadly obconical, rarely somewhat urceolate, flat-topped or slightly depressed, 3–5 (–6.5) mm diam.; involucre bracts ovate to obovate, 2–5 mm long; receptacle slightly concave or flat. Female florets c. 40–80 (–120) in 3–5 rows; corolla 0.6–0.8 mm long. Bisexual florets (3–) 10–18 (–25); corolla c. 0.8 mm long. Fruiting heads very hard, remaining intact after stems senesce; bracts somewhat spreading to erect; fruiting receptacle 2.5–3.5 mm diam., with an underlying pith layer extending below base of involucre. Achenes linear, 2.2–3.3 mm long, obtuse or truncate at apex, finely 8–16-ribbed; ribs terminating about $\frac{2}{3}$ from base of achene in a spongy apical process; hairs antrorse, some inrolled at apex, in 2 rings, one at base of achene and one at base of apical process. $n = 10$, J.L.Bruhl, *Austral. Syst. Bot.* 3: 759 (1990). Fig. 63J–L.

Scattered through arid and semi-arid Australia, mostly within 300 mm p.a. isohyet, occurring in all mainland States and N.T.; mainly on clayey soils prone to inundation (gilgais, run-ons etc.), usually surrounded by halophytic shrublands and/or eucalypt woodlands. Flowers mostly June–Nov.

W.A.: 6.8 km SSE of West Angela Hill, Hamersley Ra., *M.E.Trudgen 17499* (CANB, MEL, PERTH). N.T.: 50 km N of Alice Springs, *R.Swinbourne 523* (DNA, NSW). S.A.: Clayton R., Birdsville Track, *H.T.Smyth 178* (AD). Qld: 16 km W of St George, *H.L.Aston 2454* (BRI, CANB, MEL). N.S.W.: Brigalow Park Nat. Res., about 21 km SW of Narrabri, *J.R.Hosking 2980* (CANB, MEL, NE, NSW, TARCH). Vic.: Neds Corner Stn, *V.Stajsic 5838* (BRI, MEL, S).



Distinctive amongst all species of *Centipeda* in the ascending to erect habit, the campanulate to urceolate, flat-topped or slightly depressed capitula, usually longer than wide, and in the relatively large, scabridulous achenes that have hairs arranged in 2 rings.

Trib. 6. HELENIEAE

A.E.Orchard

Asteraceae trib. *Helenieae* Benth. in G.Bentham & J.D.Hooker, *Gen. Pl.* 2: 167 (1873), as *Helenioideae*.

Type: *Helenium* L.

Annual or perennial herbs, without latex. Leaves alternate. Capitula radiate (discoid elsewhere), usually epaleate. Ray florets female and fertile, or neuter, ligulate and usually 3-lobed, yellow, orange, red or purple, sometimes bicoloured. Disc florets bisexual, actinomorphic, 4- or 5-lobed, yellow or greenish yellow, often red to purplish distally or sometimes throughout; anther appendages narrowly ovate to round; style branches with truncate or tapering apical appendage. Pappus of up to 12 aristate scales (absent elsewhere).

The tribe contains 13 genera and c. 120 species, native to North, Central and South America. In Australia there are 2 naturalised genera.

The tribal circumscription adopted here is that of Panero (2007) and Baldwin *et al.* (2009), which is much narrower than the broad *Helenieae* of, for example, Bremer (1994). Other Australian representatives of the broad *Helenieae* are here treated under tribes Tageteae, Bahieae and Madieae.

B.L.Turner & A.M.Powell, *Helenieae* - systematic review, in V.H.Heywood, J.B.Harborne & B.L.Turner (eds), *Biol. Chem. Compositae* 2: 699–737 (1977); K.Bremer, *Asteraceae - Cladistics & Classification* (1994); B.G.Baldwin, B.L.Wessa & J.L.Panero, Nuclear rDNA evidence for major lineages of helenioid Helianthieae (Compositae), *Syst. Bot.* 27: 161–198 (2002); J.L.Panero, *XIX. Tribe Helenieae Lindl. (1829)*, in W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 400–404 (2007); B.G.Baldwin, *Helianthieae alliance*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 689–711 (2009).

ASTERACEAE

KEY TO GENERA

Leaves lanceolate to elliptic, 6–27 mm wide; receptacle with numerous stiff setae

1. GAILLARDIA

Leaves linear-filiform, 0.3–0.5 mm wide; receptacle naked

2. HELENIUM

1. GAILLARDIA

A.R.Bean

Gaillardia Foug., *Observ. Phys.* 29: 55 (1786); named in honour of A.R.Gaillard de Charentonneau (1720–?), a French amateur botanist.

Type: *G. pulchella* Foug.

Annual or perennial herbs. Stems unbranched to strongly branched, tomentose. Leaves simple, alternate, entire, toothed or pinnatifid. Inflorescences solitary on long peduncles, tomentose. Capitula heterogamous; involucre bracts multiseriate, acute to acuminate, reflexed in fruit; receptacle bearing numerous stiff setae. Ray florets often sterile; ligules showy, yellow, red or purple or combinations of these. Disc florets bisexual, yellow to red or purple; anthers not caudate at base; style branches long, tapered, glabrous or hairy. Achenes obpyramidal, with dense antrorse hairs near base or throughout. Pappus persistent, of 5–10 scales, often aristate.

A genus of about 25 species, mostly distributed in N America, but with 2 species in temperate S America. Two taxa are sparingly naturalised in Australia.

S.F.Biddulph, A Revision of the genus *Gaillardia*, *Res. Stud. State Coll. Washington* 12: 195–256 (1944); B.L.Turner & M.Whalen, Taxonomic study of *Gaillardia pulchella* (Asteraceae - Heliantheae), *Wrightia* 5(6): 189–92 (1975); C.J.Webb, W.R.Sykes & P.J.Garnock-Jones, *Fl. New Zealand* 4: 217–8 (1988).

Disc florets with corolla tube 5–6 mm long and lobes 1.5–2 mm long; setae of receptacle c. 1.5 times length of achene; erect perennials

1. *G. ×grandiflora*

Disc florets with corolla tube 4–5 mm long and lobes 2.5–3.5 mm long; setae of receptacle c. same length as achene; branched annuals

2. *G. pulchella*

1. **Gaillardia ×grandiflora* Van Houtte, *Fl. Serres* 12: t. 1183 (1857)

T: cultivated; not designated.

Perennial herb to 70 cm high. Stems with antrorse, eglandular hairs. Leaves lanceolate to elliptic, 3–10 cm long, 0.6–2.7 cm wide, entire to coarsely serrate, acute, with eglandular hairs and sessile glands; lower leaves petiolate; upper leaves sessile or nearly so. Capitula solitary or few; involucre 17–25 mm diam. at anthesis, 30–60-flowered; involucre bracts lanceolate, 8–11 mm long, acuminate; receptacle setae c. 1.5 times length of achene. Ligules red and yellow. Disc corolla purple; tube 5–6 mm long; lobes subulate, 1.5–2 mm long, densely tomentose; anthers c. 4 mm long. Achenes 2.5–3 mm long, white, with long antrorse hairs on lower half. Pappus of 6–8 scales, 4–8 mm long; apex awn-like.

Indian Blanket, *Blanket Flower*.

Sporadically naturalised in SE S.A. and SW N.S.W., forming roadside colonies. Flowers and fruits Nov.–Apr.

S.A.: 10 km N of Naracoorte, *R.Bates 9865* (AD); Keith to Naracoorte road, c. 1 km N of Tynam View, *D.E.Symon 15431* (AD, CANB). N.S.W.: between Euston and Mildura, 34 km from Euston on N.S.W. side, *D.E.Symon 8791* (AD, CANB, NSW).

A garden ornamental of hybrid origin (= *G. aristata* × *G. pulchella*).



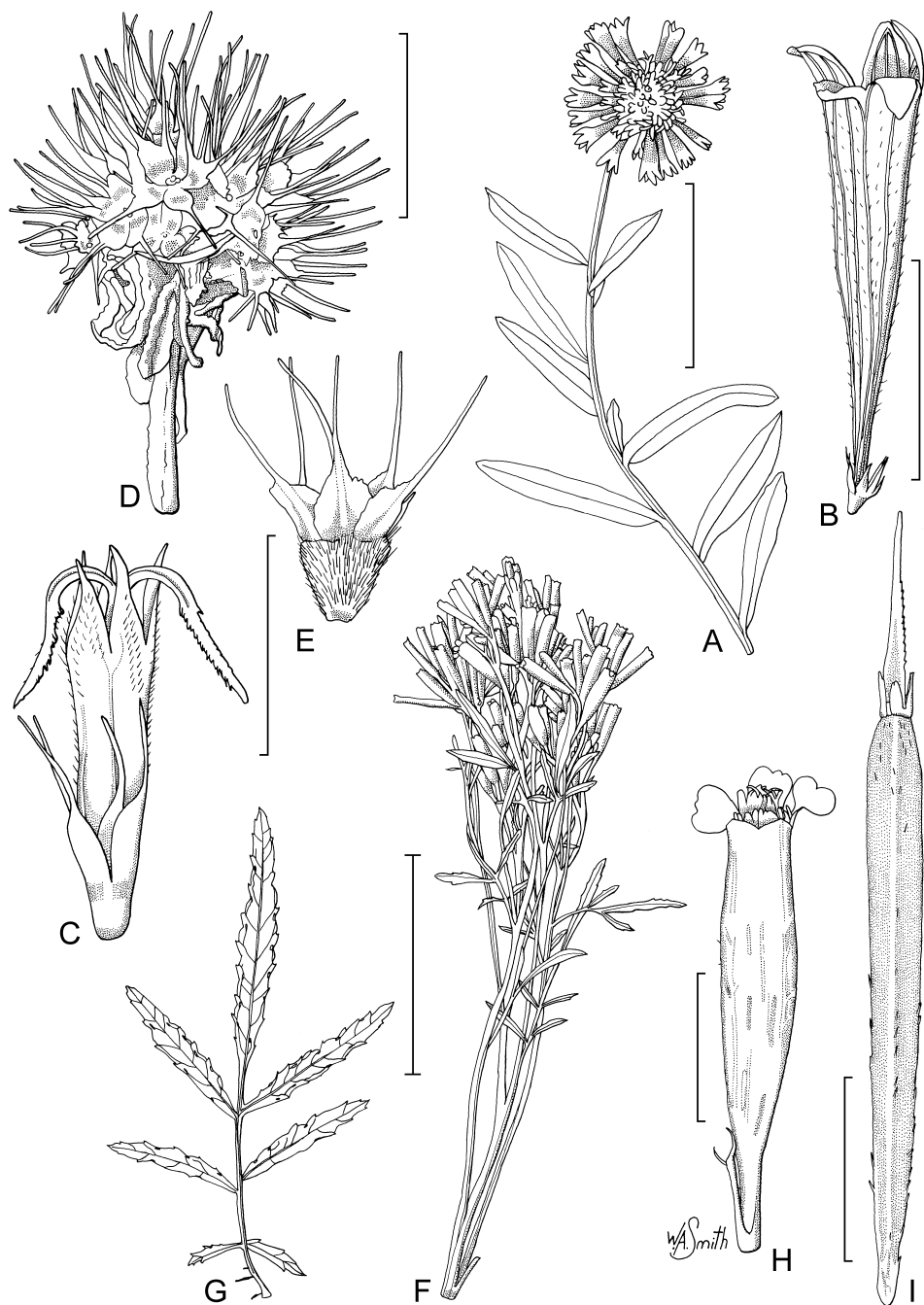


Figure 62. A–E, *Gaillardia pulchella*. A, flowering branchlet; B, marginal floret; C, disc floret; D, fruiting capitulum; E, achene (A–C, A.R.Bean 16792, BRI; D, E, Stanley 653, BRI). F–I, *Tagetes minuta*. F, flowering branch; G, leaf; H, floret; I, achene (F, H, G.Batianoff 0308143, BRI; G, I, A.R.Bean 20500, BRI). Scale bars: A = 5 cm; B, D = 10 mm; C, E, H = 5 mm; F = 4 cm; G = 3 mm; I = 1 mm. Drawn by W.A.Smith.

2. **Gaillardia pulchella* Foug., *Hist. Acad. Roy. Sci. Mém. Math. Phys. (Paris, 4to)* Mem. 5, t. I–II (1788)

T: Cult. in France, 1783, *Herb. Jussieu 9464*; lecto: P, *fide* B.L.Turner & T.Watson, *Phytologia Mem.* 13: 27 (2007).
G. picta Sweet, *Brit. Fl. Gard.* 6: t. 267 (1834); *G. pulchella* var. *picta* (Sweet) A.Gray, *Syn. Fl. N. Amer.* 1: 352 (1884). T: not designated.

Annual herb to 60 cm high. Stems with antrorse, eglandular hairs. Leaves lanceolate to elliptic, 3–8 cm long, 0.8–2 cm wide, entire to pinnatifid, acute, with eglandular hairs and sessile glands; lower leaves petiolate; upper leaves sessile. Capitula solitary or few; involucre 15–20 mm diam. at anthesis, 30–50-flowered; involucre bracts lanceolate, 7–11 mm long, acuminate; receptacle setae c. same length as achene. Ligules red and yellow. Disc corolla purple; tube 4–5 mm long; lobes subulate, 2.5–3.5 mm long, densely tomentose; anthers c. 3.5 mm long. Achenes 2.5–3 mm long, white, with long antrorse hairs on lower half. Pappus of 6–8 scales, 4–5.5 mm long; apex awn-like. *Indian Blanket, Blanket Flower*. Fig. 62A–E.

Indigenous to coastal areas of Texas, U.S.A. In Australia, sporadically naturalised in eastern Qld, where it grows on frontal dunes in deep sand. Flowers and fruits apparently throughout the year.

Qld: between Arthur's Point and Zilzie Point, Emu Park, *G.N.Batianoff 128* & *T.J.McDonald* (BRI); between Redcliffe and Scarborough, Apr. 1915, *E.W.Bick* (BRI); Platypus Bay, S side of Peel Is., Moreton Bay, 27 Jan. 1998, *L.Ford* (BRI, MEL); Kinka Beach near Yeppoon, *G.Russell 309* (BRI).

An ornamental species that has escaped from cultivation.



2. HELENIUM

A.R.Bean

Helenium L., *Sp. Pl.* 2: 886 (1753); *Gen. Pl.* 5th edn 377 (1754); from the Greek *helenion*, the name of another plant said by Linnaeus to be named after Helen of Troy.

Type: *H. autumnale* L.

Annual or perennial herbs. Stems unbranched to strongly branched, glabrous to densely pubescent, winged (not in Australia) or unwinged. Leaves simple, alternate, usually decurrent (not in Australia), entire to pinnatifid. Inflorescence of 1–many capitula, terminal. Capitula heterogamous; involucre bracts 1–3-seriate, with outer bracts exceeding inner ones, reflexed in fruit, gland-dotted; receptacle convex, naked, alveolate. Ray florets female or neuter; ligules showy, mostly yellow. Disc florets 4- or 5-merous, bisexual, cylindrical; anthers sagittate, with small acute auricles at base; style branches flattened, with penicillate tip. Achenes obconical, ribbed, glabrous or pubescent. Pappus persistent, of 5–10 scales, often aristate. *Sneezeweeds*.

A genus of 35–40 species extending from southern Canada to S America, but with greatest species diversity around Texas and northern Mexico. One species naturalised in Australia.

J.M.Kingsbury, *Poisonous Pl. United States Canada* 409–14 (1964); M.W.Bierner, *Taxonomy of Helenium* sect. *Tetradus* and a conspectus of North American *Helenium* (Compositae), *Brittonia* 24: 331–55 (1972); A.Cronquist, *Vasc. Fl. SE United States* 1: 84–87 (1980); M.W.Bierner, *Taxonomy of Helenium* sect. *Amarum* (Asteraceae), *Sida* 13: 453–9 (1989).

****Helenium amarum*** (Raf.) H.Rock, *Rhodora* 59: 131 (1957)

Gaillardia amara Raf., *Fl. Ludov.* 69 (1817). T: Alexandria, Louisiana, U.S.A., 6 Sept. 1898, *C.R.Ball 182*; neo: US n.v., *fide* H.Rock, *loc. cit.*

H. tenuifolium Nutt., *J. Acad. Nat. Sci. Philadelphia* 7: 66 (1834). T: n.v.

Illustration: H.A.Gleason, *New Britton and Brown Illustr. Fl. NE United States Canada* 3: 378 (1952), as *H. tenuifolium*.

Annual herb to 70 cm high. Stems glabrous, not winged. Leaves linear-filiform, fasciculate, 15–80 mm long, 0.3–0.5 mm wide, obtuse, very sparsely pubescent with tiny white patent hairs, densely glandular-punctate, not decurrent. Capitula numerous on slender peduncles; involucre 6–10 mm diam. at anthesis, 50–100-flowered; involucre bracts 2-seriate, linear-lanceolate to oblanceolate, 2.5–5 mm long, acuminate. Ray florets female; ligules 8–10, spreading, 6–14 mm long, yellow. Disc corolla 5-merous, yellow to yellow-brown; tube 1.5–2.2 mm long; lobes deltate, 0.5–0.6 mm long; anthers c. 1.2 mm long. Achenes 0.9–1.3 mm long, brown, with long antrorse hairs. Pappus of 6–8 obovate scales, 1.2–1.8 mm long; apex awn-like.

Indigenous to SE U.S.A., eastwards from Texas, and naturalised elsewhere in U.S.A. This species has been recorded from only one Australian location, in SE Qld. Flowers and fruits recorded in Feb.

Qld: Lowood district, Mt Tarampa aerodrome, Feb. 1953, *D.Harris* (BRI); Mt Tarampa, Daisy Rd, old airstrip, Feb 2007, *B.Whyte* (BRI).

Mt Tarampa aerodrome was used by the United States Air Force during World War II. The species is recognised in U.S.A. as being very toxic and unpalatable to livestock.



Trib. 7. COREOPSIDEAE

A.E.Orchard

Asteraceae trib. *Coreopsidae* Lindl. in J.C.Loudon, *Encycl. Pl.* 1074 (1829)

Type: *Coreopsis* L.

Annual or perennial herbs (shrubs or trees elsewhere), without latex. Leaves basal, alternate or opposite. Capitula mostly radiate, sometimes discoid; receptacle paleate. Ray florets female or sterile, usually ligulate and 2- or 3-lobed, rarely 4-lobed, sometimes absent, white, yellow, orange, red, pink, purple or blackish, sometimes bicoloured or striped. Disc florets bisexual (innermost sometimes functionally male), actinomorphic, usually 5-lobed, mostly yellow or purple, sometimes orange, white, pink or green; anther appendages lanceolate to round, sometimes absent; style branches with short to long penicillate apical appendages. Pappus of 1–8 awns, 4–6 scales, or absent.

A tribe of 30 genera and c. 550 species, mostly in the Americas, particularly N America, but with substantial endemism also in the palaeotropics, Oceania and Polynesia, with some in Australia. In Australia 7 genera, 3 native and 4 represented by naturalised species.

A number of genera are important floriculturally, including *Coreopsis*, *Cosmos* and *Dahlia*, while *Bidens* includes a number of cosmopolitan weeds.

J.F.Veldkamp & L.A.Kreffer, Notes on the southeast Asian and Australian Coreopsidinae (Asteraceae), *Blumea* 35: 459–482 (1991); J.F.Veldkamp, Notes on Australian Coreopsidinae (Compositae), *Austrobaileya* 3: 741–744 (1992); J.L.Panero & V.A.Funk, Towards a phylogenetic subfamilial classification for the Compositae (Asteraceae), *Proc. Biol. Soc. Washington* 115: 909–922 (2002); R.T.Kimball & D.J.Crawford, Phylogeny of Coreopsidae (Asteraceae) using ITS sequences suggests lability in reproductive characters, *Molec. Phylogen. Evol.* 33: 127–139 (2004); J.L.Panero, *XX. Coreopsidae* Lindl. (1829), in W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 406–417 (2007); M.E.Mort *et al.*, Phylogeny of Coreopsidae (Asteraceae) inferred from nuclear and plastid DNA sequences, *Taxon* 57: 109–120 (2008); D.J.Crawford *et al.*, *Coreopsidae*, in V.A.Funk *et al.* (eds), *Syst. Evol. Biogeogr. Compositae* 713–730 (2009).

ASTERACEAE

- 1 Achenes flattened and winged
- 2 Leaves simple, linear, sessile, less than 1 mm wide **2. DIODONTIUM**
- 2: Leaves lanceolate to spatulate or pinnately lobed, petiolate, at least 10 mm wide **5. COREOPSIS**
- 1: Achenes \pm cylindrical (sometimes slightly compressed but not flattened), unwinged
- 3 Pappus awns absent
- 4 Achenes with a elongate apical beak **4. COSMOS**
- 4: Achenes \pm truncate **7. DAHLIA**
- 3: Pappus awns present
- 5 Achenes with a elongate apical beak
- 6 Achenes involute (curled in an inverted J shape); leaves alternate, at least below **3. GLOSSOCARDIA**
- 6: Achenes straight or slightly curved (but never involute); leaves opposite **4. COSMOS**
- 5: Achenes \pm truncate
- 7 Awns spreading at c. 90° to body of achene, or reflexed **1. TRIONCINIA**
- 7: Awns erect or if somewhat diverging never as much as 90°
- 8 Leaves alternate at least below (rarely becoming opposite above) **3. GLOSSOCARDIA**
- 8: Leaves opposite, at least below **6. BIDENS**

1. TRIONCINIA

Trioncinia (F.Muell.) Veldkamp, *Blumea* 35: 459–482 (1991), from the Greek *tri* (three) and *onkos* (hooked or barbed), referring to the 3 awns that comprise the pappus.

Glossogyne sect. *Trioncinia* F.Muell., *Fragm.* 1: 51–52 (1858). T: *Glossogyne retroflexa* F.Muell.

Erect perennials with a thick woody taproot. Branches few from the caudex, almost leafless, glabrous. Leaves mainly basal, alternate, petiolate, pinnatifid or bipinnatifid; leaf segments apiculate, 1-nerved, rarely divided. Inflorescence loosely corymbose. Capitula few, radiate, on elongated peduncles; involucre bracts free, in 2 or 3 series, herbaceous; outer bracts shorter, deltoid; inner bracts ovate-oblong or obovate, striate with scarious margins; receptacle domed; paleae linear to lanceolate, obtuse. Ray florets female, usually 5, bilobed, yellow, 5- or 7-veined. Disc florets bisexual, 10–17, 4-lobed. Achenes terete, slightly curved inward, glabrous, ribbed and/or with transverse ridges, brown to black; beak absent. Pappus of 3 or 4 strongly reflexed or spreading retrorsely barbed awns.

A genus of 2 species, both endemic to central Qld.

R.J.Fensham, The rediscovery of *Trioncinia retroflexa* (Asteraceae) in central Queensland, *Newslett. Austral. Syst. Bot. Soc.* 98: 9 (1999); R.J.Fensham *et al.*, Response of a rare herb (*Trioncinia retroflexa*) from semi-arid tropical grassland to occasional fire and grazing, *Austral. Ecol.* 27: 284–290 (2002); A.E.Holland & D.W.Butler, *Trioncinia patens* (Asteraceae: Coreopsidae: Chrysanthellinae), a new and endangered species from central Queensland, *Austrobaileya* 7: 567–571 (2007).

Achenes 6–8 mm long; awns usually 3 (rarely a small 4th), strongly reflexed; basal leaves 4.5–17 cm long

1. T. retroflexa

Achenes 5–7 mm long; awns 4, spreading; basal leaves 3–7 cm long

2. T. patens

1. *Trioncinia retroflexa* (F.Muell.) Veldkamp, *Blumea* 35: 459–482 (1991)

Glossogyne retroflexa F.Muell., *Fragm.* 1: 51 (1858). T: Peak Downs [Qld], 1856, *F.v.Mueller s.n.*; holo: MEL; iso: K.

Perennial to 40 cm tall. Leaves: petioles 4 cm long; lamina 3.5 cm long, 2 cm wide. Capitula to 7 mm diam.; outer subtending bracts c. 1.75 mm long, 0.5 mm wide; involucre bracts ovate to oblong, 3.3–4.0 mm long, 1 mm wide, acute; paleae 3.5 mm long, 1.0 mm wide. Ray florets with ligule 3–3.7 mm long, 2–2.5 mm wide. Disc florets 10 or more, 2.5 mm long; anther appendage a triangular scale. Achenes 6–8 mm long, 1–1.3 mm diam., dark brown to black, longitudinally ribbed, with warty transverse ridges which become thickened or rugose. Pappus awns 3 (rarely with a smaller 4th), 2.5–3.0 mm long, strongly reflexed. *Belyando Cobbler's Pegs*.

Very rare endemic, known only from 6 roadside populations in the central highlands of Qld. It grows in infrequently grazed *Dichanthium* grassland on basaltic soil, usually in heavy black clay, and is now confined mainly to stock routes. It is sensitive to heavy grazing (Fensham *et al.*, 2002). Fruits are present in Dec. & Jan.

Qld: Blair Athol, *S.T.Blake 8057* (BRI); Meteor Downs turnoff from main highway between Springsure and Rolleston, *R.J.Fairfax 41* (BRI); 35 km NE of Capella, *R.J.Fensham 2788* (BRI); Prairie Stn, between Capella and Clermont, 18 Jan. 2001, *R.J.Fensham s.n.* (BRI).



Currently there are 6 known populations of *T. retroflexa* (8 according to Holland & Butler, 2007), with less than 10,000 individuals (Fensham *et al.*, 2002). It is listed as Endangered under Qld legislation.

2. *Trioncinia patens* A.E.Holland & D.W.Butler, *Austrobaileya* 7: 567–571 (2007)

T: Qld, Eastern Peak, 30 km W of Dysart, 8 Feb. 2006, *D.Butler 122 & J.Ambrose*; holo: BRI *n.v.*

Illustration: A.E.Holland & D.W.Butler, *loc. cit.* p. 569, fig. 1.

Perennial to 50 cm tall. Leaves: petioles 4 cm long; lamina c. 3 cm long, 2 cm wide. Capitula 6–9 mm diam.; outer subtending bracts 1–2 mm long, 0.5–1 mm wide; involucre bracts ovate, oblong or obovate, 2.4–3.6 mm long, 0.8–1.1 mm wide, acute to obtuse; paleae 3–4 mm long, 0.1–0.3 mm wide. Ray florets with ligule 1.8–2.2 mm long, 1–1.4 mm wide. Disc florets 11–17, 2–2.5 mm long; anther appendage obtuse. Achenes 5–7 mm long, 0.7–1.0 mm diam., pale brown, lacking longitudinal ribs, with thin transverse ridges, smooth between, and not becoming warty or thickened. Pappus awns 4, 1–2 mm long, spreading at 90° to each other and the body of the achene.

A rare endemic known from 3 populations, totalling about 200 individuals, near the Peak Range Natl Park between Clermont and Dysart in central Qld, growing in eucalypt woodland on basalt-derived dark-grey to red-brown clays or clay-loams, often with gravels. Flowers and fruits Jan.–Feb.

Qld: E base of Browns Peak, *D.W.Butler 123 & J.Ambrose* (BRI); W base of Mt Castor, Peak Range Natl Park, c. 40 km NE of Clermont, 17 Jan. 2001, *D.W.Butler s.n.* (BRI) (*vide* Holland & Butler, 2007).

In addition to localities cited by Holland & Butler (2007), this species was also collected by Richard Daintree in the mid-1800s (2 sheets, MEL) from Maryvale Station near Townsville. This last locality is far removed from other records. Maryvale Stn was owned by Daintree, but he collected elsewhere, notably in the Dawson R. district not far from the Peak Ra. (see A.S.George, *Australian Botanists Companion* 342 (2009)), so this material may be mislabelled as to locality.



2. DIODONTIUM

Diodontium F.Muell., *Hooker's J. Bot. Kew Gard. Misc.* 9: 19 (1857); probably from the Greek *di* (two) and *odont* (teeth), referring to the pappus of 2 straight awns.

Type: *D. filifolium* F.Muell.

Erect perennials. Branches numerous from the caudex, to 50 cm long, glabrous. Leaves cauline, crowded at base of plant, opposite, sessile and shortly stem-clasping at base (forming an interpetiolar cup on young stems), simple. Inflorescence corymbose. Capitula few to solitary, discoid, on peduncles 30–50 mm long; subtending bracts 2–4; involucre bracts free, few, ± in a single series, oblong to lanceolate, acute, weakly striate, with margins not scarious; receptacle flat; paleae lanceolate, abruptly shortly acuminate or acute. Disc florets bisexual, 3–11, 5-lobed. Achenes obovoid, compressed, broadly winged when mature, slightly cucullate, glabrous, smooth, without ribs; body dark brown; wings 2 (rarely 3), yellow-brown; beak absent. Pappus of 2 (rarely 3) awns; awns erect or divaricate, smooth or with few retrorse barbs at apex.

A monotypic, endemic and rare genus restricted to hilly areas in northern Australia.

M.E.Lawrence, *Diodontium*, in J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 946 (1992); A.E.Orchard, Lectotypification of *Diodontium filifolium* F.Muell. (Asteraceae: Coreopsidae), *Telopea* 14: 59 (2012).

Diodontium filifolium F.Muell., *Hooker's J. Bot. Kew Gard. Misc.* 9: 19 (1857)

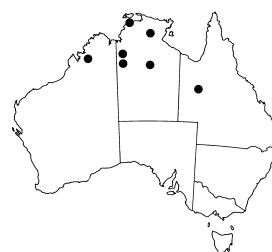
Glossogyne filifolia (F.Muell.) F.Muell. ex Benth., *Fl. Austral.* 3: 544 (1867). T: head of Sturt's Ck, Feb. [18]56, *F.Mueller s.n.*; lecto: MEL, *fide* A.E.Orchard, *Telopea* 14: 59 (2012).

Illustration: J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 935, fig. 286S (1992), as *Glossogyne bidens*.

Shrub 35–50 (–70) cm tall. Leaves cauline, crowded at base and in lower part of branches, linear, 20–80 mm long, 0.8 mm wide, apiculate, 1-nerved. Capitula 5–7 mm diam.; subtending bracts 1.5–3.1 mm long, 0.30–0.75 mm wide; involucre bracts 4–6, 2.5–3 (–4) mm long, 0.8–1 mm wide; paleae 4–4.8 mm long, 0.5 mm wide. Disc florets c. 4.8 mm long, creamy white with longitudinal dark stripes between lobes. Achenes 4–6.5 mm long, 3–4.5 mm wide (excl. awns). Pappus awns c. 1 mm long. Fig. 63A–C.

Known only from a few localities in western Qld, northern N.T., and the Kimberley region of W.A. Found in the grassy/shrubby understorey of open woodland to 5 m tall, with *Eucalyptus dichromophloia* and *Plectrachne* sp., on sandy lateritic soil. Flowers recorded Apr.–Aug., fruits Feb.–Aug.

W.A.: Inglis Gap, King Leopold Ra., May 1905, *W. Fitzgerald s.n.* (PERTH). N.T.: Southern Gregory Natl Park, S tributary of Broadarrow Ck, c. 75 km SSW of Bullita outstation, *M.F.Duretto 932 & D.B.Foreman* (MEL); 9 miles [14 km] SE Mountain Valley HS, *D.J.Nelson 219* (NSW); 17 miles [27.4 km] N of Helen Springs Stn, *R.A.Perry 1921* (CANB). Qld: at or near the MacKinlay Ra., 1876, *J.Sutherland s.n.* (MEL).



An aromatic bush with shiny winged achenes. In the first year the leaves are crowded at the base of the plant. Growth in subsequent years is sympodial, and the new branches also have leaves crowded at their bases, giving the stems an irregularly tufted appearance.

The illustration in Wheeler (ed.) *et al.* (*loc. cit.*) has been transposed with that of *Glossocardia bidens*.

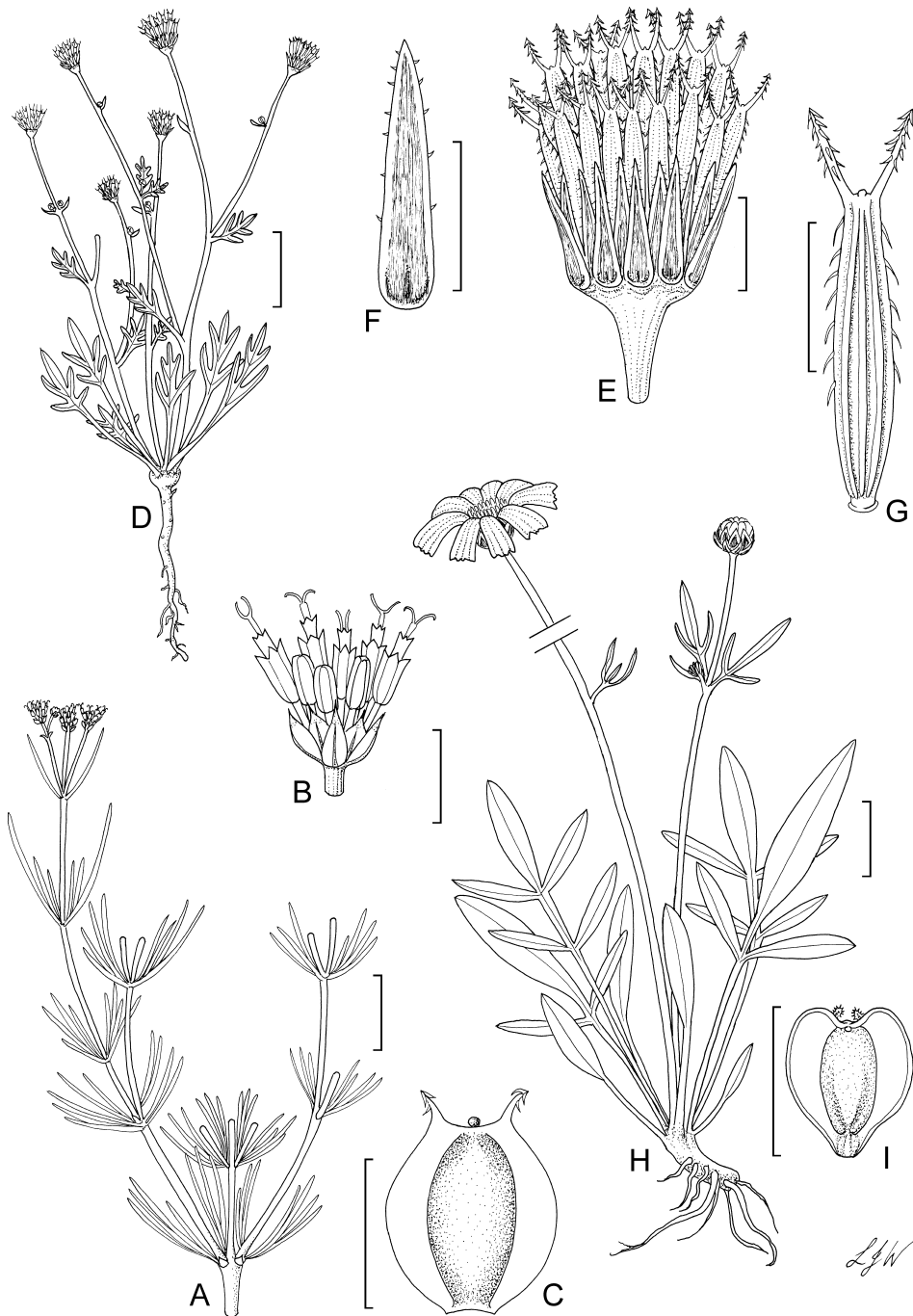


Figure 63. A–C, *Diodontium filifolium*. A, habit; B, capitulum; C, achene (A–C, R.A.Perry, CANB). D–G, *Glossocardia bidens*. D, habit; E, capitulum; F, involucral bract; G, achene (D–G, R.J.Chinnock, AD). H, I, *Coreopsis lanceolata*. H, habit; I, achene (H, I, B.J.Lepschi 3965 & J.R.Connors, AD). Scale bars: A, D, H = 30 mm; B, E = 5 mm; C, F, G, I = 4 mm. Drawn by L.J.Waters.

ASTERACEAE

3. GLOSSOCARDIA

Glossocardia Cass., *Bull. Sci. Soc. Philom. Paris* 138 (1817); from the Greek *glossa* (tongue) and *kardia* (heart), possibly a reference to the shape of the achenes.

Type: *G. linearifolia* Cass.

Neuractis Cass. in F.Cuvier, *Dict. Sci. Nat.*, 2nd edn, 34: 497 (1825). T: *N. leschenaultia* Cass.

Glossogyne Cass. in F.Cuvier, *Dict. Sci. Nat.*, 2nd edn, 59: 320 (1829). T: *G. tenuifolia* (Labill.) Cass.

Annual or perennial herbs with a thin to woody taproot. Branches few to numerous from the caudex, foliose or almost leafless, glabrous. Leaves basal and/or cauline, alternate, sometimes opposite above, sessile or petiolate (see note below), pinnatifid or bipinnatifid (sometimes simple). Inflorescence of capitula solitary on scape-like peduncles, or loose terminal cyme. Capitula radiate; peduncles to 12 (–15) cm long; involucre bracts becoming fused at base, 1–4 seriate, \pm equal; outer bracts herbaceous; inner bracts with scarious margins, sometimes sparsely ciliate; receptacle \pm flat to hemispherical; paleae linear to narrowly lanceolate, scarious, cauducous. Ray florets female (sterile elsewhere), 0–12 (–17), (rarely 2- or 3-lobed, yellow, white, pink, red or purple. Disc florets bisexual (functionally male elsewhere), numerous, 4- or 5-lobed. Achenes oblong to linear-lanceolate, straight or involute, strongly compressed, 1- or 3-ribbed, brown to black; pappus of 2 barbed awns.

Twelve species, found from Africa through India to tropical S, E and SE Asia, and the Pacific as far east as Fiji. Three species native to Australia.

Many Australian floras treat these species under *Glossogyne*. *Glossogyne* was included within *Glossocardia* by Veldkamp & Kreffer (1991) and Veldkamp (1992), and this decision is followed here.

The leaves in Australian species have been variously described as sessile or petiolate. In those taxa in which the distal part of the leaf is pinnatisect, the lower half to two thirds is considerably narrowed but is widened at the base and often stem-clasping. Here this narrow portion is considered part of the lamina (congruent with the description of the leaf in the species where the blade is linear and undivided) although others have described it as a petiole. In the accounts below this narrow portion of the lamina is described as < 'petiole' xx mm long > to minimise confusion.

P.J.Garnock-Jones, South Pacific plants named by K.P.J.Sprengel in 1807, *Taxon* 35: 125 (1986); Mesfin Tadesse, *Glossocardia* and *Neuractis* (Compositae), new records for Africa, *Kew Bull.* 45: 141–145 (1990); A.B.Pollock, Rediscovery of *Glossocardia orthochaeta* (F.Muell.) Veldk. (Asteraceae) from north-east Queensland, *Austrobaileya* 6: 341–343 (2002); A.E.Orchard, Notes on *Glossocardia bidens* (Retz.) Veldkamp, *Newslett. Austral. Syst. Bot. Soc.* 144–145: 32–34 (2010); A.E.Orchard, Lectotypification of *Glossocardia orthochaeta* (F.Muell.) Veldkamp (Asteraceae: Coreopsidae), *Telopea* 14: 61 (2012).

- | | | |
|----|--|---------------------------------|
| 1 | Cauline leaves few or absent (leaves mainly basal); stems annual from a woody caudex; ray florets 5–12; ligule 2–4 mm long | |
| 2 | Achenes strongly incurved; awns strongly reflexed | 1. <i>G. refracta</i> |
| 2: | Achenes \pm straight; awns usually erect or diverging but not reflexed | 2. <i>G. bidens</i> |
| 1: | Cauline leaves numerous; stems perennial with annual sympodial branches arising below peduncles; ray florets c. 17; ligule c. 15 mm long | 3. <i>G. orthochaeta</i> |

1. *Glossocardia refracta* Veldkamp, *Blumea* 35: 476–477 (1991)

T: Qld, Cook District, near Granite Ck, c. 12 miles [c. 19 km] SSW of Mareeba, 23 Apr. 1967, *L.Pedley* 2282; holo: K; iso: BRI, L.

Illustration: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 978, fig. 200c (1999), as *Glossocardia bidens*.

Perennial herb; taproot thick. Branches few, annual from the caudex, \pm erect, 40–60 cm long, often almost leafless. Leaves mainly basal, alternate, sessile, with lower lamina slightly widened at stem junction; 'petiole' to 45 mm long; upper lamina trullate in outline,

pinnatipartite (rarely bipinnatipartite), 4–5 cm long, 3 cm wide, green adaxially, glaucous abaxially; lobes narrow, apiculate, 1-nerved; uppermost cauline leaves often \pm simple. Capitula few, to 10 mm diam. (excluding rays); involucre bracts oblong, 2.3–2.8 mm long, 0.7–1.3 mm wide, striate; receptacle hemispherical; paleae 2.8–4.0 mm long, c. 1.0 mm wide, more scarious on margins. Ray florets female, c. 5; ligule 3-lobed, c. 2 mm long, yellow, with 5 or 7 nerves. Disc florets bisexual, 10–16, c. 2 mm long, 4-lobed, yellow. Achenes a strongly incurved cylinder (an inverted J), swollen at base, shortly beaked terminally, 4–5.5 mm long, c. 0.8 mm wide, glabrous, weakly ribbed, dark brown to black. Pappus awns strongly reflexed, 2.5–3.0 mm long, retrorsely barbed, with a distinctly prolonged tubercle between awns.

Endemic to Qld. Grows in low hilly areas in eucalypt woodland (associated species *Eucalyptus melanophloia*, *E. maculata*, *E. umbra*, *E. shirleyi*, *Corymbia* sp., *Petalostigma banksii*) with grassy (*Themeda australis*) understorey on shallow sandy soil with rocky outcrops, at altitudes of 300–850 m. Flowers Nov.–Apr.; fruits Jan.–June.



Qld: c. 4.2 km by road SW of Herberton on Silver Valley Rd, *B.J.Conn* 1164 & *J.Clarkson* (BRI, CANB, MEL); 19 km W of Irvinebank on Petford Rd, *P.C.Jobson* 1153 (BRI, CANB, MEL); Maryvale Stn, Daintree R., *leg. ign.* (MEL); 6 km E of Mt Cooper HS (site 15/6–9), *E.J.Thompson* CHA52 & *P.R.Sharpe* (BRI, K); near Granite Gorge, off Chewko Rd near Mareeba, *H.van der Werff* 11518 (QRS).

Often confused with *Trioncinia retroflexa*, from which it can be distinguished by its smooth achenes and 2 terete awns (achenes with warty transverse ridges and 3 \pm basally flattened awns in *T. retroflexa*). Vegetatively this taxon strongly resembles *G. bidens*, but is distinguished by its strongly incurved achene with reflexed awns. The illustration of '*Glossogyne bidens*' in *Fl. Victoria* 4: 978, fig. 200c (1999) is actually of *Glossocardia refracta*, but the description and collections mentioned are *Glossocardia bidens*.

2. *Glossocardia bidens* (Retz.) Veldkamp in J.F.Veldkamp & L.A.Kreffer, *Blumea* 35: 468–469 (1991)

Zinnia bidens Retz., *Obs. Bot.* 5 (1788); *Glossogyne bidens* (Retz.) Alston in H.Trimen, *Handb. Fl. Ceylon*, Suppl. 6, 168 (1931); *Neuractis bidens* (Retz.) Veldkamp ex Tadesse, *Kew Bull.* 45: 144 (1990). T: Bengal, India, *Koenig s.n.*; holotype LD *n.v.*, *fide* J.F.Veldkamp & L.A.Kreffer, *loc. cit.*

Bidens tenuifolia Labill., *Sert. Austro-Caledon.* 44, fig. 45 (1825); *Glossogyne tenuifolia* (Labill.) Cass. ex Less., *Syn. Gen. Compos.* 212 (1832). T: New Caledonia, *Labillardiere s.n.*; holotype FI; isotype P (332971, ex herb. Webb) *n.v.*

Coreopsis tannensis Forst. ex Spreng., *Syst. Veg.* 3: 614 (1826); *Glossogyne tannensis* (Spreng.) Garn.-Jones, *Taxon* 35: 125 (1986). T: Nova Caledonia, *Forster s.n.*; lectotype K; isotype BM *n.v.*, *fide* P.J.Garnock-Jones, *loc. cit.*

Glossogyne pedunculosa DC., *Prodr.* 5: 632 (1836). T: Cape Cleveland, N.S.W., 15 June 1819, [*A.Cunningham*] 56; holotype G-DC, photo seen.

Glossogyne bidentidea F.Muell., *Linnaea* 25: 402 (1852). T: In plagis sterilibus subsalsis sinum Spenceri inter et partem borealem montium Flindersii; holotype MEL.

Glossogyne tenuifolia var. *divaricata* Domin, *Biblioth. Bot.* 89: 1236 (1930). T: Qld, Sandsteinhügel der Dividing Range bei Jericho (*Domin* Mar. 1910); holotype PRC *n.v.*

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 666 (1981); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1438, fig. 647 (1986); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 565, fig. 79A (1986); all as *Glossogyne tenuifolia*.

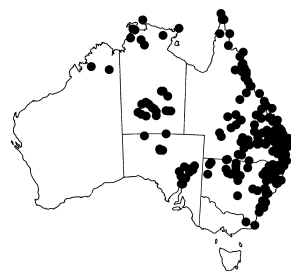
Perennial herb; taproot \pm woody. Branches few to numerous, annual from the caudex, erect, 10–50 cm tall, often almost leafless. Leaves mainly basal, alternate, sessile, with base of leaf expanded; 'petiole' 10–50 mm long; upper lamina pinnatipartite, lanceolate to triangular in outline?, 10–80 mm long, (2–) 5–30 mm wide, green adaxially, glaucous abaxially; lobes narrow, acute, entire to pinnatipartite (rarely bipinnatipartite), with 1 central nerve and thick densely branched lateral veins; cauline leaves few, subsessile, simple to pinnatifid, smaller. Capitula few, 5–8 mm diam. (excluding rays); involucre bracts narrowly lanceolate, \pm equal,

3–4 mm long, 1.0–1.5 mm wide, striate; receptacle hemispherical; paleae slightly longer and narrower than inner involucre bracts. Ray florets female, 5–12; ligule 2–4 mm long, 3-lobed, with 7 nerves, yellow. Disc florets bisexual, 7–12, 4-lobed, 2.5–3 mm long, yellow. Achenes linear-lanceolate, straight, 5–10 mm long, 1 mm wide, glabrous or retrorsely barbed, several-ribbed, dark brown. Pappus awns straight, \pm erect or diverging, 1–5 mm long, retrorsely barbed. *Cobbler's Tack*, *Native Cobbler's Pegs*. Fig. 63D–G.

Found almost throughout the range of the genus, from Africa to Fiji. In Australia recorded from all mainland states, but predominantly in drier central and northern areas. Growing in grassy situations, usually in open woodland dominated by *Eucalyptus*, *Corymbia*, *Callitris*, *Eremophila*, *Brachychiton* or *Acacia*, on a wide range of soil and rock types (sand, loam, limestone, chert, granodiorite, ironstone), at altitudes from sealevel to 800 m. Often locally common after heavy summer rains, dying back to the rootstock in drought. Flowers and fruits all months, but most commonly Nov.–May.

W.A.: Isdell R. near Mt Barnett HS, *W.V.Fitzgerald* 1046 (PERTH). N.T.: Central Arnhem Land, Emu Springs area, *I.D.Cowie & C.R.Dunlop* 8421 (BRI, DNA, MEL). S.A.: Bosworth Stn, 6 km S of HS, *F.J.Badman* 7560 (AD). Qld: 5.4 km along Shelleytop Rd, NE of Durong, *A.R.Bean* 14705 (BRI). N.S.W.: 5.8 km NE of Cumborah on the Lightning Ridge road, *P.G.Wilson* 158 & *D.I.Wilson* (MEL). Vic.: Ingeegoodbe R. opposite McFarlane Ck, 28 May 1969, *K.C.Rogers s.n.* (MEL).

In J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* (1992) the captions for figs 286S and 286T on p. 935 have been reversed. Figure 286S is *Diodontium filifolium*, while fig. 286T is *Glossocardia bidens*. Figure 288E on p. 944 is also *G. bidens* (as *Glossogyne bidens*).



For discussion of variability and typification see Orchard (2010).

The pantropical *Glossocardia bidens* has been variously described as native or naturalised in Australia. It is certainly pre-European in origin, as it was collected by Banks & Solander on the east coast in 1770, and by R.Brown at Sydney and in northern Australia in 1802–05. It is well established in New Guinea and has almost certainly been carried from there into Cape York Penin. at various times. Its scarcity in the Kimberley region of WA suggests that it might still be spreading westwards.

The achenes of this species are a minor contaminant of fleeces after wet summers (Cunningham *et al.*, *loc. cit.*).

3. *Glossocardia orthochaeta* (F.Muell.) Veldkamp, *Austrobaileya* 3: 741–744 (1992)

Glossogyne orthochaeta F.Muell., *Vict. Naturalist* 8: 116 (1891). T: Coen R., Qld, 1891, *S.Johnson s.n.*; lecto: MEL; isolecto: MEL, *fide* A.E.Orchard, *Telopea* 14: 61 (2012).

Illustration: A.B.Pollock, *Austrobaileya* 6: 343, fig. 1 (2002).

Perennial; roots not seen. Branches few to numerous from base, perennial, \pm erect, to 80 cm long, foliose. Leaves mostly cauline, alternate, crowded, sessile, with lower lamina slightly auriculate at base; ‘petioles’ indistinct from blade, to c. 45 mm long; upper lamina linear to trullate in outline, 45–70 (–110) mm long, 15–40 mm wide overall (individual lobes 1–2 mm wide), dark green and subfleshy, simple or 3–5-pinnatifid; lobes linear, sometimes with small secondary lobe, stiffly herbaceous, with very narrow hyaline margins, acute, 1-nerved. Capitula solitary on elongated peduncle, c. 10 mm diam. (excluding rays); involucre bracts ovate-lanceolate, 10 mm long, 2.5 mm wide, striate; receptacle \pm hemispherical; paleae 7.5 mm long, 1.2 mm wide. Ray florets female, c. 17; ligule 3-lobed, 15 mm long, with 9 nerves, yellow. Disc florets bisexual, numerous, c. 5 mm long, 4-lobed, yellow. Achenes lanceolate, \pm straight, 5.5 mm long, 0.8–1.0 mm wide, glabrous, ribbed, shiny, black. Pappus awns erect, c. 1 mm long, retrorsely barbed, with a small tubercle between awns.

A rare Australian endemic recorded in Qld from the Coen area on Cape York Peninsula, Stannary Hills and to the S on Kallanda Stn. The populations on Cape York (1892) and Stannary Hills (1962) have not been seen recently and may be extinct. On Kallanda Stn it

grows in partially shaded localities, close to minor creeks, in a steep rocky granite gorge on granitic lithosols on the edge of tall open woodlands of *Araucaria cunninghamii*, with a mid-dense shrub layer of *Labichea nitida* and *Acacia leptostachya*, and a thin grassy ground layer of *Digitaria* sp. and *Eriachne pallescens*. Flowers recorded Apr., June.

Qld: Stannary Hills, C.H.Gittins 528 (CANB, NSW); Three Mile Creek Falls, Kallanda Stn, A.B.Pollock 1083 (BRI).

This species has the largest heads in the genus, 35–45 mm diam. (including rays). It is also distinguished from other Australian species in having perennial stems, with numerous cauline leaves. Each year 2 branches arise sympodially from the base of each old inflorescence scape, these branches bearing dense cauline leaves. As the branches elongate (and eventually develop their own terminal inflorescence), the lower leaves are shed, leaving a peg-like leaf scar.



4. COSMOS

Cosmos Cav., *Icon.* 1: 9, t. 14 (1791); from the Greek *kosmos* (ordered, harmonious) or *kosmo* (ornamental), hence an ornament or a beautifully ordered thing.

Type: *C. bipinnatus* Cav.

Annual or tuberous perennial herbs. Branches few to many, foliose, glabrous or scabrous. Leaves cauline, opposite, petiolate or sessile, usually 1–3 times pinnately dissected into narrow lobes, rarely simple. Inflorescences solitary or loose cymes. Capitula radiate (discoid elsewhere), often large, terminal, pedunculate; involucre bracts fused at base, 2-seriate, unequal; outer bracts usually herbaceous or a little fleshy; inner bracts membranous and subtending ray florets; receptacle flat; paleae linear, acute, scarious, caducous. Ray florets sterile, 4–9 (–10), 3-lobed, usually white or pink to maroon or black-purple, rarely yellow or orange, indistinctly 5–7-veined. Disc florets bisexual, numerous, 5-lobed. Achenes usually fusiform-tetragonal, sometimes linear, with a conspicuous beak. Pappus of 2–4 (–6) erect or divergent awns, usually with retrorse barbs, or hispid, or awns sometimes absent.

A genus of c. 36 species native to North, Central and Andean South America. In Australia, 3 species naturalised.

The genus is widely cultivated in Australia as an ornamental (especially *C. bipinnatus* (*Cosmos*), *C. sulphureus* (*Yellow Cosmos*) and *C. atrosanguineus* (Hook.) Voss (*Chocolate Cosmos*)), and the first two species in particular often escape from cultivation.

J.R.Hosking in R.H.Groves, Recent incursions of weeds to Australia 1971–1995, *CRC Weed Manag. Tech. Ser.* 3: 48 (1997), recorded a '*Cosmos capitata*' as a garden escape at Bittern near Hastings, Vic. This name is not validly published, and the specimen on which it was based has not been located. It may be an error for *C. caudatus*, although this is a warm climate species.

E.E.Sherff, Revision of the genus *Cosmos* (family Compositae), *Publ. Field Mus. Nat. Hist., Bot. Ser.* 8: 401–447 (1932); T.E.Melchert, *Cosmos*, in D.L.Nash, *Fieldiana* 24(12): 229–234 (1976); H.E.Kleinschmidt & R.W.Johnson, *Weeds Queensland* 381 (1977); B.A.Auld & R.W.Medd, *Weeds* 97 (1987).

1 Ray floret ligules pink, purple, violet, or white

2 Leaves with ultimate lobes to 1.5 mm wide; ligule 20–40 (–50) mm long; achenes 7–8 mm long

2: Leaves with ultimate lobes 2–10 mm wide; ligule 10–15 mm long; achenes 10–30 (–35) mm long

1: Ray floret ligules yellow to red-orange

1. *C. bipinnatus*

2. *C. caudatus*

3. *C. sulphureus*

1. **Cosmos bipinnatus* Cav., *Icon.* 1: 10, t. 14 (1791)

T: Mexico; holo: MA? n.v.

Illustrations: H.E.Kleinschmidt & R.W.Johnson, *Weeds Queensland* 381 (1977); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 561, fig. 781 (1986); B.A.Auld & R.W.Medd, *Weeds* 97 (1987).

Annual, usually single-stemmed from taproot, 0.5–1.0 (–2.0) m tall, glabrous or minutely scabrid. Leaves ovate in outline, bipinnatifid, commonly 5–12 (–17) cm long, sessile or shortly petiolate; ultimate lobes thread-like, to 1.5 mm wide towards tip. Capitula radiate, terminal, solitary, cup-shaped, on long peduncles; outer involucral bracts deltoid-attenuate, 6–7 mm long, glabrous, green with darker lines; inner bracts lanceolate to broadly lanceolate or ovate, 7 mm long, pale green to brown with dark-lined centre and pale margins; paleae acuminate. Ray florets 4–9; ligules 20–40 (–50) mm long, pink, purple, purplish, rose-pink, violet or white. Disc florets 5–7 mm long, yellow. Achenes curved, 4-angled, linear-fusiform, 7–8 mm long, with attenuated beak (shorter in outer florets), with a few short hairs towards apex. Pappus awns (0–) 2 or 3 (–8), short, barbed. *Cosmos*. Plate 45.

A native of SE U.S.A. (Arizona) & Mexico. Naturalised in other southern USA States, Cuba, Japan, etc. In Australia an escaped cultivated ornamental, particularly in N.S.W. and Qld., and recently recorded in W.A., A.C.T. and S.A. Found in disturbed habitats, usually near habitation, in grasslands, weedy roadsides, muddy salt flats, roadwork stockpiles etc., on a wide range of soils, from near sealevel to 930 m. Flowers recorded Mar.–July & Nov.; fruits Mar.–July.

W.A.: off Hay Street, Subiaco, *G.Keighery* 16263 (PERTH). S.A.: Back Beach, between Port Augusta rly yard and Hospital Ck, 1 July 1995, *A.Stefanovic* s.n. (AD). Qld: junction of Poziers Rd and Hutchinsons Lane, 2.8 km E of Poziers (Post Box), *G.N.Batianoff* 20011132 & *D.Halford* (BRI). N.S.W.: South Armidale, May 1970, *E.McAlister* s.n. (NE). A.C.T.: Canberra, 0.9 km W of Mugga Lane on Long Gully Rd, *B.J.Lepschi* 5375 (CANB, MO, NSW, US).



Specimens lacking awns on the achenes have been named *C. bipinnatus* var. *exaristatus* DC., and originate from southern Mexico. Exaristate specimens are particularly common in cultivated (and thus naturalised) plants. Many recent treatments (e.g. Melchert *op. cit.*) do not consider this varietal taxon worth recognition.

2. **Cosmos caudatus* Kunth in F.W.H.A.von Humboldt *et al.*, *Nov. Gen. Sp.* 4: 240 (1820)

Bidens artemisiaefolia Kuntze var. *caudata* (Kunth) Kuntze, *Revis. Gen. Pl.* 1: 321 (1891). T: Crescit prope Havanam Insulae Cubae ... Floret Martio, *Humboldt & Bonpland*; holo: P n.v., fide E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 7 (6): 412 (1932).

Illustration: T.E.Melchert, *Fieldiana* 24(12): fig. 61 (1976).

Annual, single-stemmed, branched, 20–70 (–200) cm tall, glabrous or sparsely hispid, aromatic. Leaves subdeltoid in outline, 3–4-pinnate or -pinnatifid; petiole thin, 10–70 mm long; lamina 4–20 cm long, 3–15 cm wide; leaflets or ultimate lobes lanceolate or oblong-lanceolate, 2–10 mm wide, acuminate and acute, glabrous, with ciliate margins. Capitula radiate, 1–3 in terminal clusters, on thin, subglabrous peduncles 5–20 cm long; outer involucral bracts herbaceous, linear-lanceolate, 6–9 mm long, acuminate and acute, glabrous, ciliate at margins; inner involucral bracts narrowly oblong, 7–10 mm long, with hyaline margins, acute, usually pink; paleae narrowly oblong. Ray florets c. 8; ligule 10–15 mm long, usually pink to purplish or rarely white. Disc florets 7–8 mm long, yellow. Achenes fusiform-tetragonal, often curved, 10–30 (–35) mm long, with elongated hispid beak, glabrous or scabrid at base. Pappus awns 2 or 3, barbed, with barbs usually spreading or reflexed.

A minor agricultural weed, native to central America and the Antilles. Introduced in N America, Asia, Hawaii and Madagascar. Naturalised in wetter coastal areas of northern & central Qld, where it is recorded as a weed of roadsides, vacant areas and the margins of

rainforest and vine thickets, from sealevel to about 800 m. Flowers recorded Mar.–July; fruits May–Aug. & Nov.

Qld: Meregallan Rd, Malanda, 11 May 1971, *L.S.Barnes s.n.* (BRI); 1 km NE of Bamaga, *P.I.Forster 6463* (MEL, QRS); Babinda, *B.Jago 832* (QRS); c. 10 km E of Mt Pelion, *T.D.Stanley 78330* & *E.Ross* (BRI); property of Tony Coase, near Ayton, N of Wujal Wujal, *B.M.Waterhouse 5979* (BRI, CANB).

Vegetatively very similar to *C. sulphureus*, but readily distinguished by its pink to purplish (rarely white) ray florets (yellow to orange in *C. sulphureus*).



3. **Cosmos sulphureus* Cav., *Icon.* 1: 56, t. 79 (1791), as *sulfureus*.

T: Mexico; lector: the plate: A.J.Cavanilles, *Icon.* 1: 56, t. 79 (1791), *fide* E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 7 (6): 409 (1932).

Illustrations: A.J.Cavanilles, *loc. cit.*; L.H.Bailey, *Standard Cyclop. Hort.* 3: 863, fig. 1078 (1947); J.A.Steyermark, *Fl. Missouri* 1593, pl. 375 (2) (n.d.).

Annual herb, single stemmed from taproot, branching with age, 0.6–2.1 tall, glabrous to hispid. Leaves ovate in outline, bi- or tripinnatisect, 1–20 cm long (including petiole); petiole 1–7 cm long; ultimate lobes 2–10 mm wide, glabrous or with few hairs along veins. Capitula radiate, terminal and usually solitary, on peduncles 10–20 cm long; outer involucre bracts herbaceous, linear-subulate, 3–10 mm long; inner bracts oblong-lanceolate, 9–13 (–18) mm long, acute to rounded, usually yellowish; paleae narrowly oblong-lanceolate. Ray florets 8 (–10); ligule 18–28 mm long, bright yellow or red-orange. Disc florets 6–7 mm long, yellow. Achenes linear-fusiform, black, 16–28 mm long including the setulose-coronate beak, usually hispid. Pappus awns 2, weak, very slender, 4.5–7 mm long, weakly retrorsely barbed, often fragile and deciduous, sometimes absent. *Yellow Cosmos*.

A native of the tropical and subtropical regions of Mexico and Brazil. Naturalised in N, central and S America, West Indies, Europe, Asia, Africa and the Pacific. A garden escape in W.A., N.T., S.A. and Qld., found in waste ground and on weedy roadsides, amongst grasses and in open eucalypt woodland, from near sealevel to at least 800 m. Flowers and fruits Jan.–May, with a peak for both in Mar.–Apr.

W.A.: N side of King Edward R., near main airstrip, Kalumburu Mission, *A.A.Mitchell 5475* (PERTH). N.T.: Garden Point, Melville Is., *I.D.Cowie 5508* (BRI, CANB, MEL). S.A.: Murray Bridge, *R.Bates 42898* (AD). Qld: c. 7 km N of Dimbulah on road to Mt Mulligan, *J.R.Clarkson 5240* (BRI); Petford–Herberton road, 12.2 km from Irvinebank road, *A.Ford 2226* (QRS).



5. COREOPSIS

Coreopsis L., *Sp. Pl.* 2: 907 (1753); from the Greek *koris* (a bug) and *opsis* (like): the achenes resemble a beetle or tick.

Type: *C. lanceolata* L.

Annual or perennial herbs or shrubs. Branches few to many, foliose, glabrous or hairy. Leaves basal and cauline, opposite or rarely alternate, petiolate or sessile, entire to pinnately divided. Inflorescence of solitary heads or loose corymbs or panicles. Capitula radiate, usually large, long-pedunculate; involucre cup-shaped; involucre bracts usually 2-seriate, ±fused at base; outer bracts herbaceous, lanceolate to ovate, appressed or spreading; inner bracts membranous to herbaceous, ovate; receptacle flat or slightly convex; paleae ovate to linear or subulate, hyaline, caducous. Ray florets sterile, rarely female, (5–) 8 (–12+), ligulate. Disc florets bisexual, fertile (or innermost sterile), usually numerous, 4- or 5-lobed.

Achenes ovoid to obovoid, compressed, mostly laterally 2-winged; beak absent. Pappus absent, or of 2 barbed or unbarbed awns.

A widespread genus with c. 130 species in N & S America, Pacific Islands and tropical Africa. One species naturalised in Australia.

The limits of *Coreopsis* and *Bidens* are not clear. Some molecular work suggests that *Bidens* is embedded within *Coreopsis* (S.Kim *et al.*, 1999; Kimball & Crawford, 2004). Recent studies are summarised by Crawford *et al.* (2009).

E.B.Smith, A biosystematic survey of *Coreopsis* in eastern United States and Canada, *Sida* 6(3): 123–215 (1976); H.E.Kleinschmidt & R.W.Johnson, *Weeds Queensland* 380 (1977); B.A.Auld & R.W.Medd, *Weeds* 97 (1987); R.K.Jansen *et al.*, A cladistic study of North American *Coreopsis* (Asteraceae: Heliantheae), *Pl. Syst. Evol.* 157: 73–84 (1987); D.J.Crawford *et al.*, Chloroplast DNA restriction site variation, phylogenetic relationships and character evolution among sections of North American *Coreopsis* (Asteraceae), *Syst. Bot.* 16: 211–224 (1991); S.Kim *et al.*, ITS sequences and phylogenetic relationships in *Bidens* and *Coreopsis* (Asteraceae), *Syst. Bot.* 24: 480–493 (1999).

1 Disc corolla lobes 5; style branch apices usually ±penicillate

2 Aerial nodes below first peduncle usually 1–3 (–5+); cauline leaves usually with blades simple or 1- or 2-lobed, mostly in lower half of aerial stems; achenes 2.0–3.5 mm long

C. lanceolata

2: Aerial nodes below first peduncle usually (5–) 6–12+; cauline leaves with blades pinnately lobed, extending to c. 90% of aerial stems; achenes 2–3 mm long

†**C. grandiflora**

1: Disc corolla lobes 4; style branch apices ±truncate

††**C. tinctoria**

†See note under *C. lanceolata*.

††*Coreopsis tinctoria* Nutt. was recorded from Milton, Qld, 1888, *J.H.Simmonds s.n.* (BRI). It is not clear whether this was a cultivated or naturalised plant, but it has, in any case, not been collected since. Not treated further.

***Coreopsis lanceolata** L., *Sp. Pl.* 2: 908 (1753)

T: Habitat in Carolina; lecto: the plate: *Bidens caroliniana, florum radiis latissimis, insigniter dentatis, semine alato per maturitatem convoluta*, in J.Martyn, *Hist. Pl. Rar.*, 26, t. 26, (1728), *fide* M.L.Green, *Prop. Brit. Bot.* 183 (1929).

[*Coreopsis grandiflora* auct. non Hogg. ex Sweet: G.Paczkowska & A.R.Chapman, *W Australian Fl. Descr. Cat.* 160 (2000)]

[*Coreopsis grandiflora* var. *grandiflora* auct. non Hogg. ex Sweet: N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 977 (1999)]

Illustrations: E.B.Smith, *Sida* 6: 142 fig. 9 (1976); H.E.Kleinschmidt & R.W.Johnson, *Weeds Queensland* 380 (1977); N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 4: 979, fig. 200a (1999).

Clump-forming mostly perennial herbs, 0.2–0.75 (–1.2) m high; stems usually sparsely pubescent below, glabrous above. Basal leaves rosette-forming; petiole 2–8 cm long; lamina lanceolate to spatulate, 4–30 mm long, 10–20 mm wide, entire, with 2 basal lobes, or rarely pinnate, sparsely to densely hairy on both surfaces. Internodes to first peduncle usually 1–3; cauline leaves confined to lower ½ of scape, opposite, linear to narrowly lanceolate (rarely with 1 or 2 basal lobes or pinnate), sessile. Capitula (4–) 6–10 cm diam.; outer involucrel bracts herbaceous, usually lanceolate, 5–10 mm long, usually ciliate apically (rarely hyaline); inner bracts herbaceous, ovate, 10–15 mm long, with margins hyaline, glabrous. Ray florets c. 8; ligule 2–3 cm long, yellow. Disc florets 5-lobed, yellow. Achenes 2.0–3.5 mm long, ±cucullate, winged, black, glabrous or with sparse white hairs. Pappus awns minute, antrorsely barbed. *Garden Coreopsis, Showy Tickseed.* Plate 46; Fig. 63H–I.

A native of eastern N America (Canada & U.S.A.). Widely cultivated, and naturalised in western N America, S America, Africa, China, Australia and New Zealand. In Australia naturalised in SW W.A., SE Qld, N.S.W. (mainly E of the ranges), A.C.T. and Vic. (near Bogong and Moe). Found on disturbed roadsides, railway reserves, under cleared power-

lines, in open grassland, pastures, and open woodland, on a range of usually damp soils, from near sealevel to about 900 m. Flowers Oct.–May; fruits Nov.–May.

W.A.: Denmark, *G.J.Keighery 6516* (CANB, PERTH). Qld: Hartmann Park, Crows Nest, *D.Halford Q7323* (BRI). N.S.W.: Uralla, East St., opposite cemetery, *I.R.Telford 12542* (NE). A.C.T.: O'Connor Ridge, Lyneham, *B.J.Lepschi 78* (AD, CANB, MEL). Vic.: Bogong Village, *I.R.Telford & M.D.Crisp 10488* (AD, CANB, MEL).

The achenes of this species are very variable, ranging from 2 to 3.5 mm long, the body usually black, with or without white hairs, and wings narrow to broad and hyaline to black. The most usual form has black glabrous achenes and broad black wings, the whole broader than long, and often cucullate. The naturalised populations have arisen from garden escapes, from a number of cultivars.



Coreopsis grandiflora Hogg. ex Sweet, was recorded for Vic. on the basis of an incomplete specimen (Haunted Hills Rd, 5.5 km SE Moe, Nov. 1990, *K.Harris s.n.*, MEL) with finely pinnately-divided cauline leaves, and achenes with narrow wings. This specimen can be matched with occasional specimens of *C. lanceolata* found in populations with otherwise entire leaves (e.g. *B.J.Lepschi 3965* & *J.R.Connors*, AD, CANB, MEL), and achenes of *C. lanceolata* develop their wings very late in the maturation process. This record is therefore treated as a misidentification of *C. lanceolata* (as are W.A. records). *Coreopsis grandiflora*, which is similar to *C. lanceolata*, differs in having more aerial nodes below the first peduncle, the cauline leaves extending most of the length of the stems, and generally smaller achenes.

6. BIDENS

Bidens L., *Sp. Pl.* 2: 831 (1753); *Gen. Pl.* 5th edn 362 (1754); from the Latin *bis* (two, twice) and *dens* (tooth), referring to the rigid awns of the fruit, which are often 2 per achene.

Type: *B. tripartita* L.

Annual or perennial herbs, or shrubs. Stems usually many-branched, foliose, glabrous or hairy. Leaves cauline, opposite or rarely alternate (not in Australia), usually petiolate, simple or ternately to pinnately compound. Inflorescence of terminal, solitary or loosely cymose capitula, pedunculate. Capitula discoid or radiate, usually small; involucre bracts ±free, in 2–5 series; outer bracts ±foliaceous, usually linear to spatulate, lanceolate or oblanceolate; inner bracts membranous, similar to outer ones; receptacle flat or slightly convex; paleae narrow, membranous, caducous. Ray florets sterile, rarely bisexual (*B. pilosa*), few or absent, yellow or white. Disc florets bisexual, fertile, numerous, 5-lobed, yellow or greenish. Achenes frequently dimorphic, linear to oblong-cuneate, laterally compressed or 4-angled, ribbed; beak absent. Pappus of 2–4 stiff, retrorsely barbed awns.

A genus of 230–280 species, distributed throughout warm temperate and tropical regions, but especially in the Americas. In Australia there are 6 naturalised species (one native variety of *B. subalternans*).

The limits of *Coreopsis* and *Bidens* are not clear. Some molecular work suggests that *Bidens* is embedded within *Coreopsis* (Kim *et al.*, 1999; Kimball & Crawford, 2004). Recent studies are summarised by Crawford *et al.* (2009).

The latin word *bidens* is masculine, but was treated as feminine by Linnaeus and in most major works since (including the major revision of Sherff, 1937), although some authors have treated it as masculine. In this treatment the generic name is taken as feminine, following Linnaeus and common usage.

This genus is noted for frequently having dimorphic achenes, those on the outside of the head often being smaller than the inner ones, and differing in shape, number of awns, and indumentum. The shape and ornamentation of the achenes can also change significantly as

the achenes mature. In the descriptions below the achenes are described at maturity. Awns on the achenes may be closely spaced, parallel and in line with the body of the achene (described as erect), straight and diverging from each other gradually (described as V-divergent), or basally widely divergent before curving upwards (described as U-divergent). More than one type may occur in a single head.

E.E.Sherff, The genus *Bidens*, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 16: 1–709 (1937); T.E.Melchert, New combinations in the Coreopsidinae, *Phytologia* 32(4): 291–298 (1975); T.E.Melchert, *Bidens*, Flora of Guatemala, *Fieldiana* 24: 193–214 (1976); R.Ballard, *Bidens pilosa* complex (Asteraceae) in North and Central America, *Amer. J. Bot.* 73: 1452–1465 (1986); Mesfin Tadesse, An account of *Bidens* (Compositae: Heliantheae) for Africa, *Kew Bull.* 48: 437–516 (1993); S.Kim *et al.*, ITS sequences and phylogenetic relationships in *Bidens* and *Coreopsis* (Asteraceae); *Syst. Bot.* 24: 480–493 (1999).

- 1 Leaves simple, 3- or rarely 5-lobed or simply pinnate
- 2 Outer involucre bracts usually longer than florets and ±spathulate **1. B. tripartita**
- 2: Outer involucre bracts usually shorter than florets, and linear to lanceolate (linear-spathulate to broadly spatulate in *B. alba*)
- 3 Ray florets yellow, with ligules 10–30 mm long; margins of inner involucre bracts usually yellow **4. B. aurea**
- 3: Ray florets absent or white (if pale yellow, then ligules (2–) 4–8 mm long); margins of inner involucre bracts hyaline
- 4 Ray florets absent, or when present white to pale yellow, bisexual, with ligule (2–) 4–8 mm long; achenes (2-) 3- or 4-awned, erect or V-divergent; leaves usually coarsely toothed (teeth 2–3 mm long) **2. B. pilosa**
- 4: Ray florets present, white, sterile, with ligule (6–) 10–16 mm long; achenes usually 2-awned, U-divergent; leaves finely toothed (teeth 0.5–1 mm long) **3. B. alba**
- 1: Leaves 2 or more -pinnatifid or -pinnatisect, or bipinnate
- 5 Ligules of ray florets 10–30 mm long **4. B. aurea**
- 5: Ligules of ray florets rudimentary to 3 mm long (or absent in *B. subalternans*)
- 6 Outer involucre bracts, receptacle and peduncle glabrous or with relatively few short soft fine hairs; inner involucre bracts usually dark purple-brown with indistinct longitudinal veins **5. B. bipinnata**
- 6: Outer involucre bracts, receptacle and peduncle with coarse ±stiff white hairs usually as long as width of bract (sometimes bracts subglabrous); inner involucre bracts usually cream with numerous purple longitudinal veins (±uniformly dark purple brown with yellow margins in var. *araneosa*) **6. B. subalternans**

1. **Bidens tripartita* L., *Sp. Pl.* 2: 831 (1753)

T: Europe, *Herb. Clifford* 399, *Bidens* 1 [*alpha*]; lecto: BM, photo seen, *fide* E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 16: 271 (1937).

Illustrations: E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 16: facing p. 262, pl. LXVII (1937); G.J.Harden (ed.), *Fl. New South Wales* 3: 279 (1992); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 976, fig. 199k (1999).

Annual herb 20–100 cm tall; stems erect, glabrous or sparsely hairy. Leaves petiolate, broadly lanceolate to broadly ovate in outline, 6–16 cm long, 2–13 cm wide, usually 3- or 5-lobed, or simple, toothed, glabrous apart from tiny antorse hairs on margins and veins; terminal lobes ovate; lateral lobes ovate to lanceolate; simple leaves lanceolate to ovate, 6–8 cm long, 2–3 cm wide. Capitula hemispherical, 10–25 (–30) mm diam.; outer involucre bracts ±spathulate, (10–) 15–40 mm long, usually exceeding florets, sparsely hairy near base; inner bracts lanceolate, glabrous. Ray florets usually absent, if present 1–5, with ligule 4–8 mm long, orange-yellow. Achenes homomorphic, oblong-cuneate, 4–8 mm long, compressed, black to

purplish or brown, retrorsely barbed on ribs. Pappus awns 2 (–4), erect, 1.5–4 mm long. *Burr Marigold*, *Trifid Burr Marigold*. Fig. 64A–D.

Native to Europe, Asia and northern Africa; naturalised in New Zealand and the Pacific. In Australia, naturalised in N.S.W. and Vic., growing in swampy areas or shallow water around dams, rivers etc. with *Eleocharis* spp., *Ludwigia peploides*, *Persicaria hydropiper*, *Isolepis prolifer* and *Paspalum* spp., mainly in coastal areas but extending inland up to 750 m alt. A minor weed of natural environments. Flowers and fruits Mar.–Apr.

N.S.W.: 1.5 km along Shepherds Rd SW of Dorrigo, *A.R.Bean* 28662 (CANB); c. 1 km below Barren Grounds Nat. Res. off the Robertson–Jameroo road, *R.Coveny* 12589 (CANB, MEL). Vic.: Sale Common, beside the South Gippsland Hwy, Tarra R., 3 miles [5 km] SE of Yarram, *J.Ackland* 144 (MEL); c. 3.5 km S of Sale, *H.I.Aston* 2618 (AD, BRI, CBG, HO, MEL); McLeods Morass, c. 2 km S of Bairnsdale, 1 Apr. 1990, *J.R.Turner s.n.* (MEL).



A robust species, readily recognised by the spatulate outer involu-
cral bracts which usually extend well beyond the florets and fruits.

2. **Bidens pilosa* L., *Sp. Pl.* 2: 832 (1753)

T: America, *Herb. Linn. No.* 975.8; lecto: LINN *n.v.*, *fide* W.G.D'Arcy, *Ann. Missouri Bot. Gard.* 62: 1178 (1975).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1434, fig. 643 (1986); B.A.Auld & R.W.Medd, *Weeds* 86 (1987); B.M.J.Hussey *et al.*, *Western Weeds* 91 (1997).

Stout annual herb (20–) 50–100 (–170) cm tall; stems erect, usually glabrous (sometimes weakly pilose). Leaves petiolate, ovate to broadly ovate in outline, 6–17 cm long, 1–4 cm wide, usually trifoliate or pinnate, sometimes simple, coarsely toothed (teeth 2–3 mm long), glabrous, minutely scabrous on veins and margins, or appressed-pilose throughout; terminal lobes ovate to lanceolate; lateral lobes/leaflets subsessile, c. ½ as long as terminal lobe; simple leaves ovate to lanceolate, 2–8 cm long, 1.5–4 cm wide. Capitula ovoid, 5–15 mm diam.; outer involuclral bracts erect, linear, 2.5–5 (–8) mm long, not exceeding florets, glabrous or ciliate; inner bracts lanceolate, hyaline at margins, glabrous (but often with short cilia at tip). Ray florets usually absent, if present 4–7, with ligule (2–) 4–8 mm long, white to pale yellow, bisexual. Achenes dimorphic, black, linear, 4-angled; outer achenes 5–8 mm long excluding awns, not tapering to apex, with hairs throughout, with 3 or 4 awns ±U-divergent; inner achenes 10–16 (–23) mm long excluding awns, tapering to apex, glabrous or hairs in upper part, with (2) 3 or 4 awns erect or V-divergent. Pappus awns 1–2.7 (–4) mm long. *Cobbler's Pegs*, *Pitch Forks*.

Native to Mexico, the Caribbean and C America, widely naturalised in Europe, and throughout tropical and subtropical regions worldwide. In Australia naturalised in all mainland States and Territories.

This species is regarded as naturalised in Australia. However, it was collected by Banks & Solander from Botany Bay in 1770, suggesting that it is of pre-European introduction, perhaps via New Guinea.

Sherff (1937) described 6 varieties and a number of forms in this very variable species. Most of these are not maintained by current authors, and the complex in North and Central America was re-examined by Ballard (1986), who recognised three species, *B. pilosa*, *B. alba* and *B. odorata*. Du Puy *et al.*, *Fl. Australia* 50: 422 (1993) placed Christmas Is. material of this species in *B. pilosa* var. *minor* (Blume) Sherff, distinguished by its small white or pale yellow ligulate ray florets. Ligules are absent in var. *pilosa*. These 2 varieties are accepted here for mainland Australia *pro temp.*, but further investigation is required, as there is considerable variation in both vegetative and fruit characters across the complex.

Ligulate ray florets absent

2a. var. *pilosa*

Ligulate ray florets present, often minute, (2–) 4–8 mm long, ephemeral

2b. var. *minor*

2a. *Bidens pilosa* L. var. *pilosa*

Bidens pilosa var. *typica* Domin, *Biblioth. Bot.* 89: 1235 (1930), *nom. inval.*, type var.

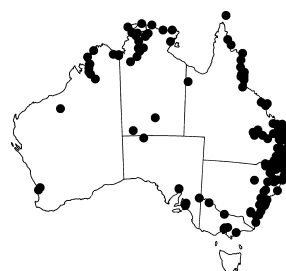
Bidens bipinnata var. *simplicior* F.Muell., *Fragm.* 7: 40 (1869), *nom. nud.*, based on 124, N. Aust. Expedn [Port Darwin, Schultz], MEL2156260.

Bidens pilosa var. *subsimplicifolia* Kuntze, *Rev. Gen. Pl.* 1: 322 (1891). T: West Indies, Dr Alexander; *n.v.*

All florets tubular. Ligulate ray florets absent. Fig. 64E–J.

Distribution as for the species. In Australia naturalised in all mainland States and Territories, but of limited distribution in W.A., S.A., A.C.T. and Vic. Found in disturbed sites (wasteland, weedy roadsides, agricultural and horticultural areas), in open forest and the edges of monsoonal vine thickets, in all soil types, from sand to loams or clays, derived from *inter alia*, coral, basalts, granites and greywacke, at altitudes from sealevel to c. 1200 m. Flowers and fruits throughout the year, with a peak Nov.–June.

W.A.: Fitzroy Crossing, *T.E.H.Aplin 223 et al.* (PERTH). N.T.: Bullita Stn, Gregory Natl Park, *I.Cowie 2386 & Brocklehurst* (DNA, MEL). S.A.: Adelaide, City, Lower Rundle St opposite the Exeter Hotel, *D.E.Symon 13221* (AD, CANB). Qld: Mt Mellum, Glasshouse Mtns, *D.E.Albrecht 3453* (MEL). N.S.W.: E side of old railway cutting 0.5 km S of Oatley Rly Stn, *P.C.Jobson 4228* (BRI, MEL). A.C.T.: Gungahlin, CSIRO Division of Wildlife and Ecology, *B.J.Lepschi 133* (CANB). Vic.: Sale Rly Stn, *R.V.Smith 64/45* (MEL).



Domin (1930) took up the name *B. pilosa* var. *subsimplicifolia* Kuntze for plants from Yarraba and False Cape, Qld. Other collections from Yarraba seen for this treatment are *B. pilosa* var. *pilosa*. Sherff (1937) synonymized the two names.

2b. *Bidens pilosa* var. *minor* (Blume) Sherff, *Bot. Gaz.* 80: 387 (1925)

Bidens sundaica var. *minor* Blume, *Bijdr.* 914 (1826). T: prope Buitenzorg, Java, *Blume s.n.*; L 900, 146...72 *p.p.*, *n.v.*, *fide* E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 16: 427 (1937).

Illustration: E.E.Sherff, *op. cit.* 16: facing p. 382, pl. CII c, d, k–r (1937).

Ligulate ray florets present, c. 5, (2–) 4–8 mm long, white or pale yellow with 5–7 purple veins, ephemeral. Plate 48.

Almost cosmopolitan in tropical and subtropical regions. Naturalised in all mainland Australian States and N.T. (not yet seen in A.C.T.), but most frequent in Qld, N.T. and N.S.W. Found in disturbed areas (footpaths, weedy roadsides, camp grounds, vineyards, orchards) and in ±natural eucalypt woodlands, margins of monsoon vine forest and along watercourses, in sand, loam or clay soils, from near sealevel to at least 1175 m. Flowers and fruits present almost year round, but flowers most frequently Feb.–June; fruits mainly Mar.–May.

W.A.: Piccaninny Creek Gorge, Bungle Bungle Ra., *M.I.Blackwell BB124* (PERTH). N.T.: 10 km S of Katherine, *M.J.A.Barritt 2124* (DNA, MEL). S.A.: Waikerie, *C.J.Hamdorf 45* (AD, CBG). Qld: Cainbale Cliffs, Lamington Natl Park, *A.R.Bean 16134* (BRI, MEL). N.S.W.: Manning R., Taree, *J.R.Hosking 2317* (CANB, MEL). Vic.: Melbourne, suburb of Elsternwick, Elster Ck, c. 100 m NW of Cochrane St, *I.C.Clark 2849* (CANB, MEL).



E.E.Sherff, *op. cit.* 16: 427 (1937), discussed the typification of this taxon in detail.

Ballard (1986) was unable to place *B. pilosa* var. *minor* in his system for the *B. pilosa* complex.

The ligulate florets which define this taxon are often small, with the ligule barely exceeding the involucre, and in dried material the inner involucral bracts with their hyaline margins can be mistaken for the ligules. The ligulate florets seem to be ephemeral, with ligules not apparent even in immature fruiting heads. The distribution of this taxon in Australia is very similar to that of *B. pilosa* var. *pilosa*, although var. *minor* is not as common, and the two usually do

not seem to form mixed populations. This complex in Australia (*B. pilosa* and *B. alba*), would repay a careful field study (with detailed comparison of overseas collections), and may result in a revised nomenclature and/or additional taxa.

3. **Bidens alba* (L.) DC., Prodr. 5: 605 (1836)

var. ***radiata*** (Sch.Bip.) F.Ballard ex Melchert, *Phytologia* 32: 295 (1975)

B. pilosa var. *radiata* Sch.Bip. in P.B.Webb & S.Berthelot, *Hist. Nat. Iles Canaries* 2: 242 (1844); *B. pilosa* f. *radiata* Sch.Bip., *Flora* 27: 673 (1844). T: America; holo: P? n.v.

Coreopsis leucantha L., *Sp. Pl.* 2nd edn, 2: 1282 (1763); *Bidens leucantha* (L.) Willd., *Sp. Pl.* edn 4, 3(1): 1719 (1800). T: Habitat in America, *Herb. Linn. No. 1026.5*; lecto: LINN n.v., fide R.Ballard, *Amer. J. Bot.* 73: 1464 (1986).

Illustrations: E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 16: facing p. 386, pl. CIIIa–h (1937), as *B. pilosa* var. *radiata*; F.Ballard, *Amer. J. Bot.* 73: 1456, figs 3A, 4A, 5A, 10; 1457, fig. 12C (1986).

Annual herb 50–300 cm tall; stems erect, weakly pilose, glabrescent. Leaves petiolate, ±ovate in outline, 6–17 cm long, 6–13 cm wide, simple or pinnate, finely toothed (teeth 0.5–1 mm long), glabrous, except petiolules and midrib below ±pilose; terminal lobes ovate to broadly ovate; lateral lobes lanceolate, ovate or broadly ovate, petiolulate; simple leaves lanceolate, 6–9 cm long, 0.8–1 (–3.5) cm wide. Capitula hemispherical, 8–10 mm diam. excluding rays (20–35 mm including rays); outer involucre bracts linear-spathulate to broadly spathulate, 2–4 mm long, shorter than florets, glabrous to moderately pubescent, ciliate marginally; inner bracts lanceolate, with hyaline margins, glabrous. Ray florets 5–8, white; ligule (6–) 10–16 mm long. Achenes dimorphic, 4–10 (–12) mm long, compressed, dark brown to black; outer achenes linear, 6 mm long, not tapering, glabrous basally, densely antrorsely shortly tuberculate-strigose above; inner achenes tapering to apex, 8–9 mm long, weakly strigose above or ±glabrous. Pappus awns 2 (sometimes 3), U-divergent, 1–2 mm long. Fig. 64K–M.

A native of Florida and Central America, naturalised elsewhere (e.g. Japan). In Australia naturalised in NE Qld, particularly the Proserpine district and Cape York, with occasional populations as far S as NE N.S.W. Found in a range of habitats, from frontal dunes on beaches and grassland fringing mangrove swamps to waste ground, open *Banksia/Callitris/Casuarina* forest and the margins of rainforest, at altitudes from sealevel to 900 m. Flowers recorded all months; fruits Jan.–Sept.

Qld: State Forest 141 Mowbray, Rex Ra., *P.I.Forster* 25247 & *R.Booth* (BRI, MEL, QRS); Airlie Beach, *T.A.Halliday* 364 (AK, BRI, HO, K); Mission Beach, *L.Pedley* 5751 (BRI, K, MEL); Conway Beach, *P.R.Sharpe* 4035 & *G.Batianoff* (BRI, CANB, K, MEL). N.S.W.: Fishery Ck, Ballina, *P.I.Forster* 29316 (BRI, MEL, NSW).



Bidens alba var. *radiata* is erect, with pubescent leaves, while var. *alba* is decumbent with glabrous, coriaceous leaves. The latter does not occur in Australia.

North Qld plants have generally 2-awned achenes while those from SE Qld and NE N.S.W. generally have 3-awned achenes and somewhat more coarsely toothed leaves.

Distinguished from all other Australian taxa by its distinct lateral leaflets with petiolules and very fine teeth usually less than 1 mm long; by its large capitula with conspicuous white ligules c. 10–16 mm long; by its short achenes (c. 10 mm long), with 2 (or 3) U-divergent awns and the tuberculate-strigose outer achenes.

4. **Bidens aurea* (Aiton) Sherff, Bot. Gaz. 59: 313 (1915)

Coreopsis aurea Aiton, *Hort. Kew* 3: 252 (1789). T: Based on a plant introduced to England in 1785 by Charles, Earl of Tankerville and grown at Kew Gardens; holo: BM n.v., fide E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 16: 342 (1937).

Illustrations: E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 16: facing p. 306, pl. LXXX (1937).

Annual or perennial herb 50–100 (–150) cm tall; stems erect, glabrous. Leaves petiolate, mainly simple, lanceolate to linear-lanceolate, 8–22 cm long, toothed or entire, usually glabrous, sometimes hairy; divided leaves deltate overall, pinnate or bipinnate, with terminal lobes lanceolate to linear lanceolate; lateral lobes/leaflets similar but smaller. Capitula hemispherical, 6 mm diam. excluding rays (25 mm diam. including rays); outer involucre bracts linear, 3–6 mm long, shorter than florets, ciliate marginally, \pm glabrous; inner bracts ovate to lanceolate, with yellow margins, glabrous. Ray florets 5 or 6, golden yellow; ligule 10–30 mm long. Achenes \pm homomorphic, linear-cuneate, 4–7 mm long, \pm compressed, glabrous or sparsely hairy, dark brown to black. Pappus awns 2, U-divergent, 1.5–2 (–4) mm long.

Native from southern U.S.A. (Arizona) to Central America (Guatemala). Naturalised in Europe. In Australia, naturalised near Sydney, N.S.W., on damp weedy roadsides with *Pennisetum clandestinum* and *Tradescantia*. Flowers and fruits Apr.–May.

N.S.W.: Epping, 1956, *K.Aird s.n.* (NSW); Castle Howard Rd, Cheltenham, *W.A.Cherry 538* (NSW); Castle Howard Rd, Cheltenham, 24 Apr. 1988, *P.W.Michael s.n.* (NSW); eastern side of Old Northern Rd, between Galston Rd and Mid-Dural Rd, Dural, 24 Apr. 1988, *P.W.Michael s.n.* (NSW).

Clumps increase in size from underground rhizomes, and from mature stems becoming prostrate, rooting at nodes and generating new erect vegetative shoots.



5. **Bidens bipinnata* L., *Sp. Pl.* 2: 832 (1753)

T: Virginia [U.S.A.], *Herb. Linn. No. 975.12*; lecto: LINN n.v., *fide* Mesfin Tadesse, *Kew Bull.* 48: 499 (1993).

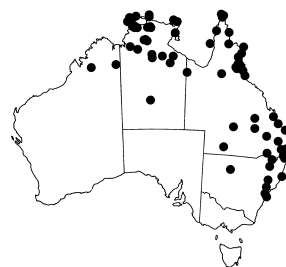
Illustrations: E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 16: facing p. 348, pl. LXXXIX(l–s) (1937); B.D.Morley & H.R.Toelken, *Fl. Pl. Australia* 303 (1983); G.J.Harden (ed.), *Fl. New South Wales* 3: 279 (1992).

Stout annual herb 25–120 (–160) cm tall; stems erect, glabrous, rarely minutely setulose. Leaves petiolate, very variable, bipinnatifid or bipinnate, rounded-deltoid to ovate or lanceolate in outline, 35–170 mm long, 20–120 mm wide, with ultimate lobes bluntly toothed or entire, sparsely hispid on veins below or glabrous; lobes linear to ovate, dissected. Capitula ovoid, 5–10 mm diam.; outer involucre bracts linear to narrowly lanceolate, not dilated, 3–5 (–7) mm long, shorter than or equalling florets, \pm acute or blunt, glabrous or with few short fine hairs; inner bracts linear-lanceolate, usually deep purplish brown with indistinct longitudinal veins, glabrous or with outermost shortly and finely hairy. Ray florets (0) 3–5, yellow; ligule 1–2 (–3) mm long. Achenes slightly dimorphic, linear, slightly compressed, red-brown to black, usually glabrous below, sometimes with a few antrorse barbs on upper part; outer achenes 8–10 mm long; inner achenes 10–18 mm long. Pappus awns (2) 3 or 4, erect or V-divergent, 2–4 mm long. *Bipinnate Beggar's Ticks*.

Probably native of E Asia and possibly eastern U.S.A., and introduced in western U.S.A., S America, Europe, Asia and the Pacific. In Australia, naturalised mainly in N.T. and Qld, with a few records for NE N.S.W. and northern W.A. A minor weed of natural and agricultural systems, found in a range of soils, and vegetation ranging from weedy roadsides to eucalypt woodland, river banks, vine thickets and rainforest, from sealevel to at least 900 m. Flowers Dec.–Aug. with a peak Feb.–Apr.; fruits Feb.–June, with a peak Mar.–May.

W.A.: Tunnel Ck, Napier Ra., *C.R.Dunlop 7718* (DNA). N.T.: SE side of Stevens Is., *I.Cowie 6756* (DNA, MEL). Qld: Muttee Head, Cape York, *P.I.Forster 6439* (BRI, DNA, MEL, QRS). N.S.W.: MacIntyre R., Inverell, *C.J.Dunn 48 et al.* (AD, BRI, MEL, NSW).

S.W.L.Jacobs & J.Pickard, *Pl. New South Wales* 72 (1981) treated N.S.W. plants as *B. bipinnata* var. *bipinnata*. Varieties of *B. bipinnata* are not recognised in this treatment.



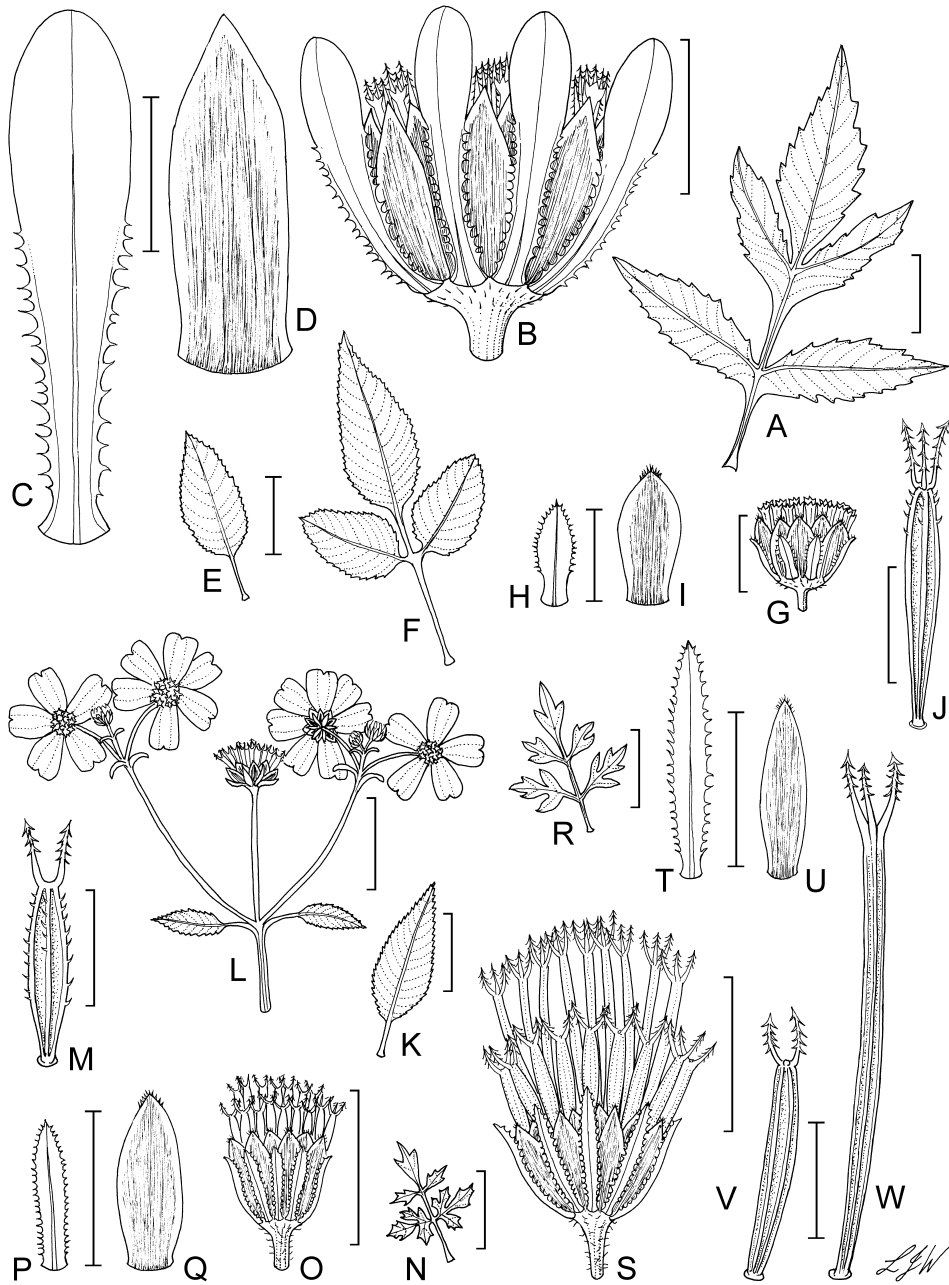


Figure 64. *Bidens*. A–D, *B. tripartita*. A, leaf; B, capitulum; C, outer involucre; D, inner involucre (A–D, H.I.Aston 2618, AD). E–J, *B. pilosa* var. *pilosa*. E, lower leaf; F, upper leaf; G, capitulum; H, outer involucre; I, inner involucre; J, achene (E–J, D.E.Symon 13221, AD). K–M, *B. alba* var. *radiata*. K, leaf; L, inflorescence of several capitula; M, achene (K–M, V.Jaegerman s.n., AD97732690). N–Q, *B. subalternans* var. *simulans*. N, leaf; O, capitulum; P, outer involucre; Q, inner involucre (N–Q, J.Palmer 222, AD). R–W, *B. subalternans* var. *araneosa*. R, leaf; S, capitulum; T, outer involucre; U, inner involucre; V, outer achene; W, inner achene (R–W, D.Symon 9999A, AD). Scale bars: A, E, F, K, N, R = 30 mm; B, O, S = 10 mm; C, D, G, J, M, P, Q, T, U, V, W = 5 mm; H, I = 3 mm; L = 2 mm. Drawn by L.J.Waters.

The differences between *B. bipinnata* and *B. subalternans* as recognised in Australia are largely quantitative rather than qualitative. Nevertheless two entities seem to exist, albeit linked by intermediates. Sherff (1937, p. 466) observed that some collections of *B. subalternans* (var. *simulans* Sherff) had very narrow leaf segments and were easily confusable with *B. bipinnata*. In the current treatment the species are separated on the characters of the involucre bracts. Collections in which the outer bracts are usually slightly dilated at the tip, and bear stiff coarse white hairs, the hairs extending to the outside of the receptacle (capitulum base) and peduncle, and the inner bracts are cream with numerous distinct purplish longitudinal veins are placed in *B. subalternans*, while those in which the outer bracts have a blunt or ±tapering tip, not dilated, and are glabrous or bear short soft fine hairs (receptacle and peduncle ±glabrous), and the inner bracts are purplish brown with indistinct longitudinal veins, are placed in *B. bipinnata*. *Bidens bipinnata*, as recognised here, is also very similar (*ex descr.*) to *B. exigua* Sherff, and differs only slightly from *B. subalternans* var. *simulans* and var. *araneosa*. It is possible that all these taxa should be amalgamated in a single species, which may or may not be conspecific with true *B. bipinnata* or *B. subalternans*, but this must await a global monograph.

The difference between *B. pilosa* and *B. bipinnata* rests largely on whether the leaves are once or twice pinnate/pinnatisect. Most *B. bipinnata* plants have relatively finely dissected leaves, but some specimens have broader and sparingly dissected 'leaflets' which can resemble those of *B. pilosa*. It is necessary to examine a range of mature leaves in these cases.

This species is here treated as naturalised, although its arrival was certainly pre-European. Robert Brown collected it on Pibasoo Is. in the N.T. in 1803 (CANB). As the species is considered native to E Asia its occurrence in Australia might be considered native also.

