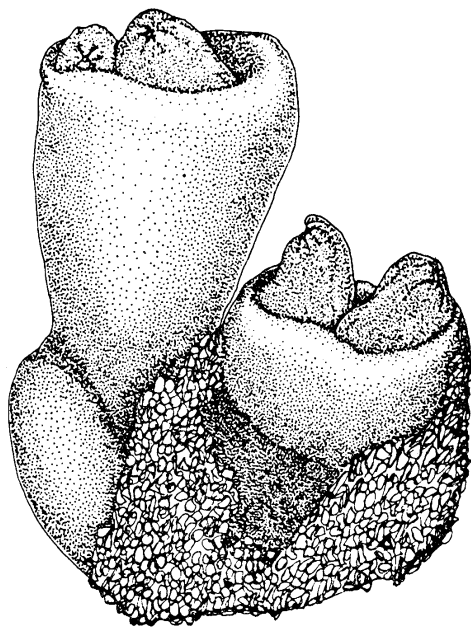


CATALOGUE OF TUNICATA IN AUSTRALIAN WATERS



P. Kott

Queensland Museum
Brisbane, Australia

qm
queensland museum



Australian Government

Department of the
Environment and Heritage



Australian Government

Department of the Environment and Heritage

Australian Biological Resources Study

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National Library of Australia Cataloguing-in-Publication entry

Kott, P.

Catalogue of Tunicata in Australian waters.

Bibliography.

Includes index.

ISBN 0 642 56842 1

[ISBN 978-0-642-56842-7].

1. Tunicata - Australia. I. Australian Biological Resources Study. II. Title.

596.20994

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[International Commission for Zoological Nomenclature (1999). *International Code of Zoological Nomenclature* 4th ed: 1–126 (Article 8.6)]

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PREFACE

This *Catalogue of Tunicata in Australian Waters* revises and updates the work published on 14 May 1998 as Kott, P. (1998). Tunicata. pp. 51-259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp., and follows the general arrangement of that work.

Arrangement of Higher Level Taxa

In this work, families are treated in alphabetical order within their class and ordinal groupings as set out below.

Class: ASCIDIACEA

Order: ENTEROGONA

Suborder: APLOUSOBRANCHIA

Cionidae
Clavelinidae
Diazonidae
Didemnidae
Euherdmaniidae
Holozoidae
Polycitoridae
Polyclinidae
Protopolyclinidae
Pseudodistomidae
Pycnoclavellidae
Ritterellidae
Stomozoidae

Suborder: PHLEBOBRANCHIA

Agneziidae
Asciidiidae
Corellidae
Perophoridae
Plurellidae

Order: PLEUROGONA

Suborder: STOLIDOBRANCHIA

Hexacrobylidae
Molgulidae
Pyuridae
Styelidae
Styelinae
Botryllinae
Polyzoinae

CLASS: THALIACEA

Doliolidae
Pyrosomatidae
Pyrosomatinae
Pyrostremmatinae
Salpidae
Salpinae
Cyclosalpinae

CLASS: APPENDICULARIA

Fritillariidae
Kowalevskiidae
Oikopleuridae
Bathochordaeinae
Oikopleurinae

Geographic Scope

Distribution data in this *Catalogue* follow the format adopted by the *Zoological Catalogue of Australia* series, using political and geographic region descriptors (see Map 1), and serves as a guide to the distribution of a taxon. For details of a taxon's distribution, the reader should consult the cited references (if any) at genus and species levels.

Australia is defined as including Lord Howe Is., Norfolk Is., Cocos (Keeling) Is., Christmas Is., Ashmore and Cartier Is., Macquarie Is., Australian Antarctic Territory, Heard and McDonald Is., and the waters associated with these land areas of Australian Political responsibility. Political areas include the adjacent waters. However, the Tunicata of the waters surrounding Macquarie Is., the Australian Antarctic Territory, Heard and McDonald Is are not included in this work. Species known from these areas are treated in monographic works by Lohmann (1905, 1908), Lohmann & Buckmann (1926), Garstang (1933) Garstang & Georgeson (1935), Kott (1954, 1969, 1971), Millar (1960) Tokioka (1964), C. Monniot (1978), Monniot & Gail (1978) and Monniot & Monniot (1983).

Terrestrial geographic terms are based on the drainage systems of continental Australia, while marine terms are self explanatory except as follows: the boundary between the coastal and oceanic zones is the 200m contour; the Arafura Sea extends from Cape York to 124°E; and the boundary between the Tasman and Coral Seas is considered to be the latitude of Fraser Island, also regarded as the southern terminus of the Great Barrier Reef.

Distribution records, if any, outside of these areas are listed as extralimital. The distribution descriptors for each species are collated to genus level. Users are advised that extralimital distribution for some taxa may not be complete.

Ecological Descriptors

The following descriptors are used in this database to summarise the life history and habit of species group taxa.

Life History

oviparous: mature gametes released for fertilisation outside the parental colony or individual (as in most solitary Ascidiacea).

viviparous: fertilisation and incubation of embryos takes place in the parental colony or individual followed later by release of live larvae or juveniles (as in all colonial Ascidiacea).

Habit

planktonic: organisms suspended in and moving in water or in air, their distribution dependent on the course of currents.

pelagic: organisms moving through water independently of currents.

benthic: attached to, or crawling or walking on, or living on or in the bottom of the sea, lakes or rivers.

sessile: directly attached to the substrate or living permanently in one place (territorial).

marine: living in the sea

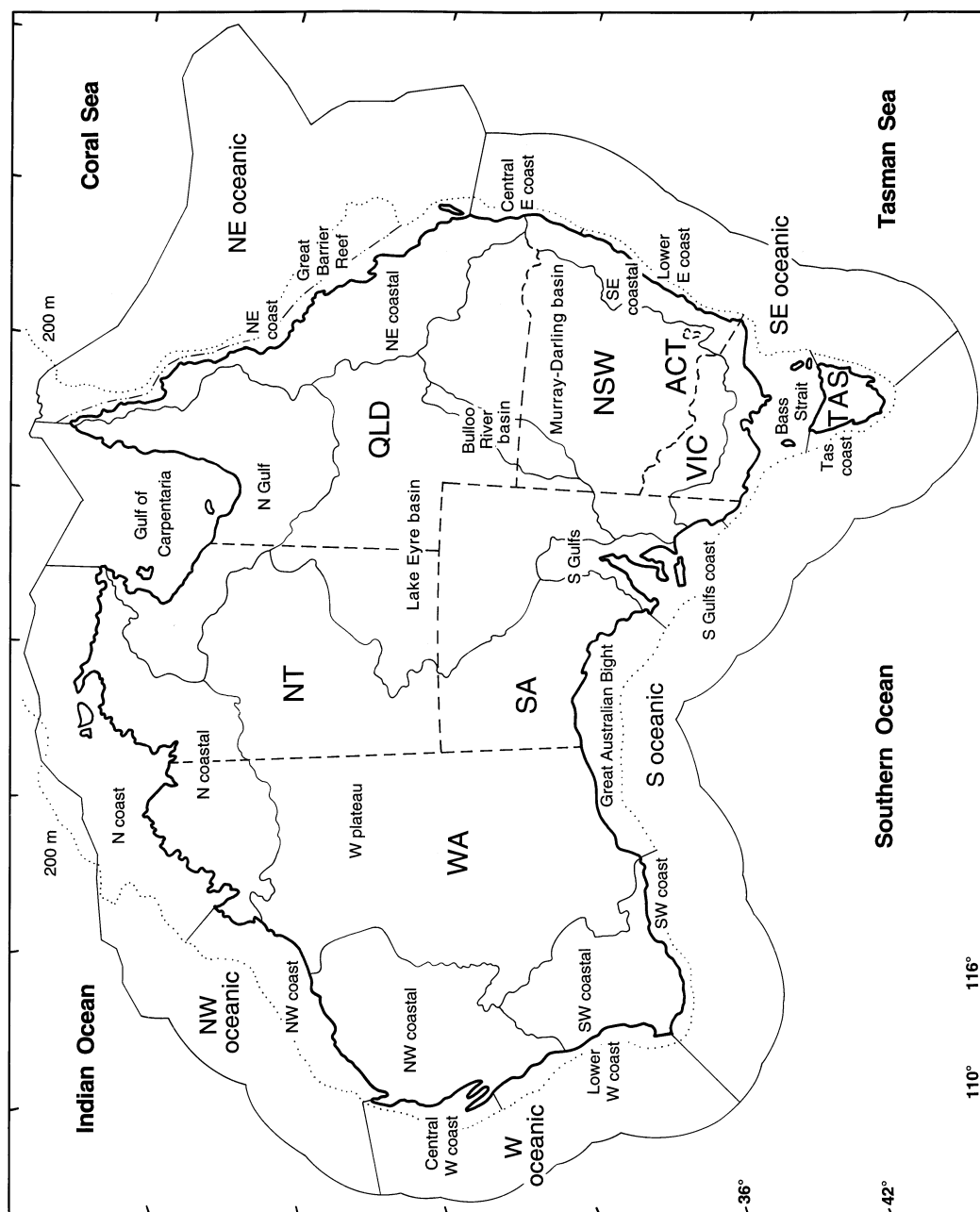
Museums

The following acronyms have been used for the institutions in which the type specimens in this taxon are held.

AM	Australian Museum, Sydney, New South Wales, Australia
AMNH	American Museum of Natural History, New York, USA
ANSP	Academy of Natural Sciences, Philadelphia, Pennsylvania, USA
BLIH	Biological Laboratory, Imperial Household of Japan, Tokyo, Japan
BMBN	Bergen Museum, Bergen, Norway
BMNH	Natural History Museum (formerly British Museum (Natural History)), London, England
BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, USA
GMNH	Muséum d'Histoire Naturelle, Genève, Switzerland
HMN	Hancock Museum, University of Newcastle, Newcastle-upon-Tyne, England
IM	Indian Museum, Calcutta, India
MAD	Madras Museum, Madras, India
MGH	Museum Godeffroy, Hamburg (now in ZMH), Germany
MNHN	Museo Nacional de Historia Natural, Santiago, Chile
MNHP	Muséum National d'Histoire Naturelle, Paris, France
MONZ	Museum of New Zealand Te Papa Tongaewa (formerly National Museum of NZ), Wellington, New Zealand
MSUMZ	Memphis State University, Tennessee, USA
NHMW	Naturhistorisches Museum, Wien, Austria
NHRM	Naturhistoriska Riksmuseet, Stockholm, Sweden
NMV	Museum Victoria, Melbourne, Victoria, Australia
NSMT	National Science Museum (Natural History), Tokyo, Japan
NTM	Museum and Art Galleries of the Northern Territory, Darwin, Northern Territory, Australia
NZOI	New Zealand Oceanographic Institute, Wellington, New Zealand
OMNH	Osaka Museum of Natural History, Osaka, Japan
OMNZ	Otago Museum, Otago, New Zealand
QM	Queensland Museum, Brisbane, Queensland, Australia
SAM	South African Museum, Cape Town, South Africa
SAMA	South Australian Museum, Adelaide, South Australia, Australia
SMBL	Museum of the Seto Marine Biological Laboratory, Sirahama, Japan
SMF	Naturmuseum und Forschungsinstitut, Senckenberg, Frankfurt am Main, Germany
TMH	Tasmanian Museum and Art Gallery, Hobart, Tasmania, Australia
USNM	National Museum of Natural History, Smithsonian Institution, Washington DC, USA
UTZM	University of Tsukuba, Zoological Museum (the Oka Collection), Okayama, Japan
VNIRO	Institute of Oceanography, Moscow, Russia
WAM	Western Australia Museum, Perth, Western Australia, Australia
YPM	Yale University, Peabody Museum, New Haven, Connecticut, USA
ZMA	Zoologisch Museum, Universiteit van Amsterdam, Amsterdam, The Netherlands
ZMB	Museum für Naturkunde an der Universität Humboldt zu Berlin, Berlin, Germany
ZMH	Zoologisches Museum für Hamburg, Hamburg, Germany
ZMUC	Zoological Museum, University of Copenhagen, Copenhagen, Denmark

Closing Date

The closing date for entries in this section of the *Catalogue* was 30 July, 2005.



Map 1. States, standard drainage basins, coastal zones within the 200 m bathymetric contour, and the 200 nautical mile Australian fishing zones. Simple conic projection with two standard parallels (18°S and 36°S).
[from Kott 1998]

PHYLUM TUNICATA

The Tunicata are grouped with Hemichordata and Cephalochordata as the Protochordata. Phylogenetic relationships of the protochordate taxa are not close, but they share certain chordate characteristics and possibly an ancestry with the Chordata (Berrill 1950). Among the shared features are a perforated pharynx, and a dorsal and sometimes hollow nerve cord derived by invagination from the ectoderm. In Tunicata the larval or adult tail (when it occurs), and in Cephalochordata a rod of cells resembling the embryonic notochord of chordate animals suggest a closer affinity with Chordata than with the invertebrate phylum Hemichordata. Also, in Tunicata and Cephalochordata but not in Hemichordata a median ventral mucus-secreting groove in the pharynx is known to take up iodine like the vertebrate thyroid gland (Godeaux 1989). Tunicates differ further from Hemichordata in their unique heart and linear circulatory system, the heart reversing the direction of blood flow from time to time to ensure the even distribution of oxygen and nutrients (Heron 1973, 1975) and in having tailed (rather than ciliated) larvae. A proposal that the tunicate anterodorsal ciliated opening of the neural gland into the pharynx might be an homologue of the vertebrate anterior pituitary has been found to be invalid (see Goodbody 1974). Secretory cells are not present and the cilia create a current into the duct and to the neural gland as part of the mechanism controlling blood volume (Ruppert 1990).

The group Tunicata Lamarck, 1816 initially contained ascidians and salps. Appendicularians and doliolids were added later by Huxley (1851). Although Lamarck believed the Tunicata to be an independent class between Alcyonaria and Vermes, they were more often thought of as a class (Molluscoides) of the Mollusca (see Cuvier 1817, 1830) until Kowalevsky (1867) demonstrated the chordate characteristics evident in their embryos (see Herdman 1882). Herdman (1882) eventually divided the Tunicata into the three classes known today (see also Garstang 1896 and Fenaux 1993). These are the sessile Ascidacea (sea squirts), and the planktonic Thaliacea (salps, doliolids and purse salps) and Appendicularia (larvaceans).

There are marked differences between the three classes of the Tunicata. The larval tail, lost on metamorphosis in the Ascidacea and Doliolidae (Thaliacea) and suppressed altogether in other Thaliacea, persists through life in Appendicularia. In Ascidacea and Thaliacea the ectoderm of the body wall synthesises a substance known as tunicin that is similar (chemically) to plant cellulose. It forms a test or tunic around the body composed of an acellular, proteinaceous matrix containing fibres and blood and test cells (see Goodbody 1974). Ectodermal vessels extend into it from the body wall and in colonial forms the test continues around ectodermal vessels that connect colonial zooids, or it forms a matrix in which zooids (as well as test vessels) are partially or completely embedded. Generally Appendicularia lack a tunicin covering. Instead, a balloon-like mucous house is secreted by special (oikoplast) cells in the trunk epithelium and is inflated around the whole or part of the animal by the beating of its tail. Thaliacea and Ascidacea have an atrial cavity invaginated from the external surface (and therefore lined with ectodermal epithelium) into which the pharyngeal perforations (stigmata) open. In Ascidacea this cavity surrounds the sides and dorsum of the perforated part of the pharynx, maintaining its connection with the exterior through the dorsal opening (atrial aperture). In Thaliacea the atrial cavity is at the posterior end of the pharynx and its aperture is at the opposite end of the animal to the mouth. In Appendicularia there is no atrial cavity and only a single pair of pharyngeal perforations open directly to the exterior.

With the exception of certain ascidians from abyssal depths that have evolved a carnivorous habit, all three classes of the Tunicata are prodigious filter feeders, straining large quantities of water passing through their mucous filters. In Ascidacea and Thaliacea the microorganisms and organic particles from the continuous sheet of mucus secreted by the endostyle and perforated by micropores is moved up over the inner wall of the perforated pharynx by cilia and rolled into

a mucous rod that moves along the dorsal midline into the oesophagus. The beating of the cilia lining the stigmata draws a current of water in through the mouth (incurrent aperture), through the mucous-sheet and the stigmata of the pharyngeal wall and out through the atrial cavity and the atrial (excurrent) aperture. In Appendicularia water is moved through special filters in the mucous house by the beating of the tail. Food caught in these filters is washed into the mouth by an incurrent stream of water generated by cilia lining the pharyngeal perforations (known as spiracles) and as in the two other tunicate classes, and the food, trapped in mucus secreted by the endostyle, is moved down into the gut (see Deibel 1998; Flood & Deibel 1998). With very few exceptions, tunicates are hermaphrodite, each individual having gonads of both sexes. Male and female organs mature at different times and normally they are not self-fertile (Ryland & Bishop 1993).

Recent reviews of aspects of the Ascidiacea are on physiology (Goodbody 1974), microscopic anatomy (Burighel & Cloney 1997) and biology and functional anatomy (Millar 1971; Kott 1985, 1990a, 1992a, 2001: Annotated Glossaries; Kott 1989). The biology of the Thaliacea and Appendicularia is reviewed in Bone (1998).

Ascidiacea is the most diverse class, with about 700 extant species in the Australian fauna. Thaliacea, although prolific and with a high biomass in coastal waters, are much less diverse, having less than 100 species worldwide. Appendicularia also are not diverse, with only about 60 species known worldwide. Most species of the planktonic Thaliacea and Appendicularia, carried by ocean currents, have wide geographic ranges that include most of the oceans of the world.

ACKNOWLEDGEMENTS

Much of the information on the Ascidiacea in this work is the result of the author's research on the class. However, for information on Appendicularia she has relied on the work of Harold Thompson (1945); and on more recent publications and comments of Dr Robert van Soest of the Zoological Museum, University of Amsterdam (Thaliacea) and Dr Robert Fenaux of the Station Zoologique of the Université de Paris, Villefranche-sur-Mer (Appendicularia). She is especially grateful to Dr van Soest and Dr Fenaux for their advice.

In the published *Catalogue*, the illustrations used in the ascidian family introductions are reproduced from Kott (1985, 1990a, 1990b, 1992a, 1992). To maintain a consistent style, Figs 23-25 (Thaliacea) were redrawn from the original publications (as indicated) by F. Knight. Figure 26 (Appendicularia) was reproduced from Alldredge (1978), with permission.

Compilation of this section of the *Zoological Catalogue of Australia* database, including this edition, was partially funded by the Australian Biological Resources Study. The continuing support of the Director and the Board of the Queensland Museum, and the assistance of its administrative staff, are acknowledged with gratitude as is the assistance of the author's research assistant (under an ABRS grant for work on the taxonomy of the Australian Ascidiacea) whose contribution to the compilation of this revision has been substantial. The author is grateful also for assistance from the editorial staff of the ABRS, and the diligence of six anonymous referees whose constructive suggestions on the original database contributed to its accuracy and comprehensiveness.

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ASCIDIACEA

The Ascidiacea, the largest class of the Tunicata, are fixed, filter feeding organisms found in most marine habitats from intertidal to hadal depths. The class contains two orders, the Enterogona in which the atrial cavity (atrium) develops from paired dorsal invaginations, and the Pleurogona in which it develops from a single median invagination. These ordinal characters are not present in adult organisms. Accordingly, the subordinal groupings, Aplousobranchia and Phlebobranchia (Enterogona) and Stolidobranchia (Pleurogona), are of more practical use at the higher taxon level.

In the earliest classification (Savigny 1816; Milne-Edwards 1841) ascidians-including the known salps, doliolids and later (Huxley 1851), appendicularians-were subdivided according to their social organisation, namely, solitary and colonial forms, the latter with zooids either embedded (compound) or joined by basal stolons (social). Recognising the anomalies this classification created, Lahille (1886) used the branchial sacs to divide the group (now known as Tunicata) into three orders: Aplousobranchia (pharynx lacking both internal longitudinal vessels and folds), Phlebobranchia (pharynx with internal longitudinal vessels but lacking folds), and Stolidobranchia (pharynx with both internal longitudinal vessels and folds). Subsequently, with thaliaceans and appendicularians in their own separate classes, Lahille's suborders came to refer only to the Class Ascidiacea, and his definitions were amplified by consideration of the position of the gut and gonads relative to the branchial sac (Harant 1929).

Kott (1969) recognised that the position of the gut and gonads are linked with the condition and function of the epicardium. These are significant characters and are informative of phylogenetic relationships. However, although generally conforming with Lahille's orders, the new phylogeny cannot be reconciled with a too rigid adherence to his definitions based solely on the branchial sac. Definitions of Lahille's taxa have been adjusted to confer the flexibility needed to accommodate the various evolutionary trends evident in this diverse group of animals. The presence of uninterrupted longitudinal branchial vessels in *Ciona* and some diazonids indicates a relationship with Phlebobranchia but is not the only indicator of affinity at subordinal rank. Rather, internal longitudinal branchial vessels are primitive, occurring in all suborders. They tend to be reduced in numbers with size reduction and simplification and are lost altogether in Aplousobranchia, in which evolution is dominated by replication, size reduction and simplification (Kott 1990a).

Ascidians have evolved in two major lines, one (Aplousobranchia) primarily associated with replication and the development of colonial systems, progressive size reduction and simplification of zooids, increasing colony organisation and the relatively small ovaries associated with internal fertilisation and viviparity. In the other line (Phlebobranchia and Stolidobranchia) evolution generally is associated with growth of the individual (rather than development of colonies), sophistication of various organs which enhance the efficiency of solitary individuals (including digestive glands) and the large ovaries associated with external fertilisation and oviparity. Occasionally replication and a colonial habit also occur in certain families in the latter two suborders, and when this occurs, the adaptive changes (including size reduction of zooids, development of colonial systems, internal fertilisation and viviparity) parallel the changes associated with colony development in Aplousobranchia. In the most highly organised colonies (in Stolidobranchia as well as Aplousobranchia), the replicate zooids are entirely embedded in common test material and their excurrent apertures open into large internal cloacal spaces (canals and cavities). In less well organised colonial species (in all suborders), the excurrent apertures open directly to the exterior (as they do in solitary forms). In less well developed colonies in all suborders, zooids are only partially embedded or they are separate and connected only by basal stolons.

The only exceptions to these generalisations are, in Aplousobranchia, the primitive and solitary *Ciona intestinalis* and some taxa in Diazonidae that form simple colonies which are fertilised externally; and in the invariably solitary stolidobranch genera *Polycarpa* (Styelidae) and *Molgula* (Molgulidae), a few species are internally fertilised and brood their embryos.

This subordinal phylogeny and classification followed in this work is based on Kott's revisions (Kott 1985, 1990a, 1992a, 2001). In Aplousobranchia (including the Cionidae and Diazonidae), the gut loop and gonads are posterior to the pharynx; and persistent endodermal epicardial sacs generally participate in regeneration of tissues, especially in replication. Only in clavelinids does mesodermal tissue generate replicates. In Phlebobranchia and Stolidobranchia, the gut loop and gonads are in the parietal body wall beside the pharynx; and the epicardium is modified for an excretory role, replication (when it occurs) being effected by the ectoderm.

The Australian Ascidian Fauna

The known Australian ascidian fauna numbers about 700 species, although this number is expected to increase as new species are found. The diversity of the fauna is greater than is known for other geographic areas of comparable size (Kott 1985, 1990, 1992, 2001)). Several factors may explain this, namely:

- The northern Australian coast is in the middle of the vast Indo-West Pacific tropical coralline region. The Australian continental shelf fauna acquires recruits and gains genetic diversity from that region.
- The Australian continent forms a bridge between the tropical and temperate waters and provides a diversity of habitats for colonisation and speciation.
- The temperate waters of the southern coast contain Gondwanan elements and recruits from the Southern Ocean, as well as the indigenous species that appear to be isolated in these habitats.

The oviparous larvae of solitary species are free-swimming for periods of one to 24 hours, and prior to hatching have been floating free in the water for up to three days (Anderson *et al.* 1975). Accordingly, they are subject to dispersal which could contribute to gene flow and remove risks of isolation. However, dispersal could also affect population maintenance, reducing the success of fertilisation for these sessile organisms. The viviparous larvae of colonial species are seldom free-swimming for more than one hour (Berrill 1950) and failure to effect recruitment to neighbouring populations could be the cause of isolation of populations in temperate rocky coastal habitats. The profusion of suitable habitats in coral reef environments may prevent such isolation in the tropics.