6. **Bidens subalternans* DC., Prodr. 5: 600 (1836)

T: in locis cultis circa Bahiam legit cl. Salzmann (v.s. comm. a cl. Salzmann.); holo: [Brazil] Bahia locis cultis, 1830, *M.Salzmann s.n.*; G-DC, photo seen.

Illustrations: E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 16: facing p. 406, pl. CX (1937); G.J.Harden (ed.), *Fl. New South Wales* 3: 279 (1992).

Annual herb (10–) 20–100 (–150) cm tall; stems erect, glabrous or sparsely hairy. Leaves petiolate, usually bipinnatifid or bipinnatisect, sometimes bipinnate, ±ovate in outline, (2–) 6–12 (–16) cm long, (1.5–) 3–7 (–10) cm wide, glabrous or sparsely hispid; lobes linear to narrowly lanceolate (broadly lanceolate to ovate in var. *subalternans*). Capitula ovoid, 5–10 mm diam.; outer involucre bracts linear to narrowly oblong, 4–15 (–20) mm long, sometimes slightly dilated at tip, marginally ciliate, dorsally subglabrous or hispid; inner bracts linear-lanceolate, usually glabrous (but often with short cilia at tip). Ray florets rudimentary, often absent, yellow. Achenes dimorphic, linear, black; outer achenes 8–9 mm long, not tapering, pilose throughout, with awns U-divergent; inner achenes 8–17 mm long, tapering to apex, glabrous or pilose in upper part, with awns erect. Pappus awns 2 or 3 (4), 1–2.5 mm long. *Greater Beggar's Ticks*.

Native to Uruguay, central Argentina and N & W Brazil. In Australia naturalised or native in W.A., N.T., N.S.W & Qld, with a few records from S.A. & Vic. Three varieties are recognised in Australia.

For differences between *B. subalternans* and *B. bipinnata*, see notes under the latter.

In addition to the 3 varieties accepted here, Everett (in G.J.Harden (ed.), *Fl. New South Wales* 3: 279 (1992)) drew attention to a form of *B. subalternans* with broadly lanceolate leaflet lobes from coastal headlands within the spray zone on the north coast of N.S.W., which she suggested might represent a distinct taxon. This form is also known from Qld (e.g. Fraser Is., 15 Oct. 1930, *C.E.Hubbard 4481*, K). Hubbard (*in sched.*) suggested his plant was near *B. hillebrandiana* (Drake) O.Deg. ex Sherff.

- 1 Leaves bipinnate, the ultimate segments resembling broadly lanceolate to ovate 'leaflets' usually 10–20 mm wide

6a. var. *subalternans*

- 1: Leaves bipinnatisect, the ultimate segments linear to lanceolate and usually up to 5 mm wide

- 2 Outer involucre bracts 5–7 (–8) mm long, shorter than florets and inner involucre bracts
- 2: Outer involucre bracts 10–15 (–20) mm long, at least equalling and usually exceeding florets and inner involucre bracts

6b. var. *simulans*

6c. var. *araneosa*

6a. **Bidens subalternans* DC. var. *subalternans*

Annual herbs 20–50 (–150) cm tall. Leaves bipinnate, 9–12 cm long, 5 cm wide overall; ultimate segments broadly lanceolate to ovate (leaflet-like), 10–20 mm wide, serrate to lobed, glabrous or with sparse hispid hairs confined to veins on lower surface. Outer involucre bracts 4–12 mm long, shorter than florets and inner involucre bracts, linear to narrowly spatulate, ±obtuse, ciliate on margins; inner bracts glabrous, cream with numerous longitudinal purple veins and yellow margins. Achenes dimorphic, longest ones to 14 mm (excluding awns).

Native to Uruguay and central America, extending to Brazil. Sparingly naturalised in Australia, in W.A., N.T. and Qld, as both a roadside weed and in natural vegetation, ranging from open eucalypt woodland to riverine vine forest, usually in damp clays and loams, at altitudes to 550 m. Flowers Dec.–May; fruits Mar.–May.

W.A.: 6.0 km E of Mt Talbot, *G.J.Keighery 10657* (PERTH); 17 km SSE of Lucy Creek HS, *P.K.Latz 9871* (BRI, NT). N.T.: Toko Hills, Tobermory, *C.Dunlop 2569* (DNA). Qld: 16.5 km N of Texas, *G.N.Batianoff 200112163* & *D.Halford* (BRI).



Different varieties of *B. subalternans* can occasionally be found growing together. The collection *C.R.Dunlop 4439*, Deaf Adder Ck (DNA) is a mixture of *B. subalternans* var. *subalternans* and var. *simulans*.

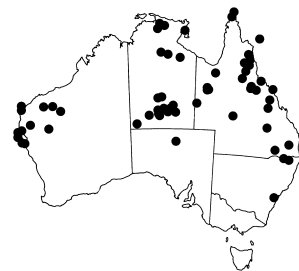
6b. **Bidens subalternans* var. *simulans* Sherff, *Bot. Gaz.* 88: 291 (1929)

T: Department of Andagalá, Province of Catamarca, Argentina, 1 Oct. 1917, *Pedro Jörgensen 1785*; holotype: US *n.v.*

Annual herbs (10–) 20–40 (–120) cm tall. Leaves bipinnatisect, (2–) 6–10 (–16) cm long, (1.5–) 4–7 (–10) cm wide overall; ultimate segments linear to lanceolate, to c. 5 mm wide, with hispid hairs on veins and margins, sparse on lamina. Outer involucre bracts 5–7 (–8) mm long, shorter than florets and inner involucre bracts, narrowly oblong to narrowly spatulate, obtuse or acute, coarsely and evenly ciliate on margins, dorsally glabrous or sparsely hispid; inner bracts cream with numerous longitudinal purple veins and yellow margins, sometimes darker throughout. Achenes dimorphic, longest ones 16–17 mm long (excluding awns). Fig. 64N–Q.

Native to Uruguay and central Argentina, extending to Brazil. In Australia found in all mainland States and Territories except Vic. & A.C.T., rare in S.A.; usually in sheltered spots in habitats ranging from grasslands and tussock grassland to open woodland, creek sides and the margins of vine thickets, in soils ranging from muds and alluvium to sands, loams and clays, at altitudes from sealevel to just over 1000 m. Flowers and fruits Feb.–Oct.

W.A.: Wittenoom Gorge, *R.Pullen 10923* (BRI, PERTH). N.T.: summit of Mt Gillen, *N.Forde 109* (AD, BRI, CANB, MEL, NT, PERTH). S.A.: near Oodnadatta, *R.Bates 19229* (AD). Qld: Stanthorpe, *G.N.Batianoff 220415* & *D.Halford* (BRI). N.S.W.: Nepean R. W of Penrith, 8 May 1954, *N.C.Ford s.n.* (MEL).



Although the species is usually considered naturalised in Australia, and var. *subalternans* behaves as a weed, var. *simulans* is almost entirely an ephemeral and localised taxon, found in sheltered habitats (e.g. under or between rocks or in shrubby thickets) in native vegetation, and as such might be considered native, or at least naturally adventive of long standing. It is readily eaten by insects and sheep (*vide Pullen 10923*).

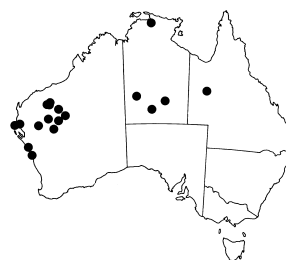
The distinctive coarse white hairs forming an even fringe around the outer involucre bracts, and sometimes dorsally as well, are much better developed on western specimens. In the eastern States they tend to be weaker and slightly shorter, and these plants approach the finely pinnatisect forms of *B. bipinnata* (where the outer involucre bracts are ±glabrous).

6c. *Bidens subalternans* var. *araneosa* Orchard, *Fl. Australia* 37: 608 (2015)

T: W.A., 5.2 miles [c. 8 km] west of Marandoo campsite on the new Tom Price road, 30 Jan. 1976, *M.E.Trudgen* 1636; holotype: PERTH, iso: CANB.

Annual herbs (10–) 20–80 cm tall. Leaves bipinnatisect, (4–) 6–9 (–13) cm long, (2–) 3–5 (–9) cm wide overall; ultimate segments linear to narrowly lanceolate, to c. 5 mm wide, with hispid hairs on veins, margins and sometimes lamina. Outer involucre bracts 10–15 (–20) mm long, equalling or usually exceeding florets and inner involucre bracts, linear, acute, obtuse or slightly dilated at tip, coarsely and evenly ciliate on margins and often also dorsally; inner bracts dark, with numerous obscure longitudinal veins and yellow margin. Achenes dimorphic, longest ones 16–17 mm long (excluding awns). Fig. 64R–W.

Only known from Australia, principally from NW W.A. with scattered records from N.T. and one doubtful collection from Qld. Found in usually well-drained situations in open eucalypt or *Acacia* (mulga) woodlands, heaths and grasslands, in sand, loams and sometimes clays. Flowers and fruits Jan.–Oct.



W.A.: Murchison R., Kalbarri Natl Park, *G.J.Keighery* & *N.Gibson* 1893 (PERTH); 14 km ESE Moffettah Well, Little Sandy Desert, *S.van Leeuwen* 1248 (PERTH). N.T.: 12 miles [c. 19 km] E Palm Valley, *P.K.Latz* 1899 (NT); c. 7 miles [c. 11 km] W of Mt Gilruth, *M.Lazarides* 7947 (BRI). Qld: Selwyn, Mar. 1997, *Anonymous* s.n. (BRI AQ533060).

The long hairy outer involucre bracts, reminiscent of spider's legs, are characteristic of this taxon, and have not been reported in *B. subalternans* outside Australia. The variety is thus treated here as indigenous, especially as it shows no weedy tendencies, and is found only in native plant communities.

The Qld collection is only in young bud and thus tentatively assigned to this taxon. Plants in which occasional heads are found with all or a few outer bracts longer than normal are excluded from var. *araneosa*, and the Qld plant may be one of these (and therefore assignable to var. *simulans*).

Excluded names

Bidens biternata (Lour.) Merrill & Sherff, *Bot. Gaz.* 88: 293 (1929)

Coreopsis biternatus Lour., *Fl. Cochinch.* 508 (1790)]. T: China, in fields near Canton, *Loureiro* s.n.; holotype: BM or P? n.v.

Recorded for Australia by J.T.Koster, *The Compositae of New Guinea* VI. *Blumea* 25: 261–262 (1979), presumably on the basis of the MacGillivray specimen from Lizard Is. cited by E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 16: 393 (1937). This specimen has not been re-examined here, but other Lizard Is. material has been identified as *B. bipinnata*.

Bidens cernua L., *Sp. Pl.* 2: 832 (1753)

T: Europe, *Herb. Linn. No.* 975.5; lecto: LINN, *fide* Mesfin Tadesse in C.E.Jarvis & N.Turland (eds), *Taxon* 47: 355 (1998).

Tentatively recorded for Australia by J.D.Hooker, *Fl. Tasman.* 2: xcv (1859), but not supported by herbarium specimens.

Bidens comosa (A.Gray) Wiegand, *Bull. Torrey Bot. Club* 24: 436 (1897)

Bidens connata var. *comosa* A.Gray, *Manual* 5th edn 261 (1867). T: Not cited; America (?Illinois).

Recorded by W.Hartley, in Standardized Plant Names: a revised list of standard common names for the more important Australian grasses, other pasture plants, and weeds. *Bulletin (CSIRO)* 272: 16 (1953), but not supported by herbarium specimens. Now usually treated as a synonym of *B. tripartita*.

Bidens connata Muhl. ex Willd., *Sp. Pl.* 4th edn, 3(3): 1718 (1803)

T: N America, *G.H.E.Muhlenberg s.n.*, Willdenow Herb. No. 15021-1; holo: B, photo seen, *vide* E.E.Sherff, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 16: 256 (1937).

Recorded by W.Hartley, in Standardized Plant Names: a revised list of standard common names for the more important Australian grasses, other pasture plants, and weeds. *Bulletin (CSIRO)* 272: 16 (1953), but not supported by herbarium specimens. Probably a mis-identification of *B. tripartita*.

Bidens repens D.Don, *Prodr. Fl. Nepal.* 180 (1825)

B. tripartita var. *repens* (D.Don) Sherff, *Bot. Gaz.* 81: 45 (1926). T: Nepal, collections by Dr Hamilton, W.Roxburgh and D.Wallich cat. 3187, in K, B, BM, all *n.v.*

Native from northern & eastern India to Korea, China, Philippines, Java and New Guinea. Recorded for Australia by J.T.Koster, *Blumea* 25: 259 (1979), without citation of specimens. Differs from *B. tripartita* var. *tripartita* in having achenes smooth or only sparingly retrorsely hook-haired (var. *tripartita* strongly retrorsely hook-haired).

7. DAHLIA

Dahlia Cav., *Icon.* 1: 56 (1791); commemorating Andreas Dahl (1751–1789), a pupil of Linnaeus, and later Swedish physician and botanist at the University of Åbo.

Type: *D. pinnata* Cav.

Tuberous perennial herbs or shrubs, rarely epiphytes. Branches few to numerous from a usually woody caudex, foliose. Leaves opposite or in whorls of 3, petiolate, simple to 1–3-pinnate. Inflorescences solitary or aggregated into loose cymes. Capitula radiate, often large, nodding, pedunculate; involucre bracts free, 2-seriate; outer bracts herbaceous, becoming reflexed; inner bracts broader, green to scarious, translucent; receptacle flat; paleae ovate, obtuse to subacute, scarious. Ray florets sterile, numerous, ligulate, apically entire or denticulate, showy, variously coloured, often in shades of white, pink, purple, red, yellow or orange, indistinctly many-veined. Disc florets bisexual (innermost sometimes functionally male), numerous, 5-lobed. Achenes linear, apically contracted with a thickened cap. Pappus absent or 2 rudimentary awns or filiform bristles.

A genus of about 40 species, native to Mexico, Central America and Colombia. Several species widely cultivated, and 2 of these naturalised in Australia as occasional garden escapes.

P.D.Sorensen, Revision of the genus *Dahlia* (Compositae, Heliantheae-Coreopsidinae), *Rhodora* 71: 309–365, 367–416 (1969); H.V.Hansen & J.P.Hjerting, Observations on chromosome numbers and biosystematics in *Dahlia* (Asteraceae, Heliantheae) with an account on the identity of *D. pinnata*, *D. rosea* and *D. coccinea*, *Nordic J. Bot.* 16: 445–455 (1996); M.Gatt *et al.*, Molecular phylogeny of the genus *Dahlia* Cav. (Asteraceae, Heliantheae-Coreopsidinae) using sequences derived from the internal transcribed spacers of nuclear ribosomal DNA, *Bot. J. Linn. Soc.* 133: 229–239 (2000); D.E.Saar *et al.*, A phylogenetic analysis of the genus *Dahlia* based on internal and external transcribed spacer regions of nuclear ribosomal DNA, *Syst. Bot.* 28: 627–639 (2003).

Perennial herb or shrub 2–4 m tall; stems ±woody, to 100 mm diam.

1. *D. imperialis*

Perennial herb to 1.5 m tall; stems ±herbaceous, to 20 mm diam.

2. *D. ×pinnata*

1. **Dahlia imperialis* Roetzl ex Ortgies, *Gartenflora* 12: 243 (1863)

T: Cultivated in Berlin Botanic Garden, from material originally collected in Mexico by Roetzl; holo: B, extant?, *n.v.*

Illustration: W.G.D'Arcy, *Ann. Missouri Bot. Gard.* 62: 1193, fig. 82 (1975).

Herbs or shrubs 2–4 m tall. Stems few, erect or drooping, ±woody, 35–100 mm diam., hollow, often unbranched. Leaves opposite, 1–3-pinnate, 28–35 cm long; leaflets opposite, ovate, rounded or obtuse at base, serrate, acuminate, with hairs on veins adaxially, and on lamina abaxially. Inflorescence a many-flowered loose cyme. Capitula large, 10–16 cm diam. (including rays); outer involucre bracts oblong, thickened, c. 10 mm long; innermost bracts broadly ovate, c. 20 mm long, scarious. Ray florets c. 9; ligule 2–4 cm long, white or pink-purple. Disc florets very numerous, yellow. Achenes 13–17 mm long. *Tree Dahlia*. Plate 47.

Native to Mexico, Panama, Costa Rica and Colombia. In Australia sparingly naturalised in Qld from discarded garden waste, rooting readily from sections of stem, and persisting, in red volcanic soil with *Lantana camara*, at altitudes of 600–650 m. Flowers June–July.

Qld: Mt Glorious Rd, just N of junction with Browns Rd, *S.P.Phillips* 240 (BRI); Mt Glorious, lower end of Bryces Rd, W of intersection with Mt Glorious Rd, *S.P.Phillips* 409 (BRI).



2. **Dahlia ×pinnata* Cav., *Icon.* 1: 57 (1791)

T: Described from plants cultivated in Royal Botanic Garden, Madrid, from seed sent from the Mexican Botanic Gardens, Mexico City, by Vicente Cervantes. lecto; the plate in A.J.Cavanilles, *Icon.* 1: tab. 80 (1791), *vide* P.D.Sorensen, *Rhodora* 71: 359 (1969).

Illustrations: A.J.Cavanilles, *loc. cit.*; R.E.Harrison, *Handbook Bulbs Perennials S Hemisphere* 2nd edn 73–75 (1963); V.A.Funk *et al.*, *Syst. Evol. Biogeog. Compositae* 718, fig. 42.2F (2009).

Herbs to 1.5 m tall. Stems few to numerous, ±herbaceous and fleshy, to 20 mm diam., hollow, sparingly branched. Leaves opposite, simple or 1–2-pinnate, 15 cm long or more; leaflets irregularly arranged, ovate to elliptic, obtuse or acute at base, serrate or sparsely dentate, acuminate, glabrate. Inflorescence usually a solitary capitulum, sometimes several irregularly clustered. Capitula large, to 15 cm diam. (including rays); outer involucre bracts oblong, thickened, c. 10 mm long; innermost bracts narrower, green to scarious, slightly longer. Ray florets few to many; ligule to 5 cm long, purple, white, red, orange or yellow. Disc florets usually numerous, yellow (rarely red to purple), sometimes replaced by ray florets. Achenes not seen. *Garden Dahlia*.

Native to Mexico. In Australia widely cultivated, and occasionally establishing from discarded garden waste (particularly tubers). Noted as sparingly naturalised in Qld. Flowers Apr.

Qld: S of The Summit, 7 km N of Stanthorpe, *G.N.Batianoff* 210821 & *J.Batianoff* (BRI).

The cultivated common *Dahlia* is a widely varying complex of hybrids. Sorensen (1969) considered it to be based on 'native *D. pinnata*' from Mexico, but involving many other species, particularly *D. coccinea* Cav. He considered that the hybridisation took place after the two species reached Europe. Hansen & Hjerting (1996), however, showed that the plants imported



from Mexico and grown and described by Cavanilles consisted of two tetraploids (*D. pinnata* (semidouble flowers) and *D. rosea* Cav. (single flowers)) and a diploid (*D. coccinea*), and further, that *D. pinnata* and *D. rosea* were of hybrid garden origin in Mexico, dating from 300 years before they were sent to Spain. Hansen & Hjerting considered that the two garden tetraploids arose spontaneously in cultivation in native gardens in Mexico, from hybrids and backcrosses between the native tetraploid *C. sorensenii* Hansen & Hjerting (a replacement name for Sorensen's 'native *D. pinnata*'), and tetraploid races of *D. coccinea*.

The name *D. variabilis* Desf. has also been used, particularly in the horticultural literature, for garden forms of this taxon, notably after Sorensen (1969) claimed that *D. pinnata* s. str. was a native Mexican taxon. This name is synonymous with *D. ×pinnata*.

Trib. 8. NEUROLAENEAE

A.E.Orchard

Asteraceae trib. *Neurolaeneae* Rydb., *N. Amer. Fl.* 34(4): 303 (1927)

Type: *Neurolaena* R.Br.

Asteraceae trib. *Heliantheae* subtrib. *Enydrineae* H.Rob., *Phytologia* 41: 398 (1979), as *Enhydrineae*. T: *Enydra* Lour., as *Enhydra*

Annual or perennial herbs (rosette-forming, or shrubs, rarely trees elsewhere), without latex. Leaves opposite (alternate or rarely whorled elsewhere). Capitula radiate (discoid elsewhere); receptacle paleate, with palea chartaceous to indurate and tightly wrapping around florets. Ray florets female, usually ligulate, rarely tubular, 3-lobed, white, yellow, rarely brownish. Disc florets bisexual or functionally male, actinomorphic, usually 5-lobed (rarely 4), white, yellow to yellow-orange or pale brown, rarely purplish; anther appendages deltate to ovate, rarely broadly ovate; style branches with a short tuft of papillae. Pappus of multiple bristles or scales (scales sometimes forming a cup), or absent.

A tribe of 5 genera and c. 150 species, most native to tropical Mexico and S America, with one genus (*Heptanthus*) endemic to Cuba, and a few species of *Enydra* native to the Old World. In Australia, 1 genus with native and sparingly naturalised species.

H.Robinson (1979) erected a new subtribe En[h]ydrinae of the Heliantheae with the type genus *Enydra* (as *Enhydra*). Recent molecular studies by J.L.Panero *et al.* (2001) and Panero & Funk (2002) support renewed recognition of this group as a tribe (as originally proposed by Rydberg, 1927), sister to Bahieae, Chaenactideae and Tageteae.

J.L.Panero *et al.*, Phylogenetic relationships of subtribe Ecliptinae (Asteraceae: Heliantheae) based on chloroplast DNA restriction site data, *Amer. J. Bot.* 86: 413–427 (1999); J.L.Panero *et al.*, Molecular phylogenetic studies of members of tribes Heleniae, Helianthiae and Eupatorieae (Asteraceae). 3. General systematics and proposed taxonomic changes in current classification, in J.M.Osborn (prog. dir.), *Botany 2001, Abstracts, part 3. Systematics* (2001); J.L.Panero & V.A.Funk, Towards a phylogenetic subfamilial classification for the Compositae (Asteraceae), *Proc. Biol. Soc. Washington* 115: 909–922 (2002); J.L.Panero, *XXI. Neurolaeneae* Rydb. (1927), in W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 417–420 (2007); B.G.Baldwin, *Heliantheae alliance*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 689–711 (2009).

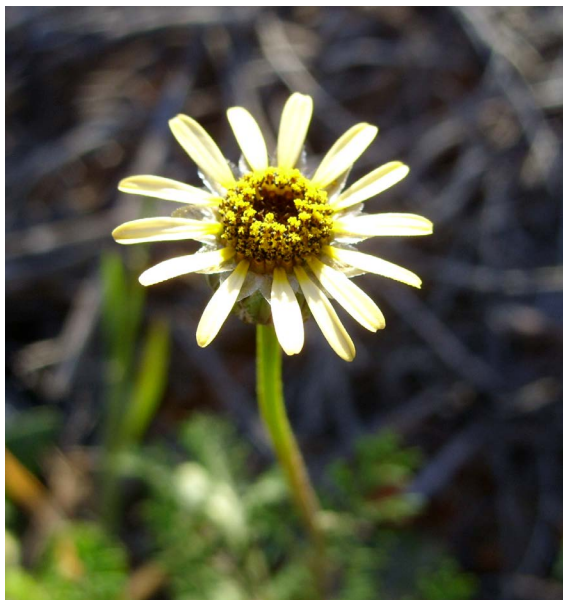


Plate 33. *Ursinia anthemoides* subsp. *anthemoides*.
 Photograph — A.Schmidt-Lebuhn.



Plate 34. *Osteospermum ecklonis*.
 Photograph — M.Fagg.



Plate 35. *Tanacetum vulgare*.
 Photograph — M.Fagg.



Plate 36. *Achillea millefolium*.
 Photograph — M.Fagg.



Plate 37. *Leucanthemum vulgare*.
 Photograph — M.Fagg.



Plate 38. *Leptinella longipes*.
 Photograph — M.Fagg.



Plate 39. *Soliva sessilis*.
 Photograph — A.Schmidt-Lebuhn.



Plate 40. *Pterocaulon serrulatum* var. *velutinum*.
 Photograph — M.Fagg.



Plate 41. *Pluchea dentex*.
Photograph — M.Fagg.



Plate 42. *Centipeda elatinoides*.
Photograph — M.Fagg.



Plate 43. *Streptoglossa cylindriceps*.
Photograph — M.Fagg.



Plate 44. *Sphaeranthus africanus*.
Photograph — M.Fagg.



Plate 45. *Cosmos bipinnatus*.
 Photograph — A.Orchard.



Plate 46. *Coreopsis lanceolata*.
 Photograph — T.Low.



Plate 47. *Dahlia imperialis*.
 Photograph — A.Orchard.



Plate 48. *Bidens pilosa* var. *minor*.
 Photograph — M.Fagg.



Plate 49. *Tagetes minuta*.
 Photograph — M.Fagg.



Plate 50. *Schkuhria pinnata*.
 Photograph — M.Fagg.



Plate 51. *Calyptocarpus vialis*.
 Photograph — B.Gray © CSIRO.



Plate 52. *Eleutheranthera ruderalis*.
 Photograph — B.Gray © CSIRO.



Plate 53. *Wollastonia uniflora*.
 Photograph — M.Fagg.



Plate 54. *Sphagneticola trilobata*.
 Photograph — T.Low.



Plate 55. *Apowollastonia stirlingii* subsp. *stirlingii*.
 Photograph — M.Fagg.



Plate 56. *Montanoa hibiscifolia*.
 Photograph — B.Gray © CSIRO.



Plate 57. *Verbesina encelioides* var. *encelioides*.
 Photograph — M.Fagg.

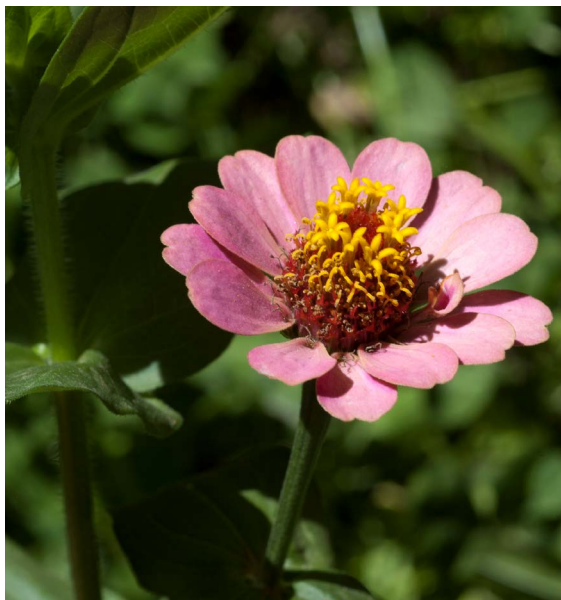


Plate 58. *Zinnia elegans*.
 Photograph — M.Fagg.



Plate 59. *Acmella grandiflora* var. *brachyglossa*.
 Photograph — M.Fagg.



Plate 60. *Tithonia diversifolia*.
 Photograph — B.Gray © CSIRO.



Plate 61. *Ambrosia artemisiifolia*.
 Photograph — M.Fagg.



Plate 62. *Xanthium occidentale*.
 Photograph — M.Fagg.



Plate 63. *Tridax procumbens*.
 Photograph — M.Fagg.



Plate 64. *Acanthospermum hispidum*.
 Photograph — M.Fagg.



Plate 65. *Galinsoga parviflora*.
 Photograph — T.Low.



Plate 66. *Sigesbeckia orientalis*.
 Photograph — M.Fagg.

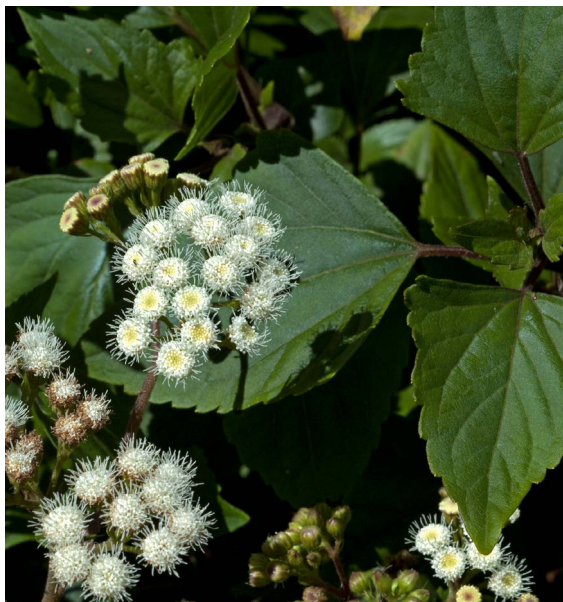


Plate 67. *Ageratina adenophora*.
 Photograph — M.Fagg.



Plate 68. *Ageratum houstonianum*.
 Photograph — T.Low.



Plate 69. *Praxelis clematidea*.
 Photograph — B.Gray © CSIRO.



Plate 70. *Adenostemma macrophyllum*.
 Photograph — B.Gray © CSIRO.



Plate 71. *Chromolaena odorata*.
 Photograph — T.Low.



Plate 72. *Mikania micrantha*.
 Photograph — T.Low.

ASTERACEAE

ENYDRA

Enydra Lour., *Fl. Cochinch.* 2: 510 (1790); from the Greek *enydros* (aquatic), referring to the preferred habitat of *Enydra*.

Type: *E. fluctuans* Lour.

Enhydra DC., *Prodr.* 5: 636 (1836), *orth. var.*

Enchydra F.Muell., *Fragm.* 3: 139 (1863), *orth. var.*

Annual or perennial herbs, aquatic or bog-dwelling. Stems often rooting at nodes. Leaves opposite, lanceolate to ovate or obovate, entire or serrate. Capitula axillary, solitary, campanulate or hemispherical, radiate or disciform; involucre bracts 4 (or 6, not in Australia), herbaceous, 2 (3) outer larger than 2 (3) inner and longer than disc florets; receptacle convex to minutely conical; paleae present, tightly wrapped around achenes. Ray florets female, in several series; ligules short or absent, 3-toothed. Disc florets bisexual or functionally male, 5-toothed. Achenes subterete, \pm compressed, wrapped in palea. Pappus absent.

Ten species in the tropical wetlands of Asia, Africa and Australia. In Australia, 1 endemic species, and another sparingly naturalised.

The generic name was deliberately spelled *Enydra* by Loureiro, who gave the derivation as “Nom. (Εὐνδρος aquaticus), a loco, in quo planta vivit”. The spelling was ‘corrected’ to *Enhydra* by de Candolle (1836), and the two spellings have been used interchangeably ever since. As Loureiro’s transliteration was deliberate and accords with current practice there is no reason to depart from the original spelling.

From 1867 until recently the native Australian taxon was thought to be part of the widespread *E. fluctuans* complex. Bean (2009) showed that Australian populations differed significantly from Asian and African *E. fluctuans*, and reinstated the name *E. woollsii* F.Muell. for Australian plants. He noted a single specimen of *E. fluctuans* collected near Darwin in 2002, apparently an escape from cultivation.

H.Robinson, Studies in the Heliantheae (Asteraceae) 16. A new subtribe Enhydrinae, *Phytologia* 41: 398 (1979); H.W.Lack, The genus *Enydra* (Asteraceae, Heliantheae) in West Tropical Africa, *Willdenowia* 10: 3–12 (1980); A.R.Bean, Reinstatement of *Enydra woollsii* F.Muell. (Asteraceae: Heliantheae), *Austrobaileya* 8: 103–105 (2009).

Terrestrial to semi-aquatic herb; lower stems solid, 3 mm diam.; leaves petiolate, cuneate or attenuate basally, strongly 3–7 (–9)-toothed on each side; outer involucre bracts 5–10 mm long

1. *E. woollsii*

Semi-aquatic to aquatic herb; lower stems hollow, 5–10 mm diam.; leaves sessile or subsessile, hastate, truncate or subcordate basally, obscurely 10–20-serrulate on each side, or entire; outer involucre bracts 11–20 mm long

2. *E. fluctuans*

1. *Enydra woollsii* F.Muell., *Fragm.* 3: 139 (1863), as *Enchydra Woollsii*

T: Manly Beach, Port Jackson, N.S.W., *W. Woolls s.n.*; holo: MEL; iso: K.

[*E. paludosa* auct. non (Reinw.) DC.: G.Bentham, *Fl. Austral.* 3: 546 (1866), as *Enhydra paludosa*]

[*E. fluctuans* auct. non Lour.: T.D.Stanley in T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 555, fig. 77G (1986); L.Murray in G.J.Harden (ed.), *Fl. New South Wales* 3: 271–272 (1992)]

Illustrations: T.D.Stanley & E.M.Ross (eds), *loc. cit.*; G.J.Harden (ed.), *loc. cit.*; both as *E. fluctuans*.

Perennial terrestrial or semiaquatic herb. Stems prostrate or weakly ascending, rooting at nodes, solid, to 3 mm diam.; flowering branches prostrate or weakly ascending, glabrous throughout or very sparsely hairy in upper parts. Leaves strongly aromatic; petiole 2–5 mm long; lamina lanceolate to narrowly elliptic, 35–80 mm long, 8–15 (–20) mm wide, cuneate or attenuate at base, strongly serrate with 3–7 (–9) teeth per side. Capitula sessile in leaf axils; involucre bracts ovate, many-veined from base, with margins glabrous or fringed; outer bracts 5–10 mm long; inner bracts 5–6 mm long. Florets creamy white to yellow. Ray florets zygomorphic, 3-lobed. Disc florets bisexual, 4- or 5-lobed, apparently all producing achenes. Achenes narrowly obovoid, compressed, dorsally curved, 2.4–2.7 mm long, longitudinally striate. Fig. 65.

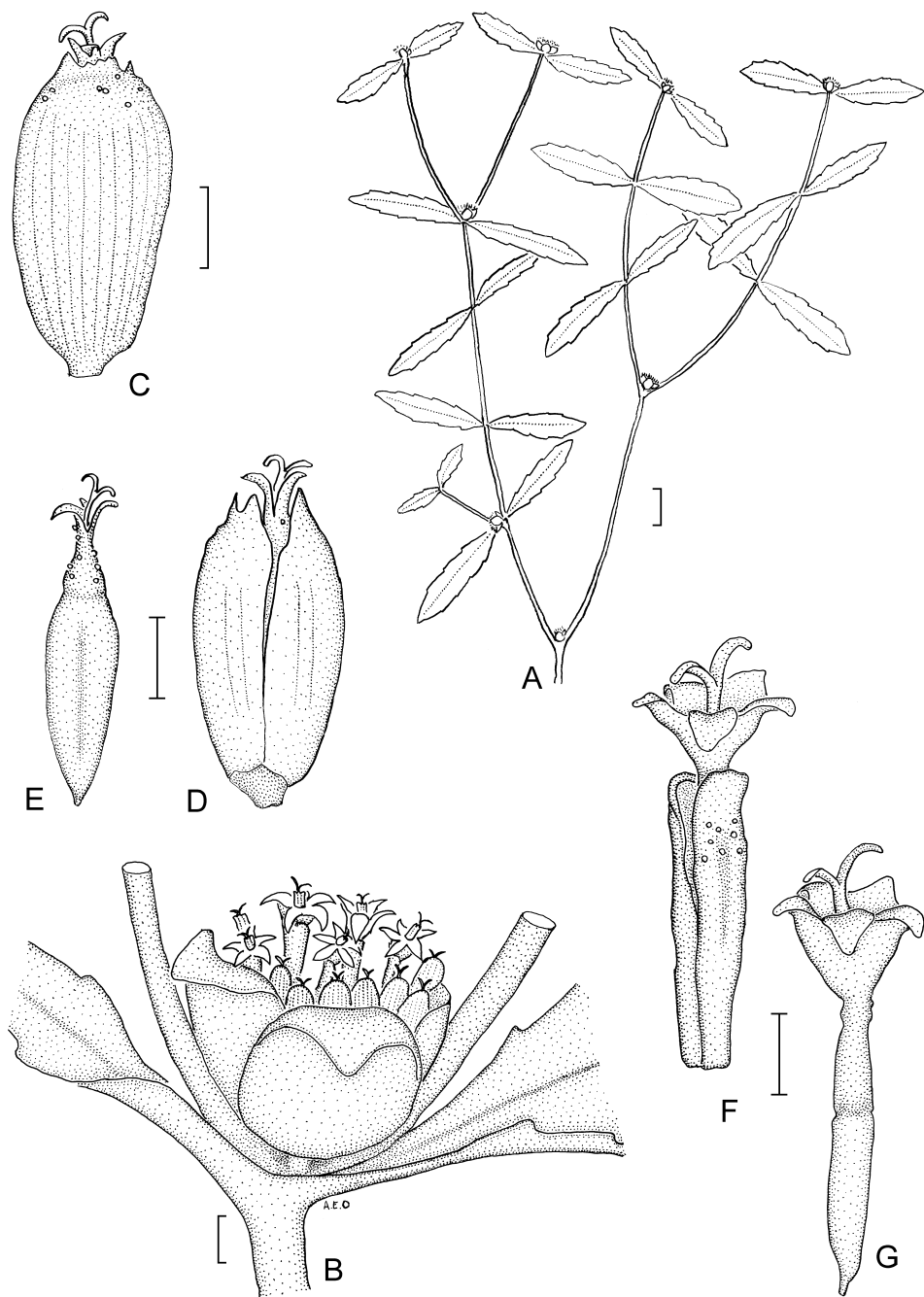


Figure 65. *Enydra woollsii*. **A**, habit; **B**, capitulum in leaf axils, **C**, ray floret within palea, abaxial view; **D**, the same, adaxial view; **E**, ray floret; **F**, disc floret within palea; **G**, disc floret. (**A**–**G**, A.R.Bean 7071, MEL). Scale bars: **A** = 1 cm, **B**–**G** = 1 mm. Drawn by A.E.Orchard.

Grows in coastal regions of N.S.W. N of Sydney and in coastal SE Qld, in the understorey of open forests dominated by *Casuarina glauca*, *Melaleuca quinquenervia*, *Eucalyptus tereticornis*, *Callistemon salignus*, *Livistona australis* and *Cordyline stricta*, in very wet dark peaty soils, in wallum swamps, and sometimes on the margin of mangrove swamps. Flowers (June–) Sept.–Feb.; fruits (Oct.–) Nov.–Feb.

Qld: Lefoe's Rd, Bli Bli, *A.R.Bean* 7071 (BRI, MEL); Fischer Rd off Redland Bay–Beenleigh road, *A.R.Bean* 28148 (CANB); Coolum Ck, c. 2 km S of Coolum Beach to Yandina road, *P.R.Sharpe* 3061 (BRI). N.S.W.: 1.3 km S of Yamba towards Angourie, *A.R.Bean* 8019 (BRI, NSW); swamp alongside Kooloonbung Ck, Port Macquarie, *J.R.Hosking* 2199 & *M.J.Dodkin* (CANB, NSW).



2. **Enydra fluctuans* Lour., *Fl. Cochinch.* 2: 511 (1790)

T: [Vietnam], spontanea in paludibus Cochinchinae, 1790, *Loureiro s.n.*; holo: BM *n.v.*, *fide* H.W.Lack, *Willdenowia* 10: 4–6 (1980).

Tetraotis paludosa Reinw. in C.L.Blume, *Bijdr.* 892 (1826); *Enydra paludosa* (Reinw.) DC., *Prodr.* 5: 637 (1836), as *Enhydra*. T: [Indonesia], in paludosis prope Bataviam, [*C.G.C.Reinwardt*]; *n.v.*

Illustrations: H.W.Lack, *Willdenowia* 10: 5, fig. 1; 7, fig. 2 (1980); M.Soerjani *et al.*, *Weeds Rice Indonesia* 83, fig. 4.27 (1987), as *Enhydra fluctuans*; P.K.Hajra *et al.*, *Fl. India* 12: 385, fig. 104 (1995), as *Enhydra fluctuans*.

Perennial aquatic to semi-aquatic herb. Stems soft, creeping, free-floating or rooting at nodes, hollow, 5–10 mm diam., glabrous or sparingly pilose; flowering branches ascending, glabrous or densely to sparingly covered with short crisped hairs. Leaves aromatic, sessile or subsessile, linear-oblong, oblong or lanceolate, usually 25–60 (–100) mm long, 6–17 (–20) mm wide, hastate, truncate or subcordate at base, entire to obscurely serrulate, with 10–20 teeth per side. Capitula sessile in leaf axils; involucre bracts ovate, many-veined from base, glabrous or with crisped hairs; outer bracts 11–15 (–20) mm long; inner bracts (5–) 8–10 mm long. Florets yellowish. Ray florets very shortly (c. 1 mm) ligulate, 3- or 4-lobed. Disc florets 5-lobed, bisexual but achenes often not developing. Achenes oblong, compressed, slightly curved, 3–5 mm long, minutely longitudinally striate.

Native to tropical Africa, India, Pakistan, Bangladesh, China and SE Asia (S to Java and E to Sulawesi); naturalised in the Philippines. There is one record of a (sparingly) naturalised plant in Australia, in N.T. Flowers recorded in Dec.

N.T.: Darwin, 80 Jervois Rd, Virginia, *I.Miller* 52 (DNA) *n.v.*, *fide* Bean (2009) and I.Cowie (*pers. comm.*).

In Indonesia this species is cultivated for its edible stems and leaves (Soerjani *et al.*, *loc. cit.*), and the Darwin record is almost certainly an escape from cultivation of the species grown in a local market garden.



Trib. 9. TAGETEAE

A.E.Orchard

Asteraceae trib. *Tageteae* Cass., *J. Phys. Chim. Hist. Nat.* 88: 162 (1819) as *Tagetineae*

Type: *Tagetes* L.

Annual or perennial herbs (shrubs or small trees elsewhere), without latex. Leaves usually opposite, sometimes becoming alternate above, rarely alternate throughout. Capitula radiate or discoid, epaleate, sometimes setose. Ray florets (if present) female, fertile, ligulate, shallowly 2- or 3-lobed, white, yellow, orange or bicoloured. Disc florets bisexual, actinomorphic, usually

ASTERACEAE

5-lobed, yellow; anther appendages linear to ovate or deltate; style branches with appendages absent or very short, truncate or acute. Pappus absent or of 5 or 6 (–20) scales; scales sometimes dissected into bristles.

A tribe of 32 genera and c. 270 species, native mainly to SW U.S.A. and Mexico, but with lesser numbers in temperate and tropical S America and the Caribbean. Three genera naturalised in Australia. Formerly included within tribe Helenieae, *q.v.*

J.L.Panero, *XXII. Tribe Tageteae Cass. (1819)*, in W.Kadereit & C.Jefferey (eds), *Fam. Gen. Vasc. Pl.* 8: 420–431 (2007); B.G.Baldwin, *Helianthieae alliance*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 689–711 (2009).

- | | | |
|----|---|-----------------------|
| 1 | Leaves entire or serrate; involuclral bracts free | 1. FLAVERIA |
| 1: | Leaves pinnatisect to compound-pinnate; involuclral bracts fused for most of length | |
| 2 | Leaves opposite; leaf segments flat, toothed; calyculus absent | 2. TAGETES |
| 2: | Leaves alternate; leaf segments filiform, not toothed; calyculus present | 3. THYMOPHYLLA |

1. FLAVERIA

A.R.Bean

Flaveria Juss., *Gen. Pl.* 186 (1789); from the Latin *flavus* (yellow), in reference to the corolla colour.

Type: *F. bidentis* (L.) Kuntze

Annual or perennial herbs or shrubs. Stems erect or lax, strongly branched, glabrous or shortly pubescent (not in Australia). Leaves simple, opposite throughout, entire or serrate. Inflorescences terminal and corymbose (not in Australia), or axillary and glomerule-like. Capitula pedunculate or sessile, heterogamous, comprising several heads clustered together, each head with 1 or 2 florets (or more in non-Australian species); involuclral bracts uniseriate; receptacle setose or naked (not in Australia). Ray florets (when present) female. Disc florets bisexual; corolla yellow; anthers ecalcarate; style branches flattened, recurved. Achenes narrowly oblanceolate or linear-oblong, brown to black, 10-ribbed, glabrous. Pappus absent, or rarely present.

A genus of 22 species, all native to tropical and subtropical parts of N and S America; one species naturalised in Australia.

A.M.Powell, Systematics of *Flaveria* (Flaveriinae-Asteraceae), *Ann. Missouri Bot. Gard.* 65: 590–636 (1978); A.D.McKown, J.M.Moncalvo & N.G.Dengler, Phylogeny of *Flaveria* (Asteraceae) and inference of C₄ photosynthetic evolution. *Amer. J. Bot.* 92: 1911–28 (2005); S.C.Yarborough & A.M.Powell, *Flaveria* in *Fl. N. America* 21: 247–250 (2006); A.R.Bean, The Australian *Flaveria* (Asteraceae): its correct name and origin status, *Newslett. Austral. Syst. Bot. Soc.* 140: 2–3 (2009).

****Flaveria trinervia* (Spreng.) C.Mohr, *Contr. U.S. Natl. Herb.* 6: 810 (1901)**

Oedera trinervia Spreng., *Bot. Gart. Halle* 63 (1800). T: cultivated at Botanical Garden, Halle; holo: ?P *n.v.*

F. australasica Hook. in T.Mitchell, *J. Exped. Trop. Australia* 118 (1848). T: banks of Balonne R. [Qld], 6 Apr. 1846, *T.L.Mitchell 100*; lecto: K, *fide* A.M.Powell, *Ann. Missouri Bot. Gard.* 65: 629 (1978); isolecto: MEL.

F. australasica subsp. *gilgai* Keighery, *Compositae Newslett.* 46: 21–23 (2008). T: 10.5 km SSE of Mt Bruce, Karijini Natl Park, W.A., 20 Aug. 2006, *G.J. & B.J.Keighery 970*; holo: PERTH; iso: CANB, K, MEL.

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 667 (1981); J.Milson, *Pasture Pl. NW Queensland* 17 (2000); both as *F. australasica*.

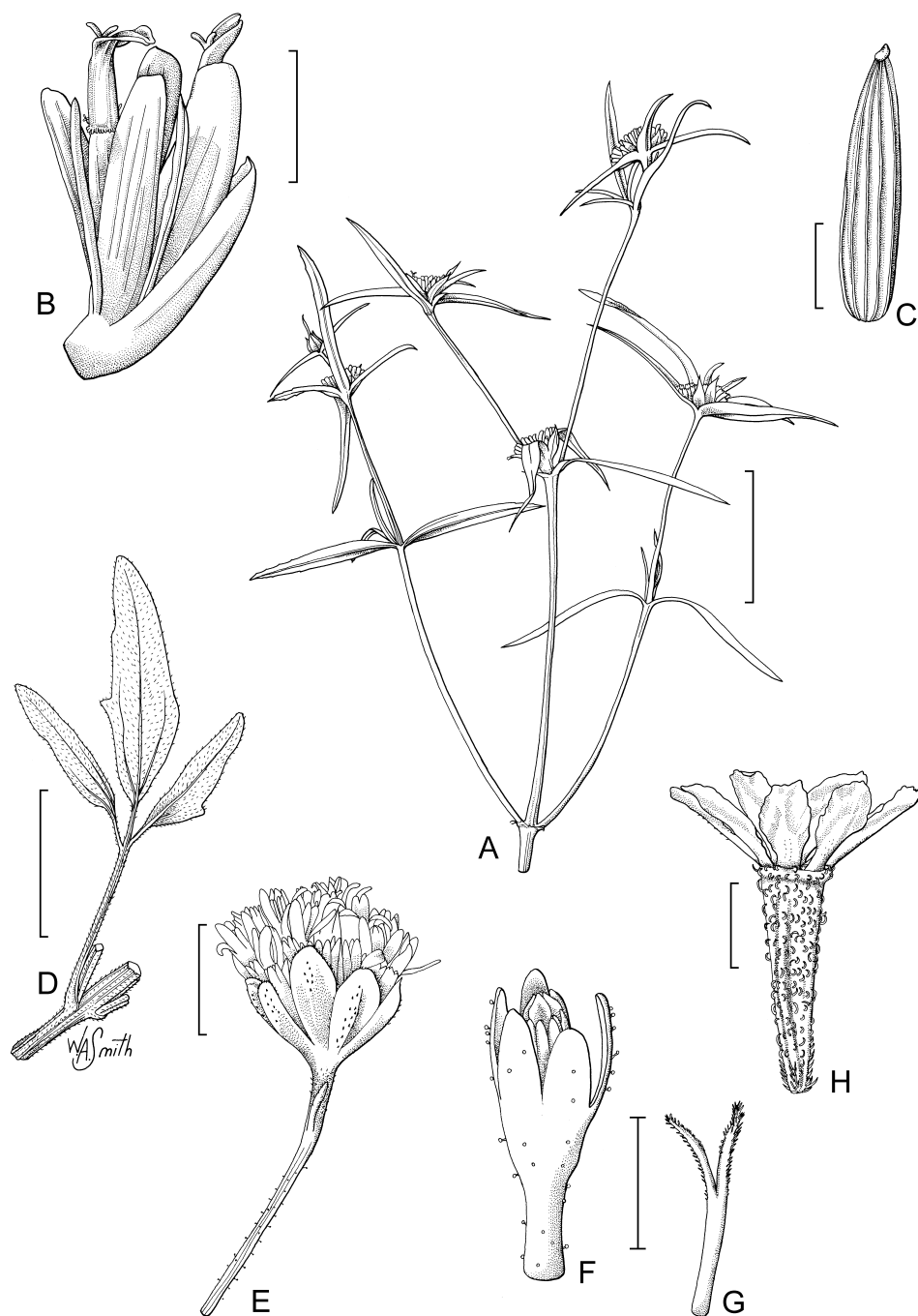
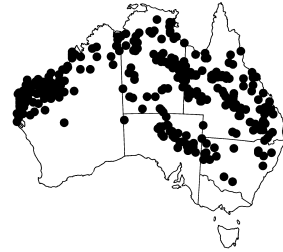


Figure 66. A–C, *Flaveria trinervia*. A, flowering branchlet; B, partial flowering head; C, achene (A–C, A.R.Bean 12977, BRI). D–H, *Florestina tripteris*. D, leaf; E, capitulum; F, floret; G, style; H, achene and persistent scales (D–H, D.Byrne s.n., BRI AQ0667938). Scale bars: A = 3 cm; B, C, F–H = 2 mm; D = 2 cm; E = 5 mm. Drawn by W.A.Smith.

Annual herb to 1.5 m high. Leaves sessile, linear to narrowly lanceolate, 2–11 cm long, 0.15–0.9 cm wide, entire to shortly serrate, acute, glabrous, with 3 longitudinal veins. Synflorescence axillary, comprising several capitula, each containing 1 or 2 florets. Involucral bracts 2, concave or cymbiform, 4.2–5.5 mm long, obtuse or lacerate at apex, glabrous; receptacle convex, with a few slender acuminate setae. Ray florets with ligule 0.5–0.8 mm long. Disc florets: corolla tube 1.5–2.3 mm long, with minute hairs on outer surface; lobes deltate; anthers enclosed in corolla tube, 0.9–1.2 mm long. Achenes oblanceolate, 2.6–3.3 mm long. Pappus absent. *n* = 18, A.M.Powell & S.A.Powell, *Madrono* 25: 160–9 (1978). *Speedy Weed*. Fig. 66A–C.

Native to Mexico, southern U.S.A. and Central America. Naturalised in S America, central Africa, the Middle East, India and Australia. Scattered across much of drier and monsoonal mainland Australia, usually on heavy clay soils. It can also occur in saline littoral areas. Flowers and fruits throughout the year.

W.A.: c. 7 km N of intersection with Burkett Rd along hwy to Exmouth, *P.S.Short* 4312 (AD, MEL, PERTH). N.T.: 16 km E from Wave Hill on road to Top Springs, *R.W.Purdie* 3362 (CANB, DNA). S.A.: c. 15 km S of Oodnadatta along road to Mt Barry HS, *J.Z.Weber* 9027 (AD, CANB, MEL). Qld: 8 km S of Monto, *A.R.Bean* 9651 (BRI, MEL, NSW). N.S.W.: Narrabri, Feb. 1981, *D.Brown* (NSW).



2. TAGETES

A.R.Bean

Tagetes L., *Sp. Pl.* 2: 887 (1753); *Gen. Pl.* 5th edn 378 (1754); named for Tages, an Etruscan god.

Type: *T. erecta* L.

Aromatic annual or perennial herbs or shrubs. Stems erect, unbranched to strongly branched, conspicuously gland-dotted and aromatic. Leaves simple (not in Australia) or pinnately dissected, mostly opposite. Capitula radiate or discoid, arranged singly or in leafy corymbiform cymes; calyculus absent; involucral bracts uniseriate, connate, glandular; receptacle convex to conical, epaleate. Ray florets ligulate, usually female, but sterile in 'double' cultivars. Disc florets bisexual; corolla 5-lobed, yellow to orange, rarely white; anthers auriculate at base; style branches truncate and penicillate, or with a short apical appendage. Achenes linear-clavate, longitudinally striate, brown to black. Pappus persistent, of 3–10 unequal basally connate scales or bristles.

A genus of 55 species distributed from south-western U.S.A. (Arizona) to Argentina; two species naturalised in Australia. The genus includes the popular garden Marigolds.

R.McVaugh, *Tagetes*, in *Fl. Novo-Galicianae* 12: 910–25 (1984); J.A.Soule, Infrageneric systematics of *Tagetes*, in D.J.N.Hind & H.J.Beentje (eds), *Compositae: Systematics. Proceedings of the International Compositae Conference, Kew, 1994* 1: 435–43 (1996); J.Strother, *Tagetes*, in *Fl. N. America*, 21: 235–236 (2006).

Capitula numerous in dense terminal corymbis; ligules pale yellow to cream; disc florets 4–7

1. *T. minuta*

Capitula solitary, terminal; ligules yellow to orange or reddish brown, rarely white (in cultivars); disc florets (10–) 50–120

2. *T. erecta*

1. **Tagetes minuta* L., *Sp. Pl.* 2: 887 (1753)

T: 'Habitat in Chili'; lecto: illustration t. 280 in J.J.Dillenius, *Hort. Eltham*. 2: 374, t. 280, f. 362 (1732), *fide* R.E.Delgado-Montano in C.E.Jarvis & N.Turland (eds), *Taxon* 47: 368 (1998).

T. glandulifera Schrank, *Pl. Rar. Hort. Monac.* 2: t. 54 (1820). T: Brasil, 1817–1820, *C.F.P.Martius*; holo: ?BR *n.v.*

Illustration: G.M.Cunningham *et al.*, *Pl. W New South Wales* 668 (1981).

Slender annual herb to 200 cm high. Stems glabrous, striate. Leaves opposite on lower parts of plant, alternate above, pinnately divided with 5–11 segments, glabrous; segments narrowly lanceolate, 1.2–6 cm long, 0.2–0.8 cm wide, serrate, acute, with 10–30 submarginal elliptic oil glands. Capitula numerous, in dense corymbose cymes; peduncles 2–6 mm long; involucre cylindrical, 1.7–3.5 mm diam. at anthesis; involucre bracts 3 (or 4), connate except near apex, 8–12 mm long, obtuse. Ray florets 1–3; ligule pale yellow to cream. Disc florets 4–7; corolla 2–4 mm long, with antrorse eglandular hairs. Achenes linear, 6–8.5 mm long, black, faintly striate. Pappus of 4–6 acute translucent scales, the longest 2.8–3.5 mm long. *Stinking Roger*. Plate 49; Fig. 62F–I.

A native of S America, from Peru to Argentina and Chile. Naturalised in Australia from NE Qld to SE S.A., in eucalypt woodland, often near creeks. Flowers and fruits Apr.–Aug.

S.A.: Old Port Rd, c. 20 m W of junction with Port Rd, Albert Park, *R.J.Chinnock* 9176 (AD). Qld: Hillyview, 3 miles [5 km] W of Injune, *R.W.Johnson* 2094 (BRI); 6 km W of Beerwah on road to Peachester, *J.H.Ross* 3169 (BRI, CANB, CHR, HO, MEL, NSW). N.S.W.: Central Tilba, 16.5 km S of Narooma, *P.C.Jobson* 4699 (BRI, CANB, MEL, NSW). Vic.: 4.8 km N of Bacchus Marsh township, 15 May 1978, *G.W.Carr* (MEL).



Known to cause contact dermatitis in some people.

2. **Tagetes erecta* L., *Sp. Pl.* 2: 887 (1753)

T. *Herb. Linn. No.* 1009.3; lecto: LINN, *fide* R.A.Howard, *Fl. Lesser Antilles* 6: 601 (1989).

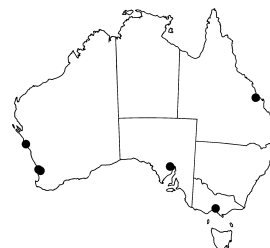
T. patula L., *Sp. Pl.* 2: 887 (1753). *T.* *Herb. Linn. No.* 1009.1; lecto: LINN, *fide* D.J.N.Hind in C.E.Jarvis *et al.* (eds), *Regnum Veg.* 127: 92 (1993).

Annual herbs 10–120 cm high. Stems glabrous. Leaves opposite to alternate, pinnately divided with 9–19 segments, glabrous; segments lanceolate to linear-lanceolate, 15–25 (–45) mm long, 3–8 (–12) mm wide, serrate, acute. Capitula solitary; peduncle 30–100 (–150) mm long; involucre cylindrical to campanulate, (3–) 5–12 mm diam. at anthesis; involucre bracts 5–8, connate except near apex. Ray florets (3–) 5–8 (–100 in ‘double’ cultivars); ligule (2–) 12–18 (–25) mm long, yellow to orange, red-brown or white (some cultivars). Disc florets (10–) 50–120; corolla 7–12 mm long. Achenes 6–11 mm long, dark brown to black. Pappus of 2–6 subulate aristate scales, the longest 6–12 mm long. *Marigold*.

Native to Mexico and Central America. Occasionally naturalised in Australia, often from garden waste. Flowers and fruits throughout the year.

W.A.: On Mundijong road, Mundijong, *G.J.Keighery* 14289 (PERTH). S.A.: Iron Knob, *R.Bates* 31849 (AD). Qld: c. 6 km from St Lawrence on road to Sarina, *T.Stanley & E.M.Ross* 78213 (BRI). Vic.: Dights Falls, Abbotsford, Melbourne, *G.W.Carr* 9704-41 (MEL).

Cultivars of *Tagetes erecta* are widely grown in gardens and, commercially, for cut flowers. They often persist after abandoned plantings. Tetraploid plants ($2n = 48$) with smaller involucre and wholly or partially red-brown corollas, included here in *T. erecta*, have been called *T. patula* by some botanists.



ASTERACEAE

3. THYMOPHYLLA

A.R.Bean

Thymophylla Lag., *Gen. Sp. Pl.* 25 (1816); from the Greek *thymon* (thyme) and *phyllon* (leaf).

Type: *T. setifolia* Lag.

Annual or perennial herbs. Leaves opposite at base, or alternate throughout, entire or pinnatisect. Capitula radiate, sometimes discoid, borne singly or in paniculiform cymes; calyculus of 1–8 deltate to linear bractlets, rarely absent; involucre bracts in 1 series, connate for most of length, usually bearing oil-glands; receptacle flat to convex, smooth or ±pitted, epaleate. Ray florets female, fertile, usually yellow to orange, rarely white. Disc florets bisexual, fertile, yellow to orange; tube shorter than ±cylindric throat; lobes 5, deltate. Achenes obpyramidal, narrowly obconic, or cylindrical, black. Pappus persistent, of 10 (–20) distinct scales, each scale dissected in several bristles. $x = 8$, *vide* J.Strother, *Sida* 13: 351–358 (1989).

About 18 species, native to SW U.S.A. and Mexico. One species naturalised in Australia.

J.Strother, *Thymophylla*, in *Fl. N. America* 21: 239–245 (2006).

**Thymophylla tenuiloba* (DC.) Small, *Fl. S.E. U.S.* 1295, 1341 (1903)

Hymenatherum tenuilobum DC., *Prodr.* 5: 462 (1836). T: 'In Mexico circa Bejar' [between Laredo and San Antonio, Texas], U.S.A., undated, *J.L.Berlandier* 2063; holotype: G-DC; iso: GH.

Annuals to 30 cm high, glabrous or sparsely hirtellous. Stems decumbent to erect. Leaves green, mostly alternate (sometimes opposite at 1–3 proximal nodes), 12–28 mm long, pinnatisect; lobes 7–15, linear to filiform, with pex acuminate. Capitula obconical, 5–7 mm long; peduncles 30–80 mm long, glabrous or hirtellous; calyculus of 3–8 bractlets, less than 1/2 length of involucre bracts; involucre bracts 12–22, fused except at distal end, glabrous or sparsely hirtellous. Ray florets 10–21, yellow-orange; ligule 4–10 mm long, 1.5–3 mm wide. Disc florets 50–100+; corollas yellow, 2.5–4.5 mm, sometimes zygomorphic. Achenes 2–3.5 mm long. Pappus of aristate scales 0.7–3.5 mm long. *Dahlberg Daisy*.

Native to Texas, U.S.A. and northern Mexico. Naturalised in several widely separated locations in Qld. Flowers and fruits June–Feb.

Qld: 'Killarney', c. 45 km E of Alpha, July 2004, *K.Pollard* (BRI); Sumners Rd, near Brumby Circuit turnoff, Brisbane, 11 Nov. 2007, *E.McRobert* (BRI); Jefferis Rd, Beecher, c. 10 km W of Gladstone, *P.Tanner TG58* (BRI).

A popular garden plant that has become self-established, with the first record of naturalisation for Australia in 2004.



Trib. 10. BAHIEAE

A.E.Orchard

Asteraceae trib. *Bahieae* B.G.Baldwin in B.G.Baldwin, B.L.Wessa & J.L.Panero, *Syst. Bot.* 27: 192 (2002)

Type: *Bahia* Lag.

Annual herbs (or perennial herbs elsewhere), without latex. Leaves opposite, becoming alternate above. Capitula discoid or radiate, epaleate. Ray florets absent or 1 (to 3 elsewhere), female, fertile, 3-lobed or acute, yellow (white elsewhere). Disc florets bisexual, actinomorphic, usually 5-lobed, yellow; anther appendages ovate; style branches with short aristate to acuminate apical appendages. Pappus of scales, obtuse, emarginate or shortly awned.

ASTERACEAE

The tribe contains 20 genera and c. 83 species, mainly native to SW U.S.A. and central Mexico, with a few species in Africa and Rapa Is. In Australia, 2 naturalised genera. Formerly included within tribe Helenieae, *q.v.*

J.L.Panero, *XXIV. Tribe Bahieae B.G.Baldwin (2002)*, in W.Kadereit & C.Jefferey (eds), *Fam. Gen. Vasc. Pl.* 8: 433–439 (2007); B.G.Baldwin, *Helianthieae alliance*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 689–711 (2009).

KEY TO GENERA

Most leaves pinnatisect with 5–9 segments each 0.3–0.5 mm diam.; involucre 1.5–3.5 mm diam.

1. SCHKUHRIA

Leaves simple or trifoliate; leaves or leaflets 3–14 mm wide; involucre 4–7 mm diam.

2. FLORESTINA

1. SCHKUHRIA

A.R.Bean

Schkuhria Roth, *Catal. Bot.* 1: 116 (1797); named for C.Schkuhr (1744–1811), a German botanist.

Type: *S. abrotanoides* Roth

Annual herbs. Stems erect, strongly branched, striate, with sessile glands, glabrous or sparsely hispid. Leaves simple to pinnately or bipinnately dissected, opposite towards base, alternate above; segments linear, entire. Inflorescences terminal in corymbose cymes. Capitula obconical to hemispherical, pedunculate, heterogamous or homogamous (not in Australia); involucre bracts multiseriate, with margins scarious. Ray florets absent or 1–3, female. Disc florets bisexual; corolla yellow or white; anthers sub-auriculate at base; style branches flattened, with short apical appendages. Achenes elongate, obpyramidal, pilose on angles. Pappus of 8 scales, all obtuse or the midrib of some extended into an awn.

A genus of 6 species extending from SW U.S.A. to Argentina and Chile; 1 species naturalised in Australia.

C.B.Heiser, A Revision of the genus *Schkuhria*, *Ann. Missouri Bot. Gard.* 32: 265–278 (1945); R.McVaugh, *Schkuhria* in *Fl. Novo-Galiciana* 12: 794–799 (1984).

****Schkuhria pinnata* (Lam.) Thell., *Repert. Spec. Nov. Regni Veg.* 11: 308 (1912)**

Pectis pinnata Lam., *J. Hist. Nat.* 2: 150, t. 31 (1792). T: origin unknown, *coll. unknown*; holo: P-LAM (microfiche n. 342).

S. isopappa Benth., *Pl. Hartw.* 205 (1845); *S. abrotanoides* var. *isopappa* (Benth.) Hieron., *Bot. Jahrb. Syst.* 29: 53 (1900). T: ad pontem Gualope prope Quito, Ecuador, *coll. unknown*; holo: ?K n.v.

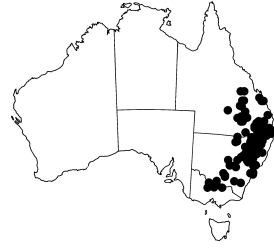
S. abrotanoides Roth, *Catal. Bot.* 1: 116 (1797); *S. pinnata* var. *abrotanoides* (Roth) Cabrera, *Anales Soc. Ci. Argent.* 114: 189 (1932). T: not designated.

Annual herb to 60 cm high. Stems with sparse eglandular hairs. Leaves (or leaf segments) thread-like, 8–25 mm long, 0.3–0.5 mm wide, sparsely hispid, glandular-punctate; lower leaves pinnately divided with 5–9 segments; upper leaves reduced and often simple. Capitula mostly terminal; involucre obconical, 1.5–3.5 mm diam. at anthesis; involucre bracts 4 or 5, broadly elliptic, 4.5–5.5 mm long, obtuse; 2 accessory bracts present, c. half length of involucre bracts. Ray floret 1 or absent. Disc florets 4 or 5; tube 1.4–1.8 mm long, glandular; lobes deltate, 0.3–0.4 mm long, glabrous; anthers 0.5–0.6 mm long. Achenes 3.2–4.5 mm long, black to brown. Pappus scales 0.7–2.3 mm long, all \pm equal or some longer, shortly awned. *Dwarf Marigold, Curious Weed.* Plate 50.

A widespread species native from Mexico to Chile and Argentina, and widely naturalised, including in eastern Australia. Prefers fertile clayey soils, but will grow on a wide range of sites. Flowers and fruits throughout the year.

Qld: 3 km NW of Mt Larcom, *E.R.Anderson 4600* (BRI); tributary of Allen Ck, 8 miles [13 km] W of Beaudesert, *L.Pedley 557* (BRI). N.S.W.: Sinclair Lookout, Waterloo Ra., 14.4 km W of Glen Innes, *R.Coveny 12495 et al.* (AD, BRI, MEL, NSW). Vic.: 2 miles [3.2 km] E of Borung, 23 May 1974, *J.Shovelton* (MEL).

Australian material has formerly been ascribed to *S. pinnata* var. *abrotanoides*, but the variation in the pappus and ligules makes the varietal distinction meaningless, as different specimens from similar locations will readily key to different varieties of *S. pinnata*.



2. FLORESTINA

A.R.Bean

Florestina Cass., *Bull. Sci. Soc. Philom. Paris* 1815: 175 (1815); derivation unknown, but possibly from the Latin *floreus* (of flowers) and *tina* (a wine vessel), perhaps alluding to sometimes purplish involucre.

Type: *F. pedata* (Cav.) Cass.

Annual or perennial herbs or shrubs. Stems erect, strongly branched, glandular-pubescent and/or with appressed non-glandular hairs. Leaves simple, tripartite or biternately dissected, opposite at first, becoming alternate, ovate to narrowly lanceolate, entire or dentate. Inflorescence cymose, subcorymbose. Capitula discoid, homogamous, pedunculate; involucre bracts uniseriate, acute or obtuse, usually scarious on margins. Florets all bisexual; corolla white to purplish, noticeably zygomorphic; style branches flattened, recurved, terminated by a penicillate cuspidate appendage. Achenes shortly pubescent, sometimes glabrescent, obpyramidal, 4-sided, with faces smooth or ribbed. Pappus persistent, of 8–10 ovate to truncate scales, with midvein rarely extending to apex or beyond.

A genus of 8 species distributed in semi-arid areas of the Americas from southern Texas to Nicaragua. One species is naturalised in Australia.

B.L.Turner, Taxonomy of *Florestina* (Helenieae, Compositae), *Brittonia* 15: 27–46 (1963); J.M.Kingsbury, *Poisonous Pl. United States Canada* 404 (1964).

**Florestina tripteris* DC., *Prodr.* 5: 655 (1836)

T: Laredo, Texas, U.S.A., Aug. 1829, *J.L.Berlandier 2077*; holotype: G-DC; isotype: F, GH, MO *n.v.*

Annual herb to 70 cm high. Lower stems with appressed white, non-glandular hairs; upper stems with both appressed and erect glandular hairs. Lower leaves simple and opposite; upper leaves trifoliate and alternate; all with appressed white hairs. Mid-cauline leaves petiolate; leaflet blades ovate, 1.5–6 cm long, 0.3–1.4 cm wide, entire, acute. Capitula numerous; involucre broadly turbinate, 4–7 mm diam. at anthesis; involucre bracts elliptic, 4–7 mm long, obtuse. Florets 15–25, white to pink, glandular-hairy; tube 1–1.5 mm long; lobes narrowly ovate, of varying lengths, 0.5–2 mm long; anthers 1.3–1.7 mm long. Achenes obpyramidal, 2.8–5 mm long, black, with appressed hairs. Pappus of 8 (9) scales, 0.3–2 mm long, obtuse to emarginate, without terminal awns or mucros. *Sticky Florestina*. Fig. 66D–H.

Native to southern Texas and NE Mexico. Naturalised in Australia, and currently confined to southern-central Qld. Flowers and fruits throughout the year.



Qld: 'Woolga', 40 km SW of Tambo, Mar. 2000, *D.Byrne* (BRI); 'Kyneton', 30 km SE of Barcaldine, Oct. 1993, *J.Chandler* (BRI); 25 km S of Charleville along road to Bollon, *D.Halford QM629* (BRI).

This species was first noticed in Qld in 1989. Since then, it has become a serious weed, and has the potential to extend over a much larger area. Reported to be toxic to stock, due to the presence of hydrogen cyanide.

Trib. 11. HELIANTHEAE

A.E.Orchard

(Authors of genera as indicated)

Asteraceae trib. *Heliantheae* Cass., *J. Phys. Chim. Hist. Nat. Arts* 88: 189 (1819)

Type: *Helianthus* L.

Annual or perennial herbs, shrubs, trees or vines, without latex. Leaves alternate or opposite. Capitula radiate or discoid (rarely disciform); receptacle paleate (rarely naked), with paleae enfolding achenes and usually persistent. Ray florets if present female or sterile, with corollas strap-shaped, 3-lobed, usually yellow or white (rarely red to orange). Disc florets usually bisexual (sometimes functionally male), actinomorphic, with corollas 4- or 5-lobed, yellow; anther appendages usually ovate; anther thecae ecaudate; style branches often terminated with tuft of hairs.

A tribe of 113 genera and about 1500 species, pantropical, with most species in Mexico and tropical and temperate S America. In recent treatments (Panero, 2007; Baldwin, 2009) 14 subtribes are recognised, of which 7 are represented in Australia, mostly by naturalised taxa.

The tribe contains several taxa of economic importance, including sunflower (*Helianthus annuus* L.) grown for oil and cut flowers, horticultural genera such as *Echinacea*, *Montanoa*, *Rudbeckia*, *Zinnia*, and weedy taxa such as *Xanthium*.

T.F.Stuessy, *Heliantheae* – systematic review, in V.H.Heywood, J.B.Harborne & B.L.Turner (eds), *Biol. Chem. Compositae* 2: 621–671 (1977); H.Robinson, A revision of the tribal and subtribal limits of the *Heliantheae* (Asteraceae), *Smithsonian Contr. Bot.* 51: 1–102 (1981); O.Karis & O.Ryding, *Tribe Heliantheae*, in K.Bremer (ed.), *Asteraceae: Cladistics & Classification* 578–624 (1994); J.L.Panero, B.G.Baldwin, E.E.Schilling & J.A.Clevinger, Molecular phylogenetic studies of members of tribes *Helenieae*, *Heliantheae* and *Eupatorieae* (Asteraceae). 2. Tribal/generic relationships, in J.M.Osborne (prog. dir.), *Botany 2001, Abstracts, part 3. Systematics* (2001); J.L.Panero & V.A.Funk, Toward a phylogenetic subfamilial classification for the *Compositae* (Asteraceae), *Proc. Biol. Soc. Washington* 115: 909–922 (2002); J.L.Panero, *XXVI. Tribe Heliantheae Cass. (1819)*, in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 440–477 (2007); B.G.Baldwin, *Heliantheae alliance*, in V.A.Funk et al. (eds), *Syst., Evol. Biogeogr. Compositae* 689–711 (2009).

KEY TO SUBTRIBES OF HELIANTHEAE IN AUSTRALIA

(adapted from Panero, 2007)

- | | | |
|----|--|---------------------------------|
| 1 | Paleae accrescent after anthesis | subtrib. 2. MONTANOINAE |
| 1: | Paleae never accrescent after anthesis | |
| 2 | Disc florets bisexual, fertile; style branches of disc florets with a continuous stigmatic surface | |
| 3 | Ray corollas fused to achenes | subtrib. 5. ZINNIINAE |
| 3: | Ray corollas not fused to achenes | |
| 4 | Receptacles conspicuously conical or columnar; paleae with decurrent bases | subtrib. 4. SPILANTHINAE |

ASTERACEAE

- 4: Receptacles flat to convex, rarely conical; paleae without decurrent bases subtrib. 6. **HELIANTHINAE**

- 2: Disc florets bisexual, fertile, or functionally male; style branches of fertile disc florets with parallel stigmatic surfaces, sometimes fused at top

- 5 Disc florets functionally male and styles with a single vascular strand, or if with two vascular strands, then ray achenes fused to adjacent 2–4 disc florets and associated paleae of capitula with 2 series of rays subtrib. 7. **AMBROSIINAE**

- 5: Disc florets bisexual, fertile, or if functionally male then styles with 2 vascular strands and ray achenes not fused to adjacent disc florets and associated paleae, nor with capitula with 2 series of ray florets

- 6 Achenes usually ±homomorphic (all winged or all angled); disc achenes compressed to quadrate in cross-section, usually wingless, rarely winged (*Pentalepis*); pappus a minute corona or of 2 awns fused to wings; paleae filiform or flattened; leaves sessile, decurrent or petiolate, but lacking stipuloid lobes subtrib. 1. **ECLIPTINAE**

- 6: Achenes distinctly dimorphic (ray achenes unwinged, disc achenes winged); disc achenes strongly compressed, obovate in outline, with 2 stramineous usually equal wings at angles of achenes; wings fused to pappus; pappus of 2 awns at each angle of achenes (rarely 1 awn or absent); paleae flattened; leaves with stipuloid lobes at base of petiole (Aust. sp.) subtrib. 3. **VERBESININAE**

Subtrib. 1. ECLIPTINAE

Heliantheae subtrib. *Ecliptinae* Less., *Linnaea* 6: 153 (1831), as *Ecliptae*

Type: *Eclipta* L.

Paleae not accrescent after anthesis, not decurrent at base, often at least partially wrapping achenes, but usually not shed with them. Receptacle flat to convex. Ray corollas not fused to achenes (ray florets female or sometimes neuter, rarely absent). Disc florets bisexual, sometimes functionally male with fused style branches; style branches with divided stigmatic surfaces. Ray achenes compressed, triquetrous (biconvex in *Synedrella*). Disc achenes biconvex, sometimes shallowly quadrate, mostly winged on angles. Pappus of caducous or persistent awns, usually equal in number to angles, sometimes with intermediate squamellae free or fused to awns; awns absent or scale-like in some Australian taxa.

A subtribe of 49 genera, mainly of the neotropics, with a few extending to the Galapagos Is, Africa, Madagascar, Philippines, Hawai'i and Australia, some pantropical; 12 genera occur in Australia.

Relationships of genera within the subtribe are still to be resolved. Stuessy (1977) recognised 2 main groups, one with conspicuous capitula and pappus absent or of small awns (represented in Australia by *Wollastonia*, *Apowollastonia*, *Acunniana* and *Pascalina*) and the second with inconspicuous capitula and pappus of 2 or 3 long awns (the remaining Australian genera). Panero *et al.* (1999), although only including a small selection of genera in their analysis, produced a tree in which Stuessy's groups retained their integrity, albeit with the addition of additional taxa, principally from Stuessy's Verbesininae.

J.L.Panero, R.K.Jansen & J.A.Clevinger, Phylogenetic relationships of the subtribe Ecliptinae (Asteraceae: Heliantheae) based on chloroplast DNA restriction site data, *Amer. J. Bot.* 86: 413–427 (1999); A.E.Orchard, The *Wollastonia/Melanthra/Wedelia* generic complex (Asteraceae: Ecliptinae), with particular reference to Australia and Malesia, *Nuytsia* 23: 337–466 (2013).

ASTERACEAE

KEY TO GENERA

- 1 Disc florets functionally male
- 2 Involucral bracts and ray florets always 5; involucral bracts in 1 series; achenes winged or unwinged **6. PENTALEPIS**
- 2: Involucral bracts and ray florets 6 or more; involucral bracts in 2 series; achenes not winged **11. ACUNNIANA**
- 1: Disc florets bisexual, fertile (in *Synedrellopsis* 2 bisexual and 2 female)
- 3 Ray florets absent
- 4 Capitula with 4 disc florets; achenes with lacerate stramineous wings **2. SYNEDRELLOPSIS**
- 4: Capitula with usually 5 or 6 disc florets; achenes without lacerate stramineous wings **5. ELEUTHERANTHERA**
- 3: Ray florets present
- 5 Disc floret corollas 4-lobed
- 6 Achenes distinctly dimorphic, with ray achenes broadly lacerate winged, and disc achenes clavate **1. SYNEDRELLA**
- 6: Achenes homomorphic or almost so, never with both broadly winged and unwinged achenes in same capitulum
- 7 Ray floret ligule tip 3-lobed **4. CALYPTOCARPUS**
- 7: Ray floret ligule tip entire or 2-lobed **7. ECLIPTA**
- 5: Disc floret corollas 5-lobed
- 8 Achenes tuberculate, produced into a terminal cup surrounding pappus **8. SPHAGNETICOLA**
- 8: Achenes not tuberculate, not produced into a terminal cup
- 9 Paleae obtuse or truncate and laciniate; anther sacs black
- 10 Paleae apically truncate and laciniate, usually dry and membranous **3. BLAINVILLEA**
- 10: Paleae apically subacute, obtuse or subapiculate, but not laciniate, often subfleshy **9. WOLLASTONIA**
- 9: Paleae tips acute to acuminate, entire; anther sacs yellow to pale yellow-brown
- 11 Taprooted annuals or perennial herbs arising from a woody caudex; paleae rigid, opaque; achenes frequently with short awns and/or wings, never with a rugose corky apex **10. APOWOLLASTONIA**
- 11: Rhizomatous perennials; paleae membranous, subhyaline; achenes lacking wings and awns, but with a rugose corky apex **12. PASCALIA**

1. SYNEDRELLA

E.W.Cross & A.E.Orchard

Synedrella Gaertn., *Fruct. Sem. Pl.* 2: 456 (1791), *nom. cons.*; from the Greek *synedros* (aggregated or clustered), in reference to the dense axillary clusters of heads.

Type: *S. nodiflora* (L.) Gaertn.

Annual herbs with tap root; stems erect to ascending. Leaves simple, opposite, petiolate, ovate to elliptic, becoming lanceolate in inflorescence, crenate to serrate, 3-veined; base attenuate. Capitula in small, sessile or subsessile, axillary clusters, sometimes solitary on peduncles to 25 mm long, radiate; involucral bracts in 2 series, with outermost 2 or 3 bracts

oblong-lanceolate, herbaceous and inner bracts scarious; receptacle paleate; paleae narrow, \pm flat, rounded or erose at tip, absent from central florets. Ray florets female and fertile; ligule 2- or 3-lobed, yellow. Disc florets bisexual, fertile; corolla 4-merous, yellow; anther sacs brown to black. Ray achenes flattened, slightly concavo-convex, smooth apart from central longitudinal rib, with conspicuous broad, pale, lacerate, connate wing or thickened margin that apically becomes a flattened pair of pappus awns. Disc achenes clavate, wingless, tuberculate., with pappus of 2 or 3 divergent awns.

A monospecific genus, pantropical and weedy, naturalised in Australia.

According to Turner (1994) *Synadrella* is closely related to *Synedrellopsis* and *Calypocarpus*. Recent molecular work by J.L.Panero *et al.* (1999) places it as sister to *Lasiantha* DC.

B.L.Turner, Taxonomic studies of the genus *Synedrella* (Asteraceae, Heliantheae), *Phytologia* 76(1): 39–51 (1994).

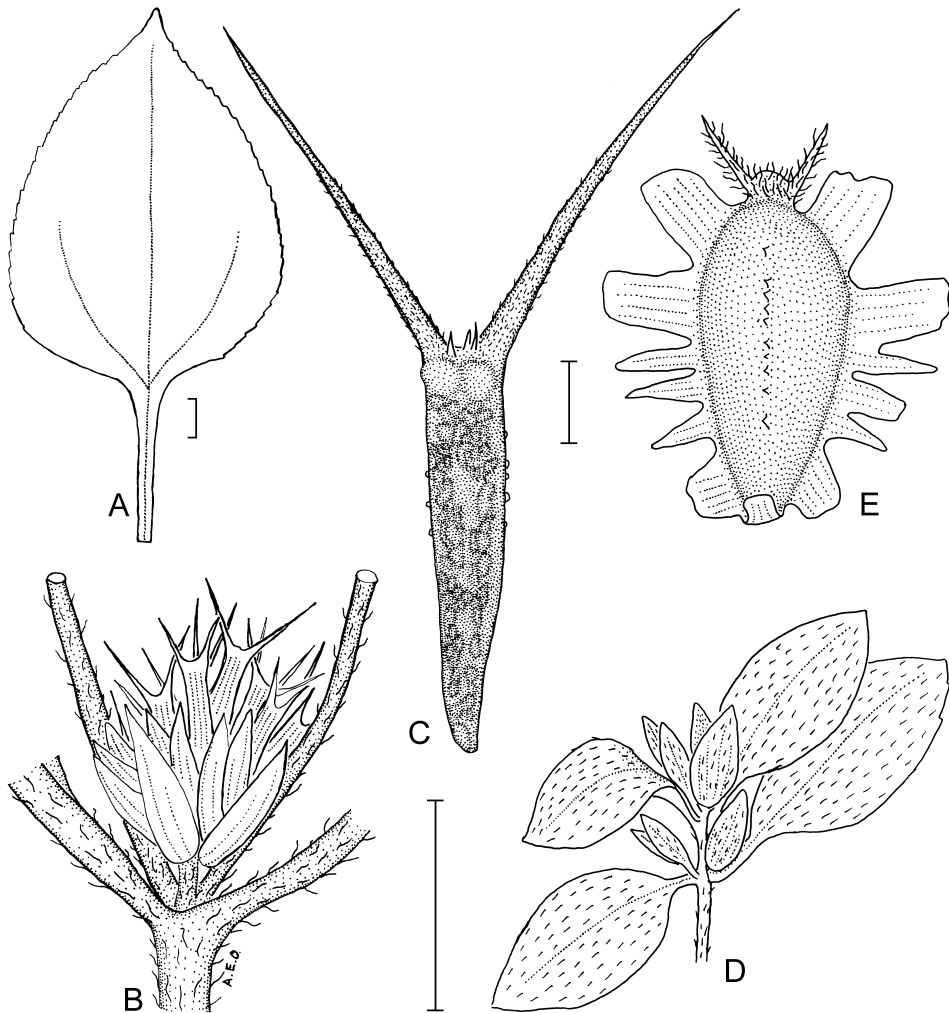


Figure 67. A–C, *Synedrella nodiflora*. A, leaf; B, capitulum; C, achene (A–C, S.B.Andrews 206 & B.Simon, BRI). D, E, *Synedrellopsis grisebachii*. D, shoot with 2 capitula (RHS) and 2 lateral branches (LHS); E, achene (D, E, A.Cooper 14 & W.Houston, BRI). Scale bars: A, B, D = 1 cm; C, E = 1 mm. Drawn by A.E.Orchard.

****Synedrella nodiflora*** (L.) Gaertn., *Fruct. Sem. Pl.* 2: 456, t. 171 (1791)

Verbesina nodiflora L., *Cent. Pl.* 1 28 (1755). T: "Habitat in Caribaeis"; not designated.

Illustrations: W.G.D'Arcy, *Ann. Missouri Bot. Gard.* 62: 1197, fig. 84 (1975); I.D.Cowie *et al.*, *Floodplain Fl.* 188, fig. 37 (2000); N.Smith, *Weeds N Australia* 65 (2011).

Erect herb to (0.15–) 0.3–1 (–2) m high. Stems rounded, with white antrorse appressed hairs. Leaves (2.7–) 4–11 (–14) cm long, (1.2–) 2–6 (–8) cm wide, discolorous, scabrous with sparse antrorse, appressed, white strigose hairs. Capitula c. 10 mm in length, in loose or dense dichasial clusters at nodes, or solitary on naked peduncles 1–25 mm long; outer involucre bracts 9–10 mm long; inner bracts 7–8 mm long; receptacle slightly domed. Ray florets 3–8; ligulate; ligule c. 4 mm long, 2- or 3-lobed. Ray achenes 5–6 mm in length including pappus, grey with cream margins. Disc achenes 4–5 mm long excluding pappus, dark grey to black, with 2 longitudinal ribs on abaxial face, 2 longitudinal ribs and lines of small tubercles on adaxial face; pappus awns 2, 2–4 mm long, rarely a smaller third awn. $x = 10$, $2n = 32, 36, 38, 40$, B.L.Turner, *Phytologia* 76(1): 46 (1994). *Cinderella Weed*. Fig. 67A–C.

Probably native to tropical America, but now pantropical. A serious problem weed of cultivated, agricultural and natural systems, mainly in rather damp sand, loam and clay soils, in Qld and N.T., mainly in near-coastal areas of low elevation but also found to 780 m alt. Also naturalised on Christmas Is. and Cocos Is. Seedlings appear in Jan.–Feb.; flowers (Jan.–) Mar.–June (–Dec.); fruits Mar.–Sept. (–Dec.).

N.T.: Melville Is., R.W.Johnson 4210 (BRI); Adelaide R., A.A.Munir 6202 (AD, DNA). Qld: Bettridges Bridge on main highway just N of El Arish, S.Andrews 206 (BRI); Earlando Bay, G.N.Batianoff 9207359 & H.A.Dillewaard (BRI); Timberland Rd, Airlie Beach, A.R.Bean 16296 (BRI, MEL).

Seed development was described by S.Sundara Rajan, *Curr. Sci.* 37: 385–386 (1968).



2. SYNEDRELLOPSIS

E.W.Cross & A.E.Orchard

Synedrellopsis Hieron. & Kuntze in C.E.O.Kuntze, *Revis. Gen. Pl.* 3(2): 180 (1898); from *Synedrella* and the Greek *-opsis* (appearance), referring to its resemblance to that genus.

T: *S. grisebachii* Hieron. & Kuntze

Perennial decumbent herbs; stems prostrate. Leaves simple, opposite, shortly petiolate, ovate to elliptic, entire or with a few small scattered teeth, 3-veined; base not or scarcely attenuate. Capitula solitary, axillary, ±sessile, discoid, green and inconspicuous; involucre bracts 2, herbaceous, ovate, strigose; receptacle flat, epaleate. Florets 4, yellow; outer 2 female, subtended by bracts, with corolla 3- or 4-lobed; inner 2 bisexual, with corolla 4-lobed; anther sacs black. Achenes usually derived only from inner florets, obovate, dorsiventrally compressed, with a shallow longitudinal rib on each face, sometimes sparsely and minutely tuberculate on adaxial face, and with 2 broad, longitudinal, lacerate, stramineous corky wings, sparsely pilose at apex and on longitudinal ribs. Pappus of 2 awns fused to wings.

A monospecific genus native to Argentina, Bolivia and Paraguay; naturalised in Australia.

****Synedrellopsis grisebachii*** Hieron. & Kuntze in C.E.O.Kuntze, *Revis. Gen. Pl.* 3(2): 180 (1898)

T: Argentina, Jan 1873, *Hieronymus & Lorentz* 1122; holo: B? n.v.

Illustration: H.Robinson, *Smithsonian Contr. Bot.* 51: 50, figs 98, 99 (1981).

Prostrate herb. Stems 30–40 cm long, round, strigose with white antrorse appressed hairs, rooting at nodes. Leaves 10–30 mm long, 6–20 mm wide, discolorous; both surfaces moderately densely strigose, with hairs emerging from centre of scale-like glands. Involucral bracts lanceolate to ovate, leaf-like, 4–5 mm long. Achenes 3.5–4 mm long excluding pappus, grey to black, with cream margins. Pappus c. 1 mm long. Fig. 67D–E.

Native to Argentina, Bolivia and Paraguay. In Australia naturalised in the Gladstone area of central Qld, where it is found in the understorey of *Eucalyptus* forest, and invading pastures and cultivated ground, on a range of soils from sand to clay, often in damp places, at altitudes of c. 140–150 m. Flowers Dec.–May; fruits Feb.–May.



Qld: Ubobo in Boyne Valley, SW of Miriam Vale, *A.C.Cooper AC14* & *W.Houston* (BRI); Mount Miller Rd, Yarwun, 11 Apr. 1994, *S.Lake s.n.* (BRI); Calliope, 18 Mar. 1998, *J.Price s.n.* (BRI); Futter Creek Environmental Park, *E.J.Thompson CAL69 et al.* (BRI); State Forest 281, 10 km S of Gladstone, *E.J.Thompson GLA8* & *G.P.Turpin* (BRI).

This species was first noted as a weed near Duaringa in 1989, and has since spread to a number of properties in the Gladstone region. It blankets and out-competes pastures, is unpalatable to stock, and resistant to glyphosate herbicides.

3. BLAINVILLEA

A.E.Orchard

Blainvillea Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 29: 493 (1823); after Henri M. Ducrotay de Blainville (1777–1850), Professor of zoology, comparative anatomy and physiology, Paris.

Type: *B. rhomboidea* Cass.

Annual or perennial herbs with taproot; stems erect. Leaves simple, opposite (sometimes becoming alternate above), petiolate, ovate, deltate to lanceolate, crenate to serrate, 3-veined; base cuneate. Capitula terminal, in leafy dichotomous cymes or openly paniculate, radiate or almost disciform; involucral bracts in 2 series; outer bracts ovate to lanceolate, usually herbaceous; inner bracts sometimes scarious; receptacle paleate; paleae scarious, oblong, conduplicate, truncate and laciniate at apex. Ray florets female, fertile; ligule minutely 2- or 3-lobed, yellow or white. Disc florets bisexual, fertile; corolla 5-merous, yellow or white; anther sacs black. Ray achenes 2- or 3-angled, dorsiventrally compressed, smooth to weakly rugose, not winged. Disc achenes obpyramidal to obovoid, 2–4-angled, usually laterally compressed, not winged. Pappus of 0–5 (–8) awns, and/or with a few (usually very short), unequal, shortly connate scales.

A pantropical genus of 4 species; in northern Australia 3 native (2 endemic) and 1 introduced.

A genus that has been confused in the past with *Wedelia s. lat.*, but distinguished by the paleae being oblong, scarious, truncate and apically laciniate, and achenes hairy only apically: in Australian taxa of the *Wedelia s. lat.* complex the paleae are linear-lanceolate, acute to acuminate, and usually apically green and scabrid; achenes are hairy throughout. Note that this complex is here treated as comprising *Wollastonia*, *Apowollastonia* and *Acunniana*, *q.v.*

J.T.Koster & W.R.Philipson, Nomenclatural changes in *Spilanthes* and *Blainvillea* with remarks and a key to the species of *Spilanthes* in the Malay archipelago, *Blumea* 6(2): 349–351 (1950); A.E.Orchard, The Australian species of *Blainvillea* Cass. (Asteraceae: *Ecliptinae*), *Austrobaileya* 8: 653–669 (2012a); A.E.Orchard, Proposals to reject the names *Blainvillea rhomboidea* and *Verbesina dichotoma* (*B. dichotoma*) (Asteraceae: *Ecliptinae*), *Taxon* 61(6): 1329–1330 (2012b).

- 1 Achenes all \pm subcylindrical (angled but not noticeably compressed), c. 5 times as long as wide; awns 2–8, stiff, 1.5–3.5 mm long
- 2 Awns 2 or 3, terete
- 2: Awns 5–8, flattened (i.e. anatomically, lengthened scales)
- 1: Achenes compressed, cuneate to obovoid, c. 2–2.5 times as long as wide; awns 0–2, weak, 0.5–2.0 mm long
- 3 Achenes convex at apex, 3–4 (–4.5) mm long, all smooth; awns c. 0.5 mm long (if present)
- 3: Achenes truncate or sunken at apex, usually with raised corners to summit of angles, c. 4–6 mm long; ray achenes (at least) weakly rugose; awns 1–1.3 mm long (if present)

1. *B. gayana*

2. *B. calcicola*

3. *B. cunninghamii*

4. *B. acmella*

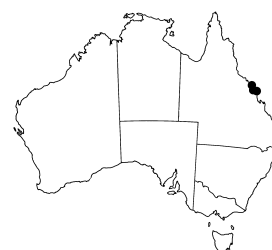
1. **Blainvillea gayana* Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 47: 90 (1827), *nom. cons. prop.*

T: Jardin de Luxembourg [cult.], 4 Sept. 1826; holo: K 410221; iso: P 69616, photo seen.

Illustration: A.E.Orchard, *Austrobaileya* 8: 657, fig. 1 (2012).

Annual herb to 2.0 m tall; stems softly pilose. Leaves opposite below, alternate above, broadly ovate to deltoid, becoming lanceolate in inflorescence, 30–120 mm long, 15–85 mm wide, shallowly crenate-serrate, pilose adaxially, more densely pilose abaxially, especially on veins; petioles 6–30 mm long. Capitula oblong-hemispherical, 10–12 mm diam.; involucre bracts subacute, green, pilose near apex, glabrous and striate below; paleae stramineous, lacerate at apex, striate, glabrous except midrib. Ray florets 4–8; corolla c. 3 mm long, mauve-white; ligule 2-lobed. Disc florets 6–8; corolla c. 3.5 mm long, white. Achenes 6–16, brown-black, very finely transversely wrinkled, finely and sparsely pilose or subglabrous; ray achenes triquetrous, slightly curved, 4.5–5.0 mm long, with pappus of 3 erect awns; disc achenes 2- or 3-angled, \pm straight, 5.5–6.5 mm long, with pappus of 2 erect awns. Awns 1.5–2.5 mm long, antrorsely pilose, on a rostrum 0.5 mm long. Fig. 68A–E.

A native of northern and tropical areas of Africa, naturalised in Australia, Bolivia and Brazil. In Australia several small infestations have been recorded near Mackay and Proserpine, Qld; in remnant *Corymbia clarksoniana*, *C. tessellaris* and *Eucalyptus platyphylla* woodland, on alluvial flats, stony gravels on hills, grassy cleared pastures, and adjacent to roadsides. While limited in distribution it can be locally abundant. Flowers and fruits recorded Apr.



Qld: 6.7 km along Dingo Beach Rd, N of Proserpine, A.R.Bean 16327 (BRI); 35 km N of Mackay, Kuttatubull, Brangus Court, Apr. 2002, L.Warren s.n. (BRI); Royston Park, property of Williamsons, W of Bruce Hwy, c. 6 km N of township of Kuttatubull, L.Warren 2 (BRI).

See Orchard *op. cit.* 658 (2012a) for discussion of typification.

2. *Blainvillea calcicola* Orchard, *Austrobaileya* 8: 658–660, fig. 2 (2012)

T: N.T., Mathison Ck, Willeroo, 15 Mar. 1989, [J.]Russell-Smith 7865 & [D.]Lucas; holo: DNA; iso: BRI.

Wedelia sp. *Limestone* (J.Russell-Smith 7865), R.A.Kerrigan & D.E.Albrecht (eds), *Checklist N. Terr. Vasc. Pl. Sp.* [unpag.] (2007).

Illustration: A.E.Orchard, *op. cit.* 659, fig. 2.

Annual herb (15–) 80–100 cm tall; stems softly pilose. Leaves all opposite, ovate, 45–70 mm long, 20–40 mm wide, shallowly crenate, moderately densely softly pilose adaxially, more densely pilose abaxially, especially on veins, with sessile golden glands between veins; petioles 15–20 mm long. Capitula obconical, 5–6 mm diam.; involucre bracts lanceolate, acute, green, densely pilose throughout; paleae stramineous, lacerate and ciliate at apex, striate, with short appressed hairs and sessile golden glands dorsally. Ray florets 2 or 3; corolla 3–4 mm long, yellow; ligule 2-lobed. Disc florets 2 or 3; corolla 4–5 mm long,

yellow. Achenes 4–6, grey, very finely transversely wrinkled, shortly pilose at apex and on angles; ray achenes cylindrical, \pm straight, 5.5 mm long, minutely tuberculate, with pappus of c. 7 erect to subpatent flattened pilose scales 2–3.5 mm long; disc achenes similar, but smooth, usually lacking tubercles. Fig. 68K–P.

A species endemic to the N.T. in a small area near Willeroo and Timber Ck, where it is found in vine thickets on karst, with *Trema tomentosa* and *Celtis philippinensis*. Flowers and fruits present Mar.

N.T.: Mathison Ck, Willeroo, C.R.Dunlop 8318 & G.R.Leach (DNA); Timber Ck, C.R.Michel 1246 (DNA).

A species in which the scales at the apex of the achene have increased in size, and adopted the function of awns. It appears to be restricted to karst formations, but note that the superficially similar *B. cunninghamii* can also be found on this substrate. *Blainvillea cunninghamii* is distinguished, *inter alia*, by flattened achenes with pappus scales less than 0.5 mm long.



3. *Blainvillea cunninghamii* (DC.) Orchard, *Austrobaileya* 8: 660–662, fig. 3 (2012)

Wedelia cunninghamii DC., *Prodr.* 5: 540 (1836). T: Goulburn Is., [N.T.], Mar. 1818, A.Cunningham 59; holo: G; iso: BM (A.Cunningham 184), K (A.Cunningham s.n.).

B. dubia Specht in R.L.Specht & C.P.Mountford, *Rec. Amer.-Austral. Sci. Exped. Arnhem Land* 3: 314–316 (1958). T: South Bay, Bickerton Is., N.T., 10 June 1948, [Specht] 524; holo: BRI; iso: AD, CANB, K, L, MEL, NSW.

[*W. urticifolia* auct. non (Blume) DC.: G.Bentham, *Fl. Austral.* 3: 538 (1867); F.M.Bailey, *Queensland Fl.* 3: 861 (1900); A.J.Ewart & O.B.Davies, *Fl. N. Terr.* 280 (1917)]

Illustrations: R.L.Specht & C.P.Mountford, *op. cit.* 315, fig. 26, as *B. dubia*; A.E.Orchard, *op. cit.* fig. 3.

Aromatic annual herb (0.4–) 1.0–1.2 (–2.0) m tall; stems sparsely softly pilose. Leaves all opposite, ovate (becoming narrower in inflorescence), 80–100 (–135) mm long, 35–50 (–90) mm wide, coarsely crenate, sparsely softly pilose adaxially, sparsely pilose on veins abaxially with sparse sessile golden glands between veins; petioles 15–20 mm long. Capitula hemispherical, 3–5 mm diam.; involucre bracts lanceolate, acute, green, densely pilose throughout or in upper half, with inner bracts broader; paleae stramineous, striate, lacinate and ciliate at apex, glabrous dorsally or with sparse sessile golden glands. Ray florets 2 or 3; corolla 3.5 mm long, yellow; ligule 2-lobed. Disc florets 4–6; corolla 2.5 mm long, yellow. Achenes grey to black, very finely transversely wrinkled, shortly pilose apically; ray achenes obovoid-trigonal, compressed, \pm straight, 3–4 (–4.5) mm long, convex at apex, without raised corners at summit of angles, smooth (lacking tubercles), with pappus of minute (0.1–0.2 mm) scales, sometimes with 1 or 2 short (c. 0.5 mm long) soft awns; disc achenes similar but 2-angled. Fig. 68F–J.

A species endemic to northern Australia from near Kalumburu Mission in W.A., across the N.T., north of about Katherine, to mainly inland Cape York Penin. in Qld, on sandy and loamy soils, in grassland woodland understorey and the margins of vine thickets and rain-forest, from sealevel in N.T., but usually at 350–550 m alt. in Qld. Flowers (Aug.–) Jan.–May (–June); fruits (Jan.–) Mar.–June (–July).