In Australian waters, most of the known ascidian families are well represented relative to their diversity in other parts of the world, although certain families, especially colonial ones, appear to have radiated more than others. Of particular interest is the family Holozoidae which is represented by a number of genera that only occasionally are represented in waters north of the equator. Some of these are diverse (*Sigillina* Savigny, 1816, *Hypodistoma* Tokioka, 1967 and *Sycozoa* Lesson, 1832) and others are not so diverse (*Hypsistozoa* Brewin, 1953, *Neodistoma* Kott, 1990 and *Polydistoma* Kott, 1990). In this family, only the genus *Distaplia* Della Valle, 1881 is cosmopolitan. The polycitorid genus *Eudistoma* Caullery, 1909 and two polyclinid genera, *Aplidium* Savigny, 1816 and *Polyclinum* Savigny, 1816, are particularly well represented. Some taxa are restricted in both diversity and range, *e.g.* in the Clavelinidae the monotypic *Nephtheis fascicularis* (Drasche, 1882) is indigenous to the West Pacific tropical region. The family Didemnidae is especially diverse, with a rich temperate indigenous fauna as well as a component of tropical species from the wider Indo-West Pacific (see Kott 2005).

Diversity in growth-form and choice of habitat occurs in most ascidian families and even genera. For example, a suite of species in the genus *Clavelina* Savigny, 1816 demonstrates a range of different levels of colony organisation including solitary species, species with individuals joined basally, and others with the zooids entirely embedded in the common test. The related cosmopolitan family Pycnoclavellidae displays a similar range in colony form and has a range of species in Australian waters which exploit a similar variety of habitats. Other aplousobranch taxa with prolific replication, probably rapid colony growth that is not constrained by the existence of cloacal systems (namely, Ritterellidae, Pseudodistomidae, Protopolyclinidae and Euherdmaniidae), have a range of different colonies from solitary zooids to branching, plate-like or compact colonies and also are found in a range of habitats.

In the Phlebobranchia, *Ascidia* Linnaeus, 1767 contains numerous and diverse species, and some (e.g. *Ascidia thompsoni* Kott, 1952 and *Ascidia scaevola* (Sluiter, 1904)) are unusual in having sand embedded in the test. *Ascidia scaevola* is especially well adapted to a sandy sea floor habitat, as are many species of the Agneziidae which use their body muscles to close folds of test across their apertures. The Plurellidae, one of the few western Pacific indigenous families also show remarkable adaptations for sandy sea-floor habitats by having the gonads in a projection from the body wall that is actually embedded in the sandy test.

In the Stolidobranchia, which usually have a characteristically tough, leathery test, a number of stalked species in Styelidae and Pyuridae favour habitats where currents change direction. The *pachydermatina* group in the genus *Pyura* Molina, 1782, includes species with especially long, narrow stalks. It has one representative in New Zealand, but other species are indigenous in Australian temperate waters. However, temperate Australian species are often indigenous possibly having speciated following isolation from their tropical sister groups. This occurs also at genus level, in the case of the genus *Polycarpa* Heller, 1877, which is conspicuous in Australian temperate as well as tropical waters. It appears to have tropical affinities, and does not occur south of the subtropical convergence.

Investigations on the Australian Ascidian Fauna

The early exploration of the Australian ascidian fauna was by European-mounted expeditions visiting these waters. The French corvettes *la Coquille* (1822-25), *Uranie* and *la Physicienne* (1817-20), and the *Astrolabe* (1826-29) and the British *Challenger* (1873-76) expeditions took material from temperate as well as tropical Australian waters (Lesson 1830-32; Quoy & Gaimard 1824, 1833, 1834; Herdman 1882, 1886). Later, the Swedish Expedition (Dr E. Mjöberg) to north-western Australia (Hartmeyer 1919) and the German expedition to south-western Australia (Hartmeyer & Michaelsen 1928, Michaelsen 1930) sampled the fauna of the western side of the continent. Along the more populated eastern coast, the Australian Museum and the NSW Fisheries Research Vessel *Thetis* made collections reported on by Herdman (1899) and Herdman & Riddell (1913). Various collections from Australian locations made by Professor Schmarda (Heller 1878) also added significantly to the knowledge of the ascidian fauna, as did Danish expeditions to the western Pacific (including New Zealand and Australian waters) in the *Dana*, and later the *Galathea*, reported on by Michaelsen (1922, 1924) and Millar (1975).

The Australian tropical fauna, nevertheless, was largely unexplored until the second half of the 20th century, the only exception being the small collection made during the Great Barrier Reef Expedition (Hastings 1931). However, the Dutch exploration of Indonesian waters by the *Siboga* (Sluiter 1904, 1909), other works by Sluiter (1885, 1890, 1895) and Pizon (1908), as well as the American *Albatross* collection (Van Name 1918) from the Philippines, continuing European and Japanese exploration (Tokioka 1950-1975; C. Monniot 1987-1991; F. Monniot 1987-1995; C. & F. Monniot 1987; F. & C. Monniot 1996, 2001; Monniot *et al.* 1991; and Nishikawa 1984, 1986) and a report on the Fijian fauna (Kott 1981) have continued to reveal a diverse tropical western Pacific fauna containing many species with ranges that include tropical Australian waters.

Savigny's (1816) work on collections from the Red Sea, and Herdman's (1906) on a small collection from Sri Lanka indicating that the tropical Indian Ocean ascidian fauna has much in common with the western Pacific fauna were confirmed by the later reports on German collections from the western Indian Ocean of Hartmeyer (1912) and Michaelsen (1918a, 1918b, 1919, 1920) and more recent works of C. & F. Monniot and F. & C. Monniot (1997). Indeed, many tropical species have been shown to have a range from the West Pacific to the eastern coast of the African continent and the northern Australian fauna appears to be the middle of the geographic range of this Indo-West Pacific fauna.

Investigations on the Japanese fauna by Oka (from the end of World War I), and Tokioka (from the end of World War II), followed by Nishikawa, and a survey in the South China Sea (Kott & Goodbody 1982) demonstrate a temperate fauna not closely related to the Australian fauna, the northern limits of the tropical fauna generally being in the Tokhara Islands.

Indigenous studies of the Australian ascidian fauna began after World War II (Kott 1952, 1957 *et seq.*). Before that, it is estimated, only about one fifth of the currently known Australian ascidians had been described. The taxonomy and biology of the Australian fauna are gradually being revised (Kott 1985; 1990a, b; 1992a, b; 1998; 2001; 2002a-c; 2003; 2004a-c; 2005).

Type Specimens of the Australian Ascidian Fauna

The type material that represents the initial (European) phase (which extended up to World War I) in the investigation of the Australian ascidian fauna is in European museum collections. In Paris (Muséum National d'Histoire Naturelle), some (though not all) of the type material of Quoy and Gaimard is retained, and also the modern collections of C. and F. Monniot. Unfortunately, none of Savigny's collection remains (Bouchet & Danrigal 1982). Collections from the *Challenger* Expedition and from Sri Lanka are in the Natural History Museum, London (BMNH)-formerly the British Museum (Natural History). Collections from north-western Australia (Hartmeyer 1919) are in the Swedish Natural History Museum. Large collections from south-western Australia (Hartmeyer & Michaelsen 1928) and Michaelsen (1930) are held in the Zoologisches Museum Hamburg and the Museum für Naturkunde, Berlin. Some South African material (Hartmeyer 1912) is in the Natural History Museum, Vienna. Material collected by Professor Schmarda and reported on by Heller (1878) is also in Hamburg and in the Natural History Museum, Vienna. Specimens from the Danish *Dana* and *Galathea* expeditions are in the Zoological Museum of the University of Copenhagen. The most comprehensive European collection of types relating to the Australian fauna is in the Zoological Museum of the University of Amsterdam, where most of Sluiter's collections from Indonesia are carefully curated and preserved (see Spoel, 1969). Station locations of the Siboga expeditions are recorded in Tydeman (1902). Pizon's (1908) types are held in the Muséum d'Histoire Naturelle, Geneva.

Japanese collections are held in the University of Tsukuba (Oka's material), in the Biological Laboratory of the Imperial Household of Japan (Tokioka 1953), in the National Science Museum (Tokyo) and in the Seto Marine Biological Laboratory (Tokioka 1949 *et seq.* and Nishikawa 1984, 1986: see Harada, 1991).

Although the material reported on by Herdman (1899) was lodged in the Australian Museum (Sydney), no other ascidian material of any significance was held in any Australian museum until after World War II — it was all in Europe. The established Australian State museums now hold significant collections of type and other material representing the ascidian fauna of each respective geographic region of the Australian coast. Types held in the Australian Museum (the NSW State Museum) are set out in Rowe & Marshall (1979).

In this *Catalogue*, the registration numbers in parentheses refer to a sampled portion of the preceding specimen held in another museum.

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APLOUSOBRANCHIA

The suborder Aplousobranchia (order Enterogona) is characterised by the division of the body into thorax, abdomen and sometimes posterior abdomen. Gonads are unpaired and are in the gut loop (in the abdomen), or posterior to it. Paired epicardial sacs (embryonic endodermal outgrowths of the posterior end of the pharynx) persist in adult zooids, although (with the exception of the Cionidae) their connection with the pharynx is lost and often they are fused. The endodermal tissue of the epicardial sacs is the regenerative tissue involved in repair and replication in all but the family Clavelinidae, in which the regenerative tissue is mesodermal (Berrill 1950). Most aplousobranch families are primarily colonial; although the monotypic Cionidae (genus *Ciona*) always is solitary and some exceptional solitary species occur also in Diazonidae, Clavelinidae and Euherdmaniidae.

The overall tendency in this suborder to form colonies through replication, interrupts the growth of individual zooids resulting in their progressive size reduction and simplification, and subsequently to the evolution of integrated colonies with zooids arranged in complex cloacal or other systems that enhance colony interactions with the environment (Kott 1989). Internal longitudinal branchial vessels (present in *Ciona* and Diazonidae) are usually absent although their remains (in the form of papillae) persist in some Protopolyclinidae, Ritterellidae and Polyclinidae. Eggs are fertilised externally only in Cionidae and Diazonidae. Associated with reduction in zooid size and increase in the numbers of replicates of a single genotype, gonads are relatively small in zooids of colonial taxa, the relatively few eggs produced are fertilised internally, and embryos, brooded either in the zooids or in the colonial test, are liberated as tailed larvae.

Australian Aplousobranchia have been revised by Kott (1990, 1992a,b, 2001, 2002, 2003, 2004a-c, 2005). Family level taxa are characterised by their colonial organisation; position, size and form of the gonads; site of fertilisation and brooding of embryos; size of the thorax and condition of the branchial sac including the number of stigmata and transverse branchial vessels; length of the oesophagus and shape of the stomach; and differences in larval adhesive organs and accessory adhesive apparatus.

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CIONIDAE

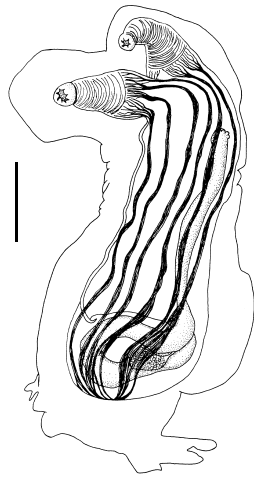


Fig. 1. *Ciona intestinalis* (Linnaeus, 1767), individual in test showing gut loop and muscles. (Scale bar = 5.0 mm). [from Kott 1990]

The family Cionidae Lahille, 1887, containing a single genus, *Ciona* Fleming, 1822, is thought to be the most primitive of the extant ascidian families. It is characterised by solitary habit, a horizontal gut loop posterior to the branchial sac, a persistent opening into the posterior end of the pharynx from each of the pair of endodermal epicardial sacs, a large perforated pharynx (branchial sac) with internal longitudinal vessels, and numerous rows of stigmata.

The family Cionidae, once regarded as a member of the Phlebobranchia due to its large flat branchial sac and internal longitudinal vessels, was proposed as a member of the Aplousobranchia by Kott (1969). Cionids lack the renal vesicles (derived from the epicardial sac) that crowd around the gut in Phlebobranchia and Stolidobranchia (Berrill 1950). Further, the epicardial sacs remain entire as in other Aplousobranchia, and their role in the regeneration of lost or damaged

tissue is homologous with their role in the replicative process of colonial Aplousobranchia. Cionids also resemble other aplousobranchs in having the gut behind the thorax (rather than alongside), the body being divided into thorax and abdomen.

This family resembles the aplousobranch family Diazonidae most closely, having a similar soft, elastic, translucent test, large branchial sac with internal longitudinal vessels, an oviparous (externally fertilised) habit, and small larvae with few larval or adult organs other than the simple triradially arranged adhesive organs. Cionidae are separated from the Diazonidae by a horizontal (rather than vertical) gut loop. Some Diazonidae form colonies, constituting a further distinction.

Cionidae are represented in Australia by a single species, *Ciona intestinalis* (Linnaeus, 1767). Records of *C. intestinalis* are from ports and harbours in all oceans, including all Australia ports, and many estuaries (Kott 1990). However, records from Australian locations later than 1983, are only from St Vincent Gulf (South Australia), Port Phillip Bay (Victoria) and Port Kembla (New South Wales).

Species of the genus *Ciona* have been reviewed by Hoshino & Nishikawa (1985). Detailed accounts of morphology are given by Roule (1884) and Millar (1953).

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***Ciona* Fleming, 1822**

Ciona Fleming, J. (1822). *The Philosophy of Zoology*. Vol. 2. Edinburgh and London pp. 508–518. [512] [*nomen conservandum*, see Melville, R.V. (1981). Opinion 1172. *Ascidia intestinalis* Linnaeus, 1767 (Tunicata) conserved. *Bull. Zool. Nomencl.* **38**(2): 100–101].

Type species: *Ascidia intestinalis* Linnaeus, 1767 by monotypy.

Extralimital distribution: Palaearctic Region; worldwide, rare in polar waters. See: Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Hoshino, Z. & Nishikawa, T. (1985). Taxonomic studies of *Ciona intestinalis* (L.) and its allies. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **30**(1–3): 61–79; Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

***Ciona intestinalis* (Linnaeus, 1767)**

Tethyum sociabile Gunnerus, J.E. (1765). Sõe-Pungen (*Tethyum sociabile*) fulständige beskreven. *Trondhj. Selsk. Skrift.* **3**: 81–102 [99] [Translated 1767: Vollständige Beschreibung des Seebeutels. *Drontheim Gesellsh. Shrift* **3**: 69 [100]; suppressed under Plenary Powers, see Melville, R.V. (1981). Opinion 1172. *Ascidia intestinalis* Linnaeus, 1767 (Tunicata) conserved. *Bull. Zool. Nomencl.* **38**(2): 100–101].

Type data: type status unknown (lost).

Type locality: Trondheimsfjorden, Norway.

Ascidia intestinalis Linnaeus, C. (1767). *Systema Naturae* per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Editio duodecim. Holmiae : Laurentii Salvii Tom. 2, pp. 1087, 1089, 1294, 1295, 1319 [1087] [conserved as type species of genus *Ciona* Fleming, 1822, see Melville, R.V. (1981). Opinion 1172. *Ascidia intestinalis* Linnaeus, 1767

(Tunicata) conserved. *Bull. Zool. Nomencl.* **38**(2): 100–101].

Type data: type status and whereabouts unknown.

Type locality: European oceans.

Ascidia canina Mueller, O.F. (1776). pp. 224–226 in, *Zoologiae Danicae*. Copenhagen : Prodrum. [225].

Type data: type status unknown.

Type locality: Denmark.

Ascidia corrugata Mueller, O.F. (1776). pp. 224–226 in, *Zoologiae Danicae*. Copenhagen : Prodrum. [225].

Type data: type status unknown.

Type locality: Norwegian fjord.

Ascidia virens Fabricius, J.C. (1779). pp. 295, 383 in, *Reise nach Norwegen mit Bemerkungen aus der Naturhistorie und Oekonomie*. Hamburg : Carl Ernst Bohn. [295].

Type data: type status unknown.

Type locality: Norway.

Ascidia viridiscens Brugière, J.G. (1792). Histoire Naturelle des Vers. pp. 23–24, 26, 141–157, 178–188 pl. 75 fig. 5 in, *Encyclopédie Méthodique* Vol. 1. Paris and Liege : Panckoucke. [152].

Type data: type status unknown.

Type locality: Le Havre, France.

Ascidia membranosa Renier, S.A. (1807). *Tavola per servire alla classificazione e conoscenza degli animale*. 8 tables. Padua. [t. 7].

Type data: type status unknown.

Type locality: Anglesey, Wales.

Ascidia virescens Pennant, T. (1812). pp. 99–100 in, *British Zoology*. 5th Edn Vol. 4. London : Wilkie & Robinson. [99].

Type data: type status unknown.

Type locality: Anglesey, Wales.

Ascidia diaphanaea Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [612].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Hobart, TAS.

Ascidia ocellata Agassiz, J.L.R. (1850). On the embryology of *Ascidia* and the characteristics of new species from the shores of Massachusetts. *Proc. Am. Ass.* **1849**: 157–159 [159].

Type data: type status unknown.

Type locality: New Bedford, North Atlantic coast of North America.

Ascidia tenella Stimpson, W. (1852). Several new ascidians from the coast of the United States. *Proc. Bost. Soc. Nat. Hist.* **4**: 228–232 [228].

Type data: type status unknown.

Type locality: Great Duck Is., Grand Manan, North Atlantic coast of North America.

Ascidia pulchella Alder, J. (1863). Observations on the British Tunicata with descriptions of several new species. *Ann. Mag. Nat. Hist.* (3)**11**: 153–173 [157].

Type data: holotype HMN 4–3–7*.

Type locality: Guernsey, Channel Is., see Hoshino, Z. & Nishikawa, T. (1985). Taxonomic studies of *Ciona intestinalis* (L.) and its allies. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **30**(1–3): 61–79.

Ciona fascicularis Hancock, A. (1870). On the larval state of *Molgula* with a description of several new species of simple ascidians. *Ann. Mag. Nat. Hist.* (4)**6**: 353–368 [364].

Type data: holotype HMN 1–6–2*, paratype(s) BMNH 98.5.7.293*.

Type locality: Kilkieran Bay, Connemara, Republic of Ireland, see Hoshino, Z. & Nishikawa, T. (1985). Taxonomic studies of *Ciona intestinalis* (L.) and its allies. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **30**(1–3): 61–79.

Ciona (Pleurociona) edwardsi Roule, L. (1883). Sur deux nouvelles espèce d'ascidies simples. *Compt. Rend. Acad. Sci. Paris* **99**: 613–614 [614].

Type data: type status unknown.

Type locality: Marseille, France.

Ciona robusta Hoshino, Z. & Tokioka, T. (1967). An unusually robust *Ciona* from the northeastern coast of Honshu Island, Japan. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **15**(4): 275–290 [275].

Type data: type status and whereabouts unknown.

Type locality: Onagawa Fisheries Laboratory fish-rearing tanks, Miyagi, Prefecture, Honsyu Island, Japan.

Taxonomic decision for synonymy: Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275 [90]; Hoshino, Z. & Nishikawa, T. (1985). Taxonomic studies of *Ciona intestinalis* (L.) and its allies. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **30**(1–3): 61–79 [63].

Distribution: Japan, China (People's Republic), Greenland, Alaska, California, Massachusetts, NSW (Lower E coast), QLD (NE coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast); west coast N America from south Alaska to south California, Europe and Mediterranean Sea, Greenland to southern Massachusetts, Arctic.

Ecology: benthic, marine; on ships' hulls and harbour installations.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

CLAVELINIDAE

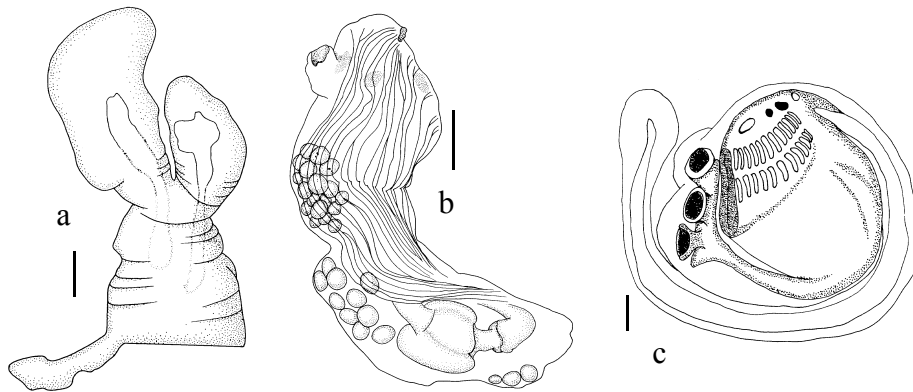


Fig. 2. *Clavelina fecunda* (Sluiter, 1904): **a**, colony; **b**, zooid showing numerous eggs and incubating embryos in distal part of oviduct; **c**, larva. (Scale bars: a = 2.0 mm; b = 1.0 mm; c = 0.1 mm).
[from Kott 1990]

Species of the family Clavelinidae Forbes & Hanley, 1848, usually are colonial with partially or completely embedded zooids, length about 10 to 100 mm, and with four to 40 rows of stigmata. A few solitary species have been described in which a connection to another zooid has not been detected. In all species, the branchial and atrial apertures have smooth rims, internal longitudinal branchial vessels are not present in the pharynx and the gut loop is of various lengths-sometimes short, with the stomach halfway along the abdomen but sometimes three or four times the length of the thorax with the stomach near the distal end of the loop. Large gonads-a sac-like to tubular ovary and a mass of small pear-shaped male follicles-are enclosed by the gut loop. Strong thoracic longitudinal muscles extend from around the apertures or from each side of the endostyle, and converge to form a band along each side of the abdomen. Zooids are very contractile. The test is soft and transparent and usually does not have sand included. Buds are formed in the isolated terminal ampullae of a posterior abdominal vascular stolon. In this family, the regenerative tissue is mesodermal. Endodermal tissue from either the gut or the epicardial sacs is not involved in replication, although epicardial sacs, as in other aplousobranch families, are present. Eggs are fertilised in the atrial cavity or in the top of the oviduct at the posterior end of the thorax, where embryos are brooded in large numbers (up to 100). They are liberated as tailed larvae. The larval trunk is from 0.5 mm to 1.5 mm long, with wide, shallow adhesive organs, arranged triradially on a robust frontal plate.

Only two genera, *Clavelina* Savigny, 1816, and the monotypic *Nephtheis* Gould, 1856, are now recognised in this family (Kott 1990). The genus *Clavelina* is well represented in Australian tropical and temperate waters, but is not known from the Antarctic. *Nephtheis* occurs in tropical waters, which are part of its western Pacific range. The Australian fauna, which includes temperate species, appears to have tropical affinities.