W.A.: 2.5 km N of Face Point, Carson Escarpment, G.J.Keighery 10666 (CANB, PERTH); Kalumburu Mission, A.A.Mitchell 5472 (DNA). N.T.: Stuart Hwy c. 11 miles [c. 18 km] SE of Katherine, L.G.Adams 932 (BRI, CANB, K, L, NSW, NT); Headwaters of the Liverpool R., L.A.Craven & G.M.Wightman 8353 (CANB, DNA, MEL). Qld: Stanley Is., J.LeCussan 539 (BRI).

See Orchard *op. cit.* 662 for discussion of typification.

Bentham (1867) treated the R.Brown and A.Cunningham collections from the Gulf of Carpentaria as *Wedelia urticifolia* (Blume) DC., an Asian/Malesian species, and in this he was followed by Bailey (1900), Ewart & Davies (1917) and later authors. *Wedelia urticifolia*



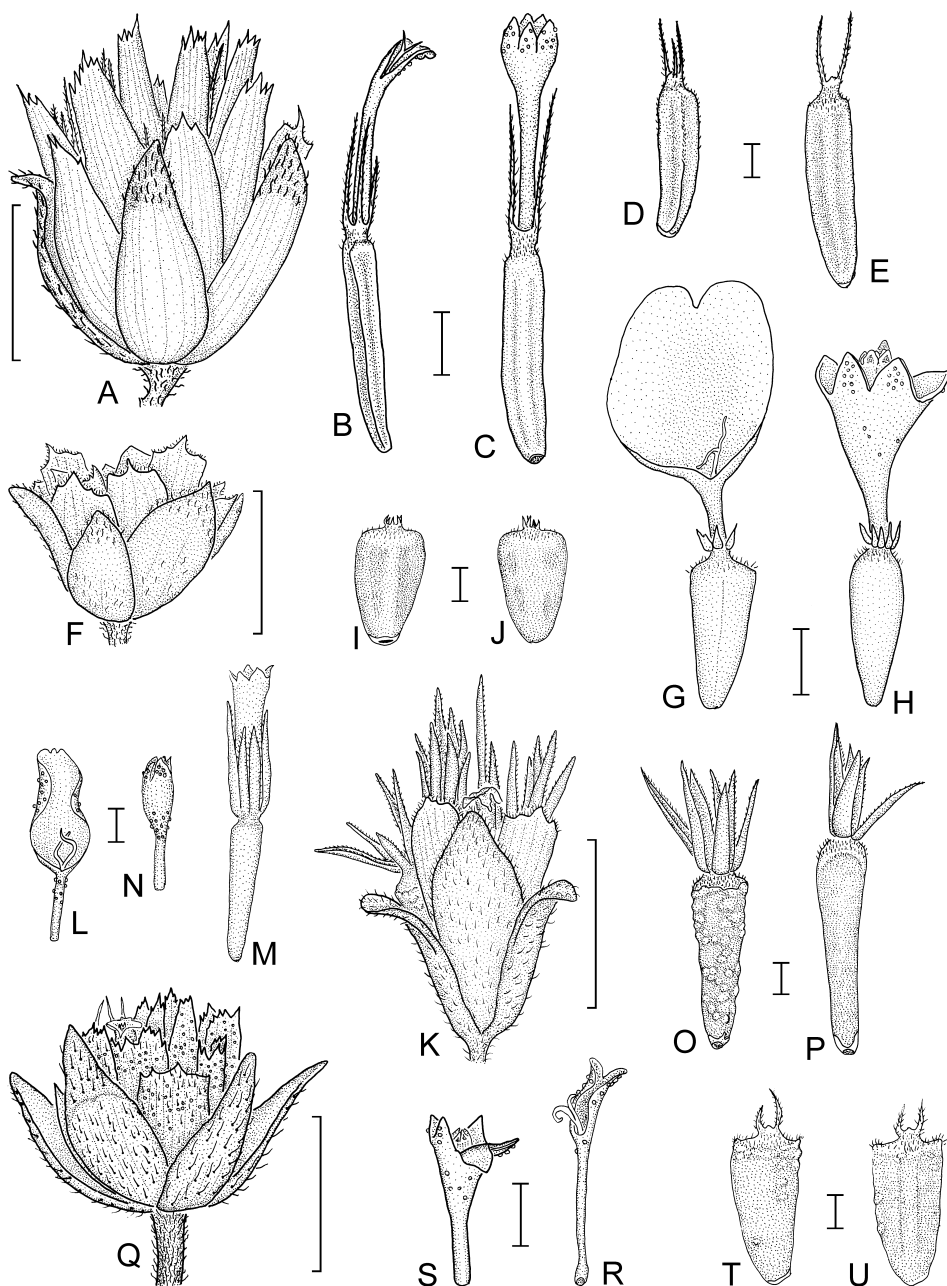


Figure 68. *Blainvillea*. **A–E**, *B. gayana*. **A**, young fruiting capitulum; **B**, ray floret; **C**, disc floret; **D**, ray achene; **E**, disc achene (**A**, **D**, **E**, L.Warren s.n. BRI AQ555637; **B**, **C**, A.R.Bean 16327, BRI). **F–J**, *B. cunninghamii*. **F**, fruiting capitulum; **G**, ray floret; **H**, disc floret; **I**, ray achene; **J**, disc achene (**F**, **I**, **J**, G.M.Wightman 1281 & C.Dunlop, BRI; **G**, **H**, L.A.Craven & G.M.Wightman 8353, MEL). **K–P**, *B. calcicola*. **K**, fruiting capitulum; **L**, ray floret corolla; **M**, disc floret; **N**, disc floret corolla; **O**, ray achene; **P**, disc achene (all J.Russell-Smith 7865 & D.Lucas; **K**, **M**, **N**, BRI; **L**, **O**, **P**, DNA). **Q–U**, *B. acmella*. **Q**, fruiting capitulum; **R**, ray floret; **S**, disc floret; **T**, ray achene; **U**, disc achene (**Q–U**, S.Clayton s.n., BRI AQ490047). Scale bars: **A**, **F**, **K**, **Q** = 5 mm; **B–E**, **G–J**, **L–P**, **R–U** = 1 mm. Drawn by A.E.Orchard.

(now *Lipoblepharis urticifolia* (Blume) Orchard) has paleae which are linear-lanceolate with long acute-acuminate tips, not truncate and laciniate as in *Blainvillea*, and achenes with longer awns which are rigid and fragile. It has not been collected in Australia, although it is known from Indonesia.

Plants growing in very damp shaded positions have larger leaves and capitula, and achenes to 4.5 mm long.

4. *Blainvillea acmella* (L.) Philipson in J.T.Koster & W.R.Philipson, *Blumea* 6(2): 350 (1950)

Verbesina acmella L., *Sp. Pl.* 2: 901 (1753); *Spilanthes acmella* (L.) L., *Syst. Veg. ed. 13* 610 (1774); *Ceratocephalus acmella* (L.) Kuntze, *Revis. Gen. Pl.* 1: 326 (1891). T: Habitat in Zeylona, *Herb. Hermann* 2: 10, No. 309; lecto: BM, *fide* J.T.Koster & W.R.Philipson, *op. cit.* 349, f. 1.

Eclipta latifolia L.f., *Supp. Pl.* 378 (1782); *Blainvillea latifolia* (L.f.) DC. in R.Wight, *Contr. Bot. India* 17 (1834). T: Habitat in India orientali; *n.v.*

Illustrations: F.M.Bailey, *Weeds & Suspected Poisonous Plants of Queensland* 86 (1906); J.T.Koster & W.R.Philipson, *op. cit.* 350, fig. 1; P.K.Hajra *et al.*, *Fl. India* 12: 378, fig. 101 (1993).

Annual aromatic herb (0.6–) 1.2–1.5 m tall; stems hispid with sparse hairs swollen at base. Leaves opposite below, alternate above, ovate to lanceolate, 80–100 mm long, (35–) 40–50 mm wide, coarsely crenate, adaxially sparsely scabrid, abaxially densely scabrid especially on veins, with coarse white hairs swollen at base and sessile golden glands between veins; petioles 15–20 mm long. Capitula hemispherical, 6–10 mm diam.; involucre bracts lanceolate to linear-lanceolate, acute, green, densely hispid throughout; inner bracts ovate, acute to acuminate, green above, stramineous below; paleae stramineous, lacerate and sparsely ciliate at apex, striate, shortly pilose dorsally with numerous sessile golden glands. Ray florets c. 5; corolla c. 3 mm long, yellow; ligule 2-lobed. Disc florets c. 6, c. 2 mm long, yellow. Achenes grey to black, shortly pilose in upper half; ray achenes cylindrical-trigonous, often slightly curved, 4–5 mm long, truncate or sunken at apex, the angles crowned by short peaks, weakly rugose, with pappus of very short scales (sometimes absent), usually with 1 or 2 short awns 1–1.3 mm long; disc achenes obovoid, sometimes truncate as in ray achenes, 2-angled, compressed, 5–6 mm long, smooth apart from fine transverse wrinkles, with pappus as ray achenes. Fig. 68Q–U.

A pantropical weed. Widespread and native in the islands of Torres Strait, and occasional in coastal localities in northern Cape York Penin., Qld, and with a single collection from Mitchell Plateau, W.A. Both the Cape York and Mitchell Plateau collections may represent recent introductions. Usually growing in near-coastal localities near sealevel, often on alkaline soils (coral cays, beach sand, shell banks), sometimes extending into the understorey of woodland and vine thickets. Flowers recorded (Feb.–) Mar.–May (–July); fruits (Mar.–) Apr.–June (–July).



W.A.: E margin of Mitchell Plateau, *T. Willing* 335 (PERTH). Qld: Pickford Rd, Bibbohra, Mar. 2000, *S. Clayton s.n.* (BRI, K); Marrett R., Princess Charlotte Bay, *J.A. Esol* 680 & *T.D. Stanley* (BRI); Mabuag, Torres Strait, *B.M. Waterhouse* 5847 (BRI, CANB, MBA); Roko Is., *B.M. Waterhouse* 6351 (BRI, CANB, US).

For a more comprehensive synonymy see Orchard (*Austrobaileya* 8: 662 (2012)) and papers cited therein.

The names *Blainvillea rhomboidea* Cass. and *Verbesina dichotoma* Murray (\equiv *B. dichotoma* (Murray) Hemsl.) potentially threaten the name *B. gayana* (see A.E.Orchard, *Taxon* 61(6): 1329–1330 (2012) for discussion). A proposal to reject these names was not accepted by the relevant nomenclatural committee, so the names are here epitypified in the Appendix of this volume, on an undoubted specimen of *B. acmella* (A.E.Orchard, *Fl. Australia* 37: 609 (2015)).

Specimens of this species in BRI have been filed in the past under the names “*Moonia* sp. *Q1*”, and “*Wedelia* sp. *Marrett River* (*J. Esol* 680 & *T. Stanley*)”.

This species has been confused with *B. cunninghamii*, but differs in its stiffer, coarser hairs with distinctly swollen bases, more numerous florets, larger achenes of which at least the ray achenes are weakly rugose (smooth in *B. cunninghamii*) and the apex of the achenes being truncate or slightly sunken, with the angles continued upwards into short peaks. In Qld, where both species occur, *B. cunninghamii* is usually found inland in damp forested situations at altitudes to 350–550 m, while *B. acmella* is a strand plant of the Torres Strait islands and coastal Cape York Peninsula.

The embryology of this taxon was described in detail (under the name *B. rhomboidea* Cass.) by S.Sundara Rajan, *Proc. Indian Acad. Sci.*, B 75: 167–176 (1972).

4. CALYPTOCARPUS

A.E.Orchard & E.W.Cross

Calyptocarpus Less., *Syn. Gen. Compos.* 221 (1832); from the Greek *kalyptos* (covered) and *karpos* (fruit).

Type: *C. vialis* Less.

Perennial herbs (rarely annual) with taproot; stems prostrate to erect. Leaves simple, opposite, petiolate, ovate to lanceolate, serrate, 3-veined; base \pm truncate. Capitula \pm pedunculate, terminal but appearing axillary by growth of lateral shoots, solitary or in simple cymes; involucre bracts mostly 5, in 1 or 2 series, herbaceous; receptacle paleate; paleae scarious, linear-lanceolate, concavo-convex. Ray florets female and fertile; ligule 3-lobed, yellow. Disc florets bisexual and fertile, 4-merous; corolla yellow; anther sacs black; pappus of 2 (rarely 3) divergent or reflexed awns plus a ring of tiny laciniate scales. Achenes obconical, compressed, narrowly obovate or obcuneate, lacking wings; disc achenes rugose; ray achenes smooth, sometimes irregularly thickened apically. Pappus of 2 awns and usually 2 or 3 short scales.

A genus of 2–5 species native to the Americas (Texas to Guatemala and Argentina) and West Indies. One species naturalised in Australia.

R.McVaugh & N.J.Smith, *Calyptocarpus vialis* and *C. wendlandii*, *Brittonia* 19: 268–272 (1967); H.Robinson, *Studies in the Heliantheae (Asteraceae)*. XV. Various new species and new combinations, *Phytologia* 41: 33–35 (1978); C.I.Peng and M.T.Kao, *Calyptocarpus vialis* Less. (Asteraceae), a newly naturalised weed in Taiwan, *Bot. Bull. Acad. Sin.* 25: 171–176 (1984); B.L.Turner, *Blainvillea brasiliensis* Blake transferred to *Calyptocarpus* (Asteraceae), *Phytologia* 64: 214 (1988).

****Calyptocarpus vialis* Less., *Syn. Gen. Compos.* 221 (1832)**

Synedrella vialis (Less.) A.Gray, *Proc. Amer. Acad. Arts n.s.* 17: 217 (1882). T: Herba Mexicana [near Jalapa, Veracruz, Mexico]; *n.v.*

Illustrations: H.E.Kleinschmidt & R.W.Johnson, *Weeds Queensland* 379 (1977); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 562, fig. 78G (1986); W.L.Wagner *et al.*, *Man. Fl. Pl. Hawai'i, Rev. edn* 285, t. 20 (1999).

Herbaceous annual or short-lived perennial; stems rounded, prostrate to 60 cm long, sometimes rooting at nodes, with densely appressed hairs 0.2–0.6 mm long. Leaves ovate-triangular, 15–45 mm long, 8–40 mm wide, crenate-serrate, acute and apiculate, densely appressed-strigose on both surfaces, especially on abaxial surface; petiole 5–11 mm long, narrowly winged at apex. Capitula solitary at each node, 5–10 mm long; involucre bracts pilose; paleae white, linear-lanceolate, concavo-convex, entire or slightly laciniate, acute. Ray florets 3–7 (–8). Disc florets 3–7 (–8); corolla densely papillose within. Achenes obconical, slightly 3- or 4-angled, 3–4 mm long; ray achenes irregularly thickened on margins near apex; disc achenes \pm smooth; awns erect and divergent, 1.5–2 mm long. $2n = 24, 72$, W.L.Wagner *et al.*, *loc. cit.* *Creeping Cinderella Weed*. Plate 51; Fig. 69H–Q.

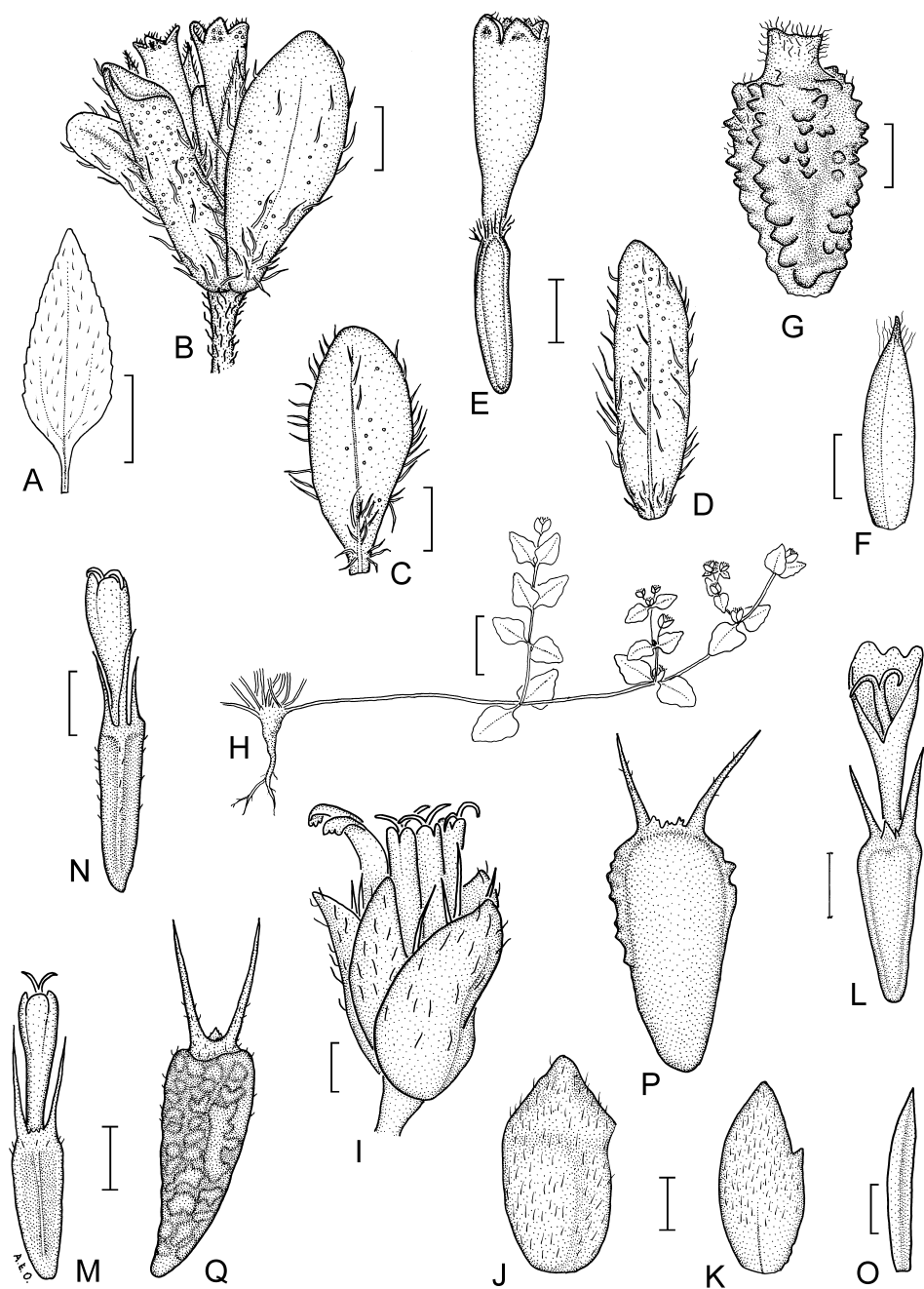


Figure 69. A–G, *Eleutheranthera ruderalis*. A, leaf; B, flowering capitulum; C, outer involucre bract; D, inner involucre bract; E, floret; F, palea; G, achene (A–G, A.R.Bean 16302, BRI). H–Q, *Calyptocarpus vialis*. H, habit; I, flowering capitulum; J, outer involucre bract; K, inner involucre bract; L, ray floret; M, 2-awned disc floret; N, 3-awned disc floret; O, palea; P, ray achene; Q, disc achene (H–O, D.I.Morris 86711, HO; P, Q, M.H.Biggs s.n., BRI 218143). Scale bars A, H = 2 cm; B–G, I–Q = 1 mm. Drawn by A.E.Orchard.

A native of southern North America, and introduced to Hawaii and elsewhere. Naturalised and fairly common in eastern Qld, a weed of lawns, gardens, pastures, wasteland and roadsides, extending into native woodland along tracks and disturbed areas, at altitudes from sealevel to at least 760 m. Flowers and fruits recorded all months, peaking Oct.–Apr.

Qld: Coral Cay, Heron Is., *G.N.Batianoff* 981084 (AD, BRI, CANB, NSW); Auburn River Crossing, Hawkwood Rd, SW of Mundubbera, *A.R.Bean* 14744 (BRI); Coronation Motel, Milton, *D.I.Morris* 86711 (HO); c. 1.5 km NE of Perry's Knob, Mt Marrow district, *A.B.Pollock* 982 (BRI); Hopevale Community, *B.M.Waterhouse* 4913 (BRI).

A minor weed of natural and agricultural systems.



5. ELEUTHERANTHERA

A.E.Orchard

Eleutheranthera Poit., *Bull. Sci. Soc. Philom. Paris* 3: 137 (1802), from the Greek *eleutheros* (free) and Latin *anthera* (anther, flower), referring to the free anthers in the florets.

Type: *E. ovata* Poit.

Annual herbs with tap root, sometimes rooting from lower prostrate stems; stems erect or semiprostrate. Leaves simple, opposite, petiolate, ovate to trullate, weakly crenate, 3-veined; base attenuate. Capitula 1–several in terminal clusters, sessile or subsessile, discoid; involucre bracts 4 or 5 in 2 or 3 series, ovate, herbaceous, with innermost bracts scarious (actually empty paleae through loss of ray florets); receptacle paleate; paleae keeled, linear, acuminate, scarious, pilose, semi-embracing achenes. Florets few, usually 5 or 6, bisexual, fertile; corolla 5-merous, yellow; anther sacs black or golden brown Achenes narrowly obovoid, somewhat compressed, subangular, not winged, narrowed to a small cylindric boss or rostrum apically. Pappus absent.

A monospecific genus, native to tropical America, naturalised in Australia.

W.Greuter, Proposal to conserve the name *Melampodium ruderae* against *Eleutheranthera ovata* (Compositae, Heliantheae), *Taxon* 56: 607–608 (2007); A.E.Orchard & A.J.G.Wilson, Lectotypification of the name *Eleutheranthera ovata* Poit. (Asteraceae: Ecliptinae), *Taxon* 61: 247 (2012).

****Eleutheranthera ruderalis*** (Sw.) Sch.Bip., *Bot. Zeitung (Berlin)* 24: 239 (1866), as *Eleuteranthera ruderalis*

Melampodium ruderae Sw., *Fl. Ind. Occid.* 3: 1372 (1806), *nom. cons.* T: Habitat in ruderae Jamaicae australioris; syn: S (R-3443 and 11-3712, both Swartz herbarium) *n.v.*

Illustrations: W.G.D'Arcy, *Ann. Missouri Bot. Gard.* 62: 1106, fig. 60 (1975); D.L.Nash, *Fieldiana, Bot.* 24(12): 522, fig. 67 (1976).

Erect or semiprostrate, slightly aromatic herb (10–) 20–75 cm tall; stems slender, pilose. Leaves ovate to oblong-lanceolate, 15–50 (–65) mm long, 7–20 (–35) mm wide, pilose on both surfaces and minutely glandular-punctate especially below; petioles 10–12 (–20) mm long. Capitula 5 mm diam. in flower (10 mm in fruit), nodding at maturity; peduncles 2–8 (–25) mm long; involucre bracts oblong or ovate-oblong, 7–9 mm long, obtuse, hispid with long hairs, minutely glandular-punctate; paleae linear, semiclasping, acute to acuminate, scarious, green and ciliate at tip. Florets 4–6; corollas pale yellow; lobes minutely ciliate internally. Achenes weakly 4-angled, 2.5–3 mm long, stramineous to light brown, usually tuberculate when mature, sparingly and minutely pubescent, particularly on rostrum. Plate 52; Fig. 69A–G.

A native of tropical America, introduced into tropical Asia, Africa, Malesia, New Guinea, and Pacific Islands. In Australia naturalised and common on the north Qld coast and northern N.T., with one record as a nursery weed from Broome, W.A. Also naturalised on Christmas Is. and Cocos Is. A weed of cultivation, wasteland, pastures and roadsides, usually in damp situations, on a range of soils from sands to clays, from sealevel to at least 650 m alt. Sometimes invading woodland, regenerating rainforest and vine forest, particularly in disturbed areas. Flowers and fruits recorded Nov.–Aug. with a peak Feb.–June.



W.A.: Hunter St nursery, Broome, A.A.Mitchell 5722 (DNA, PERTH). N.T.: South Alligator R. at Pine Creek Rd crossing, I.D.Cowie 558 (DNA, MEL). Qld: Timberland Rd, Airlie Beach, A.R.Bean 16302 (BRI, MEL, NSW); Macalister Ra., Ellis Beach, A.Ford 2620 & J.Holmes (BRI); Moa Is., St Pauls community, B.M.Waterhouse 3422 (BRI).

A minor problem weed of both natural and agricultural systems.

The capitulum in this species is the terminal element of a dichasium, but as it is rapidly overtopped by lateral branches it superficially appears to be axillary. The capitula are erect in flower, becoming nodding in fruit. Elsewhere, sterile ray florets have been reported, but not observed in Australian material. Usually only a few florets per capitulum mature to fruit, which is usually tuberculate, but may be almost smooth.

6. PENTALEPIS

A.E.Orchard & E.W.Cross

Pentalepis F.Muell., *Edinburgh New Philos. J. n.s.* 17: 230 (1863), from Greek *penta* (five) and *lepis* (scale), referring to the single series of 5 bracts that make up the involucre.

Type: *P. trichodesmoides* F.Muell.

Erect to procumbent herbs or shrubs with strigose branches. Leaves simple or deeply 3-lobed, opposite, sessile or shortly petiolate, ovate-lanceolate, entire or serrate, 3 (–5)-nerved; base truncate or attenuate. Capitula in compact or lax dichasial clusters, radiate; involucre bracts 5 in a single series, herbaceous, strigillose, each subtending a ray floret; receptacle paleate; paleae linear, flat, acute. Ray florets always 5, female, fertile, yellow; ligule 2-lobed. Disc florets functionally male, yellow to orange; corolla 5-lobed; anther sacs yellow to brown; pappus of several short scales or awns. Ray achenes compressed, often cucullate, black-brown; margins usually winged, with wing sometimes thickened and/or revolute; disc achenes narrowly linear, abortive. Pappus a minute cup, sometimes incised, strigillose, often with 2 short soft scale-like awns.

An Australian endemic genus, with 6 species in the N.T. and northern W.A.

The generic disposition of these species has been complex. See Orchard & Cross (2012) for discussion.

The style in the functionally male disc florets has fused style branches, and emerges from the anther tube as a brush. Styles in the bisexual ray florets have 2 free branches.

P.O.Karis, A.A.Anderberg & B.Nordenstam, Resurrection and systematic position of *Pentalepis* F.Muell. (Asteraceae-Heliantheae), *Austral. Syst. Bot.* 6: 149–153 (1993); A.E.Orchard & E.W.Cross, A revision of the Australian endemic genus *Pentalepis* (Asteraceae: Ecliptinae), *Nuytsia* 22: 371–392 (2012).

1 Involucral bracts 6–12 mm long

2 Shrub; capitula in crowded dichasial cymes

2: Annual herb; capitula in open dichasial cymes

1. *P. trichodesmoides*

2. *P. grandis*

- 1: Involucral bracts 3–6 mm long
- 3 Pappus cup-shaped, with 2 weak awns; disc florets (10–) 16–30
 - 4 Leaves (linear-) lanceolate to broadly oblong or narrowly ovate, sometimes broadly trilobed; central lobe or unlobed leaf 5 mm or more wide 3. *P. ecliptoides*
 - 4: Leaves narrowly linear, (1.0–) 1.5–2.0 mm wide 4. *P. linearifolia*
- 3: Pappus cup-shaped, without awns, or pappus absent; disc florets 9–15
 - 5 Leaves trifid, with long basal lobes (but basal lobes shorter than central lobe); lobes all linear (rarely narrowly lanceolate), 2–4 mm wide 5. *P. kakaduensis*
 - 5: Leaves ovate to lanceolate, with several coarse teeth; lamina usually 15 mm or more wide 6. *P. walcottii*

1. *Pentalepis trichodesmoides* F.Muell., *Edinburgh New Philos. J. n.s.* 17: 231 (1863)

Moonia trichodesmoides (F.Muell.) Benth., *Fl. Austral.* 3: 540 (1867); *Chrysogonum trichodesmoides* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 83 (1882). T: Nickol Bay, W.A., *Walcott*; holo: MEL1608228; iso: K.

Illustrations: J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 935, fig. 286K; 939, fig. 287G (1992), as *C. trichodesmoides*; P.O.Karis *et al.*, *Austral. Syst. Bot.* 6: 151, fig. 1 (1993); A.E.Orchard & E.W.Cross, *Nuytsia* 12: 375, fig. 1; 376, fig. 2 (2012).

Much-branched brittle shrub 0.4–1 (–2) m tall; young stems with appressed hairs; older stems white, glabrous. Leaves brittle, very shortly petiolate, linear, lanceolate, ovate or obovate, (25–) 60–90 mm long, (10–) 15–30 (–35) mm wide, entire or with few inconspicuous teeth, acute, acuminate or blunt; both surfaces shiny and glabrescent or with white dense appressed hairs. Capitula 5–10 in a crowded dichasium on short peduncles; involucre narrowly campanulate, 10 mm long, 6–8 mm wide. Disc florets c. 15; corolla yellow. Achenes broadly to narrowly ovate or slightly obovate, 6.0–7.5 mm long, 4.0–4.5 mm wide, weakly keeled, with broad membranous spreading entire or lacerate wings when mature. Pappus a shallow cup with 2 short weak scale-like awns.

Endemic to northern W.A. and the N.T. Three subspecies can be distinguished.

- 1 Mature leaves shiny, smooth, with sparse short hairs with conspicuously swollen basal cells 1a. subsp. **trichodesmoides**
- 1: Mature leaves with dense white hairs, obscuring shiny surface and leaves thus appearing dull; hairs dense, with or without swollen bases
- 2 Leaves ovate to lanceolate, acute; hairs 2-celled, (0.3–) 0.5–0.7 mm long, separated by about their own length, basal cell swollen 1b. subsp. **hispida**
- 2: Leaves obovate, blunt; hairs (2–) 3 or 4 celled, 0.6–1.2 mm long, densely overlapping, all cells narrow 1c. subsp. **incana**

1a. *Pentalepis trichodesmoides* F.Muell. subsp. *trichodesmoides*

Shrub 0.5–1.0 (–2.0) m tall. Leaves lanceolate, 80–90 mm long, 10–20 (–25) mm wide, midgreen to dark green; both surfaces smooth, shiny, sparsely hispid; hairs white, 0.2–0.3 mm long, erect or curved, 1- or 2-celled with basal cell conspicuously swollen, separate by (1–) several times their own length. Upper stems and involucral bracts with hairs as for leaves. Achenes ovate, 5.5–6.5 mm long, 4.0–4.5 mm wide, grey black, weakly keeled abaxially and abaxially, otherwise smooth apart from minute tubercles/hair bases, very shortly and sparsely pilose throughout or just apically; wings red-brown, membranous, spreading entire or lacerate, with a few tiny hairs marginally.

Endemic to W.A. (Hamersley and Kimberley ranges, including off-shore islands), with one collection from near Limbunya Stn, N.T. Found in open situations in spinifex (*Triodia*) hummock grasslands sandplains, on limestone and dolomite outcrops and stony



watercourses, to altitudes of at least 300 m. Reportedly common after fire in limestone country. Flowers (May–) June–Oct. (–Dec.); fruits Aug.–Nov. (–Dec.).

W.A.: Yathalla Well near Mt Rica, *C.A.Gardner 6387* (PERTH); 5 miles [c. 8 km] NE Fossil Downs Stn, *M.Lazarides 6474* (BRI, CANB, K, MEL, NT, PERTH); Bungle Bungle, Mindjiyurrdi, *N.H.Scarlett 302* (AD, CANB, DNA, PERTH); 42 km N of Hamersley HS, *P.S.Short 4288* (AD, CANB, MEL, PERTH). N.T.: 7 miles [c. 11 km] S Limbunya Stn, *R.A.Perry 2340* & *M.Lazarides* (CANB, NT).

1b. *Pentalepis trichodesmoides* subsp. *hispida* Orchard in A.E.Orchard & E.W.Cross, *Nuytsia* 22: 377 (2012)

T: W.A., c. 10 [km] E of Yalleen HS along railway line to Wickham, 20 Sept. 1994, *A.A.Mitchell 3757B*; holo: PERTH4069749; iso: MEL262445.

Shrubs 0.4–1.0 m tall. Leaves ovate to lanceolate, (25–) 60–75 mm long, (10–) 15–25 mm wide, acute, dull green; both surfaces almost entirely covered with swollen hair bases; hairs white, (0.3–) 0.5–0.7 mm long, ± appressed, 2-celled with basal cell conspicuously swollen, separated by c. their own length or less. Upper stems and involucre bracts with hairs as for leaves. Mature achenes not seen.

Endemic to W.A., in the the Hamersley Ra. Found in *Triodia* hummock grassland, often in the understorey of shrubland of *Acacia* spp., *Gossypium* spp., *Senna* spp., *Brachychiton* spp. and *Eucalyptus* spp., on summits and slopes of low hills on basaltic soils, at altitudes to 1150 m. Flowers recorded Aug.–Sept.; old fruiting heads (seeds dispersed) present Aug.–Apr.



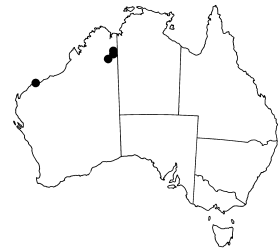
W.A.: Python Pool area, 35 km NNE of Millstream, 24 Apr. 1971, *K.H.L.Key s.n.* (CANB); North Portland R. crossing, Millstream-Chichester Natl Park, 26 Sept. 1990, *E.Leyland s.n.* (PERTH); Hamersley Ra., July–Aug. 1958, *P.McMillan s.n.* (PERTH); 14.6 km SW of Mt Messenson, Karijini Natl Park, *S.van Leeuwen 1950* (DNA); 20.3 km SW of Mt Bruce, Karijini Natl Park, *S.van Leeuwen 3628* (CANB, PERTH).

1c. *Pentalepis trichodesmoides* subsp. *incana* Orchard in A.E.Orchard & E.W.Cross, *Nuytsia* 22: 379 (2012)

T: W.A., 19 miles [c. 30 km] NW of Turner River Stn, 10 July 1949, *R.A.Perry 2409*; holo: CANB588197; iso: MEL1609799, NT19076, PERTH4310744.

Wedelia sp. A, A.J.G.Wilson in J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 961 (1992).

Shrub 0.6–1.0 m tall. Leaves obovate, becoming narrower above, 75–90 mm long, 25–35 mm wide, blunt at apex, appearing silvery-grey on both surfaces because of dense indumentum; hairs white, 0.6–1.2 mm long, appressed, densely crowded and overlapping, (2–) 3- or 4-celled, all cells narrow, tapering to tip. Upper stems and involucre bracts green with moderately dense indumentum as for leaves. Achenes ovate to slightly obovate, 6 mm long, 4.5 mm wide, grey-black, keeled abaxially, weakly keeled adaxially, very shortly pilose throughout on both surfaces; wings yellow-brown, membranous, spreading, entire, shortly ciliate on upper margins.



Endemic to W.A., in the Albert Edward Ra./Bungle Bungle region, with one old anomalous collection (?mislabelled) from Nickol Bay. Found in *Triodia* grassland and *Eucalyptus* woodland on skeletal soils on volcanic rock types. Flowers May; fruits July.

W.A.: near Nickol Bay, *W.H.Cusack 37* (MEL); Osmond Ra. near Date Palm Ck, N of Red Rock Ck, *D.J.Edinger 1307* (PERTH); 14 km from Halls Creek along Duncan Hwy, *P.Ollerenshaw 1667* (CBG, PERTH).

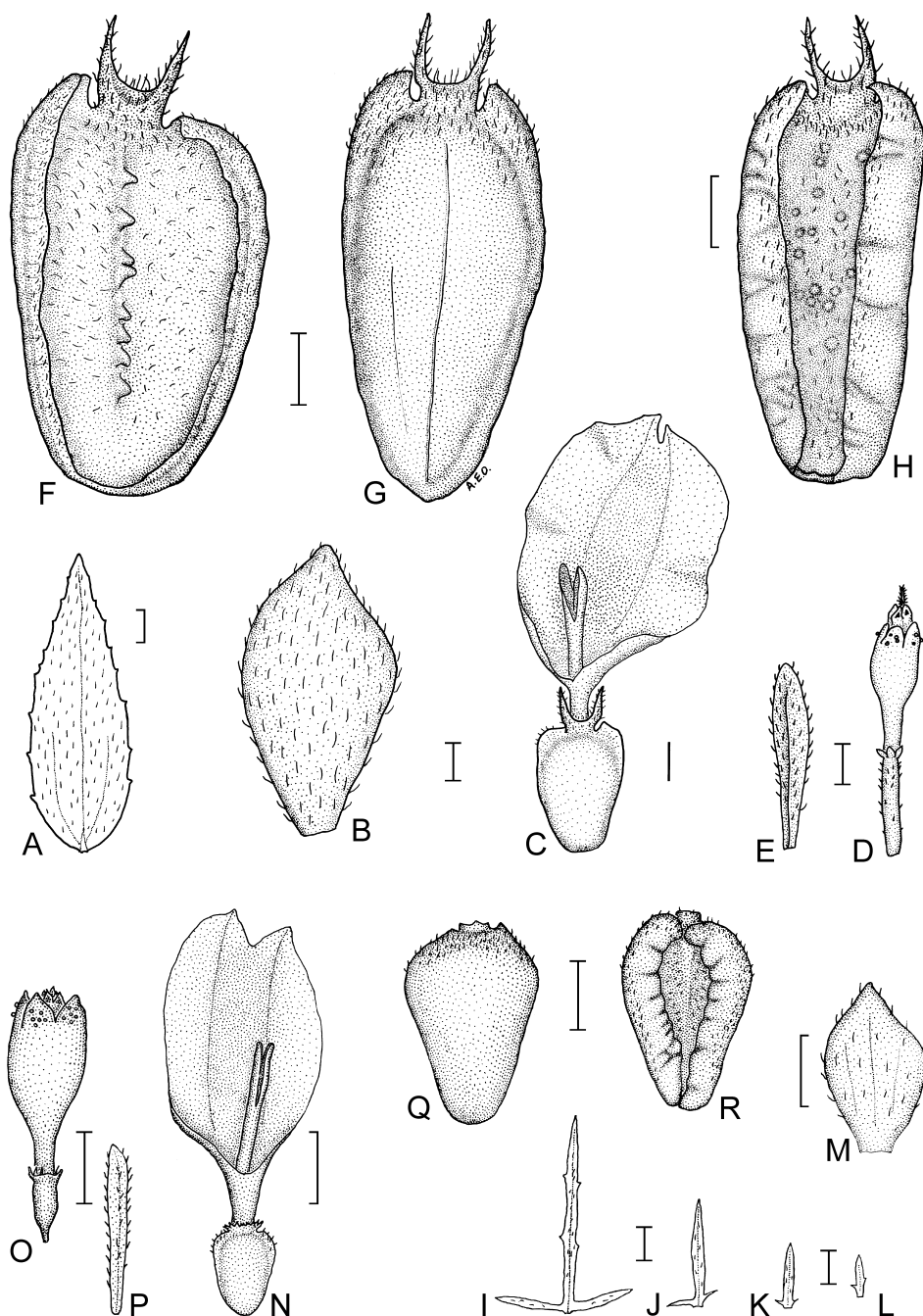


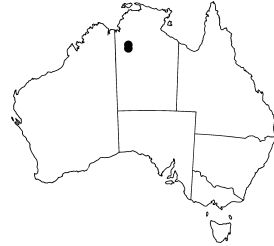
Figure 70. *Pentalepis*. **A–H**, *P. grandis*. **A**, leaf; **B**, involucre bract; **C**, ray floret; **D**, disc floret; **E**, palea; **F**, immature achene, adaxial view; mature **G**, mature achene, abaxial view; **H**, mature achene, adaxial view (**A–H**, C.R.Mitchell & C.P.Mangion 678, DNA). **I–R**, *P. kakaduensis*. **I–L**, leaves, basal to upper; **M**, involucre bract; **N**, ray floret; **O**, disc floret; **P**, palea; **Q**, achene, abaxial view; **R**, achene, adaxial view (**I–R**, I.D.Cowie 576, DNA). Scale bars: **A**, **I–L** = 1 cm; **B–H**, **M–R** = 1 mm. Drawn by A.E.Orchard.

2. *Pentalepis grandis* E.W.Cross in A.E.Orchard & E.W.Cross, *Nuytsia* 22: 379 (2012)

T: near Kalkarindji border, Wave Hill Stn, N.T., 20 Mar. 1997, *C.R.Michell* & *C.P.Mangion* 678; holo: DNA132807; iso: CANB695823.

Illustration: A.E.Orchard & E.W.Cross, *op. cit.* 381, fig. 4A–H.

Erect, rigid, annual herb (0.2–) 0.5–1.0 m tall; stems slender, scabrous, covered with appressed hairs. Leaves sessile, stiff, ovate, 30–90 mm long, 7–26 mm wide, regularly shortly toothed, acute; both surfaces shortly strigose; hairs 0.3 mm long, appressed, 2-celled with basal cell swollen and seated on a cluster of small epidermal cells, terminal cell conical. Capitula several in an open dichasium on elongated peduncles to 45 mm long; involucre hemispherical, 6–7 mm long, 6–9 mm wide. Disc florets 14–20. Achenes oblong to obovate, 5–6 mm long, 2–3 mm wide, dark brown to black; abaxial surface smooth, convex, with dense short white hairs apically; adaxial surface concave with central papillae and sparse short hairs; margins winged, ±thickened and revolute, shortly pilose on margins. Pappus a shallow cup with 2 short weak scale-like awns. Fig. 70A–H.



Endemic to N.T., from near the type locality, W and NNW of Wave Hill HS; found on brown clay or in black soil with scattered *Terminalia arostrata* and *Bauhinia cunninghamii*. Flowers and fruit recorded Mar., May.

N.T.: Pigeon Hole, Sandstone Paddock, *J.A.Risler* 2210 (DNA); Pigeon Hole, Dead Cat Paddock, *J.A.Risler* 2212 (DNA).

3. *Pentalepis ecliptoides* F.Muell., *Edinburgh New Philos. J. n.s.* 17: 231 (1863)

Moonia ecliptoides (F.Muell.) Benth., *Fl. Austral.* 3: 540 (1867). *Chrysogonum ecliptoides* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 83 (1882). T: Upper Victoria R., [N.T.], 28 Mar. 1856, *F.Mueller s.n.*; holo: MEL1608229.

Erect or procumbent annual herb 0.2–0.6 (–1.0) m tall; stems slender, covered with appressed hairs. Leaves sessile, stiff, broadly linear to linear-lanceolate, lanceolate or narrowly ovate, rarely trilobed, 20–35 (–70) mm long, 5–10 mm wide, entire or minutely and irregularly toothed, acute, sparsely scabrous to densely hirsute. Capitula several in loose dichasia, on elongated peduncles; involucre campanulate, 4 mm long, 5 mm wide. Disc florets 10–25. Achenes oblong to obovate, 3.0–4.5 mm long, 3.0–3.5 mm wide, dark grey to black or brown, abaxially convex and partly covered with minute white hairs, adaxially concave, often with central papillae, shortly pilose; wings thickened and revolute, sometimes with apex membranous and spreading. Pappus a shallow cup with 2 short, weak, scale-like awns.

Endemic to northern Australia, in W.A. and N.T. A very variable taxon with several local variants, differing in leaf shape, indumentum and achene shape. Three subspecies are recognised.

- 1 Leaves, stems and involucral bracts shortly and moderately scabrous; leaves all linear-lanceolate to broadly oblong or narrowly ovate, never trilobed, entire or with only 1 or 2 tiny teeth
- 2 Mature achenes with wing membranous and erect at apex, thickened and revolute towards base
- 2: Mature achenes with wing thickened and revolute throughout, the apical corners of the thickened wing revolute and ±touching on adaxial side of achene
- 1: Leaves, stems and involucral bracts long and densely hirsute; leaves broadly linear to linear-lanceolate, often with some basal and mid-stem leaves broadly trilobed

3a. subsp. *ecliptoides*

3c. subsp. *cucullata*

3b. subsp. *hirsuta*

3a. *Pentalepis ecliptoides* F.Muell. subsp. *ecliptoides*

Chrysogonum sp. A, M.E.Lawrence in J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 941 (1992).

Pentalepis sp., P.O.Karis *et al.*, *Austral. Syst. Bot.* 6: 153 (1993), *p.p.*

Illustrations: J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 935, fig. 286J, 286L (1992), as *Chrysogonum* sp. A; A.E.Orchard & E.W.Cross, *Nuytsia* 22: 384, fig. 4D–H (2012).

Procumbent herb 0.3–0.6 (–1.0) m tall. Leaves linear-lanceolate, lanceolate or narrowly ovate, 30–35 (–70) mm long, 8–10 mm wide, entire or minutely and irregularly toothed, sparsely to moderately scabrid; hairs 0.3–0.4 mm long, white, 2-celled with basal cell conspicuously swollen, seated on a rosette of tiny epidermal cells, upper cell narrower, tapering. Stems and involucre bracts with hairs as for leaves. Achenes obovate, 3–4.5 mm long, dark grey; abaxial surface convex, smooth, weakly keeled, apically shortly pilose and often minutely tuberculate; adaxial surface tuberculate or papillose, with a weak keel; marginal wings thickened, revolute, often crenulate, with apex usually membranous, spreading, ciliate.

Endemic to W.A. and N.T., from the west Kimberley in W.A., to the central part of the Top End of the N.T. Found on loam or clay loam soils in grassland and open *Corymbia* spp., *Eucalyptus* spp., and *Terminalia* spp. woodland, on a range of substrates (basalt, granite, sandstone), at altitudes to at least 270 m. Flowers and fruits present Mar.–July.

W.A.: 5 km along Mount House Rd from Derby–Gibb River road, A.S.George 15154 (BRI, CANB, MEL, PERTH); 15 km N of Mt Disaster, G.J.Keighery 10380 (PERTH); 10 km W of Mt Broome on the Milliewindie Track, P.G.Wilson 291 & S.W.L.Jacobs (BRI, PERTH). N.T.: Cave Creek Stn, R.K.Harwood 1259 (DNA); 8 miles [c. 13 km] S of Willeroo Outstation, R.A.Perry 2318 & M.Lazarides (AD, BRI, CANB, MEL, NT, PERTH).



Lawrence's '*Chrysogonum* sp. A' was based on a specimen (*T.E.H.Aplin et al.* 1033, Lennard River Gorge, PERTH) which is one of very few specimens of this taxon with fully mature achenes. It is however a good match with Mueller's type specimen. Karis *et al.* (1993) accepted Lawrence's taxon as a new (but still unnamed) species of *Pentalepis*. The specimens they cited under this tentatively recognised taxon included elements (*Willis s.n.*, *Bradshaw & Allen s.n.*, and *Fryxell & Craven 4182*) now referred to *P. walcottii*, as well as others which belong here in *P. ecliptoides* subsp. *ecliptoides*.

3b. *Pentalepis ecliptoides* subsp. *hirsuta* Orchard in A.E.Orchard & E.W.Cross, *Nuytsia* 22: 383 (2012)

T: W of Mt Muriel, Tipperary, N.T., 16 Mar. 1989, *Russell-Smith 7957 & Brock*; holotype: CANB558442; isotype: AD99027053.

Pentalepis sp. Mt House (E.M.Bennett 1877), *Florabase* (<http://florabase.dec.wa.gov.au/>, accessed 29 August 2012).

Procumbent herb 0.2–0.4 m tall. Leaves broadly linear to linear-lanceolate, 20–25 mm long, 5–6 mm wide, entire or with occasional tiny teeth, lower and midstem leaves sometimes with large lateral lobes (i.e. broadly trifid), densely hirsute; hairs 0.5–0.7 mm long, semiappressed, white, 2-celled with basal cell distinctly swollen, seated on a rosette of tiny epidermal cells, upper cell narrow, tapering. Stems and involucre bracts with hairs as for leaves. Achenes oblong to obovate, 3.5–3.7 mm long, dark grey; abaxial surface convex, smooth, apically shortly pilose; adaxial surface concave, weakly keeled, usually with small tubercles; marginal wings thickened and revolute throughout with apices not touching on adaxial surface, often crenate, shortly ciliate.

Endemic to W.A. and N.T., at scattered localities from the Kimberley to western Arnhem Land, in a range of soils (basalt, limestone, gravelly black soil, sandstone, sandy alluvium) in open shrubland, vine thickets and creeksides. Flowers Mar.–Aug.; fruits Mar.–June.



W.A.: 6 miles [c. 10 km] E Mt House, *N.Byrnes 346* (NT); Stockyard Creek Bay, *A.A.Mitchell 2984* (PERTH); Sir Graham Moore Is., *P.G.Wilson 11194* (PERTH). N.T.: Camfield Stn, *J.L.Egan 4141* (BRI, DNA); Beswick Aboriginal Res. between Stuart Hwy & Beswick HS, *R.Pullen 9332* (CANB).

3c. *Pentalepis ecliptoides* subsp. *cucullata* Orchard in A.E.Orchard & E.W.Cross, *Nuytsia* 22: 385 (2012)

T: Wollongorang Stn, N.T., 8 July 1998, *C.R.Michell & J.Risler 1624*; holo: DNA135002; iso: CANB.

Procumbent herb to 40 cm tall. Leaves lanceolate, 30–35 mm long, 8–10 mm wide, entire or with 1 or 2 tiny teeth, sparsely scabrid; hairs 0.3 mm long, semiappressed, white, 2-celled with basal cell swollen, often seated on rosette of tiny epidermal cells, upper cell curved, claw-like. Stems and involucre bracts with hairs as for leaves. Achenes obovate, 3.3 mm long, dark grey, cucullate; abaxial surface convex, minutely pilose above, otherwise smooth and glabrous, with a weak central keel; adaxial surface sparsely and minutely pilose above, with a central longitudinal row of large papillae; margins thickened and revolute, touching at apex and base on adaxial side and forming a complete rim, minutely pilose.

Endemic to N.T., and known only from the type locality on Wollongorang Stn, at the extreme easterly extent of the species distribution. Common among boulders on sandstone scree slope, flowers and fruits in July.



4. *Pentalepis linearifolia* Orchard in A.E.Orchard & E.W.Cross, *Nuytsia* 22: 385 (2012)

T: track to Surveyors Falls from Mitchell Plateau, W.A., 22 Apr. 1977, *A.S.George 14488*; holo: CANB498309; iso: K, MEL262462, PERTH418048 *n.v.*

Erect, branching, annual herb 0.2–0.6 (–1.4) m tall; stems slender, moderately covered with appressed hairs. Leaves sessile, stiff, narrowly linear, (20–) 40–50 mm long, (1.0–) 1.5–2.0 mm wide, entire, blunt; both surfaces moderately densely appressed-pilose; hairs 0.5–0.8 mm long, white, 2-celled with basal cell thickened, often seated on rosette of tiny epidermal cells, upper cell narrower, tapering. Stems and involucre bracts with hairs as for leaves. Capitula in lax, open dichasial inflorescence (synflorescence) on slender peduncles 40–50 mm long; involucre obconical, 5 mm long, 5 mm wide. Disc florets 20–22, yellow. Achenes obovate, 3.5–4.0 mm long, 2.0–3.0 mm wide, weakly keeled, with a spreading membranous wing throughout or only in upper part (and then wing thickened and revolute below). Pappus a shallow cup with 2 short soft awns.

Occurs in the northern Kimberley, W.A., with occasional outliers in N.T. Two subspecies are recognised.

Achenes with membranous spreading wings throughout, ciliate on margins at least apically, and frequently lacerate or interrupted

4a. subsp. *linearifolia*

Achenes with wings spreading and membranous only at apex, ciliate throughout, basally with wings thickened, reflexed and undulate below

4b. subsp. *nudibranchoides*

4a. *Pentalepis linearifolia* Orchard subsp. *linearifolia*

Illustration: A.E.Orchard & E.W.Cross, *Nuytsia* 22: 387, fig. 7A–H (2012)

Erect, slender, ephemeral herbs 20–60 (–140) cm tall. Achenes 3.5 mm long, dark grey to black; adaxial surface smooth, apart from weak longitudinal keel, minutely pilose throughout; abaxial surface convex, with weak central longitudinal keel, apically minutely pilose, otherwise glabrous; wings reddish brown, membranous and spreading throughout, often lacerate or interrupted, ciliate on margins at least apically. Fig. 71A–H.

Endemic to W.A., in the N Kimberley, on the Mitchell Plateau and towards Port Warrender. Found in herbfields and grassland,



open woodlands and vine thickets, in gravelly soils, loams and laterite, often over basalt. Flowers & fruits (Feb.–) Mar.–July (–Aug.).

W.A.: Mitchell Plateau, c. 10 km SE of Mining Camp, *Hj.Eichler 22454* (CANB, NSW, PERTH); Mitchell Plateau Mining Camp, *P.A.Fryxell & L.A.Craven 4016* (CANB, DNA, MEL, PERTH); Crusher Vine Thicket, Mitchell Plateau, *K.F.Kenneally 5335* (CANB); Port Warrender, *J.Lewis 53* (CANB, PERTH).

Leaves are often brittle and sparse, and because of their narrowness, the 2 lateral veins usually present in the leaves of *Pentalepis* are absent or obscure in this species. Flowers are usually described as yellow, but in one case as orange.

4b. *Pentalepis linearifolia* subsp. *nudibranchoides* Orchard in A.E.Orchard & E.W.Cross, *Nuytsia* 22: 389 (2012)

T: 36 km S of Kalumburu, W.A., 26 May 1993, *I.D.Cowie 4287 & L.Craven*; holo: PERTH5815282; iso: CANB479561, DNA71608, MEL1619327.

Illustration: A.E.Orchard & E.W.Cross, *op. cit.* 387, fig. 7I, J.

Erect annual herbs 30–60 (–100) cm tall. Achenes 3.5–4.0 mm long, dark grey; adaxial surface weakly keeled, minutely tuberculate, minutely pilose throughout; abaxial surface convex, weakly longitudinally keeled, otherwise smooth, minutely pilose apically; wings reddish brown to grey, narrow, membranous and spreading near apex, thickened, revolute and deeply crenate below, ciliate on margins above and below. Fig. 7I–J.

Endemic to the N Kimberley, along the Carson R. catchment, with one (possibly two) collections from the Katherine/Mataranka area in N.T. Found on lateritic gravel soils, clay loam over dolerite and stony basalt, in *Eucalyptus* spp. woodland and grassland, at altitudes to at least 140 m. Flowers & fruits Apr.–May (–June).

W.A.: Kalumburu road, 224.3 km by road N of junction with Gibb River–Ellenbrae road, *T.E.H.Aplin et al. 836* (CANB); Gibb River–Kalumburu Mission road, 1.5 km N of Coondillah Ck, *A.C.Beauglehole 52057* (PERTH); 8 km W of Kalumburu near Poompongala Hill, *I.D.Cowie 4258 & C.Brubaker* (CANB, DNA, PERTH); 15 km N of Theda jumpup & 2 km S of Honganai Ck, *D.E.Symon 10174* (AD, CANB). N.T.: E of Mataranka on Elsey Stn, *S.T.Blake 17527* (AD, BRI).

Only one definite record of this taxon (dated 1947) is known from the N.T., but a second, in flower only (Northmeat Farm, Katherine, *C.S.Robinson 47*, DNA), probably represents this plant.



5. *Pentalepis kakaduensis* E.W.Cross in A.E.Orchard & E.W.Cross, *Nuytsia* 22: 389 (2012)

T: N.T., Kakadu Natl Park [precise locality withheld], 17 Mar. 1987, *I.D.Cowie 576*; holo: DNA59743 (2 sheets).

Illustration: A.E.Orchard & E.W.Cross, *op. cit.* 381, fig. 4I–R.

Erect, slender, branching annual 30–40 cm tall; stems sparsely appressed-pilose. Leaves trifid, with central lobe greatly exceeding length of 2 basal, lateral lobes, giving the appearance of three simple leaves, apparently 1-veined; lobes linear to narrowly lanceolate, 15–65 mm long, 2–4 mm wide, entire or with occasional small tooth; adaxial surface strigose; abaxial surface with hairs restricted to margins and midrib; hairs 0.2–0.3 mm long, appressed, 2-celled with basal cell swollen, seated on cluster of tiny epidermal cells, upper cell conical. Capitula sparse, in open, lax dichasial clusters, on slender peduncles to 35 mm long; involucre campanulate-hemispherical, 3 mm long, 3–5 mm wide. Disc florets 10–15; corolla yellow. Achenes obovate, 2.8–3 mm long, 1.7–2 mm wide, dark brown to black; abaxial surface convex with minute hairs apically, otherwise smooth; adaxial surface concave, flat, with weak central keel, minutely pilose throughout, occasionally papillose; margin a thickened revolute wing, usually crenate, often with apical points touching on adaxial surface. Pappus diminutive or absent, if present coroniform, lacking awns. Fig. 70 I–R.



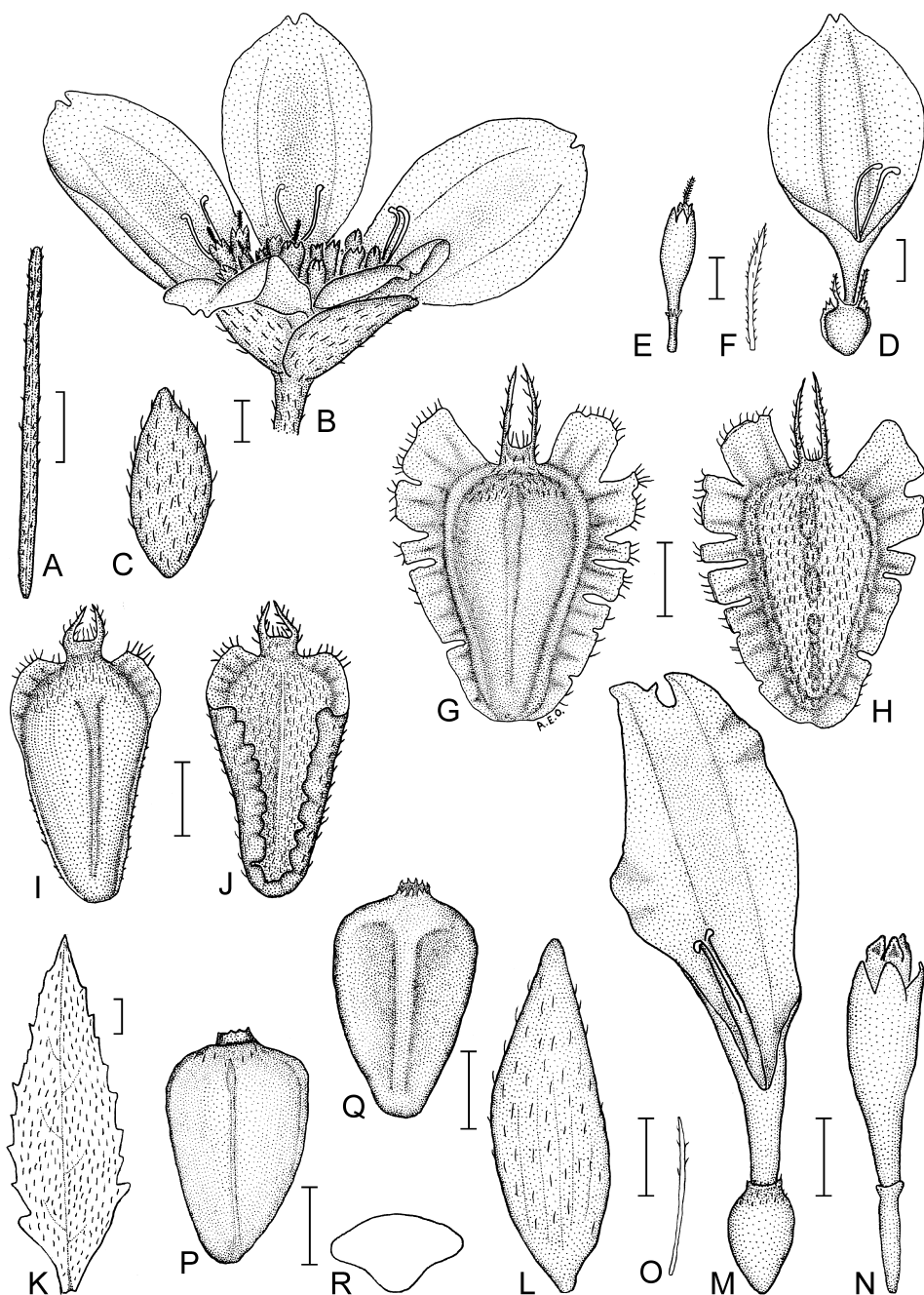


Figure 71. *Pentalepis*. **A–H**, *P. linearifolia* subsp. *linearifolia*. **A**, leaf; **B**, capitulum; **C**, involucre bract; **D**, ray floret; **E**, disc floret; **F**, palea; **G**, achene, abaxial view; **H**, achene, adaxial view (**A–H**, A.S.George 14488, CANB). **I, J**, *P. linearifolia* subsp. *nudibranchioides*. **I**, achene, abaxial view; **J**, achene, adaxial view (**I, J**, I.D.Cowie 4287 & L.Craven, PERTH). **K–R**, *P. walcottii*. **K**, leaf; **L**, involucre bract; **M**, ray floret; **N**, disc floret; **O**, palea; **P**, achene, abaxial view; **Q**, achene, adaxial view; **R**, achene TS (**K–R**, J.H.Willis s.n., DNA isotype). Scale bars: **A, K** = 1 cm; **B–J, L–R** = 1 mm. Drawn by A.E.Orchard.

Known from only three N.T. collections, two from Kakadu Natl Park, in *Eucalyptus* woodland with shallow soils and lateritic gravel at surface, the other from Napier Penin., in a similar habitat. Flowers and fruits Feb., Mar. and June.

N.T.: Napier Penin., *K.G.Brennan* 7328 (CANB, DNA); Kakadu Natl Park, *C.R.Dunlop* 7656 & *P.Minchin* (BRI, DNA).

This species, with *P. walcottii*, differs from other *Pentalepis* taxa in having a reduced pappus cup and no awns. Because of its narrow leaves, the 2 lateral veins usually present in the leaves of *Pentalepis* are absent or obscure in this species.

6. *Pentalepis walcottii* E.W.Cross in A.E.Orchard & E.W.Cross, *Nuytsia* 22: 390 (2012)

T: N Kimberley, Vansittart Bay, W.A., 26 May 1984, *J.H.Willis s.n.*; holotype: PERTH1656546; iso: DNA28761, MEL1152600.

Pentalepis sp., P.O.Karis *et al.*, *Austral. Syst. Bot.* 6: 153 (1993), *p.p.*

Erect, herbaceous, branched annual, 0.4–1.0 m tall; stems slender, striate, with appressed hairs with multi-cellular bases. Leaves subsessile, ovate to lanceolate, (30–) 50–100 mm long, (4–) 15–25 mm wide, regularly or irregularly coarsely toothed, acute; both surfaces sparsely to moderate densely strigose; hairs 0.3–0.5 mm long, appressed, white, 2-celled with basal cell swollen, seated on a cluster or rosette of tiny epidermal cells, and apical cell narrower, tapering. Capitula several in an open dichasial cluster, on slender peduncles 4–50 mm long. Involucre campanulate, 5–6 mm long, 2–5 mm wide. Disc florets 9–15; corolla ?yellow. Achenes obovate, 2–3 mm long, 2 mm wide, dark grey; abaxial surface convex with prominent keel, glabrous or very sparsely pilose with short white hairs apically; adaxial surface concave, with a prominent keel, glabrous, not winged. Pappus a short cup with regularly placed inward pointing hairs; awns absent. Fig. 71K–R.

Endemic to W.A., in the NW Kimberley, from Walcott Inlet to Carson R., including on a number of offshore islands; growing in sandy soils, on outcrops or gravel beds, on sandstone or basalt, often associated with creeks, rivers and bays. Flowers and fruits Mar.–June.

W.A.: Carson R., 1891, [*J.J.Bradshaw* & [*W.T.*] *Allen s.n.* (MEL); E shore of Ian Bay off Napier Broome Bay, *P.A.Fryxell* 4182 & *L.Craven* (CANB, MEL, PERTH); Barra Ck, 13 km SE King Cascade, *K.F.Kenneally* 11178 (DNA, PERTH); King Anna, S end of Vansittart Bay, *A.A.Mitchell* 2895 (PERTH); Osborne Is., Bonaparte Archipelago, *P.G.Wilson* 11124 (PERTH).



The two lateral veins usually present in the leaves of *Pentalepis* are weak and obscure in this species. Instead the leaves appear pinnate-veined. The plant is described as sticky (*P.G.Wilson* 11124).

Pentalepis sp., *sensu* Karis *et al.* (1993), was based on a mixture of elements of *P. ecliptoides* subsp. *ecliptoides* and *P. walcottii*.

7. ECLIPTA

A.E.Orchard & E.W.Cross

Eclipta L., *Mant. Pl.* 2: 157 (1771); from the Greek *ekleipo* (to lack), as some species are without a pappus or wings.

Type: *E. erecta* L.

Annual or perennial herbs; stems usually weak, procumbent, annual. Leaves simple, opposite, sessile to shortly petiolate, linear to lanceolate or elliptic, entire to minutely toothed, 3-nerved (sometimes obscurely); base rounded to attenuate. Capitula solitary or in dichasial clusters in upper leaf axils, radiate; involucre bracts in 2 series, \pm equal, herbaceous;

receptacle paleate; paleae narrowly linear, keeled, sparsely hairy, sometimes absent from central florets. Ray florets in several series, female or sterile; ligule narrow, usually 2-lobed, white or yellow. Disc florets bisexual, fertile; corolla 4-lobed; anther sacs yellow or black; pappus a membranous cup, sometimes produced into 2–4 short weak awns, rarely absent. Immature achenes smooth; mature achenes slightly dimorphic, oblong, tuberculate, with marginal achenes \pm 3-angled, others 4-angled, angles sometimes thickened and cartilaginous, or winged. Pappus a short, entire or toothed crown of connate scales, sometimes appearing to be 2–4 short soft awns.

A genus of six species, native to S America and Australia. Australia has 3 species, 2 endemic and 1 introduced.

R.Melville, An abberant species of *Eclipta* from Australia, *Trans. Roy. Soc. S. Australia* 83: 77–78 (1960); A.E.Orchard & E.W.Cross, A revision of the Australian species of *Eclipta* (Asteraceae: Ecliptinae), with discussion of extra-Australian taxa, *Nuytsia* 23: 43–62 (2013).

- | | | |
|----|---|---------------------------------|
| 1 | Achenes with broad erose wings | 1. <i>E. alatocarpa</i> |
| 1: | Achenes wingless, with or without cartilaginous margins | |
| 2 | Rays yellow, 8–12; upper leaves abruptly contracted basally; involuclral bracts pouched basally | 2. <i>E. platyglossa</i> |
| 2: | Rays white, numerous; upper leaves gradually tapered to base; involuclral bracts rounded basally, not pouched | 3. <i>E. prostrata</i> |

1. *Eclipta alatocarpa* Melville, *Trans. Roy. Soc. S. Australia* 83: 77 (1960)

T: S.A., Arkaringa Ck, 12 miles [c. 19 km] N of Mt Barry Stn, 60 miles [c. 95 km] S of Oodnadatta, 30 Aug. 1955, *E.H.Ising* 3766; holo: K 9768; iso: AD *n.v.*, CANB318615, K9767, MEL2196379.

Illustrations: R.Melville, *op. cit.* 78; J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1435, fig. 644A (1986); A.E.Orchard & E.W.Cross, *Nuytsia* 23: 49, fig. 1 (2013).

Decumbent annual herb (10–) 30–40 cm tall; stems weak, scabrous to subglabrous. Leaves subsessile, distant, lanceolate, (15–) 25–50 mm long, 5–12 (–14) mm wide, attenuate basally, entire or with few irregular tiny teeth, scabrous; hairs 0.4–0.5 mm long, semiappressed, with lower cell swollen. Capitula solitary or clustered on peduncles 5–15 mm long; involuclral bracts 8–10, ovate, lanceolate or elliptic, 5–6 mm long, shortly pouched at base, striate, scabrous. Ray florets 9–11; ligule obovate, c. 2 mm long, shortly 2-lobed, yellow. Disc florets 20–25; corollas yellow. Achenes 4–6 mm long, 5–6 mm wide, obovate, papillose or roughened when mature; ray achenes with 3 flat erose wings, with pappus of several connate scales to 1 mm long, 1 or 2 of these extended as short soft spines; disc achenes similar but with 2 erose wings. Fig. 72A–F.

Endemic to Australia, restricted to scattered localities in S.A., N.T. and Qld, growing in heavy soils (black cracking soils, clays, alluvium) in damp areas or locations subject to intermittent flooding, streamsides and floodplains. Flowers and fruits recorded Mar.–Aug.

N.T.: Andado Stn, *P.K.Latz* 6781 (AD, CANB, DNA, MEL). S.A.: Coober Pedy–Oodnadatta road, at the crossing of the Algebullcullia Ck, *D.E.Symon* 16210 & *J.Symon* (AD); Peake Ck, between William Creek and Oodnadatta, *J.Z.Weber* 8922 (AD). Qld: 80 km SE of Waterloo HS, *A.J.Emmott* 266 (AD, BRI); Currawinya Natl Park, Paroo R. floodplain S of Caiwarra ruins, *P.I.Forster* 20511 & *M.Watson* (BRI, MEL).

The illustration of '*Eclipta alatocarpa*' in J.P.Jessop, *Fl. Central Australia* 381 (1981) is *E. prostrata*.



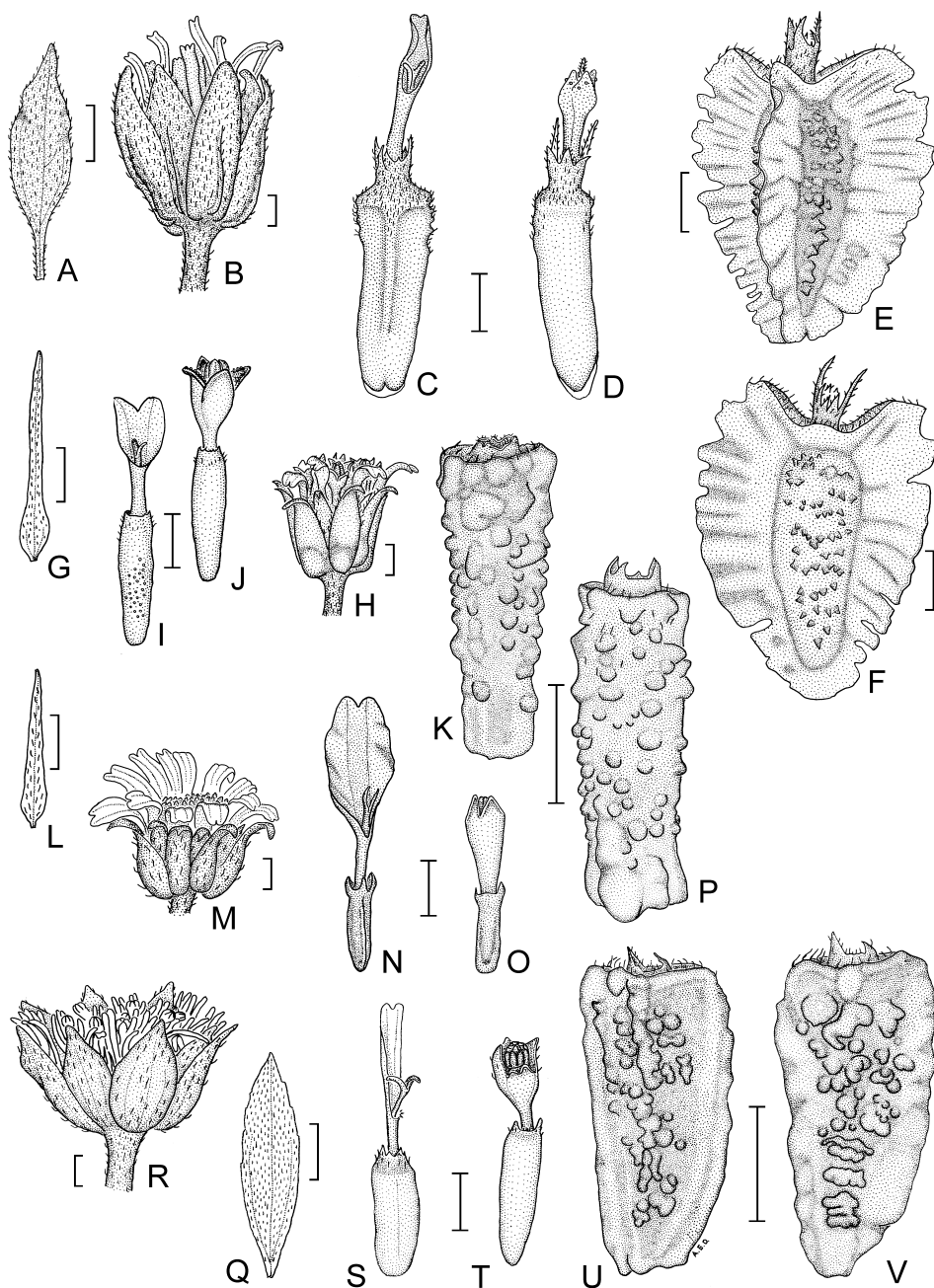


Figure 72. *Eclipta*. A–F, *E. alatacarpa*. A, leaf; B, capitulum in flower; C, ray floret; D, disc floret; E, ray achene; F, disc achene (A–F, D.E.Symon 15668, AD). G–K, *E. platyglossa* subsp. *platyglossa*. G, leaf; H, capitulum in flower; I, ray floret; J, disc floret; K, achene (G–K, A.R.Bean 8211, MEL). L–P, *E. platyglossa* subsp. *borealis*. L, leaf; M, capitulum in flower; N, ray floret; O, disc floret; P, achene (L–P, H.S.McKee 8360, CANB). Q–V, *E. prostrata*. Q, leaf; R, capitulum in flower; S, ray floret; T, disc floret; U, ray achene; V, disc achene (Q–V, A.Fraser 353, CANB). Scale bars: A, G, L, Q = 1 cm; B–F, H–K, M–P, R–V = 1 mm. Drawn by A.E.Orchard.

2. *Eclipta platyglossa* F.Muell., *Fragm.* 2: 135 (1861)

Wollastonia ecliptoides F.Muell., *Pl. Victoria Lithograms*, legend to Pl. 39 (1865), *nom. illeg., superfl.*; *Wedelia ecliptoides* F.Muell., *loc. cit.* (1865), *nom. inval., pro syn.* T: Per amplos Novae Hollandiae extratropicae tractus; sic ad flumina Yarra Yarra, Avoca, Murray, Darling, ad sinus littorales St. Vincent's Gulf et Moreton Bay, alibique; lecto: Avoca, Dec. [18]53, *Dr. M[ueller] s.n.*, MEL2217443, *fide* A.E.Orchard & E.W.Cross, *Nuytsia* 23: 50 (2013); residual syns: see A.E.Orchard & E.W.Cross, *loc. cit.*

[*Eclipta erecta* auct. non L.: O.W.Sonder, *Linnaea* 25: 482 (1852), based on specimen [S.A.]: in umbrosis ad ripam fl. Torrens, Jan., *Herb. F.Mueller s.n.* (specimen not located).

Prostrate or ascending, slender, perennial herb (5–) 20–30 cm tall; stems prostrate, rooting at nodes, with short appressed hairs. Leaves subsessile, distant, narrowly lanceolate to linear, 15–50 (–80) mm long, 2–7 mm wide, abruptly contracted at base, \pm entire or with few tiny scattered teeth; both surfaces appressed-pilose; hairs 0.3–0.8 mm long, appressed or semi-erect, with lower cell swollen or not. Capitula solitary or clustered on peduncles 5–40 mm long; involucre bracts 8–10, lanceolate, pouched at base, sparsely hairy, weakly striate, 3–4 mm long, pilose. Ray florets 8–12; ligule oblong, 2-lobed, yellow. Disc florets 8–15; corollas yellow. Achenes cylindric, 2–3 mm long, 1 mm wide, yellow-brown to purple-black, densely tuberculate when mature; ray achenes \pm 3-angled, not winged; disc achenes \pm 4-angled, otherwise similar; pappus absent or a minute cup with irregularly ciliolate margins, 2–4 teeth sometimes produced into short soft awns. *Yellow Twin Heads, Yellow Eclipta.*

An endemic Australian species, within which two subspecies can be distinguished, one mainly southern temperate to subtropical, the other northern tropical.

This species differs from the introduced *E. prostrata* in lacking cartilaginous thickened margins on the achene, in having leaves which are abruptly contracted at the base, in its yellow florets, and in having capitula with c. 20–30 florets (rather than c. 50 up to 200). The paleae in *E. platyglossa* are found mainly subtending the outer florets, absent from the central ones, while in *E. prostrata* most florets have a palea. In addition, the involucre bracts in *E. prostrata* are gently curved at the base, while those of *E. platyglossa* are distinctly pouched.

Leaves appressed-pilose; hairs soft, fine throughout; ligules c. 1 mm long;
hairs on involucre bracts sparse, mainly marginal

2a. subsp. *platyglossa*

Leaves semierect-pilose; hairs stiff, with swollen basal cell; ligules
c. 2 mm long; hairs on involucre bracts moderately dense, dorsal and
marginal

2b. subsp. *borealis*

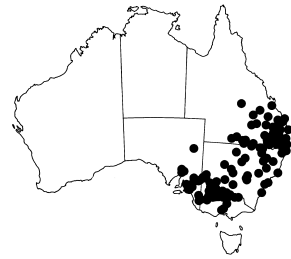
2a. *Eclipta platyglossa* F.Muell. subsp. *platyglossa*

Illustrations: F.Mueller, *Pl. Victoria Lithograms*, Pl. 39 (1865), as *Eclipta platyglossa*; G.M.Cunningham *et al.*, *Pl. W. New South Wales* 666 (1981); A.E.Orchard & E.W.Cross, *Nuytsia* 23: 53, fig. 3A–L (2013).

Leaves and stems appressed-pilose; hairs fine, without swollen bases. Involucre bracts sparsely hairy, with hairs mostly marginal. Ray floret ligule c. 1 mm long, \pm equal in length to involucre. Pappus on mature achenes absent or a minute cup to 0.1 mm long; awns rarely present on mature achenes. Fig. 72G–K.

Widespread in Qld, N.S.W., Vic. and S.A., south of latitude c. 23° 20' S. Found on heavy clay soils in damp situations (swamps, river flats, seepage areas) in grassland and woodland, at altitudes from sealevel to at least 470 m. Flowers and fruits recorded in all months.

S.A.: c. 6 km S of Blanchetown, *J.Z.Weber* 3409 (AD). Qld: Warrego Hwy, 22 km NW of Dalby, *A.R.Bean* 7616 (BRI); Turner Ck, 11.9 km N of Dalveen, *A.R.Bean* 8211 (BRI, MEL, NSW). N.S.W.: 0.4 km S of Gurley Ck, on Moree–Narrabri road, *A.R.Bean* 9490 (BRI). Vic.: Piangil, c. 40 km NW of Swan Hill, *R.V.Smith* 71/26 (AD, BRI, HO, MEL).



2b. *Eclipta platyglossa* subsp. *borealis* E.W.Cross & Orchard in A.E.Orchard & E.W.Cross, *Nuytsia* 23: 54 (2013)

T: W.A.: Fishfarm Rd, c. 15 km E from Kununurra, 21 Aug. 2000, *A.A.Mitchell* 6348; holo: PERTH6225217; iso: CANB571344, DNA *n.v.*

Eclipta ‘Humpty Doo entity’, C.R.Dunlop in I.D.Cowie *et al.*, *Floodplain Fl.* 184 (2000).

Eclipta sp. Humpty Doo (H.S.McKee 8360), R.A.Kerrigan & D.E.Albrecht (eds), *Checklist N. Terr. Vasc. Pl. Sp.* [unpag.] (2007).

Illustrations: J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 935, fig. 286N; 939, fig. 287I (1992), as *E. platyglossa*; I.D.Cowie *et al.*, *Floodplain Fl.* 185, fig. 36 (2000), as *E. ‘Humpty Doo entity’*; A.E.Orchard & E.W.Cross, *Nuytsia* 23: 53, fig. 3M–V (2013).

Leaves and stems semierect-pilose; hairs coarse, with basal cell swollen. Involucral bracts moderately densely pilose, with similar hairs, both marginal and dorsal. Ray floret ligule c. 2 mm long, usually exceeding involucre. Pappus on mature achenes a short cup to 0.3 mm long, often with 2–4 short deltoid awns Fig. 72L–P.

Widespread in northern W.A., N.T. and Qld north of latitude 19° 40' S. Found on heavy clay soils in swamps, marshes, drainage channels, and margins of pools, in grassland and woodland, including *Pandanus* swamp and the margin of salt flats and mangroves, at altitudes from sealevel to at least 400 m. Flowers and fruits recorded Feb.–Aug.



W.A.: Dampier Penin., Pender Bay at Weedong L., *S.J.Forbes* 2446 & *K.F.Kenneally* (MEL); E end of billabong in front of Carlton Hill Stn HS about 70 km N of Kununurra, *A.A.Mitchell* 3732 (PERTH). N.T.: Dalywoi Bay, c. 10 km SSE of Yirrakala, *I.Cowie* 6964 (DNA, MEL); Calvert rivermouth, *P.K.Latz* 10467 (DNA). Qld: 11.5 km N of Bizant Ranger Base, Lakefield Natl Park, *V.J.Neldner* 4035 (BRI).

This subspecies is distinguished from subsp. *platyglossa* by its coarser, longer, denser hairs, longer ligules, by its leaves having a midrib more deeply sunken above and prominent below, and by the pappus on mature achenes often produced into very short deltoid ‘awns’. It is separated geographically by several degrees of latitude.

3. **Eclipta prostrata* (L.) L., *Mant. Pl.* 2: 286 (1771)

Verbesina prostrata L., *Sp. Pl.* 2: 902 (1753). T: India; lecto: the plate *Chrysanthemum maderaspatanum, menthae arvensis...* in L.Plukenet, *Phytographia* t. 118, f. 5 (1691), *fide* D.O.Wijnands, *Bot. Commelins* 74 (1983).

Verbesina alba L., *Sp. Pl.* 2: 902 (1753); *Eclipta erecta* L., *Mant. Pl.* 2: 286 (1771), *nom. illeg., superfl.*; *E. alba* (L.) Hassk., *Pl. Jav. Rar.* 528 (1848); *E. alba* var. *erecta* (L.) Miq., *Fl. Ned. Ind.* 2(1): 95 (1856). T: Habitat in Virginia, Surinamo; *Herb. Linn. No. 1020.1*; lecto: LINN, *fide* W.G.D’Arcy, *Ann. Missouri Bot. Gard.* 62: 1102 (1975).

E. sp. Perth (S.Lloyd s.n. 3/4/1998), G.Paczkowska & A.R.Chapman, *W. Austral. Fl. Descr. Cat.* 161 (2000).

E. ‘Gove entity’, C.R.Dunlop, in I.D.Cowie *et al.*, *Floodplain Fl.* 184 (2000).

Eclipta sp. Gove (J.L.Egan 2784), R.A.Kerrigan, & D.E.Albrecht (eds), *Checklist N. Terr. Vasc. Pl. Sp.* [unpag.] (2007).

Illustrations: D.L.Nash, *Fieldiana, Bot.* 24(12): 521, fig. 66 (1976); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 562, fig. 78A (1986); I.D.Cowie *et al.*, *Floodplain Fl.* 185, fig. 36 (2000), as *E. ‘Gove entity’*, and *E. prostrata*.

Erect or decumbent, facultatively semiaquatic, perennial herb (15–) 30–60 (–100) cm tall; stems weak, scabrous, rooting adventitiously when prostrate or submerged. Leaves ±sessile, distant, lanceolate, narrowly ovate or elliptic, variable in size, usually 20–65 (–170) mm long, (2–) 5–20 (–40) mm wide, attenuate basally, entire to shortly and irregularly dentate; both surfaces appressed-pilose; hairs 0.4–0.6 mm long, slender throughout. Capitula solitary or clustered on peduncles 1–7 cm long; involucral bracts 8–10, ovate (outer) to lanceolate (inner), striate, 3–4 mm long, appressed-pilose. Ray florets numerous (30–70); ligule linear, 1–2 mm long, usually 2-lobed (some unlobed), white. Disc florets numerous (30+); corollas white. Achenes compressed-cuneate, 2.0–2.3 mm long, 0.8–1.0 mm wide, weakly

3- or 4-angled, not winged, strongly tuberculate, with 2 cartilaginous margins, with scattered hairs apically. Pappus absent or a minute ciliolate cup with 2 or 3 soft tooth-like awns. *White Eclipta*. Fig. 72Q–V.

A pantropical weed; a presumed native of S America. In Australia, widespread in Qld, N.T. and NE N.S.W.; in W.A. rare in the Kimberley and near Perth. Found in wet areas (floodplains, drainage lines, lake and river margins), on heavy clay soils, at altitudes from sealevel to at least 1000 m. When growing near stagnant water, facultatively sends submerged, adventitiously rooting shoots out into the water, and from these erect emergent flowering branches are produced. Flowers and fruits in all months.

W.A.: banks of Canning R., Liege St, Cannington, *S.Lloyd s.n.* (AD, BRI, CANB, MEL, PERTH). N.T.: Nhulunbuy Lagoon, Gayngaru Walk, *J.L.Egan 2784* (DNA). Qld: 1 km N of Daintree Ferry crossing, *B.Gray 6537* (QRS); Boyne R. near junction with Derrarabungy Ck, c. 25 km S of Mundubbera, *W.J.McDonald 6195* & *D.J.Baumgartner* (BRI). N.S.W.: Tuckean Is., W of Wardell, *A.R.Bean 17572* (BRI).



Leaf size in this species is very variable. Plants growing in swampy conditions can have leaves 9–17 cm in length, whereas most collections have leaves 2–6.5 cm long. This variation has led to the description of many local variants worldwide, all now included in a very extensive synonymy. See The Global Compositae Checklist (<http://compositae.landcareresearch.co.nz>, accessed 30 November 2011) which contains c. 100 synonyms.

The illustration of '*Eclipta alatocarpa*' in J.P.Jessop, *Fl. Central Australia* 381 (1981) is *E. prostrata*.

8. SPHAGNETICOLA

A.E.Orchard

Sphagneticola O.Hoffm., *Notizbl. Königl. Bot. Gart. Berlin* 3: 36 (1900); from *Sphagnetum* (a vegetation dominated by the moss *Sphagnum*) and the Latin *-cola* (dweller), i.e. swamp-dweller, referring to the moist environments in which members of this genus occur.

Type: *S. ulei* O.Hoffm.

Perennial herbs, prostrate (rarely annual and erect, but not in Australia). Leaves simple, opposite, petiolate or sessile, often lobed, entire to serrate or shortly dentate, 3-nerved; base shortly attenuate. Capitula terminal, appearing axillary in upper leaf, solitary or in clusters of 2–4, on long peduncles, radiate; involucre bracts in 2–4 unequal series, the outermost narrower, indurate or stramineous at base, green tipped, the innermost entirely stramineous; receptacle paleate; paleae linear to lanceolate or oblanceolate, often slightly lobed, rigid, keeled, sparsely hairy. Ray florets female and fertile, 2- or 3-lobed; ligule yellow-orange or yellow. Disc florets bisexual (rarely male but not in Australia); corolla 5-lobed, yellow to yellow-orange; anther sacs black. Achenes often dimorphic, tuberculate, lacking awns, and wings, body of achene sometimes extended apically and concealing pappus. Pappus an erose corona of connate scales seated on a rostrum.

A genus of 5 species common at lower elevations throughout much of the tropics and subtropics, except for Africa, often near waterways or in coastal zones. In Australia, 1 naturalised species.

The species in this recently resurrected genus have been variously placed in *Wedelia* Jacq., *Complaya* Strother and *Thelechitonina* Cuatrec., among others. See Strother (1991) and Pruski (1996) for discussion of morphology and relationships.

J.L.Strother, taxonomy of *Complaya*, *Elaphandra*, *Iogeton*, *Jefea*, *Wamalchitamia*, *Wedelia*, *Zexmenia*, and *Zyzyxia* (Compositae-Heliantheae-Ecliptinae), *Syst. Bot. Monog.* 33: 1–17 (1991); J.F.Pruski, Compositae of the Guayana highland—XI. *Tuberculocarpus* gen. nov. and some

other Ecliptinae (Heliantheae), *Novon* 6: 404–418 (1996); A.E.Orchard, A new species of *Sphagneticola* (Asteraceae: Ecliptinae) from Indonesia, *Blumea* 58: 49–52 (2013).

****Sphagneticola trilobata* (L.) Pruski, *Mem. New York Bot. Gard.* 78: 114 (1996)**

Silphium trilobatum L., *Syst. Nat.*, ed. 10 1233 (1759); *Wedelia trilobata* (L.) Hitchc., *Rep. (Annual) Missouri Bot. Gard.* 4: 99 (1893). T: the illustration, *Buphthalmum caule repente*, J.Burman in C.Plumier, *Pl. Amer.* 97, t. 107, f. 2 (1757); lecto, *fide* R.A.Howard, *Fl. Lesser Antilles* 6: 616 (1989).

Illustrations: J.L.Strother, *Syst. Bot. Monogr.* 33: 11, fig. 5b (1991) as *Complaya trilobata*; N.Smith, *Weeds N. Australia* 65 (2011); A.E.Orchard, *Blumea* 58: 51 (2013).

Creeping, mat-forming, semisucculent perennial herbs; stems rounded, rooting at nodes, 1–3 (–4) m long, with flowering branches ascending to (10–) 70–100 cm tall, sparsely appressed-pilose/scabrous, sometimes subglabrous. Leaves fleshy, with broadly winged petioles or sessile, lanceolate to ovate or obovate, 4–9 cm long, (1.5–) 2–5 cm wide, usually with a pair of lateral lobes or enlarged lower teeth, irregularly toothed marginally, acute, rarely obtuse. Capitula solitary, terminal (but appearing axillary), 3.0–3.5 cm diam. including rays; peduncles 3–10 cm long; receptacle convex to conical; involucre bracts 12–15, to 10 mm long, unequal; paleae linear to oblanceolate, yellow-orange-tipped, erect or arching over florets and somewhat enfolding them, persistent. Ray florets 4–10; ligule 6–15 mm long, 3-lobed, yellow-orange with c. 8 darker longitudinal veins. Disc florets with yellow-orange corollas. Achenes urceolate, 4–5 mm long, tuberculate; ray achenes 3-angled; disc achenes 2-angled; body of achene extended as an apical collar, hiding the pappus. Pappus a crown of short fimbriate scales on a stout rostrum. $2n = 40, 50–54, 56, 58, 60$, W.L.Wagner *et al.*, *Man. Fl. Pl. Hawai'i*, Rev. edn 373 (1999), as *Wedelia trilobata*; J.L.Strother, *Syst. Bot. Monog.* 33: 1–17 (1991), as *Complaya trilobata*. *Singapore Daisy*, *Creeping Ox-eye*, *Trailing Daisy*, *Wild Marigold*. Plate 54; Fig. 73.

Native range not known, but probably Central and South America, Mexico to Argentina. Widely cultivated as an ornamental globally, and locally established in coastal areas throughout tropical and subtropical latitudes, especially in coastal and moist habitats. An invasive spreading weed inhabiting the coastal strip of E Australia from Byron Bay (northern N.S.W.) to far N Qld (Torres Strait), with scattered occurrences in N.T. and W.A. Also naturalised on Lord Howe Is. Found in coastal dune systems, and in boggy situations in swamps, on creek banks and near dams, in sandy to clay soils, often invading natural woodlands and rainforest, at altitudes from sealevel to at least 680 m. Flowers and fruits all months.



W.A.: Kimbolton HS, c. 200 km N of Derby, *A.A.Mitchell 6108* (CANB). N.T.: Casuarina Coastal Res., *I.D.Cowie 1468* & *C.R.Dunlop* (BRI, CANB, DNA, MEL, PERTH). Qld: beside Brisbane R., park in Teesdale St, Corinda, *T.P.Boyle 101* & *G.N.Batianoff* (BRI); Home Rule near dam, 3 km E of Rossville, *P.I.Forster 24342* & *R.Booth* (BRI, QRS). N.S.W.: north end of southern part of Cowper St, Byron Bay, *J.R.Hosking 2022* (CANB, MEL, NE).

This species establishes from discarded garden waste and escapes from cultivation, spreading by its long prostrate stems which readily root at the nodes. Heavily promoted by plant nurseries in the 1970s, it was deliberately planted as a roadside and railway embankment stabiliser in Qld (L.Murray, <http://plantnet.rbgsyd.nsw.gov.au>, accessed 29 Jan. 2013). It forms a dense ground cover crowding out or preventing regeneration of other species.

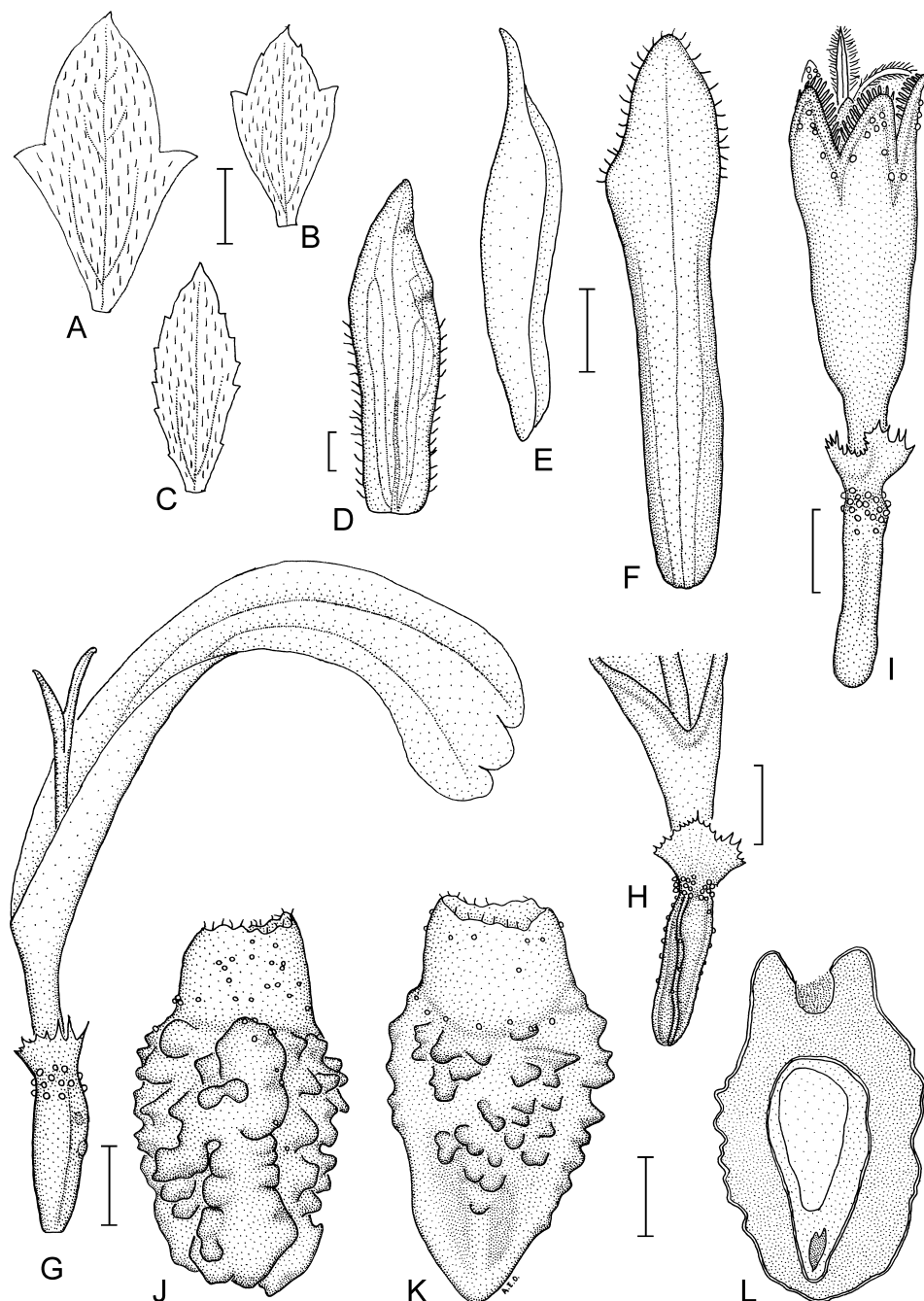


Figure 73. *Sphagneticola trilobata*. A–C, leaves, lower to upper; D, involucral bract; E, ray palea, lateral view; F, disc palea, dorsal view; G, ray floret, lateral view; H, detail of base of ray floret, adaxial view; I, disc floret; J, ray achene; K, disc achene; L, longitudinal section of achene (A–L, R.W.Purdie 7947, CANB). Scale bars: A–C = 1 cm; D–L = 1 mm. Drawn by A.E.Orchard.

ASTERACEAE

9. WOLLASTONIA

A.E.Orchard

Wollastonia DC. ex Decne., *Nouv. Ann. Mus. Hist. Nat.* 3: 414 (1834); in honour of William Hyde Wollaston (1766–1828), discoverer of the elements palladium and rhodium, developer of a commercial process for refining platinum, designer of the camera lucida, early electrical batteries, and the meniscus lens.

Wedelia sect. *Wollastonia* (DC. ex Decne.) Benth. & Hook.f., *Gen. Pl.* 2: 371 (1873). T: *Wollastonia scabriuscula* DC ex Decne.

Perennial herbs or subshrubs, with taproot; stems erect, arcuate or sometimes prostrate and rooting at nodes. Leaves simple, opposite, petiolate, ovate or deltate to linear, sometimes trilobed to pinnately lobed (rarely ternately compound), entire or remotely to closely serrulate or serrate, 3-nerved; base attenuate or truncate. Capitula terminal on main or lateral shoots, solitary or few, long-pedunculate, radiate; involucre bracts in c. 2 subequal series, all lanceolate to ovate, herbaceous; receptacle paleate; paleae (ob-)lanceolate to ovate or oblong, rigid, keeled, obtuse or subapiculate, ±hooded, dorsally scabrous. Ray florets female, fertile; ligule 2- or 3-lobed, yellow. Disc florets bisexual, fertile, rarely male; corolla 5-lobed, yellow; anther sacs black. Achenes usually obovoid to obconical, truncate, sometimes shortly and irregularly winged, apically shortly pilose; ray achenes 3-angled; disc achenes 2- or 4-angled. Pappus of 1–6 short fragile awns, a ring of tiny scales, or absent.

A genus of 20 species, from coastal regions in the Indo-Pacific, extending from the east coast of Africa to Malesia, China, Japan, Australia and the south Pacific. A group of 16 species are endemic to Hawai'i. Two native species in Australia and island Territories.

There has been much debate over the generic limits of *Melanthera* Rohr., *Lipochaeta* DC., *Wedelia* Jacq. and *Wollastonia* DC. ex Decne. See Orchard (2013) for a detailed discussion.

H.Wild, The African species of the genus *Melanthera* Rohr, *Kirkia* 5: 1–17 (1965); F.R.Fosberg & M.H.Sachet, *Wollastonia*, pp. 30–34, in *Systematic studies of Micronesian plants, Smithsonian Contr. Bot.* 45: 1–40 (1980); A.C.Smith, *Wollastonia*, *Fl. Vit. Nova* 5: 271–273, fig. 31 (1991); W.L.Wagner & H.Robinson, *Lipochaeta* and *Melanthera* (Asteraceae: Heliantheae subtribe Ecliptinae): establishing their natural limits, with a synopsis, *Brittonia* 53(4): 539–561 (2002); A.E.Orchard, The *Wollastonia/Melanthera/Wedelia* generic complex (Asteraceae: Ecliptinae), with particular reference to Australia and Malesia, *Nuytsia* 23: 337–466 (2013).

Leaves dark green, sparsely appressed-pilose beneath; ray florets 8–12, and disc florets 20–35 per capitulum

1. *W. biflora*

Leaves grey-green to yellow-green, densely erect to semiappressed-pilose beneath; ray florets (12–) 14–16, and disc florets c. 50 per capitulum

2. *W. uniflora*

1. *Wollastonia biflora* (L.) DC., *Prodr* 5: 546 (1836)

var. *biflora*

Verbesina biflora L., *Sp. Pl.* 2nd edn, 2: 1272 (1763); *Acmella biflora* (L.) Spreng., *Syst. Veg.* 3: 591 (1826); *Wedelia biflora* (L.) DC. ex Wight, *Contr. Bot. India* 18 (1834); *Stemmodontia biflora* (L.) W.Wight, *Contr. U.S. Natl. Herb.* 9: 377 (1905); *Melanthera biflora* (L.) Wild, *Kirkia* 5: 4 (1965). T: 'Habitat in India', *Herb. Linn. No. 1021.4*; lecto: LINN, *fide* H.Wild, *loc. cit.*

Wollastonia scabriuscula DC. ex Decne., *Nouv. Ann. Mus. Hist. Nat.* 3: 414 (1834), *nom. illeg. superfl.* T: in insula Timor leger. itin. Baudiniani botanici, in India orient. ad Penang, Singapore, Silhet, Rangoon cl. Wallich, et in insulis Mariannis cl. Haenke, v.s. comm. a Mus. reg. Par. et ab hou. Cur. Ind. or. angl.