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- Clavelina** Savigny, 1816
- Clavelina** Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [109].
Type species: *Ascidia lepadiformis* Mueller, 1776 by subsequent designation, see Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidenfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275.
- Chondrostachys** Macdonald, J.D. (1858). Anatomical observations on a new form of compound tunicata (*Chondrostachys*). *Ann. Mag. Nat. Hist.* (3)**1**: 401 [404] [originally without included species].
Type species: *Chondrostachys macdonaldi* Bronn, 1862 (= *Clavelina cylindrica* Quoy & Gaimard, 1834) by subsequent designation, see Bronn, H.G. (1862). Weichthiere. pp. 103–223 In, *Die Klassen und Ordnungen des Tier-Reichs*. Leipzig : C.F. Winter. Vol. 3(1).
- Podoclavella** Herdman, W.A. (1890). On the genus *Ecteinascidia* and its relations; with descriptions of two new species, and a classification of the family Clavelinidae. *Proc. Trans. Liverpool Biol. Soc.* **5**: 144–163 [160].
Type species: *Clavelina borealis* Savigny, 1816 by original designation.
- Stereoclavella** Herdman, W.A. (1890). On the genus *Ecteinascidia* and its relations; with descriptions of two new species, and a classification of the family Clavelinidae. *Proc. Trans. Liverpool Biol. Soc.* **5**: 144–163 [160].
Type species: *Clavelina oblonga* Herdman, 1880 by original designation.
- Synclavella** Caullery, M. (1900). Sur des clavelines nouvelles (*Synclavella* n.g.), constituant de cormus d'ascidies composées. *Compt. Rend. Acad. Sci. Paris* **13**: 1418–1420 [1420].
Type species: *Synclavella lessoni* Caullery, 1900 by subsequent designation, see Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [70] (the first-named species is here selected).
- Rhodozona** Van Name, W.G. (1902). The ascidians of the Bermuda Islands. *Trans. Conn. Acad. Arts Sci.* **11**: 325–412 [335].
Type species: *Diazona picta* Verrill, 1900 by original designation.
- Dendroclavella** Oka, A. (1927). Ueber *Dendroclavella*, eine neue Gattung von sozialen Ascidien. *Proc. Imp. Acad. Japan* **3**(8): 558–560 [555].
Type species: *Dendroclavella elegans* Oka, 1927 by monotypy.
- Taxonomic decision for synonymy: Harant, H. (1929). Ascidies provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)***75**: 1–110 [22]; Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [35].
- Extralimital distribution: worldwide except Antarctic waters. See: Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Tokioka, T. & Nishikawa, T. (1976). Contributions to the Japanese ascidian fauna XXX. Further notes on Japanese clavelinids. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **23**(3–5): 341–350; Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.
- Clavelina amplexa** Kott, 2002
- Clavelina amplexa** Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [21].
Type data: holotype NTM E155.
Type locality: off East Point, Darwin, 6–8 m, NT.
- Distribution: NT (N coast).
Ecology: benthic, marine.

Clavelina arafurensis Tokioka, 1952

Clavelina (Synclavella) arafurensis Tokioka, T. (1952). Ascidiens collected by Messrs Renzi Wada and Seizi Wada from the Pearl Oyster bed in the Arafura Sea in 1940. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 2(2): 91–142 [97].

Type data: syntypes SMBL 107*.

Type locality: off Melville Is., Arafura Sea.

Distribution: Philippines, Palau, NT (N coast), WA (N coast, NW coast).

Ecology: benthic, marine; under ledges.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [38].

Clavelina australis (Herdman, 1899)

Stereoclavella australis Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* 7(1): 443–450 [447] [*nom. nud.*].

Stereoclavella australis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [6].

Type data: holotype AM U132, paratype(s) AM G63.

Type locality: Port Jackson, NSW.

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [39].

Clavelina baudinensis Kott, 1957

Clavelina baudinensis Kott, P. (1957). Ascidiens of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* 8(1): 64–110 [87].

Type data: syntypes AM Y801, AM Y1118.

Type locality: Cape Vlamingh, Rottnest Is., WA.

Distribution: WA (Lower W coast, SW coast).

Ecology: benthic, marine; 2–12 m.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [41].

Clavelina cylindrica (Quoy & Gaimard, 1834)

Polyclinum cylindricum Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [618].

Type data: holotype MNHP A3 POD1*.

Type locality: Western Port, VIC.

Chondrostachys macdonaldi Bronn, H.G. (1862). Weichthiere. pp. 1281–1772. In, *Die Klassen und Ordnungen des Tier-Reichs*. Vol. 3 Suppl. (89–98). Leipzig : C. F. Winter. [1427].

Type data: type status unknown.

Type locality: Bass Strait, 20–22 m, VIC.

Taxonomic decision for synonymy: Caullery, M. (1909). Recherches sur la famille des Distomidae. *Bull. Scient. Fr. Belg.* 42: 1–59 [52].

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Great Australian Bight, Lower W coast, NW coast, SW coast).

Ecology: benthic, marine; in storm debris, washed up or floating free in surface currents.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [42].

Clavelina dagysa (Kott, 1957)

Podoclavella dagysa Kott, P. (1957). Ascidiens of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* 8(1): 64–110 [93].

Type data: syntypes AM Y1188, Y1189, Y1191.

Type locality: Rottnest Is., WA.

Distribution: WA (Central W coast, Lower W coast).

Ecology: benthic, marine; to 20 m.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [45].

Clavelina fecunda (Sluiter, 1904)

Podoclavella fecunda Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidiens. *Siboga Exped.* 56A: 1–126 [7].

Type data: lectotype ZMA TU761.2, paralectotype(s) ZMA TU1256.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* 1(13): 157–200 [184].

Type locality: Banda-anchorage, Banda Is., 18–36 m, Indonesia.

Distribution: Indonesia, NT (N coast), QLD (Great Barrier Reef), WA (Lower W coast); west Pacific Ocean.

Ecology: benthic, marine; black sand, coral, *Lithothamnion* [Rhodophyta] bank, shallow waters to 20 m.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [47].

Clavelina meridionalis (Herdman, 1891)

Podoclavella meridionalis Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* 23: 558–652 [603].

Type data: holotype AM U133 (G2091), paratype(s) QM G12247.

Type locality: Port Jackson, NSW.

Podoclavella procera Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidiens. *Siboga Exped.* 56A: 1–126 [8].

Type data: lectotype ZMA TU761.3, paralectotype(s) ZMA TU1257.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [185].

Type locality: 70 m, Indonesia [8°23'30"S 19°04'36"E].

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [48].

Distribution: Indonesia, NSW (Lower E coast), QLD (NE coast), WA (Lower W coast).

Ecology: benthic, marine; tropical, subtropical, sandy bottoms to 20 m.

***Clavelina mirabilis* Kott, 1972**

Clavelina mirabilis Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [165].

Type data: holotype SAM E902, paratype(s) SAM E903.

Type locality: Waldegrave Is., 23 m, SA.

Distribution: SA (Great Australian Bight), TAS (Tas. coast).

Ecology: benthic, marine; gravelly sand, attached to limestone.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

***Clavelina moluccensis* (Sluiter, 1904)**

Podoclavella moluccensis Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [5].

Type data: syntypes ZMA TU762, ZMA TU763.1, ZMA TU763.2, ZMA TU763.3, ZMA TU763.4.

Type locality: Saleyer Is. reef, Ambon Is. reef, Banda Is. reef, Solor-Strait, to 113 m, Indonesia [8°30'S 119°07'E].

Distribution: Singapore, Philippines, Indonesia, QLD (Great Barrier Reef, NE coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast, SW coast).

Ecology: benthic, marine; seasonal in SA waters, dies off beginning of summer and reappears early winter.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

***Clavelina nigra* Kott, 1990**

Clavelina nigra Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [53].

Type data: holotype QM G9486.

Type locality: Roe Reef, Rottnest Is., 18 m, WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Clavelina oliva* Kott, 1990**

Clavelina oliva Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [55].

Type data: holotype WAM 983.83, paratype(s) WAM 217.75.

Type locality: Ransonnet Rocks, Dirk Hartog Is., Shark Bay, WA.

Distribution: NT (N coast), QLD (Great Barrier Reef), WA (Central W coast, Lower W coast).

Ecology: benthic, marine; seagrass–*Cymodocea* [Cymodoceaceae] beds and coral rubble.

***Clavelina ostrearium* (Michaelsen, 1930)**

Podoclavella ostrearium Michaelsen, W. (1930). Ascidiae Krikobranthiae. *Fauna Südwest-Aust.* **5**(7): 463–558 [467].

Type data: holotype (probable) ZMB 3903*, paratype(s) (probable) ZMH K1683*.

Type locality: Oyster Harbour, Albany, 0.75–5.5 m, WA.

Distribution: SA (Great Australian Bight, S Gulfs coast), WA (Great Australian Bight, SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

***Clavelina pseudobaudinensis* (Kott, 1976)**

Oxycorynia pseudobaudinensis Kott, P. (1976). Ascidian fauna of Western Port Bay, Victoria and a comparison with that of Port Phillip Bay. *Mem. Natl. Mus. Vic.* **37**: 53–96 [54].

Type data: holotype AM Y1113, paratype(s) AM Y1112, Y1122.

Type locality: Laverton Bay, VIC.

Distribution: Lord Howe Island, NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

***Clavelina robusta* Kott, 1990**

Clavelina robusta Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [61].

Type data: holotype WAM 753.83 (QM GH2140), paratype(s) WAM 755.83.

Type locality: Beacon, Goss Passage Wallabi Group, Houtman Abrolhos, 20–30 m, WA.

Distribution: Japan, Philippines, Palau, NT (N coast), QLD (NE coast), WA (Central W coast, Lower W coast, N coast, NW coast).

Ecology: benthic, marine.

***Nephtheis* Gould, 1856**

Nephtheis Gould, A.A. (1856). Mollusca and shells. In, *United States Exploring Expedition during the Years 1838–1842 under the Command of Charles Wilkes* Atlas: 1–16,

pls 1–56. London : Wiley & Putnam. [16] [without originally included species].

Type species: *Oxycorynia fascicularis* Drasche, 1882 by subsequent designation, see Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [63].

Oxycorynia Drasche, R. von (1882). *Oxycorinia*, eine neue Synascidien-Gattung. *Verh. Zool.-Bot. Ges. Wien* **32**: 175–178 [175] [junior objective synonym of *Nephtheis* Gould, 1856].

Type species: *Oxycorynia fascicularis* Drasche, 1882 by monotypy.

Extralimital distribution: tropical west Pacific Ocean. See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

Generic references: Hartmeyer, R. (1909). Ascidien (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig : C.F. Winter Vol. 3, suppl. pts 81–87 [1439]; Van Name, W.G. (1931). New North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **61**: 207–225 [63].

Nephtheis fascicularis (Drasche, 1882)

Oxycorynia fascicularis Drasche, R. von (1882). *Oxycorinia*, eine neue Synascidien-Gattung. *Verh. Zool.-Bot. Ges. Wien* **32**: 175–178 [175].

Type data: holotype ZMH 540K.

Type locality: Rouk Is., Hogolen, Caroline Is.

Colella thomsoni Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [94].

Type data: syntypes BMNH 1887.2.3.226–230.

Type locality: 20 m, Philippines [6°54'N 122°18'E].

Nephtheis centripetens Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [38].

Type data: syntypes ZMA TU695, ZMA TU696.1–5*.

Type locality: off Java, Gebé, Saleyer, Kei and Aru IIs,

Siboga Expedition Stations 7, 149, 213, 258, 273, see Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200.

Nephtheis faciformis Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [39].

Type data: lectotype ZMA TU1067, paralectotype(s) ZMA TU1300.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [184].

Type locality: 369 m, Indonesia [8°20'30"S 119°04'36"E], see Tydeman, G.F. (1902). Liste des stations de la campagne scientifique du *Siboga* pp. 1–15 in, Weber, M. Introduction et description de l'expédition *Siboga Exped.* 1 mono., livre 3 + 2 maps. 176 pp.

Nephtheis malayensis Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [36].

Type data: lectotype ZMA TU1270, paralectotype(s) ZMA TU697.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [184].

Type locality: Saleyer Is., reef, Indonesia, see Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200.

Taxonomic decision for synonymy: Michaelsen, W. (1930). Ascidiaceae Krikobbranchiae. *Fauna Südwest-Aust.* **5**(7): 463–558 [469]; Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [63].

Distribution: Philippines, Indonesia, New Caledonia, NT (N coast), QLD (NE coast), WA (N coast, NW coast); Ponape Is., Sulu Sea.

Ecology: benthic, marine; from low tide.

DIAZONIDAE

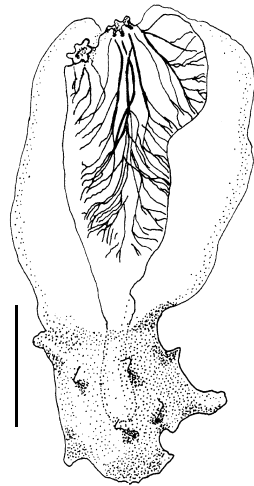


Fig. 3. *Rhopalaea crassa* (Herdman, 1880), a young individual. (Scale bar = 5.0 mm).
[from Kott 1990]

Members of the family Diazonidae Seeliger, 1906, are characterised by their large pharynx with numerous stigmata and longitudinal branchial vessels, vertical gut loop posterior to the pharynx, oviparous habit, and gonads usually enclosed by, but sometimes behind, the gut loop.

Rhopalaea Philippi, 1843 is a solitary genus, but others form colonies with zooids either partially or completely embedded. Replication occurs by transverse division of the abdomen, and is initiated by constriction of the ectoderm in a process similar to that of most other aplousobranch families. The regenerative tissue is the endodermal epicardium. Larvae, like those of *Ciona* Fleming, 1822 (family Cionidae), are small and primitive with three simple, sessile, triradially arranged adhesive organs.

The family is not especially diverse, nor are its members generally recorded in particularly dense populations. Apart from two species of *Rhopalaea* (one of which, *R. crassa*, is particularly abundant in tropical waters), the genus is represented in Australian waters only by *Pseudodiazona claviformis* (Kott, 1963), although *Syndiazona* Oka occurs in the western Pacific and in due course may be found to occur in tropical waters off this continent. The Antarctic genera *Tylobranchion* Herdman, 1886 and *Pseudodiazona* Millar, 1963 have a posterior abdomen, suggesting an affinity with the family Protopolyclinidae Kott, 1990.

References

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- Seeliger, O. (1906). Appendicularien und Ascidien, Tunicata. Manteltiere. pp. 1041–1168 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig : C.F. Winter Vol. 3 Suppl.

***Pseudodiazona* Millar, 1963**

Pseudodiazona Millar, R.H. (1963). Australian ascidians in the British Museum (Natural History). *Proc. Zool. Soc. Lond.* **141**(4): 689–746 [718].

Type species: *Pseudodiazona sabulosa* Millar, 1963 by monotypy.

Patridium Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* **99**(1): 1–20 [4].

Type species: *Patridium pulvinatum* Kott, 1975 by monotypy.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [30].

Extralimital distribution: abyssal east Atlantic Ocean. See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

***Pseudodiazona claviformis* (Kott, 1963)**

Protopolyclinum claviforme Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [72].

Type data: holotype AM U3920, paratype(s) AM U3919. Type locality: Haystack, VIC.

Pseudodiazona sabulosa Millar, R.H. (1963). Australian ascidians in the British Museum (Natural History). *Proc. Zool. Soc. Lond.* **141**(4): 689–746 [718].

Type data: holotype BMNH 85.11.20.34, paratypes BMNH 85.11.20.35, BMNH 85.11.20.36, BMNH 85.11.20.37, BMNH 85.11.20.38, BMNH 85.11.20.39–43.

Type locality: Port Phillip, VIC.

Patridium pulvinatum Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* **99**(1): 1–20 [4].

Type data: holotype SAMA E1043.

Type locality: northern Great Australian Bight, 42 m, SA [32°24'S 133°30'E].

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [31].

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine, rock bottom; 10–100 m.

***Rhopalaea* Philippi, 1843**

Rhopalaea Philippi (1843). *Rhopalaea* eine neues genus der einfachen Asciden. *Arch. Anat. Physiol.* **1**: 45–47 [45].

Type species: *Rhopalaea neapolitana* Philippi, 1843 by monotypy.

Rhopalona Roule, L. (1886). Revision des espèces de Phallusiadées des côtes de Provence. *Rec. Zool. Suisse* **2**: 209–258 [214] [unnecessary *nom. nov.* for *Rhopalaea* Philippi, 1843].

Rhopalopsis Herdman, W.A. (1890). On the genus *Ecteinascidia* and its relations; with descriptions of two new species, and a classification of the family Clavelinidae. *Proc.*

Trans. Liverpool Biol. Soc. **5**: 144–163 [160].

Type species: *Ecteinascidia crassa* Herdman, 1880 by original designation.

Taxonomic decision for synonymy: Van Name, W.G. (1921). Ascidians of the West Indian region and south-eastern United States. *Bull. Am. Mus. Nat. Hist.* **44**: 283–494 [370].

Extralimital distribution: Mediterranean Sea, tropical Indo-West Pacific Ocean, west Atlantic Ocean. See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

***Rhopalaea crassa* (Herdman, 1880)**

Ecteinascidia crassa Herdman, W.A. (1880). Preliminary report on the Tunicata of the *Challenger* expedition. Part 2. Ascidiidae. *Proc. R. Soc. Edinb.* **10**: 714–726 [723].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Ki Is., 260 m, Indonesia [5°42'S 132°25'E].

Ecteinascidia fusca Herdman, W.A. (1880). Preliminary report on the Tunicata of the *Challenger* expedition. Part 2. Ascidiidae. *Proc. R. Soc. Edinb.* **10**: 714–726 [723].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Banda Is., 34 m, Indonesia.

Ciona indica Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [24].

Type data: syntypes ZMA TU332, TU333*.

Type locality: 8°23'30"S 119°4'36"E, 274 m, 8°19'S 117°41'E, 69 m, Indonesia.

Ecteinascidia (Rhopalopsis) solida Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [299] [as *Ecteinascidia* (?*Rhopalopsis*) *solida*].

Type data: holotype BMNH 1907.8.30.3.

Type locality: Galle, Coral Reef, Sri Lanka.

Rhopalaea sagamiana Oka, A. (1927). Über zwei neue *Rhopalaea*-Arten aus Japan. *Proc. Imp. Acad. Japan* **3**: 681–683 [681].

Type data: syntypes UTZM 58-1 (M208), 339 (M482)*.

Type locality: south of Misaki, Sagami Province, Honshu, 150–300 m, Japan.

Rhopalaea macrothorax Tokioka, T. (1953). *Ascidians of Sagami Bay*. Tokyo: Iwanami Shoten 313 pp. 79 pls [212].

Type data: syntypes BLIH 216, 250, 251*.

Type locality: east half of Sagami Bay, Japan.

Rhopalaea perlucida Monniot, C. (1997). Ascides phlébobranches du Canal du Mozambique. *Zoosystema* **19**(4): 557–571.

Type data: holotype MNHP P1 Rho A21.

Type locality: Nosy-Bé, banc de Sakatia, 20 m, Mozambique.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [26]; Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1613].

Distribution: Japan, Sri Lanka, Philippines, Indonesia, Hong Kong, Mozambique, QLD (Central E coast, Great Barrier Reef), WA (Lower W coast).

Ecology: benthic, marine; common in coral reef habitats.

Reference: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1613].

Rhopalaea tenuis (Sluiter, 1904)

Rhopalopsis tenuis Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [15].

Type data: syntypes ZMA TU968.14.

Type locality: 82 m, Indonesia [6°05'S 114°07'E].

Distribution: Indonesia, QLD (NE coast).

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

DIDEMNIDAE

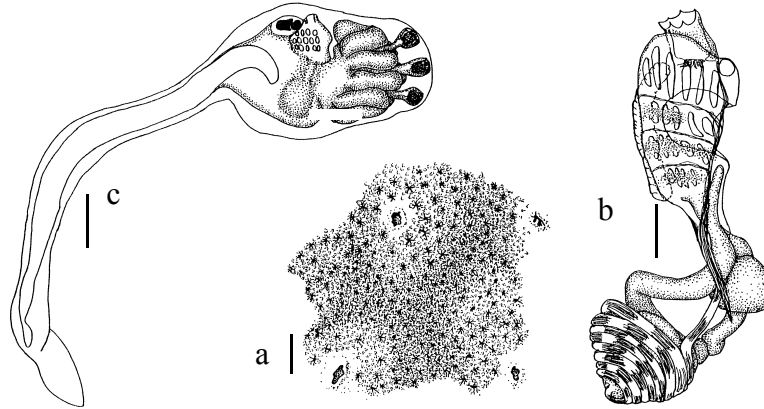


Fig. 4. *Didemnum* sp.: **a**, surface of a colony showing four common cloacal apertures and numerous star-shaped branchia apertures; **b**, zooid; **c**, larva. (Scale bars: **a** = 1.0 mm; **b**, **c** = 0.1 mm). [from Kott 1998]

Didemnidae Giard, 1872 are a relatively uniform although very speciose family in the Aplousobranchia. The family is characterised by small zooids divided into thorax (with three or four rows of stigmata), and abdomen (containing a small ovary with only one egg maturing at a time, a dome-shaped to spherical or conical testis sometimes subdivided into circular or grape-like clusters of clavate testis follicles, and a gut loop with its distal end often ventrally flexed). The gut is divided into a vertical oesophagus, smooth stomach, a cylindrical duodenal section, an oval posterior stomach and a large rectum, the latter often divided into a proximal chamber and a narrow distal chamber (see *Polysyncraton* and *Clitella*). A pyloric gland extends from the posterior end of the stomach and ends in tubules that encircle the proximal end of the rectum in a more or less conspicuous band. In *Atrium*, *Didemnum* and *Trididemnum* (with undivided testis) and *Polysyncraton* and *Leptoclinides* (with the testis divided into many follicles) the vas deferens, from the central or terminal point of the testis, coils around it in a spiral of increasing diameter and then turns anteriorly from the base, or outer coil, of the spiral to open in the atrial aperture. In *Lissoclinum*, *Clitella* and *Diplosoma* (with the testis entire or subdivided) the vas deferens extends in a straight line from its opening from the posterior margin of the testis to the atrial aperture, sometimes in the groove between the two halves when the testis is divided. Body musculature is confined to the thorax, longitudinal bands of muscle occurring in the parietal body wall, narrow transverse bands in the interstigmatal vessels and a pair of broad dorsal pharyngeal longitudinal muscle bands in the wall of the pharynx, one band on each side of the dorsal mid-line. In most species of all genera except *Atrium* and *Leptoclinides*, each dorsal pharyngeal band joins the parietal muscles from the same side of the thorax posterior to the atrial cavity, extends in the body wall around the outside of the posterior end of the thorax or around the oesophageal neck and with the muscles from the opposite side projects away from the ventral margin of the body and into the test as a retractor muscle. The retractor muscle is especially strong in *Clitella*. *Atrium* and *Leptoclinides* generally have relatively large zooids (up to about 5 mm long in *Atrium*), but both dorsal pharyngeal and parietal muscles fade out at the posterior end of the thorax and there is never a retractor muscle. In *Atrium*, *Leptoclinides* and most species of *Trididemnum* (which have relatively small zooids), the atrial aperture is on a posteriorly orientated muscular siphon often with five lobes around the rim where it opens

into the cloacal cavity. *Didemnum*, *Polysyncraton*, *Lissoclinum*, *Clitella* and *Diplosoma* have large sessile atrial openings that often expose the branchial sac directly to the cloacal cavity. The anterior margin of these sessile atrial apertures often are drawn out into a muscular lip which, when inserted into the test around the common cloacal cavity and apertures ensures that the zooid muscles can exercise some control over them. *Trididemnum* (with coiled vas deferens and undivided testis) is the only genus with three rows of stigmata (all others having four rows). *Didemnum* and *Trididemnum* larvae have three rows of stigmata in the larval pharynx, although there are four rows in the larval pharynx of *Polysyncraton*, *Leptoclinides*, *Atriolum*, *Lissoclinum* and *Diplosoma*. In most species in the family, the oesophageal buds appear to have similar numbers of stigmata as in the adult zooids. This contributes to accurate assessments of the number of stigmata as the buds are not subject to the same degree of contraction as the adult zooids.

With the exception of *Diplosoma* and a few species in other genera, minute (seldom more than 0.1 mm diameter) calcareous spicules, synthesised by an ectodermal (lateral) organ of the external thoracic parietal body wall, are in the test (Lafargue & Kniprath 1978; Ballan-Dufrançaise *et al.* 1995). Sand or other particles are not incorporated into the test in this family, although in one species faecal pellets are included. In a polyphyletic group of species, cyanophyte or *Prochloron* [Prochlorophyta] obligate symbionts occur in the test or in the cloacal cavities, or non-obligate symbionts occur on the surface of the colony (Kott 1980; Parry & Kott 1988). Such species are, at least partly, autotrophic.

Didemnid colonies are sometimes cushion or sheet-like, often thin (encrusting the substrate); or they may be more substantial flasks or massive arborescent structures, or stalked heads or complex, 3-dimensional trabeculae with a zooid-free internal test core and the zooids themselves in a layer at the surface. Zooids are arranged around a simple common cloacal cavity or along each side of long, branching two or three-dimensional systems of canals; and the colony may consist of a single system served by a single common cloacal aperture, or there may be many. This family is unusual in that the zooids are always short, and the greater part of thicker colonies consists of zooid-free basal or central test, in which embryos are incubated. Usually living colonies are kept inflated by positive pressure in the excurrent water as it passes through large cloacal cavities, behind or around the zooids. Calcareous spicules embedded in the test can also be crowded together to form a supportive internal skeleton for large branching colonies.