Wollastonia insularis DC., *Prodr.* 5: 548 (1836). T: 'in sterilibus saxosis insularum ad oram borealem Australasiae ap. flor. legit cl. A. Cunningham'; holo: G-DC; iso: BM, K.

Illustrations: C.-I.Peng *et al.*, *Fl. Taiwan* 2nd edn, 4: 188, photo 498 (1998); H.J.Beentje & D.J.N.Hind, *Fl. Trop. E Africa Compositae (part 3)* 743, fig. 156 (2005); A.C.Smith, *Fl. Vit. Nova* 5: 272, fig. 31 (1991), all as *Wedelia biflora*.

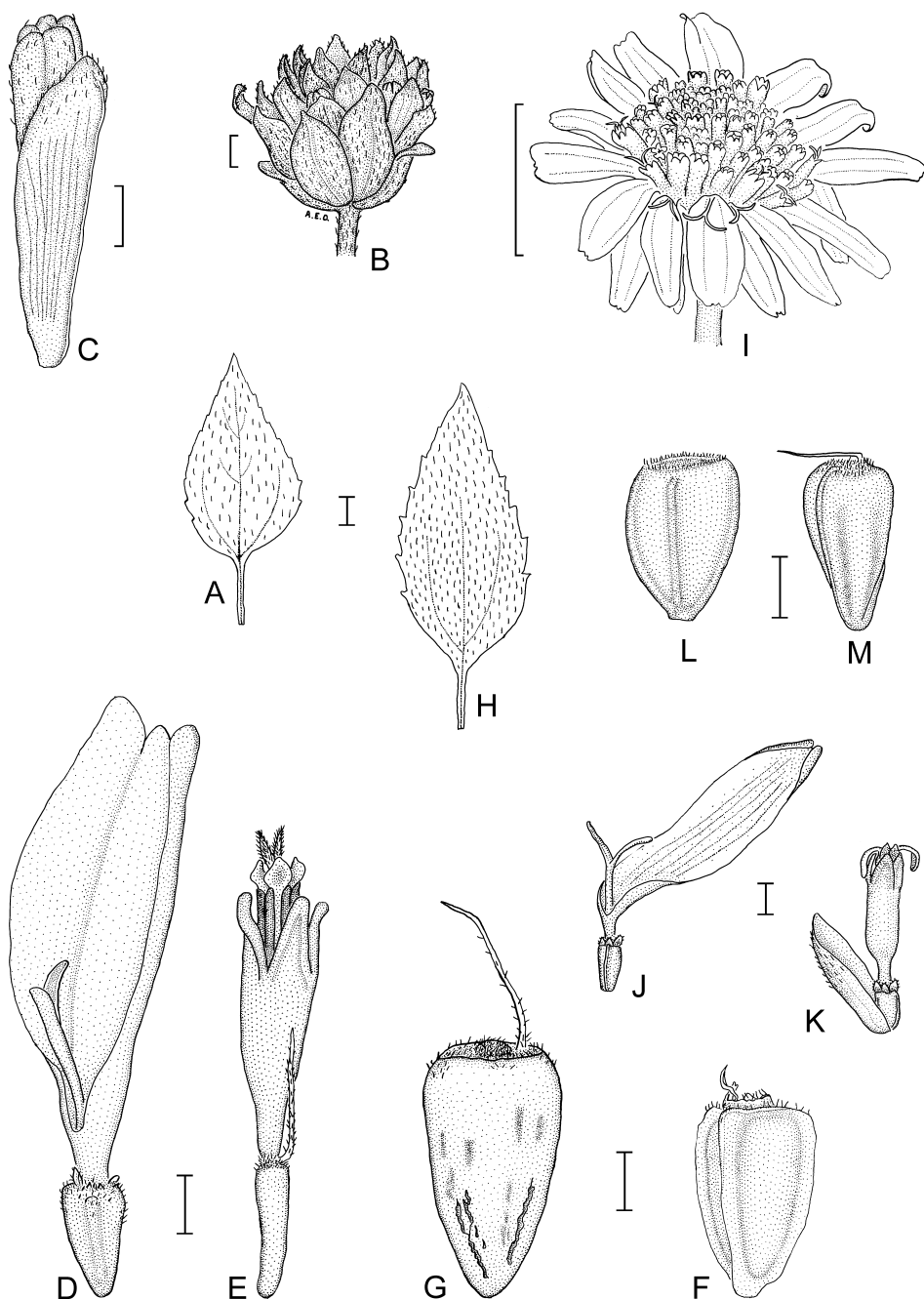


Figure 74. *Wollastonia*. **A–G**, *W. biflora* var. *biflora*. **A**, leaf; **B**, capitulum in flower (bud); **C**, palea and disc floret in bud; **D**, ray floret; **E**, disc floret; **F**, slightly immature 3-angled achene; **G**, mature achene with corky outer layer, weakly 4-angled. (**A–G**, M.J.R.Barritt 1779, DNA). **H–M**, *W. uniflora*. **H**, leaf; **I**, capitulum in flower; **J**, ray floret; **K**, disc floret within palea; **L**, 3-angled ray achene; **M**, 4-angled disc achene (**H–M**, G.N.Batianoff 981060 & J.Hacker, CANB). Scale bars: **A**, **H**, **I** = 1 cm; **B–G**, **J–M** = 1 mm. Drawn by A.E.Orchard.

Usually scandent subshrub (0.8–) 1.0–3.0 m tall; stems decumbent or scrambling, not rooting at nodes, \pm glabrous. Leaves with petiole 25–35 (–70) mm long; lamina ovate, 6–11 (–24) cm long, 3–6 (–12) cm wide, rounded to truncate at base, entire to very shortly or coarsely serrate, usually attenuate, dark glossy green; both surfaces sparsely appressed-pubescent with fine hairs. Capitula 1–3, 1.5–3.0 cm diam., on peduncles 1.5–3.0 cm long. Involucral bracts 3.5–4.5 mm long, appressed-pilose; paleae oblanceolate to subspathulate, 5 mm long, 2 mm wide, very shortly apiculate, stramineous, membranous, striate and glabrous below, green apically. Ray florets 8–12; ligule 3-lobed, yellow. Disc florets c. 20–35; corolla yellow. Achenes obovoid, 3- or 4-angled, 3.5–4.5 mm long, 2.0–2.7 mm wide, grey black (white when immature), corky, apically truncate and shortly pilose, otherwise glabrous, with usually 1 erect antrorsely barbed fragile awn c. 2 mm long, or awn absent. $2n = 30$, K.Iwatsuki *et al.* (eds), *Fl. Japan* 3b: 34 (1995). *Gauri* (Dauan Is., *M.Lawrie s.n.*, BRI); *Wasao* (Murray Is., *M.Lawrie* 14, BRI); *Ton-dronganama* (Mapoon, *J.F.Bailey s.n.*, BRI). Fig. 74A–G.

A widespread coastal species of the Indo-Pacific (East Africa to S, SE and E Asia, and the southern Pacific islands). In Australia found in coastal regions and off-shore islands of the N.T., to the western coast of Cape York Penin. (Qld) and Torres Strait (Dauan and Murray Is), as well as Ashmore Reef, Christmas Is. and Cocos (Keeling) Is. Typically a sprawling shrub with long arcuate stems, on beaches just above high water mark, or scrambling over other shrubs, on a range of soils from sand to laterite, sometimes associated with mangroves. In Papua New Guinea and Indonesia sometimes found in inland sites in disturbed forest to 1400 m. Flowers and fruits all months, but particularly Feb.–Aug.



N.T.: Buroga Is., *I.Cowie* 6741 (DNA, MEL); Yirrkala, *R.L.Specht* 892 (AD, BRI, CANB, MEL, PERTH); Nhulunbuy, E. Woody Is., *G.M.Wightman* 4136 (AD, BRI, CANB, MEL). Qld: Saibai Is., *J.R.Clarkson* 3879 (BRI, CANB); Macdonald R., *B.M.Waterhouse* 7629 (BRI, CANB).

The fragile single awn on the achenes is present intermittently, and some plants lack it entirely.

The fragrant leaves are used to flavour food in earth ovens on Dauan Is., and the wood has been used for spears at Mapoon.

Wollastonia biflora var. *ryukyuensis* (H.Koyama) Orchard differs in being larger in most of its parts, with more florets. It is confined to Kyushu and Ryukyu Is in Japan, and to Taiwan, and is a triploid taxon ($2n = 45$).

2. *Wollastonia uniflora* (Willd.) Orchard, *Nuytsia* 22: 393 (2013)

Buphthalmum uniflorum Willd., *Sp. Pl.* 3(3): 2235 (1803); *Wedelia forsteriana* Endl., *Prodr. Fl. Norfolk*. 51 (1833), *nom. illeg. superfl.*; *Wollastonia forsteriana* (Endl.) DC., *Prodr.* 5: 548 (1836), *nom. illeg. superfl.*; *Wedelia uniflora* (Willd.) W.R.B.Oliv., *Trans. & Proc. New Zealand Inst.* 49: 155 (1917). T: Norfolk Is.; holo: B-Willd. IDC microfiche seen; iso: BM820296; possible iso: P698454, photo seen.

Buphthalmum uniflorum G.Forst., *Fl. Ins. Austr.* 91 (1786), *nom. nud.*

Illustrations: R.C.Gardner, *Rhodora* 81: 322, fig. 10 (1979) as *Lipochaeta ovata*; P.S.Green, *Fl. Australia* 49: 284, fig. 65; 389, fig. 89B (1994), as *Wollastonia biflora*; G.Harden (ed.), *Fl. New South Wales* 3: 276 (1992), as *Melanthera biflora*.

Straggling perennial herb, or scandent subshrub 0.5–1.0 (–3) m tall; stems decumbent, rooting at nodes, rarely erect, sparsely appressed-hairy. Leaves with petiole 20–30 (–40) mm long; lamina ovate to lanceolate or elliptic, 2–10 (–12) cm long, 1.5–6.5 cm wide, usually rounded at base, serrate, rarely \pm entire, acute to obtuse, sometimes attenuate, grey-green to yellow-green; upper surface sparsely to moderately densely appressed-strigose; lower surface with dense \pm erect or semiappressed villous hairs. Capitula 1–3 (–5), 2.0–2.5 cm diam., on peduncles 1–6 (–12) cm long; involucral bracts 5 mm long, densely appressed-pilose; paleae oblanceolate to oblong, 5 mm long, 2 mm wide, blunt to subacute, stramineous, membranous, striate and glabrous below, green apically. Ray florets (12–) 14–16; ligule shortly 2- or 3-lobed,

yellow. Disc florets c. 50; corolla yellow. Achenes obovoid, 3- or 4-angled, (2.2–) 2.5–3.0 mm long, 1.5–2.0 mm wide, apically truncate, dark grey to black, not corky, shortly and densely pilose apically, otherwise glabrous, with 1 usually oblique (rarely erect) \pm glabrous fragile awn c. 2 mm long, or often awn absent. Plate 53; Fig. 74H–M.

True *W. uniflora* is known from the Mariana Is, Tonga, Vanuatu and Guam, with occasional scattered specimens intermediate between *W. biflora* and *W. uniflora* known throughout Micronesia. In Australia it extends from the islands of Torres Strait S along the E coast of Qld to the N coast of N.S.W. It is particularly common on the shores of islands in Torres Strait and the Great Barrier Reef. Old collections are known from around Sydney. It is also known from Norfolk and Lord Howe Is. Frequent on coastal sand, coral rubble and dunes, often a sand-binder rooting at the nodes, with *Spinifex*, *Ipomoea* and *Triumfetta*, but also recorded in coastal heaths and on rocky headlands. Flowers and fruits most months.



Qld: North West Island Natl Park, *G.N.Batianoff* 205027 (BRI, CANB); 2.5 km N of mouth of McIvor R., *J.R.Clarkson* 5218 (DNA, K, NSW, PERTH, QRS). N.S.W.: Yamba Beach, *C.J.Dunn* 134 *et al.* (BRI, CANB, MEL); Wallabi Point, Taree, 25 May 1958, *M.Wilkes s.n.* (NE34549); Manly Beach near Sydney, *s.d.*, *W.Woolfs s.n.* (MEL2166669).

Unlike *W. biflora*, the leaves of this species are not noted as aromatic.

This is a very variable species, particularly in leaf size and shape. Many Australian specimens lack awns on the achenes. If these are present, they are usually oblique to subappressed on the top of the achene.

Although this species is not noted as a poison plant, in feeding trials 1 kg dry weight killed a sheep (*P.Oelrichs s.n.*, 24 June 1980, Indooroopilly (BRI255218)).

See Orchard (2013) for discussion of nomenclature.

10. APOWOLLASTONIA

A.E.Orchard

Apowollastonia Orchard, *Nuyisia* 23: 406–407 (2013); from Latin *apo-* (away from) and the generic name *Wollastonia*, a genus thought to be a relatively recent sister to *Wollastonia*.

Type: *A. spilanthoides* (F.Muell.) Orchard

Niebuhr Neck., *Elem. Bot.* 1: 30 (1790), *nom. inval.*

Seruneum Kuntze, *Revis. Gen. Pl.* 1: 364 (1891), *nom. illeg. superfl.* (*p.p.*, as to *S. spilanthoides*).

Niebuhr Britten, *J. Bot.* 39: 68 (1901), *nom. illeg. non Niebuhr* Scop. (1777), *et nec Niebuhr* DC. (1824), *nom. illeg.*

[*Wedelia auct. non Jacq.*: G.Bentham, *Fl. Austral.* 3: 537–539 (1866), *p.p.* (excluding *W. biflora* & *W. urticifolia*); & most subsequent Australian authors]

Subshrubs, or perennial herbs with a woody caudex and \pm erect or scandent annual stems, rarely annuals. Leaves simple, opposite, sessile or petiolate, uborbicular, ovate, lanceolate or linear, usually serrate, rarely entire or subpinnatisect, 3-nerved; base attenuate or rounded. Capitula terminal, solitary or in dichasial groups of up to 5 (–11), on short or long peduncles, radiate; involucre bracts in c. 2 series, (linear) lanceolate to ovate, green, rigid; receptacle paleaceous; paleae \pm lanceolate, rigid, midribbed, acute to acuminate, dorsally scabrous. Ray florets female, fertile; ligule 2- or 3-lobed, yellow. Disc florets bisexual; corolla 5-lobed, yellow to yellow-orange; anther sacs yellow to pale yellow-brown. Achenes oblong to obovoid, sometimes winged, apically shortly pilose; ray achenes 3-angled; disc achenes 2- or 4-angled, compressed or not, the angles sometimes obscure (*A. cylindrica*) or expanded into

corky or membranous wings. Pappus rarely entirely absent, usually a ring of tiny hairs and/or scales, sometimes with 1–3 weak and deciduous fragile awns.

A genus of 8 species with its main centre of diversity in northern and central Australia (7 species), but extending into Papua New Guinea and Indonesia (1 species).

These species (and *Acunniana procumbens*) were until recently included in a broad *Wedelia*. *Apowollastonia* species differ from that genus in a number of characters, most noticeably their yellowish anther thecae (black in related genera), in their paleae, which are green, coriaceous, dorsally scabrous, and rigidly erect with acute to acuminate apices, and their generally small sessile pappus. The paleae of *Wedelia*, and related taxa such as *Aspilina*, are generally membranous, coloured, and glabrous to sparsely pilose, and have a dorsal crest, and the pappus is a laciniate cupule on a distinct rostrum. See Orchard (2013) for discussion.

Th.Koster, *The Compositae of New Guinea VI, Blumea* 25(1/2): 268–271 (1979); A.E.Orchard, *The Wollastonia/Melanthera/Wedelia generic complex (Asteraceae: Ecliptinae)*, with particular reference to Australia and Malesia, *Nuytsia* 23: 337–466 (2013).

- 1 Annual herbs, or perennial herbs with a short buried woody caudex and annual stems
- 2 Perennial herbs; disc achenes 2- or 4-angled, ray achenes 3-angled, often with angles produced into thick corky wings; pappus of tiny scales
- 3 Leaf lamina narrowly linear to narrowly lanceolate throughout
- 3: Leaf lamina ovate to suborbicular at least basally
- 2: Annual herbs; achenes all cylindrical, sometimes with 1 or 2 longitudinal veins but not noticeably angled; pappus often ±absent or represented by a circular white callus
- 1: Subshrubs with perennial woody stems
- 4 Capitula on peduncles 1.5–2.5 (–3.0) cm long
- 5 Achenes c. 3 mm long; leaf lamina ovate to suborbicular
- 5: Achenes c. 5–6 mm long; leaf lamina lanceolate
- 4: Capitula on peduncles 6–12 (–18) cm long
- 6 Leaves serrate to subpinatisect (sometimes subentire)
- 6: Leaves entire

1. *A. spilantheidoides*

2. *A. longipes*

7. *A. cylindrica*

3. *A. verbesinoides*

4. *A. hibernica*

5. *A. stirlingii*

6. *A. hamersleyensis*

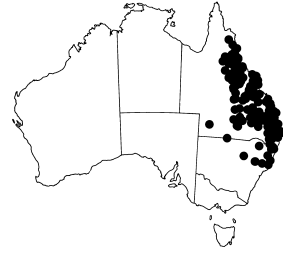
1. *Apowollastonia spilantheidoides* (F.Muell.) Orchard, *Nuytsia* 23: 408 (2013)

Wedelia spilantheidoides F.Muell., *Fragm.* 5: 64 (1866); *Seruneum spilantheidoides* (F.Muell.) Kuntze, *Revis. Gen. Pl.* 1: 365 (1891), *nom. superfl.*; *Niebuhrina spilantheidoides* Britten, *J. Bot.* 39: 69 (1901), *nom. superfl.* T: Per magnam Australiae tropicae partem diffusa; lecto: Warwick, s.d., *Anon. s.n.*, *Herb. Mueller* MEL2166644, *fide* A.E.Orchard, *loc. cit.*; residual syns: see A.E.Orchard, *loc. cit.*

Illustrations: J.Banks & D.Solander, *Illustr. Austral. Pl. Cook's Voy.* pl. 159 (1901), as *Niebuhrina spilantheidoides*; A.E.Orchard, *Nuytsia* 23: 410, fig. 19 (2013).

Perennial herb 0.2–0.5 m tall; annual stems sprawling or prostrate, not rooting at nodes. Leaves sessile or subsessile, very variable, narrowly linear to narrowly lanceolate, 30–50 (–90) mm long, 2–5 (–10) mm wide, cuneate basally, usually coarsely serrate with spreading teeth, the 2 basal teeth often larger and shortly lobe-like (occasionally some leaves almost entire), acute; both surfaces dark green and coarsely scabrous. Capitula 1–3, often solitary; peduncles 10–15 (–25) cm long; involucre bracts lanceolate, 4–5 mm long, shorter than disc florets, densely scabrous dorsally; paleae lanceolate, 4–5 mm long in flower, yellow-green. Ray florets 8–11 (–18); ligule 12–20 (–25) mm long, 2- or 3-lobed. Disc florets 26–35. Achenes obovoid, 2.5–3.0 (–3.5) mm long, 1.0–1.2 mm wide, weakly and bluntly 2- or 4- (disc achenes) or 3-angled (ray achenes), but not winged, sometimes lacking angles, dark grey-black, smooth. Pappus a few sparse minute scales, on a short rostrum, with no awns. Fig. 75A–D.

Extends from southern Cape York Penin. in northern Qld to NE N.S.W. Usually found in the relatively dry grassy understorey of open woodlands of *Eucalyptus*, *Corymbia* and *Angophora*, on a range of soils (basalts, sandstones, loams, granitic sand), at altitudes from c. 120–600 m. Flowers and fruits most months, but with a peak in mid-year.



Qld: Goodicum S.F., SE of Kalpowar, *A.R.Bean 10403* (BRI); Palmgrove Natl Park, NW of Taroom, Bigge Ra., *P.I.Forster 23704* & *R.Booth* (BRI); 25 miles [40.2 km] W of Bauhinia Downs, *W.T.Jones 3736* (CANB). N.S.W.: MacLeay R., Dec. 1896, *F.Brown s.n.* (AD); Liverpool Ra., *s.d.*, *J.E.Tenison-Woods s.n.* (MEL2169052).

This species is very variable, particularly in leaf shape. The majority of specimens have leaves which are linear to oblong or narrowly lanceolate, about 10 mm in width, with relatively even moderate serrations. In the southern part of its range (mainly SE Qld and NE N.S.W.) the leaves may become extremely narrow (1–2 mm wide) and almost entire, while in the northern part they become wider with coarser teeth, approaching those of *A. longipes* in shape.

2. *Apowollastonia longipes* (Klatt) Orchard, *Nuytsia* 23: 411 (2013)

Wedelia longipes Klatt, *Ann. K. K. Naturhist. Hofmus.* 11: 68 (1896). T: Cape York, leg. Daemel, Herb. Mus. Palat. Vindob. Nr. 38386; holo: W 38386, photo seen; iso: BM, K.

Illustration: A.E.Orchard, *Nuytsia* 23: 413, fig. 20 (2013).

Perennial herb (0.3–) 0.6–1.0 (–1.2) m tall; annual stems erect or scrambling, not rooting at nodes. Leaves shortly petiolate to subsessile; petiole 5–10 mm long; lamina ovate to sub-orbicular, becoming narrower (lanceolate) above, 40–75 (–140) mm long, 20–60 (–105) mm wide, broadly cuneate basally, shortly serrate, acute to obtuse, often grey-green, densely and coarsely scabrous both surfaces. Capitula 1–3; peduncles 10–12 cm long (often with a median pair of small leafy bracts); involucre bracts ovate to lanceolate, 5–6 mm long, c. as long as disc florets, densely appressed-scabrous dorsally; paleae linear-lanceolate, 5.5 mm long in flower, yellowish. Ray florets 10–12 (–16); ligule 9–12 mm long, 2- (or 3)-lobed. Disc florets 10–20. Achenes obovoid, 2.5–3.0 (–4.0) mm long, 1.5–2.0 mm wide, 2-angled and compressed (disc achenes) or 3-angled (ray achenes), the angles sometimes with narrow corky wings, grey-black, sometimes mottled, smooth or slightly rugose. Pappus a ring of tiny laciniate scales, with 1 or 2 sometimes elongated into soft ‘awns’ to 0.5 mm long. Fig. 75E–H.

Confined to NE Qld, on Cape York Penin., mainly north of 13° S, but with outliers near Mareeba and Rockhampton provisionally included. Found in usually sandy soils in grasslands, on beaches, in grassy understorey of *Eucalyptus/Corymbia* woodland, and understorey of monsoon forest /vine thicket, at altitudes from sealevel to 650 (–1000) m. Flowers Jan.–Aug.; fruits Jan.–July.

Qld: 2.7 km WSW of Beagles North Camp, *J.R.Clarkson 4347* (BRI, HO, K, NT, QRS); 4.6 km S of Batavia Downs on Peninsula Development Rd, *J.R.Clarkson 8245* & *V.J.Neldner* (BRI, DNA, QRS); SE of Mareeba on Tinaroo Creek Rd, *B.J.Conn* & *J.DeCampo 1188* (BRI, CANB, MEL); Bakers Blue Mtn, Font Hills, *B.Hyland 15286, 15290* (QRS); Horn Is., *B.M.Waterhouse 6439* (CANB).



This species is closely allied to *A. spilanthoides*, sharing the long-pedunculate capitula of that species, and differing mainly in its large ovate to suborbicular leaves (linear to lanceolate in *A. spilanthoides*), and strongly angled achenes. It differs from most other *Apowollastonia* species in its strongly compressed disc achenes.

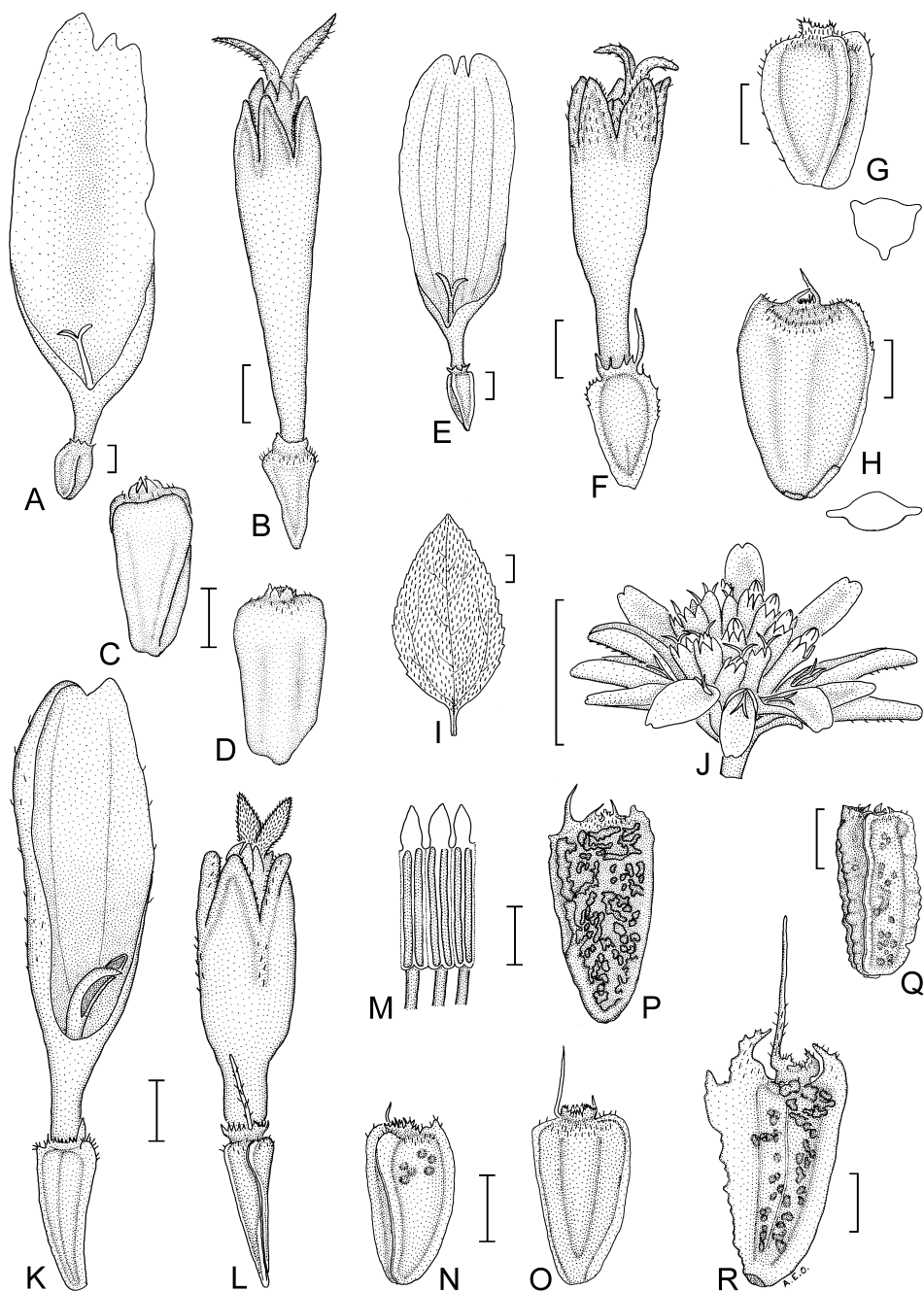


Figure 75. *Apowollastonia*. **A–D**, *A. spilanthoides*. **A**, ray floret; **B**, disc floret; **C**, 3-angled ray achene; **D**, 4-angled disc achene (**A–D**, W.T.Jones 3736, CANB). **E–H**, *A. longipes*. **E**, ray floret; **F**, disc floret; **G**, ray achene; **H**, disc achene (**E–G**, J.R.Clarkson 8245 & V.J.Neldner, BRI; **H**, J.R.Clarkson 8245 & V.J.Neldner, QRS). **I–R**, *A. verbesinoides*. **I**, leaf; **J**, flowering capitulum; **K**, ray floret; **L**, disc floret; **M**, stamens; **N**, ray achene; **O**, disc achene; **P–R**, other achenes (**I–O**, J.Egan 3213 & C.Dunlop, CANB; **P**, M.Lazerides 6380, MEL; **Q**, P.K.Latz 7778, NT; **R**, C.W.Nyulasy s.n., MEL). Scale bars: **A–H**, **K–R** = 1 mm; **I**, **J** = 1 cm. Drawn by A.E.Orchard.

3. *Apowollastonia verbesinoides* (Benth.) Orchard, *Nuytsia* 23: 416 (2013)

Wedelia verbesinoides Benth., *Fl. Austral.* 3: 538 (1867); *Seruneum verbesinoides* (Benth.) Kuntze, *Revis. Gen. Pl.* 1: 365 (1891). T: N. Australia, F. Mueller; Arnhem S. Bay, R. Brown; Finke R., McDouall Stuart's Expedition; lecto: Buphthalmum, Arnhem South Bay [N.T.], Point U1, 6 Feb. 1803, R. Brown [Bennett no. 2115]; lecto: BM1053448, photo seen, *vide* A.E. Orchard, *loc. cit.*; isolecto: CANB279200, MEL537475, K, MEL2258044, photo seen, NSW.

Wedelia sp. B, A.J.G. Wilson, in J.R. Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 961 (1992).

Illustrations: J.R. Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 952, fig. 289S (1992) as *Wedelia* sp. B; A.E. Orchard, *Nuytsia* 23: 417, fig. 22; 418, fig. 23 (2013).

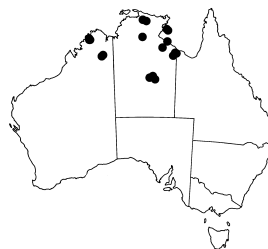
Subshrub 0.6–1.0 (–2.0) m tall; young stems erect, branching; older stems glabrous with pale ± corky bark. Leaves shortly petiolate; petioles 10 mm long; lamina ovate to suborbicular, 45–80 mm long, (20–) 35–40 mm wide, cuneate basally, shortly serrate, blunt apically, discolorous, finely appressed-pilose above, more densely scabrous beneath especially on the prominent veins. Capitula 3–5; peduncles 15–25 mm long; involucre bracts lanceolate, 4 mm long, c. as long as disc florets, appressed-scabrous; paleae linear-lanceolate, 5.5 mm long in flower, green. Ray florets c. 12; ligule 6–7 mm long, 2-lobed. Disc florets c. 24. Achenes usually narrowly obovoid, sometimes obcuneate, 2.5–3 mm long, 1.5 mm wide (both excluding wings), 2-angled (disc achenes) or 3-angled (ray achenes), variously corky-winged on angles, dark brown to black, usually rugose between wings. Pappus a ring of very short irregular scales, sometimes with a single fragile awn 1.5–2.0 mm long. Fig. 75 I–R.

Almost entirely confined to the N.T., from Arnhemland around the Gulf of Carpentaria almost to the Qld border, and S to Davenport Ra., with a few collections from northern W.A. in the vicinity of Bedford Downs Stn and Mitchell R. Usually found in well-drained sandy soils in open situations or the grassy understorey of woodlands, on a range of substrates (sandstone, limestone, calcrete, granite). Flowers collected Jan.–July; fruits Feb.–July (–Sept.).

W.A.: 40 km from AMAX Basecamp on Mitchell River Stn road, K.F. Kenneally 7070 (CANB); King Leopold Ra., 8.5 km SE of Bedford Downs Stn, M. Lazarides 6380 (AD, BRI, CANB, DNA, K, MEL). N.T.: Settlement Ck, L. Brass 159 (BRI, CANB, K); Mataranka, Elsey Natl Park, J. Egan 3213 & C. Dunlop (BRI, CANB); South West Is., D. McKay 136 (DNA).

The shape of achenes in this species is very variable, from oblong with narrow wings, to rather broadly cuneate-winged. This species is confusable with *A. hamersleyensis*, *A. stirlingii* and *A. hibernica*. See Orchard (2013) for discussion of variation and relationships.

One collector noted that the plant had a strong odour when picked. The innermost disc florets apparently do not always set fertile achenes.



4. *Apowollastonia hibernica* Orchard, *Nuytsia* 23: 419 (2013)

T: Killarney Stn, site K3, N.T., 6 Oct. 2002, J.A. Risler & D.J. Milne 1927; holotype: DNA 157104.

Illustration: A.E. Orchard, *Nuytsia* 23: 420, fig. 24 (2013).

Subshrub 0.8–1.5 m tall; young stems erect, branched, appressed-pilose; older stems glabrous with pale ± corky bark. Leaves with petiole 5–7 (–20) mm long; lamina lanceolate, 40–60 (–100) mm long, 10–12 (–30) mm wide, rounded to cuneate basally, shortly serrate, acute to acuminate, discolorous, coarsely appressed-scabrous on both surfaces especially on prominent veins beneath. Capitula in clusters of 1–3, in fruit 7–10 mm long, 8–10 mm diam.; peduncles 15–20 (–30) mm long; outer bracts linear to lanceolate or narrowly ovate, 6 (–10) mm long, acute, c. equalling disc florets, appressed-scabrous dorsally; inner bracts similar but narrower with hairs more apical; paleae linear to lanceolate, 7–8 mm long in flower, green, with midrib and 2 or 3 lateral longitudinal striae, conduplicate, dorsally densely hispid. Ray florets 6–10; ligule 8 mm long, 2-lobed. Disc florets c. 20; corolla yellow to orange, pilose externally; anther thecae yellow. Achenes narrowly obcuneate, 5–6 mm long, 2 mm wide, 3-angled with angles narrowly winged, and wing tips extended at apex into short acute lobes; body of achene densely and minutely tuberculate. Pappus a ring of very short irregular scales to 0.2 mm long. Fig. 76A–F.

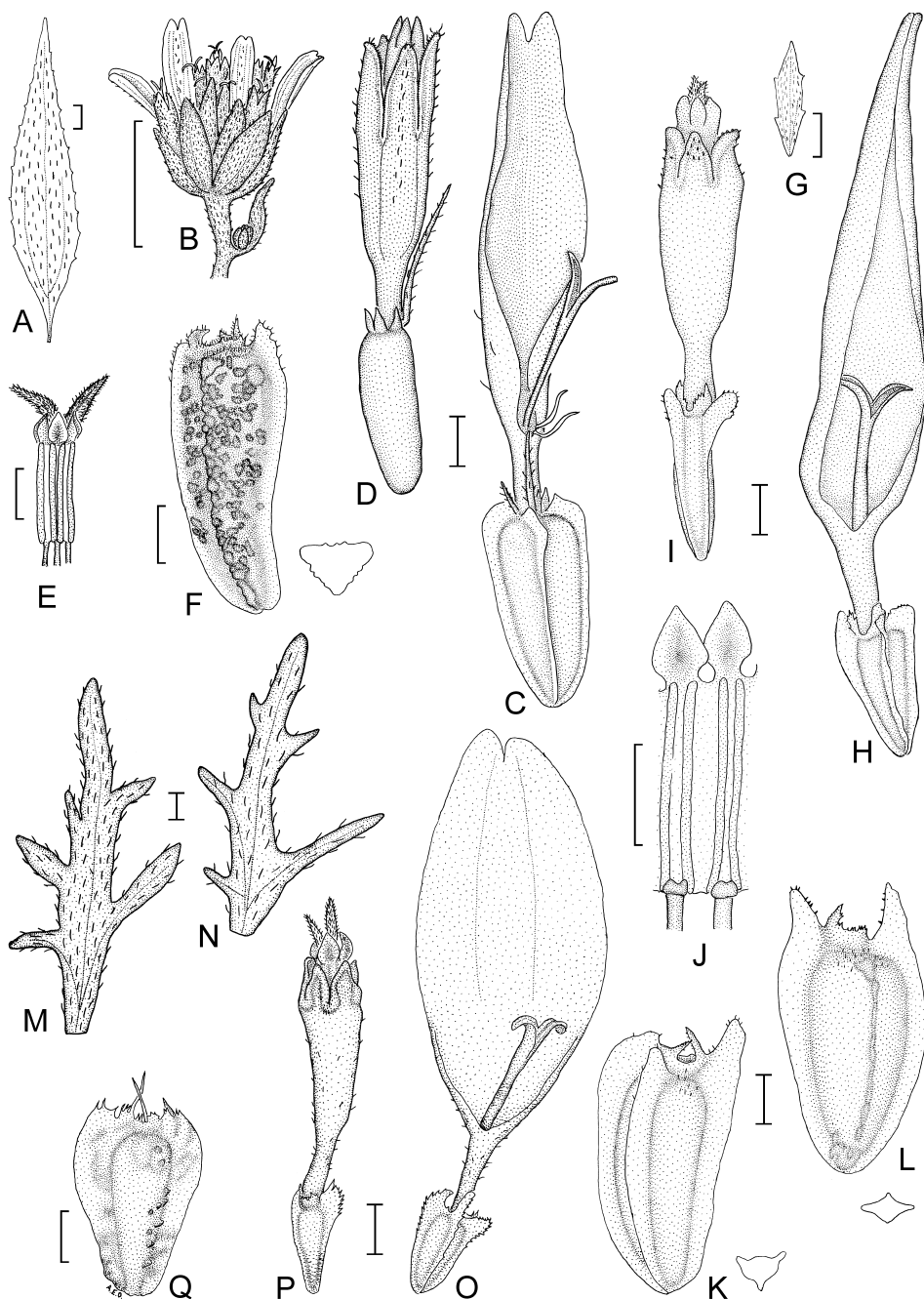
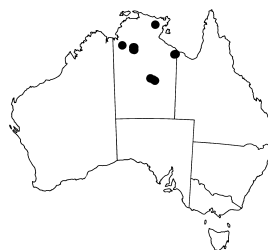


Figure 76. *Apowollastonia*. **A–F**, *A. hibernica*. **A**, leaf; **B**, flowering capitulum; **C**, ray floret; **D**, disc floret; **E**, stamens and stigma; **F**, achene (**A**, **B**, T.S.Henshall 45, CANB; **C–E**, J.A.Risler & A.J.Fisher 1942, DNA; **F**, J.A.Risler & D.J.Milne 1927, DNA). **G–L**, *A. stirlingii* subsp. *stirlingii*. **G**, leaf; **H**, ray floret; **I**, disc floret; **J**, stamens; **K**, ray achene; **L**, disc achene (**G–L**, E.C.Black s.n., AD97637379). **M–Q**, *A. stirlingii* subsp. *fontaliciana*. **M**, **N**, leaves; **O**, ray floret; **P**, disc floret; **Q**, achene (**M–P**, G.Chippendale s.n., NT523; **Q**, A.E.Orchard 813, AD). Scale bars: **A**, **B**, **G** = 1 cm; **C–F**, **H–Q** = 1 mm. Drawn by A.E.Orchard.

Confined to the N.T., in a broad area mainly S of Arnhemland, to the Davenport Ra., and from about the Victoria R. to the Qld border. Found in open grasslands of *Enneapogon*, *Sorghum* and *Aristida* spp., or the understorey of *Eucalyptus/Corymbia* open grassy woodland, on a range of soils and substrates (limestone, granite, sandstone). Flowers and fruits Apr.–Dec.



N.T.: 16 miles [c. 25 km] S Goyder R. crossing, *P.K.Latz* 2798 (AD, BRI, CANB, MEL, PERTH); Whistleduck Gorge, Davenport Ra., *P.K.Latz* 9765 (DNA, NT); Killarney Stn, *C.R.Michell* 2706 (DNA); c. 21 km W of Wollogorang on road to Calvert Hills, *R.Pullen* 9218 (CANB, NSW); Killarney Stn, site 6, *J.A.Risler & A.J.Fisher* 1942 (DNA).

Apowollastonia stirlingii subsp. *stirlingii* is almost contiguous with this species and appears similar in flower, but has much longer peduncles and smaller leaves. *Apowollastonia verbesinoides* is also similar, differing in its shorter, usually broadly winged achenes.

The innermost disc flowers apparently do not set mature achenes. Most collectors describe this species as having ‘yellow flowers’, but *Pullen* 9218 describes it as having yellow rays and orange disc florets.

5. *Apowollastonia stirlingii* (Tate) Orchard, *Nuytsia* 23: 421 (2013)

Wedelia stirlingii Tate, *Rep. Horn Exped. Central Australia* 3: 167, 188 (1896). T: Rocky and stony ground, Stokes Pass, slopes of Mereenie Bluff, Mount Francis and Mount Sonder, Finke Gorge and Stuart’s Pass!; lecto: Red Bank, Upper Finke River, Horn Expedition, s.d., *S.Baldwin* s.n. [herb. Tate], AD97632384, *vide* A.E.Orchard, *loc. cit.*; residual syn: see A.E.Orchard, *loc. cit.*

Wedelia stirlingii Tate, *Trans. Roy. Soc. S. Australia* 19: 81 (1895), *nom. nud.*

Subshrub 0.3–0.75 (–1.5) m tall, to 2 m diam.; young stems stiffly erect to spreading, weakly striate, coarsely and densely scabrous; older stems with white ±corky bark. Leaves sessile to subsessile, linear-lanceolate to lanceolate, (15–) 25–60 (–70) mm long, (5–) 6–8 (–20) mm wide, basally cuneate, serrate (sometimes subentire) or pinnatisect, acute, grey green; both surfaces densely and coarsely appressed-scabrous. Capitula usually solitary, in fruit 7–10 mm long, 8–15 mm diam.; peduncles stout, 10–12 (–18) cm long; outer bracts lanceolate, 4.0–4.5 mm long, acute, shorter than disc florets, densely and coarsely appressed-scabrous; inner bracts similar but broader; paleae linear, 6 mm long in flower, green. Ray florets c. 15; ligule 7–10 mm long, 2-lobed. Disc florets c. 50–100. Achenes obcuneate to obovoid, (2.5–) 3.0–3.5 (–5.0) mm long, 2.0 mm wide (excluding wing), 2- (disc achenes) or 3-angled (ray achenes), with angles bearing well-developed thick, subcorky or submembranous wings, often extended above into auricles, very shortly pilose apically; body of achene smooth or with an indistinct longitudinal vein or minutely tuberculate, brown with lighter wings. Pappus a ring of short lacinate scales, sometimes shortly fused at base, occasionally 1 (–3) extended into a short fragile awn.

A variable species from central Australia, characterised by long stout peduncles, grey-green linear-lanceolate coriaceous and densely scabrous leaves and achenes with 2 or 3 submembranous apically auriculate wings. It differs from other *Apowollastonia* species in having paleae which are acute rather than acute-acuminate, and the paleae are shed shortly after the achenes (long-persistent in other species). Two subspecies can be distinguished.

Leaves (20–) 30–40 (–60) mm long, lanceolate to linear-lanceolate; lamina 4–5 (–10) mm wide, ±entire or with short teeth 1–2 (–3) mm long

5a. subsp. *stirlingii*

Leaves 20 mm long, almost pinnatisect; rachis of lamina 1–1.5 mm wide with long filiform spreading teeth 3–4 (–8) mm long

5b. subsp. *fontaliciana*

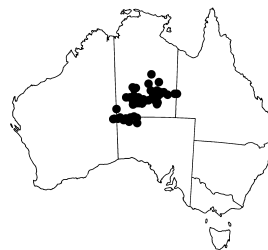
5a. *Apowollastonia stirlingii* (Tate) Orchard subsp. *stirlingii*

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1441, fig. 650 (1986); A.E.Orchard, *Nuytsia* 23: 424, fig. 25 (2013).

Leaves lanceolate to linear-lanceolate, (20–) 30–40 (–60) mm long, 4–5 (–10) mm wide, ±entire or with short teeth 1–2 (–3) mm long. Capitula usually large, to 10 mm long, 15 mm

wide in fruit. Achenes 3–5 mm long (excluding wings), with well-developed wings which are apically auriculate. Plate 55; Fig. 76G–L.

Confined to the ranges of central Australia: widespread in N.T., from the Davenport Ra. S through the MacDonnell Ra. to the Musgrave and Tomkinson Ra. of S.A., and west to the Warburton Range in W.A. One collection is known from the Toko Ra. in Qld (see notes below). Found in dry rocky situations on sandstone or limestone, with spinifex (*Triodia* spp.) in open woodland dominated by *Eucalyptus*, *Acacia* and *Dodonaea*. Flowers all year; fruits Feb.–Sept.



W.A.: 5 km SE of Bell Rock, Bell Rock Ra., *D.J.Pearson* 630 (PERTH). N.T.: Mt Riddock Stn, *N.M.Henry* 916 (BRI, CANB); Yuendumu, *T.S.Henshall* 2866 (AD, MEL, NT). S.A.: Ernabella, 16 Apr. 1950, *E.C.Black* s.n. (AD). Qld: Toko Gorge, Toko Ra., *R.W.Purdie* 2242 (BRI, CANB).

The leaf of this subspecies is relatively broad, usually 4–5 mm wide, with short teeth (some leaves on some plants ±entire).

The species is only sparingly collected in Qld, where one collection (*Purdie* 2242) is a good match with N.T. material. Other Qld collections are variable, and only tentatively assigned to this taxon: a collection from Cameron River, *A.Fraser* 257 (CANB) has winged achenes, but pappus ±absent; another from Mt Booka Booka, Elderslie, *S.T.Blake* 10055 (AD) has achenes barely angled, and leaves linear, 70 mm long, coarsely toothed; a third from 20 miles [32 km] NW of Kihee, *E.Riek* & *I.Common* 258 (CANB) has ±entire leaves, but flowers only, no achenes. These last three collections need reconsideration when additional collections with mature achenes have been made from the Channel Country of SW Qld.

Most collectors describe the florets as yellow, but *P.E.Conrick* 792, Mt Cuthbert, S.A., describes the capitulum as having ‘orange yellow petals, orange centre’, and this is supported by the photograph displayed in FloraBase.

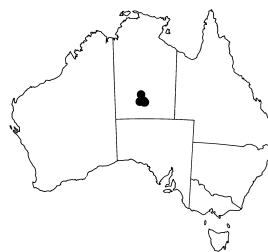
5b. *Apowollastonia stirlingii* subsp. *fontaliciana* Orchard, *Nuytsia* 23: 423 (2013)

T: Standley Chasm, N.T., 17 Nov. 1954, *G.Chippendale* s.n.; holo: NT 523; iso: AD 98672975, BRI 365709, CANB 33209.

Illustration: A.E.Orchard, *Nuytsia* 23: 425, fig. 26 (2013).

Leaves almost pinnatisect, 20 mm long, 1–1.5 mm wide, with long filiform spreading teeth 3–4 (–8) mm long. Capitula 7–8 mm long, 8 mm diam. in fruit. Achenes 2.5–3.0 mm long with narrow wings not markedly auriculate. Fig. 76M–Q.

Confined to the Macdonnell Ra. near Alice Springs, N.T., and particularly well-collected from Standley Chasm and Spencer Gorge, but with other specimens somewhat intermediate with subsp. *stirlingii* as far west as Ormiston Gorge. Found in dry rocky situations on the slopes of sandstone gorges and in river sand in the bed of dry creeks, with occasional *Eucalyptus*, *Acacia* and *Dodonaea*. Flowers and fruits May–Dec.



N.T.: Spencer Gorge, Chewings Ra., *P.K.Latz* 7109 (NT); Hugh Gorge, Hamilton Downs Stn, *W.A.Low* 189 (NT); Standley Chasm, *A.E.Orchard* 813 (AD, K, P); Standley Chasm, *R.A.Perry* 5384 (AD, BRI, CANB, K, MEL, NSW, PERTH); 35.4 km from Hermannsburg Mission, *L.D.Williams* 12122 (AD).

6. *Apowollastonia hamersleyensis* Orchard, *Nuytsia* 23: 426 (2013)

T: E of Paraburdoo, in major gully through Channor Ra., W.A., 26 Apr. 1985, *E.M.Mattiske* EMCH1636; holo: PERTH6184294; iso: AD, BRI, CANB 684289, DNA, K, MEL, MO, NSW.

Wedelia sp. *Hamersley* (*A.S.Weston* 8444), *G.Paczkowska* & *A.R.Chapman*, *W. Austral. Fl.* 179 (2000).

Illustration: A.E.Orchard, *op. cit.* 427, fig. 27.

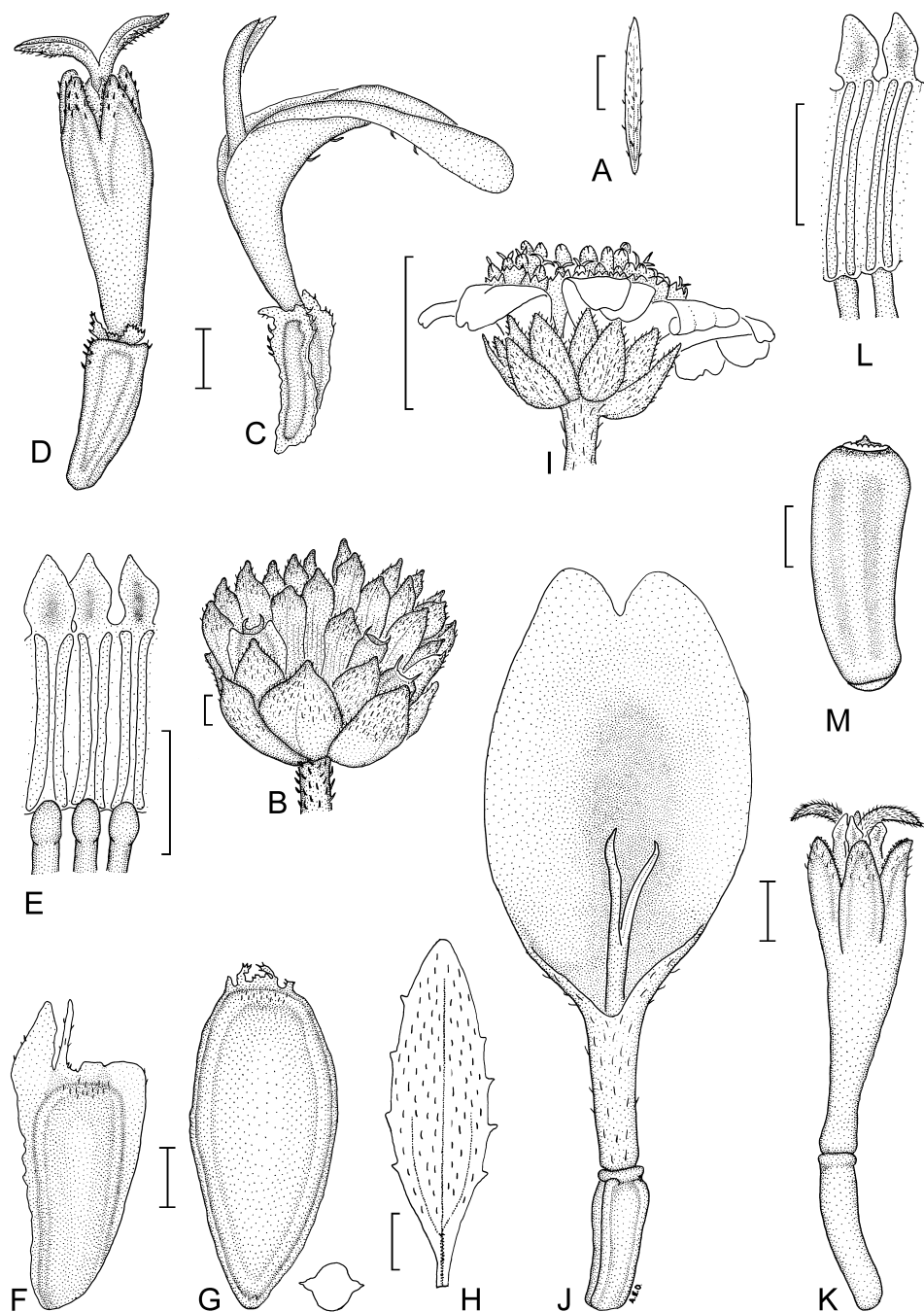


Figure 77. *Apowollastonia*. **A–G**, *A. hamersleyensis*. **A**, leaf; **B**, fruiting capitulum; **C**, ray floret; **D**, disc floret; **E**, stamens; **F**, ray achene; **G**, disc achene (**A–E**, **G**, C.Dawe 052, PERTH; **F**, M.Hughes s.n., PERTH3634280). **H–M**, *A. cylindrica*. **H**, leaf; **I**, flowering capitulum; **J**, ray floret; **K**, disc floret; **L**, stamens; **M**, achene (**H–M**, J.L.Egan 4271, DNA). Scale bars: **A**, **H**, **I** = 1 cm; **B–G**, **J–M** = 1 mm. Drawn by A.E.Orchard.

Subshrub 0.4–1.0 (–1.5) m tall, 0.6–1.0 (–2.0) m diam.; young stems stiffly erect to spreading; older stems with white ±corky bark. Leaves sessile, linear, (15–) 25–30 (–80) mm long, (1–) 2–5 mm wide, cuneate basally, entire, bluntly acute, grey-green, coarsely appressed-scabrous on both surfaces. Capitula 1–3; peduncles stout, 6–9 cm long; outer involucre bracts ovate, 3–4 mm long, shorter than disc florets, densely and coarsely appressed-scabrous dorsally; inner bracts similar but narrower; paleae linear to narrowly oblanceolate, 5–6 mm long in flower, green. Ray florets 10–14; ligule 6 mm long, 2-lobed. Disc florets 25–30. Achenes obovoid, 4–5 mm long (excluding wings), 3-angled and -winged (ray achenes) or 2-angled and -winged (disc achenes), black with paler marginal angles/wings; angles usually winged, often anisopterous, with wings truncate or shortly auriculate, submembranous. Pappus a ring of small uneven fimbriate scales, sometimes with 1 or 2 short awns. Fig. 77A–G.

Confined to the Pilbara region of W.A. Found in dry, stony, well-drained sites, in loams, clays and skeletal red soils, on ironstones, basalts etc., among low shrubs and *Triodia* in open woodlands of mallee *Eucalyptus*, *Acacia*, *Callitris*, *Brachychiton* and other low trees, at altitudes up to at least 1100 m. Flowers May–Sept.; fruits June–Aug.

W.A.: 30 km ESE Duck Creek Stn HS, *B.Backhouse et al.* 229 (CANB); Yampire Gorge, Wittenoom, *H.F. & M.Broadbent* 1998 (BM, CANB); Hamersley Range Natl Park, between Mt Bruce and Joffre Falls, *C.Dawe* 052 (BRI, CANB, DNA, PERTH); 10.5 km SSW of Mt Truchanas, *S.van Leeuwen* 2725 (DNA); lower end of Bee Gorge, Hamersley Range Natl Park, *A.S.Weston* 8444 (CANB, PERTH).



7. *Apowollastonia cylindrica* Orchard, *Nuytsia* 23: 428 (2013)

T: 38.7 miles [62 km] SE Ranken, N.T., 20 June 1960, *G.Chippendale* NT7250; holo: CANB; iso: AD, NT.

Wedelia asperima (Decne.) Benth., *sensu* G.Bentham, *Fl. Austral.* 3: 539 (1867), excluding type; *sensu* F.M.Bailey, *Queensland Fl.* 3: 862 (1900); *sensu* G.Paczkowska & A.R.Chapman, *W. Austral. Fl.* 179 (2000).

Illustration: S.L.Everist, *Poisonous Pl. Australia* rev. edn., facing p. 190, pl. 9 (1981), as *Wedelia asperima*.

Annual herb (0.15–) 0.3–1.0 (–1.5) m tall; stems erect. Leaves with petiole 5–7 mm long; lamina oblong to lanceolate or linear, (30–) 40–65 (–90) mm long, 10–20 (–30) mm wide, cuneate basally, finely serrate to almost entire, blunt to acute, grey-green, dense and fine semiappressed scabrous indumentum on both surfaces. Capitula c. 5–11; peduncles stout, 10–15 cm long; outer involucre bracts narrowly ovate, 6–8 mm long, shorter than disc florets, densely appressed-scabrous dorsally and marginally fimbriate; inner bracts similar but narrower; paleae linear, 6 mm long in flower, green with purple midrib. Ray florets 9–12; ligule 7–8 mm long, 2-lobed. Disc florets c. 50–60. Achenes cylindrical, 4 mm long, sometimes very weakly 4-angled or with 2 weak white longitudinal veins, black, paler apically, occasionally mottled, minutely rugulose apically, glabrous or with occasional short apical hairs. Pappus represented by a circular white callus, usually glabrous, sometimes with a few very short hairs, no awns. Fig. 77H–M.

Widespread in the Kimberley region of W.A., across the northern part of N.T. N of 20°S, and western Qld S of the Gulf of Carpentaria. Isolated records from the mouth of the Gascoyne R., W.A., and Ayr, Qld, probably represent recent introductions. Recorded mainly from damp soils and heavy clays, often associated with irrigation channels and creeks, on Mitchell grass (*Astrelba* spp.) plains, occasionally invading crops (e.g. chia - *Salvia hispanica*). Flowers collected Feb.–Aug.; fruits Mar.–Aug.

W.A.: 18.5 km N of Warmum (Turkey Creek), *R.W.Purdie* 4860 (CANB, NSW, PERTH); 47.4 km S of Forrest Ck along Duncan Rd, *P.S.Short* 5180 (CANB, DNA, PERTH). N.T.: 27 miles [42 km] S Austral Downs, 12 Aug. 1955, *G.Chippendale s.n.* (BRI, CANB, NT). Qld: near Maxwellton, *S.L.Everist* 5367 (DNA); Corindi, *G.R.Moule s.n.* (BRI, CANB, K).



Bentham (1867), describing Australian plants, based *Wedelia asperima* on Decaisne's *Wollastonia asperima*, which was described from a Timor specimen, now in P (2515133). *Wollastonia asperima* Decne is now treated as *Lipoblepharis asperima* (Decne) Orchard. See Orchard *op. cit.* 446 for description and discussion.

The midrib and lateral veins of the involucre bracts, the palea midrib, and the disc florets are frequently striped purplish. The disc florets are apparently all fertile, but because of crowding, only some develop into mature achenes.

This species has sometimes been considered poisonous to stock, but testing results have been ambiguous. See Everist, *Poison Pl. Australia* 190 (1975), and Orchard *op. cit.* 430 for discussion.

R.C.Cowley s.n. (BRI 365721) reported that it is used to make a lotion for sore eyes.

11. ACUNNIANA

A.E.Orchard

Acunniana Orchard, *Nuytsia* 23: 430–431 (2013); in honour of its discoverer, the botanist Allan Cunningham (1791–1839), whose name as an author is abbreviated A.Cunn., with the addition of the Latin suffix *-iana* (related to).

Type: *A. procumbens* (DC.) Orchard

Perennial herbs, procumbent. Leaves simple, opposite, shortly petiolate, ovate to lanceolate, coarsely serrate with basal teeth often enlarged and lobe-like, 3-nerved; base cuneate to rounded. Capitula terminal, usually solitary, short or long pedunculate, radiate; involucre bracts in 2 series; bracts lanceolate, herbaceous, keeled, acute, appressed-hairy; receptacle paleate; paleae lanceolate (inner ones linear), stiff, keeled, acute, dorsally scabrous. Ray florets female, fertile; ligule 3-lobed, yellow. Disc florets functionally male; corolla 5-lobed, yellow; anther sacs brown-black. Achenes only developed from ray florets, slightly compressed, 3-angled, ovoid, not winged, rounded apically, sparsely and minutely pilose apically. Pappus absent or of c. 3 small scales fused basally into a shallow 3-toothed cup.

A monospecific genus, confined to northern Australia.

In habit this genus resembles the partly sympatric *Apowollastonia*, but differs in its large outer involucre bracts which exceed the inner ones, dark anther thecae, functionally male disc florets, and relatively large achenes. In its large outer involucre bracts, dark anther thecae, and relatively large achenes it resembles *Indocypraea montana*, and is perhaps most closely related to that monospecific genus, but differs in its coarsely serrate leaves, its functionally male disc florets, and short pappus scales which never become elongated into 'awns', and it lacks the distinctive mottling on the achenes of *I. montana*.

A.E.Orchard, The *Wollastonia/Melanthera/Wedelia* generic complex (Asteraceae: Ecliptinae), with particular reference to Australia and Malesia, *Nuytsia* 23: 337–466 (2013).

***Acunniana procumbens* (DC.) Orchard, *Nuytsia* 23: 431 (2013)**

Wollastonia procumbens DC., *Prodr.* 5: 548 (1836); *Moonia procumbens* (DC.) Benth., *Fl. Austral.* 3: 540 (1867); *Chrysogonum procumbens* (DC.) F.Muell., *Syst. Census Austral. Pl.* 83 (1882). T: In littoribus insularum ad oram borealem Australasiae apr. flor. legit A.Cunningham; holotype: G-DC 135234; iso: BM 820300, K (2 sheets).

Illustration: A.E.Orchard, *op. cit.* 432, fig. 29.

Perennial herb 0.3–0.45 (–1.0) m tall; stems sprawling or prostrate, sometimes rooting at nodes. Leaves with petiole 2–5 mm long; lamina 25–55 mm long, 10–35 mm wide, coarsely serrate with 2 basal teeth often larger and shortly lobe-like, acute, discolorous, moderately appressed-pilose. Capitula on peduncles 1.5–8.0 cm long; outer involucre bracts 10–11 mm

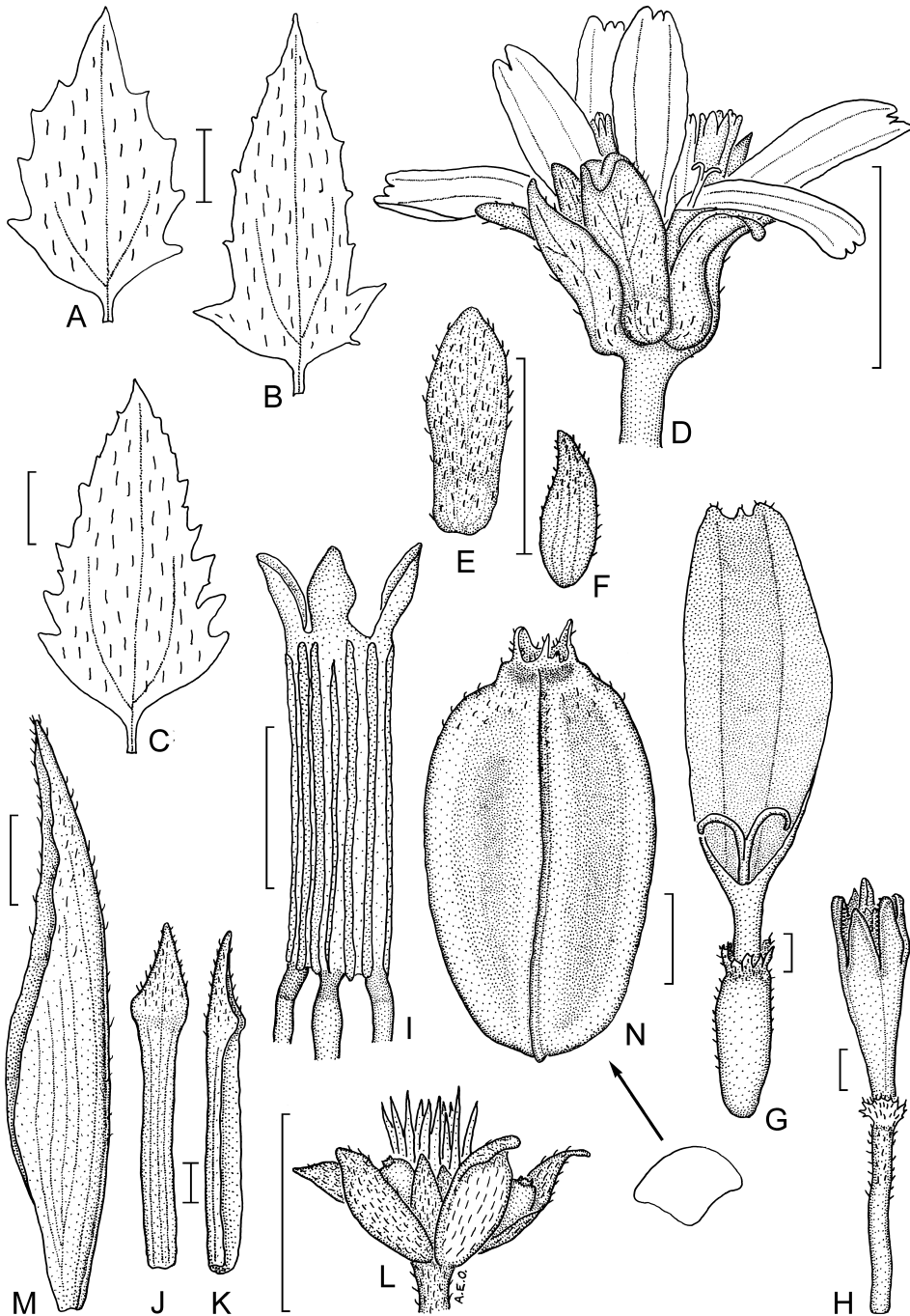
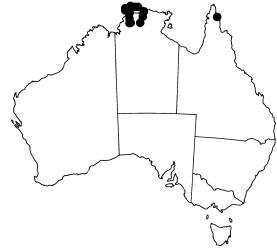


Figure 78. *Acunniana procumbens*. A–C, leaves; D, flowering capitulum; E, outer involucre bract; F, inner involucre bract; G, ray floret; H, disc floret; I, stamens; J, palea, dorsal view; K, palea, lateral view; L, fruiting capitulum; M, fruiting palea; N, achene (A–N, I.D.Cowie 4841, CANB). Scale bars: A–D, L = 1 cm; E–K, M, N = 1 mm. Drawn by A.E.Orchard.

long, subacute, longer than inner bracts and disc florets, softly pilose dorsally or sometimes only at tip; inner bracts 7 mm long; outer paleae (ray florets) lanceolate, inner paleae (disc florets) linear, all 8–9 mm long in flower, green. Ray florets 5–12; ligule (4–) 7–9 mm long. Disc florets (8–) 10–12 (–15). Achenes ovoid, 4.0–4.5 mm long, smooth, brown to grey. Pappus absent or a short cup with 3 small teeth. Fig. 78.

Almost confined to N.T., in western and central Arnhemland, with a possible outlier at Temple Bay, eastern Cape York Penin., Qld. Found in damp spots in the grassy understorey of *Eucalyptus* and *Melaleuca* woodland. Flowers Dec.–June; fruits Jan.–Apr.

N.T.: Tipperary Rd, Mary R. area, *M.J.Clark* 779 (BRI, CANB, DNA); Melville Is., near Pickertarramoor, *I.D.Cowie* 4841 (CANB, MEL); 3–4 miles [c. 5 km] NNW El Sharana, [*P.]Martenz* & [*R.]Schodde* AE441 (BRI, CANB); Gunn Point, 24 miles [c. 40 km] NE of Darwin, *J.McKean* B954 (BRI, DNA). Qld: S end of Temple Bay, *J.R.Clarkson* 2188 (BRI).



For a discussion of typification see Orchard *loc. cit.*

Many N.T. collections of this species have in the past been (mis)identified as *Wedelia urticifolia* (Blume) DC., a Malesian/Asian taxon now treated as *Lipoblepharis urticifolia* (Blume) Orchard, and not found in Australia. However, the name *W. urticifolia* appearing in print in (for example) Bentham's *Flora Australiense*, is a misapplication of that name to *Blainvillea cunninghamii* (DC.) Orchard.

The Queensland specimen is tentatively assigned to this species. It has only flowers and old empty capitula, but its long involucre bracts and apparently functionally male disc florets suggest that it is this species rather than *Apowollastonia longipes*.

12. PASCALIA

A.E.Orchard

Pascalial Ortega, *Nov. Pl. Descr. Dec.* 39, pl. 4 (1797); named for D.B.Pascal, French/Italian physician/botanist, Director of the Royal Garden at Parma.

Type: *P. glauca* Ortega

Rhizomatous, erect, branching perennial herbs. Leaves simple, opposite, petiolate or sessile, linear-lanceolate to ovate, \pm entire, 3-nerved; base cuneate. Capitula terminal, usually solitary, shortly pedunculate, radiate; involucre bracts in 2 or 3 series; bracts lanceolate to narrowly lanceolate, herbaceous, keeled, acute, appressed-hairy; receptacle paleate; paleae lanceolate, keeled, scabrous dorsally. Ray florets female (sometimes with staminodes), fertile; ligule yellow-orange, 2- or 3-lobed. Disc florets bisexual, fertile; corollas 5-lobed, yellow-orange; anther sacs yellow to pale yellow-brown. Achenes obcuneate, not noticeably compressed, irregularly 3- or 4-angled, not winged. Pappus of short persistent connate scales.

A genus of 2 species from eastern S America and north-central Chile, until recently usually included in *Wedelia*, but resurrected by Strother (1991). One species naturalised in Australia.

A.Burkart & M.N.Carera, Estudios sobre malezas, morfologia vegetativa y germinacion del "Sunchillo" (*Wedelia glauca*), *Darwiniana* 10(2): 113–144 (1953); J.L.Strother, Taxonomy of *Complaya*, *Elaphandra*, *Iogeton*, *Jefea*, *Wamalchitamia*, *Wedelia*, *Zexmenia*, and *Zyzyxia* (Compositae-Heliantheae-Ecliptinae), *Syst. Bot. Monogr.* 33: 1–111 (1991).

**Pascalial glauca* Ortega, *Nov. Pl. Descr. Dec.* 39, pl. 4 (1797)

Wedelia glauca (Ortega) O.Hoffm ex Hicken, *Chlor. Plat. Argent.* 2: 254 (1910). T: Habitat in Regno Chilensi non longè ab Oppido Chillan; *n.v.*

Illustrations: C.G.Ortega, *loc. cit.*; C.F.P.von Martius, *Fl. Bras.* 6(3): pl. 58 (1884); G.Harden (ed.), *Fl. New South Wales* 3: 274 (1992).

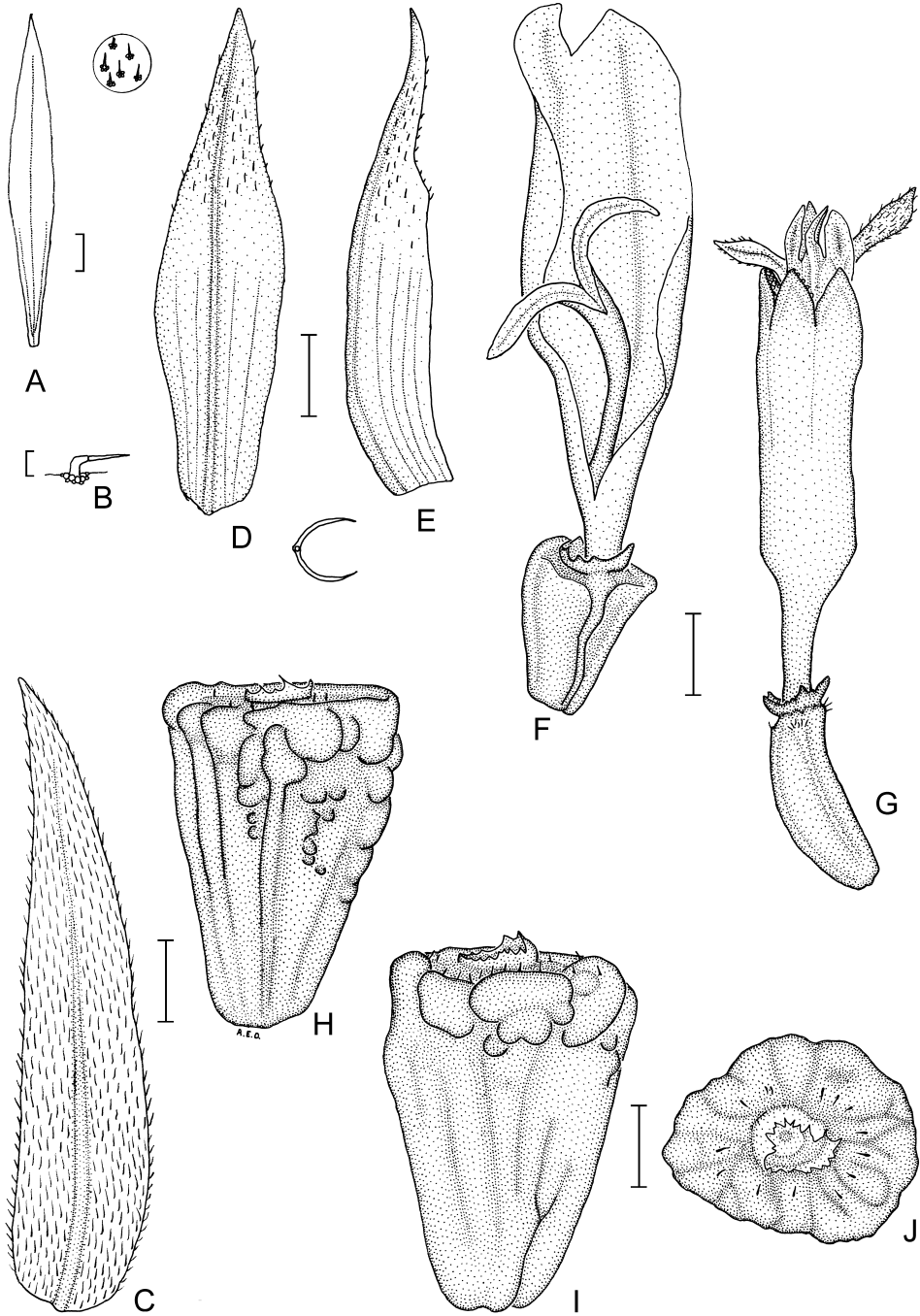


Figure 79. *Pascalía glauca*. A, leaf; B, leaf hair; C, involucre bract; D, palea, dorsal view; E, palea, lateral view; F, ray floret; G, disc floret; H, achene abaxial view; I, achene, adaxial view; J, achene apical view (A–J, W.G.Palmer s.n., MEL 617263). Scale bars: A = 1 cm; B = 0.1 mm; C–J = 1 mm. Drawn by A.E.Orchard.

Erect perennial herbs 30–70 cm tall, with a deep spreading rhizomatous rootstock and sparsely scabrous erect branches. Leaves sessile, linear to narrowly lanceolate, (40–) 50–100 mm long, (3–) 5–10 (–15) mm wide, usually entire, rarely with remote teeth near base, acute, shortly appressed-scabrous. Capitula 10–15 mm diam.; peduncles 2–6 cm long; involucre bracts 20–28, equisized, 6–10 mm long; paleae membranous, soft, subhyaline, with a midrib and several longitudinal striae, shortly scabrous on apical margins and dorsally towards tip. Ray florets 10–15; ligule 2- or 3-lobed, bright yellow. Disc florets c. 30–50; corolla yellow. Achenes obcuneate, 3.5–4 mm long, 3 mm wide, with corky exocarp, weakly furrowed basally, rugose, truncate and slightly sunken apically, with sparse short hairs on apex. Pappus a connate ring of very short acute scales. $2n = 66$, J.L.Strother, *Fl. N. America* 21: 132 (2006). *Pascalina* Weed. Fig. 79.

A native of southern Brazil, Paraguay, Uruguay and Argentina, sporadically naturalised elsewhere (e.g., SE U.S.A., northern Chile and Australia). In Australia found mainly in coastal districts of S.A. (Port Augusta and Port Adelaide), N.S.W. (lower Hunter R. and near Glen Innes), and Vic. (Melbourne and Geelong). A weed of lawns, playing fields, railway reserves, cultivation and along drains, sometimes invading natural open forest. Flowers and fruits recorded Mar.–Apr.



S.A.: Port Augusta Oval, 21 Nov. 1946, *P.J.Hannaberry s.n.* (AD); Port Adelaide street, *D.E.Symon 1234* (AD, K, NE, NSW). N.S.W.: Barool Trig, Nymboida Natl Park, *A.R.Bean 20132* (NSW). Vic.: St George Rd crossing, Melbourne–Geelong railway line, N Geelong, 27 Mar. 1963, *W.G.Palmer s.n.* (MEL); N Melbourne, railway reserve, Mar. 1909 & Apr. 1910, *J.R.Tovey & C.French Jr. s.n.* (MEL).

The earliest specimens collected in Australia were from the Raymond Terrace district, N.S.W., in 1906, and a railway reserve in North Melbourne, Vic., in 1909. By 1946 it had appeared in lawns and playing fields in Port Augusta, S.A., and by 1961 a street at Port Adelaide. Although locally abundant and hard to eradicate, the species has largely remained near these original infestations. Only recently (2003) has it been found in natural vegetation at Nymboida Natl Park (N.S.W.).

Very similar to *Helianthus ciliaris* in its yellow radiate capitula, greyish linear-lanceolate, entire to sparingly dentate leaves and deeply rhizomatous rootstock. Clearly distinguished by its (narrowly) lanceolate involucre bracts (ovate in *H. ciliaris*) and achene shape.

Subtrib. 2. MONTANOINAE

A.E.Orchard

Heliantheae subtrib. *Montanoinae* H.Rob., *Phytologia* 41: 42 (1978)

Type: *Montanoa* Cerv.

Paleae accrescent after anthesis, wrapping florets/achenes. Receptacle slightly to strongly convex. Ray corollas not fused to achenes. Disc florets bisexual, fertile; style branches of disc florets with 2 stigmatic lines. Achenes weakly compressed to obconical and shallowly quadrangular, not winged. Pappus absent.

A subtribe of a single genus, represented in Australia by 2 sparingly naturalised species, both garden escapes.

The subtribe is most closely allied to the *Ecliptinae*.

ASTERACEAE

MONTANOA

Montanoa Cerv. in P.de La Llave & J.L.Reip, *Nov. Veg. Descr.* 2: 11 (1825); named in honour of Dr Luis Montaña, a physician and naturalist from Puebla, Mexico.

Type: *M. tomentosa* Cerv.

Small shrubs to large trees or vines; stems glabrous to minutely pubescent on herbaceous parts. Leaves opposite, petiolate; lamina entire to deeply 3–5-lobed or coarsely pinnatifid, with 3 main veins from base, with wings and auricles present or absent. Capitula solitary or more usually in compound corymbs or panicles; involucre bracts 1–3-seriate, equal to subequal, ovate to lanceolate, with 3 veins; receptacle slightly to strongly convex; paleae persistent, accrescent, often spine-tipped, enclosing and at maturity greatly exceeding achenes. Ray florets in 1 series or rarely absent, male, ligulate, white (in Australian spp.). Disc florets (few or) numerous, bisexual, \pm tubular, 5-toothed, green to yellow. Anthers auriculate at base; apical appendages ovate, acute, scarious. Styles branches usually linear, densely papillose-pilose. Achenes obovoid or 4-angled, usually compressed, glabrous and smooth, (red-) brown to black, with a ring-shaped collar at apex (true pappus absent).

About 25 species in Central & northern S America. Several species are widely cultivated and 2 species have escaped from cultivation and are naturalised in Australia. Two subgenera are recognised, subg. *Montanoa* and subg. *Acanthocarphae*; both Australian species are in the latter.

Readily recognised by the hugely accrescent papery paleae, far exceeding the achenes, in fruiting heads. The paleae wrap around the achenes, and in Australian species, are shed with them.

B.Morley, Nomenclature of and a key to some cultivated species of *Montanoa* Cervantes (Compositae), *J. Adelaide Bot. Gard.* 2: 151–161 (1980); V.A.Funk, The systematics of *Montanoa* (Asteraceae: Heliantheae), *Mem. New York Bot. Gard.* 36: 1–133 (1982).

Lower leaves pinnately or bipinnately lobed

1. *M. bipinnatifida*

Lower leaves irregularly palmately lobed

2. *M. hibiscifolia*

1. **Montanoa bipinnatifida* (Kunth) K.Koch, *Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten* 7: 407–408 (1864)

Uhdea bipinnatifida Kunth, *Ind. Sem. Hort. Berol.* 17 (1847). T: Mexico, Matameros, 1845, *Uhde s.n.*; holo: B (apparently lost); neo: ex Hort., 25.ii.1864, *Herb. Schultz-Bip. s.n.*; P, photo seen, *vide* B.Morley, *J. Adelaide Bot. Gard.* 2: 152 (1980).

Illustrations: B.Morley, *op. cit.* 151–161, figs 1–4, (fig. 4 as *M. pyramidata*); V.A.Funk, *Mem. New York Bot. Gard.* 36: figs 44B, 68, 74 (1982).

Large shrubs, erect, soft-wooded, 2–3 m tall. Leaves: petiole 4–20 cm long, usually with 2 stipule-like lobes at base; lamina \pm ovate to oblong in outline, pinnatifid to bipinnatifid, 12–32 cm long, 9–40 cm wide, decurrent or slightly lobed at base, dark green, sparsely pubescent, with hairs more frequent along veins; lobes oblong to \pm lanceolate. Capitula pendulous, several–many in compound oppositely-branched corymbs; peduncles 2–7 (–9) cm long, hairy; involucre bracts biseriate, reflexed in fruit, pilose; paleae ovate, 1 mm long, with long acuminate apex 1–2 mm long, pilose, accrescent and shed with achenes. Ray florets 10–12; ligules 25–35 mm long. Disc florets 95–125, 4–6 mm long, pilose, green turning yellow with age. Achenes 3.5 mm long, 2 mm wide. $n = 19$, V.A.Funk, *Mem. New York Bot. Gard.* 36: 122 (1982). Fig. 80A.

A native of southern Mexico, but widely cultivated throughout the world. In Australia sparingly naturalised from garden escapes in Qld and N.S.W. Growing in damp disturbed areas, on roadsides and adjacent to rainforest. Flowers June.

Qld: Toowoomba, 1981, *L.G.Boyce s.n.* (BRI). N.S.W.: Toowoona Bay, 31 May 1976, *M.V.Heap s.n.* (NSW).

For a full synonymy see Morley (1980) and Funk (1982).



2. *Montanoa hibiscifolia Benth. in A.S.Oersted, *Vidensk. Meddel. Naturhist. Foren. Kjöbenhavn* 1852: 89 (1853), as *Montagnea hibiscifolia*

T: Nicaragua: Prov. Nueva Segovia, canyons and foothills 1851, *A.S.Oersted* 235 [9051]; lecto: K, photo seen; isolecoto: C (2 sheets) *n.v.*, NY (fragment) *n.v.*, *fide* V.A.Funk, *Mem. New York Bot. Gard.* 36: 101 (1982); remaining syn: Costa Rica: Volcan de Barba, 1851, *A.S.Oersted* 134; K *n.v.*

[*M. bipinnatifida* auct. non (Kunth) K.Koch: L.Murray in G.J.Harden (ed.), *Fl. New South Wales* 3: 273 (1992)]

Illustrations: B.Morley, *J. Adelaide Bot. Gard.* 2: 139–149, figs 5 & 6 (1980), first as *M. wercklei*; V.A.Funk, *op. cit.* 36: figs 1A, 9, 63; W.L.Wagner *et al.*, *Man. Fl. Pl. Hawai'i*, Rev. edn, 342, pl. 32 (1999).

Large shrubs, erect, soft-wooded, (1.5–) 3–4 m tall. Leaves: petiole 4–8 (–12) cm long, \pm stem-clasping, lacking stipule-like lobes at base; lamina ovate to pentagonal in outline, usually deeply palmately 3–5 (–7)-lobed, (7–) 20–40 cm long, (2.5–) 20–30 cm wide, often with prominent auricles at base, long-acuminate (rarely acute), discolorous, with adaxial surface moderately pubescent and abaxial surface moderately to densely glandular and pubescent; lobes ovate to deltoid or cordate. Capitula pendulous, several in compound mainly oppositely branched corymbs; peduncles 2–6 cm long, densely hairy; involucre bracts \pm uniseriate, reflexed in fruit, pilose; paleae obtrullate, 2.5 mm long, with long acuminate apex 1–2 mm long, pilose, accrescent and shed with achenes. Ray florets 7 or 8; ligules 15–25 mm long. Disc florets 85–105, c. 2 mm long, moderately to densely pubescent, yellow. Achenes c. 3 mm long. 1.5 mm wide. *n* = 19, V.A.Funk, *op. cit.* 36: 102. *Anzac Flower.* Plate 56; Fig. 80B–E.

A native of S Mexico, Central America and Costa Rica. Widely cultivated as an ornamental species, and becoming naturalised in east-coastal Africa and the Pacific. In Australia naturalised from garden escapes, in eastern Qld from S of Cairns, and in NE N.S.W. Grows in usually damp disturbed areas on roadsides, in open eucalypt forest, the margins of rainforest and complex notophyll vine forest, on a range of soils, from c. 90–800 m alt. Flowers recorded May–July; fruits (June–) July–Aug. (–Dec.).

Qld: Tomewin Rd, c. 15 km SW of Currumbin, *A.R.Bean* 16677 (BRI, MEL); Gillies Hwy, near L. Barrine, *L.J.Brass* 33476 (BRI); 4 km SE of Danbulla, *F.H.J.Crome* 507 (CANB); Upper Brookfield Rd, Upper Brookfield, *S.P.Phillips* 483 (BRI, MEL, NSW). N.S.W.: Brunswick Heads, 1965, *H.J.Cann* s.n. (NSW).

The flowers are heavily scented. For a full synonymy see Morley (1980) and Funk (1982).

The illustration of '*M. bipinnatifida*' in G.J.Harden (ed.), *Fl. New South Wales* 3: 273 (1992) is of *M. hibiscifolia*.



Subtrib. 3. VERBESININAE

A.E.Orchard

Heliantheae subtrib. *Verbesininae* Benth. & Hook.f., *Gen. Pl.* 2: 166, 193 (1873), as *Verbesineae*

Type: *Verbesina* L.

Paleae not accrescent after anthesis, not decurrent at base. Receptacle flat to convex but not conspicuously conical or columnar. Ray florets female, fertile, rarely sterile; corollas not fused to achenes. Disc florets bisexual, fertile; styles branches of disc florets with 2 distinct narrow stigmatic surfaces. Achenes of at least disc florets strongly compressed, broadly and evenly winged. Pappus of 2–4 awns, or erose squamellae, rarely absent.

A subtribe of 4 genera, of which 1 occurs in Australia.

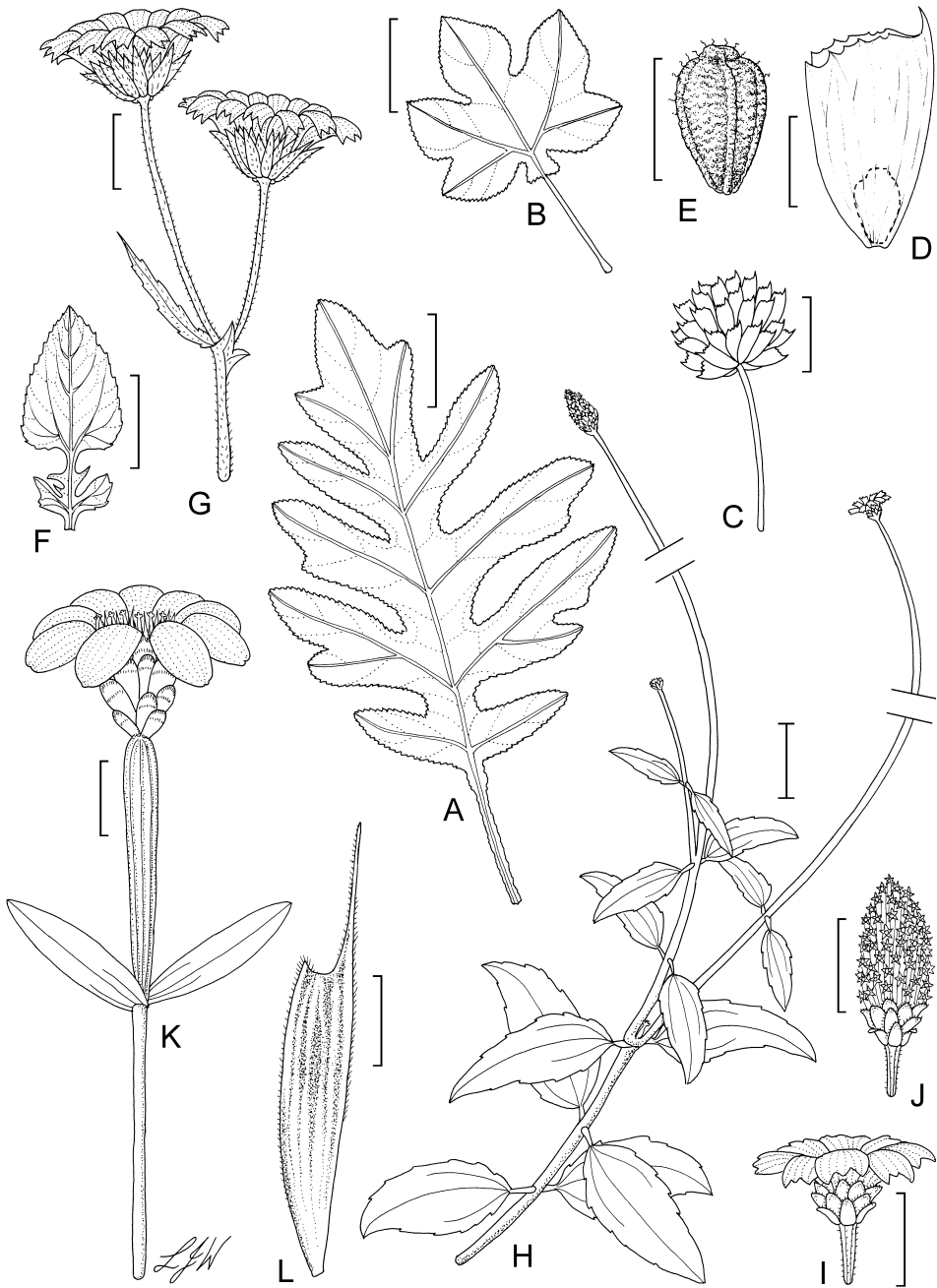


Figure 80. A, *Montanoa bipinnatifida*, leaf (M.Gray 7095, CANB). B–E, *M. hibiscifolia*. B, leaf; C, fruiting capitulum with accrescent palea; D, achene within accrescent palea; E, achene (B–E, F.H.J.Crome 507, CANB). F, G, *Verbesina encelioides* var. *encelioides*. F, leaf; G, two capitula (F, G, H.I.Aston 2448, AD). H–J, *Acmea grandiflora* var. *brachyglossa*. H, habit; I, capitulum in flower; J, capitulum in fruit (H–J, B.M.Waterhouse 7365, CANB). K, L, *Zinnia peruviana*. K, capitulum; L, achene (K, L, B.J.Lepschi & A.V.Slee 1183, CANB). Scale bars: A, B, F = 50 mm; C, G, H, K = 30 mm; D, L = 3 mm; E = 2 mm; I, J = 10 mm. Drawn by L.J.Waters.

ASTERACEAE

VERBESINA

Verbesina L., *Sp. Pl.* 2: 901 (1753); derivation obscure, possibly from *Verbena* and the Greek *-osyne* (with the features of), from the resemblance of the leaves to those of *Verbena*.

Type: *V. alata* L.

Annual or perennial herbs. Leaves opposite to alternate, petiolate, simple. Capitula long-pedunculate, hemispherical, becoming reflexed in fruit, discoid or radiate, terminal, solitary or in loose cymes; involucre bracts numerous, 2- or 3-seriate, subequal, herbaceous; receptacle convex, pitted; paleae caducous. Ray florets uniseriate, female, fertile (rarely sterile), ligulate. Disc florets bisexual, usually 5-lobed; anthers obtuse at base, with a narrow acute apical appendage; style branches linear, with shortly hairy subulate terminal appendages. Achenes compressed, oblong to obovate, at least those of disc florets winged. Pappus of 2 bristle-like awns or absent.

A genus of c. 300 species native to N, Central & S America; one species is naturalised in Australia.

Robinson & Greenman (1899), in the only survey of the entire genus, divided it into 12 sections. A molecular phylogenetic study by Panero & Jansen (1997) supported recognition of about 7 or 8 sections. The Australian weedy species, *V. encelioides*, belongs to sect. *Xiimesesia* (Cav.) A.Gray.

B.L.Robinson & J.M.Greenman, Synopsis of the genus *Verbesina*, with an analytical key to the species, *Proc. Amer. Acad.* 34: 534–566 (1899); J.L.Panero & R.K.Jansen, Chloroplast DNA restriction site study of *Verbesina* (Asteraceae: Helianthiae). *Amer. J. Bot.* 84: 382–392 (1997).

****Verbesina encelioides*** (Cav.) Benth. & Hook.f. ex A.Gray in S.Watson, *Bot. California* 1: 350 (1876)

var. ***encelioides***

Xiimesesia encelioides Cav., *Icon.* 2: 60 (1793). T: Habitat in Mexico, unde introducta in Regium hortum Matritensem; holo: MA n.v., fide R.Garilleti, *Fontqueria* 38: 231 (1993).

Illustrations: A.J.Cavanilles, *Icon.* 2: Tab. 178 (1763); H.E.Kleinschmidt & R.W.Johnson, *Weeds of Queensland* 389 (1977); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 972, fig. 199d (1999).

Erect annual herb (0.15–) 0.4–1.0 (–1.6) m tall; stems striated, woody (to 2 cm diam. at base), pubescent. Leaves alternate, with 2 small stipuloid lobes present at base of petiole; lamina lanceolate to ovate, 40–100 (–120) mm long, 10–55 (–80) mm wide, serrate, often greyish white beneath with dense appressed hairs. Capitula radiate, solitary or borne in cymbiform or corymbiform arrays of 2–6; peduncles 3–25 cm long; capitula (10–) 20–30 mm diam. (excluding rays); involucre bracts 2-seriate, narrowly lanceolate, grey, pilose; paleae linear, 8 mm long, acute, stramineous, pilose, falling after achenes. Ray florets 12–15, ligulate, bright yellow; ligule 10–20 mm long, deeply 3-lobed. Disc floret corollas yellow. Ray achenes ovoid, 3- or 4-angled, 4.0–4.5 mm long, dark grey, unwinged, glabrous, densely white-tuberculate, with pappus absent. Disc achenes obovate, strongly compressed, 4-angled, 6.0–6.5 mm long, silvery grey to dark grey, body ±smooth, minutely pilose; wings 2, well developed, corky; pappus of 2 bristles. *Crownbeard*, *Wild Sunflower*, *Goldweed*, *South African Daisy*. Plate 57; Fig. 80F–G.

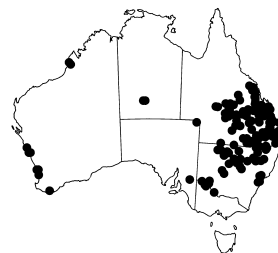
A native of N America, introduced to many countries, including the SW Arabian peninsula, Argentina, and Pacific islands. In Australia naturalised throughout southern Qld and drier parts of N.S.W., rarer in other mainland States. A weed of both natural and agricultural systems, seasonally and locally abundant, particularly on sandy soils (but also on clays), near creeks, roadsides, and other disturbed habitats, in eucalypt, *Acacia* and *Callitris* woodlands, and in grasslands, at altitudes from sealevel to at least 800 m. Flowers and fruits recorded in all months.

W.A.: 1.1 km N of Karinga Rd turnoff on Fremantle Rd, Meadow Springs, *B.J.Lepschi 3339* & *T.R.Lally* (CANB, MEL, PERTH). N.T.: 3 km S of Glen Helen, Finke R., *P.K.Latz 14802* (CANB, DNA, NT). S.A.: Waikerie, 1 Mar. 1976, *R.Kain s.n.* (AD, CANB). Qld: 23 km W of St George, *H.I.Aston 2448* (AD, BRI, CBG, MEL).

N.S.W.: MacIntyre R., Yetman, *R.Coveny 12542 et al.* (BRI, MEL, NSW).
Vic.: near Oatey's HS on Chalka Ck, Hattah-Kulkyne Natl Park, *D.G.Cameron 8606* (CBG, MEL).

This species appears to have been introduced to Australia in the late 19th century, being first recorded at Sydney, N.S.W., in 1878 (*Woolls s.n.*), and Kerang, Vic., in 1900 (*J.Moore s.n.*).

There are two varieties. *Verbesina encelioides* var. *exauriculata* B.L.Rob. & Greenm. lacks the stipuloid auricles at the base of the petiole, and is more common in the U.S.A., but has not been introduced to Australia. In some specimens of *V. encelioides* var. *encelioides* the stipuloid appendages extend some distance up the petiole, making it irregularly winged.



This taxon is often poisonous to sheep and, less frequently, to cattle (S.L.Everist, *Poisonous Pl. Australia* 187–190, pl. 9 (1981)), although rarely eaten except when food is scarce. Several studies have shown the poisonous compound to be galegine (e.g. R.F.Keeler *et al.*, *J. Environm. Pathol. Toxicol. Oncol.* 11: 11–17 (1992); T.A.Lopez *et al.*, *Veterin. Human Toxicol.* 38: 417–419 (1996)).

Subtrib. 4. SPILANTHINAE

A.E.Orchard

Heliantheae subtrib. *Spilanthinae* Panero, *Phytologia* 87: 9 (2005)

Type: *Spilanthes* Jacq.

Paleae not accrescent after anthesis, with slightly decurrent bases. Receptacle conspicuously conical or columnar. Ray corollas not fused to achenes. Disc florets bisexual, fertile; style branches with continuous stigmatic surfaces. Achenes of at least disc florets compressed or triquetrous, usually winged (sometimes only narrowly). Pappus absent or 1–4 small bristles, or a minute crown.

A subtribe of 5 genera, mostly native to the New World tropics, but *Acmella* and *Spilanthes* are pantropical and occur in Australia.

H.Cassini, *Spilanthes*, in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 24: 328–331 (1822); A.P.Candolle, *Spilanthes*, *Prodr.* 5: 620–626 (1836); A.H.Moore, Revision of the genus *Spilanthes*, *Proc. Amer. Acad. Arts* 42: 521–569 (1907); R.K.Jansen, The systematics of *Spilanthes* (Compositae: Helianthieae), *Syst. Bot.* 6: 231–257 (1981); R.K.Jansen, The systematics of *Acmella* (Asteraceae-Heliantheae), *Syst. Bot. Monogr.* 8: 1–115 (1985).

Pappus of soft bristles (hardly larger than cilia) or absent; achenes dimorphic with outer ones 3-angled, inner ones 2-angled, with margins not noticeably corky-thickened; corollas usually yellow to orange, rarely white; capitula usually radiate, rarely discoid

1. ACMELLA

Pappus of stiff awns; achenes homomorphic, with margins thickened (corky); corollas white to purplish; capitula discoid

2. SPILANTHES

1. ACMELLA

Acmella Rich. ex Pers., *Syn. Pl.* 2: 472 (1807); from Greek *akme* (point or peak) and *-ella*, a Latin diminutive suffix, probably alluding to the small spinous pappus bristles.

Type: *A. oppositifolia* (Lam.) R.K.Jansen

Annual or perennial herbs, erect or semiprostrate. Leaves opposite, sometimes clustered at base of stem. Capitula radiate or discoid, usually solitary, sometimes in groups of 2 or 3,

terminal or axillary, \pm ovoid, pedunculate; involucre bracts 1–3-seriate, subequal, usually broad, thin, at least outer ones leaf-like; receptacle conical, elongating in fruit; paleae membranous, loosely enfolding achenes. Ray florets usually present, 1-seriate, female. Disc florets bisexual, tubular, 4- or 5-lobed; anthers not or scarcely lobed at base. Ray achenes obovoid to ellipsoid, 3-angled. Disc achenes obovoid to ellipsoid, strongly laterally compressed, 2-angled, often ciliate on margins. Pappus absent or of 1–4 short fine bristles at angles of achene (bristles often hardly distinct from cilia).

A genus of about 30 species, mainly native to tropical N & S America, with fewer species in southern Asia, New Guinea & Australia. In Australia, 1 native and 1 naturalised species.

The close relationship of *Acmella* to *Spilanthes* was discussed by Cassini (1822), and Candolle (1836) reduced it to a synonym of *Spilanthes*. Australian species of *Acmella* were treated as *Spilanthes* until Jansen (1981, 1985) resurrected the genus on morphological and chromosomal evidence.

Plants perennial; capitula 6–13 (–17) mm diam. (excluding rays when present); disc florets 5-lobed; involucre bracts 8–15, 2–3-seriate

1. A. grandiflora

Plants annual; capitula 4–6 mm diam. (excluding rays); disc florets 4-lobed; involucre bracts usually 5 or 6, 1-seriate

2. A. uliginosa

1. *Acmella grandiflora* (Turcz.) R.K.Jansen, *Syst. Bot. Monogr.* 8: 75 (1985)

Spilanthes grandiflora Turcz., *Bull. Soc. Nat. Mosc.* 24: 1 (1851). T: Luzon, South Hocos, Philippines, *Cuming 1154*; holo: LE; iso: CGE, E, G, GH, L, MEL, MO, NY, OXF, UPS, W, all *n.v.*, *fide* R.K.Jansen, *loc. cit.*

Perennial herb (12–) 40–90 cm tall. Leaves subsessile or shortly petiolate, linear, lanceolate or ovate, 3–12 (–14) cm long, 0.3–3.0 cm wide, entire to sparsely and coarsely toothed, glabrous or sparsely to moderately hispid on veins and margins. Capitula radiate or discoid, 6–13 (–17) mm in diam. (excluding rays), usually solitary, terminal; peduncle 7.5–37 cm long; involucre bracts 8–15, 2–3-seriate, (broadly) ovate to obovate, \pm glabrous, ciliate on margins. Ray florets present, yellow to yellow-orange, conspicuous or tiny. Disc florets 4- or 5-lobed. Achenes (1.4–) 2.5–3.9 mm long, ciliate (rarely eciliate) on margins, glabrous or sparsely ciliate on body. Pappus absent or often of 2 or 3 subequal bristles.

Extends from Indonesia and New Guinea to the Philippines and Australia. There are 3 varieties, 2 of which occur in Australia. *Acmella grandiflora* var. *grandiflora* is found in the Philippines (Luzon, Mindoro) and Indonesia (Java) and has black anthers. The two Australian varieties share yellow to light brown anthers and are more closely related to each other than either is to var. *grandiflora*. A plant mainly of swamps and wet areas.

Capitula long-radiate, on peduncles 13–37 cm long; leaves usually linear to lanceolate, sometimes ovate

1a. var. brachyglossa

Capitula very shortly radiate, appearing discoid, on peduncles 7.5–28 cm long; leaves narrowly ovate to ovate

1b. var. discoidea

1a. *Acmella grandiflora* var. *brachyglossa* (Benth.) R.K.Jansen, *Syst. Bot. Monogr.* 8: 77 (1985)

Spilanthes grandiflora var. *brachyglossa* Benth., *Fl. Austral.* 3: 541 (1867). T: Sturts Ck, N.T., 1856, *F.Mueller s.n.*; holo: K; iso: MEL.

Spilanthes macroglossa F.Muell., *Fragm.* 5: 63 (1865). T: In pratis Australiae intertropicae et subtropicae haud infrequens; lecto: Rockhampton, Qld, *herb. F.Mueller*, no collector, MEL 91061, *fide* R.K.Jansen, *loc. cit.*; isolecto: MEL 91090; remaining syn: MEL 91079, MEL 91081, MEL 91087, MEL 91086, MEL 91088.

Spilanthes grandiflora var. *calva* Benth., *Fl. Austral.* 3: 541 (1867). T: Brisbane R., Moreton Bay, Mossman, F.Mueller, New England, C.Stuart; Clarence R., Beckler; Richmond R., Fawcett; lecto: Clarence R., N.S.W., 1862, *Beckler s.n.*, K 9761, *fide* R.K.Jansen, *loc. cit.*; isolecto: MEL 91080, 91083, 91084, NSW 143604; remaining syn: K 9762, K 9763, MEL 91065, MEL 91095.

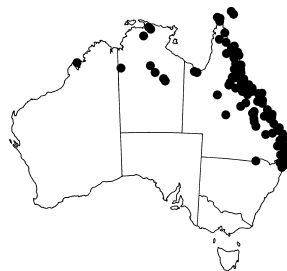
[*Spilanthes acmella* auct. non (L.) L.: F.Mueller, *Fragm.* 5: 63 (1865)]

Illustrations: J.Banks & D.Solander, *Illustr. Bot. Cook's Voy.* 2: pl. 161 (1901); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 559, fig. 78F1, F2 (1986), both as *Spilanthes grandiflora*.

Erect or semiprostrate herb (12–) 40–60 (–90) cm tall. Leaves linear to narrowly lanceolate, rarely ovate, 3–10 (–14) cm long, 0.3–2.5 (–3.0) cm wide, attenuate to cuneate at base. Capitula radiate, 6–12 mm diam. (excluding rays); peduncle 13–37 cm long; involucre bracts (2–) 3-seriate, ovate to broadly ovate, cuspidate or acuminate apically. Ray florets 7–16; ligules (3–) 5–12 mm long, yellow to yellow-orange. Disc floret corollas 2.5–3.0 mm long, yellow. Anthers yellow to light brown. Achenes (1.4–) 2.5–3.5 mm long. Pappus usually of 2 (disc florets) or 3 (ray florets) subequal bristles, rarely absent. Plate 59; Fig. 80H–J.

Occurs in eastern New Guinea and northern Australia. Uncommon in northern N.S.W., but widespread in eastern Qld and central and northern N.T., with one collection from W.A. Found in damp or wet areas in open forest, grasslands, bogs, swamps and floodplains, and along creeks and roadsides in sandy, silty, loamy or clay soil, at altitudes from sealevel to 1000 m. Flowers and fruits recorded in all months, with a peak in Mar.–July.

W.A.: Edeline Is., Buccaneer Archipelago, *J.Martin CB124* (DNA, PERTH). N.T.: 30 miles [48.2 km] NW of Rockhampton Downs Stn, *R.A.Perry 1584* (BRI, CANB, K). Qld: Burke Development Rd, c. 4 km W of Petford, *J.R.Clarkson 2768* (BRI, NT, QRS); Barwidgee Rd, S of Mt Garnet, *K.R.McDonald 314* (BRI). N.S.W.: Devils Pulpit State Forest, EIS plot 9, *A.G.Floyd 2183* (CANB, NSW).



Mueller's Sturt Creek collection, which subsequently became the type of *A. grandiflora* var. *brachyglossa*, was the basis of his misapplication of the name *S. acmella* L. (= *Blainvillea acmella* (L.) Philipson) to Australian material. The lectotype and isolectotype of *S. macroglossa* lack a collector, but there are a number of sheets in MEL which are annotated *S. macroglossa* by Mueller, and he described it as 'not infrequent'. These sheets are here considered syntypes.

This taxon is considered native to Australia: it was collected by Banks and Solander in 1770 (MEL 91078). In weakly erect specimens the basal part of the decumbent stems may root adventitiously.

This taxon superficially resembles various *Apowollastonia* species, but differs in having ±glabrous involucre bracts (marginally ciliate), paleae membranous and wrapping around florets, and an elongate receptacle.

1b. *Acmella grandiflora* var. *discoidea* R.K.Jansen, *Syst. Bot. Monogr.* 8: 78–80 (1985)

T: 16 miles NNW of Tipperary HS, N.T., 19 Jul 1961, *Lazarides 6662*; holo: BRI 140816; iso: CANB 112766, MEL 91061, NSW 701505.

Illustration: R.K.Jansen, *op. cit.* 79, fig. 23.

Erect herbs 20–35 (–60) cm tall. Leaves narrowly ovate to ovate, 1.5–4.5 cm long, 0.7–2 cm wide, attenuate at base. Capitula very shortly radiate, appearing discoid, 8–10 mm diam.; peduncle 7.5–28 cm long; involucre bracts 2-seriate, ovate to obovate, usually obtuse, sometimes acute. Ray florets 4–7, inconspicuous, barely exceeding involucre bracts, yellow. Disc floret corollas 2.5–3.9 mm long, 4-lobed, yellow. Anthers yellow. Achenes 3.2–3.9 mm long. Pappus of 2 short bristles.

Endemic to Australia, in northern N.T., with occasional specimens in Qld. Found in grassland, *Eucalyptus* and *Melaleuca* woodland and on the edge of black soil plains. Flowers and fruits recorded in Apr., July & Sept.

N.T.: near Kilfoyle Ck, *S.T.Blake 16637* (BRI); Elizabeth Downs Stn, *K.M.Manning 440* (DNA); Daly River Wildlife Res., near Anson Bay, *J.McKean 1178* (DNA); Port Darwin, *M.Schultz 430* (MEL). Qld: S of railway line off Bilwon Rd, NNE of Mareeba, *I.D.Fox 1274* (BRI).



The ligules of *A. grandiflora* var. *brachyglossa* are usually conspicuous and c. 10 mm long, but some collections have very small ligules (e.g. *B.S.Wannon 1785*, *P.K.Latz 9319*) and thus approach var. *discoidea*. Jansen (1985) acknowledged that discoid forms occur sporadically in other species of *Acmella* and are not

usually recognised as formally distinct. In the case of *A. grandiflora* var. *discoidea* he made an exception because it had geographic integrity plus some correlated morphological characters. With the discovery of these intermediate specimens, plus eligulate plants more widely dispersed in N.T. and even in Qld, the justification for maintaining this taxon as distinct is somewhat diminished. It is maintained in this treatment, pending field studies of infra-population variation.

2. *Acmella uliginosa (Sw.) Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 24: 331 (1822)

Spilanthes uliginosa Sw., *Prodr.* 110 (1788). T: Jamaica: [1784–1786] Swartz s.n.; holo: BM n.v.

Illustration: W.Fawcett & A.B.Rendle (eds), *Fl. Jamaica* 7: 239, fig. 81 (1936).

Annual herb 30–45 cm tall. Leaves subsessile or shortly petiolate, narrowly lanceolate to lanceolate, 20–50 mm long, 6–10 mm wide, entire to sparsely and coarsely toothed, sparsely hispid especially on veins and margins. Capitula terminal and axillary, solitary or in groups of 2 or 3, 4–6 mm diam.; peduncle 2–7 cm long; involucre bracts c. 5 or 6, 1-seriate, narrowly to broadly ovate, 2–4 mm long, ciliate on margins, otherwise glabrous. Ray florets present, yellow to orange yellow, inconspicuous. Disc florets 4-lobed, yellow to orange yellow. Achenes 2.5 mm long, densely ciliate on margins, otherwise glabrous or sparsely pilose. Pappus of 2–4 very short fine bristles almost indistinguishable from marginal cilia.

A pantropical weed, probably originally native to C and S America. In Australia, naturalised in the Cape York area of Qld since at least 1873 (*Hann 214*), but apparently localised. Found in the grassy understorey of *Eucalyptus tetradonta* woodland in sandy soil, and at the base of termite mounds in *Melaleuca viridiflora* woodland. Flowers and fruits June–Dec.

Qld: Lily Ck, 18.1 km SE of Hann R., A.R.Bean 13524 (MEL); 17.7 km N of Morehead R. crossing on Peninsula Development Rd, J.R.Clarkson 8915 & V.J.Neldner (BRI, MEL); Kamerunga, E.Cowley 8 (BRI); Cape York Expedition, W.Hann 214 (K); W of Musgrave on road to Pormpuraaw, B.S.Wannon 3597 (BRI).



2. SPILANTHES

Spilanthes Jacq., *Enum. Syst. Pl.* 8 (1760); derivation unknown, probably from Greek *spilos* (blemish, stain, spot) and *anthos* (flower), although the allusion is obscure.

Type: *S. urens* Jacq.

Ceratocephalus Kuntze, *Rev. Gen. Pl.* 1: 326 (1891), *nom. illeg., superfl.*

Perennial herbs, erect or prostrate. Leaves opposite, cauline. Capitula discoid, terminal, solitary or in simple cymes of 2 or 3, rarely axillary, ovoid to broadly ovoid, pedunculate; involucre bracts 2–3-seriate, subequal or unequal, narrowly lanceolate to ovate or obovate; outer bracts herbaceous; inner bracts sometimes chartaceous; receptacle conical, elongating in fruit; paleae membranous, loosely enfolding achenes. Ray florets absent. Disc florets bisexual, tubular, 5-lobed; anthers shortly acuminate at base. Achenes ellipsoid to obovoid, strongly laterally compressed, 2-angled, glabrous or ciliate on angles. Pappus of 1–3 unequal slender but substantial awns.

A genus of 6 species with a disjunct distribution in Central and S America (4 spp.), Africa (1 sp.) and Malesia (1 sp.). One species naturalised in Australia.

A.E.Orchard, The status of *Spilanthes anactina* (Asteraceae: Spilanthinae) in Australia, *Newslett. Australas. Syst. Bot. Soc.* 154: 4–7 (2013).

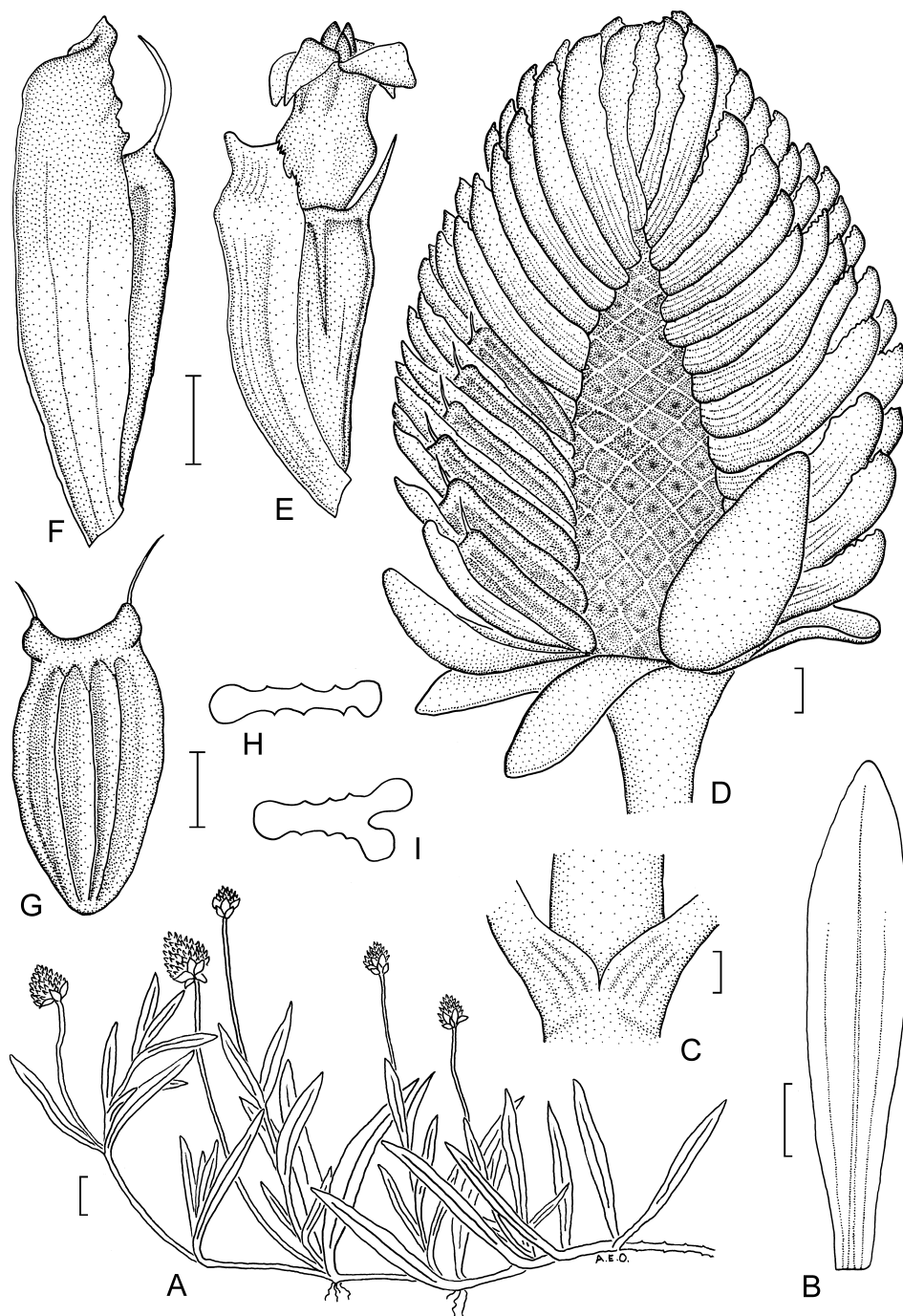


Figure 81. *Spilanthes anactina*. **A**, habit; **B**, leaf; **C**, leaf bases; **D**, inflorescence in young fruit, some florets removed; **E**, floret within palea; **F**, young achene within palea; **G**, mature achene; **H**, TS of achene; **I**, TS of rare 3-angled achene (**A**, L.L.Forman 1099 & J.B.J.Blewett, K; **B**, **C**, **G**–**I**, Gov. Creagh s.n., K; **D**, **F**, Mrs Barber s.n., K; **E**, D.Henne s.n., MEL 91063). Scale bars: **A** = 1 cm; **B**–**I** = 1 mm. Drawn by A.E.Orchard. Previously published in *Australas. Syst. Bot. Soc. Newslett.* 154: 7 (2013).

****Spilanthes anactina* F.Muell., *Fragm.* 5: 63 (1865)**

Ceratocephalus anactinus (F.Muell.) Kuntze, *Rev. Gen. Pl.* 1: 326 (1891). T: In insulis sinus Carpentariae; lecto: Sweers Is., Qld, *herb. F.Mueller*, without collector or date [*D.Henne s.n.*, 1861], MEL 91063; isolecto: MEL 91062, K (& probably GH *n.v.*), *fide* A.E.Orchard, *Flora of Australia* 37: 609 (2015).

Illustrations: R.K.Jansen, *Syst. Bot.* 6: 236, figs 2, 6 (1981).

Prostrate herb. Leaves sessile, linear-lanceolate, 1.7–8.0 cm long, 1.7–8.2 mm wide, with 3 strong primary veins arising from the base, entire, glabrous. Capitula solitary, broadly ovoid, 10.0–14.5 mm diam. Peduncles 3.0–13.7 cm long, glabrous. Receptacle broadly conic. Involucral bracts c. 8, 2-seriate, subequal; outer bracts broadly ovate, 4.4–6.5 mm long, glabrous; inner bracts broadly elliptic to obovate, 5.5–7.0 mm long, glabrous except weakly fimbriate at apex. Paleae rounded to weakly fimbriate and slightly expanded at apex. Corollas white, flushed purple, 2.6–3.7 mm long; expanded lower tube 2.1–3.1 mm long, 0.7–1.4 mm wide; throat 0.4–0.7 mm long, 0.4–0.7 mm wide; lobes 0.5–0.8 mm long. Achenes not seen mature in Australian material; elsewhere ovoid, slightly curved, 4.0–4.5 mm long, strongly compressed, 2- or 3-angled, black, ±shiny, ±glabrous with just an occasional twin hair towards base, with 3 strong longitudinal ribs on each face; angles inflated, corky, creamy-white; pappus of 2 very unequal slender unbarbed awns 1–2 mm long seated on short conical corky bases. Fig. 81.

Native from the Malay Peninsula (Johore State) to Sarawak and Brunei; introduced prior to European settlement to Sweers Is., Qld, in the Gulf of Carpentaria. Grows in sandy coastal habitats. Flowers throughout the year (*fide* Jansen, *op. cit.*).

Qld: Sweers Is., 18 Nov. 1802, *R.Brown s.n.* [*Bennett no. 2118*] (BM).

See Orchard (2013) for discussion of the typification and distribution of this species.



Subtrib. 5. ZINNIINAE

A.E.Orchard

Heliantheae subtrib. *Zinniinae* Benth. & Hook.f., *Gen. Pl.* 2: 166, 193 (1873), as *Zinnieae*

Type: *Zinnia* L.

Paleae not accrescent after anthesis, not decurrent at base, rarely absent. Receptacle convex to conical. Ray florets female, rarely neuter; corollas marcescent and fused to achenes, rarely deciduous. Disc florets bisexual, rarely functionally male; style branches usually with fused stigmatic surfaces (rarely divided). Achenes usually triquetrous to quadrate, rarely winged. Pappus absent, or of 1 or 2 (rarely many) awns, or a small crown.

A subtribe of 7 genera native to the Americas. One genus (3 species) is naturalised in Australia.

ZINNIA

Zinnia L., *Syst. Nat.* ed. 10, 2: 1221 (1759), *nom. cons.*; named in honour of Johann Gottfried Zinn (1727–1759), Professor of Botany, Göttingen, Germany.

Type: *Z. peruviana* (L.) L.

Annual or perennial herbs or shrubs. Leaves usually opposite and entire. Capitula solitary, terminal, cylindrical to campanulate or hemispherical; peduncles hollow and sometimes inflated; involucral bracts 2–5-seriate, imbricate, graduated, ±scarious; receptacle conical to

nearly flat; paleae persistent, enfolding achenes. Ray florets female, fertile; ligules firm, persistent, often resin-dotted, large, showy. Disc florets bisexual (rarely functionally male), fertile, tubular (rarely zygomorphic), 5-toothed with 1 lobe often longer than the others. Anthers truncate to auriculate basally, with narrow acute terminal appendages. Style branches filiform, with fused stigmatic surfaces. Achenes compressed; ray achenes smooth to minutely tuberculate, usually awnless; disc achenes \pm smooth, often with a single erect awn.

A genus of 17–25 species in the New World, from the SW U.S.A. to central America and northern S America. In Australia 3 species are naturalised.

A.M.Torres, *Taxonomy of Zinnia*, *Brittonia* 15: 1–25 (1963); O.Olorode & A.M.Torres, Artificial hybridization of the genera *Zinnia* (sect. *Mendenezia*) and *Tragoceras* (Compositae-Zinninae), *Brittonia* 22: 359–369 (1970); R.McVaugh, *Zinnia*, in *Fl. Novo-Galiciana* 12: 1108–1125 (1984).

1 Capitula broadly campanulate to hemispherical, usually more than 1 cm diam. (excluding rays); involucre bracts glabrous or almost so abaxially; ray achenes 6–11 mm long; disc corollas basally dilated; ligules usually pink to purplish, sometimes white, yellow or orange-red

2 Capitula campanulate to \pm hemispherical; paleae not lobed at apex, but erose or entire, obtuse and acuminate; disc achenes narrowly oblanceolate to elliptic with a single long awn; ligules glandular but otherwise \pm glabrous abaxially

1. *Z. peruviana*

2: Capitula hemispherical; paleae fimbriately lobed at apex; disc achenes broadly oblanceolate to cuneate, usually awnless, or awns very short; ligules pilose abaxially, especially on veins

2. *Z. elegans*

1: Capitula mostly hemispherical, usually much less than 1 cm diam. (excluding rays); involucre bracts pilose abaxially; ray achenes 3–4 mm long; disc corollas not basally dilated; ligules brilliant orange

3. *Z. angustifolia*

1. **Zinnia peruviana* (L.) L., *Syst. Nat.* ed. 10, 2: 1221 (1759)

Chrysogonum peruvianum L., *Sp. Pl.* 2: 920–921 (1753), *nom. cons.*; *Z. pauciflora* L., *Sp. Pl.* 2nd edn, 2: 1269 (1763), *nom. illeg.*, *superfl.* T: Peru, Jussieu, P-JU 9416 *n.v.*, *typ. cons.*

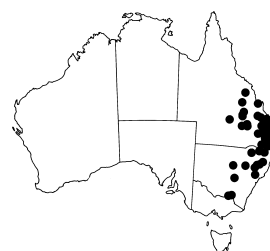
Z. multiflora L., *Sp. Pl.* 2nd edn, 2: 1269 (1763). T: Not designated. “Habitat ... *N.L. Burmannus*”; *holo?*: LINN 1019.2 *n.v.*, *fide* A.M.Torres, *Brittonia* 15: 12 (1963).

Z. verticillata Andrews, *Bot. Repos.* 3: t. 189 (1801). T: “... Mexico, South America..., and was introduced ... about the year 1789 by Mons. Richard, from the Paris gardens ...”; *lecto*: the plate, H.C.Andrews, *Bot. Repos.* 3: t. 189 (1801), *fide* A.M.Torres, *loc. cit.*

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 679 (1981); B.A.Auld & R.W.Medd, *Weeds* 122 (1987); W.L.Wagner *et al.*, *Man. Fl. Pl. Hawaii’i*, Rev. edn, 378, t. 39 (1999).

Erect annual (9–) 20–60 (–100) cm tall; stems striate, hairy. Leaves sessile, lanceolate to broadly ovate or elliptic, 15–70 mm long, 5–20 mm wide, scabrous; bases rounded to cuneate, sometimes subcordate and stem clasping. Capitula campanulate to \pm hemispherical, (8–) 12–15 mm diam. (excluding rays); involucre bracts oblong, rounded to minutely erose apically, glabrous, with darkened band near apex; paleae obtuse, erose, not lobed or fimbriate apically. Ray florets 6–15; ligules linear to obovate, sometimes heart-shaped, 8–25 mm long, minutely hairy on margins, sparsely glandular but otherwise \pm glabrous abaxially, usually pink to purple, sometimes red-orange. Disc florets numerous; corolla dilated at base, yellow; lobes velutinous. Ray achenes narrowly lanceolate, 3-angled, 9–11 mm long, pilose, unawned. Disc achenes narrowly oblanceolate to elliptic, 2-angled, 7–10 mm long, lightly ciliate; awn 1, 4–5 mm long. *Wild Zinnia*, *Field Zinnia*. Fig. 80K–L.

A native of southern U.S.A. and Central and S America. In Australia a garden escape in N.S.W. and Qld, naturalised on roadsides, disturbed sites, in *Eucalyptus*, *Callitris* and *Allocasuarina* woodland and grassland, usually on well-drained sandy or stony soils, but also on clays, at altitudes from 120–750 m. Flowers Oct.–May (–July); fruits (Aug.–) Nov.–May.



Qld: Pine Mtn, Marlborough, *G.N.Batianoff* 9805192 & *T.Ryan* (BRI, CANB, DNA, MEL, NSW); The Bluff, 10 km W of Rosewood, 8 Mar. 1992, *L.H.Bird s.n.* (BRI); 65.6 km S of Emerald on road to Springsure, *B.J.Lepschi* & *A.V.Slee* 1183 (BRI, CANB). N.S.W.: 85 km NW of Kempsey on road to Wollomombi, *T.A.Halliday* 527 (AK, BRI, K, NSW); Bolivia Mtn, *L.Murray* 68 *et al.* (BRI, CBG, K, MEL, NSW).

The nomenclatural history of this species is long and confusing. See J.F.Pruski, *Taxon* 56: 603–605 (2007) for discussion.

Holtze (*Trans. Proc. & Rep. Roy. Soc. S. Australia* 15: 2 (1892)) reported *Z. verticillata* as an introduced plant in N.T. No voucher specimen has been located, and no recent records of *Zinnia* are known from the N.T. It was presumably a fleeting garden escape of *Z. peruviana*.

2. **Zinnia elegans* Jacq., *Icon. Pl. Rar.* 3: 15, t. 589 (1792), *nom. cons.*

T: Hort[us] bot[anicus] Vind[obonensis], [1]792, *ex herb. Jacquin*; holo: W 9503 *n.v.*

Z. violacea Cav., *Icon.* 1: 57, t. 81 (1791), *nom. rej.* T: cultivated Madrid 1790, probably from Mexican seed sent by Sessé or Cervantes; lecto: MA *n.v.*, *fide* J.H.Kirkbride & J.H.Wiersema, *Taxon* 56: 958 (2007).

Z. australis F.M.Bailey, *Bot. Bull. Dept Agric. Queensland* 3: 14 (1891). T: Qld: Walsh R., Mar. 1891, *T.Barclay-Millar s.n.*; holo: BRI.

Illustrations: N.J.Jacquin, *loc. cit.*; T.F.Stuessy, *Ann. Missouri Bot. Gard.* 62: 1100, fig. 58 (1975); R.McVaugh, *Fl. Novo-Galiciana* 12: frontispiece & 1121, fig. 182 (1984), as *Z. violacea*.

Erect annual (20–) 30–60 (–120) cm tall; stems striate, hairy. Leaves sessile, lanceolate, ovate or oblong, 25–135 mm long, 10–40 mm wide, scabrous; bases truncate, obtuse or subcordate. Capitula hemispherical, to 2.2 cm diam. (excluding rays); involucre bracts obovate to broadly obovate, rounded and erose apically, glabrous, not or hardly banded at apex; Paleae acute or acuminate, deeply fimbriate apically. Ray florets c. 8–20; ligules broadly oblanceolate, 1–2 (–3) cm long, basally hairy abaxially especially on veins, usually pink to purple, rarely white, yellow or red-orange. Disc florets numerous; corolla dilated at base, with tube yellow or orange; lobes velutinous, black extrorsely. Ray achenes oblanceolate to cuneate, 3-angled, 6–8 (–9) mm long, pilose, unawned. Disc achenes broadly oblanceolate to cuneate, 2-angled, 5–6 (–9) mm long, ciliolate or glabrous, emarginate; awns absent or 1, very short. *n* = 12, T.F.Stuessy, *Ann. Missouri Bot. Gard.* 62: 1099 (1975). Plate 58.

A native of montane Mexico but widely cultivated. In Australia an occasional garden escape recorded from single localities in W.A., S.A., N.T. & A.C.T., and several localities in Qld, in urban waste land, and nearby bushland, at altitudes from sealevel to 570 m. Flowers recorded Feb.–Apr. (–Sept.); fruits Feb.–May.

W.A.: bushland surrounding Wandarrie Village at Argyle Diamond Mine, *E.Bennett* 33 B & C (PERTH). N.T.: 6.6 km W of Stuart Hwy along Tanami Hwy, *P.K.Latz* 18514 (DNA). S.A.: Iron Knob, *R.Bates* 31861 (AD). Qld: Mabuiag Is., Torres Strait, *B.M.Waterhouse* 5848 (BRI, CANB). A.C.T.: Haig Park, Canberra, *R.W.Purdie* 7105 (CANB).



The collection *Bennett* 33B & C has ‘double’ heads (an increase in the number of ligulate florets), a feature common in cultivated plants. The collection *Bates* 31861 is much more robust than other Australian collections.

The swollen hollow peduncles characteristic of many *Zinnia* species are particularly pronounced in this species (and in *Z. peruviana*). Ray colour in both species is usually shades of red to pink or purplish. If the rays are shades of orange, they differ from *Z. angustifolia* in that on drying the ray colour fades rapidly to muddy pink or purple (in *Z. angustifolia* the intense orange colour is very long-lasting).

3. **Zinnia angustifolia* Kunth in F.W.H.A.von Humboldt *et al.*, *Nov. Gen. Sp.* 4: 197 (1820) var. *angustifolia*

T: Mexico, near Guanajuato, *Bonpland*, accession 1-96-53; holo: P *n.v.*; iso: US (fragment) *n.v.*

Illustrations: A.M.Torres, *Brittonia* 15: 18, figs 33–35 (1963) [Note fig. 34 incorrectly shows a disc achene with 2 awns].

Erect annual 30–50 cm tall; stems not noticeably striate, hairy. Leaves \pm sessile, linear to linear-lanceolate, 20–70 mm long, 3–7 mm wide, scabrous; bases attenuate. Capitula hemispherical, c. 8 mm diam. (excluding rays); involucre bracts \pm ovate, rounded apically, pilose abaxially, with a narrow dark band at apex; paleae minutely erose or entire and acuminate, not lobed or fimbriate apically. Ray florets 7–9; ligules oblong, c. 15 mm long, basally hairy abaxially, especially on veins, brilliant orange. Disc florets numerous; corolla not dilated at base, orange; lobes glabrous. Ray achenes oblanceolate, 3-angled, 3–4 mm long, shortly pilose, with pappus of 2 very short blunt horns. Disc achenes obovate, 2- or 3-angled, 3–4 mm long, with ciliate margins when young; awn 1, c. 2 mm long.

Native of western Mexico. In Australia known only as a garden escape from one small area in SE Qld. Flowers and fruits recorded in May.

Qld: Kerry Valley, opposite Sam Coco's property "Erin View", 18 May 2003, *M.O'Reilly s.n.* (BRI).

There are 2 varieties of this species in Mexico. *Zinnia angustifolia* var. *greggii* (B.L.Rob. & Greenm.) McVaugh is perennial with ligules white to cream, drying yellow (var. *angustifolia* is an annual plant with intense orange ligules). Only var. *angustifolia* occurs in Australia.



Subtrib. 6. HELIANTHINAE

A.E.Orchard

Heliantheae subtrib. *Helianthinae* Dumort., *Fl. Belg.* 71 (1827), as *Heliantheae*

Type: *Helianthus* L.

Paleae not accrescent after anthesis, not decurrent at base, usually persistent, sometimes wrapping achenes and shed with them. Receptacle flat to convex. Ray florets sterile or rarely male, female or bisexual; corollas not fused to achenes. Disc florets bisexual, rarely functionally female, fertile; style branches with fused stigmatic surfaces. Achenes compressed, biconvex or bluntly angled in cross-section, not winged. Pappus present or absent.

A subtribe of 19 genera, of which 2 are naturalised in Australia.

E.E.Schilling & J.L.Panero, A revised classification of subtribe *Helianthinae* (Asteraceae: *Heliantheae*) II. Derived lineages, *Bot. J. Linn. Soc.* 167: 311–331 (2011).

Peduncles fistulous (swollen and hollow); pappus a corona of hard, fused scales plus 2 awns (in Australian taxa)

Peduncles not fistulous; pappus absent or of 2–5 caducous scale-like awns

1. TITHONIA

2. HELIANTHUS

1. TITHONIA

A.E.Orchard, E.W.Cross & R.J.Bayer

Tithonia Desf. ex Juss., *Gen. Pl.* 189 (1789), after Tithonus, a young man much loved by Aurora, Dawn goddess of Roman mythology: Desfontaines chose the name because of the golden yellow (*aurora*) colour of the flowers.

Type: *T. uniflora* Desf. ex J.F.Gmel.

Erect annual or perennial herbs, sometimes shrubs. Leaves alternate, sessile or petiolate, entire to palmately or pinnately lobed, with 3 main veins. Capitula large, radiate, solitary;

hemispherical or broadly campanulate; peduncles long, swollen and hollow below involucre (fistulose); involucre bracts 2–5-seriate, graduated or subequal, longitudinally ribbed; outer bracts leathery; inner bracts herbaceous or papery; receptacle convex; paleae concave or conduplicate, rigid, with acuminate awn, persistent, enfolding achenes. Ray florets sterile, in 1 row; ligules bright yellow or orange. Disc florets bisexual, fertile, 5-lobed, yellow to orange. Achenes oblong, \pm compressed, bluntly 4-angled. Pappus usually of 2 awns and/or scales.

There are 11 species (13 taxa) primarily in SW U.S.A., Mexico and Central America, but at least 2 species widely cultivated and naturalised in tropical regions worldwide. In Australia there are 2 naturalised species.

The genera considered most closely related to *Tithonia* by J.C.La Duke (1982) were *Gymnolomia*, *Helianthus* and *Viguiera*. Schilling *et al.*, *Syst. Bot.* 23: 177–187 (1998) placed *Tithonia* as sister to *Helianthus* + *Phoebanthus*, with all three sister to *Viguiera*.

J.C.La Duke, Revision of *Tithonia*, *Rhodora* 84: 453–522 (1982).

Herbaceous perennial; inner involucre bracts oblong to ovate, abruptly tapering to apex, glabrous or sparsely pilose abaxially, distinctly striate; capitula 10–15 cm diam. (including rays); ligules of ray florets 4–7 cm long, yellow

1. *T. diversifolia*

Herbaceous annual; inner involucre bracts linear to lanceolate, long-tapering to apex, softly pilose abaxially, obscurely striate; capitula 3–4 (–9) cm diam. (including rays); ligules of ray florets 1.2–3.0 cm long, orange

2. *T. rotundifolia*

1. **Tithonia diversifolia* (Hemsl.) A.Gray, *Proc. Amer. Acad. Arts n.s.* 19: 5 (1883)

Mirasolia diversifolia Hemsl. in F.D.Godman & O.Salvin, *Biol. Centr.-Amer. Bot.* 2: 168, t. 47 (1881). T: Valley of Orizaba, Veracruz, Mexico, 12 May [1866], *E.Bourgeau* 2319; lecto: K, photo seen; isolecoto: K, photo seen, BR, FI, GH, S, US, *all n.v.*, *fide* J.C. La Duke, *Rhodora* 84: 498 (1982); remaining syn: Valleé de Cordova, 12 December, *Bourgeau* 1562, K, photo seen.

Illustrations: H.E.Kleinschmidt & R.W.Johnson, *Weeds Queensland* 327 (1977); J.C.La Duke, *op. cit.* 499, figs. 34–36; B.A.Auld & R.W.Meddy, *Weeds* 119 (1987).

Perennial herb (1.0–) 1.5–3.5 m tall; stem green to red-purple, strongly striate, glabrescent. Leaves with petiole 2–6 cm long; lamina ovate in outline, 7–15 (–33) cm long, 7–15 (–22) cm wide, entire or 3–5-lobed, shortly toothed, acuminate, minutely scabrous, glabrous or glabrescent above; base decurrent to petiole. Capitula 10–15 cm diam. (including rays), on peduncles 2–9 (–24) cm long; paleae 0.9–1.3 cm long; involucre bracts graduated, oblong to ovate, 3- or 4-seriate, distinctly striate, \pm glabrous or sparsely pilose abaxially; inner bracts abruptly tapering to apex. Ray floret ligules 4–7 cm long, yellow. Disc florets numerous, c. 15 mm long; outer surface glabrous above, yellow. Achenes black or mottled, 5–7 mm long, appressed-pilose. Pappus of hard, white, fused, erose scales and 2 \pm equal awns 3–5 mm long. *n* = 17, J.C.La Duke, *Rhodora* 84: 500 (1982). *Tree Marigold*, *Japanese Sunflower*. Plate 60; Fig. 82A–B.

Native to tropical Mexico and Central America. Cultivated as an ornamental in Africa, Australia, Asia and N America where it has escaped and become locally abundant. In Australia, an invasive weed of damp but well-drained roadsides, embankments and wasteland, and disturbed woodland and rainforest margins in east-coastal Qld and NE N.S.W., from sea level to at least 760 m. alt. A single early collection from W.A. probably represents an ephemeral escape from cultivation (West Perth, June 1910, *A.Morrison s.n.*, K). Flowers recorded Apr.–July & sporadically in Oct.–Jan.; fruits (Apr.–) June–Oct.



Qld: Herberton main street, *A.R.Bean* 18912 & *K.R.McDonald* (BRI); near South Pine R., Highvale, *S.P.Phillips* 234 (BRI); Indooroopilly, bank of Witton Ck, near junction with Brisbane R., *L.Pedley* 5843 (BRI, NSW); summit of Grassy Hill, Cooktown, *B.M.Waterhouse* 5977 (BRI, CANB). N.S.W.: Coffs Harbour, *R.Coveny* 9426 (CANB, K, NSW).

The flowers are faintly honey-scented and worked by honey bees.

This species closely resembles the rarer (in Australia) *T. rotundifolia*, and both can occur together. In Australia the 2 species are most easily distinguished by the orange ligules 1.2–3.0 cm long in *T. rotundifolia* vs. golden yellow ligules 4–7 cm long in *T. diversifolia*, as well as differences in shape, striation and indumentum of the involucre bracts, and the indumentum of the upper leaf surface.

2. **Tithonia rotundifolia* (Mill.) S.F.Blake, *Contr. Gray Herb.* 52: 41 (1917)

Tagetes rotundifolia Mill., *Gard. Dict.* edn 8, *Tagetes* 4 (1768). T: grown from seed probably at the Chelsea Garden, originally from Veracruz, Mexico, *W.Houstoun*, holo: BM n.v., *fide* J.C.La Duke, *Rhodora* 84: 480 (1982).

Illustrations: H.E.Kleinschmidt & R.W.Johnson, *Weeds Queensland* 328 (1977). J.C.La Duke, *op. cit.* 481, figs. 14–16; T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 562, fig. 78D (1986).

Annual herb 2–3 m tall; stem reddish purple, striate, pubescent, glabrescent. Leaves with petiole 2–5 cm long; lamina ovate to triangular in outline, (3–) 5–11 (27) cm long, (1.5–) 2–13 (–20) cm wide, entire or sometimes 3–5-lobed, shortly toothed, acuminate, coarsely scabrous above; base decurrent to petiole. Capitula 3–4 (–9) cm diam. (including rays), on peduncles 10–20 (–30) cm long; paleae c. 1.5 cm long; involucre bracts \pm equal, linear to lanceolate, 2- or 3-seriate, obscurely striate, softly pilose abaxially; inner bracts long-tapering to apex. Ray floret ligules 12–30 mm long, orange. Disc florets numerous, c. 10 mm long; outer surface pilose, orange to yellow. Achenes 6–8 mm long, black or mottled, appressed-pilose. Pappus of hard, white, fused, erose scales and 2 \pm equal awns 3–5 mm long. *n* = 17, J.C.La Duke, *Rhodora* 84: 483 (1982). *Mexican Sunflower*. Fig. 82C.

A native of central and southern Mexico, S to Panama, but cultivated worldwide as a garden ornamental, and frequently escaping. In Australia, naturalised in coastal Qld and less commonly in coastal N.S.W., and in southern N.T., as a weed of roadsides, disturbed areas and embankments. Flowers recorded Mar.–May; fruits Apr.–May.



N.T.: Gang Gang Community, 132 km from Nhulunbuy P.O., *A.A.Mitchell* 6733 (BRI, CANB). Qld: Brisbane, Chelmer, 20 Apr. 1956, *S.L.Everist s.n.* (BRI); Gillies Hwy, 2 miles [3.2 km] from Gordonvale, *S.L.Everist* 5101 (BRI, CANB); Mundubbera, bank of Burnett R., Apr. 1976, *S.L.Seiler s.n.* (BRI). N.S.W.: Merriwa, 9 Mar. 1950, *G.Henderson s.n.* (NSW).

Noted as yielding a good grade of honey in Guatemala (D.L.Nash, *Fieldiana, Bot.* 24 (12): 326 (1976)).

In Central America yellow-rayed flowers are occasionally found, but all Australian material has the more common orange rays.

2. HELIANTHUS

A.E.Orchard, E.W.Cross & R.J.Bayer

Helianthus L., *Sp. Pl.* 2: 904 (1753); from the Greek *helios* (sun) and *anthos* (flower), referring to the capitula orienting towards the sun.

Type: *H. annuus* L.

Erect or decumbent annual or perennial herbs. Leaves usually opposite below, often alternate above (all alternate in *H. debilis*), sessile or petiolate, simple, entire to dentate or serrate, usually with 3 main veins. Capitula usually large, radiate, hemispherical, terminal and solitary or few (rarely numerous) in a cyme, rarely also axillary, on non-fistulose peduncles; involucre bracts herbaceous, 2–4 seriate, subequal, herbaceous, with ribs obscure; receptacle flat or convex; paleae concave or conduplicate, rigid, with an acuminate awn (acumen) and

2 shorter lateral lobes, deciduous, enfolding achenes. Ray florets female, bisexual or male, in 1 row; ligules yellow (rarely orange). Disc florets bisexual, fertile, 5-lobed, brownish, purple, or yellowish. Achenes obovate to oblong, compressed (bluntly 3- or 4-angled). Pappus absent or of 2 or more early-caducous scale-like awns, rarely small persistent scales present.

A genus of 50–60 species native to N and S America, several species cultivated as ornamentals and oil seed crops, and now widely naturalised. In Australia 5 species are naturalised.

Within the genus four sections, *Helianthus*, *Agrestes*, *Ciliares* and *Divaricati*, have been recognised by E.E.Schilling & C.B.Heiser (1981). *Helianthus tuberosus* is in sect. *Divaricati*, *H. ciliaris* in sect. *Ciliares*, and other naturalised Australian species are in sect. *Helianthus*.

C.B.Heiser *et al.*, The north American sunflowers (*Helianthus*), *Mem. Torrey Bot. Club* 22(3): 1–218 (1969); E.E.Schilling & C.B.Heiser, Infrageneric classification of *Helianthus* (Compositae), *Taxon* 30(2): 393–403 (1981); L.H.Rieseberg *et al.*, Phylogenetic and systematic inferences from chloroplast DNA and isozyme variation in *Helianthus* sect. *Helianthus* (Asteraceae), *Syst. Bot.* 16(1): 50–76 (1991); E.E.Schilling, Phylogenetic analysis of *Helianthus* (Asteraceae) based on chloroplast DNA restriction site data, *Theor. Appl. Genetics* 94: 925–933 (1997); Schilling *et al.*, Phylogenetic relationships in *Helianthus* (Asteraceae) based on nuclear ribosomal DNA internal transcribed spacer region sequence data, *Syst. Bot.* 23: 177–187 (1998).

- | | | |
|----|--|---------------------------------|
| 1 | Stems, leaves, and involucre bracts densely silvery-white-tomentose or -floccose | 4. <i>H. argophyllus</i> |
| 1: | Stems, leaves, and involucre bracts variously scabrid, hispid, glabrous, or glaucous, but never densely silvery-white | |
| 2 | Leaves linear, to 10 mm wide | 3. <i>H. ciliaris</i> |
| 2: | Leaves ovate, cordate, deltoid or broadly lanceolate, normally wider than 10 mm | |
| 3 | Involucre bracts broad, ovate to broadly lanceolate, normally more than 4 mm wide, with apices abruptly long-acuminate | 1. <i>H. annuus</i> |
| 3: | Involucre bracts narrow, lanceolate to linear, normally less than 4 mm wide, with apices gradually narrowed | |
| 4 | Roots with short rhizome and tubers; disc florets yellow; lower leaves mostly opposite; stems green to reddish purple | 2. <i>H. tuberosus</i> |
| 4: | Root a taproot; disc florets deep purple (at least on lobes); leaves all alternate; stems frequently mottled purple/yellow | 5. <i>H. debilis</i> |

1. **Helianthus annuus* L., *Sp. Pl.* 2: 904–905 (1753)

T: Habitat in Peru, Mexico, *Herb. Linn. No. 1024.1*; lecto: LINN, *fide* E.E.Watson, *Pap. Michigan Acad. Sci.* 9: 358 (1929).

Illustrations: B.M.J.Hussey *et al.*, *Western Weeds* 99 (1997); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 972, fig. 199f (1999); G.M.Diggs *et al.*, *Ill. Fl. North Central Texas* 371 (1999).

Erect annual or biennial herb with taproot, (0.2–) 0.6–1.5 (–2) m tall; stems green, hispid. Leaves petiolate, broadly lanceolate or ovate to \pm cordate, 3–20 cm long, 1–10 cm wide, entire or toothed; both surfaces hispid to scabrous; upper leaves alternate. Capitula terminal, 1 or few per plant, solitary, nodding, on hairy peduncles, usually (2.5–) 3–7 cm diam. (excluding rays) or 8–18 cm diam. (including rays); involucre bracts ovate to broadly lanceolate, abruptly long-acuminate, scabrous, ciliate; paleae long-awned with shorter deltoid lateral lobes, striate. Ray florets bright yellow; ligules 2–6 cm long. Disc florets numerous, brownish. Achenes obovate to subcuneate, 3- or 4-angled, 5–6 (–10) mm long, dark brown to black, sometimes with grey streaks or mottled, finely pubescent. Pappus scales 2, early caducous. *n* = 17, *fide* C.B.Heiser *et al.*, *Mem. Torrey Bot. Club* 22: 63 (1969). *Common Sunflower, Sunflower.* Fig. 82D–H.

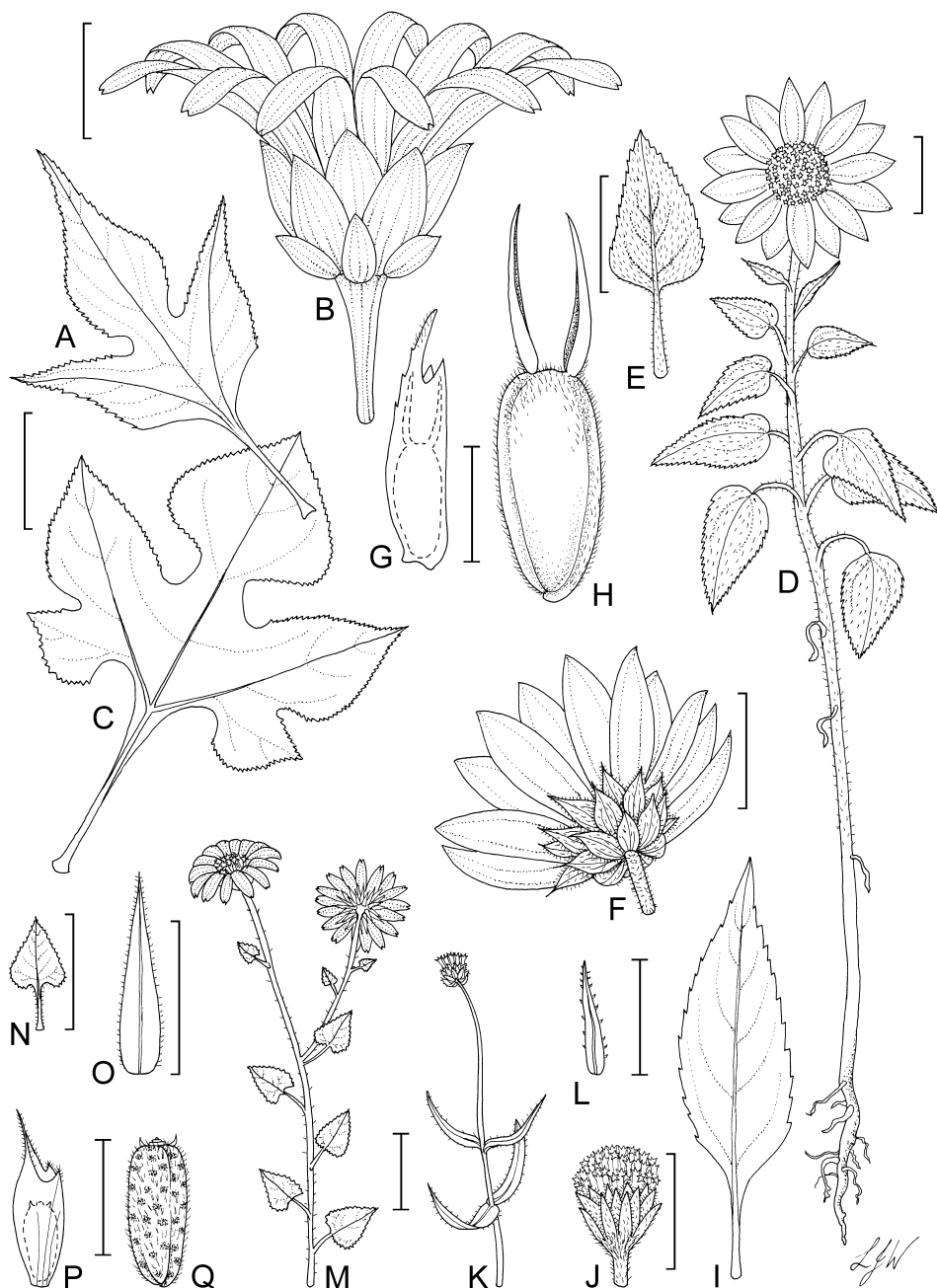
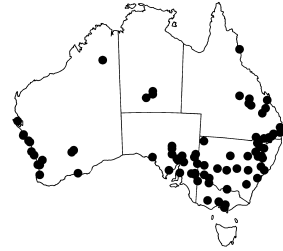


Figure 82. A, B, *Tithonia diversifolia*. A, leaf; B, capitulum (A, B, H.S.McKee 9394, CANB). C, *T. rotundifolia*, leaf (S.L.Everist s.n., CANB 36301). D–H, *Helianthus annuus*. D, habit; E, leaf; F, capitulum; G, achene within palea; H, achene (D–H, J.Cleary 57, AD). I, J, *H. tuberosus*. I, leaf; J, capitulum (I, J, H.S.McKee 10174, AD). K, L, *H. ciliaris*. K, habit; L, leaf (K, L, Anon. s.n., ex NSW 57015, AD). M–Q, *H. debilis* subsp. *cucumerifolius*. M, habit; N, leaf; O, involucre bract; P, achene within palea; Q, achene (M–Q, B.J.Lepschi 3409, CANB). Scale bars: A, C–E, I, L, N = 40 mm; B, F, J = 20 mm; G, P = 6 mm; H, Q = 3 mm; K, M = 30 mm; O = 5 mm. Drawn by L.J.Waters.

Native of N America: in Canada, U.S.A. and Mexico. In Australia naturalised in all mainland States and N.T., on roadsides and disturbed sites, but rarely extending into undisturbed sites. Grows in a range of well-drained soils at altitudes from sea level to at least 600 m. Flowers and fruits recorded in all months.

W.A.: Brand Hwy, 9 km N of Cataby Roadhouse, *T.R.Lally* 972 & *B.J.Lepschi* (CANB, PERTH). N.T.: Stuart Hwy, McGrath Flat, *P.K.Latz* 13008 (DNA). S.A.: Carrierloo Stn, highway 4 km N of Carrierloo turnoff, *D.J.Michael* 493 (AD). Qld: Box Ck, 38 km N of Taroom, *A.E.Holland* 1288 (BRI). N.S.W.: 5 km from Murrumbateman toward Canberra, *E.M.Canning* 6698 (AD, CBG, MEL, NSW). Vic.: Red Cliffs, 2 km W of Calder Hwy on Werrimall road, *A.E.Orchard* 7498 & *T.A.Orchard* (AD, CANB, MEL, NSW).



Widespread in cultivation for oil extracted from the achenes, and as a floricultural subject. Small naturalised populations are frequent on gutters of main highways, and it is possible that in many cases these are the result of minor spills from oilseed trucks.

The above description is for Australian naturalised plants. Those in cultivation may vary significantly. Ornamental forms, with rays variously coloured yellow, chestnut, or plum, and sometimes 'double' (i.e. with an extra row or more of ray florets), monocephalic or polycephalic, can be referred to as *H. annuus* subsp. *annuus*; those cultivated for seed with giant single heads (monocephalic) have been named *H. annuus* subsp. *macrocarpus* (DC.) Cockerell.

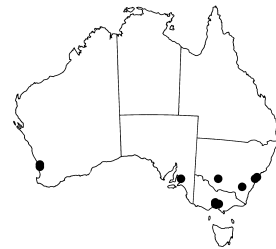
2. **Helianthus tuberosus* L., *Sp. Pl.* 2: 905 (1753)

T: Habitat in Brasilia; lecto: '*Flos Solis Farnesianus, Aster Peruan. tuberosus*' in F.Colonna, *Ekphrasis* 2: 11, 13 (1616), *fide* T.D.A.Cockerell, *Amer. Naturalist* 53: 188 (1919).

Illustrations: C.B.Heiser *et al.*, *Mem. Torrey Bot. Club* 22: 128, fig. 28 (1969); B.A.Auld & R.W.Medd, *Weeds* 104 (1987); H.W.Rickett, *Wild Fls United States 3. Texas*, facing 440, pl. 135 (s. date).

Erect perennial herb with short rhizomes and tubers, (0.4–) 1.5–3 m tall; stems green to reddish purple, hirsute. Leaves petiolate, ovate to lanceolate, 3–16 (–20) cm long, 3–9 cm wide, toothed; both surfaces scabrous; upper leaves mainly opposite. Capitula in groups of several to numerous, erect, c. 1.5 cm diam. (excluding rays) or 3.5–6 cm (including rays); peduncles hairy; involucre bracts linear to lanceolate, gradually acuminate, hirsute or ciliate on margins; paleae long-awned with shorter deltoid lateral lobes, weakly striate. Ray florets yellow; ligules (15–) 25–30 (–40) mm long. Disc florets numerous, yellow. Achenes obovoid to subcuneate, 4-angled, 4–6 mm long, dark grey, minutely hairy towards apex. Pappus of 2–5 early caducous scales. *n* = 51, C.B.Heiser *et al.*, *Mem. Torrey Bot. Club* 22: 127 (1969). *Jerusalem Artichoke*. Fig. 82 I–J.

A native of Canada and the U.S.A., but long cultivated in S America and more recently worldwide, with naturalised plants reported from Europe, Africa, S & Central America, Australasia and Asia. In Australia sparingly naturalised in W.A., S.A., N.S.W., A.C.T. and Vic., on waste ground in urban centres. Flowers recorded in Mar., June & Dec.



W.A.: Midland, 12 Dec. 1972, *I.J.Cameron* s.n. (PERTH). S.A.: Lower Torrens Gorge, adjacent to trout farm notice, *E.N.S.Jackson* 5969 (AD). N.S.W.: Campbelltown, 25 Mar. 1971, *E.J.McBarron* 19963 (K, NSW). A.C.T.: E base of Black Mtn, *H.S.McKee* 10174 (AD, BRI, CANB, NSW). Vic.: Wantirna, along Dandenong Ck, *J.C.Reid* 2178 (MEL).

Cultivated for its edible tubers.

3. **Helianthus ciliaris* DC., *Prodr.* 5: 587 (1836)

T: Tamaulipas, Mexico, [1832], *Berlandier* 2118; holo: G-DC, photo seen.

Illustrations: C.B.Heiser *et al.*, *Mem. Torrey Bot. Club* 22: 98, fig. 20 (1969); G.J.Harden (ed.), *Fl. New South Wales* 3: 276 (1992); G.M.Diggs *et al.*, *Ill. Fl. North Central Texas* 371 (1999).

Erect perennial herb, spreading by underground rhizomes, to 50 cm tall; stems glaucous. Leaves sessile, linear, 20–50 mm long, 3–10 mm wide, glaucous; margins entire to shallowly serrate and undulate with sparse coarse white hairs (lamina otherwise glabrous); upper leaves mostly opposite. Capitula terminal, solitary or in groups of 3 or 4, 1–1.5 cm diam. (excluding rays), to 3–4.5 cm diam. (including rays), erect, on short glabrous peduncles; involucre bracts ovate to oblong, obtuse, ciliate, otherwise \pm glabrous; paleae entire to erose at tip, weakly striate. Ray florets yellow; ligules c. 1 cm long, or sometimes lacking. Disc florets numerous, yellow with reddish purple lobes. Achenes obovate to subcuneate, weakly angled, c. 2.5–3 mm long, black or greyish at maturity, glabrous. Pappus of 2 early-caducous ovate scales. $n = 34$ (51), C.B.Heiser *et al.*, *Mem. Torrey Bot. Club* 22: 96 (1969). *Blue Weed*, *Texas Blue Weed*. Fig. 82K–L.

A native of southern U.S.A. and Mexico. In Australia a weed of cultivation and roadsides in N.S.W. and Qld. Flowers and fruits recorded Jan.–Mar.

Qld: Milford, nr Boonah, Feb. 1951, *C.H.Green s.n.* (BRI). N.S.W.: Coolabah, *Anon. ex NSW57015* (AD); Ganmain, 13 Mar. 1978, *K.V.Simmons s.n.* (NSW); Alectown, 18 Jan. 1973, *Unger s.n.* (NSW); 10 km N of Wellington, 26 Feb. 1990, *C.Watson s.n.* (NSW).

A species readily recognised by its narrow, sessile, glaucous leaves which are nearly all opposite, although it can be confused with *Pascalina glauca* (q.v.). A potentially serious weed in cultivated ground, spreading vegetatively by deep underground rhizomes, which are broken and distributed by ploughing. In W.A. a gazetted and prohibited weed; a Declared Noxious Weed in N.S.W.



4. **Helianthus argophyllus* Torr. & A.Gray, *Fl. N. Amer.* 2: 318–319 (1842)

T: Texas, *Drummond*; holo: NY *n.v.*

Illustrations: C.B.Heiser *et al.*, *Mem. Torrey Bot. Club* 22: 70, fig. 8 (1969); H.W.Rickett, *Wild Fls United States* 3. *Texas*, facing 438, pl. 134 (s. date); R.Melzer & J.Plumb, *Pl. Capricornia* repr. 546 (2011).

Annual herb with taproot, (0.3–) 1–3 m tall; stems densely silvery-white-tomentose to floccose. Leaves petiolate, ovate to ovate-lanceolate, 7–25 cm long, 3.5–14 cm wide, entire or shallowly serrate; both surfaces densely pubescent with long silky hairs; upper leaves alternate. Capitula axillary and terminal, erect to nodding, 2–3.5 cm diam. (excluding rays) or 7–9 cm diam. (including rays); peduncles short, hairy; involucre bracts ovate-lanceolate, long acuminate, densely white-villous, tomentose or floccose; paleae long-awned with shorter deltoid lateral lobes, striate. Ray florets yellow to orange; ligules to 3.5 cm long. Disc florets numerous, purple. Achenes obovate to subcuneate, somewhat compressed, (4–) 6 mm long, dark grey to black, minutely pilose apically. Pappus scales early caducous. $n = 17$, C.B.Heiser *et al.*, *Mem. Torrey Bot. Club* 22: 69 (1969).

A native of eastern Texas, adventive in Florida (U.S.A.), S Africa and Australia. In Australia naturalised in the Port Curtis district, Qld. Grows in a variety of soils, but particularly in coastal sand dunes. Flowers recorded (Oct.–) Jan.–July; fruits (Oct.–) Apr.–July.

Qld: Rosslyn Bay, *P.V.Back* 139 (BRI); Emu Park, beach between Arthur's Point and Zilzie Point, *G.N.Batianoff* 127 (BRI); 10 km N of Cattle Point, 30 km S of Yeppoon, *G.N.Batianoff* 280 & *T.J.McDonald* (BRI); Mazie Bay, Keppell Island Natl Park, *D.Hay* 65 (BRI); Rockhampton, 6 Jan. 1965, *J.Mann s.n.* (BRI, CANB).



Distinguished from all other *Helianthus* species by its dense silvery indumentum. Natural and artificial hybrids between *H. argophyllus* and *H. annuus* have been recorded in the U.S.A. (Heiser *et al.*, 1969). One Australian collection (*G.J.Keighery* 2630, W.A., wasteland at Mandurah (PERTH)) has silvery upper leaves but lower leaves hispid, and may originate from a (cultivated) *H. annuus* / *H. argophyllus* cross (*H. argophyllus* has not been recorded as naturalised in W.A.). Natural and artificial hybrids between *H. argophyllus* and *H. debilis* subsp. *cucumerifolius* have also been recorded in the U.S.A., but no material suggesting such hybridisation has yet been found in Australia.

5. **Helianthus debilis* Nutt., *Trans. Amer. Philos. Soc. n.s.* 7: 367 (1841)

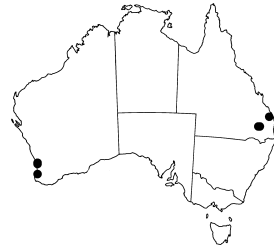
subsp. ***cucumerifolius*** (Torr. & A.Gray) Heiser, *Madroño* 13: 160 (1956)

H. cucumerifolius Torr. & A.Gray, *Fl. N. Amer.* 2: 319 (1842). T: Texas, *Drummond* 171; holo. NY *n.v.*

Illustrations: C.B.Heiser *et al.*, *Mem. Torrey Bot. Club* 22: 49, fig. 3a (1969); G.M.Diggs *et al.*, *Ill. Fl. North Central Texas* 371 (1999).

Annual or perennial herb with taproot, 30–100 (–150) cm tall; stem usually purple and yellow mottled when young, scabrous below. Leaves petiolate, deltoid to ovate, sometimes cordate, (10–) 30–60 mm long, (9–) 25–60 mm wide, \pm entire to irregularly serrate; both surfaces hispid; leaves alternate. Capitula terminal, solitary, nodding to erect, 15–20 mm diam. (excluding rays) or 30–50 mm diam. (including rays); peduncles long, \pm glabrous; involucre bracts lanceolate (inner ones narrowly ovate), gradually acuminate, scabridulous; paleae long-awned with 2 truncate-erose or shortly deltoid lobes, longitudinally pleated but not striate. Ray florets pale yellow to orange; ligules 1.2–2.3 cm long. Disc florets numerous, deep purple at least on lobes. Achenes obovate to subcuneate, weakly 4-angled, 2.5–4.0 mm long, sparingly pubescent, grey-brown or black, often mottled. Pappus scales 2, early caducous. *n* = 17, C.B.Heiser *et al.*, *Mem. Torrey Bot. Club* 22: 46 (1969). Fig. 82M–Q.

A native of Texas, U.S.A., often grown as an ornamental, and naturalised elsewhere in U.S.A., southern Africa and Australia. In Australia, a garden escape in SE Qld and SW W.A., found on weedy waste ground in urban areas, usually on sandy soil. Flowers recorded Dec.–Apr. (–July); fruits Dec.–Apr.



W.A.: Vacant block opposite Dept of Agriculture, Jarrah Rd, South Perth, *R.J.Cranfield* 225 (PERTH); Big Swamp, Bunbury, *G.J.Keighery* 9248 (PERTH); 10 km S of Bunbury on Old Coast Rd, *B.J.Lepschi & T.R.Lally* 3398 (PERTH). Qld: 8.5 km SE of Chinchilla on Warrego Hwy, *D.Halford* Q2413 (BRI); Urgan, Hervey Bay, *L.Pedley* 5850 (BRI, NSW).

A taxon distinguished by having ovate, petiolate, mostly alternate leaves, with cordate or truncate bases, and the younger stems and peduncles distinctively purple/yellow mottled. In the U.S.A. (but not yet in Australia) hybrids with *H. argophyllus* are recorded. In the U.S.A. 5 subspecies are recognised, on characters such as decumbent *vs.* erect habit, leaf and capitulum size, peduncle size and leaf shape (see Heiser *et al.*, 1969). All naturalised Australian material seems to agree with subsp. *cucumerifolius*, but cultivated material may differ in some respects (particularly leaf size).

Subtrib. 7. AMBROSIINAE

A.E.Orchard

Heliantheae subtrib. *Ambrosiinae* Less., *Linnaea* 5: 151 (1830), as *Ambrosieae*

Type: *Ambrosia* L.

Paleae not accrescent after anthesis, not decurrent at base, sometimes absent. Receptacles flat, convex or slightly conical. Outer florets female, fertile; corollas (if present) not fused to achenes; style branches free, with divided stigmatic surfaces. Disc florets functionally male

ASTERACEAE

with style branches fused, terete. Achenes often enclosed in a conceptacle formed of fused involucre bracts or other complex structure. Pappus absent or of 2 scales (*Parthenium*).

A subtribe of 8 genera and about 70 species, native to the Americas. Four genera are naturalised in Australia.

Capitular structure in this subtribe is complex. The capitula are discoid, disciform or radiate, often unisexual, and then with female capitula at the base of a spicate male inflorescence. Ray florets are usually absent, or if present with very short ligules. In bisexual capitula the outer florets are female, the inner disc florets functionally male with fused style branches. Many genera in this subtribe have disseminules consisting of achenes enclosed in an (often spinous) conceptacle formed from the fused involucre bracts, or other complex disseminules (see *Parthenium*). See Panero (2007) for a fuller discussion.

P.O.Karis, Cladistics of the Subtribe Ambrosiinae (Asteraceae: Heliantheae), *Syst. Bot.* 20: 40–54 (1995); B.Miao *et al.*, Systematic implications of chloroplast DNA variation in the subtribe Ambrosiinae (Asteraceae: Helianthiae), *Amer. J. Bot.* 84: 471–932 (1995); J.L.Strother & B.G.Baldwin, *Hymenocleas* are *Ambrosias*, *Madroño* 49: 143–144 (2002).

KEY TO GENERA

- | | | |
|----|--|----------------------|
| 1 | Achenes associated with 2 functionally male disc florets and their paleae, the achene being shed as a unit with these 2 sterile florets | 3. PARTHENIUM |
| 1: | Achenes never associated with adjacent disc florets and their corresponding paleae; achenes at maturity shed in a conceptacle formed from the fused involucre bracts (conceptacle loose and open in <i>Iva</i>) | |
| 2 | Capitula bisexual, with male and female florets in the same capitulum | 2. IVA |
| 2: | Capitula unisexual; plants monoecious | |
| 3 | Involucre bracts of male capitula fused; female florets/achenes solitary in capitula/conceptacles | 1. AMBROSIA |
| 3: | Involucre bracts of male capitula free; female florets/achenes 2 in capitula/conceptacles | 4. XANTHIUM |

1. AMBROSIA

Ambrosia L., *Sp. Pl.* 2: 987 (1753); from the Greek *ambrosia* (the food of the gods); a name used in Roman times for various aromatic plants.

Type: *A. maritima* L.

Franseria Cav., *Icon.* 2: 78, t. 200 (1793). T: *F. ambrosioides* Cav.

Annual or perennial herbs or shrubs, glandular, aromatic. Leaves opposite or alternate, sessile or shortly petiolate, lobed to deeply dissected, \pm glabrous to hairy. Capitula dimorphic. Male capitula usually many in ebracteate terminal 'spikes', hemispherical, nodding; involucre bracts uniseriate, fused, sparsely pilose; receptacle hemispherical, paleate; corollas funnelform-campanulate, 5-lobed; ovary and pappus absent; anthers \pm obtuse at base, with terminal appendage often inflexed; style short, entire. Female capitula sessile in upper leaf axils below male capitula, erect, campanulate; involucre bracts uniseriate, becoming hardened, beaked and ribbed when in fruit; florets 1–7, consisting of ovary and style only; style branches elongate, linear, papillose. Disseminule a conceptacle formed of involucre bracts fused together and to the achene(s), variously smooth or spiny. Pappus absent. *Ragweeds*.

A genus of 30–40 species in N & S America and the Mediterranean; 4 species naturalised in Australia.

In Australian species the majority of the capitula are male, in spike-like ebracteate compound inflorescences, with usually very few (none on some stems) female capitula in the uppermost leaf axils. Traditionally, Australian species have been separated on degree of leaf dissection and annual/perennial lifeform. The first character is variable, and the second not always obvious from herbarium material. The shape of the mature conceptacle is diagnostic, if mature specimens are collected.

A history of the spread of the genus in Australia can be found in Parsons & Cuthbertson (1992).

W.W.Payne, A re-evaluation of the genus *Ambrosia* (Compositae). *J. Arnold Arbor.* 65: 401–438 (1964); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 245–254 (1992).

- | | |
|---|--|
| <p>1 Annuals with taproot (i.e. non-stoloniferous); conceptacle obovoid, usually \pmglabrous (sometimes with a few sparse hairs on apex), with raised surface veins; leaves usually bipinnate</p> <p>1: Perennials with stoloniferous rootstocks; conceptacle variously shaped, always pilose, lacking raised surface veins</p> <p>2 Conceptacles with numerous long hooked spines; leaves bipinnate with fine ultimate lobes</p> <p>2: Conceptacles with 0–5 very short conical spines (not hooked); leaves pinnate or bipinnate</p> <p>3 Conceptacles depressed-globular with a terminal beak, with a 3-winged deltoid peduncle; leaves usually simply pinnate with broad (c. 2–3 mm wide) ultimate lobes (lobes sometimes shortly toothed)</p> <p>3: Conceptacles obpyramidal with a terminal beak; peduncle 3-angled but not winged; leaves bipinnate with very fine (c. 1 mm wide) ultimate lobes</p> | <p>1. <i>A. artemisiifolia</i></p> <p>2. <i>A. confertifolia</i></p> <p>3. <i>A. psilostachya</i></p> <p>4. <i>A. tenuifolia</i></p> |
|---|--|

1. **Ambrosia artemisiifolia* L., *Sp. Pl.* 2: 988 (1753)

T: Virginia, Pennsylvania, *Herb. Linn. No. 1114.4*; lecto: LINN, *fide* N.Hind in J.Bosser *et al.* (eds), *Fl. Mascareignes* 109: 214 (1993).

[*A. maritima* auct. non L.: F.M.Bailey, *Syn. Queensland Fl.* Suppl. 3: 40 (1890); F.M.Bailey, *Queensland Fl.* 3: 857 (1900)]

Illustrations: B.A.Auld & R.W.Medd, *Weeds* 83 (1987); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 246–247 (1992); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 979, fig. 200e (1999).

Erect annual herb 0.6–2 m tall, shallow-rooted with taproot. Leaves opposite to alternate, 1–10 (–16) cm long, 1–4 (–6) cm wide, bipinnately divided; lobes lanceolate to oblong, finely hairy to \pm glabrous, green to grey-green. Male capitula 3.0–3.5 mm diam., of 6–12 (–15) florets; involucre bracts fused 90–100% of their length; corollas glabrous. Female capitula in clusters of 1–6, each with 1 floret, often on short lateral inflorescences in upper leaf axils. Conceptacles obovoid, 3–4 mm long, with a single row of 0–5 short, \pm straight, conical spines or teeth, and a terminal beak, with raised reticulate veins on surface, glabrous or sparsely pilose apically, eglandular. *Annual Ragweed, Bitterweed, Hay-feverweed, Hog-weed.* Plate 61; Fig. 83A–F.

A native of N America. In Australia a major weed of roadsides, wasteland, cultivation and pastures (rarely invading natural systems), particularly in NE N.S.W. & SE Qld but also with scattered populations in S.A. & W.A., usually on sandy or loam soils, at low altitudes. Old collections are known from Tas. Flowers Jan.–May (–Oct.); fruits Mar.–June.

W.A.: jctn of Coldwell St and Welshpool Rd, Wattle Grove, *B.J.Lepschi & T.R.Lally* 2507 (AD, CANB, PERTH). S.A.: Mitchell Park, *T.J.Smith* 1190 (AD). Qld: Archer R., Tamborine, Apr. 1951, *J.Mann s.n.* (BRI). N.S.W.: c. 20 km S of Casino on road to Grafton, *T.A.Halliday* 518 (BRI, HO). Vic.: Cape Patterson, 16 Apr. 1906, *P.R.H.St.John s.n.* (MEL). Tas.: *s. loc.*, Mar. 1911, [*L.Rodway?*] *s.n.* (HO).



Western Australian plants tend to have slightly pilose conceptacles, while those of eastern populations tend to be \pm glabrous.

This species can be confused with *A. psilostachya*. Its annual lifeform, with taproot, readily distinguishes it, if this organ is available. Alternatively, it has usually reddish stems (green in *A. psilostachya*), and a glabrous or subglabrous obovoid conceptacle with prominent surface veins (depressed-globular, pilose, on a long 3-winged peduncle in *A. psilostachya*).

Ambrosia artemisiifolia is reputed to cause hayfever and contact dermatitis. It is a declared noxious weed in N.T., S.A. and Qld.

2. **Ambrosia confertiflora* DC., *Prodr.* 5: 526 (1836)

Franseria confertiflora (DC.) Rydb., *N. Amer. Fl.* 33: 28 (1922). T: [Mexico], Matamoros, 1830, *Berlandier* 2297; holotype: G n.v.

Franseria tenuifolia Harv. & A.Gray, *Mem. Amer. Acad. Arts n.s.* 4: 80 (1849). T: [California], Poñi Ck, between Bent's Fort and Santa Fé, *Fendler* 406 [not located by Payne, 1964]; n.v.

Illustrations: W.W.Payne, *J. Arnold Arbor.* 65: 419, t. 5, fig. 46 (1964); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 552, fig. 77B (1986); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 248–250 (1992).

Erect perennial to 2 m high, forming large colonies from stoloniferous roots. Leaves alternate, 5–16 cm long, (3–) 10–15 cm wide, bipinnately divided; lobes linear to lanceolate, finely hairy, green to grey-green. Male capitula 2.5 mm diam., of 10–20 (–25) florets; involucre bracts fused 75% of their length; corollas densely glandular in upper part. Female capitula in clusters of 1–3, each with 1 or rarely 2 florets, sessile in upper leaf axils. Conceptacles globose, 3–4 mm long, covered with 12–15 long hooked spines and a terminal beak, pilose, and with copious subsessile golden glands. *Burr Ragweed*.

A native of the semi-arid plains of southern U.S.A. and Mexico. In Australia a minor weed of cultivation, roadsides and wasteland in inland areas of S.A. (one record), N.S.W. and Qld. Flowers recorded Apr.; fruits May–June.

S.A.: Murtho Forest Res., *R.Bates* 18447 (AD). Qld: Drillham, Apr. 1951, *J.Mann s.n.* (BRI); Cloyna, Apr. 1951, *J.Mann s.n.* (BRI). N.S.W.: Darling R. at Menindee, 6 May 1993, *M.Stanley s.n.* (AD, CANB).

This species is readily distinguished from other Australian taxa by the long hooked spines on the conceptacle. As it flowers in late autumn it has probably been overlooked by collectors and may be more widespread than current records indicate.



3. **Ambrosia psilostachya* DC., *Prodr.* 5: 526 (1836)

T: in Mexico inter San-Fernando et Matamoros, *Berlandier* 2280; holotype: G? n.v.

Illustrations: W.T.Parsons, *Noxious Weeds Victoria* 88, fig. 72 (1973); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1433, fig. 642 (1986); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 251–252 (1992).

Erect, stout, perennial herb to 2 m high, often forming extensive colonies from its deep stoloniferous root system. Leaves opposite to alternate, 3–12 cm long, 1.5–4 cm wide, pinnately divided; segments lanceolate, sometimes toothed, scabrous to hirsute, often grey-green. Male capitula c. 2 mm diam., of 8–10 (–20) florets; involucre bracts fused 90–100% of their length; corollas glabrous. Female capitula in clusters of 1–6 (usually solitary), each with 1 floret, sessile in upper leaf axils. Conceptacles depressed-globular, c. 2 mm long, with a single row of 0–5 \pm straight conical spines or teeth, with a terminal beak and a deltoid 3-winged peduncle, rugose, but lacking raised reticulate veins on surface, pilose, glandular. *Perennial Ragweed*.



A native of N America. In Australia, a locally troublesome weed of cultivation, roadsides, wasteland, creek and channel banks in W.A., S.A., Qld, N.S.W. and Vic. Flowers recorded Jan.–June (–Oct.); fruits (rarely collected) Mar.

W.A.: Caldwell Rd, Kenwick, 24 Feb. 1980, *M.Beck s.n.* (PERTH). S.A.: 10 km S of Swan Reach, *R.Bates* 22723 (AD, BRI). Qld: Sherwood, W of Brisbane, June 1951, *J.Mann s.n.* (BRI, K, MEL). N.S.W.: Arian Park, *D.Symon* 9849 (AD). Vic.: Corryong, Mar. 1947, *Inspector's Branch, Lands Department s.n.* (MEL).

Declared a noxious weed in N.S.W., Vic., Qld, S.A. and N.T.

Confusable with *A. artemisiifolia*, *q.v.*

4. **Ambrosia tenuifolia* Spreng., *Syst. Veg.* 3: 851 (1826)

T: Monte Video, Brazil, *Sello* 362; B? *n.v.*

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 728 (1981); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia*, 253–254 (1992); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 979, fig. 200g (1999).

Erect perennial herb 20–75 cm tall, with long stolons. Leaves opposite or alternate, 6–9 cm long, 4–6 cm wide, bipinnately divided; lobes linear to narrowly oblong, lacy, covered with long white hairs, grey. Male capitula 2.5–3.0 mm diam., of 7–10 (–19) florets; involucre bracts fused for 75–100% of their length; corollas ±glabrous. Female capitula 1 or few together, each with 1 floret, sessile. Conceptacle obpyramidal, 3.5 mm long, with 2–5 very short irregular teeth, and a terminal beak, lacking raised reticulate veins on surface, sparsely pilose, eglandular or with only sparse glands. *Lacy Ragweed*.

A native of S America. In Australia, a weed of natural and agricultural systems on roadsides and wasteland in W.A., S.A., Qld, N.S.W. and Vic, often on sandy soils. Flowers and fruit recorded Feb.–May.

W.A.: Lake Richmond Nature Res., NE area, *A.Bellman* 7 (PERTH). S.A.: Port Rd, Port Adelaide, 27 Apr. 1974, *H.Amtsberg s.n.* (AD, MEL); Largs Bay, 17 Mar. 1949, *J.B.Cleland s.n.* (AD). Qld: Macarthur Ave, Hamilton, Brisbane, 28 Nov. 1972, *K.L.Kay s.n.* (BRI). N.S.W.: Blacksmiths Nature Res., Blacksmiths, *R.G.Coveny* 16533 *et al.* (AD, BRI, CBG, HO, K, MEL). Vic.: S. Kensington, *E.J.Sonnenberg s.n.* (MEL).



2. IVA

Iva L., *Sp. Pl.* 2: 988 (1753); named in reference to its odour being similar to that of *Ajuga iva* (Lamiaceae).

Type: *I. annua* L.

Annual or perennial herbs or shrubs, glandular, aromatic. Leaves opposite or alternate, sessile or subsessile, simple or lobed. Capitula solitary in leaf axils, small, nodding, discoid, heterogamous; involucre bracts 5, uniseriate, free or connate, herbaceous; receptacle convex, paleate. Outer florets few, uniseriate, female, tubular; corolla filiform (sometimes absent); style branches linear, with subulate papillose terminal appendages. Inner florets functionally male (pistil reduced), tubular, campanulate, 5-lobed; anthers free, sagittate at base with short apical appendage; style short, entire. Achenes enclosed in a very loose conceptacle consisting of the fused involucre bracts, obconical to obovoid, ±compressed, glabrous or hairy. Pappus absent.

A genus of 10–15 species in N America; 1 species naturalised in Australia.

R.C.Jackson (1962) recognised 3 sections in *Iva*: sect. *Linearbractea*, sect. *Iva* and sect. *Cyclachaena*. Bolick (1985) suggested that sect. *Cyclachaena* should be excluded, which was subsequently done. P.O.Karis (1995) placed *Iva* as a sister group to representatives of *Leuciva*, *Euphrosyne* and *Cyclachaena*. Panero (2007) included the genus *Cyclachaena* (and *Leuciva*) in the synonymy of *Euphrosyne* DC.

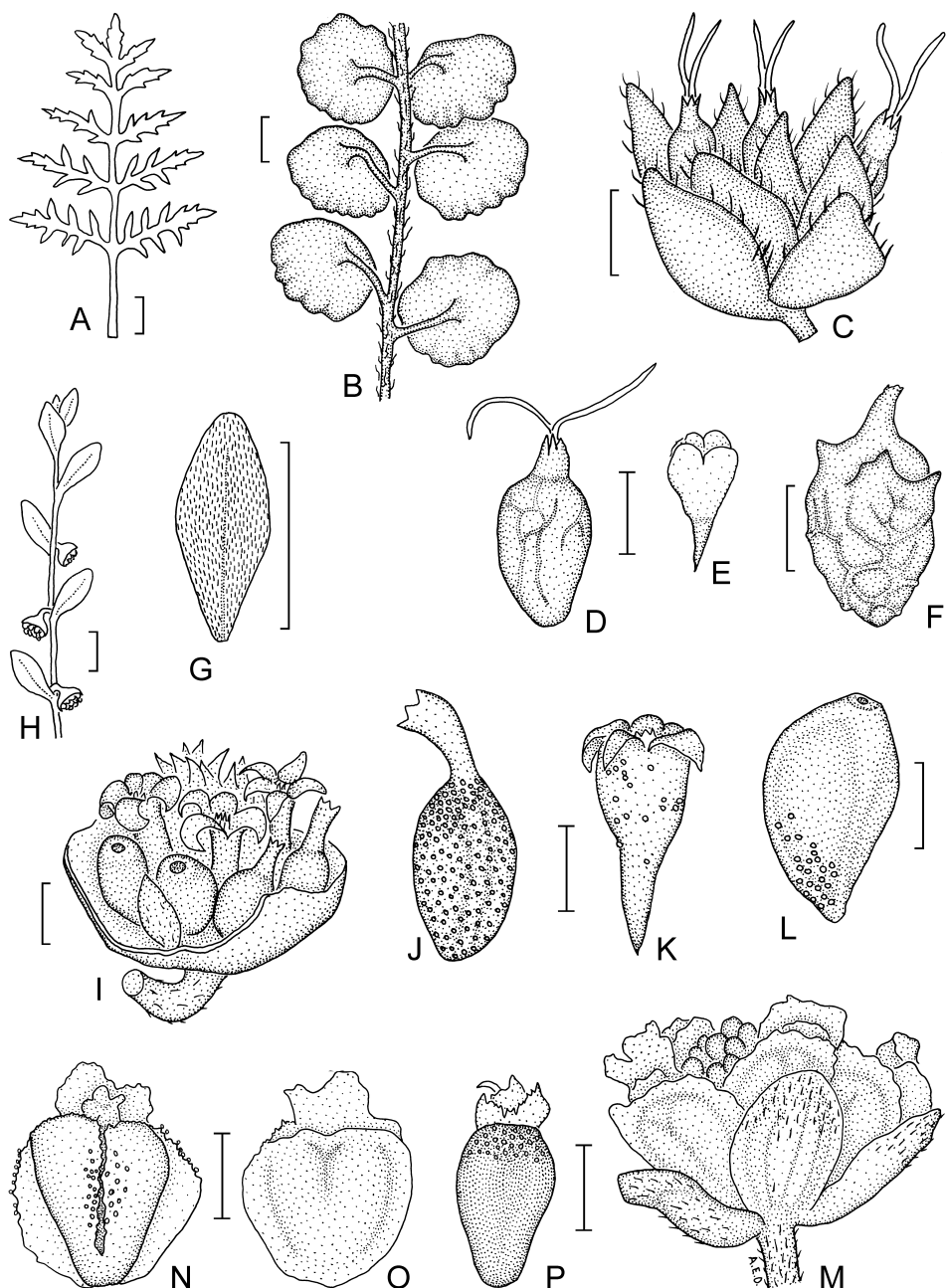


Figure 83. A–F, *Ambrosia artemisiifolia*. A, leaf; B, portion of inflorescence with nodding male staminate capitula; C, cluster of pistillate capitula; D, female capitulum; E, male floret; F, mature conceptacle (A–F, L.Pedley 4651, CANB). G–L, *Iva axillaris* subsp. *robustior*. G, leaf; H, upper portion of stem with nodding capitula; I, capitulum, involucre partly cut away; J, female floret; K, male floret; L, achene (G–L, G.Pritchard s.n., MEL1536566). M–P, *Parthenium hysterophorus*. M, capitulum; N, fruiting disseminule, adaxial view; O, fruiting disseminule, abaxial view; P, achene (M–P, J.E.Cherry s.n., NE62374A). Scale bars: A, G, H = 1 cm; B–F, I–P = 1 mm. Drawn by A.E.Orchard.

There is some evidence that *Iva* achenes were an important food source of native peoples in the Mississippi region.

R.C.Jackson, A revision of the genus *Iva* L., *Kansas Univ. Sci. Bull.* 41(7): 793–876 (1960); I.J.Bassett *et al.*, Poverty weed, *Iva axillaris*, in Canada and the United States, *Canad. J. Bot.* 40: 1243–1249 (1962); M.R.Bolick, Cladistic analysis of *Iva*: a case in point, *Taxon* 34: 81–84 (1985); G.H.Pritchard, Poverty Weed (*Iva axillaris* Pursh): its distribution and control, *Pl. Protect. Quart.* 2: 69–73 (1987); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 287–288 (1992).

**Iva axillaris* Pursh, *Fl. Amer. Sept.* 2: 743 (1814)

subsp. **robustior** (Hook.) Bassett in I.J.Bassett *et al.*, *Canad. J. Bot.* 40: 1245 (1962)

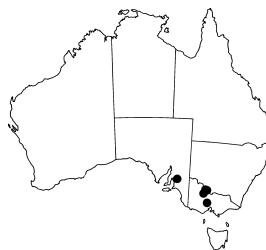
I. axillaris var. *robustior* Hook., *Fl. Bor.-Amer.* 1: 309 (1834). T: Between Carlton House and Edmonton House on the Saskatchewan [Canada], Douglas (Herb. Hookerianum); holo: K; iso: DAO n.v., *fide* I.J.Bassett *et al.*, *Canad. J. Bot.* 40: 1246 (1962).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1439, fig. 648 (1986); B.A.Auld & R.W.Medd, *Weeds* 106 (1987); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 287–289 (1992).

Perennial herb, c. 20–40 cm high; multiple stems from rhizomatous rootstock, often decumbent at base then erect, sparsely branched, lightly pubescent. Leaves opposite below, alternate above, subsessile, elliptic to ovate, attenuate at base, entire, subacute to obtuse, with distinct midrib and 2 obscure lateral veins; both surfaces densely appressed-pubescent, with embedded dark glands, concolorous, grey-green. Capitula 4–6 (–8) mm diam.; peduncles 2–15 mm long; involucre bracts ovate, c. 3 mm long, connate for more than half their length, obtuse, pubescent and glandular, forming an open conceptacle. Florets greenish yellow; outer florets 1–10, with corolla short, filiform; inner florets 6–25 (–50). Achenes obovoid, slightly compressed, 1.5–3.0 mm long, glandular on margins and apex, sparsely pilose towards apex, brown to dark grey, often abortive. $2n = 36, 54$, I.J.Bassett *et al.*, *loc cit.* *Poverty Weed*. Fig. 83G–L.

A native of N America. An uncommon and localised weed of cultivated land, on red brown clay loam, in Vic. and S.A. Flowers and fruits recorded Dec.–Apr.

S.A.: Riverton, 11 Dec. 1959, *I.Fry s.n.* (AD); Sevenhills, Feb. 1933, *M.C.Johnston s.n.* (AD). Vic.: c. ¼ mile [c. 0.4 km] N of Myall school, Mar. 1962, *K.Bain s.n.* (MEL); Newstead, 18 Jan. 1926, *J.Callender s.n.* (MEL); 1.6 km SW of Quambatook, 1 Jan. 1985, *G.Pritchard s.n.* (MEL).



A declared noxious weed in Vic. as it has an extensive rhizomatous habit and a tendency to chemically inhibit the germination of other species (allelopathy). In N America the species causes contact dermatitis in some people and has been implicated in hayfever attacks. The known S.A. populations have been eradicated, and eradication of the Victorian populations is proceeding (Parsons & Cuthbertson, 1992).

Two subspecies are recognised. *Iva axillaris* subsp. *axillaris* differs from the above in having narrower leaves which are ±glabrous above, with pustulate hairs beneath, and the involucre bracts are free almost to the base. Not known from Australia.

3. PARTHENIUM

Parthenium L., *Sp. Pl.* 2: 998 (1753); from the Greek *parthenos* (girl or virgin), probably a reference to the white ray florets in these plants; or derived from *partheniki*, the Greek name for a plant latinised as *parthenice* by the Roman poet Gaius Valerius Catullus (c. 84–54 BC): this plant is now *Tanacetum parthenium* (L.) Bernh. or *Feverfew*.

Type: *P. hysterothorus* L.

Herbs or shrubs, perennials, annuals or biennials, bitter, aromatic. Leaves alternate, entire, toothed or pinnatisect, glabrous to tomentose. Inflorescence terminal; capitula solitary or

numerous in corymbs or panicles, homomorphic, each with male and female florets, usually hemispherical; involucre bracts 2-seriate; outer bracts 5, elliptic, ovate or obovate, persistent; inner bracts 5, ±circular, membranous, not persistent, subtending ray florets; receptacle convex or conical, paleate, deciduous. Ray florets female, fertile, white; ligules very broad, 2-toothed, persisting on achenes; style branches slightly flattened, glabrous. Disc florets male, tubular-funnelform; anthers obtuse at base, with ovate thickened apical appendages; styles discoid. Ray achenes compressed, keeled along inner face, with margins thickened; pappus of usually 2 short scales. Disseminule an achene and 2 attached male florets, plus bracts.

A genus of c. 16 species native to the Americas & West Indies. In Australia, one species is naturalised.

The disseminule in this genus is a complex structure, consisting of the achene, with persistent broad ligule and usually 2 broad pappus scales, fused to 2 male florets and their subtending paleae. Apart from the 10 outer male florets which are thus shed with the achenes, the remaining male disc florets, and their paleae, are shed as a unit.

Guayule rubber plant (*Parthenium argentatum* A.Gray) was growing in a plantation at Willanthery Stn, near Hillston, N.S.W. in 1989 (A.V.Slee 2443, CANB). Earlier it had been trialled as a crop plant, as a potential source of natural rubber, at CSIRO laboratories, Black Mountain, Canberra (1937–38). It has narrowly ovate, toothed grey leaves, and a more compact inflorescence with larger capitula, and is not known as a naturalised plant.

R.C.Rollins, The guayule rubber plant and its relatives, *Contr. Gray Herb.* 172: 1–72 (1950); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 292–296 (1992); S.C.Navie *et al.*, *Parthenium hysterophorus* L., in F.D.Panetta *et al.* (eds), *Biol. Austral. Weeds* 2: 157–176 (1998).

****Parthenium hysterophorus* L., *Sp. Pl.* 2: 988 (1753)**

T: Jamaica, *Herb. Linn. No. 1115.1*; lecto: LINN *n.v.*, *fide* T.F.Stuessy in R.E.Woodson & R.W.Schery (eds), *Ann. Missouri Bot. Gard.* 62: 1094 (1975).

Illustrations: R.E.Woodson & R.W.Schery, *op. cit.* 62: 1095, fig. 196; H.E.Kleinschmidt & R.W.Johnson, *Weeds of Queensland* 420 (1977); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 292 (1992).

Erect taprooted annual, (0.2–) 0.3–1.75 (–2.0) m high, mostly single-stemmed and much branched above; stems and leaves pubescent and glandular-punctate or resin-dotted. Leaves bipinnatisect; lower leaves 4–13 (–20) cm long, 3–4 (–7) cm wide; upper leaves less divided and smaller. Capitula in terminal panicles, 3–5 mm diam., white. Outer involucre bracts ovate, 1.5–2.0 mm long, pilose; inner involucre bracts circular, 2.0–2.2 mm long, pilose on margin. Ray florets with ligules 0.5–0.7 mm long, broad, truncate to emarginate. Disc florets cream. Achenes 1.7–2.0 mm long, plano-convex, black; apex and centre of each face densely white-papillose. Pappus of 2 broad membranous scales, c. 0.5 mm long, white. $2n = 34$, R.C.Rollins, *Contr. Gray Herb.* 172: 16 (1950). *Parthenium Weed.* Fig. 83M–P.

A native of the Gulf of Mexico or central S America, now widespread outside its native range. In Australia, a serious weed of agricultural systems in northern N.S.W. and central and eastern Qld. Recently recorded in the N.T. Commonly found in disturbed sites, and a rapid invader of newly cleared brigalow and other native woodlands, on a range of soils from clays to sandy loams, at altitudes from sea level to at least 700 m. Flowers and fruits recorded in all months.

N.T.: Elsey Reach, 150 km W of Roper Bar, *J.Must* 1521 (CANB). Qld: Coastal Ring Rd, Woodwark Bay, *G.N.Batianoff* 940542 (AD, BRI, CANB, MEL); Bendemeer, 40 km NE of Clermont, 3 Feb. 1975, *B.J.Caffery s.n.* (BRI); Pine Mtn, State Forest 79, *P.I.Forster* 8020 & *W.J.McDonald* (MEL). N.S.W.: Loder St, Quirindi, 5 May 1995, *J.E.Cherry s.n.* (NE).

The original introduction of *Parthenium* to Australia was probably during WWII with aircraft and machinery parts. It is frequently spread as a contaminant of stock feed, and the light disseminule is easily dispersed by wind and water.



This plant is usually unpalatable to stock, but is toxic to cattle and buffalo, less so to sheep. In humans it can cause hayfever and allergic dermatitis. Parthenium Weed is a declared noxious weed almost throughout Qld, N.S.W., Tas., S.A. and N.T., and is a prohibited weed in Vic. and W.A.

4. XANTHIUM

Xanthium L., *Sp. Pl.* 2: 987 (1753); from the Greek *xanthus* (yellow), the name of a plant said by Dioscorides to have been used for dyeing the hair yellow, thought to be *Xanthium strumarium*.

Type: *X. strumarium* L.

Annual herbs, sometimes spiny. Leaves alternate, variously lobed and/or toothed, scabrous to pilose. Capitula dimorphic. Male heads, usually many, in terminal or axillary spiciform inflorescences, deciduous, campanulate to hemispherical; involuclral bracts numerous, 1–3-seriate; receptacle hemispherical, paleate; corollas tubular, 5-lobed; anthers obtuse at base, with short terminal appendage; ovary abortive; style unbranched; pappus absent. Female capitula axillary below male heads, ovoid; involuclral bracts 2-seriate, fused and completely enclosing florets; florets 2; corollas absent. Disseminule a subcylindrical to ovoid conceptacle, with tips of the involuclral bracts becoming hooked spines, (0–) 2-beaked (terminally spined) at summit. Achenes usually 2, retained inside conceptacle, which is shed as a unit. Pappus absent. *Cockleburrs*.

A genus of 3 to 30 species, depending on species concept, now widely distributed in temperate & tropical regions; of uncertain origin, but probably originally from the Americas and Europe. In Australia, (2 or) 8 naturalised species.

Most past in-depth revisions (Widder, 1923; Fernald, 1946; McMillan, 1971, 1975) resulted in recognition of multiple species (usually about 30) in this genus. Under this system, Australia's introduced taxa fall into eight species, as described below. However, some consider there are just two *Xanthium* species world-wide (corresponding with Candolle's two sections, sect. *Euxanthium* [= sect. *Xanthium*] and sect. *Acanthoxanthium*, both with numerous 'races', following Löve & Dansereau (1959) and others.

This alternative (and equally valid) view recognises *X. spinosum*, with taxonomic synonyms *X. ambrosioides*, *X. canescens* and *X. catharticum*, and treats *X. occidentale*, *X. cavanillesii*, *X. orientale* and *X. italicum* as part of a very broad and variable aggregate species, of which the correct name and typification is: *Xanthium strumarium* L., *Sp. Pl.* 2: 987 (1753). T: Habitat in Europa, Canada, Virginia, Jamaica, Zeylona, Japonia; *Herb. Linn. No. 1113.1*; lecto: LINN, *fide* K.H.Rechinger in *Fl. Iranica* 164: 39 (1989).

The synonymy of this second aggregate species is very complex, including many species described from both the Old and New World, but for Australian purposes comprises those taxa treated as species 5 to 8 below.

Taxonomic difficulties in the genus arise from 3 sources: multiple introductions of different races from various parts of the world, the fact that seeds may be produced asexually leading to development of local clones, and frequent hybridisation.

In this treatment the fruiting bodies are termed conceptacles, in conformity with the terminology used in the rest of the subtribe. In other works they are often called burrs or fruits. Note that in the "*X. strumarium* complex", specimens lacking mature conceptacles cannot be reliably identified to their segregate species.

All species are declared noxious weeds (in various categories), virtually throughout Australia. See Parsons & Cuthbertson (1992) for the history of their introduction to Australia.

F.J.Widder, Die Arten der Gattung *Xanthium*, *Repert. Spec. Nov. Regni Veg. Beih.* 20: 1–222 (1923); M.L.Fernald, Technical studies on North American plants, *Rhodora* 48: 65–81 (1946); D.Löve & P.Dansereau, Biosystematic studies on *Xanthium*: taxonomic appraisal and

ecological status, *Canad. J. Bot.* 37: 173–207 (1959); C.McMillan, Photoperiod evidence in the introduction of *Xanthium* (Cocklebur) to Australia, *Science* 171: 1029–1031 (1971); C.McMillan, The *Xanthium strumarium* complexes in Australia, *Austral. J. Bot.* 23: 173–192 (1975); P.J.Hocking & M.J.Liddle, The biology of Australian weeds. 15. *Xanthium occidentale* Bertol. complex and *Xanthium spinosum* L., *J. Austral. Inst. Agric. Sci.* 52: 191–221 (1986); B.A.Auld & R.W.Medd, *Weeds* 120–122 (1987); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 313–321 (1992).

- 1 Stems with (1–) 3-pronged spines on nodes at bases of leaves; conceptacles lacking 2 large stout terminal spines (sometimes with 1 or 2 slender terminal spines to 2 mm long) [*Xanthium* sect. *Acanthoxanthium* DC.; *X. spinosum* complex]
 - 2 Leaves lanceolate to narrowly rhombic; upper surface dark green (often with white zone of denser hairs over major veins), sparsely pubescent, with lobes if present broad; lower surface white-felted **1. *X. spinosum***
 - 2: Leaves narrowly linear to terete, trifid or pinnatisect; both surfaces grey-green, densely and finely pubescent; lobes if present narrow
 - 3 Leaves pinnatisect (ovate in outline) **2. *X. ambrosioides***
 - 3: Leaves narrowly linear to terete or trifid
 - 4 Leaves narrowly linear to terete (occasionally with 1 or 2 short blunt lobes) **3. *X. canescens***
 - 4: Leaves trifid with narrowly linear to terete lobes **4. *X. catharticum***
- 1: Stems lacking spines at nodes; conceptacles with 2 stout terminal spines (4–) 6–8 mm long, exceeding the body spines [*Xanthium* sect. *Xanthium* (*X. sect. Euxanthium* DC.); *X. strumarium* complex]
 - 5 Conceptacles with terminal spines straight but divergent
 - 6 Leaves with 3–5 well-defined lobes; conceptacles (12–) 16–20 mm long (including spines) **5. *X. occidentale***
 - 6: Leaves shallowly and unevenly lobed; conceptacles (15–) 28–33 mm long (including spines) **6. *X. cavanillesii***
 - 5: Conceptacles with terminal spines incurved, either throughout whole length or at tips
 - 7 Terminal spines incurved throughout their length; conceptacles (15–) 20–25 mm long (including spines) **7. *X. orientale***
 - 7: Terminal spines incurved only at tip (crucially hooked); conceptacles 22–30 mm long (including spines) **8. *X. italicum***

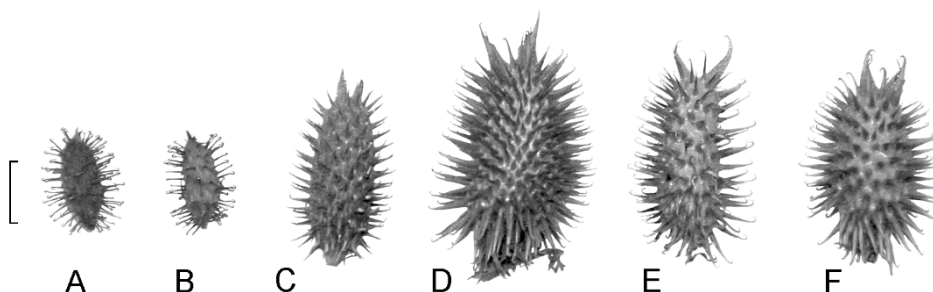


Figure 84. *Xanthium* fruits. **A.** *X. spinosum* (P.K.Latz 10037, DNA). **B.** *X. canescens* (Cox Bros 3247, CANB). **C.** *X. occidentale* (F.J.Badman 5169, AD). **D.** *X. cavanillesii* (P.Micheal N.S.Lander 629, MEL). **E.** *X. orientale* (R.Taylor 426, AD). **F.** *X. italicum* (A.Cholil s.n., NE40705). Scale bar: **A–F** = 1 cm. Photograph taken by A.E.Orchard.