Replication in the Didemnidae is by oesophageal budding involving the epicardial sacs. It is a modification of transverse strobilation in other aplousobranchs (Berrill 1950). Colonies of several species of the didemnid-*Prochloron* symbioses are known to subdivide or lobulate (Ryland 1990). This is associated with colonies moving apart to space themselves, although movements also can occur independently of lobulation (Cowan 1981; Birkeland *et al.* 1981).

In the Didemnidae, eggs (fertilised through an otherwise vestigial oviduct: Burighel & Martinucci 1994) usually rupture directly from the abdomen and move into the base or centre of the colony where they are incubated. They are liberated as tailed larvae into the cloacal cavity or directly to the exterior through the surface of the colony. The genus *Atriolum* and a few *Leptoclinides* species are the only exceptions, with embryos being brooded in a thoracic brood pouch as in some Holozoidae.

The larvae are relatively uniform, with lateral ampullae each side of three adhesive organs in the anterior median vertical line. A blastozooid, as well as the oozooid, occurs in the larvae of a few species of *Didemnum*, *Lissoclinum* and *Diplosoma*, and in most species of *Polysyncraton*, but never in *Leptoclinides*, *Atriolum*, or *Trididemnum*. *Polysyncraton* and some *Didemnum* species have up to eight pairs of lateral ampullae, although usually there are not more than six on each side in other taxa. The monotypic genus *Clitella* has highly modified adhesive organs forming a convoluted band of adhesive cells on frontal lobes of the large larval trunk and prolific budding takes place in the larvae.

The Didemnidae have long been regarded as the most highly evolved of the Aplousobranchia. Certainly colony organisation and zooid size reduction and simplification are more marked in this family than in others. Nevertheless, these developments do not imply a direct linear relationship with other aplousobranchs. Compelling evidence for an earlier origin (from a common ancestor) for Didemnidae than for most other aplousobranch families exists in the presence in *Leptoclinides* of high concentrations of vanadium (Hawkins *et al.* 1983). This

element is present in similar high concentrations in the more primitive families of Aplousobranchia and Phlebobranchia. Unless the Didemnidae are polyphyletic, the presence of vanadium in *Leptoclinides* suggests an origin for the Didemnidae directly from a diazonid ancestor, and implies that the evolution of complex cloacal systems parallels their evolution in other Aplousobranchia.

All genera of the Didemnidae are well represented in the tropical Indo-west Pacific and in Australian temperate and tropical waters, although their diversity is much reduced in the Antarctic and Subantarctic.

The basis for the study of the Didemnidae in Australian waters are the reports on the collections made by European expeditions of 19th century, namely, HMS *Challenger* (Herdman 1886) and the Dutch *Siboga* Expedition (Sluiter 1909). An account of existing Australian collections (by Kott 1962), did not advance the understanding of the family to any great extent; although later studies (Kott 1980, 1981, 1982) elucidated the taxonomy of the large group of didemnid-algal symbioses. A major revision of the family in Australian waters by Kott (2001), followed by supplementary works (Kott 2002, 2004a-c, 2005) has resulted in the documentation of 255 species, of which 190 have been described since 1960. Of the species known to occur in Australian waters, 103 are indigenous temperate species recorded from the southern half of the Australian continent and 82 are tropical species with a range in the wider Indo-West Pacific tropical region. Another 70 species are known only from Australian tropical waters but, in due course, may be found to be part of that wider tropical fauna.

References

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***Atriolum* Kott, 1983**

Atriolum Kott, P. (1983). Two new genera of didemnid ascidians from tropical Australian waters. *The Beagle, Rec. N.T. Mus. Arts Sci.* **1**(2): 13–19 [13].
Type species: *Atriolum robustum* Kott, 1983 by monotypy.

Extralimital distribution: Torres Strait, west Indian Ocean. See: Millar, R.H. (1988). Ascidiaceans collected during the International Indian Ocean Expedition. *J. Nat. Hist.* **22**: 823–848; Monniot, F. (1989). Ascidiées de Nouvelle-Calédonie VII. Les genres *Atriolum* et *Leptoclinides* dans le lagon sud. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **11A**(4): 673–691.

***Atriolum bucinum* Kott, 2001**

Atriolum bucinum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [21].
Type data: holotype QM G304670.
Type locality: Houtman's Abrolhos, Wallabi Group, WA.

Distribution: WA (Lower W coast); known only from type locality.
Ecology: benthic, marine.

***Atriolum eversum* Kott, 2001**

Atriolum eversum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [22].
Type data: holotype WAM 366.80.
Type locality: Houtman's Abrolhos, SW of Split Is., Morning Reef, Wallabi Group, 180 m, WA.

Distribution: WA (Lower W coast); known only from type locality.
Ecology: benthic, marine.

***Atriolum glauerti* (Michaelsen, 1930)**

Leptoclinides glauerti Michaelsen, W. (1930). Ascidiæ Krikobranchiæ. *Fauna Südwest-Aust.* **5**(7): 463–558 [511].
Type data: holotype ZMB Pch 3884.
Type locality: Shark Bay, about 3 mls NW of Denham, 3 m, WA.

Distribution: WA (Central W coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2465].

***Atriolum lilium* Kott, 2001**

Atriolum lilium Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [24].

Type data: holotype QM GH2385.

Type locality: Flinders Is., Investigator Group, eastern Great Australian Bight, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

***Atriolum marinense* Kott, 2001**

Atriolum marinense Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [25].

Type data: holotype QM G301616.

Type locality: Marion Reef, 8 m, Coral Sea.

Distribution: New Caledonia, QLD (NE oceanic); Coral Sea, West Indian Ocean.

Ecology: benthic, marine.

***Atriolum robustum* Kott, 1983**

Atriolum robustum Kott, P. (1983). Two new genera of didemnid ascidians from tropical Australian waters. *The Beagle, Rec. N.T. Mus. Arts Sci.* **1**(2): 13–19 [13].

Type data: holotype QM GH285, paratypes QM GH286, QM GH1410, NTME18.

Type locality: Murray Is., between Maer and Dewar Is., 20 m, QLD.

Distribution: QLD (Great Barrier Reef, NE coast); Torres Strait.

Ecology: benthic, marine.

***Atriolum tubiporum* Kott, 2001**

Atriolum tubiporum Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [29].

Type data: holotype QM G302885.

Type locality: bay at western end of Breaksea Is., Albany Harbour, 20 m, WA.

Distribution: WA (Lower W coast, SW coast).

Ecology: benthic, marine.

***Clitella* Kott, 2001**

Clitella Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [332].

Type species: *Clitellum nutricula* Kott, 2001 by monotypy.

***Clitella nutricula* Kott, 2001**

Clitellum nutricula Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [332].

Type data: holotype SAMA E2678.

Type locality: Marun Is., Sir Joseph Banks Group, SA.

Distribution: SA (S Gulfs coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2466].

***Didemnum* Savigny, 1816**

Didemnum Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [194].

Type species: *Didemnum candidum* Savigny, 1816 by subsequent designation, see Hartmeyer, R. (1909). Hartmeyer, R. (1908). Zur Terminologie der Didemnidae. *Sitzungs-Ber. Ges. naturforsch. Freunde Ber.* **1909**: 575–581 [580].

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Type species: *Leptoclinum fulgens* Milne-Edwards, 1841 by designation under Plenary Powers, see Tubbs, P.K. (1986). Opinion 1412. *Leptoclinum fulgens* Milne-Edwards, 1841 designated as type species of *Leptoclinum* Milne-Edwards, 1841 (Tunicata, Asciacea). *Bull. Zool. Nomencl.* **43**(3): 253–254.

Tetradidemnum Della Valle, A. (1881). Nuove contribuzioni alla storia naturale delle ascidie composte del Golfo di Napoli. *Atti Accad. nag. Lincei Series 3, Memoir* **10**: 431–498 [pl. 5 fig. 47, 69] [pl. 7 fig. 69].

Type species: *Tetradidemnum gigas* Della Valle, 1881 by original designation.

Didemnoides Drasche, R. von (1883). Die Synascidien der Bucht von Rovigno (Istrien). In *Ein Beitrag zur Fauna der Adria* Wien : Carl Gerolds Sohn. 41 pp. [37].

Type species: *Didemnoides resinaceum* Drasche, 1883 by original designation.

Diplosomoides Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [399].

Type species: none designated; originally included nominotypical species: *Diplosoma pseudoleptoclinum* Drasche, 1883; *Diplosomoides molle* Herdman, 1886.

Sarcodidemnoides Oka, A & Willey, A. (1892). On a new genus of synascidian from Japan. *Q. J. Microsc. Sci.* **33**(2): 313–324 [313].

Type species: *Sarcodidemnoides misakiense* Oka & Willey, 1892 by monotypy.

Hypurgon Sollas, I.B.J. (1903). On *Hypurgon skeati* a new genus and species of compound ascidian. *Q. J. Microsc. Sci. (ns)* **46**: 729–735 [729].

Type species: *Hypurgon skeati* Sollas, 1903 by monotypy.

Taxonomic decision for synonymy: Harant, H. (1929). Ascides provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110 [21]; Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl Mus.* **251**: 1–242 [75].

Extralimital distribution: Australian Region—Chatham Island; worldwide, including polar regions (not at abyssal depths). See: Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidenfauna auf tier-geographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Harant, H. (1929). Ascides provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Nishikawa, T. (1990). The ascidians of the Japan Sea 1. *Publ. Seto Mar. Biol. Lab.* **34**(4–6): 73–148; Monniot, F. (1995). Ascides de Nouvelle-Calédonie XV. Le genre *Didemnum*. *Bull. Mus. Natl. Hist. Nat. Paris* (4)**16A**(2–4): 299–344.

Generic reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2416].

***Didemnum albopunctatum* Sluiter, 1909**

Didemnum albopunctatum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Asciden. *Siboga Exped.* **56B**: 1–112 [58].
Type data: lectotype ZMA TU433.2.
Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [172].
Type locality: Ambon, Indonesia.

Didemnum biglutinum Monniot, F. (1995). Ascides de Nouvelle-Calédonie XV. Le genre *Didemnum*. *Bull. Mus. Natl. Hist. Nat. Paris* (4)**16A**(2–4): 299–344 [300].
Type data: holotype MNHP A2. DID.C 219.
Type locality: New Caledonia.

Taxonomic decision for synonymy: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [148].

Distribution: Indonesia, Cocos (Keeling) Islands (Aust. Terr.), Palau, New Caledonia, Fiji, NT (N coast), QLD (Great Barrier Reef, NE coast), WA (Lower W coast, N coast, NW oceanic).
Ecology: benthic, marine.

***Didemnum arancium* Kott, 2001**

Didemnum arancium Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [150].
Type data: holotype QM G308115, paratype(s) QM G308120.
Type locality: Wistari reef, QLD.

Distribution: French Polynesia, QLD (Great Barrier Reef).
Ecology: benthic, marine.

***Didemnum aratore* Kott, 2004**

Didemnum aratore Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [53].
Type data: holotype NTM E256.
Type locality: Ashmore Reef, 3–6 m, Timor Sea.

Distribution: WA (N coast); known only from type locality.
Ecology: benthic, marine.

***Didemnum asterix* Kott, 2004**

Didemnum asterix Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [747].
Type data: holotype WAM 633.88.
Type locality: Cape Legendre, 40–42 m, WA.

Distribution: WA (NW coast); known only from type locality.
Ecology: benthic, marine.

***Didemnum astrum* Kott, 2001**

Didemnum astrum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [151].
Type data: holotype QM G308015, paratype(s) QM G308204.
Type locality: Wistari Reef, QLD.

Distribution: QLD (Great Barrier Reef), WA (Lower W coast, N coast); Indian Ocean.
Ecology: benthic, marine; rubble fauna, low tide.
Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2437].

***Didemnum bicolor* Kott, 2001**

Didemnum bicolor Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [152].
Type data: holotype QM GH2410, paratype(s) QM GH2409.
Type locality: Top Gallant Is., Investigator Group, SA.

Distribution: SA (Great Australian Bight); known only from type locality.
Ecology: benthic, marine; in caves.

***Didemnum bisectatum* Kott, 2001**

Didemnum bisectatum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [154].
Type data: holotype QM G302599.
Type locality: Flat Top Bank, Timor Sea, NT.

Distribution: WA (NW coast); known only from type locality.
Ecology: benthic, marine.

***Didemnum caesium* Sluiter, 1909**

Didemnum caesium Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [53].
Type data: holotype ZMA TU434.
Type locality: between Nusa Besi and the NE point of Timor, 27–54 m, Indonesia [8°25.2 'S 127°18.4 'E].

Distribution: Indonesia, New Caledonia, WA (NW coast).
Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [155].

***Didemnum candidum* Savigny, 1816**

Didemnum candidum Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [194].
Type data: neotype LA 1247–51.
Subsequent designation: Lafargue, F. (1974). Description d'un néotype de *Didemnum candidum* Savigny, 1816 espèce-type de Mer Rouge (Ascidie composée). *Vie Milieu* **24**(2): Sér. A: 341–356 [341].
Type locality: Red Sea.

Leptoclinum cretaceum Sluiter, C.P. (1898). Beiträge zur Kenntnis der Fauna von Südafrika II. Tunicaten. *Zool. Jahrb. Syst.* **11**: 1–64 [36].
Type data: lectotype ZMA TU602, paralectotype(s) ZMA TU578.
Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [180].
Type locality: coast of Mozambique.

Didemnum yolky Monniot, C. & Monniot, F. (1997). Records of ascidians from Bahrain, Arabian Gulf, with three new species. *J. Nat. Hist.* **31**: 1623–1643 [1626].
Type data: holotype MNHP A2 DID. C 389.
Type locality: Mozambique, Iboi Is., 3 m.

Taxonomic decision for synonymy: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [157].

Distribution: Tanzania, Mozambique, Mauritius, NT (N coast), WA (NW coast); Gulf of Suez, Gulf of Aquaba, Gulf of Arabia.
Ecology: benthic, marine; tropical latitudes.

***Didemnum chartaceum* Sluiter, 1909**

Didemnum chartaceum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [57].
Type data: syntypes ZMA TU437.
Type locality: Flores Is., Indonesia.

Distribution: Indonesia, Fiji, QLD (Great Barrier Reef).
Ecology: benthic, marine.
Reference: Kott, P., Parry, D.L. & Cox, G.C. (1984). Prokaryotic symbionts with a range of ascidian hosts. *Bull. Mar. Sci.* **34**(2): 308–312.

***Didemnum cilicium* Kott, 2005**

Didemnum cilicium Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2438].
Type data: holotype SAMA E3251.
Type locality: : between Western River Cove and Snug Cove, Pissy Boy Rock, W side, on rock wall, 6–8 m, Kangaroo Is., SA.

Distribution: SA (S Gulfs coast); known only from type locality.
Ecology: benthic, marine.

***Didemnum clavum* Kott, 2001**

Didemnum clavum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [162].
Type data: holotype QM G308161, paratype(s) QM G308402.
Type locality: Heron Is., filter of aquarium seawater intake, QLD.

Distribution: Indonesia, NT (N coast), QLD (Great Barrier Reef), WA (Lower W coast, N coast, NW coast).
Ecology: benthic, marine.

***Didemnum complexum* Kott, 2001**

Didemnum complexum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [164].
Type data: holotype AM Y820.
Type locality: Little Turiel Point, Port Hacking, 60–70 m, NSW.

Distribution: NSW (Lower E coast), TAS (Tas. coast).
Ecology: benthic, marine.

***Didemnum coralliforme* Kott, 2004**

Didemnum coralliforme Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [748].

Type data: holotype NTM E34.

Type locality: W of Port Hedland, 50 m, WA.

Distribution: NT (N coast), WA (NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2490].

***Didemnum corium* Kott, 2005**

Didemnum corium Kott, P. (2005). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2440].

Type data: holotype SAMA E3249.

Type locality: Port Davey, Bathurst Channel, Beebee Point, 6–8 m on silt, TAS.

Distribution: TAS (Tas. coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum crescente* Kott, 2001**

Didemnum crescente Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [166].

Type data: holotype QM G308495.

Type locality: Eden, NSW.

Distribution: NSW (Lower E coast), SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2491].

***Didemnum cygnuus* Kott, 2001**

Didemnum cygnuus Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [169].

Type data: holotype WAM 362.92.

Type locality: Rocky Bay, Swan River estuary on seagrass, WA.

Distribution: NT (N coast), WA (Lower W coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2440].

***Didemnum delectum* Kott, 2001**

Didemnum delectum Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [171].

Type data: holotype SAMA E2632, paratype(s) SAMA E2662.

Type locality: Bonaparte Creek, Tourville Bay, SW of Ceduna, 6–8 m, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2492].

***Didemnum diversum* Kott, 2004**

Didemnum diversum Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [749].

Type data: holotype WAM 159.93.

Type locality: Passage Is, NW Long Is., 16–15 m, WA.

Distribution: WA (NW coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum domesticum* Kott, 2004**

Didemnum domesticum Kott, P. (2004). Ascidacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [54].

Type data: holotype NTM E237.

Type locality: Ashmore Reef, 4–7 m, Timor Sea.

Distribution: NT (N coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum effusium* Kott, 2001**

Didemnum effusium Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [173].

Type data: holotype QM G10139.

Type locality: Kingston South East, SA.

Distribution: SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine.

***Didemnum elongatum* Sluiter, 1909**

Didemnum elongatum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [66].

Type data: syntypes ZMA TU444, TU445.

Type locality: sounding due West, 1300 m distant from N point of Kabia Is. reef, 701 m, Indonesia.

Distribution: Indonesia, WA (NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [173].

***Didemnum etiolum* Kott, 1982**

Didemnum etiolum Kott, P. (1982). Didemnid-algal symbioses: host species in the western Pacific with notes on the symbiosis. *Micronesica* **18**(1): 95–127 [104].

Type data: syntypes QM GH247, GH272, GH459.

Type locality: Martha Ridgeway Reef, northern Great Barrier Reef, QLD.

Distribution: Philippines, QLD (Great Barrier Reef).

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

References: Parry, D.L. & Kott, P. (1988). Cosymbiosis in the Ascidiacea. *Bull. Mar. Sci.* **42**(1): 149–153; Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [175].

***Didemnum fibriae* Kott, 2004**

Didemnum fibriae Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [750].

Type data: holotype WAM 175.91.

Type locality: Woodman's Point, Cockburn Sound, 18 m, WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum flavoviride* Monniot, 1995**

Didemnum flavoviride Monniot, F. (1995). Ascides de Nouvelle-Calédonie XV. Le genre *Didemnum*. *Bull. Mus. Natl. Hist. Nat. Paris* (4)**16A**(2–4): 299–344 [308].

Type data: holotype MNHP A2 DID. C 198.

Type locality: New Caledonia.

Distribution: New Caledonia, QLD (Great Barrier Reef); west Pacific Ocean.

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [176].

***Didemnum fragile* Sluiter, 1909**

Didemnum fragile Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [56].

Type data: lectotype ZMA TU446.3, paralectotype(s) ZMA TU446.1, 446.2.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [172].

Type locality: Wunoh-Bay, NW coast of Waigeu Is., 32 m, Indonesia.

Didemnum proliferum Kott, P. (1981). The ascidians of the reef flats of Fiji. *Proc. Linn. Soc. N.S.W.* **105**(3): 147–212 [171].

Type data: holotype QM G12577.

Type locality: Viti Levu, Vuda Point, LWM, Fiji.

Taxonomic decision for synonymy: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [177].

Distribution: Palau, French Polynesia, Fiji, NT (N coast), QLD (Great Barrier Reef, NE coast), WA (N coast); west Pacific Ocean.

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2441].

***Didemnum fragum* Kott, 2001**

Didemnum fragum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [179].

Type data: holotype SAMA E2680, paratypes SAMA E2832, E2838, QM GH5438*.

Type locality: Nora Creina Bay, Gulf St Vincent, SA.

Distribution: NSW (Central E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2441].

***Didemnum fucatum* Sluiter, 1909**

Didemnum fucatum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [47].

Type data: syntypes ZMA TU448.

Type locality: Pulu Kaniungan ketjil, 11 m, Indonesia.

Distribution: Indonesia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [182].

***Didemnum fuscum* Sluiter, 1909**

Didemnum fuscum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [52].

Type data: syntypes ZMA TU451.

Type locality: 32 m, Indonesia [1°42.5'S 130°47'E].

Distribution: Indonesia, NT (N coast), QLD (Great Barrier Reef), WA (NW coast); west Pacific Ocean.

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2443].

***Didemnum grande* (Herdman, 1886)**

Leptoclinum albidum grande Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiæ compositæ. *Zool. Chall. Exped.* **14**(38): 1–425 [291] [as *Leptoclinum albidum* var. *grande* Verrill, 1871].

Type data: type status unknown BMNH* (depository uncertain, not found).

Type locality: off Cebu, 190 m, Philippines [10°14'N 123°54'E].

Didemnum makropnous Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112.

Type data: syntypes ZMA TU461.3–5.

Type locality: 32 m; Saleyer Is., 36 m; Dammar Is., 45 m [1°42.5'S 130°47.5'E].

Taxonomic decision for synonymy: Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334 [325].

Distribution: Philippines, Indonesia, NT (N coast), QLD (Great Barrier Reef, NE coast), WA (Central W coast, Lower W coast).

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2492]; Kott, P. (2005). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2444].

Didemnum granulatum Tokioka, 1954

Didemnum granulatum Tokioka, T. (1954). Contributions to Japanese ascidian fauna VII. Invertebrate fauna of the intertidal zone of the Tokara Islands. VII Ascidians. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **3**(3): 239–264 [244].

Type data: syntypes SMBL Type 130.

Type locality: Takarazima, Tokara Is.

Distribution: Hawaii, French Polynesia, Fiji, NT (N coast), QLD (Great Barrier Reef), WA (Lower W coast, NW coast); Tokara Is.

Ecology: benthic, marine.

References: Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [188]; Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2491].

Didemnum guttatum F. & C. Monniot, 1996

Didemnum guttatum Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [153].

Type data: holotype MNHP A2DID C229.

Type locality: north Sulawesi, west of Talisei Is., Indonesia, 1 m [1°51.87'N 125°04.08'E].

Distribution: Indonesia, QLD (Great Barrier Reef); Coral Sea.

Ecology: benthic, marine.

Didemnum herba Kott, 2001

Didemnum herba Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [189].

Type data: holotype QM G308641.

Type locality: Big Broadhurst Reef, 11 m, QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

Didemnum hiopaa C. & F. Monniot, 1987

Didemnum hiopaa Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [32].

Type data: holotype MNHP A2 DID C 92.

Type locality: Station 6, NE Mooréa, French Polynesia.

Distribution: New Caledonia, French Polynesia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [191].

Didemnum incanum (Herdman, 1899)

Leptoclinum incanum Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [90].

Type data: type status unknown (depository uncertain, not found; not listed in Rowe, F.W.E. & Marshall, J.I. (1979). A catalogue of the ascidian type-specimens in the Australian Museum, Sydney. *Rec. Aust. Mus.* **32**(17): 547–562).

Type locality: Port Jackson, NSW.

Distribution: New Zealand, NSW (Lower E coast), SA (S Gulfs coast), TAS (Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2444].

Didemnum inveteratum Kott, 2001

Didemnum inveteratum Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [193].

Type data: holotype QM G302922.

Type locality: Lord Mayor Shoal, 21 m, WA [16°31.2'S 122°36.4'E].

Distribution: WA (NW coast); known only from type locality.

Ecology: benthic, marine.

Didemnum jedanense Sluiter, 1909

Didemnum jedanense Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [59].

Type data: lectotype ZMA TU454.1.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [173].

Type locality: Pulu Kaniungan ketjil, 11 m, Indonesia.

Didemnum reticulatum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [60].

Type data: syntypes ZMA TU475.4, 475.5.

Type locality: off Kawio- and Kamboling islands, Karkaralong group, 23–31m, Indonesia; off Pulu Jedan, east coast of Aru islands (Pearl banks), 13 m, Indonesia.

Taxonomic decision for synonymy: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [194].

Distribution: Indonesia, New Caledonia, NT (N coast), QLD (Great Barrier Reef, NE coast), WA (N coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [55].

***Didemnum jucundum* Kott, 2001**

Didemnum jucundum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [197].

Type data: holotype SAMA E2646, paratype(s) SAMA E2693.

Type locality: Portsea Pier piles 4–6 m, Port Phillip Bay, VIC.