1. *Xanthium spinosum L., *Sp. Pl.* 2: 987 (1753)

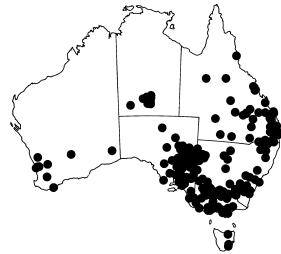
T: Habitat in Lusitania, *Herb. Linn. No.* 1113.3; lecto: LINN *n.v.*, *fide* D.O.Wijnands, *Bot. Commelins* 87 (1983).

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 727 (1981); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 318–319 (1992); B.M.J.Hussey *et al.*, *Western Weeds* 109 (1997).

Herb (0.1–) 0.3–1.0 (–1.5) m tall; stems pubescent, armed with rigid 3-pronged spines at base of leaves; spines 7–25 mm long, yellowish. Leaves: petiole 5–10 mm long; lamina narrowly rhombic to lanceolate, 20–80 (–110) mm long, 8–22 (–40) mm wide, entire or 3- (–5-) lobed; lobes broad, deltoid, extending not more than ½ way to midrib; upper surface dark green, with 1 or 3 whitish veins, shiny and ±pubescent; lower surface white-felted. Male capitula in terminal globular clusters, or in upper leaf axils. Female capitula usually solitary. Conceptacles (9–) 10–12 (–13) mm long, with mainly woolly hairs, and occasional sessile glandular hairs, plus numerous hooked glabrous spines 2–3 mm long. Terminal spines slender, 1–2 mm long. *Bathurst Burr*, *Common Cocklebur*, *Spiny Cocklebur*, *Spiny Clothurr*. Fig. 84A.

A native of S America and Europe. In Australia, naturalised in all States, widespread in Qld, N.S.W. and northern Vic., scattered elsewhere, in agricultural ground and disturbed places, often on drainage lines, creek banks and other damp situations, on most soil types, often forming prolific stands after summer rain or flooding. Flowers and fruits recorded Oct.–June, but with a peak in Mar.–May.

W.A.: Kalgoorlie, Jan. 1963, *A.C.Linto s.n.* (PERTH). N.T.: 1.2 km NW Mt Hay Bore, Yuendumu road, *D.J.Nelson* 2475 (BRI, DNA). S.A.: Billeroo Hut, c. 14 miles [22.5 km] E of Frome Downs HS, *A.E.Orchard* 281 (AD). Qld: Kalpowar State Forest, 6 km E of Kalpowar, *A.R.Bean* 9215 (BRI). N.S.W.: Sinclair Lookout, 14.4 km W Glen Innes, *J.J.Plat* 8 *et al.* (BRI, K, MEL). A.C.T.: Curtin, corner of Groom & Carruthers St, *E.M.Canning* 6548 (CANB). Vic.: L. Grassy, Lake Cope Wildlife Res., *A.C.Beauglehole* 68766 (MEL). Tas.: Queens Domain, Hobart, Feb. 1894, *L.Rodway s.n.* (HO).



This species is usually considered native to S America, although Fernald (1946) recorded semifossil conceptacles from neolithic sites in Bulgaria.

Two seeds are formed in each conceptacle, one capable of immediate germination, the other remaining dormant for about 3 years.

The species is variable across its range. Particularly noteworthy specimens are *B.Powell s.n.* (AD) from Bruce, near Quorn, S.A., in which the conceptacles have very long spines; and *D.E.Symon 14036* (AD) from Moralana Stn, S.A., with linear to pinnatisect leaves, with no spines at leaf nodes or spines very small, and the conceptacle 12 mm long, frequently with 3 terminal beaks topped with short slender spines.

2. *Xanthium ambrosioides Hook. & Arn., *J. Bot.* 3: 310 (1841)

T: [Argentina] Los Caldanes, Province of Cordova, *Dr. Gillies* 96; syn: K; B.Ayres [Buenos Aires], *Tweedie* 738; syn: K.

Illustrations: F.J.Widder, *Repert. Spec. Nov. Regni Veg. Beih.* 20: Taf. IV, figs 42a, b, 43a, b (1923); M.N.Corrêa (ed.), *Fl. Patagonica VII. Compositae* 132 (1971); G.J.Harden (ed.), *Fl. New South Wales* 3: 269 (1992).

Very similar to *X. spinosum*, differing in leaf shape (ovate in outline, deeply pinnatifid or bipinnatifid, with lobes extending almost to midrib), leaf size (1.0–3.0 cm long, 0.5–1.0 cm wide) and indumentum (densely pilose in both surfaces and thus appearing grey-green), and in having shorter conceptacles (4–8 mm long), with or without a slender terminal spine.

Native of central Argentina, adventive in Europe. In Australia only known from old collections, naturalised in the Jerilderie district of N.S.W., where it is (or was) a minor weed of pastures. Flowers and fruits Apr.



N.S.W.: Jerilderie, 23 Apr. 1913, *J.T.Mackie s.n.* (K); T.S.R. c. 2½ miles [c. 4 km] S of Jerilderie, Apr. 1913, *J.T.Mackie s.n.* (NSW).

3. **Xanthium canescens* (Costa) Widder, *Repert. Spec. Nov. Regni Veg. Beih.* 20: 121 (1923)

X. spinosum var. *canescens* Costa, *Introd. Fl. Cataluña* 160 (1864). T: [Spain] Ad oras fluvii Besós raro, versus Badalona, 1860, *A.C.Costa y Cuxart s.n.*; holotype: LE *n.v.*

Illustration: F.J.Widder, *loc. cit.* 20: Taf. IV, fig. 45 (1923).

Very similar to *X. spinosum*, but differing in being smaller (6–15 cm tall); leaves narrowly linear to terete, 1.5–2.0 cm long, 0.5–1.0 mm wide, unlobed or occasionally with 1 or 2 very short broad lobes, usually near base, grey-green with dense hairs on both surfaces; conceptacles 9–10 mm long, excluding spines. Fig. 84B.

Described from NW Spain and also known from southern France, but perhaps originally from S America. In Australia known only from a single old (May 1955) collection from near Armidale, N.S.W. Fruits in May.

N.S.W.: Broombee Stn, Armidale area, *Cox Bros.* 3247 (CANB).



4. **Xanthium catharticum* Kunth in F.W.H.A. von Humboldt *et al.*, *Nov. Gen. Sp.* 4: 275 (1820)

T: [Peru] Crescit in Regno Quitensi, prope Chillo et Quito, alt. 1315 hex.; holotype: P? *n.v.*

Illustrations: F.J.Widder, *Repert. Spec. Nov. Regni Veg. Beih.* 20: Taf. IV, fig. 44a, b (1923); M.N. Correa (ed.), *Fl. Patagonica VII. Compositae* 132, fig. 126 (1971); G.J. Harden (ed.), *Fl. New South Wales* 3: 269 (1992), as *X. ambrosioides*.

Very similar to *X. spinosum*, but differing in having leaves trifid (rarely with 1 or 2 additional small lobes), 7–12 cm long, 2–3 cm wide overall, with lobes linear to terete and extending almost to midrib, grey-green with dense hairs on both surfaces; conceptacles 9–13 mm long, excluding spines.

Native to the Pacific coast of S America. In Australia naturalised near Moulamein, N.S.W. Fruits Apr.

N.S.W.: Moulamein, Apr. 1965, *Wakool Shire Council s.n.* (NSW).



5. **Xanthium occidentale* Bertol., *Lucubr. Re Herb.* 38 (1822)

T: Nascitur in S. Domingo, unde semina misit Berterus. Florebat in tepidario horti botanici Bononiensis sero autumnno, et iterum veniente vere anni insequenteis. Ann. [Grown at Bologna from seed sent by Bertero from San Domingo]; *n.v.*

X. pungens Wallr., *Beitr. Bot.* 1: 231 (1842). T: [Saxony, Germany] Nordhausen; *n.v.* [see D. Löve & P. Dansereau *Canad. J. Bot.* 37: 178 (1959) for discussion of actual N. American origin].

X. chinense Mill., *Gard. Dict.* 8th edn (1768). T: 'China' [*spalm.*, actually Vera Cruz, Mexico – see D. Löve & P. Dansereau, *loc. cit.*]; *n.v.*

[*Xanthium* 'chinensis complex' sensu C. McMillan, *Austral. J. Bot.* 23: 173–192 (1975)]

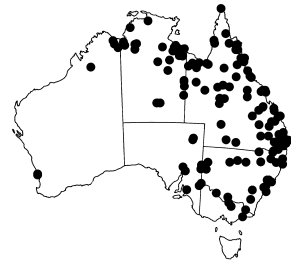
Illustrations: W.T. Parsons & E.G. Cuthbertson, *Noxious Weeds of Australia* 314, 320 (1992); G.M. Cunningham *et al.*, *Pl. W New South Wales* 727 (1992); N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 4: 993, fig. 201b (1999).

Herb (0.1–) 0.5–1.5 (–2.0) m high; stems unarmed, hairy. Leaves: petiole 20–120 mm long; lamina broadly ovate to palmatifid, 50–160 mm long, 50–160 mm wide, cordate to truncate at base, toothed on margins, 3- or 5-lobed; lobes well-defined, usually acute, scabrous, discoloured, with upper surface darker green and ±dull, prominently 3-veined. Male capitula in terminal clusters or in upper leaf axils. Female capitula in axillary clusters or solitary. Conceptacles ellipsoid, (12–) 16–20 mm long (including spines), covered with numerous hooked spines, and with 2 longer stout terminal spines, with moderately dense predominantly

eglandular hairs on body of fruit and extending to bases of spines. Terminal spines straight but divergent; extreme tips erect or bent at 90° inwards or outwards, but not cruciately hooked. Achenes 2 in each burr, one larger than the other. *Noogoora Burr*, *Cockleburr*, *Clotburr*, *Large Cockleburr*. Plate 62; Fig. 84C.

A native of N America. In Australia naturalised in all mainland States, but particularly Qld, N.S.W. and northern Vic. An old population in Tas. has been eradicated. Widespread in pastures, cultivated and waste ground, especially in low-lying areas subject to inundation, rivers and creek banks and flats after summer flooding, to altitudes of c. 600 m. Flowers and fruits recorded in most months, but most commonly Apr.–July.

W.A.: Goose Hill Ck, Lower Ord R., *A.A.Mitchell 3081* (PERTH).
N.T.: Macarthur R. crossing, *G.Wightman 1535* (CANB, DNA, MEL).
S.A.: Waukatanna Waterhole, Cooper Ck, *F.J.Badman 1652* (AD, MEL, NSW). Qld: Orpheus Island Resort, *B.M.Waterhouse 6229* (BRI, CANB).
N.S.W.: Aberfoyle area, *M.Gray 3417* (CANB). A.C.T.: Murrumbidgee R., 1.5 km ENE of Uriarra Crossing, *B.J.Lepschi 552* (CANB).
Vic.: Snowy R., c. 2.5 km downstream of Gattamurh Ford, *D.E.Albrecht 5253* (AD, CANB, MEL).



The plant is toxic in its young stages to pigs, less so to calves and sheep (*C.T.White 3305*, BRI). See also S.L.Everist, *Poisonous Pl. Australia* rev. edn 192 (1981) under *X. pungens*.

The conceptacles at maturity are usually mid-brown or yellow brown, rarely purplish. Glandular hairs on the conceptacles are sparse, and the indumentum of eglandular hairs is only moderately dense compared with related taxa.

6. **Xanthium cavanillesii* Schouw, *Ind. Sem. Hort. Haun.* 14 (1849)

T: [Argentina] Buenos-Aires, *Didrichsen*; holo: C? *n.v.*

[*Xanthium 'cavanillesii complex'* sensu C.McMillan, *Austral. J. Bot.* 23: 173–192 (1975)]

Illustrations: A.L.Cabrera, *Fl. Prov. Buenos Aires 6 Compuestas* 192, fig. 53 (1963); G.J.Harden (ed.), *Fl. New South Wales* 3: 269 (1992); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 320 (1992).

Similar to *X. occidentale*, but differing in the leaves being shallowly and irregularly lobed, and the conceptacles longer, (15–) 28–33 mm long; indumentum on body of conceptacle and lower half of spines predominantly sessile and stalked glandular hairs. Terminal spines massive, straight and divergent, extreme tips erect or bent at 90° inwards or outwards, but not cruciately hooked. *South American Burr*. Fig. 84D.

Native of Argentina. In Australia naturalised in several small areas of N.S.W., near Richmond and Windsor, and along the Murrumbidgee and Hunters Rivers, on river banks, to c. 150 m alt. Flowers present in Mar.; fruits Mar.–Aug.

N.S.W.: Murrumbidgee R., 30 km W of Darlington Point, 7 Mar. 1990, *B.A.Auld s.n.* (NSW); N Wagga Wagga, Apr. 1993, *I.Good s.n.* (NSW); bridge over Hunter R. on road to Sandy Hollow, Muswellbrook, *P.Michael & N.S.Lander 614* (NSW); Cupit's Lane, Windsor, *P.Michael & N.S.Lander 629* (MEL, NSW); Hawkesbury R., Castlereagh, *P.Michael & N.S.Lander 630* (BRI, NSW).



The conceptacles at maturity are usually dark brown to purplish and significantly larger and more robust than those of *X. occidentale*. Glandular hairs (sessile and stalked) are dense and extend halfway up the spines. Body spines are very dense (compared with *X. occidentale*).

7. **Xanthium orientale* L., *Sp. Pl.* 2: 1400 (1753)

T: Habitat in China, Japonia, Zeylona; *Herb. Linn. No. 1113.2*; lecto: LINN *n.v.*, fide D.Jeanmonod in J.Gamisans & D.Jeanmonod (eds), *Compl. Prodr. Fl. Corse, Asteraceae* 1: 190 (1998); epi: France. Perigord, rechtes Ufer der Dordogne bei Bezenac, 14 Sep 1987, *R.Wisskirchen 230*; BM *n.v.*, fide R.Wisskirchen in C.E.Jarvis & N.J.Turland (eds.), *Taxon* 47: 369 (1998).

X. californicum Greene, *Pittonia* 4: 62 (1899). T: middle California, especially about San Francisco Bay; *n.v.*

[*X. 'pennsylvanicum complex'* sensu C.McMillan, *Austral. J. Bot.* 23: 173–192 (1975)]

Illustrations: F.J.Widder, *Repert. Spec. Nov. Regni Veg. Beih.* 20: Taf. II, fig. 23, 24 (1923); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1442, fig. 651 (1986), as *X. californicum*; N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 983, fig. 201a (1999).

Similar to *X. occidentale*, but differing in leaf lobes acute or rounded, and the conceptacles slightly larger, (15–) 20–25 mm; indumentum on body of conceptacle and lower half of spines \pm equally glandular and eglandular hairs, or glandular hairs predominant. Terminal spines thick and conspicuously incurved throughout their length and cruciately hooked at their tips. *Californian Burr*, *European Cocklebur*. Fig. 84E.

A native of N America. In Australia, naturalised in SW N.S.W., N and central Vic. and E S.A., mainly in the Murray River valley and Adelaide suburbs, particularly on irrigated land, river and creek banks, or land subject to flooding, at altitudes to c. 200 m. Flowers present (Nov.–) Feb.–Apr. (–May); fruits (Oct.–) Mar.–Apr. (–May).

S.A.: River Murray bank near Waikerie at Sunnyside, *D.Symon 10998* (AD, NSW, NT). N.S.W.: 'Pomingalarna', Wagga, *Smith NSW139180* (K). Vic.: Mullaroo Ck, Lindsay Is., *A.C.Beauglehole 40621* (AD, MEL).

The conceptacles at maturity are usually light brown (very rarely purplish), and often somewhat longer than *X. occidentale*, although the size ranges overlap. Glandular hairs (mainly sessile), plus equal or fewer eglandular hairs, are dense and extend up the spines. Body spines often more dense than *X. occidentale*.



8. **Xanthium italicum* Moretti, *Giorn. Fis. Chim. Storia Nat. Med. Arti* ser. 2, 5: 326 (1822)

T: Habitat in multis italiae locis: illam inveni prope mare in regione Porto di Fermo, eamque abundantissimam secus decursum fluminis Padi a vicinis Augustae Taurinorum Ticinum usque perspexi; *n.v.*

[*Xanthium 'italicum complex'* sensu C.McMillan, *Austral. J. Bot.* 23: 173–192 (1975)]

Illustrations: M.L.Fernald, *Rhodora* 48: facing p. 77, pl. 1017, figs 1–8 (1946); G.J.Harden (ed.), *Fl. New South Wales* 3: 269 (1992); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds of Australia* 320 (1992).

Similar to *X. occidentale*, but differing in leaves bluntly to acutely shallowly lobed, and the conceptacles generally larger, 22–30 mm long; indumentum on body of conceptacle and lower part of spines densely glandular-hairy, with sessile and stalked glandular hairs. Terminal spines divergent, cruciately hooked at their tips. *Hunter Burr*, *Italian Cocklebur*. Fig. 84F.

Described from Italy, but probably a native of N America. In Australia, naturalised in relatively small areas of north eastern N.S.W., especially in the Hunter R. valley, and adjacent headwaters of the Macquarie, Namoi and Gwydir Rivers, where it is a weed of agricultural land, particularly in sandy soil along watercourses, to altitudes of c. 600 m. Flowers and fruits recorded Mar.–Apr.

N.S.W.: Stockton R., Kooragong Is., Hunter R., *R.Coveny 12203* & *W.Bishop* (K, MEL); Tareelaro Weir, c. 25 km E of Moree, Mar. 1977, *K.Harley s.n.* (BRI); Oxley Park, Tamworth, 12 Mar. 1986, *J.R.Hosking s.n.* (CANB, NE).

The conceptacles at maturity are yellow brown, and somewhat larger than those of *X. occidentale*, although size ranges overlap. Glandular hairs (sessile and stalked) are dense and extend part way up the spines. Eglandular hairs are almost absent. The tips of the terminal spines are cruciately hooked (turned through at least 180°), unlike those of other Australian taxa in this complex, where the tips are straight, or the extreme tips turned through only 90°.



ASTERACEAE

Trib. 12. MILLERIEAE

A.E.Orchard

Asteraceae trib. *Millerieae* Lindl. in J.C.Loudon, *Encycl. Pl.* 1074 (1829)

Type: *Milleria* L.

Annual or perennial herbs, shrubs or trees, without latex. Leaves usually opposite. Capitula radiate or discoid (rarely disciform); receptacle usually paleate (rarely partially paleate), with palea flat to navicular. Ray florets female, rarely neuter; corolla usually ligulate (rarely shallowly bilabiate), 3-lobed, white, purplish, orange or yellow (rarely red). Disc florets mainly actinomorphic, with corollas 5-lobed, yellow, orange, pink, purple, green or white; anther appendages lanceolate to ovate, sometimes cochleate; style branches sometimes with appendages. Pappus of scales or bristles, or absent.

A tribe of 34 genera and c. 400 species found mostly in central Mexico and the northern Andes, S America, with a few taxa extending to Africa and the Old World tropics. It is divided into 8 subtribes (Panero, 2007), of which 4 subtribes are represented in the Australian flora.

The tribe has no single defining character, but most species have opposite, glandular leaves, scarious paleae, subterete achenes, a pappus (when present) of scales or bristles and 3-lobed ray corollas (Panero, 2007). Members of this tribe are dominant in the paramos of northern S America.

J.L.Panero, *XXVII. Tribe Millerieae Lindl. (1829)*, in J.W.Kadereit & C.Jefferey (eds), *Fam. Gen. Vasc. Pl.* 8: 477–492 (2007); B.G.Baldwin, *Heliantheae alliance*, in V.A.Funk *et al.*, *Syst., Evol. Biogeogr. Compositae* 689–711 (2009).

KEY TO SUBTRIBES AND GENERA

(adapted from Panero, 2007)

- | | |
|--|--------------------------|
| 1 Inner series of involucre bracts fused to achenes forming a variously spined, verrucose or awned conceptacle [subtrib. 3. Melampodiinae] | 3. ACANTHOSPERMUM |
| 1: Involucre bracts not fused to achenes | |
| 2 Capitula with dimorphic involucre bracts normally in 2 series, outer bracts broad, herbaceous, inner bracts cucullate, scarious; achenes glabrous and lacking a pappus [subtrib. 4. Milleriinae] | |
| 3 Outermost involucre bracts broad, cochleate or cucullate, rarely lanceolate, erect and enclosing inner bracts | 4. GUIZOTIA |
| 3: Outermost involucre bracts linear to spatulate, spreading or reflexed, not covering inner bracts | 5. SIGESBECKIA |
| 2: Capitula with subequal, gradate involucre bracts, never dimorphic; achenes glabrous to densely pubescent, with a pappus (lacking in some extra-Australian taxa) | |
| 4 Pappus of plumose bristles [subtrib. 1. Dyscritothamninae] | 1. TRIDAX |
| 4: Pappus of lanceolate fimbriate scales [subtrib. 2. Galinsoginae] | 2. GALINSOGA |

ASTERACEAE

Subtrib. 1. DYSCRITOTHAMNINAE

Millerieae subtrib. *Dyscritithamninae* Panero, *Phytologia* 87: 10 (2005)

Type: *Dyscritothamnus* B.L.Rob.

Annual or perennial herbs, rarely shrubs. Capitula with subequal gradate involucre bracts in 2 or 3 series, never fused to achenes. Achenes densely pubescent. Pappus of numerous barbellate bristles (rarely absent or scales in extra-Australian taxa).

A subtribe of 5 genera and about 43 species, native to the southern U.S.A., Central America and Andean S America. One genus naturalised in Australia.

1. TRIDAX

Tridax L., *Sp. Pl.* 2: 900 (1753); from the Greek name *Thridax* for lettuce (*Lactuca sativa*).

Type: *T. procumbens* L.

Annual or perennial, erect, procumbent or decumbent herbs; stems rooting at nodes when prostrate, usually hairy, glandular. Leaves opposite, sessile or petiolate, simple, toothed (Australian sp.; trilobed or pinnately lobed elsewhere). Capitula discoid or radiate, terminal, solitary, rarely in cymose panicles, hemispherical to campanulate, on long naked peduncles; involucre bracts 2- or 3-seriate; outer bracts herbaceous; inner bracts membranous, often transitional to paleae; receptacle conical or convex; paleae scarious, persistent, partially enclosing achenes. Ray florets few in 1 row, female, fertile; ligules usually 3-lobed. Disc florets numerous, bisexual, fertile, 5-lobed. Achenes turbinate, narrowly obconical or subcylindrical, glabrous to densely pilose. Pappus of numerous plumose bristles or scales, that of ray achenes often reduced, rarely absent.

A genus of c. 30 species from Mexico to tropical S America. In Australia, one species is naturalised.

A.M.Powell, Taxonomy of *Tridax* (Compositae), *Brittonia* 17: 47–96 (1965).

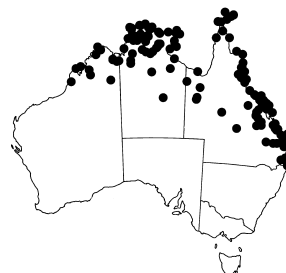
**Tridax procumbens* L., *Sp. Pl.* 2: 900 (1753)

T: Mexico, Veracruz, *Houstoun s.n.*, *Herb. Clifford*: 418, *Tridax* 1; lecto: BM, photo seen, *vide* A.M.Powell, *Brittonia* 17: 80 (1965).

Illustrations: W.G.D'Arcy, *Ann. Missouri Bot. Gard.* 62: 1216, fig. 88 (1975); J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 952, fig. 289L; 955, fig. 290F (1992); B.M.J.Hussey *et al.*, *Western Weeds* 107 (1997).

Procumbent perennial herb, (5–) 30–60 (–90) cm tall; stems striate, coarsely hispid, rooting at lower nodes. Leaves with petiole 5–10 (–20) mm long; lamina lanceolate to ovate, (20–) 25–40 (–80) mm long, (6–) 10–20 (–50) mm wide, coarsely toothed, coarsely hispid. Capitula radiate, solitary, terminal, 10–15 mm diam. (excluding rays); peduncles (15–) 20–30 cm long; outer involucre bracts herbaceous, hispid; inner bracts membranous, striate, often purplish, hairy near rounded apices; paleae lanceolate, acute, membranous, straw coloured, glabrous. Ray florets 5 or 6, pale yellow to white; ligules 4–5 mm long, deeply 3-lobed at apex, shortly pilose abaxially. Disc florets shortly pilose, yellow. Achenes narrowly obconical, c. 2 mm long, long-pilose. Pappus bristles c. 20, c. 6 mm long (those of ray florets shorter), widened at base, plumose. *n* = 18, A.M.Powell, *Brittonia* 17: 83 (1965). *Tridax* Daisy, *Tridax*. Plate 63; Fig. 85A–D.

Native of Mexico, central America and Andean S America (Venezuela, Colombia, Peru, and Bolivia). Naturalised almost throughout tropical and subtropical regions of the world. In Australia widely naturalised in W.A., N.T., Qld and NE



N.S.W., where it is a weed of roadsides, railway embankments, cultivation, pastures and open grassy woodlands, usually on drier sandy or rocky soils, from sea level (just above highwater mark) to at least 420 m altitude. Also naturalised in Cocos (Keeling) and Christmas Is, and Willis Is. in the Coral Sea. Flowers and fruits all months.

W.A.: One Arm Point, SE tip of Dampierland, *B.J.Carter 44* (PERTH). N.T.: White Ck, 2 km NW of Timber Ck, *M.J.A.Barritt 1621* (DNA, MEL); South Goulburn Is., *C.R.Dunlop 9021* (DNA). Qld: near Atherton township, *M.Lazarides 4241* (CANB). N.S.W.: Chinderah, Tweed R., *H.S.McKee 11658* (CANB).

The lowermost teeth of large leaves are sometimes \pm lobe-like.

This species is reportedly eaten by cattle.

Subtrib. 2. GALINSOGINAE

Millerieae subtrib. *Galinsoginae* Benth. & Hook.f., *Gen. Pl.* 2: 167, 198 (1873), as *Galinsogeae*

Type: *Galinsoga* Ruiz & Pav.

Annual or perennial herbs or shrubs. Capitula with subequal gradate involuclral bracts in 2–5 series, never fused to achenes. Achenes glabrous to moderately pubescent. Pappus of tapered or truncate scales (rarely absent or a few bristles in extra-Australian taxa).

A subtribe of 9 genera and about 87 species, native mainly to Mexico, Central and tropical S America. One genus naturalised in Australia.

2. GALINSOGA

Galinsoga Ruiz & Pav., *Fl. Peruv. Prodr.* 110, t. 24 (1794); after Don Mariano Martinez de Galinsoga (1766–1797), Director of the Madrid Botanic Garden and physician to the Queen of Spain.

Type: *G. parviflora* Cav.

Annual herbs (in Australia; perennials or shrubs elsewhere); stems glabrous or hairy. Leaves opposite, sessile or shortly petiolate, simple, entire or serrate, 3-veined. Capitula radiate (rarely discoid) in loose to congested terminal cymes, sometimes axillary, \pm hemispherical; involuclral bracts 1–3 seriate, herbaceous to membranous; receptacle conical; paleae scarious, veined, persistent to caducous, not or hardly enclosing achenes. Ray florets few in 1 row, female, white or purplish; ligule usually tiny, usually 3-lobed. Disc florets numerous, fertile, bisexual, usually yellowish, 5-lobed. Achenes obconic or obpyramidal, dimorphic; achenes from ray florets compressed, curved, embraced by a structure formed from fusion of an involuclral bract and 2 or 3 paleae, with pappus of short weak awns, or absent; achenes from disc florets obconical, with pappus of 15–20 deeply fimbriate scales fused at base.

A New World genus of 16 species, 2 of which, *G. quadriradiata* Ruiz & Pav. and *G. parviflora* Cav., have become widespread weeds: the latter species is naturalised in Australia.

Canne (1978) considered *Galinsoga* to be closely related to *Sabazia* Cass., *Stenocarpa* S.F.Blake and *Tricarpha* Longpre.

J.M.Canne, *A Revision of the genus Galinsoga (Compositae: Heliantheae)*, *Rhodora* 79: 319–389 (1977); J.M.Canne, Circumscription and generic relationships of *Galinsoga* (Compositae: Heliantheae), *Madroño* 25: 81–88 (1978); S.I.Warwick & R.D.Sweet, The biology of Canadian weeds 58. *Galinsoga parviflora* and *G. quadriradiata* (*G. ciliata*), *Canad. J. Pl. Sci.* 63: 695–709 (1983); J.M.Canne-Hilliker, An emended description, chromosome counts and a key to South American *Galinsoga* (Asteraceae, Heliantheae), *Taxon* 41: 661–666 (1992).

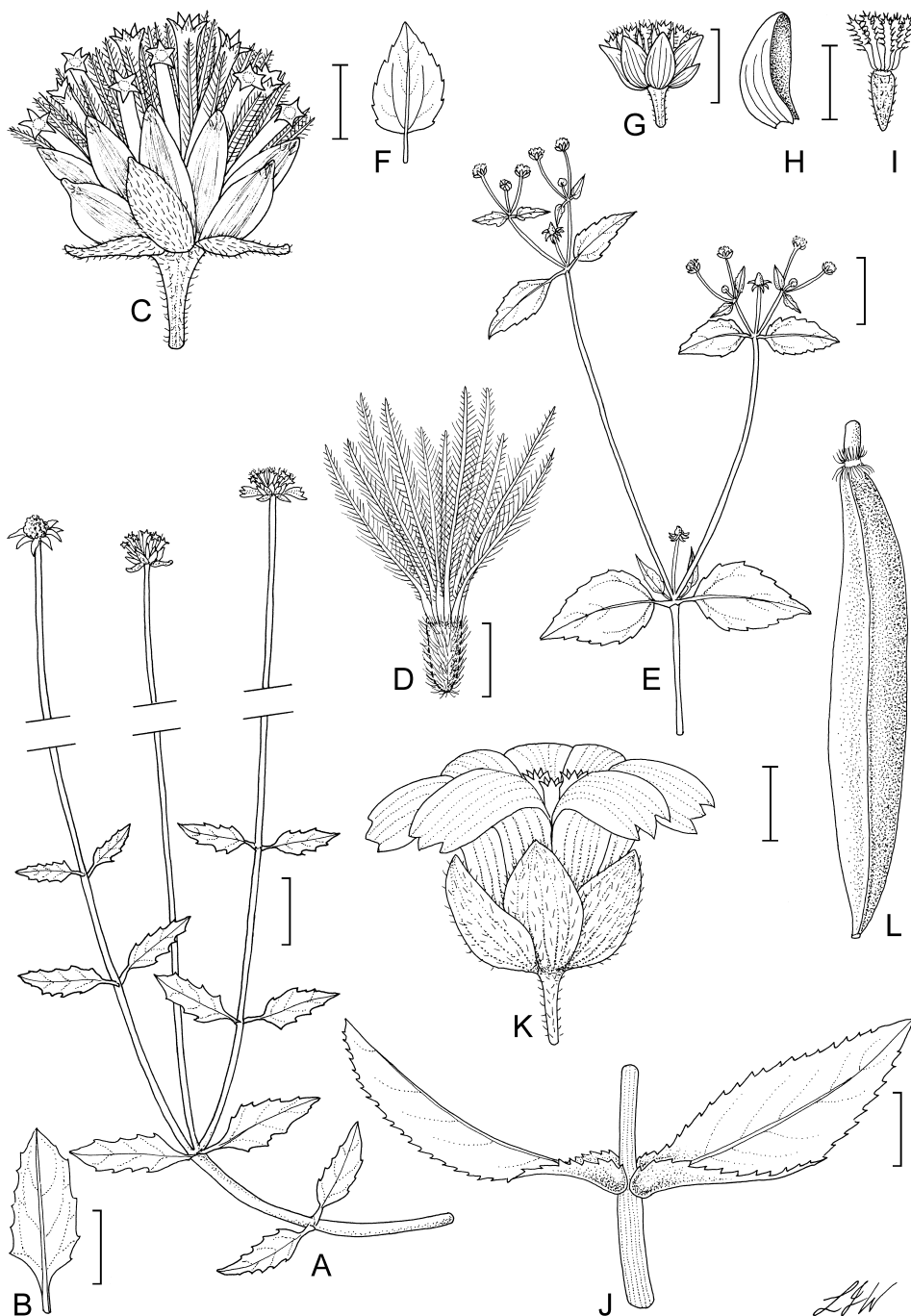


Figure 85. A–D, *Tridax procumbens*. A, habit; B, leaf; C, capitulum in flower; D, achene (A–C, R.L. Specht 174, AD; D, J.Z. Weber 9737, AD). E–I, *Galinsoga parviflora*. E, partial habit: inflorescence of several capitula; F, leaf; G, capitulum; H, involucral bract; I, achene (E–I, C.R. Alcock 4456, AD). J–L, *Guizotia abyssinica*. J, pair of leaves; K, capitulum; L, achene (J–L, W. Duncan s.n., HO 303514). Scale bars: A, B, E, F, J = 20 mm; C, G, K = 4 mm; D, H, I, L = 2 mm. Drawn by L.J. Waters.

***Galinsoga parviflora** Cav., *Icon.* 3: 41, t. 281 (1795)

T: seed from Peru sent by D.Dombey to Paris; seen by Cavanilles at the Botanic Garden in Paris and later at the Botanic Garden in Madrid; cultivated; holo: MA n.v., *vide* J.M.Canne, *Rhodora* 79: 373 (1977).

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1437, fig. 646 (1986); G.J.Harden (ed.), *Fl. New South Wales* 3: 281 (1992); B.M.J.Hussey *et al.*, *Western Weeds* 98 (1997).

Slender annual herb, sparsely pubescent, sometimes glandular-pubescent; stems branched, (8–) 30–60 (–75) cm tall. Leaves with petiole 5–25 mm long; lamina lanceolate to ovate, (17–) 20–60 mm long, (8–) 10–35 mm wide, cuneate, rounded or subtruncate at base, entire to serrulate, acute to subacuminate, sparsely pubescent. Capitula 3–6 mm diam., in loose terminal and axillary cymes, long-pedunculate; involucre bracts c. 7–10, ovate, 1–3 mm long; outermost paleae broadly elliptic to obovate, entire or laciniate, basally adnate to inner involucre scales; inner paleae narrower, often \pm persistent. Ray florets usually 5, white or tinged pink; ligule 0.5–1.5 mm long, 1 mm wide, 3-lobed. Achenes 1.5–2 mm long, black, weakly pilose near apex. Pappus of numerous fimbriate scales. $n = 8$, J.M.Canne, *Rhodora* 79: 375 (1977). *Gallant Soldier*, *Potato Weed*, *Yellow Weed*, *Galinsoga*, *Chickweed*, *Peterson's Pest.* Plate 65; Fig. 85E–I.

A native of Central America, now a worldwide weed of disturbed ground. In Australia naturalised in all States and Territories except N.T., where it is a common weed of horticulture and market gardens in a range of damp soils, and may also invade natural areas of forest along tracks and roadsides, at altitudes from sea level to at least 1100 m. Also naturalised on Norfolk and Lord Howe Is. Flowers and fruits all months.

W.A.: Queen St, Busselton, *G.J.Keighery 13538* (PERTH). S.A.: Upper Swamp Rd, Piccadilly Valley, *R.Bates 17502* (AD). Qld: Erbacher Rd, Nambour, *A.R.Bean 14444* (BRI). N.S.W.: Dorrigo Mtn, 5.1 km ESE of Dorrigo, 9 May 1973, *J.B.Williams s.n.* (NE). A.C.T.: Dickson shops, *D.J.Mallinson 752* (CANB). Vic.: Royal Botanic Gardens, on Observatory site, South Yarra, *P.S.Short 4155* (MEL). Tas.: Don Heads, *D.I.Morris 86315* (HO, MEL).

**Subtrib. 3. MELAMPODIINAE**

Millerieae subtrib. *Melampodiinae* Less., *Linnaea* 5: 149 (1830), as *Melampodieae*

Type: *Melampodium* L.

Annual or perennial herbs or shrubs. Capitula with dimorphic involucre bracts, with the outer series free to connate, the inner series fused to the ray achenes and forming a conceptacle which is variously smooth, verrucose or spiny. Pappus absent.

A subtribe of 3 genera and c. 50 species, native to the neotropics and Galapagos Is. One genus naturalised in Australia.

3. ACANTHOSPERMUM

Acanthospermum Schrank, *Pl. Rar. Hort. Monac.* 2: t. 53 (1820); from the Greek *acantha* (thorn) and *sperma* (seed), referring to the burr-like fruits.

Type: *A. brasilum* Schrank

Annual herbs; stems with multicellular hairs. Leaves opposite, sessile or petiolate, ovate, elliptic or rhomboid, entire, serrate or crenulate, pubescent or glabrescent. Capitula radiate, solitary, terminal, appearing axillary by sympodial growth, narrowly campanulate, pedunculate; involucre bracts in 2 series; outer bracts 4–6, elliptic to ovate, herbaceous,

spreading; inner bracts larger, each bract enclosing a ray floret, ±prickly or spiny, persistent, forming a conceptacle; receptacle small, conical, with scales. Ray florets 5–8, in 1 whorl, female, fertile, yellow; ligules minute, emarginate or 3-toothed. Disc florets 5–10, bisexual, functionally male, 5-lobed, yellow. Fruits are conceptacles formed by persistent and often hardened inner involucre bracts enclosing achenes developed from ray florets, usually compressed parallel to a radius of the head, cuneate or oblong-fusiform, spinous, glabrous. Pappus absent.

A genus of c. 6 species native to tropical and warm-temperate N and S America, the West Indies and the Galapagos Is. In Australia, 2 naturalised species.

S.F.Blake, Revision of the genus *Acanthospermum*, *Contr. U.S. Natl. Herb.* 20: 383–392 (1921); T.F.Stuessy, The genus *Acanthospermum* (Compositae-Heliantheae-Melampodinae): taxonomic changes and generic affinities, *Rhodora* 72: 106–109 (1970).

Prostrate herb; conceptacle with crozier-tipped spines of ±uniform length, lacking divergent spines at apex; leaves usually 1–4 cm long, dotted with sunken glands, glabrescent

1. *A. australe*

Erect herb; conceptacle with straight or slightly hooked spines of ±uniform length plus 2 large divergent spines at apex; leaves usually 2–12.5 cm long, densely hispid, sunken glands sparse or absent, pilose

2. *A. hispidum*

1. **Acanthospermum australe* (Loefl.) Kuntze, *Revis. Gen. Pl.* 1: 303 (1891)

Melampodium australe Loefl., *Iter Hispan.* 268 (1758). T: Vicinity of Barcelona, Venezuela, 15 Feb. 1755, Loefling; holo: LINN? n.v., fide S.F.Blake, *Contr. U.S. Natl. Herb.* 20: 390 (1921).

Illustrations: F.W.H.A.von Humboldt, A.J.A.Bonpland & C.S.Kunth, *Nov. Gen. Sp.* 4: 271, t. 397 (1820); B.A.Auld & R.W.Medd, *Weeds* 80 (1987); W.L.Wagner *et al.*, *Man. Fl. Pl. Hawai'i*, Rev. edn, 253, t. 14 (1999).

Stems prostrate, to 1 m long. Leaves petiolate, ovate to rhomboid, 10–40 mm long, 6–27 mm wide, serrate to crenulate, with sparse appressed hairs, usually only visible on young growth or on secondary veins of lower surface, dotted with viscid glands mostly on lower surface; leaf base tapering to petiole. Capitula on peduncle 7–18 mm long; outer involucre bracts usually 5, lanceolate to elliptic, 1–2 mm long; inner bracts to 10 mm long. Ray florets 4 or 5, shorter than bracts and disc florets. Disc florets 5–10. Conceptacle oblong-fusiform, compressed, 7–9 mm long, with 5–8 longitudinal ribs, with strongly hooked (crozier-tipped) prickles 1–2.5 mm long mainly on ribs, but lacking terminal spines, densely sticky-glandular. Fig. 86A–B.

Native to the Caribbean and S America but widely naturalised. In Australia naturalised from the Nelson Bay area in the Hunter Valley to Royal Natl Park in N.S.W., with disjunct populations on South Stradbroke Is. and the Southport Spit region of SE Qld. There is a single old record from Perth, W.A. It is a minor weed of disturbed sites in both domestic and natural grassy woodland systems, usually on sandy soils. Flowers recorded Feb.–Apr. (–May); fruits (Mar.–) Apr.–May.

W.A.: near Perth, 1894–1911, *A.Morrison s.n.* (K). Qld: Southport Spit, Apr. 2000, *G.Leiper s.n.* (BRI); South Stradbroke Is., 3 Feb. 1994, *B.Stevens s.n.* (K, MEL, NSW). N.S.W.: Nelson Bay Rd, 5.2 km ENE of the Soldier's Point and Nelson Bay road junction at Anna Bay, *R.G.Coveny 16461* (BRI, CANB, MEL, NSW); alongside Moira Parade, Hawks Nest, *J.R.Hosking 1705* (CANB, MEL, NE, NSW).



A population recorded from the Glen Innes region of N.S.W. may have been eradicated, as has the W.A. population.

2. **Acanthospermum hispidum* DC., *Prodr.* 5: 522 (1836)

T: In Brasiliae sabulosis maritimis circa Bahiam legit cl. Salzman [*M.Salzman* 21, 1830]; holo: G-DC, photo seen.

Illustrations: H.E.Kleinschmidt & R.W.Johnson, *Weeds Queensland* 166 (1977); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 550, fig. 76L (1986); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds Australia* 234 (1992).

Stems erect, 40–60 (–100) cm high. Leaves sessile, ovate to elliptic, 20–125 mm long, 10–45 mm wide, sometimes reduced near inflorescence, usually attenuate at base, shallowly serrate to crenulate, pubescent, pilose on both sides; glands sparse on upper surface, numerous on lower surface. Capitula on peduncle to 25 mm long; outer involucre bracts usually 5, elliptic to ovate, 4–5 mm long; inner bracts longer, usually 7 or 8. Ray florets 5–8, shorter than bracts and disc florets. Disc florets c. 7 or 8. Conceptacles cuneate, compressed, 4–7 mm long, with ribs weak or absent, with straight or slightly hooked prickles on body and 2 divergent spines at apex, densely or sparsely sticky-glandular. *Star-Burr*, *Goat's Head* *Chinese Burr*. Plate 64; Fig. 86C–E.

A native of the Caribbean, Central and S America, as far S as Uruguay; widely naturalised in warm-temperate and tropical regions almost worldwide. In Australia naturalised in northern N.S.W., Qld, and tropical N.T. and the Kimberley region of W.A. (with one old collection from Kenwick near Perth). A major weed of roadsides, river banks and disturbed areas such as over-grazed pastures and cattle yards. Also invading crops (passionfruit, oranges) and disturbed areas in natural habitats such as woodland, tussock grassland and monsoon forest, on a range of soils from beach sand to heavy clays. Flowers Feb.–July; fruits (Feb.–) Mar.–July.

W.A.: E of L. Argyle at the Behn R. crossing on roadside along the Duncan Hwy, *Hj.Eichler* 22287 (CANB, PERTH); Ord R., W of Ord River Stn, *R.Pullen* 10.752 (CANB). N.T.: VRD Stn, *J.Egan* 4877 (DNA). Qld: Spring Ck 500 m W of Barkly Hwy, 22.5 km NNW of Mt Isa, *A.Fraser* 316 (CANB). N.S.W.: Armidale, opposite airport, *G.J.White* s.n. (NE).



In agricultural land the burrs are a troublesome wool contaminant, and the plant is a declared noxious weed in Qld.

This species appears to have been introduced to Qld in the late 19th century and was recorded as naturalised in Townsville in 1906. It has since spread to all parts of Qld except for the south-western interior.

Subtrib. 4. MILLERIINAE

Millerieae subtrib. *Milleriinae* Cass. in B.C.J.Dumortier, *Anal. Fam. Pl.* 31 (1829), as *Millerieae*

Type: *Milleria* L.

Annual or perennial herbs, shrubs or rarely trees. Capitula with dimorphic involucre bracts in 1–3 series; usually 2 series with outer series broad and herbaceous, inner series cucullate and scarious, not fused to ray achenes. Achenes glabrous. Pappus absent.

A subtribe of 12 genera and c. 83 species, native to Mexico, Central and northern S America, Africa, Madagascar and India. Two genera naturalised in Australia.

4. GUIZOTIA

Guizotia Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 59: 248 (1829), *nom. cons.*; named in honour of the French historian François Pierre Guillaume Guizot.

Type: *Guizotia abyssinica* (L.f.) Cass.

Annual or perennial erect or procumbent herbs; stems sometimes rooting adventitiously, usually hollow. Leaves opposite and subconnate (becoming alternate above), sessile, simple, entire or dentate. Capitula radiate, solitary to many, corymbose, hemispherical to campanulate, usually long-pedunculate, rarely sessile; involucre bracts ± 2 -seriate; outer bracts herbaceous, erect; inner bracts membranous; receptacle convex to subconical;

paleae scarious, persistent, becoming more cucullate towards centre. Ray florets 6–18, in 1 row, female, fertile; ligules truncate and shallowly 3-lobed. Disc florets numerous, bisexual, fertile, 5-lobed. Ray achenes 3-angled; disc achenes 4-angled. Pappus absent.

A genus of 6 species, endemic to Africa; 5 species are native to the Ethiopian Highlands. In Australia, 1 naturalised species.

The florets have a distinctive densely pilose zone at the base of the corolla, where it attaches to the ovary/achene, which can be mistaken for a pappus.

J.Baagøe, The genus *Guizotia* (Compositae). A taxonomic revision, *Bot. Tidsskr.* 69: 1–39 (1974); A.Getinet & S.M.Sharma, *Promoting the Conservation and Use of Underutilized and Neglected Crops. vol. 5. Niger*. *Guizotia abyssinica* (L.f.) Cass. (1996); B.E.Umali & K.Yantasath, *Guizotia abyssinica* (L.f.) Cass., in H.A.M. van der Vossen & B.E.Umali (eds), *Plant Resources of South-East Asia No. 14, Vegetable Oils and Fats* 97–101 (2001).

****Guizotia abyssinica* (L.f.) Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 59: 248 (1829)**

Polymnia abyssinica L.f., *Suppl. Pl.* 383 (1782). T: Habitat in Abyssinia; lecto: LINN n.v., *sede* J.Baagøe, *Bot. Tidsskr.* 69: 21 (1974).

Illustrations: J.Baagøe, *op. cit.* 18, fig. 15A & E, 21, fig. 16; G.J.Harden (ed.), *Fl. New South Wales* 3: 277 (1992); B.E.Umali & K.Yantasath, *op. cit.* 99 (2001).

Annual herb (0.3–) 1–2 m tall, ±glabrous to hairy; stems to 10 (–15) mm diam. Leaves narrowly ovate to obovate, (45–) 60–200 mm long, (10–) 20–50 mm wide, mostly toothed, rarely entire, stem-clasping. Capitula long-pedunculate, few to many, 10–15 mm diam. excluding rays, 15–25 (–40) mm diam. including rays; involucre bracts sparsely and minutely hairy; outer bracts 5 or 6, broadly ovate, cochleate or cucullate, rarely lanceolate, erect and enclosing inner bracts; inner bracts obovate, white with longitudinal purple stripes. Ray florets yellow; ligules elliptic, 11–15 mm long. Achenes 4–6 mm long, brown or black (silvery grey when immature). $2n = 30$, A.Getinet & S.M.Sharma, *op. cit.* 45 (1996). *Rantil, Niger Seed, Niger*. Fig. 85J–L.

A native of Ethiopia, long cultivated for oilseed and naturalised in India, and sometimes mistakenly considered native there. Occasionally naturalised in N.S.W., Qld and Tas., usually in wetter situations, sometimes a minor weed of crops, at altitudes from sealevel to at least 250 m. Flowers and fruits recorded in Apr.–May.

Qld: Peel Is., Apr. 1958, *M.Gabriel s.n.* (BRI); Toowoomba, 10 Feb. 1971, *T.K.Hughes s.n.* (BRI). N.S.W.: Kellyville, 26 Apr. 1974, *G.Drury s.n.* (NSW). Tas.: Harford, 11 Apr. 1989, *A.Duncan s.n.* (HO); Mole Creek, 2 km W of town boundary, 7 May 1993, *W.Duncan s.n.* (HO).



An oil seed crop in India, Nepal and Ethiopia; also used for bird seed. Occasionally cultivated in Australia (e.g. *A.A.Mitchell* 3232, W.A., Kununurra, CANB, PERTH). Most naturalised occurrences are localised, and arise from discard of bird seed, contamination on international shipping containers, or as contamination of (sunflower) seed imported for sowing. For detailed discussions of biology, cropping potential and practices see Getinet & Sharma (1996) and Umali & Yantasath (2001).

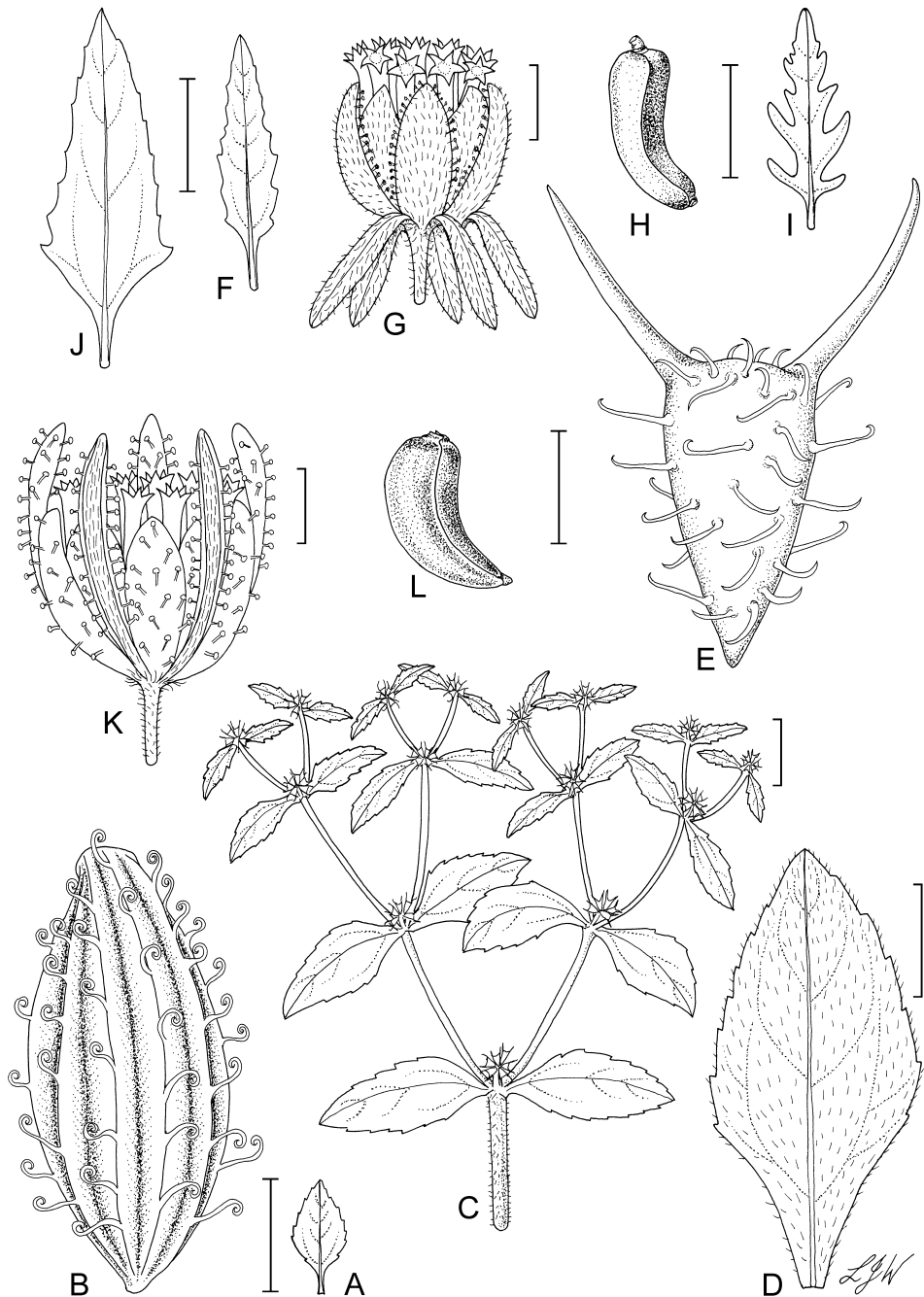


Figure 86. A, B, *Acanthospermum australe*. A, leaf; B, conceptacle (A, B, R.Coveny 12586 & B.Wiecek, AD). C–E, *A. hispidum*. C, habit; D, leaf; E, conceptacle (C–E, B.Jackses 59, AD). F–H, *Sigesbeckia australiensis* subsp. *australiensis*. F, leaf; G, capitulum; H, achene (F–H, P.G.Wilson 514, AD). I, *S. australiensis* subsp. *fugax*, leaf (C.W.E.Moore 8732, CANB). J–L, *S. orientalis*. J, leaf; K, capitulum; L, achene (J–L, C.R.Alcock 944, AD). Scale bars: A, D, F, G, I–K = 20 mm; B, C, E, H, L = 2 mm. Drawn by L.J.Waters.

5. SIGESBECKIA

Sigesbeckia L., *Sp. Pl.* 2: 900 (1753); named by Linnaeus after Johann Georg Siegesbeck (1686–1755), initially a friend, later an opponent, because Linnaeus thought the plant to be especially unattractive. J.G.Siegesbeck was a Prussian botanist and physician, and Director of the Botanic Garden at St. Petersburg from 1735 to 1747.

Type: *S. orientalis* L.

Annual or perennial glandular-pilose herbs; stems erect. Leaves opposite, sessile or with winged petiole simple, entire, toothed or lobed. Capitula small, in terminal cymes, broadly campanulate or hemispherical; involucre bracts 1-seriate, herbaceous, 5, spreading or reflexed; receptacle convex to short-conical; outer paleae cucullate, green to purplish, each enclosing a ray floret; inner paleae membranous, becoming flatter, white to purplish. Ray florets in 1 series, female, fertile, 3-toothed, inconspicuous. Disc florets bisexual, fertile, tubular, 5-toothed. Achenes obovoid-oblong, often incurved. Pappus absent.

A genus of 8–13 species, widespread in tropical and temperate regions, but with most species in Mexico. In Australia there are 2 species, both native.

The capitula of *Sigesbeckia* have an involucre of 5 usually linear or narrowly spatulate bracts which are sterile. Inside these are several whorls of usually cucullate ovate or obovate bracts, each subtending a floret/achene, the outer bracts green to purplish, and becoming increasingly membranous, paler (white to purplish) and planar towards the centre of the capitulum. The outermost whorl of these cucullate bracts (particularly those subtending ray florets) are often described as 'inner involucre bracts', although functionally they are all paleae and morph seamlessly from outer cucullate to inner planar structures. In this treatment only the 5 clavate, or linear to narrowly spatulate bracts are termed involucre bracts, with the broader inner bracts all being termed paleae.

D.L.Schulz, Zur Kenntnis der in Europa beobachteten Arten der Gattung *Sigesbeckia* L., *Gleditschia* 15(2): 205–210 (1987); D.L.Schulz, Zur Kenntnis der Gattung *Sigesbeckia* L. in Afrika, *Gleditschia* 18(2): 211–218 (1987); L.Pedley, *Sigesbeckia fugax* and *Tetramolopium vagans*, new Asteraceae from Queensland, *Austrobaileya* 4(1): 87–92 (1993).

Involucre bracts always flattened and linear to narrowly spatulate, shorter than, equalling, or exceeding florets and paleae by less than 2 times, densely pilose but lacking stout stalked glands (glands if present tiny, sessile, very rarely 1 or 2 tiny glands on filiform stalks)

1. *S. australiensis*

Involucre bracts clavate or flattened and narrowly spatulate, exceeding the florets and paleae by 2–3 times, and bearing numerous stout stalked glands

2. *S. orientalis*

1. *Sigesbeckia australiensis* D.L.Schulz, *Gleditschia* 15: 208 (1987)

T: S.A., Italowie Gorge, c. 30 km E of Copley, 4 Sept. 1968, *B.Copley* 2237, holo: LZ; iso: AD, G, both *n.v.*, LZ.

[*S. microcephala* auct. non DC.: N.T.Burbidge & M.Gray, *Fl. Austral. Cap. Terr.* 368 ((1970); G.M.Cunningham *et al.*, *Pl. W. New South Wales* 666 (1981); D.A.Cooke in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1439 (1986)]

Annual erect herbs (10–) 30–50 (–80) cm tall; stems red to brownish, slightly pubescent. Leaves with winged petiole 10–20 mm long (rarely sessile); lamina lanceolate to elliptic, 35–100 mm long, 6–30 (–50) mm wide, scabrous above and below (mainly on veins below), often sessile-glandular below, attenuate at base, entire, shortly and bluntly dentate, or lobed. Capitula in loose corymbose panicles, 10 mm diam.; involucre bracts linear to oblanceolate, 4–7 (–13) mm long, shorter than, equalling, or rarely exceeding florets (up to twice length), pilose, lacking stalked glandular hairs (small sessile glands sometimes present); outer paleae green to purplish, coarsely stalked-glandular, enfolding the outer achenes; inner paleae obovate, 3 mm long, membranous, become whitish, flattened. Florets yellow. Ray florets 5–8; ligules 1–2 (–3) mm long, broadly oblong, 2 or 3-toothed at apex, yellow. Achenes slightly 3- or 4-angled, incurved, c. 3 mm long, black. *Cobber Weed*.

Native to inland Australia. Two subspecies are recognised.

A more delicate plant than *S. orientalis*, with leaves never developing the truncate bases found in robust *S. orientalis* specimens, but always \pm attenuate. The involucre bracts are pilose, and lack the robust stalked glands of *S. orientalis*. If glands are present on the involucre bracts they are small and sessile (very rarely 1 or 2 stalked glands but then stalks filamentous and glands tiny).

Leaves entire or bluntly toothed, if lobed then lobes shallow and less than half depth of lamina

1a. subsp. *australiensis*

Leaves deeply lobed to half or more of depth of lamina

1b. subsp. *fugax*

1a. *Sigesbeckia australiensis* D.L.Schulz subsp. *australiensis*

Illustrations: J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1440, fig. 649A (1986), as *S. microcephala*; L.Pedley, *Austrobaileya* 4: 89, fig. G–I (1993); N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 4: 975, fig. 199h (1999).

Leaves entire or shallowly and bluntly toothed, if lobed then lobes less than half depth of lamina (rarely, 1 deeper lobe at base of lamina only). Involucre bracts often reflexed at maturity, with indumentum spreading. *Pale Indian Weed*. Fig. 86F–H.

Found in all mainland State and territories, although rarer in Qld, and only isolated collections in W.A. An ephemeral plant, common after rain, in drier inland habitats, often in open *Eucalyptus*, *Callitris* or *Acacia* woodlands or tussock grasslands, or on stony hillsides, usually in skeletal sandy soils, at altitudes to at least 770 m. Flowers and fruits (Mar.–) July–Dec.

W.A.: near E end of Schwerin Mural Crescent, *A.S.George* 12108 (CANB, PERTH). N.T.: 5 miles [8 km] N of Mt Cavenagh Stn, *R.A.Perry* 5505 (AD, BRI, CANB, K, MEL, PERTH). S.A.: Musgrave Ra., near soak at the foot of Mt Harriet, *D.J.E.Whibley* 931 (AD). Qld: 35 km NE of Capella, *R.J.Fensham* 2777 (BRI). N.S.W.: Travelling Stock Res., 10 km N of Bigga, *N. Taws* 145 (CBG, MEL, NSW). A.C.T.: northern ridge of Mt Tennent, near Tharwa, *P.Gilmour* 5376 (CANB). Vic.: Warby Ra., near Wangaratta, *E.M.Canning* 3196 (CBG, MEL).



This taxon was first suggested to be a distinct species by Steetz, who annotated a collection by Blandowsky of 1850, from Port Adelaide, as '*Sigesbeckia* nov. sp.' (now in MEL), but he did not proceed to publication. In 1987 Dorothea Schulz described it as *S. australiensis*, after discovering it as a naturalised wool alien in Germany, Switzerland and the United Kingdom, and tracing it back to its native distribution in Australia.

1b. *Sigesbeckia australiensis* subsp. *fugax* (Pedley) Orchard, *Fl. Australia* 37: 609 (2015)

S. fugax Pedley, *Austrobaileya* 4: 87–92 (1993). T: Qld, Maranoa District: 10 km W of Roma, 2 Dec. 1989, *L.Pedley* 5499; holotype: BRI *n.v.*; isotype: BRI, CANB, K, MEL, NSW (and AD, LZ, MO, PR, US, all *n.v.*).

Illustrations: B.A.Auld & R.W.Medd, *Weeds* 115 (1987), as *S. orientalis*; L.Pedley, *Austrobaileya* 4: 89, fig. 1A–C (1993).

Leaves deeply lobed to half or more of lamina depth. Involucre bracts usually remaining erect and appressed to capitulum, with indumentum usually \pm appressed. Fig. 86 I.

Found in Qld and NE N.S.W., on the western slopes of the Great Dividing Ra. An ephemeral plant found in *Eucalyptus* woodland and *Astrebla* or *Dichanthium* grassland, often on heavier clay soils, frequently over basalt. Flowers and fruits recorded all year round, but with a slight peak in summer.



Qld: Gordonstone Mine site 304, Alpha, *L.Broom* 303 (BRI); 35 km NE of Capella, *R.J.Fensham* 2777 (BRI); 7 miles [c. 11 km] W of Roma, *S.L.Everist* 3517 (BRI). N.S.W.: 16 km S of Yetman, 23 Oct. 1947, *R.Roe* s.n. (NE); Gara R., 14 km E of Armidale, 15 Feb. 1970, *J.B.Williams* s.n. (NE).

2. *Sigesbeckia orientalis* L., *Sp. Pl.* 2: 900 (1753)

T: Habitat in China, Media ad pagos; lecto: the plate: “*Sigesbeckia*” in C.Linnaeus, *Hort. Cliff.* 412, t. 23 (1738), *fide* W.T.Stearn, *Introd. Linnaeus’ Sp. Pl.* (Ray Soc. edn) 47 (1957).

S. microcephala DC., *Prodr.* 5: 496 (1836). T: In Nova Hollandia ex herb. Lambert [*M.Lambert* s.n., 1816]; holo: G-DC, photo seen.

S. gracilis DC., *Prodr.* 5: 496 (1836). T: In Nova Hollandia ex herb. Lambert [*M.Lambert* s.n., 1816]; holo: G-DC, photo seen.

Illustrations: T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 555, fig. 77f (1986); B.M.J.Hussey *et al.*, *Western Weeds* 105 (1997); T.-C.Huang (ed.), *Fl. Taiwan* 2nd edn, 4: 1063, pl. 506 (1998).

Annual erect herbs or subshrubs (0.15–) 0.4–0.8 (–15) m tall, often much branched with reddish stems. Leaves with winged petiole 5–60 mm long; lamina deltoid, broadly lanceolate or lanceolate, (25–) 30–120 (–150) mm long, (10–) 15–90 (–100) mm wide, acute to truncate at base, toothed, with teeth acute to rounded and largest teeth at base, rarely entire, attenuate, scaberrulous on both surfaces, sometimes sparsely glandular. Capitula in loose corymbose panicles, 6–10 mm diam. excluding spreading involucre bracts; involucre bracts usually clavate or narrowly spatulate, 5–10 (–15) mm long, 2–3 times length of florets, densely stalked-glandular; outer paleae green to purplish, coarsely stalked-glandular, enfolding the outer achenes; inner paleae obovate, 3 mm long, membranous, become whitish, flattened. Florets yellow. Ray florets 3–5; ligule c. 1 mm long. Achenes slightly 3- or 4-angled, usually curved, 2–3 mm long, dark brown to purplish black. $2n = 20, 24, 30, 60$, W.L.Wagner *et al.*, *Man. Fl. Pl. Hawai’i*, rev. edn. 357 (1999). *Indian Weed*, *Sticky Beak*. Plate 66; Fig. 86J–L.

Native to warm temperate Asia and Africa. Widespread in N.S.W., Qld, Vic., W.A., and rare in Tas. Naturalised on Norfolk Is. Grows in moist and shady places, particularly on creek and river banks, and in eucalypt woodland, vine forest and the margins of rainforest, on a range of soils, and at altitudes from sealevel to at least 1050 m.

A minor weed of disturbed ground and agricultural systems. Flowers and fruits all months.

W.A.: 8 km NE of Quarry Hill, c. 120 km W of Tom Price, *K.Newbey* 10633 (CANB, K, PERTH). S.A.: Brown Hill Ck, Mitcham, *C.R.Alcock* 944 (AD). Qld: Binna Burra–Coomera Falls Track, Lamington Natl Park, *M.Fagg* 619 (AD, CBG). N.S.W.: Brockelton Ck crossing on Bega to Bermagui road, c. 15 km S of Bermagui, *L.Haegi* 1738 (MEL). Vic.: 1.2 km along track to Blanket Bay, from its intersection with the Cape Otway road, *D.E.Albrecht* 166 (MEL). Tas.: Flinders Is., near Mt Hauland, *J.S.Whinray* 1332 & 1972 (AD, CANB).



Australian regional floras have sometimes called this taxon *S. orientalis* subsp. *orientalis*. The other two subspecies are *S. orientalis* subsp. *glabrescens* (Makino) H.Koyama and *S. orientalis* subsp. *pubescens* (Makino) H.Koyama, both from east Asia (Manchuria to Japan). They are described as differing from subsp. *orientalis* mainly in branching pattern (lacking the sympodial branching of the inflorescence), but recent authors have chosen not to distinguish subspecies in this region (e.g. Peng *et al.*, *op. cit.*, “It is virtually impossible to effectively distinguish *S. orientalis* from *S. glabrescens*”), so there seems little need to name the Australian plants to subspecies either.

This species is clearly distinguished from *S. australiensis* by its involucre bracts, which are 2–3 times the length of the florets, narrowly spatulate or more often clavate, with dense coarse radiating stalked glands, and resemble the linear-spatulate leaves of some *Drosera* species. *Sigesbeckia australiensis* has involucre bracts which are pilose, often eglandular, or if glandular hairs are present, they are sparse, with filiform stalks, and the glands are usually yellow and smaller than those in *S. orientalis*.

Sigesbeckia orientalis has often been considered naturalised in Australia, but if so introduction was probably pre-European. The earliest collection is by Luis Née (Malaspina

Expedition, 1793) from Botany Bay (cited by A.R.Bean, *Austral. Syst. Bot.* 20: 1–43, 2007), and the next by R.Brown, 1802–1805, from ‘South Coast’ (possibly Mt Brown), MEL 643354. Bean (2007) considered this species native in Qld, N.S.W., Vic. and S.A. and naturalised in Tas. and W.A.

Trib. 13. MADIEAE

A.E.Orchard

Asteraceae trib. *Madieae* Jeps., *Fl. W. Calif.* 440 (1901)

Type: *Madia* Molina

Annual herbs (perennial elsewhere), without latex. Leaves opposite below, alternate above. Capitula radiate (often glomerulate elsewhere), paleate (usually in a single series, sometimes fused; sometimes receptacle also setulose). Ray florets female, ligulate and 2- or 3-lobed, yellow. Disc florets bisexual or male, actinomorphic, (4) 5-lobed, yellow; anther appendages oblong to ovate or orbicular; style branches with ovate, subulate or narrowly triangular hairy appendages. Pappus absent (sometimes scales on disc florets elsewhere).

The tribe contains 36 genera and 200+ species, native to the Americas, with 3 genera in Hawai'i, and a few species in Eurasia. In Australia 2 genera were in the past recorded as naturalised, but both may now have been eradicated. Formerly included within tribe Helenieae, *q.v.*

B.G.Baldwin & J.L.Panero, *XXVIII. Tribe Madieae Jepson (1901)*, W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 492–507 (2007); B.G.Baldwin, *Helianthieae alliance*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 689–711 (2009).

KEY TO GENERA

Leaves with eglandular hairs; apex pungent-pointed

1. CENTROMADIA

Leaves glandular-hairy, apex acute or obtuse, but not pungent

2. MADIA

1. CENTROMADIA

A.R.Bean

Centromadia Greene, *Man. Bot. San Francisco* 196 (1894); from the Greek *centro* (spurred) and *Madia*, the name of a related genus. This refers to the spurs or beaks on the achenes.

Type: not designated.

Annual or perennial herbs. Stems erect or procumbent, strongly branched; hairs glandular or eglandular. Leaves simple, opposite below, then alternate, entire or coarsely dentate, pungent-pointed, hairs glandular or eglandular. Inflorescences axillary or terminal, solitary or in small clusters. Capitula sessile, heterogamous; involucre bracts uniseriate, involute, partially enclosing ray achenes; receptacle with persistent scales subtending each disc floret. Ray florets equal in number to involucre bracts, female, ligulate, yellow. Disc florets many, male or bisexual; corolla yellow; anther tips ovate; style branches with short apical appendages. Ray achenes 3-angled, beaked, with pappus absent; disc achenes cylindrical or obconical, with pappus present (not in Australia) or absent.

A genus of 4 species, distributed in western North America from Oregon to Baja Peninsula in Mexico. 1 species recorded as naturalised in Australia.

D.D.Keck, *Hemizonia*, in P.A.Munz (ed.), *California Fl.* 1117–24 (1959); J.C.Hickman (ed.), *Hemizonia*, in *Jepson Manual, Higher Pl. California* 280–5 (1990); B.G.Baldwin, New Combinations and New Genera in the North American Tarweeds (Compositae-Madiinae), *Novon* 9(4): 462–71 (1999).

***Centromadia pungens** (Hook. & Arn.) Greene, *Man. Bot. San Francisco* 196 (1894)

Hartmannia pungens Hook. & Arn., *Bot. Beechey Voy.* 357 (1839); *Hemizonia pungens* (Hook. & Arn.) Torr. & A.Gray, *Fl. N. Amer.* 2: 399 (1843). T: California, U.S.A., 1830–32, *D.Douglas*; ?K n.v.

Annual herb to 100 cm high. Stems with sparse eglandular hairs. Leaves divergent, with eglandular hairs, sessile, apically pungent; upper leaves 3–11 mm long, 0.6–1 mm wide, entire; lower leaves longer and pinnatifid to bipinnatifid. Capitula sessile, hemispherical, in upper axils and terminal, 7–11 mm diam. at anthesis; involucre bracts 15–20, lanceolate, pungent, persistent; receptacle scales pungent. Ray florets 15–20; ligules 3–5 mm long. Disc florets numerous, mostly male; corolla tube 3–3.5 mm long, glabrous; lobes deltate, 0.2–0.3 mm long, glabrous.; anthers c. 1.8 mm long. Achenes 1.5–2 mm long, somewhat rugose, dark brown to black, beaked. *Common Spikeweed*.

Native to western U.S.A., from Washington state to southern California. Recorded as naturalised from two N.S.W. locations early last century. Flowers and fruits Mar.–May.

N.S.W.: Avendale Dairy, Orange, Mar. 1923, *W.R.Brown* (NSW); Walbundrie Stn, near Culcairn, May 1918, *S.F.Mudge* (NSW).

Probably no longer present in Australia, as not collected or otherwise recorded since 1923.



2. MADIA

A.R.Bean

Madia Molina, *Sag. Stor. Nat. Chili* 136, 354 (1782); name derived from *madi*, the Chilean name for *Madia sativa*.

Type: *M. sativa* Molina

Annual herbs. Stems erect, sparsely to strongly branched, glandular-pubescent. Leaves simple, opposite below, then alternate, entire to slightly toothed. Inflorescence racemose, cymose or paniculate, glandular-hairy. Capitula pedunculate, heterogamous; involucre bracts uniseriate, involute, enclosing ray florets; receptacle with a single row of scales between ray and disk florets. Ray florets equal in number to involucre bracts, female, shortly ligulate, usually yellow. Disc florets (1–) 2–many, male (not in Australia) or bisexual; corolla usually yellow; anthers without appendages; style branches flattened, with short apical appendages. Achenes obovoid, longitudinally striate, glabrous; ray achenes somewhat compressed or 3-angled. Pappus absent. *Tarweeds*.

A genus of 10 species native to western N America (mainly California), with one species (*M. sativa*) also occurring naturally in Chile and Argentina; 1 species naturalised in Australia.

D.D.Keck, *Madia*, in P.A.Munz (ed.), *California Fl.* 1113–7 (1959); E.Zardini, *Madia sativa* Mol. (Asteraceae-Heliantheae-Madiinae): An Ethnobotanical and Geographical Disjunct, *Econ. Bot.* 46: 34–44 (1992); J.C.Hickman (ed.), *Madia*, in *Jepson Manual, Higher Pl. California* 310–4, 317 (1990).

****Madia sativa*** Molina, *Sag. Stor. Nat. Chili* 136, 354 (1782)

T: Chile; *n.v.*

Herb to 120 cm high. Stems with copious sticky glandular hairs. Leaves linear to lanceolate, sessile, 20–130 mm long, 4–12 mm wide, entire, acute, with sparse to dense glandular hairs. Capitula terminal or axillary, in dense clusters, 5–10 mm diam. at anthesis; involucre bracts 6–9, elliptic, 7–9 mm long, with blunt apex, folded around ray florets; receptacle scales strongly fused into a cup. Ray florets 6–9. Disc florets 7–14, bisexual; corolla tube 1.7–2.8 mm long, with dense eglandular hairs; lobes deltate to lanceolate, 0.2–0.4 mm long, glabrous; anthers c. 0.8 mm long. Achenes 3.5–5 mm long, brown to black; beak absent. *Tarweed*, *Pitchweed*.

Indigenous from Alaska to Baja Penin., Mexico, also Chile and Argentina. Recorded as naturalised in central and southern N.S.W., Vic. and W.A. Flowers and fruits Oct.–Mar.

W.A.: Shark Bay, Oct. 1877, *F.Mueller* (MEL). N.S.W.: “Tunbridge Wells”, Four Mile Ck, Jan. 1888, *B.Auld* (NSW); Tumut, Mar. 1922, *C.C.Redford* (NSW). Vic.: Barwon Downs, Mar. 1914, *E.Cullahan* (MEL); Kyneton, 1871, *M.H.Mitchell* (MEL).

This species was once cultivated as a seed-oil crop in S America and some parts of Europe and Africa. It is almost certainly no longer present in W.A. and probably eradicated in Vic., while in N.S.W. there has been only one herbarium collection since 1953.



Trib. 14. EUPATORIEAE

A.E.Orchard

(*Authors of genera as indicated*)

Asteraceae trib. *Eupatorieae* Cass., *J. Phys. Chim. Hist. Nat. Arts* 88: 202 (1819)

Type: *Eupatorium* L.

Annual or perennial herbs, subshrubs, scramblers or small trees, without latex. Leaves usually opposite or whorled (rarely alternate). Capitula discoid; corollas actinomorphic, white to red or lavender, never yellow; anther appendages hollow or poorly developed; style branches with enlarged protruding clavate appendages. Pappus usually of bristles, usually persistent.

A tribe of c. 180 genera and over 2000 species, mainly from the Americas. Nine genera and 15 species in Australia, all but one genus (two species) naturalised.

Other diagnostic features of the tribe (*vide* Robinson *et al.*, 2009) are: the presence of mono-ester type pyrrolizidine alkaloids secreted by nectaries, and pentayne acetylenes, some monoterpenes and sesquiterpene lactones, an ent-kaurine diterpene glycoside, kolavane derivatives, chromenes, benzofurans; raphides in the achenes completely lacking.

The genera in this treatment are arranged according to King & Robinson (1987) as modified in Robinson *et al.* (2009).

R.M.King & H.Robinson, The genera of Eupatorieae (Asteraceae), *Monogr. Syst. Bot. Missouri Bot. Gard.* 22 (1987); K.Bremer *et al.*, *Tribe Eupatorieae*, in K.Bremer (ed.), *Asteraceae: Cladistics and Classification* 625–680 (1994); D.J.N.Hind & H.Robinson, *XXX. Tribe Eupatorieae* Cass. (1819), in J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 510–575 (2007); H.Robinson, E.Schilling & J.L.Panero, *Eupatorieae*, in V.A.Funk *et al.* (eds), *Syst., Evol. Biogeogr. Compositae* 731–744 (2009).

ASTERACEAE

KEY TO GENERA

- | | |
|---|--|
| <p>1 Pappus absent</p> <p>1: Pappus present, of bristles or scales, or a mixture of both</p> <p>2 Pappus of 5 scales</p> <p>2: Pappus of bristles, or of 3 bristles alternating with 3 scales</p> <p>3 Pappus of 3 bristles alternating with 3 scales</p> <p>3: Pappus of bristles</p> <p>4 Pappus bristles 3–5, short, with a sticky brown gland at tip</p> <p>4: Pappus bristles 5–numerous, barbellate or almost smooth, lacking a sticky gland at tip</p> <p>5 Vines</p> <p>6 Florets 4 per capitulum; vine climbing to 6 m</p> <p>6: Florets 20–35 per capitulum; vine climbing to 10 m</p> <p>5: Herbs or subshrubs, not climbing</p> <p>7 Involucral bracts in 1 or 2 (rarely 3) series, persistent at maturity</p> <p>8 Involucral bracts all approximately equal in length; pappus bristles 5–15</p> <p>8: Involucral bracts unequal, pappus bristles 25–40</p> <p>7: Involucral bracts in 3 or more series, deciduous at maturity</p> <p>9 Leaf lamina sparsely hairy above, more densely hairy below; receptacle flat to slightly convex with carpodium symmetrical, (achene borne terminally); involucral bracts in 4–7 series</p> <p>9: Leaf lamina hirsute and gland-dotted on both surfaces; receptacle conical with carpodium asymmetrical (achene borne laterally); involucral bracts in 4 or 5 series</p> | <p>9. GYMNOCORONIS</p>
<p>4. AGERATUM</p>
<p>2. STEVIA</p>
<p>8. ADENOSTEMMA</p>
<p>3. MIKANIA</p> <p>5. CHROMOLAENA</p>
<p>1. AGERATINA</p> <p>7. EUPATORIUM</p>
<p>5. CHROMOLAENA</p> <p>6. PRAXELIS</p> |
|---|--|

1. AGERATINA

A.E.Orchard, E.W.Cross & R.J.Bayer

Ageratina Spach, *Hist. Nat. Vég.* 10: 286 (1841); from the generic name *Ageratum* with the suffix *-ina*, indicating a resemblance to that genus.

Type: *A. aromatica* (L.) Spach

Perennial herbs or shrubs. Leaves opposite (elsewhere rarely alternate), petiolate, simple, entire to lobed. Inflorescence of heads in loose to dense terminal or axillary corymbs. Capitula homogamous, ±campanulate; involucral bracts herbaceous, numerous, subequal, in 1 or 2 (rarely 3) series, slightly imbricate, free to base; receptacle convex, naked (lacking paleae) or sometimes with minute hairs. Disc florets bisexual; corolla funnel-shaped with a slender lower portion, 4- or 5-lobed, glabrous or hairy, white. Achenes slender, usually 5-ribbed, glabrous, hairy or glandular. Pappus of 5–40 (5–15 in Australian spp.) scabrid bristles, easily deciduous.

A New World genus of c. 240 species. Three species are naturalised in Australia.

Ageratina adenophora and *A. riparia* are members of subg. *Ageratina* and both apparently triploid apomicts, while *A. ligustrina* is a member of subg. *Neogreenella* and a diploid species (King & Robinson, 1987).

Ageratina has been relatively recently separated from the Old World genus *Eupatorium* L. It was treated as *Eupatorium* in Australian floras up until the late 1980s.

R.M.King & H.Robinson, Studies in the Compositae-Eupatorieae, 11. Typification of genera, *Sida* 3: 330 (1967); R.M.King & H.Robinson, Studies in the Eupatorieae (Compositae). XIX. New combinations in *Ageratina*, *Phytologia* 19: 211–229 (1970); B.A.Auld, The introduction of *Eupatorium* species to Australia, *J. Austral. Inst. Agric. Sci.* 43: 146 (1977); B.A.Auld & P.M.Martin, The autecology of *Eupatorium adenophorum* Spreng. in Australia, *Weed Res.* 15: 27–31 (1975).

1 Perennial herbs or shrubs, rarely more than 1 m tall; stems pubescent; leaf lamina with at least some hairs, particularly on veins; involucre bracts 3–4 mm long, 1–3-veined

2 Leaves deltoid to rhombic (rarely ovate); young stems and inflorescence densely glandular-pubescent; achenes glabrous

1. *A. adenophora*

2: Leaves lanceolate to narrowly lanceolate or narrowly ovate; young stems and inflorescence pubescent but not glandular; achenes setulose on ribs

2. *A. riparia*

1: Shrubs to 2.5 m tall; stems glabrous; leaf lamina glabrous; involucre bracts 4–5 mm long, with veins obscure (achenes sparsely setulose on ribs)

3. *A. ligustrina*

1. **Ageratina adenophora* (Spreng.) R.M.King & H.Rob., *Phytologia* 19: 211 (1970)

Eupatorium adenophorum Spreng., *Syst. Veg.* 3: 420 (1826). T: Mexico; holo: ?P n.v.

Illustrations: R.A.Buchanan, *Common Weeds Sydney Bushland* 58, fig. 23 (1981); J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 3: 1639, fig. 749 (1986); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds Australia* 240–241 (1992).

Herb or sometimes a subshrub, with a short rootstock, normally 0.5–1 (–2) m tall; stems erect or decumbent, fleshy, brittle, purplish, densely glandular-pubescent in upper parts. Leaves with petioles 10–50 mm long; lamina deltoid to rhombic (rarely ovate), 30–120 mm long, 15–70 (–100) mm wide, obtusely cuneate to truncate at base, coarsely crenate to serrate, shortly glandular-pubescent on abaxial veins, ±glabrous adaxially, discolorous. Capitula 4–8 mm diam., numerous, in erect, dense, terminal corymbs; involucre bracts in 2 or 3 series, narrowly elliptic to lanceolate, 3–4 mm long, glandular, 2- or 3-veined. Corollas 3–4 mm long. Achenes c. 1.5–2.5 mm long, 5-ribbed, glabrous, dark grey or black. Pappus bristles 5–10, 3–4 mm long, scabrid. *Crofton Weed*. Plate 67; Fig. 87A–D.

A Central American species now widely naturalised in tropical and subtropical regions, including India, Africa, SE Asia and the Pacific. In Australia naturalised and invading open areas mainly E of the Dividing Ra. in SE and N Qld, and N.S.W., and (sparingly) in S.A. (Adelaide Hills and Mt Gambier) and Vic. (Melbourne metropolitan area). Also naturalised on Lord Howe Is. A major weed of natural and agricultural land, growing in disturbed moist sites on fertile soils in a wide range of communities, including foreshore shrubberies, grassy pastures, open *Eucalyptus* or heathy woodland, swamp woodland and rainforest margins, on soils ranging from sand to loam, peat or clay, from near sealevel to 900 m altitude. Flowers Aug.–Nov.; fruits Sept.–Dec. Seedlings have been collected in May.

S.A.: Waterfall Gully, City Council Res., adjoining NW end of Cleland Natl Park, *C.R.Alcock* 3786 (AD, BRI, CANB, MEL). Qld: 3.5 km E of Canungra, *A.R.Bean* 7862 (BRI, MEL). N.S.W.: Woolloomooloo, NW from the intersection of Lincoln Cres. and the Cahill Expressway exit, *I.C.Clarke* 2064 (MEL); Nattai R. crossing of Hume Freeway, near Mittagong, *L.A.Craven* & *P.B.Heenan* 10130 (CANB). Vic.: Domain Rd, South Yarra, *D.A.Cooke* 264 (CANB, MEL).

The dense gland-tipped hairs giving terminal stems and the inflorescence a sticky consistency are diagnostic, but the hairs on the lower stems may lack the glandular tips. First-formed leaves on new shoots may lack the distinctive truncate bases of mature middle-ranking leaves, and be almost acute at base.

This species is a declared noxious weed in parts of N.S.W. and Qld. Cattle find it unpalatable, sheep and goats eat it without ill effect, but it is poisonous to horses, giving rise to the fatal Numinbah disease or Tallebudgera horse disease (S.L.Everist, *Poisonous Pl.*



Australia 167–169 (1981)). For the history of its introduction and spread see Parsons & Cuthbertson, *loc. cit.*

2. **Ageratina riparia* (Regel) R.M.King & H.Rob., *Phytologia* 19: 216 (1970)

Eupatorium riparium Regel, *Gartenflora* 15: 324, t. 525 (1866). T: cultivated; holo: ?LE n.v.

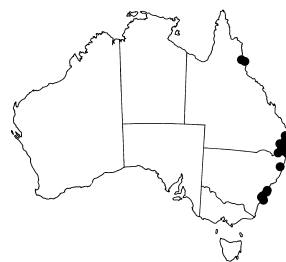
Illustrations: R.A.Buchanan, *Common Weeds Sydney Bushland* 60, fig. 24 (1981); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 506, fig. 70G (1986); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds Australia* 243–244 (1992).

Herb or subshrub, 0.3–1 m tall; stems erect or sprawling, spreading-prostrate in lower parts, rooting at nodes, purplish, sparsely to densely pubescent, not glandular. Leaves with petioles to 15 mm long; lamina lanceolate to narrowly lanceolate or narrowly ovate, 30–120 mm long, 8–30 mm wide, cuneate-attenuate at base, coarsely serrate, glabrescent to sparsely short-pilose, especially on abaxial veins, slightly discolorous. Capitula 3–6 mm diam., numerous, grouped in terminal and sometimes axillary loose corymbs; involucre bracts in 2 series, narrowly lanceolate, 3–4 mm long, puberulent, sparsely short-pilose, not glandular, 1- or 2-veined. Corollas 3–5 mm long. Achenes 1.5–2 mm long, 5-ribbed, setulose on ribs, black. Pappus bristles c. 10, 3–4 mm long, scabrid. *Mistflower, Creeping Crofton Weed*. Fig. 87E.

A Mexican species widely naturalised in tropical and subtropical areas worldwide. In Australia naturalised mainly east of the Dividing Range in SE and N Qld and eastern N.S.W. Also naturalised on Norfolk Is. A serious weed in native ecosystems and a minor problem in agricultural land: a declared noxious weed in parts of N.S.W. and Qld. Found in damp sites in a wide range of communities, from rainforest margins, vine thickets, dry or wet *Eucalyptus* woodland, along creek banks (and even in shallow water), in coastal shrubberies and in grassy pastures, from near sealevel to 1210 m altitude. Flowers July–Oct. (–Nov.); fruits Aug.–Oct. (–Nov.).

Qld: Christmas Ck, *P.I.Forster 17684* (BRI, CANB, MEL, NSW); State Forest Res. 194, Western, Compartment 55, *B.Hyland 14478* (QRS); Tamborine Mtn, *W.T.Jones 3234* (CANB). N.S.W.: New England Natl Park, 10 m NW of Bellinger R., 500 m SW of Dardenelles Bridge, *L.M.Copeland 1823* (NE); Abrahams Bosom Res., Currarong, Jervis Bay, *R.O.Makinson 810 et al.* (CANB, NE).

Adenophora riparia was introduced to many parts of the world as an ornamental in the 19th century, and has become an invasive weed throughout Africa, India, N America, SE Asia, Australasia and New Zealand. It may be toxic to stock but this is still to be proven (Parsons & Cuthbertson, *loc. cit.*).



3. **Ageratina ligustrina* (DC.) R.M.King & H.Rob., *Phytologia* 19: 223 (1970)

Eupatorium ligustrinum DC., *Prodr.* 5: 181 (1836). T: in Mexico ad Tamaulipas legit cl. *Berlandier*: syn: G-DC, 2 sheets, photos seen.

Shrub to 2.5 m tall; stems erect, green to purple, glabrous. Leaves with petioles 15 mm long; lamina lanceolate to narrowly ovate, 70–90 mm long, 25–30 mm wide, attenuate basally, subentire with a few very shallow teeth, glabrous, not markedly discolorous. Capitula 5–7 mm diam., numerous, in erect terminal subumbelliform cymes; involucre bracts in c. 2 series, narrowly lanceolate, 4–5 mm long, almost glabrous, with veins obscure. Corollas 6 mm long. Achenes 5-ribbed, 2.5 mm long, sparsely setulose on ribs, otherwise glabrous, black. Pappus bristles 12–15, almost smooth, 3 mm long.

Native to Central America (Mexico, Guatemala, El Salvador and Costa Rica). In Australia one naturalised population known from near Sherbrooke, Vic. Possibly a fairly recent garden escape, spreading by suckers, and persistent since at least 1997. Flowers and fruits May–Oct.

Vic.: 80 m N of E end of Jacka St, Sherbrooke, *J.C.Reid 2237* (MEL); *loc. cit.*, *Cochrane 959 et al.* (MEL).



ASTERACEAE

2. STEVIA

A.E.Orchard, E.W.Cross & R.J.Bayer

Stevia Cav., *Icon.* 4: 32 (1797); named in honour of Petri Iacobi Stevii (Steve or Esteve), a medical practitioner and botany professor of Valencia, Spain, in the mid 16th century.

Type: *S. serrata* Cav.

Annual or perennial herbs or small shrubs. Leaves opposite (rarely in whorls of 3), becoming alternate above, sessile or petiolate, simple (lanceolate to linear) or pinnate, entire or toothed at apex. Inflorescence of heads in terminal congested panicles or corymbs. Capitula homogamous, cylindrical; involucre bracts herbaceous, 5, equal to subequal, in 1 series, \pm imbricate, free to base; receptacle flat, naked (lacking paleae). Disc florets bisexual; corolla tubular, 5-toothed, usually hairy, white, pink or lavender to purple. Achenes cylindrical to clavate, 4- or 5-angular. Pappus variable: a jagged cup, fused scales, and/or bristles.

A genus of c. 230 species widely distributed from the southwestern U.S.A. through Mexico and Central America to non-Amazonian S America, southward to central Argentina. In Australia 1 species is naturalised.

The genus is noted for the shrub *Stevia rebaudiana* (Bertoni) Bertoni, *Stevia*, *Sweetleaf* or *Sugar leaf*, native to Paraguay and Brazil, which contains the glycosides stevioside, rebaudioside-A and -D and other compounds which are many times sweeter than sucrose. The leaves are used to produce a sugar substitute, particularly in China, Japan and India, and it has been proposed as a new crop for Australia (T.Lester, *Stevia rebaudiana* (Sweet Honey Leaf). *Austral New Crops Newslett.* 11, article 16.1 (1999); N.W.Megeji *et al.*, Introducing *Stevia rebaudiana*, a natural zero-calorie sweetener, *Curr. Sci.* 88: 801–804 (2005)).

****Stevia eupatoria* (Spreng.) Willd., *Sp. Pl.* 3: 1775 (1803)**

Mustelia eupatoria Spreng., *Bot. Gart. Halle, Erster Nachtrag* 28 (1801). T: not designated.

Illustrations: B.A.Auld & R.W.Medd, *Weeds* 117 (1987); W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds Australia* 310 (1992); G.J.Harden (ed.) *Fl. New South Wales* 3: 150 (1992).

Perennial herb, 0.4–0.7 m high, rhizomatous; stems rounded, moderately to sparsely hairy, glandular. Leaves mostly opposite, sometimes in whorls of 3 or alternate, \pm sessile, lanceolate, 12–23 mm long, 3–6 mm wide, entire, acute; both surfaces with a few glandular hairs, gland-dotted. Capitula 1.5–3 mm diam., in terminal corymbs; involucre bracts oblanceolate, 5–6 mm long, acute. Florets 4 or 5 per head, c. 10 mm long, white or pinkish. Achenes 3–4 mm long, dark brown to black, striate, with occasional short hairs. Pappus of 3 minutely barbellate bristles 5–6 mm long, alternating with 3 short ovate hyaline scales. *Kempton's Weed.* Fig. 87F–G.

A native of Mexico. Naturalised and a weed in pasture land of the northern tablelands of N.S.W., on red volcanic soils. Flowers Jan.–May; fruits Mar.–May.

N.S.W.: G.Kempton's property, Red Ra., 16 Mar. 1971, *K.E.Chaffey s.n.* (NSW); Red Ra., 15 miles [24 km] E of Glen Innes, 5 May 1966, *K.Green s.n.* (BRI); Red Ra. (E of Glen Innes), 25 Mar. 1965, *G.M.Kempton s.n.* (NSW); Red Ra., Glen Innes district, 20 Mar. 1979, *D.Randall s.n.* (NE); Glen Innes, Jan. 1933, *G.Sparks s.n.* (BRI, NSW).

Stevia eupatoria is a resilient weed of pastures and cultivation, difficult to control because of its deep rhizomes and limited susceptibility to herbicides (Parsons & Cuthbertson, *loc. cit.*).



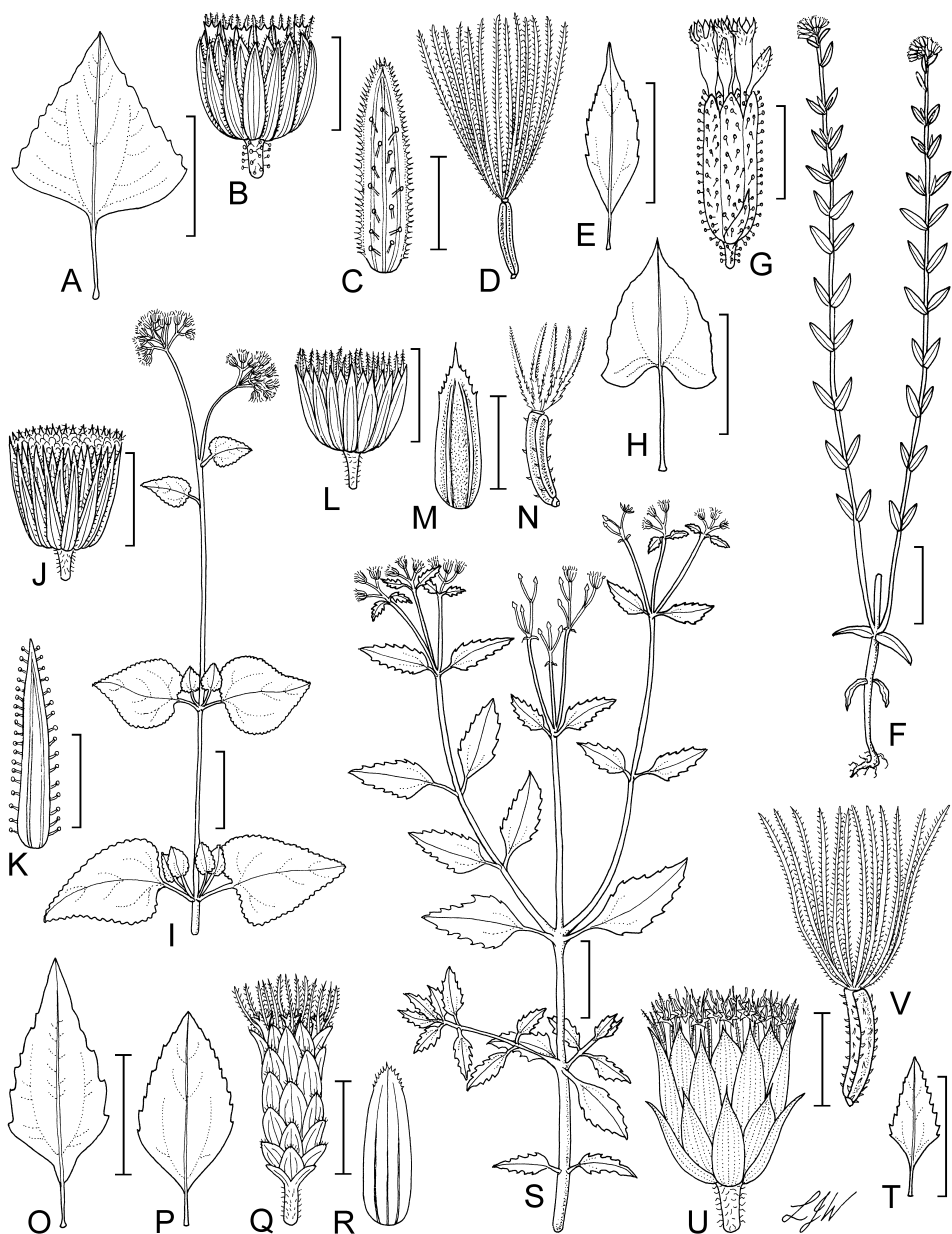


Figure 87. A–D, *Ageratina adenophora*. A, leaf; B, capitulum; C, involucre bract; D, achene (A–C, R.J.Bates 35583, AD; D, R.J.Bates 30991, AD). E, *A. riparia*, leaf (V.Jaegerman 315, AD). F, G, *Stevia eupatoria*. F, habit; G, capitulum (F, G, D.Randall s.n., NE40254). H, *Mikania micrantha*, leaf (B.M.Waterhouse 4883, BRI). I–K, *Ageratum houstonianum*. I, habit; J, involucre bract; K, capitulum (I–K, C.R.Alcock 4435, AD). L–N, *A. conyzoides* subsp. *conyzoides*. L, capitulum; M, involucre bract; N, achene (L, M, C.R.Alcock 8633, AD; N, A.A.Munir 6218, AD). O, *Chromolaena odorata*, leaf (J.Ready s.n., BRI AQ558184). P–R, *C. squalida*. P, leaf; Q, capitulum; R, involucre bract (P–R, B.M.Waterhouse 6085, CANB). S–V, *Praxelis clematidea*. S, habit; T, leaf; U, capitulum; V, achene (S–V, B.M.Waterhouse 6615, CANB). Scale bars: A, E, H, O, P, T = 50 mm; B, G, J, L, Q, U = 4 mm; C, D, K, M, N, R, V = 2 mm; F, I, S = 40 mm. Drawn by L.J.Waters.

ASTERACEAE

3. MIKANIA

A.E.Orchard

Mikania Willd., *Sp. Pl.* 3: 1742 (1803); named in honour of Joseph Gottfried Mikan, 1743–1814, botanist and professor at the University of Prague.

Type: *M. scandens* (L.) Willd.

Scandent herbs, shrubs or woody vines. Leaves opposite or in whorls of 3 or 4, petiolate, simple, dentate to subentire. Inflorescence a dense terminal or axillary corymbose panicle with sub-corymbose branches. Capitula homogamous, of 4 florets, cylindrical; involucre bracts ± herbaceous, subequal, 4, free, imbricate, with 1 smaller subtending bract at base; receptacle flat, naked (lacking paleae). Disc florets 4, bisexual; corolla tubular-campanulate, 5-lobed, glabrous or variously hairy, white or pink. Achenes slender, 4–10 ribbed, glabrous or glandular. Pappus of numerous slender scabrid bristles in 1 or 2 series.

A pantropical genus of c. 430 species. One weedy species has been naturalised in Australia, and is the subject of a national eradication scheme.

B.L.Robinson, *Mikania scandens* and near relatives, *Contr. Gray Herb.* 104: 55–71 (1934); J.T.Koster, The Compositae of the Malay Archipelago. I. Vernoniae and Eupatorieae, *Blumea* 1(3): 503–511 (1935); L.G.Holm *et al.*, *Mikania cordata*, *Mikania scandens* & *M. micrantha*, *World's Worst Weeds* 320–327 (1977); W.C.Holmes, Revision of the Old World *Mikania* (Compositae), *Bot. Jahrb. Syst.* 103: 211–246 (1982); B.M.Waterhouse, Know your enemy: recent records of potentially serious weeds in northern Australia, Papua New Guinea and Papua (Indonesia), *Telopea* 10: 477–485 (2003).

****Mikania micrantha* Kunth** in F.W.H.A.Humboldt, A.J.A.Bonpland & S.Kunth, *Nov. Gen. Sp.* Folio edn, 4: 105 (1818)

T: [Venezuela] prope Caripe Cumanensium, *F.W.H.A.Humboldt & A.J.A.Bonpland*; holo: P n.v., *fide* R.M.King & H.Robinson, *Ann. Missouri Bot. Gard.* 62: 975–976 (1975).