Distribution: SA (S Gulfs coast), TAS (Tas. coast), WA (SW coast).

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2495]; Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2446].

***Didemnum lacertosum* Monniot, 1995**

Didemnum lacertosum Monniot, F. (1995). Ascides de Nouvelle-Calédonie XV. Le genre *Didemnum*. *Bull. Mus. Nat. Hist. Nat. Paris (4)* **16A**(2–4): 299–344 [311].

Type data: holotype MNHP A2 DID. C 261.

Type locality: Loyalty Is., Lifou, 10–30 m, New Caledonia.

Distribution: New Caledonia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [199].

***Didemnum leopardus* Kott, 2005**

Didemnum leopardus Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2447].

Type data: holotype QM G308719.

Type locality: Dawson Rock, Bynoe Harbour, 5–8 m, muddy bottom, NT.

Distribution: NT (N coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum levitas* Kott, 2001**

Didemnum levitas Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [200].

Type data: holotype QM G308224, paratype(s) QM G308220.

Type locality: Heron Is., intertidal, QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

***Didemnum lillipution* Kott, 2004**

Didemnum lillipution Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [55].

Type data: holotype NTM E250.

Type locality: Ashmore Reef, 3–6 m, Timor Sea.

Distribution: WA (N coast).

Ecology: benthic, marine.

***Didemnum linatum* Kott, 2001**

Didemnum linatum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [200].

Type data: holotype WAM 40.89.

Type locality: 51 n miles NNE of Port Hedland, 38 m, WA.

Distribution: WA (NW coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum lissoclinum* Kott, 2001**

Didemnum lissoclinum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [202].

Type data: holotype SAMA E2665, paratype(s) SAMA E2607.

Type locality: 49 m, Great Australian Bight, SA [32°24'S 113°30'E].

Distribution: SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

***Didemnum macrosiphonium* Kott, 2001**

Didemnum macrosiphonium Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [202].

Type data: holotype SAMA E2657, paratype(s) SAMA E2658.

Type locality: Aldinga drop off, Gulf St Vincent, 10–25 m, SA.

Distribution: SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine.

***Didemnum madeleinae* F. & C. Monniot, 2001**

Didemnum madeleinae Monniot, F. & Monniot, C. (2001). Ascidiaceans from the tropical western Pacific. *Zoosystema* **23**(2): 201–383 [268].

Type data: holotype MNHP A2 DID.C 470.

Type locality: Louisiade Archipelago, Deboyne Lagoon, Nivani Is., overhang [10°47.46'S 152°23.08'E].

Distribution: Papua New Guinea, NT (N coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [35].

***Didemnum mantile* Kott, 2001**

Didemnum mantile Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [203].

Type data: holotype QM G302881.

Type locality: Southern French Is., Tortoise Head, Western Port, 3 m, VIC.

Distribution: SA (Great Australian Bight), VIC (Bass Strait), WA (SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2447].

***Didemnum membranaceum* Sluiter, 1909**

Didemnum membranaceum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Asciden. *Siboga Exped.* **56B**: 1–112 [58].

Type data: syntypes ZMA TU471.1, TU471.2.

Type locality: Pater Noster and Flores Is., Indonesia.

Didemnum turritum Michaelsen, W. (1930). Ascidiaceae Krikobanchiae. *Fauna Südwest-Aust.* **5**(7): 463–558 [521].

Type data: syntypes MGH K1701.

Type locality: NNW of North Point of Heirisson Prong, Shark Bay, WA.

Distribution: Indonesia, Hong Kong, Andaman Islands, French Polynesia, Federated States of Micronesia, NT (N coast), QLD (Central E coast, Great Barrier Reef), SA (S Gulfs coast), WA (Central W coast, Lower W coast).

Ecology: benthic, marine.

References: Kott, P., Parry, D.L. & Cox, G.C. (1984). Prokaryotic symbionts with a range of ascidian hosts. *Bull. Mar. Sci.* **34**(2): 308–312; Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [36]; Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2497].

***Didemnum microthoracicum* Kott, 2001**

Didemnum microthoracicum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [207].

Type data: holotype SAMA E2656.

Type locality: Avoid Bay, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2448].

***Didemnum minisculum* Kott, 2001**

Didemnum minisculum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [207].

Type data: holotype SAMA E2647.

Type locality: Stansbury jetty on seagrass, 2–3 m, Yorke Peninsula, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum molle* (Herdman, 1886)**

Diplosomoides molle Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [310].

Type data: holotype BMNH 87.2.4.446.

Type locality: Aru Is., Torres Strait.

Didemnum sycon Michaelsen, W. (1920). Die Ascidiaceae Krikobanchiae des Roten Meeres: Clavelinidae und Synoicidae. Expedition S.M. Schiff *Pola* in das Rote Meer, nördliche und südliche Hälfte 1895/1896–1897/1898 Zoologische Ergebnisse xxxiii. *Denkschr. Akad. Wiss. Wien* **97**: 1–38 [44].

Type data: syntypes ZMH K1088, ZMH K1089.

Type locality: Comoren, Malagasy.

Taxonomic decision for synonymy: Kott, P. (1980). Algal-bearing didemnid ascidians in the Indo-west Pacific. *Mem. Queensl. Mus.* **20**(1): 1–47 [2].

Distribution: Indonesia, Guam, Fiji, NT (N coast), QLD (Great Barrier Reef), WA (Lower W coast); west Pacific Ocean including Okinawa, west Indian Ocean.

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

References: Olson, R.R. (1985). The consequences of short distance larval dispersal in a sessile marine invertebrate. *Ecology* **66**(1): 30–39; Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [208].

***Didemnum monile* Kott, 2001**

Didemnum monile Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [211].

Type data: holotype SAMA E2683.

Type locality: West Island, Nuyts Archipelago, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

Didemnum moseleyi (Herdman, 1886)

Leptoclinum moseleyi Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [272].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: unknown.

Distribution: Indonesia, NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast); west Pacific Ocean, Gulf of Suez, west Indian Ocean.

Ecology: benthic, marine.

References: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [211]; Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2448].

Didemnum multispirale Kott, 2001

Didemnum multispirale Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [213].

Type data: holotype QM G308017, paratype(s) QM G308044.

Type locality: Heron Is., under rubble, 0.5 m, QLD.

Distribution: Indonesia, QLD (Great Barrier Reef, NE coast), WA (NW coast).

Ecology: benthic, marine.

Didemnum mutabile C. & F. Monniot, 1987

Didemnum mutabile Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [37].

Type data: holotype MNHP A2 DID C 109.

Type locality: Moorea, Tahiti, French Polynesia.

Distribution: French Polynesia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [215].

Didemnum nambucciensis Kott, 2004

Didemnum nambucciensis Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [753].

Type data: holotype QM G10025, paratype(s) QM G10026.

Type locality: Nambucca Heads, 13 m, NSW.

Distribution: NSW (Lower E coast); known only from type locality.

Ecology: benthic, marine.

Didemnum nekozita Tokioka, 1967

Didemnum nekozita Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl. Mus.* **251**: 1–242 [67].

Type data: holotype USNM 11381, paratype(s) USNM 11801, 11418.

Type locality: Palau Is., Barrier reef 8 mi.[les] NW of Koror Island [7°24'30"N 134°21'20"E].

Didemnum anoi Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [25].

Type data: holotype MNHP A2 DID C 94.

Type locality: French Polynesia, Teavatia, Tikehau Atoll.

Taxonomic decision for synonymy: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [754].

Distribution: Philippines, Palau, French Polynesia, Fiji, QLD (Great Barrier Reef), WA (Central W coast, Lower W coast, N coast); also Eniwetak.

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [57].

Didemnum oblitum Kott, 2001

Didemnum oblitum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [215].

Type data: holotype QM G308380, paratype(s) QM G308363, 305733, 305605, 308386.

Type locality: Price Cay, Swain Reefs, 20 m, QLD.

Distribution: QLD (Great Barrier Reef, NE coast).

Ecology: benthic, marine.

Didemnum ossium Kott, 2001

Didemnum ossium Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [216].

Type data: holotype QM G300986, paratype(s) QM G302927, 300967.

Type locality: Fenelon Is., Institut Is., Bonaparte Archipelago, 20 m, WA.

Distribution: Philippines, New Caledonia, NT (N coast), WA (NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [57].

Didemnum parancium Kott, 2001

Didemnum parancium Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [218].

Type data: holotype QM GH5353.

Type locality: Bowden Reef, off Townsville, 10 m, QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

***Didemnum parau* C. & F. Monniot, 1987**

Didemnum parau Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [39].

Type data: holotype MNHP A2 DID C 101.

Type locality: Mataiva, French Polynesia, centre of lagoon.

Distribution: Philippines, French Polynesia, NT (N coast).

Ecology: benthic, marine.

Reference: Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [37].

***Didemnum patulum* (Herdman, 1899)**

Leptoclinum patulum Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [448] [*nom. nud.*].

Leptoclinum patulum Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [92].

Type data: type status unknown AM (depository uncertain, not found; not listed in Rowe, F.W.E. & Marshall, J.I. (1979). A catalogue of the ascidian type-specimens in the Australian Museum, Sydney. *Rec. Aust. Mus.* **32**(17): 547–562).

Type locality: Port Jackson, NSW.

Distribution: NSW (Lower E coast), SA (S Gulfs coast), TAS (Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [756]; Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2450].

***Didemnum pecten* Kott, 2001**

Didemnum pecten Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [220].

Type data: holotype QM G300929.

Type locality: Kangaroo Is., 6 m, SA.

Distribution: NSW (Lower E coast), SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2498].

***Didemnum pellucidum* Kott, 2001**

Didemnum pellucidum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [222].

Type data: holotype SAMA E2622, paratypes SAMA E2696, QM G300985.

Type locality: Edithburgh, Yorke Peninsula, 2–3 m, SA.

Distribution: SA (S Gulfs coast), TAS (Tas. coast), WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2450].

***Didemnum perplexum* Kott, 2001**

Didemnum perplexum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [224].

Type data: holotype QM G300985, paratype(s) QM G302960, G308046.

Type locality: Heron Is., QLD.

Distribution: Indonesia, New Caledonia, NT (N coast), QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [757].

***Didemnum plebium* Kott, 2005**

Didemnum plebium Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2451].

Type data: holotype WAM 155.93.

Type locality: N of Rosemary Is., Dampier Archipelago, 60–64 m, WA [19°45'S 116°45'E].

Distribution: WA (NW coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum poecilomorpha* F. & C. Monniot, 1996**

Didemnum poecilomorpha Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [160].

Type data: holotype MNHP A2 DID C 230.

Type locality: Indonesia, north Sulawesi, W side of Talisei Is., 40 m [1°51.52'N 125°03.84'E].

Distribution: Philippines, Indonesia, Papua New Guinea, Palau, WA (Central W coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2498].

***Didemnum precocinum* Kott, 2001**

Didemnum precocinum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [160].

Type data: holotype QM G308026, paratype(s) QM G308028.

Type locality: Wistari Reef, low tide rubble, QLD.

Distribution: NT (N coast), QLD (Great Barrier Reef), WA (N coast).

Ecology: benthic, marine.

Didemnum psammatode (Sluiter, 1895)

Leptoclinum psammatode Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.-Naturw. Ges. Jena* **8**: 163–186; Nachtrag zu den tunicaten: 325–326. [171] [as *Leptoclinum psamathodes*, lapsus].
Type data: holotype ZMA TU588.
Type locality: Thursday Is., Torres Strait.

Hypurgon skeati Sollas, I.B.J. (1903). On *Hypurgon skeati* a new genus and species of compound ascidian. *Q. J. Microsc. Sci. (ns)* **46**: 729–735 [729].
Type data: type status unknown BMNH (depository uncertain, not found).
Type locality: Pulau Bidang, Malaysia.

Hypurgon fuscum Oka, A. (1931). Ueber eine neue Art von der Merkwürdigen Synascien-Gattung *Hypurgon*. *Proc. Imp. Acad. Japan* **7**: 287–290 [287] [junior homonym of *Didemnum fuscum* Sluiter, 1909].
Type data: syntypes (probable) UTZM 463 (S61), 332 (S81)*.
Type locality: Japan.

Didemnum dorotubu Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl Mus.* **251**: 1–242 [74] [*nom. nov.* for *Hypurgon fuscum* Oka, 1931].
Taxonomic decision for synonymy: Kott, P. (1981). The ascidians of the reef flats of Fiji. *Proc. Linn. Soc. N.S.W.* **105**(3): 147–212 [173].

Distribution: Japan, Malaysia, Indonesia, New Zealand, NSW (Central E coast), QLD (Central E coast, Great Barrier Reef, NE coast), VIC (Bass Strait); west Indian Ocean, Red Sea.
Ecology: benthic, marine.
Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [229].

Didemnum roberti Michaelsen, 1930

Didemnum roberti Michaelsen, W. (1930). Ascidiace Krikobanchiae. *Fauna Südwest-Aust.* **5**(7): 463–558 [516].
Type data: holotype ZMB 3886*.
Type locality: NNW Heirisson Prong, Shark Bay, 22–25 m, WA.

Distribution: NT (N coast), WA (Central W coast, Lower W coast, NW coast).
Ecology: benthic, marine.
Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [58].

Didemnum rota Kott, 2004

Didemnum rota Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [58].
Type data: holotype NTM E241.
Type locality: Ashmore Reef, 4–7 m, Timor Sea.

Distribution: WA (N coast); known only from type locality.
Ecology: benthic, marine.

Didemnum scopi Kott, 2001

Didemnum scopi Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [232].
Type data: holotype QM G308216, paratype(s) QM G308221, G308478.
Type locality: Gorgonia pools, Heron Is., QLD.

Distribution: QLD (Central E coast, Great Barrier Reef, NE coast).
Ecology: benthic, marine.
Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2499].

Didemnum sordidum Kott, 2001

Didemnum sordidum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [234].
Type data: holotype QM G4970, paratype(s) QM G308304.
Type locality: Noosa Heads, 1 m, QLD.

Distribution: Philippines, Hong Kong, French Polynesia, QLD (Central E coast, Great Barrier Reef, NE coast), WA (NW coast); Indian Ocean.
Ecology: benthic, marine.

Didemnum spadix Kott, 2001

Didemnum spadix Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [236].
Type data: holotype SAMA E2841, paratype(s) SAMA E2694.
Type locality: Elliston Bay, 6 m, cave roof, SA.

Distribution: SA (Great Australian Bight), WA (Lower W coast).
Ecology: benthic, marine.

Didemnum spongioides Sluiter, 1909

Didemnum spongioides Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [67].
Type data: lectotype ZMA TU472, paralectotype(s) ZMA TU1272.
Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [174].
Type locality: Pearl Banks, E coast Aru Is., Torres Strait.

Distribution: Indonesia, QLD (NE oceanic), TAS (Tas. coast), WA (Lower W coast); Aru Is., Indonesia.
Ecology: benthic, marine.
Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [236].

Didemnum spumante Kott, 2004

Didemnum spumante Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2500].

Type data: holotype WAM 195.90, paratype(s) WAM 194.90.

Type locality: Green Head, near Leeman, in crevice, WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum spumosum* Kott, 2004**

Didemnum spumosum Kott, P. (2004). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [758].

Type data: holotype NMV F53285.

Type locality: Coffs Harbour on jetty piles, 0–5 m, NSW.

Distribution: NSW (Central E coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum stragulum* Kott, 2001**

Didemnum stragulum Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [238].

Type data: holotype WAM 610.89.

Type locality: West Is., intertidal, Cocos (Keeling) Is., east Indian Ocean.

Distribution: Cocos (Keeling) Islands (Aust. Terr.).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2452].

***Didemnum sucosum* Kott, 2001**

Didemnum sucosum Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [240].

Type data: holotype QM G300980.

Type locality: Corinella Jetty piles, Western Port, VIC.

Distribution: TAS (Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

***Didemnum tabulatum* Sluiter, 1909**

Didemnum tabulatum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [49].

Type data: syntypes ZMA TU480.1–3.

Type locality: off Pulu Sarassa, Postillon Is., 36 m; off Kawio and Kambooling islands, Karkaralong group, 23–31 m; off Pulu Jedan, east coast of Aru Islands (Pearl banks), Indonesia.

Distribution: Indonesia, WA (Central W coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known

species of Didemnidae (Asciacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2501].

***Didemnum ternerratum* Kott, 2001**

Didemnum ternerratum Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [241].

Type data: holotype SAMA E2653.

Type locality: Elliston Bay, Great Australian Bight, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2500]; Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2452].

***Didemnum theca* Kott, 2001**

Didemnum theca Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [243].

Type data: holotype WAM 121.93.

Type locality: 41 n miles WNW of Port Hedland, 36 m, WA.

Distribution: WA (NW coast).

Ecology: benthic, marine.

***Didemnum tonga* (Herdman, 1886)**

Didemnum tonga Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [269].

Type data: holotype BMNH 1887.2.4.402–403*.

Type locality: off Tongatabu (an error, presumably for Tongatapu), Friendly Is., 9 m [20°58'S 175°09'E].

Didemnum productum Monniot, F. (1995). Ascidies de Nouvelle-Calédonie XV. Le genre *Didemnum*. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **16A**(2–4): 299–344 [323].

Type data: holotype MNHP A2 DID. C 263.

Type locality: Marion Reef, Coral Sea Plateau, 35 m.

Taxonomic decision for synonymy: Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [243].

Distribution: Coral Sea, west Pacific Ocean.

Ecology: benthic, marine.

***Didemnum tumulatum* Kott, 2004**

Didemnum tumulatum Kott, P. (2004). Asciacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [58].

Type data: holotype NTM E279.

Type locality: Ashmore Reef, 6–8 m, Timor Sea.

Distribution: WA (NW coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum usitatum* Kott, 2004**

Didemnum usitatum Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [59].

Type data: holotype NTM E259.

Type locality: Ashmore Reef, 4–6 m, Timor Sea.

Distribution: WA (N coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum uturoa* C. & F. Monniot, 1987**

Didemnum uturoa Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [43].

Type data: holotype MNHP A2 DID C 99.

Type locality: Tahiti, Toafini reef in centre of lagoon, 10–20 m.

Distribution: New Caledonia, French Polynesia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [244].

***Didemnum vahatuio* C. & F. Monniot, 1987**

Didemnum vahatuio Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [43].

Type data: holotype MNHP A2 DID C 111.

Type locality: Tahiti, Toafini reef in centre of lagoon, 10–20 m.

Distribution: New Caledonia, French Polynesia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [246].

***Didemnum verdantum* Kott, 2001**

Didemnum verdantum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [247].

Type data: holotype QM GH5358.

Type locality: 35 n miles W of Bathurst Is., 16 m, NT.

Distribution: NT (N coast); known only from type locality.

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

***Didemnum vesperi* Kott, 2004**

Didemnum vesperi Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [xx].

Type data: holotype NTM E239.

Type locality: Ashmore Reef, 4–7 m, Timor Sea.

Distribution: WA (N coast); known only from type locality.

Ecology: benthic, marine.

***Didemnum via* Kott, 2001**

Didemnum via Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [248].

Type data: holotype QM GH808.

Type locality: Heron Is., 15–20 m, QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

***Didemnum viride* (Herdman, 1906)**

Leptoclinum viride Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [337].

Type data: holotype BMNH 07.8.30.41, paratype(s) ZMA TU598.

Type locality: 2.5 m[iles] south of Periya Paar, 26 m, Sri Lanka.

Distribution: Malagasy, QLD (Great Barrier Reef); west Pacific Ocean.

Ecology: benthic, marine; obligate cyanophyte symbionts.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [248].

***Didemnum vulgare* Kott, 2001**

Didemnum vulgare Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [250].

Type data: holotype SAMA E2684.

Type locality: 100 n miles SSW Eucla, 175 m, WA [33°17'S 128°12'E].

Distribution: SA (S Gulfs coast), VIC (Bass Strait), WA (Great Australian Bight).

Ecology: benthic, marine.

***Diplosoma* Macdonald, 1859**

Diplosoma Macdonald, J.D. (1859). On the anatomical characters of a remarkable form of compound Tunicata. *Trans. Linn. Soc. Lond. (Zool.)* **22**: 373–375 [375].

Type species: *Diplosoma rayneri* Macdonald, 1859 by monotypy.

Lioclinum Verrill, A.E. (1871). Descriptions of some imperfectly known and new ascidians from New England. *Amer. J. Sci. (3)* **1**: 54–58, 93–100, 211–212, 288–294, 443–446 [444].

Type species: *Didemnum viscosum* Savigny, 1816 by original designation.

Astellium Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [657].

Type species: *Astellium spongiforme* Giard, 1872 by original designation.

Arenadiplosoma Menker, D. & Ax, P. (1970). Zur Morphologie von *Arenadiplosoma migrans* n. gen., n. sp. einer vagilen Ascidiien-Kolonie aus dem Mesopsammal der Nordsee (Tunicata, Ascidiacea). *Z. Morphol. Tiere* **66**: 323–336 [323].

Type species: *Arenadiplosoma migrans* Menker & Ax, 1970 by monotypy.

Taxonomic decision for synonymy: Lafargue, F. (1972). Les Didemnidae (Prochordata) d'Helgoland. *Helgolander Wiss Meeresunters* **23**: 100–116 [110].

Extralimital distribution: worldwide, including polar regions (not at abyssal depths). See: Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidiienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Harant, H. (1929). Ascidiées provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Nishikawa, T. (1990). The ascidians of the Japan Sea I. *Publ. Seto Mar. Biol. Lab.* **34**(4–6): 73–148; Monniot, F. (1994). Ascidiées de Nouvelle-Calédonie XIV. Le genre *Diplosoma* (Didemnidae). *Bull. Mus. Natl. Hist. Nat. Paris* (4) **16A**(1): 3–11.

Diplosoma fecundum Kott, 2004

Diplosoma fecundum Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2515].

Type data: holotype SAMA E2919.

Type locality: Kingscote Jetty piles, 3–4 m, Kangaroo Is., SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

Diplosoma listerianum (Milne-Edwards, 1841)

Leptoclinum gelatinosum Milne-Edwards, H. (1841). Observations sur les ascidiées composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [295].

Type data: type status and whereabouts unknown.

Type locality: English Channel.

Leptoclinum listerianum Milne-Edwards, H. (1841). Observations sur les ascidiées composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [295].

Type data: neotype BMNH 1966.2.14.2*.

Subsequent designation: Rowe, F.W.E. (1966). A review of the genus *Diplosoma* Macdonald, 1959, (Ascidiacea, Didemnidae) with a description of the proposed neotype of *Diplosoma listerianum* (Milne-Edwards, 1841). *Ann. Mag. Nat. Hist.* **9**(13): 457–467 [458].

Type locality: Brighton, Sussex, England.

Diplosoma rayneri Macdonald, J.D. (1859). On the anatomical characters of a remarkable form of compound Tunicata. *Trans. Linn. Soc. Lond. (Zool.)* **22**: 373–375 [373].

Type data: type status and whereabouts unknown.

Type locality: Port Jackson, NSW.

Diplosoma macdonaldi Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiacea compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [315].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Bahia, Brazil.

Diplosoma mitsukurii Oka, A. (1892). Die periodische Regeneration der oberen Körperhälfte bei den Diplosomiden. *Biol. Centralblatt* **12**(9): 265–268 [265].

Type data: type status unknown UTZM (depository uncertain, not found).

Type locality: Pacific coast of Honsyû, Japan.

Diplosoma atropunctatum Van Name, W.G. (1902). The ascidians of the Bermuda Islands. *Trans. Conn. Acad. Arts Sci.* **11**: 325–412 [370].

Type data: holotype AMNH 1249 (AMNH 1386)*.

Type locality: Bermuda.

Diplosoma lacteum Van Name, W.G. (1902). The ascidians of the Bermuda Islands. *Trans. Conn. Acad. Arts Sci.* **11**: 325–412 [369].

Type data: holotype AMNH 1248*, paratype(s) AMNH 1396*.

Type locality: Bermuda.

Diplosoma pizoni Ritter, W.E. & Forsyth, R.A. (1917). Ascidians of the littoral zone of southern California. *Univ. Calif. Publ. Zool.* **16**: 439–512 [474].

Type data: type status unknown USNM (depository uncertain, not found).

Type locality: San Diego Bay, California, USA.

Diplosoma okai Tokioka, T. (1949). Contributions to the Japanese ascidian fauna I. Ascidians collected by Prof. Mijadi and Mr Masui during the bottom survey 1934–1940. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**: 1–18 [5].

Type data: syntypes SMBL 355*.

Type locality: Matoya Bay, Japan.

Leptoclinum macrolobium Tokioka, T. (1949). Contributions to the Japanese ascidian fauna II. Notes on some ascidians collected chiefly along the coast of Kii Peninsula. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**(2): 39–64 [44].

Type data: syntypes SMBL 118*.

Type locality: Kii Peninsula, Seto Naikai Sea, Japan.

Taxonomic decision for synonymy: Rowe, F.W.E. (1966). A review of the genus *Diplosoma* Macdonald, 1959, (Ascidiacea, Didemnidae) with a description of the proposed neotype of *Diplosoma listerianum* (Milne-Edwards, 1841). *Ann. Mag. Nat. Hist.* **9**(13): 457–467 [457].

Distribution: Japan, Indonesia, New Zealand, California, QLD (Central E coast), VIC (Bass Strait), WA (Lower W coast, SW coast); north and south

Atlantic Ocean, English Channel and Mediterranean, west Indian Ocean, Indonesia, west Pacific Ocean, New Zealand, Japan, east Pacific Ocean, California to Vancouver Is.

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [339].

Diplosoma simile (Sluiter, 1909)

Leptoclinum simile Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [77].

Type data: syntypes ZMA TU591.1, TU591.2.

Type locality: off Pulu Jedan, east coast Aru Is., Indonesia.

Leptoclinum midori Tokioka, T. (1954). Contributions to Japanese ascidian fauna VII. Invertebrate fauna of the intertidal zone of the Tokara Islands. VII Ascidiens. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **3**(3): 239–264.

Type data: holotype SMBL 132*.

Type locality: Tokara Is., Japan.

Taxonomic decision for synonymy: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [341].

Distribution: Japan, Singapore, Indonesia, QLD (Great Barrier Reef); west Pacific Ocean, Tokara Is.

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

Diplosoma translucidum (Hartmeyer, 1910)

Leptoclinum perspicuum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [79] [junior homonym of *Leptoclinum perspicuum* Giard, 1872].

Type data: syntypes ZMA TU586.

Type locality: off Pulu Jedan, east coast Aru Is., Indonesia.

Leptoclinum translucidum Hartmeyer, R. (1910). Ascidien (continuation of work by Seeliger). pp. 1489–1680 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Vol. 3, suppl. pts 88–94. Leipzig: C.F. Winter [1490] [*nom. nov.* for *Leptoclinum perspicuum* Sluiter, 1909].

Distribution: Indonesia, VIC (Bass Strait), WA (NW coast, SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [341].

Diplosoma velatum Kott, 2001

Diplosoma velatum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [345].

Type data: holotype SAMA E2612.

Type locality: Point Turton Jetty piles on *Posidonia* seagrass, 3–4 m, York Peninsula, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast), VIC (Bass Strait), WA (SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2468].

Diplosoma versicolor Monniot, 1994

Diplosoma versicolor Monniot, F. (1994). Ascidies de Nouvelle-Calédonie XIV. Le genre *Diplosoma* (Didemnidae). *Bull. Mus. Natl. Hist. Nat. Paris* (4) **16A**(1): 3–11 [9].

Type data: holotype MNHP A2-Dip-82*.

Type locality: near Redika Is., Woodin canal, W of Isle of Pines, 15–40 m, New Cale.

Diplosoma ferrugineum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [337].

Type data: holotype QM G302262, paratype(s) QM G308027.

Type locality: Heron Is., rubble fauna, low tide, QLD.

Taxonomic decision for synonymy: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [67].

Distribution: New Caledonia, Lord Howe Island, QLD (Great Barrier Reef), WA (Lower W coast, N coast, NW coast).

Ecology: benthic, marine.

Diplosoma virens (Hartmeyer, 1909)

Diplosoma viride Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [341] [junior homonym of *Leptoclinum viride* Herdman, 1906 = *Didemnum viride* (Herdman, 1906)].

Type data: holotype BMNH 1907.8.30.42, paratype(s) ZMA TU489.

Type locality: coral reef, Galle, Sri Lanka.

Leptoclinum calificiforme Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [82].

Type data: holotype ZMA TU573.

Type locality: west of North Ubian, Indonesia, see Tydeman, G.F. (1902). Liste des stations de la campagne scientifique du *Siboga* pp. 1–15 in, Weber, M. Introduction et description de l'expédition *Siboga Exped.* 1 mono., livre 3 + 2 maps. 176 pp. (station localities).

Leptoclinum varium Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [80].

Type data: syntypes ZMA TU599.6, TU599.8, TU597.

Type locality: Siboga Stations 37, 86, 89, 172, 213, 231, 240, 279, 282, 296, Indonesia, see Tydeman, G.F. (1902). Liste des stations de la campagne scientifique du *Siboga* pp. 1–15 in, Weber, M. Introduction et description de l'expédition *Siboga Exped.* 1 mono., livre 3 + 2 maps. 176 pp. (station localities).

Leptoclinum virens Hartmeyer, R. (1909). Ascidien (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig: C.F. Winter Vol. 3, suppl. pts 81–87 [1456] [*nom. nov.* for *Diplosoma viride* Herdman, 1906].

Diplosoma pavonia Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [60].

Type data: holotype MNHP A2 DIPA 45.

Type locality: Solomon Is., French Polynesia.

Taxonomic decision for synonymy: Kott, P. (1980). Algal-bearing didemnid ascidians in the Indo-west Pacific. *Mem. Queensl. Mus.* **20**(1): 1–47 [22]; Kott, P. (2001). The Australian Asciadiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [347].

Distribution: Sri Lanka, Indonesia, Marshall Islands, Fiji, NT (N coast), QLD (Great Barrier Reef); west Pacific Ocean.

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

Reference: Kott, P. (1982). Didemnid-algal symbioses: host species in the western Pacific with notes on the symbiosis. *Micronesica* **18**(1): 95–127.

***Leptoclinides* Bjerkan, 1905**

Leptoclinides Bjerkan, P. (1905). Ascidian von dem norwegischen Fishereidampfer 'Michael Sars' in den Jahren 1900–1904 gesammelt. *Bergens Mus. Aarbog* **5**: 1–29 [20]. Type species: *Leptoclinides faeroensis* Bjerkan, 1905 by monotypy.

Askonides Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334 [291].

Type species: *Askonides coelenteratus* Kott, 1962 by original designation.

Taxonomic decision for synonymy: Kott, P. (1972). The ascidians of South Australia I. Spencer Gulf, St Vincent Gulf and Encounter Bay. *Trans. R. Soc. S. Aust.* **96**(1): 1–52 [17].

Extralimital distribution: worldwide, excluding polar regions. See: Hartmeyer, R. (1924). Asciadiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Harant, H. (1929). Ascidies provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Monniot, F. (1989). Ascidies de Nouvelle-Calédonie VII. Les genres *Atriolum* et *Leptoclinides* dans le lagon sud. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **11A**(4): 673–691; Nishikawa, T. (1990). The ascidians of the Japan Sea I. *Publ. Seto Mar. Biol. Lab.* **34**(4–6): 73–148.

Generic reference: Kott, P. (2005). New and little known species of Didemnidae (Asciadiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2414].

***Leptoclinides aciculus* Kott, 2001**

Leptoclinides aciculus Kott, P. (2001). The Australian Asciadiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [37].

Type data: holotype WAM 124.93 (20 m).

Type locality: 24 n miles NNW of Port Hedland, WA [19°57.2'S 118°25.1'E].

Distribution: Philippines, Papua New Guinea, Palau, NT (N coast), QLD (Great Barrier Reef, NE coast), WA (NW coast).

Ecology: benthic, marine.

References: Kott, P. (2002). Asciadiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [29]; Kott, P. (2004). Asciadiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [48].

***Leptoclinides albamaculatus* Kott, 2001**

Leptoclinides albamaculatus Kott, P. (2001). The Australian Asciadiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [38].

Type data: syntypes QM G308274.

Type locality: Heron Is., QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides brandi* Kott, 2001**

Leptoclinides brandi Kott, P. (2001). The Australian Asciadiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [40].

Type data: holotype QM GH918, paratype(s) QM GH917.

Type locality: Blue Pools, Heron Is., QLD.

Distribution: NT (N coast), QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Asciadiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [49].

***Leptoclinides caelestis* Kott, 2001**

Leptoclinides caelestis Kott, P. (2001). The Australian Asciadiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [42].

Type data: holotype WAM 794.88.

Type locality: W side of Goss Passage, 30–35 m, Wallabi Group, Houtman's Abrolhos, WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides carduus* Kott, 2001**

Leptoclinides carduus Kott, P. (2001). The Australian Asciadiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [43].

Type data: holotype QM G308154.

Type locality: Coral Gardens, Heron Is., QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides cavernosus* Kott, 2001**

Leptoclinides cavernosus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [44].

Type data: holotype QM G300896, paratype(s) QM G302102.

Type locality: N of meteorological tower, rubble zone, Heron Is., QLD.

Distribution: Coral Sea Islands Territory, QLD (Great Barrier Reef), WA (Lower W coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2468].

***Leptoclinides coelenteratus* (Kott, 1962)**

Askonides coelenteratus Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334 [292].

Type data: holotype AM Y1343, paratype(s) AM Y1344, Y1345, Y1346, Y1347.

Type locality: Rottnest Is., WA.

Distribution: WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [46].

***Leptoclinides comitus* Kott, 2001**

Leptoclinides comitus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [48].

Type data: holotype SAMA E2614, paratype(s) SAMA E2615.

Type locality: rock slope with *Hormosira*, off Eve Point, 1–10 m, Bathurst Channel, Port Davey, TAS.

Distribution: SA (S Gulfs coast), TAS (Tas. coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2468].

***Leptoclinides compactus* Kott, 2001**

Leptoclinides compactus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [49].

Type data: holotype QM G302052.

Type locality: Price Is., Avoid Bay, Great Australian Bight, SA.

Distribution: SA (Great Australian Bight).

Ecology: benthic, marine.

***Leptoclinides complexus* Kott, 2002**

Leptoclinides complexus Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [30].

Type data: holotype NTM E13, paratype(s) NTM E12.

Type locality: Table Head, Port Essington, NT.

Distribution: NT (N coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides confirmatus* Kott, 2001**

Leptoclinides confirmatus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [50].

Type data: holotype SAMA E2619.

Type locality: Bathurst Channel off Jean Point, 21 m, Port Davey, TAS.

Distribution: TAS (Tas. coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides constellatus* Kott, 2001**

Leptoclinides constellatus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [51].

Type data: holotype QM G302924, paratype(s) QM GH5420.

Type locality: Solway Pass, 15 m, Haselwood Is., Whitsunday Group, QLD.

Distribution: NT (N coast), QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [49].

***Leptoclinides cucurbitus* Kott, 2004**

Leptoclinides cucurbitus Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [733].

Type data: holotype SAMA E2905.

Type locality: Paterson's Arch on rock wall, Waterfall Bay, Tasman Peninsula, TAS.

Distribution: TAS (Tas. coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides cuspidatus* Sluiter, 1909**

Leptoclinides cuspidatus Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [57].

Type data: syntypes ZMA TU 440.1–2.

Type locality: between Nusa Besi and the NE point of Timor, 27–54 m; Sailus ketjil, Paternoster Is, 27 m; Indonesia [8°25.2'S 127°18.4'E].

Leptoclinides oscitans Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [177].

Type data: holotype MNHP A2 Lep 32.

Type locality: Ruang Is., north Sulawesi, 25 m, Indonesia [2°17.24'N 125°21.84'E].

Taxonomic decision for synonymy: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [52].

Distribution: Philippines, Indonesia, QLD (Great Barrier Reef), WA (NW coast); west Pacific Ocean.

Ecology: benthic, marine.

***Leptoclinides decoratus* Kott, 2004**

Leptoclinides decoratus Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2469].

Type data: holotype SAMA E3213, paratype(s) SAMA E3214.

Type locality: The Arch between Snug Cave and Western River Cave, Kangaroo Is., SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2417].

***Leptoclinides dubius* (Sluiter, 1909)**

Polysyncraton dubium Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [69].

Type data: lectotype ZMA TU1275, paralectotype(s) ZMA TU834.1, TU834.2.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [188].

Type locality: inner side Moearas reef, east coast of Borneo.

Distribution: Philippines, Indonesia, New Caledonia, 200 m bathymetric (Central W coast, Great Barrier Reef, Lower W coast, NE coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2418].

***Leptoclinides durus* Kott, 2001**

Leptoclinides durus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [57].

Type data: holotype QM G302350, paratypes QM G300893, QM G302045.

Type locality: Heron Is., QLD.

Distribution: QLD (Great Barrier Reef), WA (N coast); Arafura Sea, Micronesia.

Ecology: benthic, marine.

***Leptoclinides echinus* Kott, 2001**

Leptoclinides echinus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [59].

Type data: holotype WAM 865.83(1) QM GH2121, paratype(s) QM G302871.

Type locality: 8.5 n miles NWN Port Hedland, 18 m, WA [20°13'S 118°28'E].

Distribution: NT (N coast), WA (NW coast).

Ecology: benthic, marine.

References: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [50]; Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2471] (as *Leptoclinides levitatus*).

***Leptoclinides erinaceus* Kott, 2001**

Leptoclinides erinaceus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [61].

Type data: holotype WAM 128.93.

Type locality: 24 n miles NNW Port Hedland, 22–24 m, WA [19°57.2'S 118°25.1'E].

Distribution: QLD (Great Barrier Reef), WA (NW coast).

Ecology: benthic, marine.

***Leptoclinides exiguus* Kott, 2001**

Leptoclinides exiguus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [62].

Type data: holotype QM G300947, paratype(s) QM G10166.

Type locality: Turton jetty, 5 m, Spencer Gulf Point, SA.

Distribution: SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2471].

***Leptoclinides frustus* Kott, 2005**

Leptoclinides frustus Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2419].

Type data: holotype SAMA E3255.

Type locality: between Western River Cove and Snug Cove, west of the Arch, Fred's, on rock wall, 10–12 m, Kangaroo Is., SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides fungiformis* Kott, 1972**

Leptoclinides fungiformis Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [180].

Type data: syntypes SAMA E911.

Type locality: Pearson Is., SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides grandistellus* Kott, 2004**

Leptoclinides grandistellus Kott, P. (2004). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [735].

Type data: holotype WAM Z10920.

Type locality: SW of Cliff head Dongara, 44 m, WA [29°4'S 114°42.5'E].

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides imperfectus* (Kott, 1962)**

Askonides imperfectus Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334 [294].

Type data: holotype AM Y1348.

Type locality: Reevesby Is., SA.

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast), VIC (Bass Strait), WA (SW coast).

Ecology: benthic, marine.

References: Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [65]; Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2420].

***Leptoclinides kingi* Michaelsen, 1930**

Leptoclinides dubius kingi Michaelsen, W. (1930). Ascidiae Krikobranchiae. *Fauna Südwest-Aust.* **5**(7): 463–558 [507] [proposed with subspecific rank in *Leptoclinides dubius* (Sluiter, 1909)].

Type data: syntypes (probable) ZMB 3887, 3888, 3889*.

Type locality: Shark Bay, WA.

Distribution: QLD (Great Barrier Reef, NE coast), WA (Central W coast, NW coast).

Ecology: benthic, marine.

References: Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [67]; Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2421].

***Leptoclinides levitatus* Kott, 2001**

Leptoclinides levitatus Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [69].

Type data: holotype QM GH5380, paratype(s) QM GH5456.

Type locality: QLD, Little Black Reef, 15 m [19°46.25'S 149°22.0'E].

Distribution: QLD (Great Barrier Reef), WA (Lower W coast).

Ecology: benthic, marine.

***Leptoclinides lissus* Hastings, 1931**

Leptoclinides lissus Hastings, A.B. (1931). Tunicata. *Sci. Repts. Gt Barrier Reef Exped.* **4**(3): 69–109 [93].

Type data: holotype AM G13449.

Type locality: Low Is., Great Barrier Reef, QLD.

Distribution: NT (N coast), QLD (Great Barrier Reef).

Ecology: benthic, marine.

References: Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [70]; Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2422].

***Leptoclinides longicollis* Kott, 2001**

Leptoclinides longicollis Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [70].

Type data: holotype QM G300898.

Type locality: Moreton Bay, QLD.

Distribution: QLD (Central E coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides maculatus* Kott, 2001**

Leptoclinides maculatus Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [72].

Type data: holotype SAMA E2609, paratypes QM G9303, QM G301572.

Type locality: Point Turton jetty piles, 3–4 m, Yorke Peninsula, SA.

Distribution: SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2472].

***Leptoclinides magnistellus* Kott, 2001**

Leptoclinides magnistellus Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [73].

Type data: holotype AM Y1481.

Type locality: Oyster Bay, 10 m, TAS.

Distribution: TAS (Tas. coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides minimus* Kott, 2005**

Leptoclinides minimus Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2422].

Type data: holotype WAM 30.84.

Type locality: Marmion Lagoon, WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides multilobatus* Kott, 1954**

Leptoclinides multilobata Kott, P. (1954). Tunicata, Ascidiaceae. *Rep. B.A.N.Z. Antarct. Res. Exped.* **1**(4): 121–182 [166].

Type data: holotype AM Y1492.

Type locality: off Maria Is., TAS.

Distribution: NSW (Lower E coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

***Leptoclinides placidus* Kott, 2001**

Leptoclinides placidus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [75].

Type data: holotype QM GH372, paratype(s) QM G300902.

Type locality: Smith's Reef, 15 m, Moreton Bay, QLD.

Distribution: NSW (Central E coast), QLD (Central E coast, NE coast).

Ecology: benthic, marine.

***Leptoclinides prunus* Kott, 2004**

Leptoclinides prunus Kott, P. (2004). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2473].

Type data: holotype SAMA E2915.

Type locality: Portsea Pier on piles, 4–5 m, VIC.

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides pulvinus* Kott, 2005**

Leptoclinides pulvinus Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2424].

Type data: holotype QM G308742.

Type locality: Moira Reef, Bynoe Harbour, rocky reef on rock 5–8 m, NT.

Distribution: NT (N coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides rigidus* Kott, 2001**

Leptoclinides rigidus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [77].

Type data: holotype QM GH5371, paratype(s) QM G300987.

Type locality: Deloraine Is., 10 m, Whitsunday Group, QLD.

Distribution: NT (N coast), QLD (NE coast), WA (Central W coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2425].

***Leptoclinides rufus* (Sluiter, 1909)**

Polysyncrator rufum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidiaceen. *Siboga Exped.* **56B**: 1–112 [77].

Type data: syntypes ZMA TU840.1, ZMA TU840.2.

Type locality: off Pulu Kwawassang, Paternoster Is., Indonesia.

Leptoclinides oscitans Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [177].

Type data: holotype MNHP A2 Lep 32*.

Type locality: Indonesia, North Sulawesi, Ruang Is., 25 m.

Taxonomic decision for synonymy: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [79].

Distribution: Indonesia, Palau, QLD (Central E coast, Great Barrier Reef, NE coast).

Ecology: benthic, marine.

***Leptoclinides seminudus* Kott, 2001**

Leptoclinides seminudus Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [82].

Type data: holotype SAMA E2671 (growing on *Pinna* and *Cellepora* spp.).

Type locality: Gulf St Vincent, off Port Gawler, 18–20 m, SA.

Distribution: NSW (Central E coast), SA (S Gulfs coast), TAS (Bass Strait), VIC (Bass Strait).

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [736]; Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2426].

***Leptoclinides sulawesi* F. & C. Monniot, 1996**

Leptoclinides sulawesi Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [180].

Type data: holotype MNHP A2 Lep 30* (1°23.52'N 124°32.64'E).

Type locality: W of Manado, north Sulawesi, Indonesia, 38 m.

Distribution: Indonesia, Palau, NSW (Lower E coast), WA (Lower W coast, N coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2475].

***Leptoclinides tuberculatus* Kott, 2004**

Leptoclinides tuberculatus Kott, P. (2004). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [737].

Type data: holotype QM G308540, paratypes QM G308536, QM G308539.

Type locality: Shelburne Bay, 22 m, QLD.

Distribution: QLD (NE coast); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides umbrosus* Kott, 2001**

Leptoclinides umbrosus Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [83].

Type data: holotype QM G308279, paratype(s) QM G308283.

Type locality: Heron Is., QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

***Leptoclinides variegatus* Kott, 2001**

Leptoclinides variegatus Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [86].

Type data: holotype QM GH2426, paratype(s) QM GH2428.

Type locality: Topgallant Is., in caves, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2427].

***Leptoclinides volvus* Kott, 1975**

Leptoclinides volvus Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* **99**(1): 1–20 [8].

Type data: holotype SAMA E1034, paratypes SAMA E1033, QM G7511.

Type locality: north Great Australian Bight, SA [32°24'S 133°30'E].

Distribution: SA (Great Australian Bight).

Ecology: benthic, marine; to 42 m.

Reference: Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [87].

***Lissoclinum* Verrill, 1871**

Lissoclinum Verrill, A.E. (1871). Descriptions of some imperfectly known and new ascidians from New England. *Amer. J. Sci.* (3) **1**: 54–58, 93–100, 211–212, 288–294, 443–446 [444].

Type species: *Lissoclinum aureum* Verrill, 1871 by subsequent designation, see Van Name, W.G. (1910). Compound ascidians of the coasts of New England and neighbouring British Provinces. *Proc. Bost. Soc. Nat. Hist.* **34**: 339–424.

Echinoclinum Van Name, W.G. (1902). The ascidians of the Bermuda Islands. *Trans. Conn. Acad. Arts Sci.* **11**: 325–412 [372].

Type species: *Echinoclinum verrilli* Van Name, 1902 by monotypy.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [87].

Extralimital distribution: east Pacific Ocean off south America to California, West Indies, north Atlantic Ocean to Arctic Ocean and northwest of Iceland, west Pacific Ocean. See: Hartmeyer, R. (1924). Asciacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tier-geographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Nishikawa, T. (1990). The ascidians of the Japan Sea 1. *Publ. Seto Mar. Biol. Lab.* **34**(4–6): 73–148; Monniot, F. (1992). Ascidies de Nouvelle-Calédonie XII. Le genre *Lissoclinum* (Didemnidae) dans le lagon sud. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **14A**(3–4): 565–589.

Generic reference: Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2417].

***Lissoclinum agriculum* Kott, 2005**

Lissoclinum agriculum Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2459].

Type data: holotype WAM 179.93.

Type locality: east of Montebello Is., 7–8 m, WA.

Distribution: WA (NW coast); known only from type locality.

Ecology: benthic, marine.

Lissoclinum badium F. & C Monniot., 1996

Lissoclinum badium Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [170].
Type data: holotype MNHP A2 Lis A 109*.
Type locality: Eastern Fields Atoll, 140 km SW of Port Moresby, Coral Sea, 10 m, Papua New Guinea [10°01.47'S 145°38.49'E].

Distribution: Papua New Guinea, Palau, Coral Sea Islands Territory, NT (N coast), QLD (Great Barrier Reef), WA (NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [40].

Lissoclinum bistratum (Sluiter, 1905)

Didemnum bistratum Sluiter, C.P. (1905). Tuniciers récoltés en 1904 par M. Ch. Gravier dans la golfe de Tadjourah (Somalie Française). *Bull. Mus. Natl. Hist. Nat. Paris* **11**: 100–103 [103].
Type data: syntypes ZMH K1107, K1108, MNHP A2 LIS 24.
Type locality: Gulf of Tadjourah, Gulf of Aden, Somalia.

Didemnum gottschalldti Tokioka, T. (1950). Ascidians from the Palao Is. I. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**(3): 115–150 [118] [publication date established from Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl Mus.* **251**: 1–242; junior homonym of *Didemnum gottschalldti* Hartmeyer, 1905].
Type data: syntypes SMBL 75*.
Type locality: Palau Is., west Pacific Ocean.

Lissoclinum pulvinum Tokioka, T. (1954). Contributions to Japanese ascidian fauna VII. Invertebrate fauna of the intertidal zone of the Tokara Islands. VII Ascidians. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **3**(3): 239–264 [247] [nom. nov. for *Didemnum gottschalldti* Tokioka, 1950].

Taxonomic decision for synonymy: Kott, P. (1980). Algal-bearing didemnid ascidians in the Indo-west Pacific. *Mem. Queensl. Mus.* **20**(1): 1–47 [16].