Illustrations: W.C.Holmes, *Bot. Jahrb. Syst.* 103: 235, fig. 10 (1982); A.C.Smith, *Fl. Vitiensis Nova* 5: 299 (1991); D.J.Du Puy *et al.*, *Fl. Australia* 50: 328, fig. 60; 412, fig. 87A–B (1993).

Branched herbaceous to semi-woody vine to 6 m. Stems slender, terete to hexagonal, sparsely pubescent to glabrous, rooting at nodes. Leaves opposite; petiole 1–8 cm long; lamina ovate-deltoid, 3–13 cm long, 2–9 cm wide, cordate at base, entire to dentate, acuminate, trinerved, glabrous or sparsely glandular. Capitula in a mainly terminal corymbose panicle; peduncles 2–4 mm long; involucre narrow-campanulate; bracts in 2 series, oblong to obovate, 2–4 mm long, acuminate, glabrous to puberulous. Corolla c. 3 mm long, white. Achenes black, narrowly oblanceolate-oblong, c. 1.5–3.5 mm long, 4- or 5-ribbed, glandular, glabrous, or shortly scabrous on ribs. Pappus of elongated, erect, white scabrid bristles 2–4 mm long, persistent and shortly fused basally. *Mile-a-minute*, *Bittervine*, *Chinese Creeper*, *American Rope*, *Climbing Hemp Vine*. Plate 72; Fig. 87H.

A native of wet tropical N America (excluding U.S.A.) and S America to northern Argentina, introduced to Ascension Is., SE Asia, Malaysia, Sri Lanka, India, Indian Ocean, Hong Kong and the Pacific. In Australia naturalised on Christmas Is. and several small populations have been discovered in NE Qld. Flowers June; fruits June–July; plants sterile in Sept.–Nov.

Qld: Ingham airport, 7 Nov. 2001, *P.Horrocks s.n.* (BRI); towards western end of Boyett Rd, Mission Beach, *B.M.Waterhouse 4888* (BRI); 48 Wattle St, Forrest Beach, 17 km E of Ingham, *B.M.Waterhouse 4889* (BRI); Rosebud Farm, Douglas Track, Speerwah, *B.M.Waterhouse 6288* (BRI).



In Hawai'i the species is used for therapeutic purposes with the macerated plant being applied to wounds, insect stings and skin irritations (A.C.Smith, *Fl. Vitiensis Nova* 5: 299 (1991)). It has been occasionally grown in Qld as a medicinal herb.

Old World taxa were treated as part of the *M. scandens* (L.) Willd. complex, until B.L.Robinson (1934) restricted the name *M. scandens* to U.S.A. plants. Subsequently the Old World taxa widely assumed the name *M. cordata* (Burm.f.) B.L.Rob. Both of these names may have been applied to Australian plants. Holmes (1982) revised this Old World complex, recognising nine species, only one of which, *M. micrantha*, is widely adventive. It is this taxon which has been introduced to Australia and is the subject of a national eradication project. *Mikania micrantha* and, as a precautionary measure, the similar *M. scandens*, *M. cordata* and *M. dentata* Spreng. (the last not a currently recognised species name), are listed as noxious weeds and their import prohibited (see Noxious Weeds List for Australian States and Territories (<http://www.weeds.org.au/docs/weednet6.pdf>, version 26b.00, updated June 2012). There is no evidence that any taxon except *M. micrantha* has ever been naturalised in Australia.

Mikania micrantha is an extremely invasive weed, spreading via seed and vegetatively. An illustrated weed fact sheet is available at http://www.daff.qld.gov.au/__data/assets/pdf_file/0011/75539/IPA-Mikania-Vine-PP143.pdf, accessed 24 Feb. 2014.

A summary of efforts at biological control is given by M.J.W.Cock *et al.*, pp. 155–167 in N.R.Spencer (ed.), *Proc. X Internatl Symposium Biol. Control Weeds* (2000).

4. AGERATUM

A.E.Orchard, E.W.Cross & R.J.Bayer

Ageratum L., *Sp. Pl.* 2: 839 (1753); *Gen. Pl.* 5th edn, 363 (1754); an ancient Greek name for a plant, presumably derived from *a* (not) and *geras* (old age), possibly because the flowers retain their colour for a long time.

Type: *A. conyzoides* L.

Annual or perennial herbs, sometimes subshrubs. Leaves usually opposite, upper ones sometimes alternate, petiolate, simple, entire to lobed. Inflorescence of heads in terminal, usually dense, paniculate to corymbiform clusters. Capitula homogamous, campanulate to ±globose; involucre bracts ±herbaceous, subequal, numerous, in 2 or 3 series, imbricate, free to base; innermost bracts sometimes persistent; receptacle convex to conical, naked (lacking paleae). Disc florets bisexual; corolla tubular, 5-lobed, glabrous or hairy (at least apically), blue or violet to (rarely) pink or white. Achenes narrowly oblong to obpyramidal, 4- or 5-ribbed, glabrous or sparsely hairy. Pappus of 5–10 free or connate scales (often awn-tipped), sometimes reduced or absent.

A genus of 40–60 species, widespread throughout Central & S America. In Australia, 2 naturalised species, both of which are widespread weeds.

M.F.Johnson, A monograph of the genus *Ageratum* L. (Compositae-Eupatorieae), *Ann. Missouri Bot. Gard.* 58: 6–88 (1971); T.R.Sahu, Taxonomic studies of the genus *Ageratum* L. in India, *Feddes Repert.* 93(1–2): 61–65 (1982); V.S.Sharma, Comments on the identity of *Ageratum conyzoides* L., and *A. houstonianum* Mill. – two naturalised weeds in India, *Feddes Repert.* 98(11–12): 557–560 (1987); E.E.Schilling *et al.*, Chloroplast DNA restriction site data support a narrowed interpretation of *Eupatorium*, *Pl. Syst. Evol.* 219: 209–223 (1999).

Involucre bracts oblong-lanceolate, glabrous or with few scattered non-glandular hairs, with apex short-acuminate to acute and margin erose to fimbriate, rarely entire; capitula 3–7 mm diam.; leaves obtuse at base

1. *A. conyzoides*

Involucre bracts linear-lanceolate, coarsely hairy and glandular-ciliate with apex long-acuminate and margin entire; capitula mostly 6–8 mm diam.; leaves rounded to cordate or truncate at base

2. *A. houstonianum*

1. *Ageratum conyzoides L., Sp. Pl. 2: 839 (1753)**subsp. conyzoides**

T: Habitat in America, *Herb. Clifford 396, Ageratum 1*; lecto: BM 646956, *fide* A.J.C.Grierson in M.D.Dassanayake & F.R.Fosberg (eds), *Revis. Handb. Fl. Ceylon* 1: 141 (1980), but see note below.

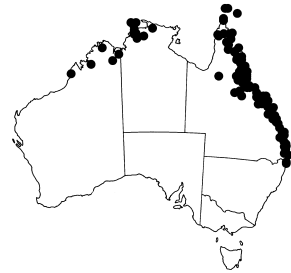
[*Eupatorium cannabinum* auct. non L.: J.H.Maiden, *Proc. Linn. Soc. New South Wales* 45: 566 (1920)]

Illustrations: V.S.Sharma, *Feddes Repert.* 98(11–12): 558, fig. 1 G–L (1987); G.J.Harden (ed.), *Fl. New South Wales* 3: 150 (1992); W.L.Wagner *et al.*, *Man. Fl. Pl. Hawai'i*, rev. edn, 253, t. 14. (1999).

Annual or short lived perennial herb, 0.5–1 m tall, sparsely to densely hairy. Leaves with petiole (5–) 8–80 mm long; lamina ovate, broadly ovate, triangular-ovate or rhombic-ovate, (10–) 30–100 mm long, (5–) 20–70 mm wide, obtuse at base, serrate, crenate or dentate, acute to obtuse, pilose, gland-dotted abaxially. Inflorescence of c. 5–15 heads, in a flat-topped corymb. Capitula \pm globose, 3–7 mm diam.; involucre bracts oblong-lanceolate, 3–5 mm long, erose or dentate (rarely entire), acute or shortly acuminate, glabrous or with a few short hairs especially towards base. Florets bluish to lavender, lilac or mauve, rarely pink and sometimes white. Achenes narrowly oblong, 1.5–2.0 mm long, scaberrulous on ribs or glabrous, black. Pappus scales 5, 2–3 mm long, scarcely connate at extreme base, shortly fimbriate on margins or glabrous, sharply acute to awned, white. *Billygoat Weed*, *Goatweed*, *Nightshade*. Fig. 87L–N.

A native of Mexico, the West Indies and S America. Naturalised in parts of the Kimberley region of W.A., northern N.T., and eastern Qld (predominantly E of the Great Dividing range, and including the Torres Strait Is), rare in coastal northern N.S.W. The species (subspecies not noted) is also naturalised on Norfolk, Lord Howe and Christmas Is. A major weed of natural and agricultural systems, found in disturbed sites, often in damp places, along creek and river banks, roadsides, in cultivated crops and on rainforest margins. Flowers and fruits all months, with a peak Mar.–Aug.

W.A.: Kachana Stn HS, SW of Kununurra, *A.A.Mitchell 5563* (PERTH). N.T.: 5 km S of Darwin River Dam, *G.J.Leach 2687 & C.R.Dunlop* (DNA). Qld: McIlwraith Ra., Timber Reserve 9, Lankelly Ck, end of track, *P.I.Forster 10340 & M.C.Tucker* (BRI); Black Mountain Rd, Kuranda, adjacent to Harris Park, *B.M.Waterhouse 3374* (BRI, MEL). N.S.W.: 16 miles [c. 26 km] from Lismore toward Ballina, 17 July 1966, *A.Richards s.n.* (CBG).



Problems with the lectotype were discussed by F.R.Barrie *et al.*, *Taxon* 41: 510–511 (1992).

Only the pantropical *A. conyzoides* subsp. *conyzoides* (a tetraploid, $2n = 40$) is found in Australasia. The other subspecies, *A. conyzoides* subsp. *latifolium* (Cav.) M.F.Johnson (a diploid, $2n = 20$) is confined to western South America and Central America (*fide* Johnson, 1971, *op. cit.*).

In the past many specimens of *A. conyzoides* var. *conyzoides* in Australia have been misidentified as *A. houstonianum*. The latter is far more restricted in its distribution than some accounts claim. The two taxa are best distinguished on characters of the involucre. *Ageratum conyzoides* has broader involucre bracts which are contracted abruptly into a short acumen or are acute, usually with erose or fimbriate margins, and are glabrous, or sparsely pilose with non-glandular hairs. *Ageratum houstonianum* has narrower involucre bracts, tapering gradually to a long thin tip, with entire margins, and the hairs are denser, with some gland-tipped.

The plant is strong smelling when bruised. It is widely used in folk medicine worldwide.

2. *Ageratum houstonianum Mill., Gard. Dict. edn 8 (1768)

T: Eupatorium herbaceum melissae folio villosum flore coeruleo, Vera Cruz, *W.Houston s.n.*, lecto: BM n.v., *fide* M.F.Johnson, *Ann. Missouri Bot. Gard.* 58: 22 (1971).

A. mexicanum Sweet, *Brit. Fl. Gard.* 1: t. 89 (1825), as *mexicana*. T: Cultivated plant; lecto: the plate, R.Sweet, *loc. cit.*, *fide* M.F.Johnson, *Ann. Missouri Bot. Gard.* 58: 22 (1971).

Illustrations: R.M.King & H.Robinson, *Ann. Missouri Bot. Gard.* 62: 905, fig. 13 (1975); B.A.Auld & R.W.Medda, *Weeds* 82 (1987); V.S.Sharma, *Feddes Rept.* 98: 558, figs 1A–H (1987).

Annual or short-lived perennial herb, erect or decumbent, 0.3–1 m high, softly hairy or nearly glabrous. Leaves with petiole 5–50 (–65) mm long; lamina ovate to deltoid, (10–) 20–90 (–100) mm long, (10–) 15–60 mm wide, rounded to cordate or truncate at base, serrate to crenate, acute to obtuse, with scattered hairs on both surfaces. Inflorescence of 5–15 heads in a compact corymb. Capitula ±globose, 5–8 mm diam.; involucre bracts linear-lanceolate, c. 5 mm long, entire, long-acuminate, coarsely hairy and glandular-ciliate, especially towards tips. Florets blue-mauve. Achenes narrowly oblong, c. 2 mm long, glabrous or sparsely hairy, black. Pappus scales c. 5, 2–3 mm long, free at base, shortly fimbriate on margins or glabrous, awned, white. *Blue Billygoat Weed*. Plate 68; Fig. 87 I–K.

A native of central and southern Mexico, Guatemala and Belize, but widely naturalised worldwide. A major weed of natural and agricultural lands on the northern tablelands and north coast of N.S.W., extending across the border into SE Qld and disjunctly in north Qld. Found particularly in disturbed areas, in damp or swampy situations, on roadsides and riverbanks. Flowers and fruits all months, with a peak about Apr.



Qld: Brisbane, Griffith University Site, Kessels Rd, Mt Gravatt, *P.Sharpe* 806 (BRI). N.S.W.: Bogangar, 15 km S of Tweed Heads, Norries Headland, *G.N.Batianoff* 30 (BRI); Dungaruba Rd towards Wyallah Rd, 2.5 km SW from The Broadwater, *R.G.Coveny* 12942 (BRI, CANB, MEL); Horseshoe Rd, 200 m S of Hercules Rd, New England Natl Park, *L.M.Copeland* 2221 (NE); Ballina, Fishery Ck, Barlows Road Industrial Area, *P.I.Forster* 29319 (BRI).

This plant, with numerous variants under a multitude of infraspecific and cultivar names, has been grown as an annual ornamental bedding plant for over 200 years (see Johnson (1971) for a summary).

For distinguishing characters from the more widespread *A. conyzoides*, see notes under the latter species.

5. CHROMOLAENA

A.E.Orchard, E.W.Cross & R.J.Bayer

Chromolaena DC., *Prodr.* 5: 133 (1836) from the Greek *chroma* (colour) and *laina* (cloak), presumably a reference to the coloured involucre bracts in the type and other species.

Eupatorium sect. *Chromolaena* (DC.) Benth. ex Baker in C.Martius, *Fl. Bras.* 6(2): 275, 300 (1876). T: *C. horminoides* DC.

Eupatorium sect. *Cylindrocephala* DC., *Prodr.* 5: 141 (1836). T: *E. odoratum* L.

Osmia Sch.Bip., *Jahresber. Pollichia* 22–24: 251 (1866); *Eupatorium* sect. *Osmia* (Sch.Bip.) Benth. ex Baker in C.Martius, *Fl. Bras.* 6(2): 275 (1876). T: *E. odoratum* L.

Perennial erect herbs or subshrubs, often subscandent. Leaves opposite, petiolate, simple, entire to coarsely toothed. Inflorescence of heads usually in sub-corymbose axillary and terminal clusters. Capitula homogamous, narrowly cylindrical to cylindrical-campanulate; involucre bracts herbaceous, numerous and overlapping in 4–7 series, progressively lengthening towards florets, free, deciduous at maturity; receptacle elongate, with upper surface flat to convex, usually naked (lacking paleae). Disc florets bisexual; corolla tubular to narrowly funnel-form, 5-lobed, glandular, lavender, pale purple, blue or dull off-white to pale pink. Achenes slender, cylindrical, (3–) 5-ribbed, with bristles on ribs. Pappus of numerous persistent white bristles.

A genus native from the southern U.S.A. to S America (particularly Brazil), with c. 165 species. Two weedy species have been introduced into Australia.

Chromolaena DC. was treated as *Eupatorium* sect. *Cylindrocephala* DC. or *Osmia* Sch.Bip. until resurrected by King & Robinson (1970).

R.M.King & H.Robinson, Studies in the Eupatorieae (Compositae) 28. The genus *Chromolaena*, *Phytologia* 20(3): 196–209 (1970); B.M.Waterhouse, Know your enemy: recent records of potentially serious weeds in northern Australia, Papua New Guinea and Papua (Indonesia), *Telopea* 10: 477–485 (2003).

Petiole 10–30 mm long; leaf lamina deltoid-ovate, 50–150 mm long, 20–60 mm wide; capitula with peduncle 10–30 mm long; involucre 3–5 mm diam.

1. *C. odorata*

Petiole 2–5 mm long; leaf lamina ovate-elliptic, 20–50 mm long, 4–25 mm wide; capitula with peduncle 2–10 mm long; involucre c. 2.5 mm diam.

2. *C. squalida*

1. **Chromolaena odorata* (L.) R.M.King & H.Rob., *Phytologia* 20(3): 204 (1970)

Eupatorium odoratum L., *Syst. Nat.* ed. 10, 2: 1205 (1759). T: [Jamaica]; lecto: '*Eupatoria conyzoides, folio molli & incano, capitulis magnis, americana*' in L.Plukenet, *Phytographia* t. 177, f. 3 (1692), fide R.M.King & H.Robinson in R.E.Woodson & R.W.Schery (eds), *Ann. Missouri Bot. Gard.* 62: 925 (1975).

Illustrations: R.E.Woodson & R.W.Schery (eds), *op. cit.* 926; W.T.Parsons & E.G.Cuthbertson, *Noxious Weeds Australia* 271 (1992); H.Robinson & W.C.Holmes, *Fl. Ecuador* 83: 113, fig. 13 (2008).

Erect or procumbent shrub 2–4 m tall or vine climbing to 10 m; stems terete, strigose-pubescent. Leaves aromatic; petiole 10–30 mm long; lamina deltoid-ovate, 50–150 mm long, 20–60 (–80) mm wide, basally attenuate, serrate or entire in young leaves, acute, discolourous, adaxially sparsely pubescent, abaxially densely pubescent, glandular. Capitula with peduncles 10–30 mm long; involucre (8–) 9–10 mm long, 3–5 mm wide; involucre bracts 4–7-seriate, 2–12 mm long, glabrous to sparsely pubescent, with outer bracts ovate and inner bracts oblong with tips rounded to subacute; paleae absent. Florets 20–35, c. 5–6 mm long; corolla white, mauve, lavender, lilac, pink or purple. Achenes narrowly cylindrical, angular, c. 4 mm long, black, with (3) 4 or 5 white setulose ribs. Pappus bristles c. 5 mm long, fused at base, scabrid. *Siam Weed*. Plate 71; Fig. 87 O.

Endemic to SE U.S.A., Mexico and the West Indies, S to Argentina. It is widely adventive in the tropical and subtropical areas of the world (India, Asia, Africa) and is spreading rapidly through the Pacific region. In Australia recorded as naturalised from Port Douglas S to Townsville in N Qld, but subject to an intense eradication program. Also naturalised on Cocos Is. Found on a range of soils from sand to clay, on coastal dunes, pastures, swampy woodland, river banks and grassland on floodplains, and in disturbed areas such as clearings for powerlines, at altitudes from 0–200 m. Flowers (Jan.–) June–Sept. (–Nov.).



Qld: NE of Double Mtn, *N.Byrnes* 194 (BRI); SFR191, Barron, *B.Hyland* 15379 (QRS); Tirrabella Stn, unnamed seasonal tributary of Herbert R., c. 1.5 km upstream from junction, 1 Sept. 1997, *H.Irwin s.n.* (BRI); Daveson Rd, 1.8 km from corner of Midgere Bar and Bingal Bay roads, *B.M.Waterhouse* 3362 (BRI); southern shore of Tully R., *B.M.Waterhouse* 3366 (BRI, CANB).

This species is toxic to stock, and causes abortions: the toxic element is high nitrate (Parsons & Cuthbertson, *loc. cit.*). It is a proclaimed noxious weed (P1, P2) in Qld.

Its potential for spread was described in R.E.C.McFadyen in C.Zacharides *et al.* (eds), *Proc. 5th Internatl Workshop Biol. Control Manag. Chromolaena odorata* 13–18 (2002). Its history of spread and control was documented by B.H.Waterhouse & O.Zeimer, in the same publication, pp. 29–33.

Two genotypes have been recognized in northern Qld: one form flowers in May–July and in Sept.–Oct. and is a type widespread throughout the native range of *C. odorata*. A second form flowers during Feb.–Mar. and is otherwise known only from southern Brazil.

The swollen taproots appear to contain carbohydrates and have vegetative buds at the apex. In genotype 2 (at least) adventitious roots form at nodes and internodes on trailing stems.

2. **Chromolaena squalida* (DC.) R.M.King & H.Rob., *Phytologia* 20(3): 206 (1970)

Eupatorium squalidum DC., *Prodr.* 5: 142 (1836). T: in Brasiliae prov. Minarum Gener. ad Mariannam, *Vauthier*; holo: Herbar du Bresil, Minas Gerais, Marianne, 1833, *M. Vauthier s.n.*; G-DC, photo seen.

Perennial erect branching herb to subshrub 1.5–2.0 m tall; stems terete, pubescent. Leaves unscented when mature; petiole 2–5 mm long; lamina ovate-elliptic, 20–50 mm long, 4–25 mm wide, basally attenuate-cuneate, serrate or entire, acute, discolorous, adaxially sparsely hairy, abaxially densely tomentose, glandular. Capitula with peduncles 2–10 mm long; involucre 8 mm long, c. 2.5 mm wide; involucre bracts 6-seriate, 2–12 mm long, glabrous, with outer bracts ovate and inner bracts oblong with tips rounded; paleae absent. Florets 15–30, 4–5 mm long; corolla pale pink. Achenes narrowly cylindrical, angular, 3–4 mm long, black, with (3) 4 or 5 white setulous ribs, rugulose. Pappus bristles c. 5 mm long, fused at base, scabrid. Fig. 87P–R.

A native of tropical S America (Brazil and Venezuela), recently discovered in Qld where 2 populations of scattered plants have been recorded near Tully. Flowers (Feb.–) Apr.–Aug.

Qld: Davidson Ck on Tully River Stn, 11 Aug. 1994, *G.Hardwick s.n.* (BRI); Caravan Hill, original occupation site on former 'King Ranch', near Tully, *B.M.Waterhouse 4875* & *O.Zeimer* (BRI, K); *loc. cit.*, *B.M.Waterhouse 6085* (BRI, CANB).



This species is similar to *C. odorata*, but smaller in its stature, leaves and capitula, never becoming a vine, and the mature leaves lack the strong odour of *C. odorata*, although young leaves are reported to sometimes have a smell resembling that of *Praxelis clematidea*. Its weed potential has been recognised and it is under an active eradication program.

6. PRAXELIS

A.E.Orchard, E.W.Cross & R.J.Bayer

Praxelis Cass. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 43: 261 (1826); etymology unknown.

Type: *Praxelis villosa* Cass.

Annual or perennial herbs or undershrubs. Leaves opposite or whorled, sessile or petiolate, simple, entire to coarsely serrate. Inflorescence monocephalic to loosely corymbose. Capitula homogamous, campanulate; involucre bracts herbaceous, 15–25, unequal, in 3–5 indistinct series, imbricate, free to base, deciduous; receptacle conical to ellipsoid, naked. Disc florets bisexual; corolla narrowly funnelform or with cylindrical throat and slightly narrower basal tube, 5-lobed, mostly smooth on outer surface with a few glands, white, blue or lavender; outer lobes of marginal flowers not expanded. Achenes ± flattened, 3- or 4-ribbed, sparsely hairy. Pappus of up to 40 scabrid bristles in 1 series, persistent.

A genus of c. 15 species, native to S America, particularly Brazil. One naturalised species in Australia.

Until recently the genus was included in the Old World genus *Eupatorium* L. The conical receptacle in *Praxelis* means that achenes are attached laterally (although held erect), resulting in an asymmetrical attachment (carpopodium). In the related *Chromolaena* the receptacle is flat to slightly convex and the carpopodium is therefore symmetrical.

R.M.King & H.Robinson, Studies in the Eupatorieae (Compositae) 28. The genus *Praxelis*, *Phytologia* 20: 193–195 (1970); J.F.Veldkamp, *Eupatorium catarium*, a new name for *Eupatorium clematideum* Griseb., *non* Sch.Bip. (Compositae), a South American species naturalised and spreading in SE Asia and Queensland, Australia, *Gard. Bull. Singapore* 51: 119–124 (1999); B.M.Waterhouse, Know your enemy: recent records of potentially serious weeds in northern Australia, Papua New Guinea and Papua (Indonesia), *Telopea* 10: 477–485 (2003).

***Praxelis clematidea** R.M.King & H.Rob., *Phytologia* 20: 194 (1970)

Eupatorium clematideum Griseb., *Abh. Königl. Ges. Wiss. Göttingen* 24: 172 (1879), *nom. illeg., non* Sch.Bip. (1866); *E. catarium* Veldkamp, *Gard. Bull. Singapore* 51: 119–124 (1999). T: *Balansa* 936; syn: ?GOET, ?P n.v.; Lorentz s.n., ‘Cordoba’, syn: ?GOET n.v., *fide* J.F.Veldkamp, *op. cit.* 51: 121.

Illustration: S.Pollock *et al.*, New alien weed for Queensland: *Praxelis*, *Queensland Herbarium Alert Sheet* 1/2004 (2004).

Perennial 0.3–1.2 m tall; stem herbaceous, erect, hirsute. Leaves malodorous, opposite; petiole 3–20 mm long; lamina ovate to rhomboid, 25–60 mm long, 10–40 mm wide, rounded, cuneate or shortly attenuate basally, coarsely serrate, acute, hirsute and gland-dotted on both sides especially abaxially. Inflorescence terminal, of many capitula in dense clusters. Capitula of 25–30 florets; peduncles hirsute, 2–10 mm long; involucre narrowly campanulate, 7–10 mm long; bracts in 4 or 5 series, yellowish with 3–5 green nerves, distally purplish, glabrous to distally appressed-strigose; outer bracts smallest, lanceolate, acuminate; inner bracts linear, acute. Corolla 3.5–4.8 mm long, shortly (4 or) 5-dentate; tube white, purplish blue or lilac at tip (as are style branches). Achenes 2–3 mm long, black, hispidulous. Pappus bristles 15–40, white to golden. *n* = 31, J.F.Veldkamp, *op. cit.*, 121. *Giant Bluetop*. Plate 69; Fig. 87S–V.

A native of Argentina, Brazil, Paraguay and Bolivia that has become a major weed in S China, and in N Qld, from Townsville to Mossman and the Atherton Tablelands. NAQS surveys have recently recorded small infestations at remote sites in Cape York Penin., on many islands in Torres Strait, and it is also known from around Gympie in SE Qld. It is an abundant weed of disturbed roadsides, stream banks, pastures and cultivation, and is also found in relatively undisturbed *Eucalyptus* woodland and on the margins of rainforest and vine thickets, in a wide range of soils, at altitudes of 0–1040 m. Flowers and fruits (Jan.–) Feb.–Aug. (–Nov.).



Qld: Forty Mile Scrub Natl Park, *P.I.Forster* 24223 *et al.* (BRI, K, QRS); Kennedy Hwy near Koah turnoff, c. 27 km E of Mareeba, *B.M.Waterhouse* 3426 (BRI); Southedge Rd, c. 5 km W of Mareeba, *B.M.Waterhouse* 5210 (CANB); Suburb of Quarantine, Thursday Is., Torres Strait, *B.M.Waterhouse* 6123 (BRI, CANB); Townsville High Range Field Training Area, *B.M.Waterhouse* 6185 (BRI, CANB).

Praxelis clematidea was first recorded outside its native range of S Brazil in 1993/1994 when specimens from N Qld and Hong Kong were identified at K. The species had however been present in N Qld for at least a decade but had been misidentified as *Ageratum*. This weed is highly dispersive and adaptable to a wide range of climatic conditions and has the ability to flower in its first season. It currently threatens much of northern Australia, as far south as SE Qld and northern N.S.W., and is also threatening New Guinea, SE Asia and the Pacific Islands. See the website http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/publications/weeds-crc-pubs/wmg/alerts/awmg_praxelis.pdf (accessed 25 January 2013) for its history of introduction, illustrations and control measures.

7. EUPATORIUM

A.E.Orchard, E.W.Cross & R.J.Bayer

Eupatorium L., *Sp. Pl.* 2: 836 (1753); from *Eupator*, king of Pontus (Mithridates VI Eupator, 132–63 B.C.), said by Pliny to have employed one of this group of plants in medicine.

Type: *E. cannabinum* L.

Annual or perennial herbs. Leaves opposite or whorled, with upper leaves subopposite to alternate, sessile or petiolate, simple, entire or trilobed. Inflorescence a corymbose or pyramidal panicle. Capitula homogamous, narrowly cylindrical to campanulate; involucre bracts herbaceous to cartilaginous, 10–22, weakly to strongly subimbricate in 1–5 series,

unequal, usually persistent, free to base; receptacle flat or weakly convex, naked. Disc florets bisexual; corolla narrowly funnelform or with constricted basal tube and narrowly to broadly campanulate limb, 5-lobed, white to purple, lavender or pink; outer surface often glandular at base of throat. Achenes narrowly cylindrical, 5-ribbed, glandular. Pappus of 25–40 scabrous persistent bristles with rounded to short-acute tips, persistent.

A genus of 45 species in N America, Asia and Europe. In Australia 2 species naturalised in Qld.

R.M.King & H.Robinson, *Eupatorium*, a Composite genus of arcto-tertiary distribution, *Taxon* 19: 769–774 (1970); B.A.Auld, The introduction of *Eupatorium* species to Australia, *J. Austral. Inst. Agric. Sci.* 146 (1977); A.Whittemore, The sectional classification of *Eupatorium* (Asteraceae), *Taxon* 36: 618–620 (1987); G.J.Schmidt & E.E.Schilling, Phylogeny and biogeography of *Eupatorium* (Asteraceae: Eupatorieae) based on nuclear ITS sequence data, *Amer. J. Bot.* 87: 716–726 (2000).

Leaves distinctly petiolate; petioles 10–35 mm long; lamina narrowly ovate, 50–140 mm long, 20–50 mm wide

1. *E. serotinum*

Leaves sessile to shortly petiolate; petioles 0–2 mm long; lamina lanceolate to narrowly lanceolate, 40–100 mm long, 5–30 mm wide

2. *E. lindleyanum*

1. **Eupatorium serotinum* Michx., *Fl. Bor.-Amer.* 2: 100 (1803)

T: “hab. in scirpetis Carolinae maritimis”; holo: ?P *n.v.*

Illustrations: H.A.Gleason, *Ill. Fl. NE United States & Canada* 2nd edn, 3: 492 (1958); R.M.King & H.Robinson, *Taxon* 19: 771, figs 7–9 (1970); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 506, fig. 70F (1986).

Rhizomatous clump-forming perennial, to 2 m tall. Stems erect, densely pubescent especially towards branch-tips, ±glandular-punctate. Leaves opposite; petioles 10–35 mm long; lamina narrowly ovate, 50–140 mm long, 20–50 mm wide, rounded, broadly cuneate or ±truncate basally, serrate, acuminate. Corymbs to c. 50 cm wide. Capitula c. 5 mm long; involucre bracts c. 8–12 in 1 or 2 series. Florets white. Achenes c. 1.5 mm long, 5-ribbed, glabrous, black. Pappus bristles numerous, c. 3 mm long, scabrid. Fig. 88C.

A native of the eastern U.S.A. and Mexico. In Australia naturalised near Nerang in SE Qld. Flowering commences Feb.; fruits Apr.

Qld: Nerang, 21 Nov. 1963, *A.Taylor s.n.* (NSW); roadside on southern edge of Nerang, 12 Feb. 1970, *A.J.Tomley s.n.* (BRI); road to sale yards and in the railway property at Nerang, 4 Apr. 1963, *N.A.Gampe s.n.* (BRI).

A garden plant that escaped cultivation in the 1960s, becoming naturalised in a small area near Nerang (Auld, 1977). No collections seen since 1970.



2. **Eupatorium lindleyanum* DC., *Prodr.* 5: 180 (1836)

T: “in Chinae collibus, (v.s. in h. Lindley.)”; holo: CGE? *n.v.*

[*Eupatorium cannabinum* auct. non L.: G.Bentham, *Fl. Austral.* 3: 462 (1867), C.Moore & E.Betche, *Handbook Fl. New South Wales* 261 (1893); J.H.Maiden & E.Betche, *Census New South Wales Pl.* 193 (1916)]

Illustration: T.-C.Huang, *Fl. Taiwan* 2nd edn, 4: 962, pl. 456 (1998).

Rhizomatous perennial to 1.5 m tall. Stems single, branched distally, puberulent. Leaves opposite, sessile to shortly petiolate (petiole to 2 mm long), lanceolate to narrowly lanceolate, 40–100 mm long, 5–30 mm wide, cuneate to lanceolate at base, serrate, sometimes with 2–5 small lateral lobes near base, or 3–5-digitate, acute. Corymbs to 10 cm wide. Capitula 4–5 mm long; involucre bracts c. 10 in 2 series. Florets pink to purple. Achenes 2–3 mm long, 5-ribbed black. Pappus bristles 20–30, 3–5 mm long, scabrid. Fig. 88A–B.

Native to China, Taiwan, Korea, Japan and Philippines. In Australia, recorded from a few old fragmentary specimens from the Tweed R. and the New England tableland of N.S.W., and

recently collected on the Petroi Plateau of the New England tableland, growing in wet, boggy, peaty soil, on granite, in a wet meadow/*Sphagnum* bog, and beside a small stream with *Gleichenia*, *Empodisma* and *Leptospermum polygalifolium* at c. 960 m alt. Flowers Feb.–May; fruits Apr.–May.

N.S.W.: Petroi, Cunnawarra Natl Park, *W.Cherry* 479 & *A.J.Perkins* (CANB, NSW); near Tweed R., [*C.Stuart?*] 50 (MEL); near Dorsays, New England, *C.Stewart* [= *C.Stuart*] 454 (MEL); Clear Ck, Timbarra, *C.Stuart* 477 (MEL); Petroi Plateau, S of New England Natl Park, 5 Feb. 1974, *J.B.Williams s.n.* (NE, NSW).



The name *E. lindleyanum* was applied to a small number of collections from NE N.S.W. by Mueller, *Fragm.* 5: 62 (1865). Two years later Bentham (mis)applied the name *E. cannabinum* to the same group of specimens, and he was followed by several authors. The confusion arose because Candolle described *E. lindleyanum* as having simple leaves, whereas he placed *E. cannabinum* in a group with sometimes divided leaves. However, *E. lindleyanum* can have trifid leaves, and it is clearly distinguished from *E. cannabinum* in its narrower, subglabrous leaves, and most importantly, by their trinerved base (pinnate venation in *E. cannabinum*).

8. ADENOSTEMMA

A.E.Orchard

Adenostemma J.R.Forst. & G.Forst., *Char. Gen. Pl.* 2nd edn, 89, t. 45 (1776); from the Greek *aden* (gland) and *stemma* (a crown), referring to the pappus bristles, which are crowned by a round, or club-shaped gland.

Type: *A. viscosum* J.R.Forst. & G.Forst.

Adenostema N.H.F.Desp. in F.Cuvier, *Dict. Sci. Nat.* 2nd edn, 1: 256 (1816), *orth. var.*

Annual or perennial herbs with leafy stems. Leaves opposite, petiolate, simple, ±entire or toothed. Inflorescence of heads in loose terminal corymbose panicles. Capitula homogamous, campanulate or hemispherical to ±globose; involucre bracts herbaceous, equal, in 2 or 3 series, ±fused at base; receptacle flat, naked. Disc florets bisexual; corolla tubular, 4- or 5-lobed, usually hairy or glandular externally, white or mauve. Achenes obovoid-oblong, plano-convex or 3–5-angled, gland-dotted or tuberculate. Pappus of 3–5 short rigid bristles, each crowned by a round or club-shaped gland.

About 24 to 30 species, occurring in tropical Asia, tropical & subtropical America & Africa; in Australia there are 2 native species, one with 2 varieties.

A.E.Orchard, A review of Australian *Adenostemma* J.R.Forst. & G.Forst. (Asteraceae: Eupatorieae), *Telopea* 341–348 (2011).

Leaves ovate or narrowly ovate, or lanceolate; base acute, tapering gradually to petiole; upper surface dull or slightly shiny when dried, with scattered white cyst-like hair bases; achenes yellow to brownish, densely muricate when mature, glabrous or sparsely glandular

1. *A. lavenia*

Leaves broadly ovate; base truncate to subcordate, then sharply attenuate into petiole; upper surface ±shiny when dried, lacking cyst-like hair bases; achenes black, smooth when mature, glabrous or sparsely glandular

2. *A. macrophyllum*

1. *Adenostemma lavenia* (L.) Kuntze, *Revis. Gen. Pl.* 1: 304 (1891)

Verbesina lavenia L., *Sp. Pl.* 2: 902 (1753). T: Sri Lanka; lecto: the plate, 'Eupatoriophalacron Scrophulariae aquatica foliis oppositis', in J.Burman, *Thes. Zeylan.* 95, Pl. 42 (1737), *fide* G.Panigrahi, *Kew Bull.* 30: 647 (1975).

Annual or short-lived perennial, semi-prostrate or erect, fleshy herb 0.3–1 m tall; stems sparsely hairy at apex. Leaves with petiole 10–70 mm long; lamina lanceolate to narrowly or broadly ovate, 50–160 (–200) mm long, (15–) 30–60 mm wide, acute at base, serrate to crenate, acute, ±glabrous or sparsely hairy along veins on both surfaces; upper surface dull or slightly shiny when dried, with scattered white cyst-like hair bases. Panicles on slender peduncles. Capitula ±globose, 8–10 mm diam.; involucre bracts in 2 series, narrowly oblong to spatulate, 3–4 mm long, rounded, reflexed, pilose becoming ±glabrous with age, with hairs more frequent towards base. Florets white. Achenes plano-convex to 3-angled, ±flattened radially, 2.7–3.5 mm long, muricate, sometimes with sparse glandular hairs, yellow to brownish at maturity. *Sticky-daisy*.

A variable pan-tropical species, found from Africa to the Indian subcontinent, throughout east and southeast Asia, to Indonesia, New Guinea, the Philippines and Pacific, as far as east as Hawai'i. A native of Australia; found in scattered localities from the Kimberley in W.A., northern N.T., and mainly E of the Dividing Ra. in Qld and NE N.S.W. Two varieties are recognised for Australia.

See Orchard (2011) for a discussion of the complex nomenclatural history of this species in the Australian and Asian region.

The distinctive tubercles on the achenes develop from glandular hairs on the ovary. Their development is discussed and illustrated by Koyama, *Mem. Natl. Sci. Mus. (Tokyo)* 37: 159–168 (2001). The fruit dispersal mechanism of an *Adenostemma* sp. from Singapore and Sri Lanka (probably this species) was described by R.H.Yapp, *Ann. Bot.* 20: 311–316, pl. 23 (1906).

Leaves ovate or narrowly ovate, with lamina 50–70 (–120) mm long, (15–) 30–35 (–50) mm wide; capitula c. 8 mm diam.; achenes 2.7–3.0 mm long

1a. var. *lavenia*

Leaves lanceolate to broadly lanceolate, with lamina (75–) 130–160 (–200) mm long, 35–60 mm wide; capitula c. 9–10 mm diam.; achenes (3.0–) 3.3–3.5 mm long

1b. var. *lanceolatum*

1a. *Adenostemma lavenia* (L.) Kuntze var. *lavenia*

A. viscosum J.R.Forst. & G.Forst., *Char. Gen. Pl.* 2nd edn 90 (1776). T: Tahiti, "Adenostemma viscosa (Forster) Habitatus Taheitee (Presented by Corporation of Liverpool)"; lecto: K 9772, photo seen; isolecto: K 9771, photo seen, BM n.v., *fide* G.Panigrahi, *Kew Bull.* 30: 647 (1975).

[*A. latifolium* auct. non D.Don: F.Mueller, *Essay Pl. Coll. Fitzalan Estuary Burdekin* 18 (1860)]

Illustrations: T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 2: 506, fig. 70B (1986); J.R.Wheeler (ed.) *et al.*, *Fl. Kimberley Region* 939, fig. 287B (1992), as *A. viscosum*; J.W.Kadereit & C.Jeffrey (eds), *Fam. Gen. Vasc. Pl.* 8: 519, fig. 107 (2007), as *A. viscosum*.

Annual or perennial herb 60 cm tall; stems rooting at base, glabrous or hairy. Leaves with petiole 7–12 (–15) mm long; lamina ovate or narrowly ovate, 50–70 (–120) mm long, (15–) 30–35 (–50) mm wide; upper surface dull, with scattered white 'cysts' and very short conical hairs, occasional short hairs on veins; lower surface glabrous or with occasional short hairs on main veins. Panicles ±robust. Capitula 8 mm diam.; involucre bracts oblong to spatulate, free to base or slightly fused, ±glabrous except at base. Achenes straight, deltoid, plano-convex or 3-angled, 2.7–3.0 mm long. Fig. 88D.

Reported from Pakistan to Japan and Korea, S to Australia and through the Pacific to Hawai'i. In Australia largely confined to areas east of the Great Dividing Ra., from about Cooktown in Qld to Newcastle in N.S.W., with a few records from the western slopes of the Range, and far eastern N.T. Found in damp spots in cultivated land, and on the edge of rivers and swamps and other watercourses, in alluvial silt, on basalt or granite, at relatively low altitudes from near sealevel. Flowers recorded Jan.–May; fruits Mar.–May.

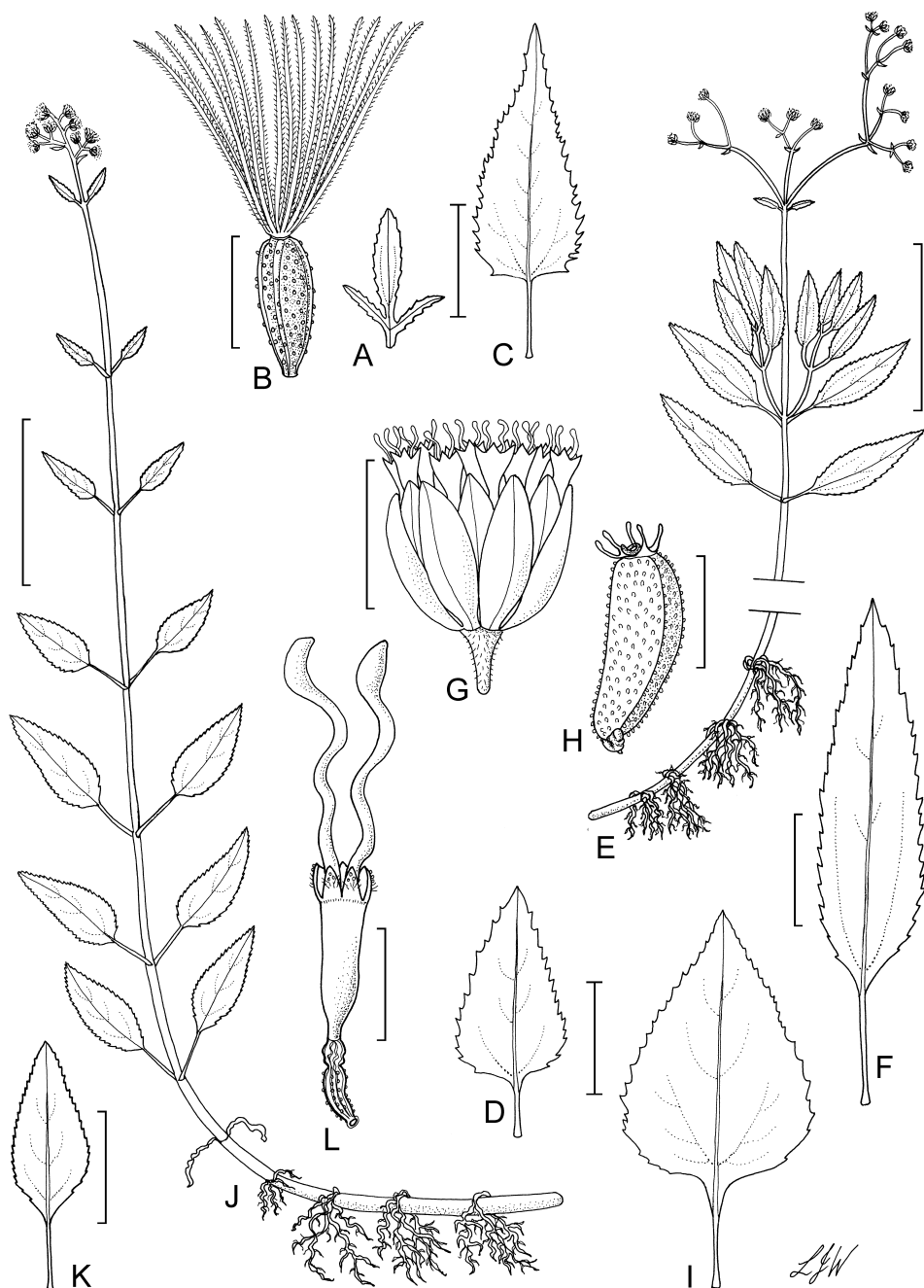


Figure 88. A, B, *Eupatorium lindleyanum*. A, leaf; B, achene (A, B, W.Cherry 479 & A.J.Perkins, CANB). C, *E. serotinum*, leaf (N.A.Gampe s.n., BRI 38286). D, *Adenostemma lavenia* var. *lavenia*, leaf (A.Dietrich 2673, MEL). E–H, *A. lavenia* var. *lanceolatum*. E, habit; F, leaf; G, capitulum; H, achene (E–G, K.F.Kenneally 8739, CANB; H, K.F.Kenneally 10687, CANB). I, *A. macrophyllum*, leaf (R.Jensen 222, QRS). J–L, *Gymnocoronis spilanthoides*. J, habit; K, leaf; L, floret (J–L, K.Stephens s.n., CANB 688377). Scale bars: A, C, D, F, I, K = 50 mm; B, H, L = 2 mm; E, J = 100 mm; G = 5 mm. Drawn by L.J.Waters.

N.T.: Settlement Ck, July 1923, *L.J.Brass s.n.* (CANB). Qld: Port Mackay, *A.Dietrich 2673* (MEL); Daintree Natl Park, Gas Bottle Flat, *P.I.Forster 22742 et al.* (BRI, MEL, QRS). N.S.W.: Lismore, *W.Baeuerlen 168* (CANB, MEL, NSW); Glen Innes, Apr. 1885, *Porter s.n.* (MEL).

There are very few modern collections of this taxon, particularly from N.S.W. Most collections date from the 19th or early 20th century. A collection by Banks and Solander, 1770, New Holland, without locality (MEL 717585, ex BM) is much more robust than more recent collections. It closely resembles two Banks & Solander collections in BM (BM 8210297 and 820298) from Tahiti, 1769, and may be mislabelled. Two records from Settlement Creek and Wollogorang Stn in the Gulf country of the N.T. seem to be this taxon, although sharing some characteristics of var. *lanceolatum*.

The record of '*A. viscosum*' from S.A. in Bentham, *Fl. Austral.* 3: 463 (1866) ("Entrance to the Murray River, Wilhelmi" [1849]) is based on MEL 717573, a collection determined by Mueller as *A. latifolium* D.Don. It is *A. lavenia* var. *lavenia*, and is presumably mislabelled since this pan-tropical taxon does not occur in S.A.



1b. *Adenostemma lavenia* var. *lanceolatum* (Miq.) J.Kost., *Blumea* 1: 474 (1935)

A. lanceolatum Miq., *Fl. Ned. Ind.* 2: 24 (1856). T: [Indonesia] Java, in Soerakarta, *Horsfield; n.v.*

Perennial fleshy herb 50–100 (–120) cm tall; stems rooting at lower nodes, hairy above, glabrescent. Leaves with petiole 10–15 (–40) mm long; lamina lanceolate to broadly lanceolate, (75–) 130–160 (–200) mm long, 35–60 mm wide; upper surface dull to almost shiny, with scattered white 'cysts', occasional hairs on major veins, otherwise glabrous; lower surface glabrous except for a few hairs on major veins. Panicles robust. Capitula 9–10 mm diam.; involucre bracts oblong to broadly spatulate, shortly fused at base, very sparsely hairy throughout. Achenes ±straight, deltoid, 3-angled, (3.0–) 3.3–3.5 mm long, with minute glandular hairs between ribs. Fig. 88E–H.

Reported from Nepal, Thailand, Indonesia, New Guinea and Micronesia. In Australia known from W.A. near Kununurra and in the west Kimberley, and N.T. north of 15° 20' S from the W.A. border to eastern Arnhem Land; also in Qld (old 19th century collections known from eastern Cape York Penin., and 2 recent collections from the Leichhardt region). A facultatively semiaquatic plant, spreading by rooting from the lower nodes of decumbent stems. Frequently found growing in water to 20 cm deep, in creeks and swamps, in gallery, vine and monsoon forest, usually on black peaty soils, commonly in rainforest, on basalt and limestone, at low altitudes from near sealevel. Flowers and fruits present (Nov.–) Feb.–July.



W.A.: Point Springs, 40 km N of Kununurra, *K.F.Kenneally 10687* (BRI, CANB, PERTH); 4 km S of junction of Neville Ck & Calder R., Eastern Walcott Inlet, *K.F.Kenneally 8739* (CANB). N.T.: Black Jungle area SE of Darwin, *R.W.Purdie 3431* (CBG); Tipperary Stn, *C.J.Leach 2868* & *I.D.Cowie* (DNA, K, MEL, MO). Qld: Hellhole Gorge, Carnarvon Gorge Natl Park, *R.J.Fensham 4777* (BRI).

2. *Adenostemma macrophyllum* (Blume) DC., *Prodr.* 5: 113 (1836)

Lavenia macrophylla Blume, *Bijdr.* 15: 905 (1826). T: [Indonesia: Java], Crescit in montanis Gede locis humidis; holo: L? *n.v.*

Annual or short-lived perennial, fleshy herb or subshrub 40–100 cm tall, viscid; young stems sparsely hairy. Leaves with petiole (10–) 30–50 mm long; lamina broadly ovate, (90–) 100–140 (–180) mm long, (40–) 70–85 (–125) mm wide, truncate to subcordate at base then sharply attenuate into upper petiole, bluntly and coarsely crenate, acute; upper surface ±shiny, lacking 'cysts', with sparse hairs on major veins, otherwise glabrous, or sometimes with minute (0.1 mm) sparse conical hairs on lamina. Panicles on slender peduncles. Capitula

±globose, 6–8 mm diam.; involucre bracts in 2 series, oblong (rarely lanceolate), 4–5 mm long, shortly fused at base, sparsely hairy abaxially, especially at base. Florets white to pale lilac. Achenes curved-deltoid, 3-angled, 3.0–3.5 mm long, smooth, glabrous or with minute glandular hairs, black at maturity. Plate 70; Fig. 88 I.

Found in India, Bangladesh, the Malay Penin., Indonesia and New Guinea. In Australia almost entirely confined to the Atherton Tableland and Rockingham Bay area of N Qld, with a disjunction to Mt Archer (Leichhardt collection of 1843) and the Springbrook region (modern collections) in SE Qld. Found in damp spots in grassy forests, on rainforest margins, roadsides, mud and edges of swamps, on granite, at altitudes of 680–1150 m. Flowers Apr.–Aug. (–Nov.); fruits Apr.–Nov. (–Jan.).

Qld: TR 1230, Boonjee LA, *R.Jensen* 222 (QRS); Massey Ck, old Palmerston Hwy, *R.Jensen* 854 (BRI, QRS); Mt Spec, *C.T.White* 8985 (BRI); Daintree Natl Park, Adeline Ck headwaters, *P.I.Forster* 24530 & *R.Booth* (BRI); Mt Archer, Moreton Bay, 14 Aug. 1843, *L.Leichhardt s.n.* (MEL).



The very distinctive truncate to subcordate leaf base with secondary tapering to the petiole is not as obvious in small-leaved (young or depauperate) plants. However in these plants the shiny upper leaf surface lacking ‘cysts’ and the smooth, curved black achenes are diagnostic.

9. GYMNOCORONIS

A.E.Orchard

Gymnocoronis DC., *Prodr.* 5: 106 (1836); probably from the Greek *gymnos* (naked, unclad) and the Latin *corona* (corona, crown) from the Greek *koryphe* (the crown or top of the head), referring to the lack of pappus in this genus.

Type: *G. attenuata* DC.

Annual or perennial herbs with erect leafy stems. Leaves opposite, sessile or petiolate, simple, entire to serrate. Inflorescence of heads in cymose panicles. Capitula homogamous, hemispherical; involucre bracts herbaceous, equal to subequal, ±2-seriate, imbricate, ±free at base; receptacle convex, naked. Disc florets bisexual; corolla narrowly funnelform, 5-lobed, white to pale pink, shortly stalked-glandular externally. Achenes narrowly cylindrical, (4- or 5-ribbed, glanduliferous between ribs. Pappus absent.

A genus of 5 species native to Central and S America, from Mexico to Argentina. In Australia one species is naturalised.

R.M.King & H.Robinson, *Studies in the Eupatorieae (Asteraceae). CXXVII. Additions to the American and Pacific Adenostemmatinae. Adenostemma, Gymnocoronis and Sciadocephala*, *Phytologia* 29: 1–13 (1974).

****Gymnocoronis spilanthoides* (D.Don ex Hook. & Arn.) DC., *Prodr.* 7: 266 (1838)**

Alomia spilanthoides D.Don ex Hook. & Arn., *Compan. Bot. Mag.* 1: 238 (1835). T: Between Casa Blanca and Valparaiso, Chile, and Saladillo, Province of Cordova, *Dr Gillies*; Buenos Ayres, Uruguay, and frequent in standing pools on the coast of La Plata, *Tweedie*; syns: K, photos seen.

Illustrations: R.M.King & H.Robinson, *Monogr. Syst. Bot. Missouri Bot. Gard.* 22: 63, pl. 3 (1987); G.J.Harden (ed.), *Fl. New South Wales* 3: 149 (1992); V.A.Funk *et al.*, *Syst., Evol. Biogeogr. Compositae* 732, fig. 43.1D (2009).

Subaquatic perennial herb, rhizomatous; stems 1–2.5 m tall, rooting at lower nodes, hollow, to 10–15 mm diam., glabrous below, hairy apically. Leaves with petioles 30–40 mm long, unwinged; lamina elliptic to lanceolate or ovate, 4–20 cm long, 1.5–8 cm wide, rounded to attenuate basally, entire to shallowly and irregularly toothed, acute, glabrous. Inflorescence

dense, with hairy branches. Capitula many-flowered, hemispherical, (8–) 10–15 (–20) mm diam.; involucre bracts narrowly oblong to oblong-lanceolate, 4–5 mm long, obtuse to acute, glabrous or sparsely hairy basally. Corolla narrowly funnelform, ±saccate at base, white, covering top of achene. Achenes compressed, 5-angled, 0.5 mm long, papillose between ribs, glabrous. *Temple Plant*, *Senegal Tea*. Fig. 88J–L.

A species native to Argentina, Bolivia, Brazil, Paraguay, Peru and Uruguay. In Australia, naturalised in SE Qld, eastern N.S.W. and the Murray R. valley in Vic. Also naturalised in Japan. Found in mud on the banks of dams, drains, freshwater lakes and creeks, or as an aquatic plant with floating stems growing in shallow water. Flowers Dec.–Mar.; fruits present Mar.

Qld: Lot 66, Bunker Rd, Victoria Point, 19 Jan. 1995, *M.Trevino s.n.* (BRI); Hotham Ck, Pimpama, 18 Dec. 2002, *K.Stephens s.n.* (CANB). N.S.W.: Barrington West Rd, Barrington, *J.Britton NSW179730* (BRI, CANB, K); Oxley Is., just E of Taree, *L.Haegi 2020* (BRI, K, NSW). Vic.: edges of island in L. Nagambie, 14 Mar. 2001, *L.Gunesckera s.n.* (CANB).



The author citation for this species has been the subject of some discussion. Hooker & Arnott described *Alomia spilanthis* in 1835. Wight & Arnott clearly wrote to Candolle mentioning the new taxon, because in 1836 in vol. 7 of the *Prodromus* Candolle included *Gymnocoronis spilanthis* [without author], based on “in agro Bonariensi legit cl. Bacle! (pl. exs. n. 100). *Alomia spilanthis* Wight et Arn. in litt.! 1836.’ Some have argued that as Candolle did not refer directly to the Hooker & Arnott publication he was creating a *nom. nov.* and authorship should be ascribed only to him. However, his mention of a letter from (Wight &) Arnott, the date (1836) when the *Alomia* combination had been published, and the adoption of the same rather unusual species epithet, all indicate that Candolle was indirectly referring to the earlier name, albeit with an error in bibliographic detail of authorship. *Alomia spilanthis* is thus the basionym of *Gymnocoronis spilanthis* and the parenthetical authorship is to be given as (D.Don ex Hook. & Arn.) DC.

A declared noxious weed in Qld, N.S.W., S.A., Tas. and W.A.

APPENDIX

New taxa, combinations and lectotypifications

New taxa, combinations and lectotypifications occurring in this volume of the *Flora of Australia* are formally published here. Taxa are arranged in the order they appear in the text. For economy the entries are brief; the treatment in the main text is more comprehensive. Accepted names are in **bold**, basionyms and synonyms in *italic*. The date of publication of this Volume will be given in the next published volume of the *Flora of Australia*.

TARAXACUM

N.H.Scarlett

Taraxacum cygnorum Hand.-Mazz., *Monogr. Taraxacum* 55 (1907)

T: Swan River to Cape Riche, [W.A.], n.d., *J. Drummond* 5:367; lecto (*here chosen*): S.W. Australia [W.A.], n.d., *Drummond* 367, K; isolecto: W. Australia [W.A.], n.d., *Drummond* 367, K.; Australia, Swan River [W.A.], n.d., *Drummond coll.* 5, 367, W 143769.

The Kew specimen cited was chosen for two reasons: firstly, it was seen by Handel-Mazzetti, as evidenced by the upper right hand label stating “*Taraxacum cygnorum* *mh.* determ. Handel-Mazzetti”, secondly the collection is of good quality, including both flowers and mature achenes. The Vienna sheet, though also seen by the author, has rather fragmentary material, lacking mature achenes. The second Kew sheet, though part of the cited type, has no indication that it was seen by the author. No Drummond 367 material could be located in L or P in 1986. Handel-Mazzetti’s figure, though eligible for lectotype status, must be rejected as it shows only one flowering capitulum and the lower part of a achene, scarcely diagnostic of the species.

MICROSERIS

B.V.Sneddon

Phyllopappus lanceolatus Walp., *Linnaea* 14: 507 (1841)

T: Nova Hollandia, *Lhotsky*; lecto (*here chosen*): KIEL; isolecto: BM.

The lectotype is more complete and matches the protologue better than the isolectotype.

Microseris scapigera Sch.Bip., *Jahresber. Pollichia* 22–24: 310 (1866)

T: Nova Zelandia [New Zealand], near Totara nui [Queen Charlotte Sound], 1769, *Banks and Solander*; lecto (*here chosen*): BM; isolecto: WELT.

Microseris scapigera Sch.Bip. is not based on *Scorzonera scapigera* Sol. ex A.Cunn., but both these names are based on the nomen nudum *Scorzonera scapigera* of G.Forster. The lectotype selected preserves Schultz-Bipontinus’ intention, as well as current usage of the name.

CYANTHILLIUM

A. Ghafoor

Cyanthillium cinereum var. **lanatum** (J.Kost.) Ghafoor, *comb. nov.*

Vernonia cinerea var. *lanata* J.Kost., *Blumea* 1: 415 (1935). T: Mollucas, Amboina, *Zippelius* 244; holo: L.

Cyanthillium cinereum var. **pinnatifidum** Ghafoor, *var. nov.*

Differs from the typical and other varieties in its shallowly to deeply pinnatifid leaf blades with lobes subacute to subobtusate, 3–6 mm long.

T: N.S.W., Northern Tablelands, Dorrigo–Bellingen road, Thora turn off, 30° 26' S, 152° 47' E, 9 Mar. 1963, *I.Hore-Lacey* 881; holo: NE.

The epithet is from the Latin *pinnati*- (= pinnate) and *fidus* (= cut or dissected) and refers to the pinnately dissected leaves.

Endemic to Australia in NE N.S.W. & SE Qld.

BLUMEA

C. Dunlop

Blumea milnei Seem., *Fl. Vit.* 141 (1866)

T: Interior of Viti Levu, 1860, *B.C.Seemann* 273; lecto (*designated here*): K; islecto: BM, G-BOIS, NSW, P.

Blumea benthamiana Domin, *Biblioth. Bot.* 89: 1214 (1930)

T: Broad Sound, Peaked West hill [Qld], 1802, *R.Brown* [Bennett No. 2096]; lecto (*designated here*): K; islecto: BM 810599, CANB, NSW 577741.

Domin, *loc. cit.*, recognised Bentham's misapplication of the name *B. glandulosa* DC. (*Fl. Austral.* 3: 525, 1867) and proposed the name *B. benthamiana* based on Bentham's concept of *B. glandulosa*. The specimens cited by Bentham (Endeavour River, *Banks and Solander*; Broad Sound and Shoalwater Bay, *R.Brown*; Port Molle, *McGillivray*) thus become the syntypes of Domin's name. Brown's collection from Broad Sound, Qld, is considered to be representative of Bentham's concept and is selected here as the lectotype.

Blumea psammophila Dunlop, *sp. nov.*

A *B. integrifolia* DC. habitu erosulato, involucrialibus bracteis et corollis glabris differt.

T: Winnama Gorge, Mabel Downs, W.A., 14 May 1984, *E.A.Chesterfield* 209; holo: PERTH; iso: DNA.

The epithet means 'sand-loving', referring to the species' preferred habitat.

Blumea diffusa R.Br. ex Benth., *Fl. Austral.* 3: 525 (1867)

T: Islands of the Gulf of Carpentaria, *R.Brown*; towards McAdam Range, *F.Mueller*; lecto (*designated here*): Carpentaria Islands (North Is., Sir Edward Pellew Group) [N.T.], 18 Dec. 1802, *R.Brown s.n.*, BM; islecto: CANB, K; remaining syn: McAdam Range, *F.Mueller s.n.*, K, MEL 611443A.

Bentham cited two collections in describing this species. The Robert Brown collection agrees well with Bentham's characters and is chosen here as the lectotype. The Mueller syntype from McAdam Range was later cited (by implication, see above) as the type of *B. dentata* Domin (var. *dentata*), a name here considered synonymous with *B. diffusa*.

Blumea dentata Domin, *Biblioth. Bot.* 89: 1215 (1930)

T: towards McAdam Range [N.T.], *F.Mueller s.n.*; lecto (*designated here*): K; isolecto: MEL.

Domin *loc. cit.* did not explicitly designate a type for this species, referring to it as “species collectiva”, providing the new name for Bentham’s interpretation of De Candolle’s *B. integrifolia*. Bentham cited four specimens under *B. integrifolia*, including the type. Of the three remaining collections, all by Ferdinand Mueller, Domin typified *B. dentata* var. *glandulosa* on the Roper R. collection and typified *B. integrifolia* var. *pumila* on the Victoria R. collection. The remaining collection, from McAdam Range, a syntype of *B. diffusa* R.Br. ex Benth., is presumed to be what Domin regarded as representing his type variety.

PTERIGERON

C.Dunlop & A.E.Orchard

Pterigeron microglossus Benth., *Fl. Austral.* 3: 532 (1866)

T: Sturt’s Creek and Fitzmaurice rivers, F.Mueller; lecto (*designated here*): Fitzmaurice R. [N.T.], Oct. 1855, *F.Mueller s.n.*; K.

In describing this taxon Bentham cited two specimens, one referable to *Streptoglossa macrocephala*, the other to *S. liatroides*. To resolve this ambiguity, the name is lectotypified here on the specimen referable to *S. macrocephala*, making *P. microglossus* Benth. a taxonomic synonym of *S. macrocephala* (F.Muell.) Dunlop.

BIDENS

A.E.Orchard

***Bidens subalternans* var. *araneosa* Orchard, var. nov.**

Bidentem subalternantem var. *simulantem* arte simulantem, sed bracteis involucrialibus 10–15 (–20) mm longis, saltem aequantibus et plerumque excedentibus flosculos et bracteas interiores involucriales, differt.

T: W.A., 5.2 miles [c. 8 km] W of Marandoo campsite on the new Tom Price road, 30 Jan. 1976, *M.E.Trudgen 1636*; holo: PERTH; iso: CANB.

Closely resembling *B. subalternans* var. *simulans*, but differing in having outer involucrial bracts 10–15 (–20) mm long, at least equalling and usually exceeding the florets and inner involucrial bracts. The inner involucrial bracts have, as in var. *simulans* and var. *subalternans*, a distinctive fringe of coarse white cilia, and are linear, acute, obtuse or slightly dilated at the tip. The capitula, in their long involucrial bracts, superficially resemble those of *B. tripartita*, but are much smaller. The leaves are bipinnatisect, with narrow ultimate segments up to about 5 mm wide.

Only known from Australia, principally from north western W.A., with scattered records from the northern N.T. and one doubtful collection from Qld. Found in usually well-drained situations in open eucalypt or *Acacia* (mulga) woodlands, heaths and grasslands, in sand, loams and sometimes clays. Flowers and fruits January to October.

The epithet is chosen to mean ‘spider-like’, the long hairy involucrial bracts resembling spiders legs.

BLAINVILLEA*A.E.Orchard*

The names *Blainvillea rhomboidea* Cass. and *Verbesina dichotoma* Murray (\equiv *B. dichotoma* (Murray) Hemsl.) potentially threaten the name *B. gayana* (see A.E.Orchard, *Taxon* 61(6): 1329–1330 (2012) for discussion). A proposal to reject these names was not accepted by the relevant nomenclatural committee, so both names are here epitypified on the following specimen: [India] Flora of Madras, Nilgiris District, Sigur [?Sholur], Aug. 1886, *J.S.Gamble 17890*, K. The sheet contains a mature specimen of *Blainvillea acmella*, with excellent sketches of the florets, palea and achene.

SPILANTHES*A.E.Orchard****Spilanthes anactina* F.Muell., *Fragm.* 5: 63 (1865)**

T: “In insulis sinus Carpentariae”; lecto (*designated here*): Sweers Is., Qld, *s.d.*, *s.coll.*, MEL 91063; isolecto: Sweers Is., Gulf of Carpentaria, Qld, *s.d.*, *s.coll.*, MEL 91062; isolecto: Sweers Is., Gulf of Carpentaria, Qld, *s.d.*, *Henne s.n.*, K, ex Herb. Hookerianum 1867; isolecto?: GH *n.v.*

Jansen (1981) cited MEL (*s.n.*) as holding the holotype of this species, and MEL (*s.n.*) as also holding an isotype. Another isotype was recorded as being in GH (not seen for the current study). Subsequently, in labels dated July 1982 he identified MEL 91062 as the holotype and MEL 91063 as the isotype. These choices were never published. A fourth type sheet in K has since been identified, and lectotypification is required.

Accordingly, the sheet MEL 91063 is designated here as lectotype of the name *Spilanthes anactina* F.Muell. Of the two MEL sheets (both with labels in Mueller's hand), this contains slightly better material (two capitula instead of one), and bears a small packet with dissected paleae and florets labelled “*Spil. anactina*” in Mueller's hand. The replicates in MEL (91062)!, K! and GH (presumably, *n.v.*) are isolectotypes.

SIGESBECKIA*A.E.Orchard****Sigesbeckia australiensis* subsp. *fugax* (Pedley) Orchard, *comb. et stat. nov.***

Sigesbeckia fugax Pedley, *Austrobaileya* 4: 87–92 (1993). T: Qld, Maranoa District: 10 km W of Roma, 2 Dec 1989, *L.Pedley 5499*; holotype: BRI *n.v.*; isotype: BRI, CANB, K, MEL, NSW (AD, LZ, MO, PR, US, all *n.v.*).

The most distinctive feature of this subspecies is the deep lobing of the leaves, which extends throughout the lamina, and is not confined to just a basal lobe as in *S. australiensis* subsp. *australiensis* (sometimes) or *S. orientalis*. Pedley also described differences between this and subsp. *australiensis* in the distribution of the glandular hairs on the outer paleae, but these differences seem to break down when a wider selection of material is examined. The characters of the involucre bracts described here in the main text are also qualitative, and cannot be relied upon in all cases—they are definitely secondary ‘tendency’ characters.

The lobing of the leaves is very pronounced in Qld and the adjacent parts of the western slopes in N.S.W., but is clinal south of this region, and no sharp geographical line dividing

the two subspecies can be drawn. The lobing character becomes attenuated through south-central N.S.W., and even as far south as the A.C.T. some specimens of *S. australiensis* subsp. *australiensis* can be found with deeper than normal teeth. In this work plants with several lobes per leaf all extending halfway or more to the midrib are assigned to subsp. *fugax*, others to subsp. *australiensis*, but this is, to an extent, subjective.

SUPPLEMENTARY GLOSSARY

calculus: whorl of bracts immediately subtending the involucre bracts.

carpopodium: in Asteraceae, a callus at the base of the achene, providing the attachment to the receptacle.

epaleate: of a receptacle, without palea, cf. **paleate**.

palea: vascularised scales on the receptacle, subtending some or all of the florets. Often membranous or chartaceous, sometimes enclosing achenes and dispersed with them, or fused into burrs (see *Xanthium*).

paleate: of a receptacle, bearing palea, cf. **epaleate**.

receptacle: in Asteraceae, the basal part of the capitulum or head, bearing the involucre bracts, florets and sometimes palea.

stereome: (in Asteraceae) a central sclerified part of an involucre bract that may be entire or divided in two.

synflorescence: a compound inflorescence; in Asteraceae, an aggregation of capitula which may be variously arranged in cymes, panicles, spikes, etc, or closely fused into a compound capitulum, with or without surrounding bracts.

synoecious: with male and female flowers in the same inflorescence.

Abbreviations and Contractions

Literature

Author abbreviations follow R.K.Brummitt & C.E.Powell, *Authors of Plant Names* (Royal Botanic Gardens, Kew, 1992).

Journal titles are abbreviated in accordance with G.H.M.Lawrence *et al.*, *Botanico-Periodicum-Huntianum* (Hunt Botanical Library, Pittsburgh, 1968) and G.D.R.Bridson, *BPH-2* (Hunt Institute for Botanical Documentation, Pittsburgh, 2004).

Other literature is abbreviated in accordance with F.A.Stafleu & R.S.Cowan, *Taxonomic Literature*, 2nd edn and supplements (Bohn, Scheltema & Holkema, Utrecht, 1976–2009), except that upper case initial letters are used for proper names and significant words. The *Flora of Australia* is abbreviated to *Fl. Australia*.

Herbaria

Abbreviations of herbaria are in accordance with P.K.Holmgren, N.H.Holmgren & L.C.Barnett, *Index Herbariorum* Part I, 8th edn (New York Botanical Garden, 1990). Those most commonly cited in the *Flora* are:

| | |
|-------|---|
| AD | State Herbarium of South Australia, Adelaide |
| BM | The Natural History Museum, London |
| BRI | Queensland Herbarium, Brisbane |
| CANB | Australian National Herbarium, Canberra |
| CBG | Australian National Botanic Gardens Herbarium, Canberra |
| CNS | Australian Tropical Herbarium, Cairns |
| DNA | Northern Territory Herbarium, Darwin |
| HO | Tasmanian Herbarium, Hobart |
| K | Royal Botanic Gardens, Kew |
| MEL | National Herbarium of Victoria, Melbourne |
| NSW | National Herbarium of New South Wales, Sydney |
| PERTH | Western Australian Herbarium, Perth |

States, Territories

Abbreviations of Australian States and Territories as used in statements of distribution and citation of collections are:

| | |
|--------|------------------------------|
| A.C.T. | Australian Capital Territory |
| N.S.W. | New South Wales |
| N.T. | Northern Territory |
| Qld | Queensland |
| S.A. | South Australia |
| Tas. | Tasmania |
| Vic. | Victoria |
| W.A. | Western Australia |

General abbreviations

| | |
|-------------|--|
| add. | addendum |
| alt. | altitude |
| app. | appendix |
| auct. | <i>auctoris/auctorum</i> (of an author or authors) |
| auct. mult. | <i>auctorum multorum</i> (of many authors) |

Abbreviations and Contractions

| | |
|------------------|--|
| <i>auct. non</i> | <i>auctorum non</i> (of authors [but] not....), used for misapplied names |
| BP | before present |
| c. | <i>circa</i> (about) |
| cf. | <i>confer</i> (compare) |
| Ck | Creek |
| cm | centimetre |
| coll. | collector |
| colln | collection |
| <i>comb.</i> | <i>combinatio</i> /combination |
| <i>cons.</i> | <i>conservandus</i> |
| cult. | cultivated |
| cv. | cultivar |
| d.b.h. | diameter at breast height |
| Dept | Department |
| <i>descr.</i> | <i>descriptio</i> |
| diam. | diameter |
| E | east |
| ed./eds | editor/editors |
| edn | edition |
| <i>e.g.</i> | <i>exempli gratia</i> (for example) |
| <i>et al.</i> | <i>et alii/et aliorum</i> ; and others/and of others |
| f. | <i>forma</i> /form |
| fam. | <i>familia</i> /family |
| fig./figs | figure/figures (in other works) |
| Fig. | Figure (referring to a Figure in this volume of the <i>Flora</i>) |
| gen. | <i>genus</i> /genus |
| <i>gen. nov.</i> | <i>genus novus</i> (new genus) |
| Gt | Great |
| holo | holotype |
| <i>hort.</i> | <i>hortus</i> (garden) or <i>hortensis</i> (of a garden) |
| HS | Homestead |
| Hwy | Highway |
| <i>i.e.</i> | <i>id est</i> (that is) |
| <i>ined.</i> | <i>ineditus</i> (unpublished) |
| <i>in litt.</i> | <i>in litteris</i> (in correspondence) |
| <i>in obs.</i> | <i>in observatio</i> (in observation) |
| Is. | Island/s |
| iso | isotype |
| isolecto | isolectotype |
| km | kilometre |
| L. | Lake |
| L.A. | Logging Area |
| lat. | latitude |
| lecto | lectotype |
| <i>loc. cit.</i> | <i>loco citato</i> (in bibliographic citations: in the same work and page as just cited) |
| <i>loc. id.</i> | <i>loco idem</i> (in specimen citations: in the same place as just cited) |
| long. | longitude |
| L.S. | longitudinal section |
| l:w | length to width ratio |
| m | metre |
| mm | millimetre |
| Mt/Mts | Mount/Mounts |
| Mtn/Mtns | Mountain/Mountains |
| N | north |
| <i>n</i> | haploid chromosome number |

Abbreviations and Contractions

| | |
|---------------------|---|
| 2n | diploid chromosome number |
| Natl | National |
| n.d. | no date |
| NE | north-east (ern) |
| nom. cons. | <i>nomen conservandum</i> (conserved name) |
| nom. cons.
prop. | <i>nomen conservandum propositus</i> (proposed conserved name) |
| nom. illeg. | <i>nomen illegitimum</i> (illegitimate name) |
| nom. inval. | <i>nomen invalidum</i> (name not validly published) |
| nom. nov. | <i>nomina nova</i> (new name) |
| nom. nud. | <i>nomen nudum</i> (name published without a description or reference to a published description) |
| nom. prov. | <i>nomen provisorium</i> (provisional name) |
| nom. rej. | <i>nomen rejiciendum</i> (rejected name) |
| nom. superfl. | <i>nomen superfluum</i> (superfluous name) |
| nov. | novus/new |
| n. ser. | new series |
| n.v. | <i>non vidi</i> (not seen) |
| NW | north-west (ern) |
| op. cit. | <i>opere citato</i> (in the work cited above) |
| opp. | opposite |
| orth. | orthography, orthographic |
| p./pp. | page/pages |
| penin. | peninsula |
| pers. comm. | by personal communication |
| pl./pls | plate/plates |
| p.p. | <i>pro parte</i> (in part) |
| p.p. max | <i>pro parte maxima</i> , the larger part |
| p.p. min | <i>pro parte minore</i> , the smaller part |
| q.v. | <i>quod vide</i> (which see) |
| R. | River |
| Ra. | Range |
| Rd | Road |
| Res. | reserve |
| rly | railway |
| S | south |
| SE | south-east (ern) |
| sect. | <i>sectio</i> /section |
| SEM | Scanning Electron Micrograph |
| ser. | series |
| S.F.R. | State Forest Reserve |
| s. lat. | <i>sensu lato</i> (in a wide sense) |
| s. loc. | <i>sine loco</i> (without locality) |
| s.n. | <i>sine numero</i> (without number) |
| sp./spp. | species (singular/plural) |
| sp. aff. | <i>species affinis</i> (species related to) |
| sp. nov. | <i>species nova</i> (new species) |
| specim. | specimen |
| s. str. | <i>sensu stricto</i> (in a narrow sense) |
| St | Saint/Street |
| stat. | <i>status</i> /status |
| Stn | (pastoral) Station |
| subg. | subgenus |
| subsp./subspp. | subspecies (singular/plural) |
| subsp. nov. | <i>subspecies nova</i> (new subspecies) |
| suppl. | supplement |

Abbreviations and Contractions

| | |
|-------------------|--|
| SW | south-west (ern) |
| syn | syntype |
| synon. | synonym |
| T | Type (collection) |
| t./tt. | <i>tabula/tabulae</i> (plate/plates) |
| T.R. | Timber Reserve |
| trib. | <i>tribus</i> /tribe |
| trig. | trigonometric station |
| T.S. | transverse section |
| <i>typ. cons.</i> | <i>typus conservandus</i> (conserved type) |
| var. | <i>varietas</i> /variety |
| <i>viz.</i> | <i>videlicet</i> (namely) |
| UV | ultraviolet |
| W | west |
| <i>x</i> | basic chromosome number |

Symbols

| | |
|-----|--|
| † | taxon included in key but not treated further in text |
| * | naturalised taxon, not originally native |
| # | native taxon now naturalised in Australia beyond its natural range |
| [] | misapplied name or <i>nomen invalidum</i> ; also, in localities, denotes a place name later than that originally cited or on the herbarium sheet |
| ± | <i>in species descriptions</i> , more or less |
| ± | <i>in lichen chemistry</i> , with or without |
| < | less than |
| ≤ | less than or equal to |
| > | more than |
| ≥ | more than or equal to |
| μm | micrometre |
| ♀ | female |
| ♂ | male |

Publication date of previous volumes

| | |
|------------|--------------------------|
| Volume 1 | 22 August 1981 (1st edn) |
| Volume 1 | 2 March 1999 (2nd edn) |
| Volume 2 | 28 February 2007 |
| Volume 3 | 24 April 1989 |
| Volume 4 | 12 November 1984 |
| Volume 8 | 9 December 1982 |
| Volume 11A | 9 July 2001 |
| Volume 11B | 9 July 2001 |
| Volume 12 | 4 May 1998 |
| Volume 16 | 30 November 1995 |
| Volume 17A | 14 April 2000 |
| Volume 17B | 26 May 1999 |
| Volume 18 | 8 June 1990 |
| Volume 19 | 27 June 1988 |
| Volume 22 | 17 May 1984 |
| Volume 25 | 25 December 1985 |
| Volume 26 | 8 June 2013 |
| Volume 28 | 28 June 1996 |
| Volume 29 | 27 July 1982 |
| Volume 35 | 6 August 1992 |
| Volume 39 | 25 July 2011 |
| Volume 43 | 28 August 2002 |
| Volume 44A | 3 March 2009 |
| Volume 44B | 17 March 2005 |
| Volume 45 | 15 May 1987 |
| Volume 46 | 2 May 1986 |
| Volume 48 | 27 October 1998 |
| Volume 49 | 3 May 1994 |
| Volume 50 | 29 July 1993 |
| Volume 51 | 21 July 2006 |
| Volume 54 | 4 September 1992 |
| Volume 55 | 21 December 1994 |
| Volume 56A | 30 April 2004 |
| Volume 57 | 21 April 2009 |
| Volume 58A | 21 August 2001 |

For the publication date of Volume 37, see
www.environment.gov.au/abrs/

INDEX

Accepted names are in roman, synonyms and doubtful names in *italic*.

Principal page references are in **bold**, figures and plates in *italic*.

- Abrotanella Cass. 12, 26, 193, **194**, 198
emarginata Cass. 194
 forsteroides (Hook.f.) Benth. 194, **195**, 197
 nivigena (F.Muell.) F.Muell. *xix*, 194, **195**, 197
papuana S.Moore 195
 scapigera (F.Muell.) Benth. 194, **196**, 197
 Absinthe 5
 Acanthocladium 13, 35
 Acanthospermum Schrank 8, 17, 30, 572, **576**
 australe (Loefl.) Kuntze **577**, 580
brasilum Schrank 576
 hispidum DC. 478, **577**, 580
 Achillea L. 15, 34, 331, **338**
 distans Waldst. & Kit. ex Willd. **339**, 340, 341
 subsp. *distans* 339
 subsp. *tanacetifolia* 339
 filipendulina Lam. 339
 millefolium L. 6, 338, 339, **341**, 471
 tomentosa L. 339, **341**
 Achnophora 14, 34, 42
 Acnema Rich. ex Pers. 16, 23, 30, 31, **543**
biflora (L.) Spreng. 521
 grandiflora (Turcz.) R.K.Jansen **544**
 var. *brachyglossa* (Benth.) R.K.Jansen 477, 541, **544**, 545
 var. *discoidea* R.K.Jansen **545**, 546
 var. *grandiflora* 544
 oppositifolia (Lam.) R.K.Jansen 543
 uliginosa (Sw.) Cass. 544, **546**
 Acomis 13, 36
 Acroptilon Cass. 70
picris (Pall. ex Willd.) C.A.Mey. 72
repens (L.) DC. 70, 72
 Actinobole 13, 25, 39
 Actites Lander 12, 20, 84, 87, **122**
 megalocarpus (Hook.f.) Lander *xvi*, 84, 85, 118, 120, 121, **122**, 123
 Acunniana Orchard 8, 16, 31, 32, 492, 493, 496, **534**
 procumbens (DC.) Orchard 525, **534**, 535
 Adenophora
 riparia 589
 Adenostema N.H.F.Desp. 600
 Adenostemma J.R.Forst. & G.Forst. 17, 23, 587, **600**
lanceolatum Miq. 603
latifolium auct. non D.Don 601
 lavenia (L.) Kuntze 600, **601**
 var. *lanceolatum* (Miq.) J.Kost. 601, 602, **603**
 var. *lavenia* **601**, 602, 603
 macrophyllum (Blume) DC. 480, 600, 602, **603**
viscosum J.R.Forst. & G.Forst. 600, 601
 African Boneseed 320
 African Daisy 302
 Trailing 329
 White 322
 African Marigold 162, 208
 African Moonflower 322
 African Sheep Bush 358
 African Thistle 168
 Ageratina Spach 17, 23, **587**
 adenophora (Spreng.) R.M.King & H.Rob. 479, 587, **588**, 591
 aromatica (L.) Spach 587
 ligustrina (DC.) R.M.King & H.Rob. 587, 588, **589**
 riparia (Regel) R.M.King & H.Rob. 587, 588, **589**, 591
 subg. *Neogreenella* 587
 Ageratum L. 7, 17, 23, 587, **593**
 conyzoides L. 593, **594**, 595
 subsp. *conyzoides* 591, **594**
 subsp. *latifolium* (Cav.) M.F.Johnson 594
 houstonianum Mill. 7, 479, 591, 593, **594**
mexicana Sweet 594
mexicanum Sweet 594
 Allittia 14, 44
 Allopterigeron Dunlop 15, 29, 33, 388, **429**
 filifolius (F.Muell.) Dunlop **429**
 Alomia
 spilanthoides D.Don ex Hook. & Arn. 604
 Alpine Cotula 364
 Alpine Groundsel 278
 Alseuosmiaceae 4
 Amblyosperma Benth. 45
 minor Keighery 46
 scapigera Benth. 45, 46
 spathulata (Cunn. ex DC.) D.J.N.Hind 46
 Ambrosia L. 16, 30, 558, **559**
 artemisiifolia L. 478, **560**, 561, 562, 563
 confertiflora DC. 560, **561**
maritima auct. non L. 560
 maritima L. 559
 psilostachya DC. 560, **561**
 tenuifolia Spreng. 560, **562**
 American Rope 592
 Ammobium 13, 28, 37
alatum R.Br. 7
 Ampherephus
 mutica Kunth 179
 Anacyclus 331
australis Sieber ex Spreng. 361
 radiatus Lois. 332
 Anemocarpa 13, 37
 Angianthus 7, 13, 40
 Annual Ragweed 560
 Anthemis L. 15, 34, 330, 331, **343**
 arvensis L. 342, **344**, 346, 353
 cotula L. 5, 342, **344**, 345, 346, 353
 lithuanica Besser ex DC. 345
 maritima L. 343
 nobilis L. 343
 tinctoria L. 344, **345**
 subsp. *australis* R.R.Fern. 345
 Anzac Flower 540
 Apalochlamys 13, 37
 Aplotaxis
 australasica F.Muell. 51
 carthamoides DC. 51

INDEX

- Apowollastonia Orchard 8, 16, 31, 32, 492, 493, 496, **524**, 534, 545
 cylindrica Orchard 8, 525, 532, **533**
 hamersleyensis Orchard 525, 528, **531**, 532
 hibernica Orchard 525, **528**, 529
 longipes (Klatt) Orchard 525, **526**, 527, 536
 spilanthoides (F.Muell.) Orchard 524, **525**, 526, 527
 stirlingii (Tate) Orchard 525, 528, **530**
 subsp. fontaliciana Orchard 529, 530, **531**
 subsp. stirlingii 476, 529, **530**
 verbesinoides (Benth.) Orchard 525, 527, **528**, 530
 Apple Bush 394
 Arctium L. 11, 21, 22, 49, **66**
 lappa L. 4, 6, **66**, 67
 minus (Hill) Bernh. 66, **67**
 Arctotheca Vaill. 8, 12, 33, 159, **160**
 calendula (L.) Levyns 7, 8, 160, *161*, **162**
 calendula × populifolia 163
 calendulacea (L.) K.Lewin 162
 Dune 160
 nivea (L.f.) K.Lewin 160
 populifolia (P.J.Bergius) Norl. **160**, *161*
 prostrata (Salisb.) Britten 160, **162**
 repens J.C.Wendl. 160, 162
 Arctotis L. 12, 33, 159, **163**
 angustifolia L. 163
 argentea Thunb. 164
 aspera L. 164
 auriculata Jacq. 164
 australiensis Beauverd 165
 calendula L. 162
 calendulacea L. 162
 decurrens Jacq. 164
 fastuosa Jacq. 164
 grandis Thunb. 164
 gumbletonii Hook.f. 164
 lawsoniana (Gaudich.) Beauverd 166
 maidenii Beauverd 165
 populifolia P.J.Bergius 160
 prostrata Salisb. 162
 Silver 164
 stoechadifolia P.J.Bergius *161*, **164**
 tristis L. 162
 venusta Norl. 164
 White 164
 Argentipallium 8, 13, 36, 37
 Argophyllaceae 4
 Argyanthemum Webb ex Sch.Bip. 15, 35, 331, 343, **345**, 348
 foeniculaceum auct. non (Willd.) Webb ex Sch.Bip. 347
 frutescens (L.) Webb ex Sch.Bip. 345, **347**
 subsp. frutescens **347**
 subsp. foeniculaceum (Pit. & Proust) Humphries *346*, **347**
 var. foeniculaceum Pit. & Proust 347
 Argyroglottis 13, 36
 Argyrotegium 13, 29, 35, 37
 Arnica 6
 Arnopogon
 picroides (L.) Willd. 134
 Arrhenechthites Mattf. 12, 24, 194, **309**
 mixtus (A.Rich.) Belcher 298, **309**, 311
 tomentellus 309
 Artemesinin 6
 Artemisia L. 15, 26, 332, **336**
 abrotanum L. 338
 absinthium L. 5, 337
 annua L. 6
 arborescens L. **337**, 340
 dracunculoides Pursch. 5
 dracunculus L. 5
 littoralis Retz. 406
 ludoviciana Nutt. 337
 subsp. albula (Wooton) D.D.Keck 337
 matricarioides Less. 355
 minima L. 433
 pontica L. 5
 scoparia Waldst. & Kit. 338
 sternutatoria Roxb. 433
 verlotiorum Lamotte **337**, 338
 vulgaris L. 336, 338
 Artichoke 5
 Jerusalem 4, 556
 Wild 62
 Artichoke Thistle 62
 Asplia 525
 Aster 7, 14, 44
 conocephala (F.Muell.) F.Muell. 390
 Asteraceae 2
 subfam. Asteroideae 3, 12, 18
 trib. Anthemideae Cass. 15, **330**
 trib. Athroismeae Panero 15, **430**
 subtrib. Centipediniae Panero 430
 trib. Astereae 14
 trib. Bahieae B.G.Baldwin 16, **488**
 trib. Calenduleae Cass. 13, **316**
 trib. Coreopsidae Lindl. 15, **446**
 trib. Eupatorieae Cass. 17, **586**
 trib. Gnaphalieae 3, 13
 trib. Helenieae Benth. 15, **442**
 trib. *Helenioideae* Benth. 442
 trib. Heliantheae Cass. 16, **491**
 subtrib. *Ambrosieae* Less. 558
 subtrib. Ambrosiinae Less. 16, 492, **558**
 subtrib. *Ecliptae* Less. 492
 subtrib. Ecliptinae Less. 16, **492**, 538
 subtrib. *Enhydrineae* H.Rob. 470
 subtrib. *Enydrineae* H.Rob. 470
 subtrib. Helianthinae Dumort. 16, 492, **551**
 subtrib. Montanoinae H.Rob. 16, 491, **538**
 subtrib. Spilanthinae Panero 16, 491, **543**
 subtrib. Verbesininae Benth. & Hook.f. 16, 492, **540**
 subtrib. *Zinnieae* Benth. & Hook.f. 548
 subtrib. Zinniinae Benth. & Hook.f. 16, 491, **548**
 trib. Inuleae Cass. 3, 15, **371**
 subtrib. *Inuleae* Dumort. 371
 subtrib. Inulinae Dumort. 15, **371**
 subtrib. *Plucheae* Dumort. 387
 subtrib. *Plucheinae* Benth. & Hook.f. 371
 subtrib. *Plucheinae* Dumort. 15, 371, **387**
 subtrib. *Plucheinae* Benth. & Hook.f. 371
 trib. *Lactuceae* Cass. 84
 trib. Liabeae 3
 trib. Madieae Jeps. 17, **584**
 trib. Millerieae Lindl. 17, **572**
 subtrib. Dyscritithamninae Panero 17, 572, **573**
 subtrib. Galinsoginae Benth. & Hook.f. 17, 572, **574**
 subtrib. *Melampodieae* Less. 576

INDEX

- Asteraceae trib. Millerieae *continued*
 subtrib. Melampodiinae Less. 17, 572, **576**
 subtrib. Milleriinae Cass. 17, 572, **578**
 trib. Neurolaeneae Rydb. 15, **470**
 trib. *Plucheeae* (Benth. & Hook.f.) A.Anderb.
 3, 371
 trib. Senecioneae Cass. 3, 12, **192**
 trib. Tageteae Cass. 16, **483**
subfam. Barnadesioideae 3
subfam. *Carduaceae* Cass. ex Sweet 48
subfam. Carduoideae Cass. ex Sweet 11, 18, **48**
 trib. Cardueae Cass. 11, **48**
 trib. *Carduinae* Cass. 48
 trib. *Cynareae* Less. 48
subfam. Cichorioideae Chevall. 3, 12, 18, **84**
 trib. Arctotideae Cass. 12, **159**
 trib. Cichorieae Lam. & DC. 12, **84**
 trib. Vernonieae Cass. 12, **172**
subfam. *Cynareae* Kostel. 48
subfam. *Cynaroideae* Kostel. 48
subfam. *Lactuicoideae* Cass. 84
subfam. Mutisioideae Cass. 11, 18, **45**
 Trib. Mutiseae 11
Asteridea 13, 27, 41
Asteriscus Mill. 15, 27, 32, 372, **385**
 spinosus (L.) Sch.Bip. **385**, 386
Athroisma DC. 430
Austral Cornflower 72
- Baccharis 8, 14, 42
 indica L. 409
Bachelor's Button
 Brazilian 179
Bahia Lag. 488
Barkhausia
 haenseleri Boiss. ex DC. 94
Basedowia 13, 41
Bathurst Burr 8, 568
Beach Daisy 160
Beach Pumpkin 160
Bears-ear
 Creeping 162
Bedfordia DC. 12, 24, 193, 196, **198**
 arborescens Hochr. *xix*, **199**
 linearis (Labill.) DC. 198, 199, **200**
 subsp. linearis 200, **201**, **202**
 subsp. oblongifolia Orchard 200, **202**
 var. curvifolia Orchard 201, 202, **203**
 var. oblongifolia 201, **202**
 salicina auct. non (Labill.) DC. 199
 salicina (Labill.) DC. 198, **199**, 200
Beggar's Ticks
 Bipinnate 463
 Greater 465
Belgian Endive 4
Bellida 13, 27, 38
Bellis 14, 43
 perennis L. 7
Belyando Cobbler's Pegs 448
Berkheya Ehrh. 12, 21, 34, 159, **168**
 carduiformis auct. non DC. 168
 rigida (Thunb.) Ewart, Jean White & B.Rees
 168, 169
Bidens L. 15, 22, 31, 446, 447, 457, **458**
 alba (L.) DC. 459, **462**
 var. radiata (Sch.Bip.) F.Ballard ex Melchert **462**,
 464
Bidens continued
 artemisiaefolia Kuntze
 var. *caudata* (Kunth) Kuntze 455
 aurea (Aiton) Sherff 459, **462**
 bipinnata L. 459, **463**, 465, 467
 var. *bipinnata* 463
 var. *simplicior* F.Muell. 461
 bitermata (Lour.) Merrill & Sherff 467
 cernua L. 467
 comosa (A.Gray) Wiegand 468
 connata Muhl. ex Willd. 468
 exigua Sherff 465
 leucantha (L.) Willd. 462
 pilosa L. 459, **460**, 465
 var. minor (Blume) Sherff 460, **461**, 474
 var. pilosa 460, **461**, 464
 var. *radiata* Sch.Bip. 462
 var. *subsimplificifolia* Kuntze 461
 var. *typica* Domin 461
 repens D.Don 468
 subalternans DC. 459, **465**, 467
 var. *araneosa* Orchard 464, 465, 466, **467**, **608**
 var. *simulans* Sherff 464, 465, **466**, 467
 var. subalternans 465, **466**
 sundaica
 var. *minor* Blume 461
 tenuifolia Labill. 452
 tripartita L. 458, **459**, 464, 468
 var. *repens* (D.Don) Sherff 468
 var. *tripartita* 468
Billygoat Weed 594
 Blue 595
Bindyi 8, 369
Bipinnate Beggar's Ticks 463
Bitou Bush 321
Bittervine 592
Bitterweed 560
Black Knapweed 82
Black Oyster Plant 4
Blainvillea Cass. 16, 31, 493, **496**, **609**
 acmella (L.) Philipson 497, 499, **500**, 501, 545,
 609
 calicicola Orchard **497**, 499
 cunninghamii (DC.) Orchard 497, **498**, 499,
 501, 536
 dichotoma (Murray) Hemsl. 500, 609
 dubia Specht 498
 gayana Cass. **497**, 499, 500, 609
 latifolia (L.f.) DC. 500
 rhomboidea Cass. 496, 500, 609
Blanket Flower 443, 445
Blanket Leaf 199, 200
Blennospora 13, 39
Blessed Thistle 79
Blue Billygoat Weed 595
Blue Weed 557
 Texas 557
Bluebush 390
Bluebush Daisy 390
Bluetop
 Giant 598
Blumea DC. 15, 26, 27, **372**
 acutata auct. non DC. 377
 amplectans auct. non DC. 382
 arabidea Domin 382
 axillaris (Lam.) DC. 372, **375**, 382
 balsamifera (L.) DC. 372

INDEX

- Blumea continued*
benthamiana Domin 372, 373, **378**, **607**
 var. *minor* (Benth.) A.D.Chapm. 378
cunninghamii DC. 375
dentata Domin 608
 var. *dentata* 380, 607
 var. *foliosa* Domin 379
 var. *glabrescens* Domin 378
 var. *glandulosa* Domin 378, 608
 var. *rigida* Domin 378
 var. *schultzii* Domin 378
diffusa R.Br. ex Benth. 373, **380**, 381, 382, **607**, 608
diplotricha Domin 375
glandulosa auct. non DC. 378, 608
 var. *minor* Benth. 378
hieracifolia auct. non (D.Don) DC. 377
 var. *holosericea* (DC.) Benth. 382
holosericea DC. 382
integrifolia DC. 373, **379**, 380, 382, 608
 var. *diffusa* (R.Br. ex Benth.) Domin 380
 var. *normalis* Domin 379
 var. *pumila* Domin 379, 608
 var. *simplex* Domin 379
lacera (Burm.f.) DC. 372, **377**, 382
lanceolaria (Wall. ex Roxb.) Druce 372
milnei Seem. 372, **375**, 376, **607**
mollis (D.Don) Merr. 375
pannosa O.Schwarz 382
prostrata W.Fitzg. 379
psammophila Dunlop 373, **380**, 381, **607**
pubigera auct. non (L.) Merr. 373
pubigera (L.) Merr. 373, 375
pungens W.Fitzg. 372, **373**, 374
riparia DC. 372, 375
 f. *riparia* **373**, 376
saxatilis Zoll. & Moritzi 372, **378**, 382
scapigera Domin 380
solidaginoides (Poir.) DC. 382
 sp. *Psammophila* (E.A.Chesterfield 209)
 Dunlop 380
tenella DC. 373, **382**
viminea DC. 375
wightiana DC. 377
 Boneseed 8, 320
 African 320
 Brachyglottis 198
 brunonis (Hook.f.) B.Nord. 196, 198
 Brachyscome 7, 14, 44
 Brazilian Bachelor's Button 179
 Brazilian Button Flower 179
 Brazilian Fireweed 308
 Bristly Hawksbeard 93
 Brown Knapweed 83
 Brunoniaceae 4
 Bull's Tongue 173
 Bupththalmum
 spinosum L. 385
 uniflorum G.Forst. 523
 uniflorum Willd. 523
 Burdock 4, 6
 Greater 66
 Lesser 67
 Burr
 Bathurst 568
 Californian 571
 Hunter 571
Burr continued
 Noogoora 8, 570
 South American 570
 Burr Marigold 460
 Trifid 460
 Burr Ragweed 561
 Button Flower
 Brazilian 179
Cacalia
 linearis Labill. 200
 odorata (Hornem.) Desf. 252
 ovalis Ker Gawl. 315
 salicina Labill. 199
 sonchifolia L. 312
 Calendula L. 7, 13, 34, 316, **317**
 arvensis L. **317**, 319
 fruticosa L. 328
 monstrosa Burm.f. 324
 officinalis L. 7, 317, **318**, 319
 palaestina Boiss. xxi, 317, **318**, 319
 pluvialis L. 322
 Californian Burr 571
 Calocephalus 13, 40
 Calomba Daisy 357
 Calomeria 13, 37
 amaranthoides Vent. 7
 Calotis 14, 33, 44
 Calyceraceae 3, 4
 Calyptocarpus Less. 16, 23, 30, 493, 494, **501**
 vialis Less. 475, **501**, 502
 Campanulaceae 3
 Campactra 14, 43
 Canada Thistle 59
 Cape Ivy 206
 Cape Marigold 322
 Cape Weed 162
 Capeweed 7
 Coast 160
 Carbeni
 benedicta (L.) Adans. 79
 Cardoon 62
 Carduus L. 7, 8, 11, 22, 48, 50, **51**
 acanthoides L. 52, **54**
 acarna L. 57
 acaulis L. 60
 arvensis (L.) Robson 59
 crispus L. 55
 lanceolatus L. 58
 macrocephalus Desf. 52
 marianus L. 56
 nutans L. xiv, 51, **52**
 subsp. *macrocephalus* (Desf.) Nyman 52
 palustris L. 60
 pycnocephalus L. 52, 53, **54**, 55
 syriacus L. 61
 tenuiflorus Curtis 52, **55**
 thoermeri Weinm. 52, **54**
 vulgaris Savi 58
 Carpesium L. 15, 28, 372, **387**
 cernuum L. 386, **387**
 var. *queenslandicum* Domin 387
 Carrot Weed 361
 Carthamus L. 7, 11, 21, 50, **67**
 dentatus Vahl 68, **69**
 glaucus auct. non M.Bieb. 69
 lanatus L. xv, 68, **69**, 70