Distribution: Singapore, Philippines, Indonesia, Palau, New Caledonia, Fiji, Malagasy, NSW (Central E coast), NT (N coast), QLD (Central E coast, Great Barrier Reef), WA (Central W coast, NW coast); Red Sea, Gulf of Aden, Tokara Is., Caroline Is., Coral Sea.
Ecology: benthic, marine; cryptic habitats, behind reef crest and in tidal pools; obligate *Prochloron* [Prochlorophyta] symbionts.

References: Parry, D.L. (1987). Selected Chemistry of the Ascidiacea. Unpubl. Ph.D. Thesis. Brisbane : University of Queensland. 221 pp.; Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [298]; Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [64]; Kott, P. (2005). New and

little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2460].

Lissoclinum caliginosum Kott, 2001

Lissoclinum caliginosum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [300].

Type data: holotype QM G308082, paratype(s) QM G308083.

Type locality: Heron Is., QLD.

Distribution: QLD (Great Barrier Reef).

Ecology: benthic, marine.

Lissoclinum calycis Monniot, 1992

Lissoclinum calycis Monniot, F. (1992). Ascidiées de Nouvelle-Calédonie XII. Le genre *Lissoclinum* (Didemnidae) dans le lagon sud. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **14A**(3–4): 565–589 [568].

Type data: holotype MNHP A2 Lis 55*.

Type locality: Lagoon, 20–35 m, Woodin Canal, New Caledonia.

Distribution: New Caledonia, NT (N coast), QLD (Great Barrier Reef).

Ecology: benthic, marine.

References: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [302]; Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2461].

Lissoclinum clavatum Kott, 2005

Lissoclinum clavatum Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2462].

Type data: holotype SAMA E3260, paratype(s) SAMA E3258.

Type locality: between Western River Cove and Snug Cove, W. of the Arch, on rock wall, 10–12 m, Kangaroo Is., SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

Lissoclinum coactum Kott, 2004

Lissoclinum coactum Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2506].

Type data: syntypes WAM 1136.89.

Type locality: Five Mile Reef, 10km E of Hopetoun, 0–3 m, WA [33°56'S 120°12'E].

Distribution: WA (SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2463].

***Lissoclinum concavum* Kott, 2001**

Lissoclinum concavum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [303].

Type data: holotype SAMA E2691.

Type locality: South Australia, Franklin Is.

Distribution: SA (Great Australian Bight), TAS (Tas. coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2464].

***Lissoclinum conchylum* Kott, 2001**

Lissoclinum conchylum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [305].

Type data: holotype QM G308321.

Type locality: Heron Is., QLD.

Distribution: NT (N coast), QLD (Central E coast, Great Barrier Reef).

Ecology: benthic, marine.

***Lissoclinum diversum* Kott, 2004**

Lissoclinum diversum Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2508].

Type data: holotype WAM 140-93.

Type locality: NE end of Kendrew Is., under boulders, Dampier Archipelago, WA.

Distribution: WA (Central W coast, NW coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2465].

***Lissoclinum durable* Kott, 2001**

Lissoclinum durable Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [306].

Type data: holotype SAMA E2663, paratype(s) SAMA E2667.

Type locality: West Is., under boulder, 5 m, SA.

Distribution: NSW (Central E coast), NT (N coast), SA (S Gulfs coast), VIC (Bass Strait), WA (SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2509].

***Lissoclinum laneum* Kott, 2004**

Lissoclinum laneum Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2510].

Type data: holotype SAMA E2923.

Type locality: Port Victoria Jetty, Yorke Peninsula, 3–4 m, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

***Lissoclinum levitum* Kott, 2001**

Lissoclinum levitum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [307].

Type data: holotype QM GH2420.

Type locality: Ward Is., in caves, Investigator Group, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast).

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [767]; Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2465].

***Lissoclinum limosum* Kott, 2001**

Lissoclinum limosum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [308].

Type data: holotype QM G301746, paratypes QM G308357, QM G302325.

Type locality: Heron Is., north reef, low tide rubble fauna, QLD.

Distribution: NT (N coast), QLD (Great Barrier Reef).

Ecology: benthic, marine.

***Lissoclinum maculatum* Kott, 2001**

Lissoclinum maculatum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [310].

Type data: holotype QM G302236.

Type locality: Lizard Is., north reef, low tide rubble fauna, QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

***Lissoclinum multifidum* Sluiter, 1909**

Lissoclinum multifidum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [83].

Type data: holotype ZMA TU 590*.

Type locality: Moearas Reef, inner side, east coast of Borneo, 54 m, Indonesia.

Polysoma testiculatum Kott, P. (1983). Two new genera of didemnid ascidians from tropical Australian waters. *The Beagle, Rec. N.T. Mus. Arts Sci.* **1**(2): 13–19 [16].

Type data: holotype NTM E 11, paratype(s) QM GH802.

Type locality: Coral Bay, Port Essington, 3 m, NT.

Lissoclinum concavum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [303].

Type data: holotype SAMA E2691.

Type locality: Franklin Is., SA.

Taxonomic decision for synonymy: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [311]; Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [65].

Distribution: Thailand, Indonesia, Mauritius, NT (N coast), SA (S Gulfs coast), TAS (Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

Lissoclinum nebulosum F. & C. Monniot, 1996

Lissoclinum nebulosum Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [173].

Type data: holotype MNHP A2 Lis A 118*.

Type locality: Chuuk Lagoon, Polle Is., 10–30 m, Federated States of Micronesia [7°21.54'N 151°35.63'E].

Distribution: Federated States of Micronesia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [311].

Lissoclinum ostrearium (Michaelsen, 1930)

Diplosomoides ostrearium Michaelsen, W. (1930). Ascidiæ Krikobanchiæ. *Fauna Südwest-Aust.* **5**(7): 463–558 [526].

Type data: holotype (probable) ZMB Pch 3878*.

Type locality: Oyster Harbour, Albany, WA, 0.75–5 m.

Distribution: QLD (Great Barrier Reef), SA (Bass Strait, S Gulfs coast), WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [314].

Lissoclinum pacificense (Kott, 1981)

Echinoclinum pacificense Kott, P. (1981). The ascidians of the reef flats of Fiji. *Proc. Linn. Soc. N.S.W.* **105**(3): 147–212 [193].

Type data: holotype QM 12584, paratype(s) QM 12463.

Type locality: Suva barrier reef, Viti Levu, Fiji.

Distribution: Fiji, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [768].

Lissoclinum patella (Gottschaldt, 1898)

Didemnoides patella Gottschaldt, R. (1898). Synascidien von Ternate. *Abh. Senckenb. Naturforsch. Ges.* **24**: 641–666 [651].

Type data: holotype ZMH K1087.

Type locality: Ternate Is., Indonesia.

Didemnoides sulcatum Gottschaldt, R. (1898). Synascidien von Ternate. *Abh. Senckenb. Naturforsch. Ges.* **24**: 641–666 [651].

Type data: holotype ZMH.

Type locality: Ternate, Indonesia.

Didemnoides ternatanum Gottschaldt, R. (1898). Synascidien von Ternate. *Abh. Senckenb. Naturforsch. Ges.* **24**: 641–666 [648].

Type data: holotype ZMH K595.

Type locality: Ternate Is., Indonesia.

Didemnum maeandrium Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [64].

Type data: lectotype ZMA TU457, paralectotype(s) ZMA TU459.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [173].

Type locality: Pulu Kaniungan Ketjil, Indonesia, see Tydeman, G.F. (1902). Liste des stations de la campagne scientifique du *Siboga* pp. 1–15 in, Weber, M. Introduction et description de l'expédition *Siboga Exped.* 1 mono., livre 3 + 2 maps. 176 pp.

Diplosomoides tropicum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [88].

Type data: lectotype ZMA TU500, paralectotype(s) ZMA TU473.1–13.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [175].

Type locality: Elat, W coast Great Kei Is., Indonesia, see Tydeman, G.F. (1902). Liste des stations de la campagne scientifique du *Siboga* pp. 1–15 in, Weber, M. Introduction et description de l'expédition *Siboga Exped.* 1 mono., livre 3 + 2 maps. 176 pp. (station localities).

Taxonomic decision for synonymy: Kott, P. (1980). Algal-bearing didemnid ascidians in the Indo-west Pacific. *Mem. Queensl. Mus.* **20**(1): 1–47 [18].

Distribution: Philippines, Indonesia, Borneo, Palau, Guam, QLD (Great Barrier Reef), WA (Lower W coast).

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

References: Parry, D.L. (1987). Selected Chemistry of the Ascidiacea. Unpubl. Ph.D. Thesis. Brisbane : University of Queensland. 221 pp.; Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [315].

***Lissoclinum punctatum* Kott, 1977**

Lissoclinum punctatum Kott, P. (1977). Algal supporting didemnid ascidians of the Great Barrier Reef. pp. 615–621 in Taylor, D.L. (ed.) *Proceedings of the Second International Coral Reef Symposium Miami 1*. Biology. Miami : University of Miami [620].

Type data: holotype QM G9920, paratypes QM G9426, QM G9926.

Type locality: North-west Is., Capricorn Group, Great Barrier Reef, QLD, see Parry, D.L. & Kott, P. (1988). Cosymbiosis in the Ascidacea. *Bull. Mar. Sci* **42**(1): 149–153.

Distribution: Singapore, Palau, New Caledonia, Fiji, QLD (Great Barrier Reef).

Ecology: benthic, marine; cryptic, in interstices of algae mats and rubble, obligate *Prochloron* [Prochlorophyta] symbionts.

References: Parry, D.L. (1987). Selected Chemistry of the Ascidacea. Unpubl. Ph.D. Thesis. Brisbane : University of Queensland. 221 pp.; Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [318].

***Lissoclinum reginum* Kott, 2001**

Lissoclinum reginum Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [319].

Type data: holotype QM G308077, paratype(s) QM G308088.

Type locality: Heron Is., eastern end, below low tide, on *Halimeda* sp., QLD.

Distribution: Cocos (Keeling) Islands (Aust. Terr.), NT (N coast), QLD (Great Barrier Reef), WA (N coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [65].

***Lissoclinum roseum* Kott, 2001**

Lissoclinum roseum Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [322].

Type data: holotype QM G308053, paratype(s) QM G308312.

Type locality: Wistari Reef, low tide rubble fauna, QLD.

Distribution: QLD (Great Barrier Reef, NE coast), WA (NW coast).

Ecology: benthic, marine.

***Lissoclinum scopulosum* Kott, 2004**

Lissoclinum scopulosum Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [770].

Type data: holotype WAM 163.93.

Type locality: NW Long Is., Passage Is., WA.

Distribution: WA (NW coast); known only from type locality.

Ecology: benthic, marine.

***Lissoclinum sente* Kott, 2001**

Lissoclinum sente Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [323].

Type data: holotype QM G9467.

Type locality: Heron Is., south reef opposite cay, 8–9 m, QLD.

Distribution: French Polynesia, Fiji, NSW (Lower E coast), QLD (Great Barrier Reef).

Ecology: benthic, marine.

***Lissoclinum spongium* Kott, 2001**

Lissoclinum spongium Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [325].

Type data: holotype QM GH4372, paratype(s).

Type locality: Lord Howe Is., lagoon, 1 m.

Distribution: Lord Howe Island; known only from type locality.

Ecology: benthic, marine.

***Lissoclinum stellatum* Kott, 2004**

Lissoclinum stellatum Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2514].

Type data: holotype SAMA E2926.

Type locality: Waterfall Bay, Dog Leg Cave on rock wall, 10–12 m, Tasman Peninsula, TAS.

Distribution: TAS (Tas. coast); known only from type locality.

Ecology: benthic, marine.

***Lissoclinum taratara* C. & F. Monniot, 1987**

Lissoclinum taratara Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [52].

Type data: holotype MNHP A2 LIS 39*.

Type locality: outer reef, Papetoai, Mooréa, French Polynesia.

Distribution: Indonesia, French Polynesia, NT (N coast), QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [66].

***Lissoclinum tasmanense* (Kott, 1954)**

Cystodytes tasmanensis Kott, P. (1954). Tunicata, Ascidians. *Rep. B.A.N.Z. Antarct. Res. Exped.* **1**(4): 121–182 [155].

Type data: holotype whereabouts unknown (not in AM).

Type locality: off Maria Is., TAS, 155–174 m.

Distribution: SA (S Gulfs coast), TAS (Tas. coast).
Ecology: benthic, marine; 5–174 m depth, undersides of boulders, protected conditions.

References: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [88] ('*Echinoclinum verrili*' of Kott, P. (1972). The ascidians of South Australia I. Spencer Gulf, St Vincent Gulf and Encounter Bay. *Trans. R. Soc. S. Aust.* **96**(1): 1–52 [21] is here referred to *Lissoclinum tasmanense*); Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [326].

Lissoclinum timorense (Sluiter, 1909)

Didemnum timorense Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [51].

Type data: lectotype ZMA TU1274, paralectotype(s) ZMA TU482.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [174].

Type locality: southern coast of Timor, 8–36 m.

Didemnum voeltzkowi Michaelsen, W. (1920). Die Ascidiae Krikobranchiae des westlichen Indischen Ozeans. Didemniden. *Jahrb. Hamb. Wiss. Anst.* **37**: 1–76 [54].

Type data: holotype ZMH K1099, paratype(s) ZMH K1111. Type locality: Malagasy, west Indian Ocean.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [89].

Distribution: Philippines, Indonesia, Palau, New Caledonia, Guam, Fiji, Malagasy, QLD (Great Barrier Reef); also Caroline Is.

Ecology: benthic, marine; non cryptic reef flat habitats; obligate *Prochloron* [Prochlorophyta] symbionts.

References: Kott, P. (1980). Algal-bearing didemnid ascidians in the Indo-west Pacific. *Mem. Queensl. Mus.* **20**(1): 1–47 [13] (as *Lissoclinum voeltzkowi*); Kott, P. (1982). Didemnid-algal symbioses: host species in the western Pacific with notes on the symbiosis. *Micronesica* **18**(1): 95–127; Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [328].

Lissoclinum triangulum (Sluiter, 1909)

Diplosomoides triangulum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [86].

Type data: holotype ZMA TU499.

Type locality: Pulu Pasi Tanette, Indonesia.

Echinoclinum philippinense Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl. Mus.* **251**: 1–242 [93].

Type data: holotype USNM 11790, paratype(s) USNM 11791.

Type locality: Punta Natangol, Basilan Is., Philippines.

Taxonomic decision for synonymy: Kott, P. (1980). Algal-bearing didemnid ascidians in the Indo-west Pacific. *Mem. Queensl. Mus.* **20**(1): 1–47 [21].

Distribution: Philippines, Indonesia, QLD (Great Barrier Reef).

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [330].

Lissoclinum variabile Kott, 2001

Lissoclinum variabile Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [331].

Type data: holotype QM G308008.

Type locality: Heron Is., E end of reef, low tide, QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

Polysyncraton Nott, 1892

Polysyncraton Nott, J.T. (1892). On the composite ascidians of the North Shore Reef. *Trans. N.Z. Inst.* **24**: 305–334 [318]. Type species: *Polysyncraton paradoxum* Nott, 1892 by original designation.

Extralimital distribution: worldwide, including polar regions. See: Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Nishikawa, T. (1990). The ascidians of the Japan Sea I. *Publ. Seto Mar. Biol. Lab.* **34**(4–6): 73–148; Monniot, F. (1993). Ascidiées de Nouvelle-Calédonie XIII. Le genre *Polysyncraton* (Didemnidae). *Bull. Mus. Natl. Hist. Nat. Paris* (4) **15A**(1–4): 3–17.

Generic reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2415].

***Polysyncraton alingulum* Kott, 2004**

Polysyncraton alingulum Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [xxx].
Type data: holotype NTM E311, paratype(s) NTM E310.
Type locality: Mandorah jetty pylons, 5–8 m, Darwin Harbour, NT.

Distribution: NT (N coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton arafurensis* Tokioka, 1952**

Polysyncraton arafurensis Tokioka, T. (1952). Ascidiacea collected by Messrs Renzi Wada and Seizi Wada from the Pearl Oyster bed in the Arafura Sea in 1940. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **2**(2): 91–142 [91].
Type data: holotype SMBL 110*.
Type locality: Arafura Sea.

Distribution: NT (N coast), WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [30].

***Polysyncraton arvum* Kott, 2004**

Polysyncraton arvum Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [51].
Type data: holotype NTM E289.
Type locality: Ashmore Reef, 3–5 m, Timor Sea.

Distribution: WA (N coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton catillum* Kott, 2004**

Polysyncraton catillum Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2476].
Type data: holotype WAM 1046.88.
Type locality: Ashmore Reef, 6–16 m, Timor Sea.

Distribution: WA (N coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton circulum* Kott, 1962**

Polysyncraton circulum Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334 [298].
Type data: holotype AM Y1489, paratypes AM U3947, AM U3948.
Type locality: south of Peel Is., Moreton Bay, QLD.

Distribution: QLD (Central E coast, NE coast).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [94].

***Polysyncraton cuculliferum* (Sluiter, 1909)**

Diplosomoides cuculliferum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [90].
Type data: holotype ZMA TU490*.
Type locality: off Pulu Jedan, east coast of Aru Is (pearl banks), 13 m, Indonesia.

Polysyncraton echinatum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [101].

Type data: holotype QM G302987, paratype(s) QM G300911.

Type locality: Wistari Reef, near landing stage, low tide, Great Barrier Reef.

Taxonomic decision for synonymy: Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [30].

Distribution: Indonesia, NT (N coast), QLD (Great Barrier Reef).

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2476]; Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2427].

***Polysyncraton dentatum* Kott, 2001**

Polysyncraton dentatum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [96].

Type data: holotype SAMA E2677.

Type locality: E of Cape Naturaliste, western end of Bunker Bay, 4–5 m on rocks, WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton discoides* Kott, 1962**

Polysyncraton discoides Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334 [303].

Type data: holotype AM Y1482.

Type locality: Fish Hook Bay, Rottnest Is., WA.

Distribution: SA (Great Australian Bight), TAS (Tas. coast), WA (Lower W coast).

Ecology: benthic, marine.

References: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [98]; Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2429].

***Polysyncraton dromide* Kott, 2001**

Polysyncraton dromide Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [99].

Type data: holotype QM G301568.

Type locality: Robert Is., 16–30 m, from back of a dromid crab, Torres Strait, N Australia [9°59'S 143°07'E].

Distribution: NT (N coast), QLD (NE oceanic), WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [32].

***Polysyncraton flammeum* Kott, 2001**

Polysyncraton flammeum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [103].

Type data: holotype QM G308461.

Type locality: low tide under rubble, Kings Beach, Caloundra, QLD.

Distribution: QLD (Central E coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton galaxum* Kott, 2004**

Polysyncraton galaxum Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2478].

Type data: holotype SAMA E3200, paratype(s) SAMA E2927.

Type locality: Pissy Boy Rock, 14–17 m, W of Western River Cove, Kangaroo Is., SA.

Distribution: SA (S Gulfs coast), TAS (Tas. coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2429].

***Polysyncraton glaucum* Kott, 2001**

Polysyncraton glaucum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [104].

Type data: holotype QM G305628, paratypes QM G305589, QM G308057.

Type locality: Swain Reefs, Frigate Cay, 20 m, Great Barrier Reef, QLD.

Distribution: NT (N coast), QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2431].

***Polysyncraton infundibulum* Kott, 2001**

Polysyncraton infundibulum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [106].

Type data: holotype SAMA E2610.

Type locality: Bathurst Channel, off Jean Point, steep rock slope, 5–21 m, Port Davey, TAS.

Distribution: TAS (Tas. coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton jugosum* (Herdman & Riddell, 1913)**

Leptoclinum jugosum Herdman, W. & Riddell, W. (1913). The Tunicata of the 'Thetis' Expedition. In, Scientific results of the Trawl Expedition Thetis, Part 17. *Mem. Aust. Mus.* **4**: 873–889 [886].

Type data: syntypes AM G12205, AM G12209 (Rowe, F.W.E. & Marshall, J.I. (1979). A catalogue of the ascidian type-specimens in the Australian Museum, Sydney. *Rec. Aust. Mus.* **32**(17): 547–562 [533] list 10 syntypes for this species. However, only 4 specimens were examined by the authors of the species, and qualify as types. Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334 [296] assigned one of these, AM G12208, to the genus *Didemnum*).

Type locality: Port Jackson, Botany Bay and off Cape Three points, NSW.

Distribution: NSW (Lower E coast).

Ecology: benthic, marine.

***Polysyncraton linere* Kott, 2004**

Polysyncraton linere Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [738].

Type data: holotype NMV F70228.

Type locality: Western Port, 23 m, VIC.

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton lodix* Kott, 2001**

Polysyncraton lodix Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [108].

Type data: holotype QM GH5751.

Type locality: Deloraine Is., 18 m, Whitsunday Passage, QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton longitubis* Kott, 2004**

Polysyncraton longitubis Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2480].

Type data: holotype SAMA E2929.

Type locality: between Western River Cove and Snug Cove, The Arch on rock wall, 10–14 m, Kangaroo Is., SA.

Distribution: SA (S Gulfs coast); known only from type locality.
Ecology: benthic, marine.

***Polysyncraton luteum* Kott, 2004**

Polysyncraton luteum Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [739].
Type data: holotype QM G308565.
Type locality: Flinders Pier, 4–6 m, VIC.

Distribution: VIC (Bass Strait); known only from type locality.
Ecology: benthic, marine.

***Polysyncraton magnetae* (Hastings, 1931)**

Didemnum (Polysyncraton) magnetae Hastings, A.B. (1931). Tunicata. *Sci. Repts Gt Barrier Reef Exped.* **4**(3): 69–109 [100].
Type data: holotype AM G13485.
Type locality: Low Is., Great Barrier Reef, QLD.

Distribution: QLD (NE coast).
Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [741].

***Polysyncraton meandratum* Monniot, 1993**

Polysyncraton meandratum Monniot, F. (1993). Ascidiées de Nouvelle-Calédonie XIII. Le genre *Polysyncraton* (Didemnidae). *Bull. Mus. Natl. Hist. Nat. Paris* (4) **15A**(1–4): 3–17 [6].
Type data: holotype MNHP A2 POL 42.
Type locality: New Caledonia.

Distribution: New Caledonia, QLD (Great Barrier Reef, NE coast).
Ecology: benthic, marine.
Reference: Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [111].

***Polysyncraton millepore* Vasseur, 1969**

Polysyncraton millepore Vasseur, P. (1969). Deuxième contribution à l'étude des ascidies de Madagascar région de Tuléar. *Bull. Mus. Natl. Hist. Nat. Paris* **40**(5): 912–933 [917].
Type data: type status unknown (no type designated).
Type locality: Great reef of Tuléar, Pente Est de la Grand Vasque à proximité de la passe, Malagasy.

Polysyncraton thallomorpha Monniot, F. (1993). Ascidiées de Nouvelle-Calédonie XIII. Le genre *Polysyncraton* (Didemnidae). *Bull. Mus. Natl. Hist. Nat. Paris* (4) **15A**(1–4): 3–17 [14].
Type data: holotype MNHP A2 POL 50*.
Type locality: New Caledonia.

Taxonomic decision for synonymy: Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [113].

Distribution: Philippines, New Caledonia, QLD (Great Barrier Reef), WA (Lower W coast, NW coast); west Indian Ocean.

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [741]; Kott, P. (2005). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2433].

***Polysyncraton miniastrum* Kott, 2004**

Polysyncraton miniastrum Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [743].
Type data: holotype QM G308537.
Type locality: Shelburne Bay, 22 m, encrusting worm tube, QLD.

Distribution: QLD (NE coast); known only from type locality.
Ecology: benthic, marine.

***Polysyncraton montanum* Kott, 2004**

Polysyncraton montanum Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2481].
Type data: holotype SAMA E3244.
Type locality: between Western River Cove and Snug Cove, Pissy Boy Rock, 8–10 m, Kangaroo Is., S.

Distribution: SA (S Gulfs coast); known only from type locality.
Ecology: benthic, marine.

***Polysyncraton multiforme* Kott, 2001**

Polysyncraton multiforme Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [114].
Type data: holotype QM G304641, paratype(s) QM G304673.
Type locality: Houtman's Abrolhos, WA.

Distribution: WA (Lower W coast); known only from type locality.
Ecology: benthic, marine.