INDEX

- Carthamus continued*
leucocaulos Sm. 68, **69**
tinctorius L. 5, 6, 67, **68**
Cassinia 7, 13, 36
Cats-ear 138
Smooth 136
Celmisia, 14, 42
spathulata A.Cunn. ex DC. 46
Centaurea L. 7, 8, 11, 21, 22, 49, **74**
aspera L. 74, **77**
australis (Gaudich.) F.M.Bailey 72
benedicta (L.) L. 74, **79**
calcitrapa L. 74, **75**, 76, 77
cineraria L. 75, **80**
cyanoides Wahlenb. 83
cyanus L. 75
eriphora L. 74, **78**
iberica Trevir. ex Spreng. 77
isnardii L. 77
jacea auct. non L. 82
jacea L. 75, 76, **83**
macrocephala Willd. 74, 75
maculosa auct. non Lam. 80
melitensis L. xv, 74, 76, **77**
×moncktonii C.E.Britton 75, **82**
montana L. 74, 75
nigra auct. non L. 82
nigra L. 75, **82**, 83
nigrescens auct. non Willd.
 subsp. *nigrescens* 82
nigrescens Willd. 75
paniculata L. 74, 75, **79**
picris Pall. ex Willd. 72
ragusina L. 74, 75
repens L. 72
riparia DC. 179
salmantica L. 73
scabiosa L. 75
solstitialis L. 74, **78**, 81
sp. *B* 82
stoebe L. 75, **80**, 81
Centipeda Lour. 15, 26, 330, **430**
borealis N.G.Walsh 432, **434**, 436, 440
crateriformis N.G.Walsh 430, 431, 432, 433, **439**
 subsp. *compacta* N.G.Walsh 439, **441**
 subsp. *crateriformis* **439**, 440, 441
cunninghamii (DC.) A.Braun & Asch. 430, 432, 433, 435, **438**
elatinoides (Less.) Benth. & Hook. ex O.Hoffm. 431, **432**, 435, 473
minima auct. non (L.) A.Braun & Asch. 434
minima (L.) A.Braun & Asch. 430, 431, 432, **433**, 436, 437, 438
 subsp. *A59820 Elkedra* 434
 subsp. *A94915 N'Dhala Gorge* 433
 subsp. *macrocephala* N.G.Walsh 433, **434**
 subsp. *minima* **433**, 434, 435, 439
 var. *lanuginosa* (DC.) Domin 433, 434
 var. *minima* 438
nidiformis N.G.Walsh 431, **436**
orbicularis Lour. 433
 var. *lanuginosa* (DC.) F.M.Bailey 433
 var. *sternutatoria* (Roxb.) F.M.Bailey 433
pleiocephala N.G.Walsh 431, 432, 433, **437**, 440
racemosa (Hook.) F.Muell. 432, **437**, 440
 var. *lanata* F.M.Bailey 437
sp. *I* 432
Centipeda continued
sp. 92472 *Toko Range* 437
sp. aff. *minima* (Mallee) 436
sp. aff. *thespidioides* (North-west) 439, 441
sp. *D14869 borealis* 434
sp. *D17777 Sanctuary Swamp NT Herbarium* 436
sp. *D18576 Andado* 439
thespidioides F.Muell. 430, 432, 433, 435, **441**
Centratherum Cass. 12, 26, 72, **177**
muticum (Kunth) Less. 179
punctatum Cass. xix, 177, 178, **179**
 subsp. *australianum* K.Kirkman 179
riparium (DC.) A.R.Bean 177, 178, **179**
Centromadia Greene 17, 31, **584**
pungens (Hook. & Arn.) Greene **585**
Centropappus Hook.f. 12, 24, 32, 193, **196**, 198
brunonis Hook.f. 196, 197, **198**
Cephalipterum 13, 40
Cephalosorus 13, 39
Ceratocephalus Kuntze 546
acmella (L.) Kuntze 500
anactinus (F.Muell.) Kuntze 548
Ceratogyne 14, 26, 43, 330
Chamaemelum Mill. 15, 34, 330, 331, **342**
nobile (L.) All. 5, 342, **343**, 344, 345, 353
Chamomile 343
Dyer's 345
English 5
Field 344
German 5
Globe 357
Rayless 355
Rounded 355
Scentless False 353
Wild 355
Yellow 345
Chamomile Tea 5
Chamomilla Gray 353
recutita (L.) Rauschert 355
Chickweed 576
Chicory 4, 5, 89
Coffee 4
Chinese Burr
Goat's Head 578
Chinese Creeper 592
Chinese Wormwood 338
Chioggia 4
Chocolate Cosmos 454
Chondrilla L. 12, 20, 86, **90**
junceae L. xv, 8, **90**, 91
Chondropyxis 13, 38
Chromolaena DC. 17, 24, 587, **595**, 597
horminoides DC. 595
odorata (L.) R.M.King & H.Rob. 480, 591, **596**, 597
squalida (DC.) R.M.King & H.Rob. 591, 596, **597**
Chrysanthemoides Fabr. 13, 35, 316, **320**
monilifera (L.) Norl. 8, **320**, 323
 subsp. *monilifera* **320**
 subsp. *rotundata* (DC.) Norl. xxi, 320, **321**
Chrysanthemum
anethifolium auct. non Brouss. ex Willd. 347
coronarium L. 348
foeniculaceum auct. non Willd. 347
frutescens L. 347
incanum Thunb. 358
indicum L. 7

INDEX

- Chrysanthemum continued*
lacustre auct. non Brot. 352
leucanthemum L. 351
paludosum Poir. 350
parthenium (L.) Bernh. 335
segetum auct. non L. 348
segetum L. 350
 Summer 348
 ×*superbum* Bergmans ex J.W.Ingram 352
vulgare (L.) Bernh. 336
Chrysocephalum 7, 13, 37, 41
Chrysogonum
ecliptoides (F.Muell.) F.Muell. 508
peruvianum L. 549
procumbens (DC.) F.Muell. 534
 sp. A 509
trichodesmoides (F.Muell.) F.Muell. 505
Chthonocephalus 13, 39
Cichorium L. 12, 19, 84, 86, **89**
endivia L. 89
intybus L. 4, 6, **89**, 91
 var. *sativum* Bisch. 5
Cinderella Weed 495
 Creeping 501
Cineraria L. 7, 12, 32, 193, **208**
crassiflora Poir. 305
lyrata DC. 208
geifolia L. 208
lyratiformis Cron 205, **208**
petasitis Sims 204
Cirsium Mill. 7, 11, 21, 49, 50, 57, **58**
acarna (L.) Moench 57
acaule (L.) All. 60
arvense (L.) Scop. 58, **59**
 var. *arvense* **59**
 var. *vestitum* Wimm. & Grab. 59, **60**
heterophyllum (L.) Hill 58
lanceolatum Hill 60
lanceolatum (L.) Scop. 58, 60
lyratum Bunge 51
palustre (L.) Scop. 60
syriacum (L.) Gaertn. 61
vulgare (Savi) Ten. *xiv*, **58**, 60
 Climbing Hemp Vine 592
 Clotburr 570
 Spiny 568
 Clumping Gazania 171
Cnicus L. 74
arvensis (L.) Hoffm. 59
benedictus L. 74, 79
lanceolatus (L.) Willd. 58
palustris 60
syriacus (L.) Roth 61
 Coast Capeweed 160
 Cobber Weed 581
 Cobbler's Pegs 460
 Native 453
 Cobbler's Tack 453
 Cocklebur 570
 Common 568
 European 571
 Italian 571
 Large 570
 Spiny 568
 Cockleburs 566
 Cockspur
 Maltese 78
 Woolly 78
 Coffee Chicory 4
Coleocoma F.Muell. 15, 29, 388, **419**
centaurea F.Muell. **419**, 420
 Common Cocklebur 568
 Common Cotula 361
 Common Gazania 171
 Common Groundsel 305
 Common Sow Thistle 8
 Common Spikeweed 585
 Common Sunflower 554
 Common Tansy 336
 Commonwealth Weed 220
 Compositae **2**
Conyza 14, 42
axillaris Lam. 375
bonariensis (L.) Cronquist 7
canadensis (L.) Cronquist 7
cinerea L. 183
lacera Burm.f. 377
patula Dryand. 187
redolens Willd. 400
riparia Blume. 373, 375
Coreopsis L. 15, 31, 446, 447, **456**, 458
aurea Aiton 462
bitematus Loureiro 467
 Garden 457
grandiflora auct. non Hogg. ex Sweet 457
 var. *grandiflora* auct. non Hogg. ex Sweet 457
grandiflora Hogg. ex Sweet 457, 458
lanceolata L. 450, 456, **457**, 458, 474
leucantha L. 462
tannensis Forst. ex Spreng. 452
tinctoria Nutt. 457
 Corn Marigold 350
 Cornflower
 Austral 72
 Coronidium 7, 13, 37
Cosmos Cav. 7, 15, 31, 446, 447, **454**
atrosanguineus (Hook.) Voss 454
bipinnatus Cav. 454, **455**, 474
 var. *exaristatus* DC. 455
capitata 454
caudatus Kunth 454, **455**
 Chocolate 454
Sulfureus Cav. 456
sulphureus Cav. 454, **456**
 Yellow 454, 456
 Cotton Fireweed 233
 Cotton Lavender 332
 Cotton Thistle 65
Cotula L. 15, 26, 35, 330, 332, **359**
alpina (Hook.f.) Hook.f. 359, 361, **364**, 365
 Alpine 364
australis (Sieber ex Spreng.) Hook.f. 359, **361**, 363
bipinnata Thunb. 359, 360, **363**, 364
 Common 361
coronopifolia L. 7, 359, 360, 362, **363**, 364
cotuloides (Steetz) Druce 359, **360**, 361, 363
cunninghamii F.Muell. 438
drummondii Benth. 367
 Ferny 362, 363
filicula (Hook.f.) Benth. 365
filifolia auct. non Thunb. 360
globifera Thunb. 357

INDEX

- Cotula continued*
gymnogyne F.Muell. ex Benth. 360, 361
integrifolia Hook.f. 363
longipes (Hook.f.) W.M.Curtis 367
minuta G.Forst. 433
Mountain 365
pilulifera L.f. 357
reptans (Benth.) Benth. 367
var. *major* Benth. 367
sect. *Leptinella* (Cass.) Hook.f. 364
Slender 360
Smooth 360
sternutatoria (Roxb.) Wall. ex DC. 433
turbinata L. 359, **361**, 362, 364
vulgaris Levyns, 359, **360**, 363
var. *australasica* J.H.Willis **360**, 361, 362
Craspedia 7, 8, 13, 37, 39
Crassocephalum Moench 12, 24, 193, **311**
cernuum (L.f.) Moench 311
crepidioides (Benth.) S.Moore 308, 310, **311**, 312
Cratystylis S.Moore 15, 29, **388**
centralis Albr. & Paul G.Wilson 389, **391**
conocephala (F.Muell.) S.Moore 388, 389, **390**, 392
conocephala × *microphylla* 389, **392**
microphylla auct. non S.Moore 392
microphylla S.Moore 389, **390**, 392
subspinescens S.Moore 389, **391**
Creeping Bears-ear 162
Creeping Cinderella Weed 501
Creeping Crofton Weed 589
Creeping Ox-eye 519
Creeping Thistle 59
Cremnothamnus 13, 35
Crepis L. 12, 20, 21, 86, 87, **92**
barbata L. 131
biennis L. 92
capillaris (L.) Wallr. 91, **92**, 93, 94, 95
Dandelion 95
dioscoridis L. 92
foetida L. 92, 93, **94**
a. *vulgaris* Bisch. 94
subsp. *foetida* 91, **94**
subsp. *vulgaris* (Bisch.) Bab. 94
japonica (L.) Benth. 113
nicaeensis Balb. ex Pers. 95
pusilla (Sommier) Merxm. 92, **95**
setosa Haller f. 91, 92, **93**
taraxacifolia Thuill. 94
tectorum auct. non L. 92
vesicaria L. 92, 93
subsp. *haenseleri* (Boiss. ex DC.) P.D.Sell 94
subsp. *taraxacifolia* (Thuill.) Thell. 93, **94**, 95
virens L. 92
virgata Desf. 131
Crofton Weed 588
Creeping 589
Crownbeard 542
Crupina 11, 21, 49
vulgaris Cass. 50
Cryptostemma R.Br. 160
calendula (L.) Druce 162
calendulacea (L.) R.Br. 162
niveum (L.f.) G.Nicholson 160
triste (L.) Domin 162
Ctenosperma Hook.f. 359
alpinum Hook.f. 359, 364
Culcitium
lineare (Labill.) Spreng. 200
salicina (Labill.) Spreng. 199
Cupularia Godr. 383
Curious Weed 489
Curly Endive 4
Cyanthillium Blume 12, 27, 173, **183**
cinereum (L.) H.Rob. **183**, 187
var. *cinereum* **184**, 186
var. *lanatum* (J.Kost.) Ghafoor **184**, 186, **607**
var. *linifolium* (Blume) Karthik. & Moorthy
184, **185**
var. *pinnatifidum* Ghafoor 184, **185**, **607**
patula 187
patulum (Dryand.) H.Rob. 183, **187**
villosum Blume 183
Cyanus
segetum Hill 75
Cyclachaena 562
Cymbonotus Cass. 12, 34, 35, 159, **165**
lawsonianus Gaudich. 165, **166**, 167
maidenii (Beauverd) A.E.Holland & V.A.Funk **165**
preissianus Steetz xviii, 165, **166**
sp. (*Mitchell R.W.Johnson* 2237) 165
sp. 1 165
sp. A 165
Cynar 5
Cynara L. 7, 11, 22, 48, 50, **61**
cardunculus L. 4, **61**
subsp. *flavescens* Wiklund **61**, 62
var. *scolymus* (L.) Benth. 61
scolymus L. 4, 5, 61
Dahlberg Daisy 488
Dahlia Cav. 7, 15, 31, 446, 447, **468**
coccinea Cav. 469, 470
Garden 469
imperialis Roezl ex Ortgies 468, **469**, 474
xpinnata Cav. 468, **469**, 470
rosea Cav. 469, 470
sorensenii Hansen & Hjerting 470
Tree 469
variabilis Desf. 470
Dandelion
Mountain 100
Native 126, 127
Dandelion *Crepis* 95
Dandelion Hawksbeard 94
Dandelions 96
Decaneuropsis H.Rob. & Skvarla 12, 27, 172, **189**
cumingiana (Benth.) H.Rob. & Skvarla 189
obovata (Gaudich.) H.Rob. & Skvarla **189**, 190
Decazesia 13, 39
Delairea Lem. 12, 24, 193, **206**
odorata Lem. xx, 205, **206**
Desert Daisy 428
Devil's Grandmother 175
Dichrocephala 14, 26, 43
Dichromochlamys 14, 42
Dielitzia 13, 39
Dimorphocoma 14, 27, 43, 330
Dimorphotheca Vaill. 8, 13, 34, 316, **321**
ecklonis DC. 328
fruticosa (L.) DC. 328
jucunda E.Phillips 326
pluvialis (L.) Moench 321, **322**, 323, 324
sinuata DC. **322**

INDEX

- Diodontium F.Muell. 15, 23, 32, 33, 447, **449**
 filifolium F.Muell. **449**, 450, 453
Discritothamnus B.L.Rob. 573
 Dithyrostegia 13, 39
 Dittrichia Greuter 15, 28, 33, 372, **383**
 graveolens (L.) Greuter 383, **384**
 viscosa (L.) Greuter 383, **384**
 Dog Fennel 5
 Dog's Tongue 176
 Dread 188
 Dreadlock 188
 Dune Arcotrocha 160
 Dune Thistle 122
 Dusty Miller 80
 Dwarf Marigold 489
 Dyer's Chamomile 345
- Echinacea 491
 angustifolia DC. 6
 pallida (Nutt.) Nutt. 6
 purpurea (L.) Moench. 6
 Echinops 11, 21, 50
 exaltatus Schrad. 49, 50
 sphaerocephalus L. 49
 Eclipta L. 16, 23, 31, 492, 493, **513**
 alatocarpa Melville **514**, 515, 518
 alba (L.) Hassk. 517
 var. *erecta* (L.) Miq. 517
 erecta auct. non L. 516
 erecta L. 513, 517
 Gove entity 517
 Humpty Doo entity 517
 latifolia L.f. 500
 platyglossa F.Muell. 514, **516**
 subsp. *borealis* E.W.Cross & Orchard 515,
 516, **517**
 subsp. *platyglossa* 515, **516**, 517
 prostrata (L.) L. 514, 515, 516, **517**, 518
 sp. *Gove* (*J.L.Egan* 2784) 517
 sp. *Humpty Doo* (*H.S.McKee* 8360) 517
 sp. *Perth* (*S.Lloyd s.n.* 3/4/1998) 517
 White 518
 Yellow 516
 Elachanthus 14, 27, 43, 330
 Elephant Weed 176
 Elephant's Foot 173
 Prickly-leaved 173
 Elephantopus L. 12, 24, 172, **173**
 mollis Kunth 175
 scaber L. 173, 175
 spicatus B.Juss. ex Aubl. 176
 tomentosus L. 173, 174, **175**
Eleutheranthera
 ruderalis 503
 Eleutheranthera Poit. 16, 23, 493, **503**
 ovata Poit. 503
 ruderalis (Sw.) Sch.Bip. 475, 502, **503**
Embergeria
 megalocarpa (Hook.f.) Boulos 122
 Emilia Cass. 12, 22, 24, 193, **312**
 flammea Cass. 314
 fosbergii Nicolson 312, **313**
 purpurea auct. non Cass. 313
 sonchifolia (L.) DC. **312**
 var. *javanica* (Burm.f.) Mattf. **313**
 var. *sonchifolia* xxi, 310, **313**
 var. *typica* Domin 312
- Endive 4
Enchydra F.Muell. 481
 Woollsii 481
 English Chamomile 5
Enhydra DC. 470, 481
 paludosa 481
 Enydra Lour. 15, 22, 31, 470, **481**
 fluctuans auct. non Lour. 481
 fluctuans Lour. 481, **483**
 paludosa auct. non (Reinw.) DC. 481
 paludosa (Reinw.) DC. 483
 woollsii F.Muell. **481**, 482
 Epaltes Cass. 402
 australis Less. 403, 406
 cunninghamii (Hook.) Benth. 407
 harrisii F.Muell. 404
 littoralis (Retz.) Less. 406
 pleiochaeta F.Muell. 414
 sect. *Ethuliopsis* (F.Muell.) F.Muell. 407
 Epitriche 13, 39
Erechthites
 arguta
 var. *glomerata* (DC.) Domin 226
 quadridentata
 var. *glandulosa* (A.Cunn. ex DC.) Domin 230
 Erechites Raf. 12, 24, 193, 209, **307**
 apargiaefolia (Walp.) Sond. 306
 apargiifolia (Walp.) Sond. 306
 arguta (A.Rich.) DC. 226
 var. *asper* Hook.f. 224
 var. *bathurstiana* (DC.) Domin 221
 var. *dissecta* auct. non Benth. 226
 var. *dissecta* Benth. 221
 var. *glabrata* Hook.f. 308
 var. *glomerata* (DC.) Domin 226
 var. *microcephala* Benth. 306
 var. *obovata* Hook.f. 226
 var. *ε* Hook.f. 225
 argutus (A.Rich.) DC.
 var. *glabratus* Hook.f. 308
 atkinsoniae F.Muell. 220
 bathurstiana DC. 221
 candicans Hook.f. 244
 erecta F.Muell. ex Lange 233
 glabrescens DC. 231
 glandulosa A.Cunn. ex DC. 230
 glomerata DC. 226
 var. *polyccephala* DC. 226
 var. *subincisa* DC. 226
 glossantha Sond. 281
 gunnii Hook.f. 237
 hispidula auct. non (A.Rich.) DC. 243
 hispidula (A.Rich.) DC. 222
 incana Turcz. 233
 labillardierei Hieron. 238
 lacerata F.Muell. 228
 minima (Poir.) DC. 216
 mixta auct. non (A.Rich.) DC. 229
 mixta (A.Rich.) DC. 309
 mixtus (A.Rich.) DC. 309
 muelleri Lange 308
 Mulleri Lange 308
 picridioides Sond. 229
 picridioides Turcz. 219
 praealta Raf. 309
 praealtus Raf. 307, 309

INDEX

- Erechtites continued*
prenanthoides (A.Rich.) DC. 238
var. *picridioides* (Turcz.) Benth. 219
pumila DC. 216
quadridentata (Labill.) DC. 233
var. *glabrescens* (DC.) Benth. 231
var. *glandulosa* (A.Cunn. ex DC.) Domin 230
var. *gunnii* (Hook.f.) Benth. 237
richardiana DC. 243
sonchoides DC. 219
tenuiflora DC. 236
valerianaefolia (Wolf) DC.
f. *valerianaefolia* 308
valerianifolius (Wolf) DC. **308**
f. *valerianifolius* xx, **308**, 310, 312
- Erigerodes* 404
australe (Less.) Kuntze 403
cunninghamii (Hook.) Kuntze 407
- Erigeron* 14, 42
decurrens DC. 422, 424
graveolens L. 384
liatroides Turcz. 427
molle D.Don 375
sect. *Pterigeron* DC. 422
viscosus L. 384
- Eriocephalus* L. 15, 26, 330, **356**
africanus L. **356**
- Eriochlamys* 13, 25, 39
- Erodiophyllum* 14, 34, 35, 43
- Erymophyllum* 13, 40
- Escarole* 4
- Ethulia* L.f. 12, 26, 172, **176**
conyzoides L.f. 176, **177**, 178
cunninghamii Hook. 407
- Ethuliopsis* F.Muell. 15, 28, 29, **407**
cunninghamii (Hook.) F.Muell. 405, **407**
dioica F.Muell. 407
- Euchiton* 13, 29, 37, 41
- Eupatorium* L. 8, 17, 23, 586, 587, 597, **598**
adenophorum Spreng. 588
cannabinum auct. non L. 594, 599
cannabinum L. 598, 600
catarium Veldkamp 598
clematideum Griseb. 598
ligustrinum DC. 589
lindleyanum DC. **599**, 600, 602
odoratum L. 595, 596
riparium Regel 589
sect. *Chromolaena* (DC.) Benth. ex Baker 595
sect. *Cylindrocephala* DC. 595
sect. *Osmia* (Sch.Bip.) Benth. ex Baker 595
serotinum Michx. **599**, 602
squalidum DC. 597
- Euphrosyne* DC. 562
- European Cocklebur* 571
- Eurybia*
conocephala F.Muell. 390
- Euryops* (Cass.) Cass. 12, 32, 35, 193, **207**
abrotanifolius (L.) DC. 205, **207**
chrysanthemoides (DC.) B.Nord. 205, 207, **208**
erectus (Compton) B.Nord. 207
Winter 207
- Ewartia* 13, 29, 37
- Eyrea* F.Muell. 408
rubelliflora F.Muell. 408, 411
- Facelis* 13, 41
- False Chamomile*
Scentless 353
- False Hawkbit* 135
- False Sow-thistle* 124
- Febraea*
rhytismoides 365
- Feldstonia* 13, 39, 44
- Felicia* 14, 44
- Ferny Cotula* 362, 363
- Feverfew* 6, 335
- Field Chamomile* 344
- Field Marigold* 317
- Field Zinnia* 549
- Filago* 13, 28, 41
- Fireweed*
Brazilian 308
Cotton 233
Jagged 219
Purple 309
- Fitzwillia* 13, 39
- Flat-weed* 138
White 139
- Flaveria* Juss. 16, 25, **484**
australasica Hook. 484
subsp. *gilgai* Keighery 484
bidentis (L.) Kuntze 484
trinervia (Spreng.) C.Mohr **484**, 485
- Fleabane* 7, 184
Purple 184, 185
Spreading 187
- Fleshy Groundsel* 267
- Florestina* Cass. 16, 23, 489, **490**
pedata (Cav.) Cass. 490
sticky 490
tripteris DC. 485, **490**
- Franseria* Cav. 559
ambrosioides Cav. 559
confertiflora (DC.) Rydb. 561
tenuifolia Harv. & A.Gray 561
- Frisée* 4
- Fruit Salad Plant* 394
- Gaillardia* Foug. 15, 32, **443**
amara Raf. 445
aristata 443
×*grandiflora* Van Houtte **443**
picta Sweet 445
pulchella Foug. 7, 443, 444, **445**
var. *picta* (Sweet) A.Gray 445
- Galinsoga* Ruiz & Pav. 17, 31, 572, **574**, 576
parviflora Cav. 479, 574, 575, **576**
quadriradiata Ruiz & Pav. 574
- Gallant Soldier* 576
- Gamochaeta* 13, 37, 41
- Gamolepis*
chrysanthemoides DC. 208
- Garden Coreopsis* 457
- Garden Dahlia* 469
- Garden Marigold* 318
- Gauri* 523
- Gazania* Daisy 170
- Gazania* Gaertn. 12, 32, 33, 159, **170**
Clumping 171
Common 171
Hardy 170
linearis (Thunb.) Druce xviii, 169, **170**

INDEX

- Gazania *continued*
pavonia R.Br. 171
rigens (L.) Gaertn. 170, **171**
 Trailing 171
 Gerbera 7
 Native 46
 German Chamomile 5
 Giant Bluetop 598
 Gilbertia 13, 38
 Gilruthia 13, 40
 Glaucous Star Thistle 69
 Glebionis Cass. 15, 34, 331, **348**
 coronaria (L.) Cass. ex Spach **348**, 349
 segetum (L.) Fourr. 348, **350**
 Globe Chamomile 357
 Glossocardia Cass. 15, 23, 33, 447, **451**
 bidens (Retz.) Veldkamp 449, 450, 451, **452**, 453
 linearifolia Cass. 451
 orthochaeta (F.Muell.) Veldkamp 451, **453**, **609**
 refracta Veldkamp **451**, 452
 Glossogyne Cass. 451
 bidens (Retz.) Alston 452, 453
 bidentidea F.Muell. 452
 filifolia (F.Muell.) F.Muell. ex Benth. 449
 orthochaeta F.Muell. 453, 609
 retroflexa F.Muell. 447, 448
 pedunculosa DC. 452
 sect. *Trioncinia* F.Muell. 447
 tannensis (Spreng.) Garn.-Jones 452
 tenuifolia (Labill.) Cass. 451
 tenuifolia (Labill.) Cass. ex Less. 452
 var. *divaricata* Domin 452
 Gnaphalium 13, 25, 29, 37, 41
 solidaginoides Poir. 382
 Gnephosis 13, 39
 Goat's Head Chinese Burr 578
 Goatweed 594
 Gobo Root 4
 Golden Thistle 88
 Spotted 88
 Goldweed 542
 Goodeniaceae 3, 4
 Gorteria L. 12, 34, 159, **167**
 calendulacea DC. 167
 fruticosa (L.) Ehrh. 168
 linearis Thunb. 170
 personata L. **161**, **167**
 rigens (L.) L. 171
 Gratwickia 13, 41
 Greater Beggar's Ticks 465
 Greater Burdock 66
 Grindelia 14, 33, 42
 Groundsel
 Alpine 278
 Common 305
 Fleshy 267
 Ivy 206
 Purple 303
 Saw 273
 Stiff 259
 Guayule Rubber 6
 Guizotia Cass. 17, 30, 572, **578**
 abyssinica (L.f.) Cass. 5, 575, 578, **579**
 scabra Choiv. 5
 Gukwonderuk 438
 Gymnanthemum
 obovatum Gaudich. 189
 Gymnocoronis DC. 17, 23, 587, **604**
 attenuata DC. 604
 spilanthoides (D.Don ex Hook. & Arn.) DC. 602, **604**
 Gymnogyne Steetz 359
 cotuloides Steetz 359, 360
 Gymnolomia 552
 Gymnostyles
 anthemifolia Juss. 370
 pterosperma Juss. 369
 Gynaphanes Steetz 407
 australis Steetz 407
 Gynura Cass. 12, 24, 194, **314**
 auriculata Cass. 314
 crepidioides Benth. 311
 drymophila (F.Muell.) F.G.Davies 311, **314**
 var. *drymophila* xxi, 310, **315**
 var. *glabrifolia* P.I.Forst. & Thongp. **315**
 ovalis (Ker Gawl.) DC. 315
 pseudochina auct. non (L.) DC. 315
 Haeckeria 13, 36
 Haegiela 13, 40, 41
 Hairy Hawkbit 140
 Hamelin Thistle 168
 Haplotaxis
 australasica F.Muell. 51
 Haptotrichion 13, 38
 Hard Heads 72
 Hardy Gazania 170
 Hartmannia
 pungens Hook. & Arn. 585
 Hawkbit
 False 135
 Hairy 140
 Hawksbeard
 Bristly 93
 Dandelion 94
 Smooth 93
 Stinking 94
 Hawksbeards 92
 Hawkweed 143
 Orange 129
 Yellow 131
 Hay-feverweed 560
 Hedypnois Mill. 12, 20, 86, **132**
 cretica (L.) Dum.Cours. 133
 rhagadioloides (L.) F.W.Schmidt 131, **132**
 subsp. *cretica* (L.) Hayek 130, **133**, 134
 subsp. *rhagadioloides* 130, **133**, 134
 Helenium L. 8, 15, 32, 442, 443, **445**
 amarum (Raf.) H.Rock **445**
 autumnale L. 445
 tenuifolium Nutt. 445
 Helianthus L. 7, 16, 32, 491, 551, 552, **553**
 annuus L. 7, 491, 553, **554**, 555, 558
 subsp. *annuus* 556
 subsp. *macrocarpus* (DC.) Cockerell 556
 argophyllus Torr. & A.Gray 554, **557**, 558
 ciliaris DC. 538, 554, 555, **557**
 cucumerifolius Torr. & A.Gray 558
 debilis Nutt. 554
 subsp. *cucumerifolius* (Torr. & A.Gray) Heiser 555, **558**
 sect. *Agrestes* 554
 sect. *Ciliares* 554
 sect. *Divaricati* 554

INDEX

- Helianthus continued*
 sect. *Helianthus* 554
tuberosus L. 4, 6, 554, 555, **556**
Helichrysum 8, 13, 37
Heliotrope
 Winter 204
Helminthia Juss. 141
echioides (L.) Gaertn. 141
Helminthotheca Zinn 12, 20, 86, **141**
echioides (L.) Holub *xvii*, **141**, 142, 143
Helmintia
echioides (L.) Gaertn. 141
Hemisteptia Fisch. & C.A.Mey. 11, 21, 49, **50**
lyrata (Bunge) Fisch. & C.A.Mey. 50, **51**, 53
Hemizonia
pungens (Hook. & Arn.) Torr. & A.Gray 585
Hemp Vine
 Climbing 592
Heptanthus 470
Heterotheca 14, 33, 42
Hevea 6
Hieracium L. 12, 21, 87, **128**
aurantiacum L. 85, 128
 subsp. *carpathicola* Nägeli & Peter *xvii*, **129**, 130
javanicum Burm.f. 313
murorum L. 128
pilosella L. 128
praealtum Vill. ex Gochnat 128
 subsp. *bauhinii* (Besser) Petunn. 128
Hippia
stolonifera Brot. 370
Hog-weed 560
Hullsia 14, 44
Hunter Burr 571
Hyalochlamys 13, 39
Hyalosperma 7, 13, 40
Hymenatherum
tenuilobum DC. 488
Hyoseris
cretica L. 133
rhagadioloides L. 132
taraxacoides Vill. 140
Hypochoeris L. 12, 19, 85, **135**
albiflora (Kuntze) Azevedo-Gonc. & Matzenb.
 136, 137, **139**
brasiliensis
 var. *albiflora* Kuntze 139
 glabra L. 135, **136**, 137, 138, 139
 hispida Willd. 139
 microcephala
 var. *albiflora* (Kuntze) Cabrera 139
 radicata L. *xvii*, 136, **138**, 139, 141
 f. *gigantea* Hochr. 139
 sect. *Achyrophorus* 139
 sect. *Hypochoeris* 139
Hypochoeris 136

Illyrian Thistle 65
Indian Blanket 443, 445
Indian Weed 583
 Pale 582
Indocypraea
montana 534
Inteng-inteng 433
Inula L. 8, 371
 graveolens (L.) Desf. 384
 viscosa (L.) Desf. 384

Inulaceae Bercht. & J.Presl 371
Inulin 6
Iotasperma 14, 42
Iron Weed 184
Isoetopsis 14, 25, 43, 330
Italian Cocklebur 571
Iva L. 16, 23, 559, **562**
 annua L. 562
 axillaris Pursh 564
 subsp. *axillaris* 564
 subsp. *robustior* (Hook.) Bassett 563, **564**
 var. *robustior* Hook. 564
 sect. *Cyclachaena* 562
 sect. *Iva* 562
 sect. *Linearbractea* 562
Ivy
 Cape 206
 Natal 304
Ivy Groundsel 206
Ixiochlamys 14, 33, 42
Ixiolaena 8, 13, 27, 37
Ixodia 13, 28, 36

Jagged Fireweed 219
Japanese Sunflower 552
Jerusalem Artichoke 4, 5, 556
Jo-Jo 8, 369

Karengkal 433
Kata-palkalpa 433
Kempton's Weed 590
Kentrophyllum Neck. ex DC. 67
 lanatum (L.) DC. & Duby 67, 69
Kippistia 14, 43
Knapweed
 Black 82
 Brown 83
 Meadow 82
 Protean 82
 Russian 72

Lactuca L. 8, 12, 20, 84, 86, **115**
 saligna L. 115, 116, **117**, 120
 sativa L. 4, 115
 scariola L. 115
 serriola L. *xvi*, 4, **115**
 f. *integrifolia* (Gray) S.D.Prince & R.N.Carter
 116, 120
 f. *serriola* **116**, 120
 virosa 115
 var. *integrifolia* Gray 116
Lacy Ragweed 562
Lagenophora 14, 25, 34, 43
Lappa
 minor Hill 67
Lapsana L. 12, 20, 86, **114**
 capillaris L. 92
 communis L. **114**
 subsp. *communis* 91, **114**
Large Cocklebur 570
Lasiantha DC. 494
Lasiospermum Lag. 15, 34, 331, **342**
 bipinnatum (Thunb.) Druce **342**
 pedunculare Lag. 342
 radiatum Trevir. 342

INDEX

- Launaea Cass. 12, 20, 87, **123**
 sarmentosa (Willd.) Kuntze 4, 85, **123**
 Lavender
 Cotton 332
Lavenia
 macrophylla Blume 603
 Lawrencella 13, 40
 Leiocarpa 13, 37
 Lemoorea 13, 39
 Leontodon L. 12, 20, 85, **140**
 hirtus auct. non L. 140
 hispidus L. 140
 leysseri auct. non (Wallr.) Beck 140
 saxatilis 137, **140**, 141
 taraxacoides (Vill.) Mérat 140
 Leptinella Cass. 15, 35, 330, 332, **364**
 drummondii (Benth.) D.G.Lloyd & C.J.Webb
 365, **367**
 filicula (Hook.f.) Hook.f. 364, **365**, 366
 intricata Hook.f. 367
 var. *multifida* (Hook.f.) Hook.f. 367
 longipes Hook.f. 365, **367**, 368, 472
 maniototo 365
 multifida Hook.f. 367
 reptans (Benth.) D.G.Lloyd & C.J.Webb 365,
 367, 368
 scariosa Cass. 364
 Leptorhynchus 7, 13, 28, 41
 Lesser Burdock 67
 Lettuce 4
 Prickly 115
 Willow-leaf 117
 Lettuces 115
 Leucanthemum Mill. 15, 35, 331, 348, **351**
 lacustre (Brot.) Samp. 352
 maximum auct. non (Ramond) DC. 352
 maximum (Ramond) DC. 352
 ×*superbum* (Bergmans ex J.W.Ingram)
 D.H.Kent 351, **352**
 vulgare Lam. 7, 349, **351**, 472
 Leuciva 562
 Leucochrysum 7, 13, 36, 37, 38
 Leucoglossum
 paludosum (Poir.) B.H.Wilcox, K.Bremer &
 Humphries 350
 Leucophyta 13, 36
Leuzea
 australis Gaudich. 72
Lidbeckia
 bipinnata Thunb. 342
 Lipoblepharis
 asperrima (Decne) Orchard 534
 urticifolia (Blume) Orchard 500, 536
 Lipochaeta DC. 521
 Logfia 13, 28, 41

 Madia Molina 17, 30, 584, **585**
 sativa Molina 585, **586**
 Malta Thistle 78
 Maltese Cockspur 78
 Mantisalca Cass. 11, 22, 49, **73**
 salmanica (L.) Briq. & Cavill. 71, **73**
 Marguerite 347
 Marigold 5, 7, 487
 African 162, 208
 Burr 460
 Cape 322
 Marigold *continued*
 Corn 350
 Dwarf 489
 Field 317
 Garden 318
 Palestine 318
 Pot 318
 Sun 322
 Tree 552
 Trifid Burr 460
 Wild 519
 Matricaria L. 15, 26, 34, 331, 332, 343, **353**
 discoidea DC. 355
 globifera (Thunb.) Fenzl ex Harv. 357
 inodora L. 353
 matricarioides (Less.) Porter 5, 354, **355**
 multiflora Fenzl ex Harv. 357
 parthenium L. 335
 perforata Mérat 353
 pilulifera (L.f.) Druce 357
 recutita L. 5, 353, **355**
 suffruticosa (L.) Druce 357
 Mauranthemum Vogt & Oberpr. 15, 34, 331, 343,
 348, **350**
 paludosum (Poir.) Vogt & Oberpr. **350**, 351, 354
 Mayweed
 Scentless 353
 Stinking 344
 Meadow Knapweed 82
 Melampodium L. 576
 australe Loeffl. 577
 ruderae Sw. 503
 Melanthera Rohr. 521
 biflora (L.) Wild 521
Melitella
 pusilla Sommier 95
 Menyanthaceae 4
 Mexican Sunflower 553
Microlonchus Cass. 73
 salmanicus (L.) DC. 73
 Microseris D.Don 12, 20, 87, **125**
 forsteri Hook.f. 126
 var. *subplumosa* Benth. 126
 lanceolata (Walp.) Sch.Bip. xvii, 4, 6, **126**, 127,
 128, 154
 latifolia Gand. 126
 obtusifolia Gand. 127
 pygmaea D.Don 125
 scapigera Sch.Bip. 126, **127**, 154, **606**
 tasmanica Gand. 127
 tenuicula Gand. 128
 walteri Gand. 126
 Mikania Willd. 17, 23, 587, **592**
 cordata (Burm.f.) B.L.Rob. 593
 dentata Spreng. 593
 micrantha Kunth 480, 591, **592**, 593
 scandens (L.) Willd. 592
 Mile-a-minute 592
 Milfoil 341
 Milleria L. 572, 578
 Millotia 13, 25, 26, 27, 28, 38
 Minty Pom-poms 422
 Minuria 14, 43
Mirasolia
 diversifolia Hemsl. 552
 Mistflower 589

INDEX

- Monenteles*
forsteri Endl. 400
glandulosus Benth. 399
globiferus DC. 396
intermedius DC. 396
redolens (Willd.) DC. 400
serrulatus Montrouz. 399
sphacelatus Labill. 394
sphaeranthoides DC. 395
spicatus Labill. 400
verbascifolius Benth. 401
Monoculus B.Nord. 13, 35, 316, **324**
monstrosus (Burm.f.) B.Nord. 323, **324**
Montagnea
hibiscifolia Benth. 540
Montanoa Cerv. 16, 31, 491, 538, **539**
bipinnatifida auct. non (Kunth) K.Koch 540
bipinnatifida (Kunth) K.Koch **539**, 540, 541
hibiscifolia Benth. 476, 539, **540**, 541
subg. *Acanthocarphae* 539
subg. *Montanoa* 539
tomentosa Cerv. 539
wercklei 540
Moonflower
African 322
Moonia
ecliptoides (F.Muell.) Benth. 508
procumbens (DC.) Benth. 534
sp. *Q1* 500
trichodesmoides (F.Muell.) Benth. 505
Mountain Cotula 365
Mountain Dandelion 100
Munyu-parnti-parnti 433
Murnong 126
Mustelia
eupatoria Spreng. 590
Mutisia L.f. 45
Myriocephalus 13, 39
Myriogyne Less. 430
cunninghamii DC. 438
elatinoides Less. 430, 432
minuta (G.Forst.) Less. 433
var. *lanuginosa* DC. 433
racemosa Hook. 437

Nablonium 13, 28, 37
Natal Ivy 304
Native Cobbler's Pegs 453
Native Dandelion 126, 127
Native Gerbera 46
Native
Sow-thistle 121
Neotysonia 13, 26, 38
Neuractis Cass. 451
bidens (Retz.) Veldkamp ex Tadesse 452
leschenaultia Cass. 451
Neurolaena R.Br. 470
Niebuhrria Britten 524
spilanthoides Britten 525
Niebuhrria Neck. 524
Niger 579
Niger Oil 5
Niger Seed 579
Nightshade 594
Nipplewort 114
Nodding Thistle 52, 54
Noogoora Burr 8, 570
Notobasis Cass. 11, 21, 50, **60**
syriaca (L.) Cass. 60, **61**

Odixia 13, 36
Oedera
trinervia Spreng. 484
Old Man Weed 438
Olearia 14, 27, 30, 42
conocephala (F.Muell.) Benth. 390
phlogopappa (Labill.) DC. 7
Oliganthemum
filifolium F.Muell. 429
Oligocarpus Less. 13, 34, 316, **325**
calendulaceus (L.f.) Less. **325**, 327
Oncosiphon Källersjö 15, 26, 332, 343, **356**
piluliferum (L.f.) Källersjö 356, **357**
suffruticosum (L.) Källersjö 354, 356, **357**
Onehunga 8, 369
Onobroma
leucocaulon (Sm.) Spreng. 69
Onopordum L. 7, 11, 21, 49, 50, **62**
acanthium L. 62, **65**
acaulon L. *xiv*, 62, **63**
illyricum L. 63, 64, **65**
leptolepis DC. 66
nervosum Boiss. 63
subsp. *castellanum* Gonz.Sierra, Perez
Morales, Penas & Rivas Mart. 63
tauricum Willd. 62, **63**
Orange Hawkweed 129
Osmia Sch.Bip. 595
Osteospermum L. 8, 13, 35, 316, **325**
calendulaceum L.f. 325
clandestinum (Less.) Norl. 324
ecklonis (DC.) Norl. 326, 327, **328**, 471
fruticosum (L.) Norl. 326, **328**
jucundum (E.Phillips) Norl. **326**
moniliferum L. 320
muricatum E.Mey. ex DC. **326**, 327
niveum L.f. 160
rotundatum DC. 321
sect. *Unifenestrata* Norl. 324
spinescens Thunb. 326, 327, **329**
spinosum L. 325
Othonna 268
abrotanifolia L. 207
gregorii (F.Muell.) C.Jeffrey 267
gypsicola R.J.Bates 268
rigens L. 171
subg. *Euryops* Cass. 207
Ox-eye
Creeping 519
Ox-eye Daisy 7, 351
Ox-tongue 141
Prickly 141
Oyster Plant 4, 157
Ozothamnus 7, 13, 35, 36

Paenula 13, 36
Pale Indian Weed 582
Palestine Marigold 318
Pallenis Cass. 385
spinosa (L.) Cass. 385
Pappachroma 14, 43
Parantennaria 13, 36
Paris Daisy 208
Parthenium L. 16, 29, 559, **564**
argentatum Gray 6, 565
hysterophorus L. 563, 564, **565**
Parthenium Weed 565

INDEX

- Pascalía Ortega 16, 30, 492, 493, **536**
 glauca Ortega **536**, 537, 557
 Pascalía Weed 538
 Pectis
 pinnata Lam. 489
 Pembertonía 14, 44
 Pentalepis F.Muell. 16, 31, 493, **504**
 ecliptoides F.Muell. 505, **508**
 subsp. *cucullata* Orchard 508, **510**
 subsp. *ecliptoides* 508, **509**, 513
 subsp. *hirsuta* Orchard 508, **509**
 grandis E.W.Cross 504, 507, **508**
 kakaduensis E.W.Cross 505, 507, **511**
 linearifolia Orchard 505, **510**
 subsp. *linearifolia* **510**, 512
 subsp. *nudibranchoides* Orchard 510, **511**, 512
 sp. 509, 513
 sp. Mt House (E.M.Bennett 1877) 509
 trichodesmoides F.Muell. 504, **505**
 subsp. *hispida* Orchard 505, **506**
 subsp. *incana* Orchard 505, **506**
 subsp. *trichodesmoides* **505**
 walcottii E.W.Cross 505, 509, 512, **513**
 Pentzia Thunb. 15, 26, 332, **358**
 crenata Thunb. 358
 globifera (Thunb.) Hutch. 357
 globosa Less. **358**
 incana (Thunb.) Kuntze **358**, 366
 suffruticosa (L.) Hutch. & Merxm 357
 virgata Less. 358
 Perennial Ragweed 561
 Perennial Thistle 59
 Peripleura 14, 43
 Petasites Mill. 12, 32, 193, **203**
 fragrans (Vill.) C.Presl **203**, 205
 major Mill. 203
Petasitis 203
 Peterson's Pest 576
 Petite Wormwood 5
 Phacellothrix 14, 29, 38
 Phellinaceae 4
 Phoebanthus 552
Phyllopappus Walp. 125
 lanceolatus Walp. 125, 126, 606
 Picnomon Adans. 7, 11, 21, 50, **57**
 acarna (L.) Cass. **57**, 64
 Picridium
 tingitanum (L.) Desf. 124
 Picris L. 12, 20, 86, **143**
 altissima Delile 143, 144
 angustifolia DC. 144, **145**
 subsp. *angustifolia* 142, **146**, 149, 150, 151, 153
 subsp. *carolorum-henricorum* (Lack)
 S.Holzapel 142, 143, **146**, 153
 subsp. *merxmuelleri* Lack & S.Holzapel 142,
 146, **147**, 153
 asperima Lindl. 146
 attenuata A.Cunn. 147
 barbarorum Lindl. 144, 148, 153, **154**
 burbidgeae S.Holzapel 145, 148, **151**, 152, 153
 burbidgei S.Holzapel 151
 carolorum-henricorum Lack 146
 compacta S.Holzapel 145, 148, **150**, 153
 conyzoides Lack & S.Holzapel 142, 144, **149**, 153
 drummondii S.Holzapel 145, 148, **151**, 153
 echioides L. 141, 143
 eichleri Lack & S.Holzapel 145, 148, **152**, 153
 Picris *continued*
 evae Lack 144, 148, 153, **154**
 hieracioides L. 143, 144, 147, 152, 155
 subsp. *hieracioides* 144
 var. *hieracioides* 149
 var. *squarrosa* (Steetz) Benth. 149
 squarrosa Steetz xviii, 144, 148, **149**, 150, 152,
 153, 155
 wagenitzii Lack 145, 148, **150**, 151, 153
 Pilbara, 14, 27, 43
 Pineapple Weed 5, 355
 Pitch Forks 460
 Pitchweed 585, 586
 Pithocarpa 14, 36, 40
 Placus
 solandri S.Moore 378
 Pleiogyne K.Koch. 359
 australis (Sieber ex Spreng.) K.Koch 361
 multifida (Hook.f.) Sond. 367
 reptans (Benth.) K.Koch 367
 Pleurocarpaea Benth. 12, 26, 172, 173, **180**
 denticulata Benth. **180**, 182
 fasciculata Dunlop 180, **181**, 182
 gracilis Lander & P.J.H.Hurter 180, **181**
 Pluchea Cass. 15, 29, 371, 387, 388, **408**
 alata A.R.Bean 409, **411**, 412
 baccharoides (F.Muell.) Benth. 409, **414**, 416
 conocephala (F.Muell.) F.Muell. 390
 var. *microphylla* F.Muell. & Tate 390, 392
 var. *subspinescens* F.Muell. & Tate 391
 dentex Benth. 409, 411, **413**, 416, 473
 dioscoridis auct. non (L.) DC. 410
 dunlopii Hunger 409, **415**, 416
 eyrea F.Muell. 411
 var. *major* Benth. 413
 ferdinandi-muelleri Domin 409, **417**
 filifolia F.Muell. 429
 indica (L.) Less. **409**
 ligulata F.Muell. 422, 427
 longiseta A.R.Bean 408, 412, **417**
 macdonnellensis Albr. & A.R.Bean 409, **413**
 macrocephala F.Muell. 423
 marilandica (Michx.) Cass. 408
 mesotes A.R.Bean 409, **410**, 412
 odora F.Muell. 424
 punctata A.R.Bean 408, 412, **414**
 rubelliflora (F.Muell.) B.L.Rob. 408, **411**
 var. *major* (Benth.) J.M.Black 413
 sect. *Eyrea* Benth. 408
 sect. *Oliganthemum* F.Muell. 429
 sect. *Rhodanthemum* F.Muell. 422
 sp. A 417
 sp. B 417
 sp. Ormiston (H.D.V.Prendegast 66) 413
 squarrosa Benth. 413
 tetranthera auct. non F.Muell. 415
 tetranthera F.Muell. 409, **415**
 var. *cinerea* W.Fitzg. 417
 var. *tetranthera* 415
 var. *tomentosa* Benth. 417
 xanthina A.R.Bean 409, **410**, 412
 Plumeless Thistle 54
 Podolepis 14, 33, 41
 Podospermum DC. 155
 laciniatum (L.) DC. 155
 resedifolium DC. 156
 Podotheca 14, 38, 40

INDEX

- Pogonolepis 14, 39
 Polycalymma 14, 39
 Polymnia
 abyssinica L.f. 579
 sonchifolia Poepp. & Endl. 4, 6
 Pom-poms
 Minty 422
 Pot Marigold 318
 Potato Weed 576
 Poverty Weed 564
 Praxelis Cass. 17, 24, 587, **597**
 clematidea R.M.King & H.Rob. 480, 591, 597, **598**
 villosa Cass. 597
 Prenanthes
 japonica L. 113
 sarmentosa Willd. 123
 Prickly Lettuce 115
 Prickly Ox-tongue 141
 Prickly-leaved Elephant's Foot 173
 Protean Knapweed 82
 Pseudelephantopus Rohr 12, 24, 172, **175**
 spicatus (B.Juss. ex Aubl.) C.F.Baker *xix*, 174, 175, **176**
 Pterigeron (DC.) Benth. 422
 adscendens Benth. 428
 bubakii Domin 426
 cylindriceps J.M.Black 428
 decurrens (DC.) Benth. 422, 424
 filifolius (F.Muell.) Benth. 429
 liatroides (Turcz.) Benth. 427
 var. *humilis* Benth. 427
 var. *repens* S.Moore 427
 macrocephalus (F.Muell.) Benth. 423
 microglossus Benth. 423, 427, 608
 odorus (F.Muell.) Benth. 424
 var. *major* Benth. 424, 426
 Pterocaulon Elliott 15, 25, 388, **392**
 billardiarei F.Muell. 400
 ciliolum A.R.Bean 393, **394**
 cylindrostachyum C.B.Clarke 400
 discolor A.R.Bean 393, **398**
 glandulosum (Benth.) F.Muell. 399
 var. *velutinum* Ewart & O.B.Davies 400
 globuliflorum W.Fitzg. 393, **398**
 intermedium (DC.) A.R.Bean 393, **396**
 niveum Cabrera & A.M.Ragonese 393, **398**
 paradoxum A.R.Bean 393, **395**
 pynostachyum (Michaux) Elliott 392
 redolens (Willd.) Fern.-Vill. 393, **400**
 sect. *Monenteles* (Labill.) Kuntze 392
 serratum O.Schwarz 400
 serrulatum (Montrouz.) Guillaumin 393, **399**
 var. *serrulatum* **400**
 var. *velutinum* (Ewart & O.B.Davies) Guillaumin **400**, 472
 sphacelatum (Labill.) F.Muell. 393, **394**
 sphaeranthoides (DC.) F.Muell. 393, **395**
 spicatum (Labill.) Domin 400
 tricholobum A.R.Bean 393, **396**, 397
 verbascifolium (Benth.) F.Muell. 393, 397, **401**
 xenicum A.R.Bean 393, **399**
 Pterochaeta 14, 41
 Pteronia
 australiensis J.Hutchinson 390
 Pterygopappus 14, 29, 35
 Purple Fireweed 309
 Purple Fleabane 184, 185
 Purple Groundsel 303
 Pycnosorus 14, 37, 40
 Quinetia 14, 27, 38
 Quinquereculus 14, 38
 Raddichio 4
 Ragweed
 Annual 560
 Burr 561
 Lacy 562
 Perennial 561
 Ragwort 7, 302
 Tree 198
 Rantil 579
 Rayless Chamomile 355
 Reichardia Roth 12, 21, 87, 123, **124**
 picroides auct. non (L.) Roth 124
 picroides (L.) Roth 124, **125**
 tingitana (L.) Roth *xvi*, 123, **124**, 130
 Rhaponticum Vaill. 11, 21, 49, **70**
 australe (Gaudich.) Soják 70, 71, **72**
 jacea (L.) Scop. 70
 repens (L.) Hidalgo 70, **72**
 Rhetinocarpha 14, 36
 Rhodanthe 7, 14, 40
 Roebuckia 14, 32
 Roldana La Llave 12, 32, 193, **204**
 lobata La Llave 204
 petasitis (Sims) H.Rob. & Brettell **204**, 205
 Rough Senecio 302
 Rough Star-thistle 77
 Rounded Chamomile 355
 Rubber
 Guayule 6
 Rudbeckia 491
 Russian Knapweed 72
 Russian Tarragon 5
 Rutidosis 14, 36, 37, 38
 Rythrin 6
 Sabazia Cass. 574
 Safflower 5, 6, 68
 Saffron Thistle 70
 Salsify 4, 157
 Santolina 332
 chamaecyparissus L. 332
 suaveolens Pursh 355
 Saussurea 51
 affinis Spreng. ex DC. 51
 carthamoides (DC.) Benth. 51
 Saw Groundsel 273
 Scentless False Chamomile 353
 Scentless Mayweed 353
 Schkuhria Roth 16, 22, 31, **489**
 abrotanoides Roth 489
 var. *isopappa* (Benth.) Hieron. 489
 isopappa Benth. 489
 pinnata (Lam.) Thell. 475, **489**, 490
 var. *abrotanoides* (Roth) Cabrera 489, 490
 Schoenia 14, 38, 40
 Scleroleima Hook.f. 194
 forsteroides Hook.f. 194, 195
 Scolymus L. 12, 19, 85, **87**
 hispanicus L. **88**, 91
 maculatus L. 87, **88**

INDEX

- Scorzonera L. 4, 12, 20, 85, **155**
calcitrapifolia Vahl 156
hispanica L. 4, 6
humilis L. 155
laciniata L. **155**
 var. *calcitrapifolia* (Vahl) Bisch. ex Boiss. 155, **156**
 var. *laciniata* 155, **156**
lawrencei Hook.f. 126
picroides L. 125
scapigera G.Forst. 127
scapigera Sol. ex A.Cunn. 127, 606
tingitana L. 124
Scotch Thistle 58, 65
Scyphocoronis 38
Senecio L. 12, 24, 32, 192, 193, 194, **209**
 aff. *lautus* 289
 albogilvus I.Thomps. 272, 275, **276**
 amygdalifolius F.Muell. 257, 272, **274**, 275
 anacampserotis DC. 288
 anethifolius A.Cunn. ex DC. 246, **247**
 subsp. *anethifolius* **247**, 249
 subsp. *brevibracteolatus* I.Thomps. **247**, 249
 angulatus L.f. 206, 298, 301, **304**
 angustifolius Sond. 247
 angustilobus F.Muell. 247
 apargiaefolius Walp. 306
 argutus A.Rich. 226
 articulatus (Haw.) Sch.Bip. 301
 asper A.Cunn. 224
 atkinsoniae F.Muell. 220
 australis auct. non Willd. 253
 australis Willd.
 var. *edentatus* DC. 306
 var. *macrodonatus* (DC.) Benth. 257
 var. *unidentatus* DC. 306
 barkhausioides Turcz. 260, 261, **263**
 bathurstianus (DC.) Sch.Bip. 212, 220, **221**, 222, 224, 226
 bedfordii F.Muell. 199
 behrianus Sond. & F.Muell. 246, 256, **259**
 billardierii F.Muell. 200
 bipinnatisectus Belcher 211, **220**, 221, 222
 biserratus Belcher 213, 218, **219**, 221, 307
 brachyglossus F.Muell. ex Benth. 281
 var. *major* Benth. 282
 brachylaenus DC. 251
 brevitubulus I.Thomps. 221
 brigalowensis I.Thomps. 285, **296**, 297, 298, 299, 301
 brunonis (Hook.f.) J.H.Willis 198
 cahillii Belcher 217
 campylocarpus I.Thomps. 215, **230**
 capillifolius Hook.f. 293
 carnulentus DC. 289
 var. *angustissima* Steetz 291
 var. *angustissimus* Steetz 291
 var. *latilobus* Steetz 291
 centropappus F.Muell. 198
 ciliolatus DC. 306
 cinerarioides A.Rich. 257
 condylus I.Thomps. 279, 284, **286**
 conferruminatus I.Thomps. 264, 266, **268**
 crassiflorus (Poir.) DC. 301, **305**
 crithmifolius A.Rich. 290
Senecio *continued*
 cunninghamii DC. 246, **250**
 f. 1 (*typical*) 250
 f. 2 (*arid zone*) 250
 var. *cunninghamii* 249, **251**
 var. *flindersensis* I.Thomps. **251**
 var. *serratus* M.E.Lawr. 250
 cygnorum Steetz 263
 Daltonii F.Muell. 274
 daltonii F.Muell. 271, 272, **274**
 depressicola I.Thomps. 285, **297**, 299
 diaschides D.G.Drury 212, **217**, 218
 Disciform Group 210, **211**, 246
 distalilobatus I.Thomps. 213, 218, 219, **220**, 221, 224
 dolichocephalus I.Thomps. 216, 230, 232, **233**, 234
 dryadeus Ewart 306
 var. *macrodonatus* (DC.) Ewart 257
 dryadeus Spreng. 257
 var. *garlandii* F.Muell. ex Maiden & Betche 260
 drymophilus F.Muell. 314
 elegans L. 301, **303**
 var. *diffusus* Ewart 303
 var. *erectus* Ewart 303
 endlicheri DC. 290
 eremicola I.Thomps. 284, **297**, 299
 esleri C.J.Webb 212, 217, **221**, 222
 euclaensis I.Thomps. 246, **248**
 Exotic Group 210, 211
 extensus I.Thomps. 216, 223, **228**
 flaccidus A.Rich. 219
 garlandii F.Muell. ex Belcher 246, 253, 256, 259, **260**
 gaudichaudianus A.Rich. 290
 gawlerensis M.E.Lawr. 246, **248**, 249
 georgianus DC. 214, **244**, 245, 263
 var. *latifolius* J.M.Black 248
 gilbertii Turcz. 261
 gilbertii Turcz. 260, **261**
 glabrescens (DC.) Sch.Bip. 215, **231**
 glandulosus (A.Cunn. ex DC.) Sch.Bip. 230
 glastifolius L.f. 301, **303**
 glomeratus Desf. ex Poir. 213, 222, **225**, 226, 253, 308
 subsp. *glomeratus* **226**, 227
 subsp. *longifructus* I.Thomps. 223, 226, **227**, 306
 subsp. 1 226
 subsp. 2 (*Small capitula*) 227
 glossanthus (Sond.) Belcher 279, 280, **281**, 282, 283, 305
 Glossanthus Group 210, **279**
 gregorii F.Muell. 264, 266, **267**, 268, 269
 gunnii (Hook.f.) Belcher 216, **237**
 gypsicola (R.J.Bates) I.Thomps. 264, 266, **268**
 halophilus I.Thomps. 279, 280, 281, **282**, 305
 hamersleyensis I.Thomps. 285, **300**
 helichrysoides F.Muell. 214, 244, **245**
 hispidissimus I.Thomps. 213, 214, 223, **224**
 hispidulus A.Rich. 213, 214, 221, **222**, 223, 224, 225, 226, 302, 308
 var. *dissectus* (Benth.) Belcher 221
 hypoleucus F.Muell. ex Benth. 246, 249, **251**, 252, 260, 302
 interpositus I.Thomps. 214, **244**, 263
 jacobaea L. 7, 8, 301, **302**, 303
 laceratus (F.Muell.) Belcher 214, 223, **228**

INDEX

Senecio *continued*

lacustrinus I.Thomps. 285, 296, **299**, 300
lageniformis I.Thomps. 215, **240**
lanibracteus I.Thomps. xx, 246, 247, 249, **250**, 307
laticostatus Belcher 306
latifolius DC. 306
lautus G.Forst. ex Willd. 306
 f. *pinnatifolius* (A.Rich.) Hochr. 289
 subsp. *alpinus* Ali 294
 subsp. *dissectifolius* Ali 295
 subsp. *lanceolatus* (Benth.) Ali 292
 subsp. *maritimus* Ali 291, 294, 295
 subsp. *maritimus auct. non* Ali 290
 var. *capillifolius* F.Muell. 293
 var. *lanceolatus* Benth. 292
 var. *pilosus* J.M.Black 307
Lautusoid Group 211, **284**
leptocarpus DC. 272, 275, **276**
lessonianus Sch.Bip. 226
lessonianus Steud. 254
lessonii F.Muell. 226
leucoglossus F.Muell. **261**, 262
linearifolius A.Rich. 217, 246, 252, **253**, 259,
 260, 306, 307
 var. 2 (*Eastern*) 254
 var. 2 (*Euroa*) 259
 var. 2 (*Montane*) 255
 var. 3 (*Grampians*) 258
 var. 4 (*Suggan Buggan*) 255
 var. arachnoideus I.Thomps. 253, 255, 256,
 257, 258
 var. dangarensis Belcher ex I.Thomps. 253, **258**
 var. denticulatus I.Thomps. **254**, 255, 257
 var. garwerdensis I.Thomps. 253, 256, **258**, 259
 var. graniticola I.Thomps. 253, **259**, 260
 var. intermedius I.Thomps. 253, **255**, 258
 var. latifolius I.Thomps. 254, **255**, 256, 257
 var. linearifolius **254**, 255, 256, 257
 var. macrodontus (DC.) I.Thomps. 253, **257**, 258
longicollaris I.Thomps. 215, **229**, 230, 231, 232
longipilus I.Thomps. 214, 239, **241**, 242, 263
macquariensis DC. 290
macranthus A.Rich. xx, 272, **273**
Macranthus Group 210, **271**
macrocarpus F.Muell. ex Belcher 215, 230, 241,
 243
macrodontus DC. 257
macroglossus DC. 206, 301, **304**
madagascariensis Poir. 284, 298, **300**, 301
magnificus F.Muell. 264, 266, 268, **269**, 270
Magnificus Group 211, **263**
megaglossus F.Muell. 264, 268, **269**, 270
meyeri Regel 307
microbasis I.Thomps. 212, **235**
mikanoides Otto ex Walp. 206
minimus Poir. 212, **216**, 217, 218, 253
 var. *minimus* 307
 var. *picridioides* (Turcz.) Belcher 219
mixtus A.Rich. 309
muelleri Regel 216
Mülleri Regel 216
multicaulis A.Rich. 214, 216, **224**
 subsp. *multicaulis* **223**, **225**
 subsp. *stirlingensis* I.Thomps. **225**
 var. *dissecta* E.L.Robertson 226
 var. *microcephala* E.L.Robertson 227
murrayanus Wawra 262, 264, 265, **267**, 268

Senecio *continued*

nebrodensis
 var. *glabratus* DC. 286
nigrapicus I.Thomps. 214, **241**, 242
niveoplanus I.Thomps. 213, **237**, 238, 239
odoratus A.Rich. 252
odoratus Hornem. 217, 246, **252**, 253, 307
 f. *petiolata* Sond. 251
 var. *laciniatus* F.Muell. 307
 var. *longifolius* M.E.Lawr. 252
 var. *obtusifolius* J.M.Black 252
Odoratus Group 210, **245**
oldfieldii I.Thomps. 214, **242**, 263
oligocephalus DC. 290
orarius J.M.Black 219, 307
papillosus F.Muell. 272, **278**, 279
pauciligulatus A.Rich. 307
pectinatus DC. 272, 276, **277**
 var. *major* F.Muell. ex Belcher **277**
 var. *ochroleuca* F.Muell. 276
 var. *ochroleucus* F.Muell. 276
 var. *pectinatus* 275, **277**
 var. *pleiocephalus* Benth. 276
persicaefolius A.Rich. 257
persicifolius A.Rich. 257
petasitis (Sims) DC. 204
phelleus I.Thomps. 216, 232, **234**, 236, 238, 306
picridioides (Turcz.) M.E.Lawr. 212, 218, **219**,
 302
pilosicristus I.Thomps. 264, 266, **270**, 271
pinnatifolius A.Rich. 219, 284, 285, 286, 287,
 289, 296, 301, 303, 307
 var. 1 295
 var. 2 292
 var. 3 292
 var. *alpinus* (Ali) I.Thomps. 289, 292, **294**
 var. *capillifolius* (Hook.f.) I.Thomps. 289, **293**
 var. *lanceolatus* (Benth.) I.Thomps. 280, 289,
 292, 293, 295, 299, 307
 var. *latilobus* (Steetz) I.Thomps. 288, 289,
 291, 292
 var. *leucocarpus* I.Thomps. 290, **295**
 var. *maritimus* (Ali) I.Thomps. 287, 290, 291,
 294, 295, 296
 var. *pinnatifolius* 288, **290**, 291, 292, 293, 294,
 295, 296
 var. *pleiocephalus* Belcher 294
 var. *serratus* I.Thomps. 289, **292**, 299
platylepis DC. 262, 264, **265**, 268
prenanthoides A.Rich. 212, 213, 235, 236, **238**,
 239, 240, 311
primulaefolius F.Muell. 272, **278**
primulifolius F.Muell. 278
productus I.Thomps. 279, **281**, 305
 subsp. *magnus* I.Thomps. 281, **282**
 subsp. *productus* 281, **282**
psilocarpus Belcher & Albr. 216, 239, **242**, 243
psilophyllus I.Thomps. 212, **240**
pterophorus DC. 211, 252, 298, 301, **302**
 var. *apterus* Harv. 302
 var. *verus* Harv. 302
pusillus A.Rich. 225
quadridentatus Labill. 212, 215, 217, 231, 232,
 233, 234, 235, 237, 308
queenslandicus I.Thomps. 215, **234**, 237
ramosissimus DC. 217, 261, 262, **263**
Ramosissimus Group 210, **246**

INDEX

- Senecio continued*
richardianus DC. 257
 Rough 302
runcinifolius J.H.Willis 211, **229**, 232
rupicola A.Rich. 294
scabrellus I.Thomps. 212, **236**
scandens DC. 206
serratifomis I.Thomps. 279, **283**
 subsp. *serratifomis* **283**
 subsp. *stenophyllus* I.Thomps. **283**
sieberianus DC. 290
 sp. (aff. *S. cunninghamii*) 250
 sp. (*Alps*) 228
 sp. 1 228
 sp. 2 240
 sp. A 217
 sp. A ('*garlandii*' of F.Muell.) 260
 sp. A ("garlandii") 260
 sp. aff. *biserratus* (*Montane*) 220
 sp. aff. *cunninghamii* 250
 sp. aff. *cunninghamii* (*North-west*) 250
 sp. aff. *magnificus* (*North-west*) 270
 sp. aff. *quadridentatus* (*Dunkeld*) 231
 sp. aff. *quadridentatus* (*North-east*) 229
 sp. aff. *quadridentatus* (*North-west*) 233
 sp. aff. *squarrosus* (*Alps 1*) 241
 sp. aff. *squarrosus* (*Alps 2*) 244
 sp. aff. *squarrosus* (*South West Swamps*) 242
 sp. aff. *tenuiflorus* 238
 sp. aff. *tenuiflorus* (*Alps*) 237
 sp. aff. *tenuiflorus* (*North-east*) 235, 237
 sp. aff. *tenuiflorus* (*South-west*) 224
 sp. B 217
 sp. C 258
 f. 1 238
 f. 2 238
 f. 3 224
 f. 4 224
 sp. E 238
 sp. E (aff. *apargiifolius*) 238
 sp. F (aff. *cunninghamii*) 250
 sp. H (aff. *glomeratus*) 226
 sp. J (aff. *hypoleucus*) 260
 sp. K (aff. *lanceolatus*) 300
 sp. N 240
spanomerus I.Thomps. 280, 285, 286, 291, **295**,
 296, 299, 307
spathulatus A.Rich. 285, **286**, 288
 var. *attenuatus* I.Thomps. 287, **288**
 var. *latifructus* I.Thomps. **287**
 var. *spathulatus* **287**, 295
squarrosus A.Rich. 214, 216, 224, 239, 241, **243**
tamoides DC. 206, 301, **304**
tasmanicus I.Thomps. 216, **230**
tenuiflorus (DC.) Sieber ex Sch.Bip. 212, 216,
 232, 235, **236**, 237, 308
tripartitus A.Rich. 290
tuberculatus Ali 262, 264, **265**, 268, 297
vagus F.Muell. **272**
 subsp. *eglandulosus* Ali **273**
 subsp. *vagus* **273**, 275, 311
 var. *alpestris* F.Muell. 273
valerianaefolius Wolf 308
velleioides A.Cunn. ex DC. 264, **271**
vulgaris L. 209, 210, 301, **305**
warrenensis I.Thomps. 285, **288**
warszewiczii A.Braun & Bouche 307

 Senegal Tea 605
Serratula
 arvensis L. 59
 carthamoides Roxb. 51
Seruneum Kuntze 524
 spilanthoides (F.Muell.) Kuntze 525
 verbesinoides (Benth.) Kuntze 528
 Shasta Daisy 352
 Sheep Bush
 African 358
 Sheep Thistle 55
 Showy Tickseed 457
 Siam Weed 596
Sigesbeckia L. 17, 22, 30, 31, 572, **581**
 australiensis D.L.Schulz **581**, 583
 subsp. *australiensis* 580, **582**, 609
 subsp. *fugax* (Pedley) Orchard 580, **582**, **609**
 fugax Pedley 582, 609
 gracilis DC. 583
 microcephala auct. non DC. 581
 microcephala DC. 583
 orientalis L. 479, 580, 581, **583**, 609
 subsp. *glabrescens* (Makino) H.Koyama 583
 subsp. *pubescens* (Makino) H.Koyama 583
Siloxerus 14, 39
Silphium
 trilobatum L. 519
 Silver Arctotis 164
 Silver Wormwood 337
Silybum Adans. 7, 11, 22, 50, **56**
 marianum (L.) Gaertn. xiv, **56**
 Singapore Daisy 519
 Skeleton Weed 8, 90
 Slender Cotula 360
 Slender Thistle 54, 55
 Winged 55
 Smooth Cats-ear 136
 Smooth Cotula 360
 Smooth Hawksbeard 93
 Sneezeweed 430
 Sneezeweeds 445
 Snow-wort 195
 Soldier Thistle 57
Solenogyne 14, 26, 43
Solidago 14, 42
Soliva Ruiz & Pav. 15, 26, 330, 332, **368**
 anthemifolia (Juss.) Sweet 366, 369, **370**
 pterosperma (Juss.) Less. 369
 sessilis Ruiz & Pav. 8, 366, 368, **369**, 370, 472
 stolonifera (Brot.) Sweet 366, 369, **370**
 valdiviana Phil. 368, **369**, 370
Sonchus L. 12, 20, 86, **117**, 122
 arvensis L. 118
 asper (L.) Hill 118, **119**, 121, 122
 f. *hydrophilus* (Boulos) J.Kost. 121
 subsp. *asper* **119**, **120**, 121
 subsp. *glaucescens* 121
 subsp. *glaucescens* auct. non (Jord.) Ball 119
 var. *littoralis* J.M.Black 122
 var. *megalocarpus* Hook.f. 122
 hydrophilus Boulos xvi, 118, **120**, **121**, 122
 megalocarpus (Hook.f.) J.M.Black 122
 oleraceus L. 8, 117, **118**, 119, **120**
 var. *asper* L. 119
 tenerrimus auct. non L. 118
 tenerrimus L. 119
Sondottia 14, 39

INDEX

- South African Daisy 542
 South American Burr 570
 Sow Thistle 118
 Common 8
 False 124
 Native 121
 Sow-thistles 117
 Spear Thistle 58
 Speedy Weed 486
 Sphaeranthus L. 15, 25, 388, **421**
 [africanus](#) L. **421**, 473
 [glaber](#) DC. 421
 [hirtus](#) Willd. 422
 [indicus](#) L. 421, **422**
 [microcephalus](#) Willd. 421
 Sphaeromorphaea DC. 15, 28, 29, **402**, 430
 [australis](#) (Less.) Kitam. 402, **403**, 404, 407
 [ephemera](#) A.R.Bean 402, **404**
 [harrisii](#) (F.Muell.) A.R.Bean 402, **404**
 [littoralis](#) (Retz.) A.R.Bean 402, **406**
 [major](#) A.R.Bean 402, **403**
 [petiolaris](#) DC. 403
 [russeliana](#) DC. 402
 [subintegra](#) A.R.Bean 402, 405, **406**
 Spagneticola O.Hoffm. 16, 30, 493, **518**
 [trilobata](#) (L.) Pruski 476, **519**, 520
 [ulei](#) O.Hoffm. 518
 Spikeweed
 Common 585
 Spilanthes Jacq. 16, 23, 543, **546**
 [acmella](#) *auct. non* (L.) L. 544
 [acmella](#) (L.) L. 500
 [anactina](#) F.Muell. 547, **548**, **609**
 [grandiflora](#) Turcz. 544
 var. *brachyglossa* Benth. 544
 var. *calva* Benth. 544
 [macroglossa](#) F.Muell. 544, 545
 [uliginosa](#) Sw. 546
 [urens](#) Jacq. 546
 Spiny Clotburr 568
 Spiny Cocklebur 568
Spiropodium
 [baccharoides](#) F.Muell. 414
 Spotted Golden Thistle 88
 Spreading Fleabane 187
 St Barnaby's Thistle 79
 Star Thistle 75
 Glaucous 69
 Rough 77
 Yellow 79
 Star-Burr 578
 Stemless Thistle 63
Stemmacantha Cass. 70
 [australis](#) (Gaudich.) Dittrich 72
 [centaurioides](#) (L.) Cass. 70
Stemmodontia
 [biflora](#) (L.) W.Wight 521
 Stenocarpa S.F.Blake 574
Stera Ewart 388
 [conocephala](#) (F.Muell.) Ewart & B.Rees 390
 [microphylla](#) Ewart & B.Rees 392
 [subspinescens](#) Ewart & B.Rees 391
 Stevia Cav. 17, 23, 587, **590**
 [eupatoria](#) (Spreng.) Willd. **590**, 591
 [rebaudiana](#) (Bertoni) Bertoni 6, 590
 [serrata](#) Cav. 590
 Sticky Beak 583
 Sticky Florestina 490
 Sticky-daisy 601
 Stiff Groundsel 259
 Stinking Hawksbeard 94
 Stinking Mayweed 344
 Stinking Roger 487
 Stinkwort 384
Stobaea
 [rigida](#) Thunb. 168
 Streptoglossa Steetz 15, 29, 33, 388, **422**
 [adscendens](#) (Benth.) Dunlop 423, **428**
 [bubakii](#) (Domin) Dunlop 423, **426**
 [cylindriceps](#) (J.M.Black) Dunlop 423, **428**, 473
 [decurrens](#) (DC.) Dunlop 423, **424**, 425
 [liatroides](#) (Turcz.) Dunlop 423, **427**, 608
 [macrocephala](#) (F.Muell.) Dunlop **423**, 608
 [odora](#) (F.Muell.) Dunlop 423, **424**, 428
 sp. A 428
 sp. B 427
 [steetzii](#) F.Muell. 422, 424
 [tenuiflora](#) Dunlop 423, **426**
Strongylosperma Less. 359
 [australe](#) (Sieber ex Spreng.) Less. 359, 361
 [reptans](#) Benth. 367
Strongylospermum
 [reptans](#) Benth. 367
 Stuartina 14, 25, 41
 Stylidiaceae 4
 Sugar leaf 590
 Summer Chrysanthemum 348
 Sun Marigold 322
 Sunflower 5, 554
 Common 554
 Japanese 552
 Mexican 553
 Wild 542
 Sweetleaf 590
Symphyomera Hook.f. 364
 [filicula](#) Hook.f. 364, 365
 Synedrella Gaertn. 16, 31, **493**
 [nodiflora](#) (L.) Gaertn. 493, 494, **495**
 [vialis](#) (Less.) A.Gray 501
 Synedrellopsis Hieron. & Kuntze 16, 23, 493, **495**
 [grisebachii](#) Hieron. & Kuntze 494, **495**
 Syrian Thistle 61

 Tagetes L. 7, 16, 22, 31, 483, 484, **486**
 [erecta](#) L. 486, **487**
 [glandulifera](#) Schrank 486
 [minuta](#) L. 444, 475, **486**
 [patula](#) L. 487
 [rotundifolia](#) Mill. 553
 Tanacetum L. 15, 28, 331, 332, **335**, 343
 [boreale](#) Fisch. ex DC. 336
 [cinerariifolium](#) (Trevir.) Sch.Bip. 6, 335
 [huronense](#) *auct. non* Nutt. 336
 [parthenium](#) (L.) Sch.Bip. 6, **335**, 340
 [ptarmiciflorum](#) (Webb & Berthel.) Sch.Bip. 335
 [suffruticosum](#) L. 357
 [vulgare](#) L. 335, **336**, 471
 Tansy
 Common 336
 Taplinia 14, 38
 Taraxacum F.H.Wigg. 12, 20, 86, **95**
 [argutum](#) Dahlst. 101
 [aristum](#) *auct. non* G.E.Haglund & Markl. 111

INDEX

- Taraxacum continued*
 aristum G.E.Haglund & Markl. 96, 98, 99, **100**
 bracteatum Dahlst. **106**, 107, 108
 castellanum Sonck 105
 celticum A.J.Richards 106
 chelelobatum Sahlin 101
 cynnorum Hand.-Mazz. **98**, 99, 100, 105, **606**
 dens-leonis auct. non Desf. 98
 disseminatum auct. non G.E.Haglund 103
 duplidentifrons Dahlst. 107
 erythrospermum auct. non Andr. ex Besser 96, 100
 fasciatum Dahlst. 109
 gasparini Tineo ex Lojac. 101, **103**
 gelertii Raunk. 107
 gracile Dahlst. **101**, 102
 Group 1 Fl. Victoria (A.C.Beauglehole 67529)
 Vic. Herbarium 109
 hamatulum Hagend., Soest & Zevenb. 105
 hamatum Raunk. 105
 hepaticolor Soest 101, **103**, 104, 108
 khatoonae Abedin 99, **110**
 koksaghyz Rodin 6, 96, 110
 laholense Abedin 110
 lambinonii Soest 101, **105**
 magellanicum auct. non Comm. ex Sch.Bip. 100
 melanocarpum Hand.-Mazz. 98
 multidentatum Soest 101, 102, **104**
 officinale F.H.Wigg. 6, 8, 95, 96, 109
 oxoniense Dahlst ex Druce 112
 pseudocalocephalum auct. non Soest 110, 111
 retzii Soest 101, 111, **112**
 sarcidanum Arrigoni 101, **102**
 sect. Antarctica Hand.-Mazz. 98
 sect. Australasica Kirschner, Scarlett & Štěpánek 96, 97, **98**
 sect. Celtica A.J.Richards 96, 97, **106**, 107
 sect. Ceratoidea Kirschner & Štěpánek 110
 sect. Crocea M.P.Christ. 109
 sect. Dissimilia Dahlst. 110
 sect. Erythrocarpa Hand.-Mazz. 101, 110
 sect. Erythrosperma Dahlst. 96, 97, **100**, 101, 102, 111
 sect. Hamata H.Øllg. 97, **105**, 107
 sect. Macrocornuta Soest 110
 sect. Ruderalia Kirschner, H.Øllg. & Štěpánek 109
 sect. Scariosa Hand.-Mazz. 101, 111
 sect. Taraxacum 97, **109**, 110
 sp. ? 111
 Species Group 1 97, **109**
 Species Group 2 97, **111**
 squamulosum Soest 96, 99, 101, **111**, 112
 subbracteatum A.J.Richards 106, **107**
 [unranked] *Erythrosperma* H.Lindb. 100
 Tarlounia H.Rob., S.C.Keeley, Skvarla & R.Chan 12, 27, 172, **187**
 elliptica (DC.) H.Rob., S.C.Keeley, Skvarla & R.Chan 186, 187, **188**
 Tarragon 5
 Russian 5
 Tarweed 585, 586
 Tarweeds 585
 Taurian Thistle 63
 Tea
 Chamomile 5
 Temple Plant 605
 Tessaria
 redolens (Willd.) Less. 400
 Tetramolopium 14, 43
 Tetraotis
 paludosa Reinw. 483
 Texas Blue Weed 557
 Thespidium 15, 29
 Thickhead 311
 Thiseltonia 14, 28, 40
 Thistle
 African 168
 Artichoke 62
 Blessed 79
 Canada 59
 Cotton 65
 Creeping 59
 Dune 122
 Glaucous Star 69
 Golden 88
 Hamelin 168
 Illyrian 65
 Malta 78
 Nodding 52, 54
 Perennial 59
 Plumeless 54
 Saffron 70
 Scotch 58, 65
 Sheep 55
 Slender 54, 55
 Soldier 57
 Spear 58
 Spotted Golden 88
 St Barnaby's 79
 Star 75
 Stemless 63
 Syrian 61
 Taurian 63
 Toothed 69
 Variegated 56
 Winged Slender 55
 Thistles 48
 Thymophylla Lag. 16, 484, **488**
 setifolia Lag. 488
 tenuiloba (DC.) Small **488**
 Tickseed
 Showy 457
 Tietkensia 14, 40
 Tithonia Desf. ex Juss. 16, 32, **551**
 diversifolia (Hemsl.) A.Gray 477, **552**, 553, 555
 rotundifolia (Mill.) S.F.Blake 552, **553**, 555
 uniflora Desf. ex Gmelin 551
 Tobacco Weed 175
 Tolpis Adans. 12, 21, 86, **129**
 altissima Pers. 131
 barbata (L.) Gaertn. 129, 130, **131**
 umbellata Bertol. 131
 virgata (Desf.) Bertol. 129, **131**
 Ton-dronganama 523
 Toothed Thistle 69
 Toxanthus 38
 Tragopogon L. 12, 19, 20, 85, **156**
 brevistrois 157
 subsp. *longifolius* (Heldr. & Sart. ex Boiss.)
 I.Richardson 157
 dalechampii L. 135
 dubius Scop. xviii, 157, **158**
 hybridus L. 157, **158**

INDEX

- Tragopogon continued*
picroides L. 134
porrifolium L. 157
porrifolius L. 4, 6, **157**, 158
 subsp. *porrifolius* **157**
pratense L. 156
 Trailing African Daisy 329
 Trailing Daisy 519
 Trailing Gazania 171
 Treasure Flower 170
 Tree Dahlia 469
 Tree Marigold 552
 Tree Ragwort 198
Tricarpha Longpre 574
Trichanthodium 14, 39
Trichocline Cass. 11, 33, **45**
 incana Cass. 45
 scapigera (Benth.) F.Muell. 46
 spathulata (Cunn. ex DC.) J.H.Willis **46**, 47
 sp. *KWD* 61 46, 47
 sp. *Treeton* (G.J.Keighery & N.Gibson) 46, 47
Tridax L. 17, 30, 572, **573**
 procumbens L. 478, **573**, 575
Tridax Daisy 573
 Trifid Burr Marigold 460
Trineuron Hook.f. 194, 196
 nivigenum F.Muell. 195
 scapigerum F.Muell. 196
 spathulatum Hook.f. 194
Trioncinia (F.Muell.) Veldkamp 15, 23, **447**
 patens A.E.Holland & D.W.Butler 447, **448**
 retroflexa (F.Muell.) Veldkamp 447, **448**, 452
Tripleurospermum Sch.Bip. 15, 35, 331, 343, **352**
 inodorum (L.) Sch.Bip. 352, 353
 maritimum (L.) Koch. **353**
 subsp. *inodorum* (L.) Appleq. 345, 349, **353**
 perforatum (Mérat) Láinz 353
Tripteris
 atropurpurea Turcz. 324
 clandestina Less. 324
Triptilodiscus 14, 41
Tussilago
 fragrans Vill. 203
 Twin Heads
 Yellow 516

Uhdea
 bipinnatifida Kunth 539
Urospermum Scop. 12, 20, 85, **134**
 dalechampii (L.) F.W.Schmidt 134, **135**
 picroides (L.) Scop. ex F.W.Schmidt **134**, 137
Ursinia Gaertn. 15, 33, 331, **332**
 anthemoides (L.) Poir. 333, **334**
 subsp. *anthemoides* 333, **334**, 471
 subsp. *versicolor* (DC.) Prassler 334
 chrysanthemoides auct. non (Less.) Harv. 334
 chrysanthemoides (Less.) Harv. 332
 nana DC.
 subsp. *nana* 335
 speciosa DC. 333, **334**

 Variegated Thistle 56
 Vellereophyton 14, 38, 41
Verbesina L. 8, 16, 30, 32, 540, **542**
 acmella L. 500
 alata L. 542

Verbesina continued
 alba L. 517
 biflora L. 521
 dichotoma Murray 500, 609
 encelioides (Cav.) Benth. & Hook.f. ex A.Gray **542**
 var. *encelioides* 477, 541, **542**, 543
 var. *exauriculata* B.L.Rob. & Greenm. 543
 lavenia L. 601
 nodiflora L. 495
 prostrata L. 517
 sect. *Ximenesia* (Cav.) A.Gray 542
 Vermouth 5
Vernonia Schreb. 12, 27, 172, 173, **188**
 cinerea (L.) Less. 183
 var. *lanata* J.Kost. 184, 607
 var. *linifolia* (Blume) J.Kost. 185
 cuneata Less. 189
 elaeagnifolia DC. 188
 elliptica DC. 188
 junghuhniana J.Kost. **189**, 190
 linifolia Blume 185
 noveboracensis (L.) Willd. 188
 vagans DC. 191
Viguiera 552
 Vine
 Wax 304
Vittadinia 14, 27, 33, 42, 43
Volutaria 11, 22
 muricata (L.) Maire 49, 50

Waitzia 14, 25, 28, 38
Wasao 523
 Water-buttons 363
 Wax Vine 304
Wedelia Jacq. 8, 496, 521, 525, 536
 asperima (Decne) Benth. 533, 534
 auct. non Jacq. 524
 biflora (L.) DC. ex Wight 521
 cunninghamii DC. 498
 ecliptoides F.Muell. 516
 forsteriana Endl. 523
 glaucula (Ortega) O.Hoffm ex Hicken 536
 longipes Klatt 526
 sect. *Wollastonia* (DC. ex Decne) Benth. & Hook.f. 521
 sp. A 506
 sp. B 528
 sp. *Hamersley* (A.S.Weston 8444) 531
 sp. *Limestone* (J.Russell-Smith 7865) 497
 sp. *Marrett River* (J.Elsol 680 & T.Stanley) 500
 spilanthoides F.Muell. 525
 stirlingii Tate 530
 uniflora (Willd.) W.R.B.Oliv. 523
 urticifolia auct. non (Blume) DC. 498
 urticifolia (Blume) DC. 498, 536
 verbesinoides Benth. 528
Wertaloona Daisy 427
 White African Daisy 322
 White Arctotis 164
 White Eclipta 518
 White Flat-weed 139
 Wild Artichoke 62
 Wild Chamomile 355
 Wild Marigold 519
 Wild Sunflower 542
 Wild Zinnia 549

INDEX

- Willow-leaf Lettuce 117
 Winged Slender Thistle 55
 Winter Euryops 207
 Winter Heliotrope 204
 Witloof 4
 Wollastonia DC. ex Decne 16, 30, 31, 492, 493, 496, **521**
 asperima Decne 534
 biflora (L.) DC. 4, **521**, 524
 var. *biflora* **521**, 522
 var. *ryukyuensis* (H.Koyama) Orchard 523
 ecliptoides F.Muell. 516
 forsteriana (Endl.) DC. 523
 procumbens DC. 534
 scabriuscula DC ex Decne 521
 uniflora (Willd.) Orchard 476, 521, 522, **523**
 Woolly Cockspur 78
 Woolly Yarrow 341
 Wormwood 5
 Chinese 338
 Silver 337
 Petite 5
- Xanthium L. 8, 16, 30, 491, 559, **566**
 ambrosioides Hook. & Arn. 566, 567, **568**
 californicum Greene 570
 canescens (Costa) Widder 566, 567, **569**
 catharticum Kunth 566, 567, **569**
 cavanillesii complex 570
 cavanillesii Schouw 566, 567, **570**
 chinense Mill. 569
 chinensis complex 569
 italicum complex 571
 italicum Moretti 566, 567, **571**
 occidentale Bertol. 8, 478, 566, 567, **569**, 570, 571
 orientale L. 566, 567, **570**
 pennsylvanicum complex 571
 pungens Wallr. 569
- Xanthium *continued*
 spinosum L. 8, 566, 567, **568**
 var. *canescens* Costa 569
 strumarium L. 566
 Xerochrysum 7, 14, 37
 Ximenesia
 encelioides Cav. 542
- Yacon 4
 Yam Daisy 126
 Yarrow 6, 341
 Woolly 341
 Yellow Chamomile 345
 Yellow Cosmos 454, 456
 Yellow Eclipta 516
 Yellow Hawkweed 131
 Yellow Star Thistle 79
 Yellow Twin Heads 516
 Yellow Weed 576
 Youngia Cass. 12, 20, 21, 86, **113**
 japonica (L.) DC. xv, 91, **113**
 thunbergiana auct. non DC. 113
- Zinnia L. 7, 16, 30, 491, **548**
 angustifolia Kunth 549, **550**
 var. *angustifolia* **550**
 var. *greggii* (B.L.Rob. & Greenm.) McVaugh 551
 australis F.M.Bailey 550
 bidens Retz. 452
 elegans Jacq. 477, 549, **550**
 Field 549
 multiflora L. 549
 pauciflora L. 549
 peruviana (L.) L. 541, 548, **549**, 550
 verticillata Andr. 549, 550
 violacea Cav. 550
 Wild 549

***Flora of Australia* — Index to families of flowering plants, current at November 2014.**

Bolding denotes published families/volumes.

| | Volume | | Volume | | Volume |
|---------------------------|-----------|--------------------------|-----------|-------------------------|------------|
| Acanthaceae | 33 | Byblidaceae | 10 | Elaeagnaceae | 16 |
| Aceraceae | 25 | Cabombaceae | 2 | Elaeocarpaceae | 7 |
| Actinidiaceae | 6 | Cactaceae | 4 | Elatinaceae | 6 |
| Agavaceae | 46 | Caesalpinniaceae | 12 | Epacridaceae | 9 |
| Aizoaceae | 4 | Callitrichaceae | 32 | Ericaceae | 9 |
| Akaniaceae | 25 | Campanulaceae | 34 | Eriocaulaceae | 40 |
| Alangiaceae | 22 | Cannabaceae | 3 | Erythroxylaceae | 24 |
| Alismataceae | 39 | Cannaceae | 45 | Eucryphiaceae | 10 |
| Aloeaceae | 46 | Capparaceae | 8 | Euphorbiaceae | 23 |
| Alseuosmiaceae | 10 | Caprifoliaceae | 36 | Eupomatiaceae | 2 |
| Amaranthaceae | 5 | Cardiopteridaceae | 22 | Fabaceae | 13, 14, 15 |
| Anacardiaceae | 25 | Caryophyllaceae | 5 | Fagaceae | 3 |
| Annonaceae | 2 | Casuarinaceae | 3 | Flacourtiaceae | 8 |
| Apiaceae | 27 | Celastraceae | 22 | Flagellariaceae | 40 |
| Apocynaceae | 28 | Centrolepidaceae | 40 | Frankeniaceae | 8 |
| Aponogetonaceae | 39 | Cephalotaceae | 10 | Fumariaceae | 2 |
| Aquifoliaceae | 22 | Ceratophyllaceae | 2 | Gentianaceae | 28 |
| Araceae | 39 | Chenopodiaceae | 4 | Geraniaceae | 27 |
| Araliaceae | 27 | Chrysobalanaceae | 10 | Gesneriaceae | 33 |
| Arecaceae | 39 | Cistaceae | 8 | Globulariaceae | 32 |
| Aristolochiaceae | 2 | Clusiaceae | 6 | Goodeniaceae | 35 |
| Asclepiadaceae | 28 | Combretaceae | 18 | Grossulariaceae | 10 |
| Asteraceae | 37, 38 | Commelinaceae | 40 | Gunneraceae | 18 |
| Atherospermataceae | 2 | Connaraceae | 10 | Gyrostemonaceae | 8 |
| Austrobaileyaceae | 2 | Convolvulaceae | 30 | Haemodoraceae | 45 |
| Avicenniaceae | 30 | Corsiaceae | 47 | Haloragaceae | 18 |
| Balanopaceae | 3 | Corynocarpaceae | 22 | Hamamelidaceae | 3 |
| Balanophoraceae | 22 | Costaceae | 45 | Hanguanaceae | 46 |
| Balsaminaceae | 27 | Crassulaceae | 10 | Hernandiaceae | 2 |
| Basellaceae | 5 | Cucurbitaceae | 8 | Himantandraceae | 2 |
| Bataceae | 8 | Cunoniaceae | 10 | Hippocrateaceae | 22 |
| Berberidaceae | 2 | Cuscutaceae | 30 | Hugoniaceae | 24 |
| Betulaceae | 3 | Cymodoceaceae | 39 | Hydatellaceae | 45 |
| Bignoniaceae | 33 | Cyperaceae | 41, 42 | Hydrocharitaceae | 39 |
| Bixaceae | 8 | Datisceaeae | 8 | Hydrophyllaceae | 30 |
| Bombacaceae | 7 | Davidsoniaceae | 10 | Icacinaceae | 22 |
| Boraginaceae | 30 | Dichapetalaceae | 22 | Idiospermaceae | 2 |
| Brassicaceae | 8 | Dilleniaceae | 6 | Iridaceae | 46 |
| Bromeliaceae | 45 | Dioscoreaceae | 46 | Juncaceae | 40 |
| Brunoniaceae | 35 | Dipsacaceae | 36 | Juncaginaceae | 39 |
| Buddlejaceae | 32 | Donatiaceae | 34 | Lamiaceae | 31 |
| Burmanniaceae | 47 | Droseraceae | 8 | Lauraceae | 2 |
| Burseraceae | 25 | Ebenaceae | 10 | Lecythidaceae | 8 |

| Volume | | Volume | | Volume | |
|-------------------------|---------------------|-------------------------|---------------------|-------------------------|-----------|
| Leeaceae | 24 | Philydraceae | 45 | Stylidiaceae | 34 |
| Lemnaceae | 39 | Phytolaccaceae | 4 | Surianaceae | 10 |
| Lentibulariaceae | 33 | Piperaceae | 2 | Symplocaceae | 10 |
| Liliaceae | 45 | Pittosporaceae | 10 | Taccaceae | 46 |
| Limnocharitaceae | 39 | Plantaginaceae | 32 | Tamaricaceae | 8 |
| Linaceae | 24 | Platanaceae | 2 | Theaceae | 6 |
| Loganiaceae | 28 | Plumbaginaceae | 5 | Thymelaeaceae | 18 |
| Loranthaceae | 22 | Poaceae | 43, 44A, 44B, 44C | Tiliaceae | 7 |
| Lythraceae | 18 | Podostemaceae | 18 | Tremandraceae | 24 |
| Malpighiaceae | 24 | Polemoniaceae | 30 | Trimeniaceae | 2 |
| Malvaceae | 7 | Polygalaceae | 24 | Triuridaceae | 39 |
| Melastomataceae | 18 | Polygonaceae | 5 | Tropaeolaceae | 27 |
| Meliaceae | 26 | Pontederiaceae | 45 | Typhaceae | 45 |
| Melianthaceae | 25 | Portulacaceae | 5 | Ulmaceae | 3 |
| Menispermaceae | 2 | Posidoniaceae | 39 | Urticaceae | 3 |
| Menyanthaceae | 30 | Potamogetonaceae | 39 | Valerianaceae | 36 |
| Mimosaceae | 11A, 11B, 12 | Primulaceae | 10 | Verbenaceae | 30 |
| Molluginaceae | 5 | Proteaceae | 16, 17A, 17B | Violaceae | 8 |
| Monimiaceae | 2 | Rafflesiaceae | 22 | Viscaceae | 22 |
| Moraceae | 3 | Ranunculaceae | 2 | Vitaceae | 24 |
| Moringaceae | 8 | Resedaceae | 8 | Winteraceae | 2 |
| Musaceae | 45 | Restionaceae | 40 | Xanthophyllaceae | 24 |
| Myoporaceae | 33 | Rhamnaceae | 24 | Xanthorrhoeaceae | 46 |
| Myristicaceae | 2 | Rhizophoraceae | 22 | Xyridaceae | 40 |
| Myrsinaceae | 10 | Rosaceae | 10 | Zannichelliaceae | 39 |
| Myrtaceae | 19, 20, 21 | Rubiaceae | 36 | Zingiberaceae | 45 |
| Najadaceae | 39 | Ruppiaceae | 39 | Zosteraceae | 39 |
| Nelumbonaceae | 2 | Rutaceae | 26 | Zygophyllaceae | 26 |
| Nepenthaceae | 8 | Salicaceae | 8 | | |
| Nyctaginaceae | 4 | Santalaceae | 22 | | |
| Nymphaeaceae | 2 | Sapindaceae | 25 | | |
| Ochnaceae | 6 | Sapotaceae | 10 | | |
| Olacaceae | 22 | Saxifragaceae | 10 | | |
| Oleaceae | 32 | Scrophulariaceae | 32 | | |
| Onagraceae | 18 | Simaroubaceae | 25 | | |
| Opiliaceae | 22 | Smilacaceae | 46 | | |
| Orchidaceae | 47 | Solanaceae | 29 | | |
| Orobanchaceae | 32 | Sonneratiaceae | 18 | | |
| Oxalidaceae | 27 | Sparganiaceae | 45 | | |
| Pandanaceae | 39 | Sphenocleaceae | 34 | | |
| Papaveraceae | 2 | Stackhousiaceae | 22 | | |
| Passifloraceae | 8 | Stemonaceae | 46 | | |
| Pedaliaceae | 33 | Sterculiaceae | 7 | | |

Australian Biological Resources Study

In 1973 the Commonwealth Government established the Australian Biological Resources Study to document what plants and animals there are in Australia and where they occur. It brings together the expertise of scientists from around Australia, and overseas, to prepare authoritative publications on Australia's flora and fauna.

There are seven book series:

Flora of Australia

A series of over 60 volumes providing detailed species-level descriptions of all vascular plants, bryophytes and lichenised fungi found in Australia.

Fungi of Australia

A multi-volume series describing the indigenous and naturalised fungi in Australia and its territories.

Algae of Australia

A multi-volume series documenting the marine, freshwater and terrestrial algae of Australia.

Flora of Australia Supplementary Series

An occasional series of monographs, bibliographies, atlases, indices and related works, basic to the production of the *Flora of Australia*.

Fauna of Australia

A series comprising comprehensive reviews of animal groups in Australia.

Zoological Catalogue of Australia

A nomenclator of animal taxa in Australia, with brief information on distribution and ecology.

Australian Flora and Fauna Series

A 15-volume group of monographs on various topics in the fields of biogeography, botany and zoology.

In addition, a range of electronic products is available.

ABRS also supports taxonomic research on Australia's plants and animals through its grants and scholarships schemes.

Volumes published:

- | | | | |
|-----|--|-----|---|
| 1 | Introduction (1st edn) 1981 | 28 | Gentianales 1996 |
| 1 | Introduction (2nd edn) 1999 | 29 | Solanaceae 1982 |
| 2 | Winteraceae to Platanaceae 2007 | 35 | Brunoniaceae, Goodeniaceae 1992 |
| 3 | Hamamelidales to
Casuarinales 1989 | 37 | Asteraceae 1 2015 |
| 4 | Phytolaccaceae to
Chenopodiaceae 1984 | 39 | Alismatales to Arales 2011 |
| 8 | Lecythidales to Batales 1982 | 43 | Poaceae 1, Introduction and
Atlas 2002 |
| 11A | Mimosaceae, Acacia part 1 2001 | 44A | Poaceae 2 2009 |
| 11B | Mimosaceae, Acacia part 2 2001 | 44B | Poaceae 3 2005 |
| 12 | Mimosaceae (excl. Acacia),
Caesalpiniaceae 1998 | 45 | Hydatellaceae to Liliaceae 1987 |
| 16 | Elaeagnaceae, Proteaceae 1 1995 | 46 | Iridaceae to Dioscoreaceae 1986 |
| 17A | Proteaceae 2, Grevillea 2000 | 48 | Ferns, Gymnosperms and
Allied Groups 1998 |
| 17B | Proteaceae 3, Hakea to
Dryandra 1999 | 49 | Oceanic Islands 1 1994 |
| 18 | Podostemaceae to
Combretaceae 1990 | 50 | Oceanic Islands 2 1993 |
| 19 | Myrtaceae — Eucalyptus,
Angophora 1988 | 51 | Mosses 1 2006 |
| 22 | Rhizophorales to Celastrales 1984 | 54 | Lichens — Introduction,
Lecanorales 1 1992 |
| 25 | Melanthaceae to
Simaroubaceae 1985 | 55 | Lichens — Lecanorales 2,
Parmeliaceae 1994 |
| 26 | Meliaceae, Rutaceae,
Zygophyllaceae 2013 | 56A | Lichens 4 2004 |
| | | 57 | Lichens 5 2009 |
| | | 58A | Lichens 3 2001 |



Australian Government

Department of the Environment

Australian Biological Resources Study