***Polysyncraton niveum* Kott, 2004**

Polysyncraton niveum Kott, P. (2004). Ascidacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [xx].
Type data: holotype NTM E233, paratype(s) NTM E258.
Type locality: West Lagoon, 3–6 m, Ashmore Reef, Timor Sea.

Distribution: NT (N coast), WA (N coast).
Ecology: benthic, marine.

***Polysyncraton oceanum* Kott, 2001**

Polysyncraton oceanum Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [115].

Type data: holotype QM GH143.

Type locality: Great Astrolabe Reef, Dravuni, low tide rubble fauna, Fiji.

Distribution: Fiji, QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

***Polysyncrator orbiculum* Kott, 1962**

Polysyncrator orbiculum Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334 [300].

Type data: holotype AM Y1486, paratype(s) AM Y1479.

Type locality: Mary Cove, Rottnest Is., WA.

Distribution: SA (S Gulfs coast), VIC (Bass Strait), WA (Lower W coast, SW coast).

Ecology: benthic, marine.

References: Kott, P. (2001). The Australian Asciadiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [117]; Kott, P. (2005). New and little known species of Didemnidae (Asciadiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2432].

***Polysyncrator otuetue* C. & F. Monniot, 1987**

Polysyncrator otuetue Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [45].

Type data: holotype MNHP A2 POL 20.

Type locality: Tahiti, 3–10 m, between two parts of Manunutau Reef, French Polynesia.

Distribution: French Polynesia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Asciadiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [118].

***Polysyncrator palliolum* Kott, 2001**

Polysyncrator palliolum Kott, P. (2001). The Australian Asciadiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [118].

Type data: holotype QM G300988.

Type locality: Rottnest Is., 0.5 n miles off Charlotte Point, 18 m, WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncrator papyrus* Kott, 2001**

Polysyncrator papyrus Kott, P. (2001). The Australian Asciadiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [120].

Type data: holotype AM Y1520.

Type locality: north-eastern coast of Tasmania, 128–676 m.

Distribution: SA (S Gulfs coast), TAS (Tas. coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Asciadiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2433].

***Polysyncrator pavementum* Monniot, 1993**

Polysyncrator pavementum Monniot, F. (1993). Ascidies de Nouvelle-Calédonie XIII. Le genre *Polysyncrator* (Didemnidae). *Bull. Mus. Natl. Hist. Nat. Paris* (4) **15A**(1–4): 3–17 [9].

Type data: holotype MNHP A2 POL 46.

Type locality: Barrier reef, Cape N'Doua, New Caledonia.

Distribution: New Caledonia, NT (N coast); Coral Sea.

Ecology: benthic, marine.

Reference: Kott, P. (2002). Asciadiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [32].

***Polysyncrator pedunculatum* Kott, 2001**

Polysyncrator pedunculatum Kott, P. (2001). The Australian Asciadiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [121].

Type data: holotype NMV F68818, paratype(s) NMV F68944.

Type locality: Investigator Strait, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast).

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Asciadiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2482]; Kott, P. (2005). New and little known species of Didemnidae (Asciadiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2435].

***Polysyncrator peristroma* Kott, 2004**

Polysyncrator peristroma Kott, P. (2004). New and little known species of Didemnidae (Asciadiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2482].

Type data: holotype QM G308608.

Type locality: Darwin, Angler Reef, 10–12 m, NT.

Distribution: NT (N coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncrator polysystema* Kott, 2005**

Polysyncrator polysystema Kott, P. (2005). New and little known species of Didemnidae (Asciadiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2435].

Type data: holotype NTM E170.

Type locality: Plater Rock, 8–10 m, Darwin Harbour, NT.

Distribution: NT (N coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton pontoniae* C. & F. Monniot, 1987**

Polysyncraton pontoniae Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [47].

Type data: holotype MNHP A2 POL 26*.

Type locality: Mooréa, French Polynesia.

Distribution: French Polynesia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [122].

***Polysyncraton pseudomagnetæ* Kott, 2004**

Polysyncraton pseudomagnetæ Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2483].

Type data: holotype QM G308612.

Type locality: Darwin, Angler Reef, 10–12 m, NT.

Distribution: NT (N coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton pseudorugosum* Monniot, 1993**

Polysyncraton pseudorugosum Monniot, F. (1993). Ascidies de Nouvelle-Calédonie XIII. Le genre *Polysyncraton* (Didemnidae). *Bull. Mus. Natl. Hist. Nat. Paris* (4) **15A**(1–4): 3–17 [10].

Type data: holotype MNHP A2 POL 41*.

Type locality: Woodin canal, 32 m, New Caledonia.

Distribution: New Caledonia, NT (N coast), QLD (NE coast); Coral Sea.

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2483].

***Polysyncraton pulchrum* Kott, 2001**

Polysyncraton pulchrum Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [125].

Type data: holotype WAM 137.93, paratype(s) WAM 176.91.

Type locality: Cockburn Sound, WA.

Distribution: WA (Lower W coast).

Ecology: benthic, marine.

***Polysyncraton purou* C. & F. Monniot, 1987**

Polysyncraton purou Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [49].

Type data: holotype MNHP A2 POL 24*.

Type locality: Tahiti, Tapuaerha passage, 10–20 m, French Polynesia.

Distribution: Philippines, French Polynesia, NT (N coast), QLD (Great Barrier Reef, NE coast).

Ecology: benthic, marine.

References: Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [126]; Kott, P. (2005). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2436].

***Polysyncraton regulum* Kott, 2001**

Polysyncraton regulum Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [128].

Type data: holotype QM G308474.

Type locality: Hervey Bay rubble fauna, QLD.

Distribution: QLD (NE coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton reticulum* Kott, 2004**

Polysyncraton reticulum Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2484].

Type data: holotype SAMA E2917.

Type locality: Kangaroo Is., between Snug Cove and Western River, 10–12 m, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton rica* Kott, 2001**

Polysyncraton rica Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [130].

Type data: holotype QM GH5426, paratype(s) QM G308487.

Type locality: Kangaroo Is., D'Estrées Bay, 6 m, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast).

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2486]; Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [745]; Kott, P. (2005). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2437].

***Polysyncraton robustum* Kott, 2001**

Polysyncraton robustum Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [130].

Type data: holotype AM Y2315, paratype(s) AM Y2313–4.

Type locality: Point Peron west of Point John, sheltered pools, WA.

Distribution: WA (Lower W coast).

Ecology: benthic, marine.

***Polysyncraton rostrum* Kott, 2004**

Polysyncraton rostrum Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2486].
Type data: holotype QM G308631, paratype(s) QM G308628.

Type locality: South Shell Is., 7–11 m, NT.

Distribution: NT (N coast).

Ecology: benthic, marine.

***Polysyncraton rubitapum* Kott, 2001**

Polysyncraton rubitapum Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [131].

Type data: holotype QM GH1330.

Type locality: Top Gallant Is., 5 m, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton rugosum* Monniot, 1993**

Polysyncraton rugosum Monniot, F. (1993). Ascidiées de Nouvelle-Calédonie XIII. Le genre *Polysyncraton* (Didemnidae). *Bull. Mus. Natl. Hist. Nat. Paris (4)* **15A**(1–4): 3–17 [12].

Type data: holotype MNHP A2 POL 48*.

Type locality: New Caledonia.

Distribution: New Caledonia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [132].

***Polysyncraton scobinum* Kott, 2001**

Polysyncraton scobinum Kott, P. (2001). The Australian Ascidacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [139].

Type data: holotype WAM 390.75.

Type locality: W of Long Is., Wallabi Group, Houtman's Abrolhos, WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton textus* Kott, 2004**

Polysyncraton textus Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2487].

Type data: holotype WAM 556.88.

Type locality: 8.5 n miles NW of Port Hedland, 18 m, WA.

Distribution: WA (NW coast); known only from type locality.

Ecology: benthic, marine.

***Polysyncraton turris* Kott, 2004**

Polysyncraton turris Kott, P. (2004). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [746].

Type data: holotype QM G308538.

Type locality: Shelburne Bay, 43 m, QLD.

Distribution: QLD (NE coast); known only from type locality.

Ecology: benthic, marine.

***Trididemnum* Della Valle, 1881**

Trididemnum Della Valle, A. (1881). Nuove contribuzioni alla storia naturale delle ascidie composte del Golfo di Napoli. *Atti Accad. nag. Lincei Series 3, Memoir* **10**: 431–498 [478].

Type species: *Lissoclinum tenerum* Verrill, 1871 by subsequent designation, see Hartmeyer, R. (1924). Ascidacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275.

Didemnopsis Hartmeyer, R. (1903). Die Ascidien der Arktis. *Fauna Arct.* **3**(2): 93–412 [33].

Type species: *Didemnum inarmata* Drasche, 1883 by original designation.

Taxonomic decision for synonymy: Huus, J. (1937). Ascidaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [670].

Extralimital distribution: worldwide. See: Hartmeyer, R. (1924). Ascidacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Harant, H. (1929). Ascidiées provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1969). Antarctic Ascidacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Nishikawa, T. (1990). The ascidians of the Japan Sea I. *Publ. Seto Mar. Biol. Lab.* **34**(4–6): 73–148; Monniot, F. (1991). Ascidiées de Nouvelle-Calédonie IX. Le genre *Trididemnum*. *Bull. Mus. Natl. Hist. Nat. Paris (4)* **12A**(3–4): 517–529.

Generic reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2417].

***Trididemnum amiculum* Kott, 2001**

Trididemnum amiculum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [256].

Type data: holotype NMV F70259.

Type locality: 39 km NNE Devonport, 68 m, TAS [40°49.8'S 146°31.3'E].

Distribution: NSW (Lower E coast), TAS (Tas. coast).

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [760]; Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2453].

***Trididemnum areolatum* (Herdman, 1906)**

Trididemnum areolatum Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [337].

Type data: holotype (probable) BMNH [19]07.8.30.36 (part) slide only.

Type locality: Chiulaw Paa, Gulf of Manaar, 4–5 m.

Trididemnum banneri Eldredge, L.G. (1967). A taxonomic review of the Indo-Pacific didemnid ascidians and descriptions of twenty three central Pacific species. *Micronesica* **2**: 162–261 [177].

Type data: syntypes BPBM Y204*.

Type locality: Penguin Spit, Palmyra Is., Line Islands, 0–4 m [5°52'N 162°06'W].

Taxonomic decision for synonymy: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [258].

Distribution: Sri Lanka, French Polynesia, NT (N coast), QLD (Great Barrier Reef, NE coast); Central Pacific, west Pacific Ocean.

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2455].

***Trididemnum caelatum* Kott, 2001**

Trididemnum caelatum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [260].

Type data: holotype SAMA E2670.

Type locality: Great Australian Bight, SW Eucla, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

***Trididemnum clinides* Kott, 1977**

Trididemnum clinides Kott, P. (1977). Algal supporting didemnid ascidians of the Great Barrier Reef. pp. 615–621 in Taylor, D.L. (ed.) *Proceedings of the Second International Coral Reef Symposium Miami* 1. Biology. Miami : University

of Miami [617].

Type data: holotype QM G9928, paratype(s) QM G9931.

Type locality: lagoon, Heron Is., QLD.

Distribution: Philippines, Guam, French Polynesia, Fiji, QLD (Great Barrier Reef); west Pacific Ocean, Eniwetak.

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

References: Parry, D.L. & Kott, P. (1988). Cosymbiosis in the Ascidiacea. *Bull. Mar. Sci.* **42**(1): 149–153; Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [261].

***Trididemnum cristatum* Kott, 2001**

Trididemnum cristatum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [262].

Type data: holotype AM Y2321.

Type locality: NE coast Tasmania, 128–676 m.

Distribution: TAS (Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

***Trididemnum cyclops* Michaelsen, 1921**

Trididemnum cyclops Michaelsen, W. (1921). Ascidien von westlichen Indischen ozeans; aus dem Reichsmuseum zu Stockholm. *Ark. Zool.* **13**(23): 1–25 [19].

Type data: syntypes ZMH K1110.

Type locality: Malagasy.

Trididemnum symbioticum Pérès, J.M. (1962). Sur une collection d'ascidies de la côte israélienne de la Mer Rouge et de la Peninsule du Sinai. Contributions to knowledge of the Red Sea. 24. *Bull. Res. Stat. Haifa* **30**: 39–47 [40].

Type data: syntypes MNHP A2 TRI 74*.

Type locality: Red Sea.

Taxonomic decision for synonymy: Kott, P. (1982). Didemnid-algal symbioses: host species in the western Pacific with notes on the symbiosis. *Micronesica* **18**(1): 95–127 [111].

Distribution: Philippines, Palau, New Caledonia, Kiribati, French Polynesia, Fiji, Malagasy, NT (N coast), QLD (Great Barrier Reef); also Caroline Is, Eniwetak, Red Sea.

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

References: Thinh, L.V. (1979). *Prochloron* (Prochlorophyta) associated with the ascidian *Trididemnum cyclops* Michaelsen. *Phycologia* **18**(1): 77–82; Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [263].

***Trididemnum discrepans* (Sluiter, 1909)**

Leptoclinum discrepans Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [77].

Type data: syntypes ZMA TU579.1–TU579.2.

Type locality: Gisser, Nusa-laut Is., Indonesia.

Didemnopsis jolense Van Name, W.G. (1918). Ascidians from the Philippines and adjacent waters. *Bull. U.S. Natl Mus.* **100**(1): 49–174 [147].

Type data: holotype USNM 6040.

Type locality: Jolo, Philippines, 20 m.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [91].

Distribution: Thailand, Philippines, Indonesia, Cocos (Keeling) Islands (Aust. Terr.), Tonga, Palau, New Caledonia, Kiribati, Fiji, NT (N coast), QLD (Great Barrier Reef, NE coast), SA (S Gulfs coast), WA (N coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [761].

Trididemnum dispersum (Sluiter, 1909)

Didemnum dispersum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [54].

Type data: syntypes ZMA TU443.1, ZMA TU 443.2.

Type locality: Salibabu Is., Samau Is., Indonesia.

Trididemnum tegulum Kott, P. (1984). Related species of *Trididemnum* in symbiosis with Cyanophyta. *Proc. Linn. Soc. N.S.W.* **107**(4): 515–520 [515].

Type data: holotype QM GH1492, paratypes QM GH892, QM GH1337, QM GH1350, QM GH1493–5.

Type locality: under boulders on weed and rubble, Heron Is., Great Barrier Reef, QLD.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [91].

Distribution: Indonesia, NT (N coast), QLD (Great Barrier Reef), WA (Central W coast).

Ecology: benthic, marine; obligate cyanophyte symbionts.

References: Larkum, A.W.D., Cox, G.C., Hiller, R.G., Parry, D.L. & Dibbayawan, T.P. (1987). Filamentous cyanophytes containing PUB and in symbiosis with sponges and ascidians of coral reefs. *Mar. Biol.* **95**: 1–13; Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [267]; Kott, P. (2004). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [761]; Kott, P. (2005). New and little known species of Didemnidae (Asciacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2455].

Trididemnum farrago Kott, 2004

Trididemnum farrago Kott, P. (2004). Asciacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [xx].

Type data: holotype NTM E253.

Type locality: Ashmore Reef, inner West Lagoon, 3–6 m, Timor Sea.

Distribution: WA (NW coast); known only from type locality.

Ecology: benthic, marine.

Trididemnum lapidosum Kott, 2001

Trididemnum lapidosum Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [270].

Type data: holotype QM G308687, paratype(s) QM G304634.

Type locality: NW of Surrurier Is., Long Is., 18 m, WA [21°33.5'S 114°40.0'E].

Distribution: WA (Lower W coast, NW coast).

Ecology: benthic, marine.

Trididemnum marmoratum (Sluiter, 1909)

Leptoclinum marmoratum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [84].

Type data: lectotype ZMA TU 1277, paralectotype(s) ZMA TU584.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [180].

Type locality: not determined.

Distribution: Indonesia, NT (Gulf of Carpentaria, N coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Asciacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [61].

Trididemnum miniatum Kott, 1977

Trididemnum miniatum Kott, P. (1977). Algal supporting didemnid ascidians of the Great Barrier Reef. pp. 615–621 in Taylor, D.L. (ed.) *Proceedings of the Second International Coral Reef Symposium Miami* 1. Biology. Miami : University of Miami [617].

Type data: syntypes QM G9927, G9945.

Type locality: lagoon, Heron Is., Great Barrier Reef, QLD.

Distribution: Indonesia, New Caledonia, French Polynesia, Fiji, QLD (Great Barrier Reef).

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

References: Parry, D.L. & Kott, P. (1988). Cosymbiosis in the Asciacea. *Bull. Mar. Sci.* **42**(1): 149–153; Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [271].

Trididemnum nobile Kott, 2001

Trididemnum nobile Kott, P. (2001). The Australian Asciacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [272].

Type data: holotype SAMA E2630, paratypes SAMA E2633, QM GH2371.

Type locality: W of Ceduna, Tourville Bay, Davenport Creek, 6–8 m, South Australia.

Trididemnum vermiforme Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [289].

Type data: holotype QM G300960, paratype(s) QM G11925. Type locality: Beachport Jetty, on jetty piles, South Australia.

Taxonomic decision for synonymy: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [763].

Distribution: QLD (Central E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast), VIC (Bass Strait), WA (Lower W coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2456].

Trididemnum nubilum Kott, 1980

Trididemnum nubilum Kott, P. (1980). Algal-bearing didemnid ascidians in the Indo-west Pacific. *Mem. Queensl. Mus.* **20**(1): 1–47 [9].

Type data: syntypes USNM 11641.

Type locality: Amoyloi Reefs, southern part of Basilan Is., 0.5–1 m, Philippines.

Distribution: Philippines, Fiji, QLD (Great Barrier Reef).

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

References: Kott, P. (1982). Didemnid-algal symbioses: host species in the western Pacific with notes on the symbiosis. *Micronesica* **18**(1): 95–127; Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [274].

Trididemnum paraclinides Kott, 1982

Trididemnum paraclinides Kott, P. (1982). Didemnid-algal symbioses: host species in the western Pacific with notes on the symbiosis. *Micronesica* **18**(1): 95–127 [107].

Type data: holotype QM GH575, paratype(s) QM GH144, GH91.

Type locality: Nemelis, 1m, Palau Is.

Distribution: Cocos (Keeling) Islands (Aust. Terr.), Palau, Fiji.

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [276].

Trididemnum paracyclops Kott, 1980

Trididemnum paracyclops Kott, P. (1980). Algal-bearing didemnid ascidians in the Indo-west Pacific. *Mem. Queensl. Mus.* **20**(1): 1–47 [12].

Type data: holotype QM 12627, paratype(s) QM 12628.

Type locality: in pools behind reef crest, Heron Is., Great Barrier Reef, QLD.

Distribution: Philippines, New Caledonia, Guam, French Polynesia, Fiji, QLD (Great Barrier Reef), WA (Lower W coast).

Ecology: benthic, marine; obligate *Prochloron* [Prochlorophyta] symbionts.

References: Kott, P. (1982). Didemnid-algal symbioses: host species in the western Pacific with notes on the symbiosis. *Micronesica* **18**(1): 95–127; Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2503].

Trididemnum pigmentatum Kott, 2001

Trididemnum pigmentatum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [278].

Type data: holotype QM G308134, paratype(s) QM GH325.

Type locality: Heron Is., low tide rubble fauna, QLD.

Distribution: Indonesia, Fiji, NT (N coast), QLD (Great Barrier Reef, NE coast), WA (N coast, NW coast).

Ecology: benthic, marine.

References: Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2503]; Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2457].

Trididemnum planum Sluiter, 1909

Trididemnum planum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [42].

Type data: lectotype ZMA TU 1273, paralectotype(s) ZMA TU 1098.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [197].

Type locality: Karang Lintang and Pulu Palabangan islands, on *Lithothamnion*, shore collecting, Indonesia.

Distribution: Indonesia, NT (N coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [62].

Trididemnum pseudodiplosoma (Kott, 1962)

Didemnum pseudodiplosoma Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae. *Giard. Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334 [321].

Type data: holotype AM Y1527, paratype(s) AM Y1526.

Type locality: Port Noarlunga, Gulf St Vincent, SA.

Trididemnum crystallinum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [263].

Type data: holotype QM G302608.

Type locality: Gulf of Carpentaria, Northern Territory, 21 m.

Trididemnum inermum F. & Monniot, F. & Monniot, C. (2001). Ascidiaceans from the tropical western Pacific. *Zoosystema* **23**(2): 201–383 [263].

Type data: holotype MNHP A2 TRI 150*.

Type locality: Eastern Fields, Coral Sea, 31 m, Papua New Guinea [10°09.35'S 145°33.92'E].

Taxonomic decision for synonymy: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [xx] (*T. crystallinum*); Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *J. Nat. Hist.* **38**(19): 2455–2526 [2504] (*T. inermum*).

Distribution: NT (N coast), SA (S Gulfs coast); Coral Sea.

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [279].

Trididemnum pusillum Kott, 2004

Trididemnum pusillum Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [764].

Type data: holotype NTM E32.

Type locality: W of Port Hedland, 40 m, WA.

Distribution: WA (NW coast); known only from type locality.

Ecology: benthic, marine.

Trididemnum reticulatum Kott, 2004

Trididemnum reticulatum Kott, P. (2004). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 1). *J. Nat. Hist.* **38**(6): 731–774 [765].

Type data: holotype QM G308535.

Type locality: Slashers Reef, central Great Barrier Reef, 4 m, QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

Trididemnum savignii (Herdman, 1886)

Didemnum savignii Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [261].

Type data: syntypes BMNH 1887.2.4.398*, BMNH 1887.2.4.399*.

Type locality: ?Bermuda, see Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476 [100].

Didemnum tenebrosus Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [48].

Type data: neotype ZMA TU481.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [174].

Type locality: Roti Is., Indonesia.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [92].

Distribution: Indonesia, Bermuda, Florida, NT (N coast), QLD (NE coast), WA (NW coast); ?West Indies.

Ecology: benthic, marine.

References: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [281]; Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2458].

Trididemnum sibogae (Hartmeyer, 1910)

Didemnum ramosum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [63] [junior homonym of *Didemnum ramosum* Gottschaldt, 1898].

Type data: lectotype ZMA TU476.3, paralectotypes ZMA TU1271, ZMA 476.1-2.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [173].

Type locality: Jedan Is., Aru Is., 13 m, Indonesia.

Didemnum sibogae Hartmeyer, R. (1910). Ascidien (continuation of work by Seeliger). pp. 1489–1680 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Vol. 3, suppl., pts 88–94. Leipzig : C.F. Winter [1489] [*nom. nov.* for *Didemnum ramosum* Sluiter, 1909].

Distribution: Indonesia, New Caledonia, NSW (Central E coast, Lower E coast), NT (Gulf of Carpentaria, N coast), QLD (Gulf of Carpentaria, NE coast), SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast), VIC (Bass Strait), WA (NW coast); Gulf of Manar.

Ecology: benthic, marine; facultative *Prochloron* [Prochlorophyta] symbionts.

References: Parry, D.L. & Kott, P. (1988). Cosymbiosis in the Ascidiacea. *Bull. Mar. Sci.* **42**(1): 149–153 (as *Trididemnum cerebriforme*); Monniot, F. (1995). Ascidiées de Nouvelle-Calédonie XV. Le genre *Didemnum*. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **16A**(2–4): 299–344 [328]; Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [283]; Kott, P. (2005). New and little known species of Didemnidae (Ascidiacea, Tunicata) from Australia (Part 3). *J. Nat. Hist.* **39**(26): 2409–2479 [2458].

DIDEMNIDAE

***Trididemnum spumosum* Kott, 2001**

Trididemnum spumosum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [286].

Type data: holotype SAMA E2616.

Type locality: on *Posidonia*, 3–4 m, Edithburgh, Yorke Peninsula, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

***Trididemnum tectum* Kott, 2001**

Trididemnum tectum Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [288].

Type data: holotype SAMA E2834.

Type locality: intertidal rock pools, Franklin Is., Nuyts Archipelago, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

***Trididemnum tomarahi* C. & F. Monniot, 1987**

Trididemnum tomarahi Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [22].

Type data: holotype MNHP A2-TRI-54*.

Type locality: Tikehau, southern part of back reef, 2 m, French Polynesia.

Distribution: Philippines, Palau, Hawaii, French Polynesia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2001). The Australian Ascidiacea Pt 4, Didemnidae. *Mem. Queensl. Mus.* **47**(1): 1–410 [288].

EUEHERDMANIIDAE

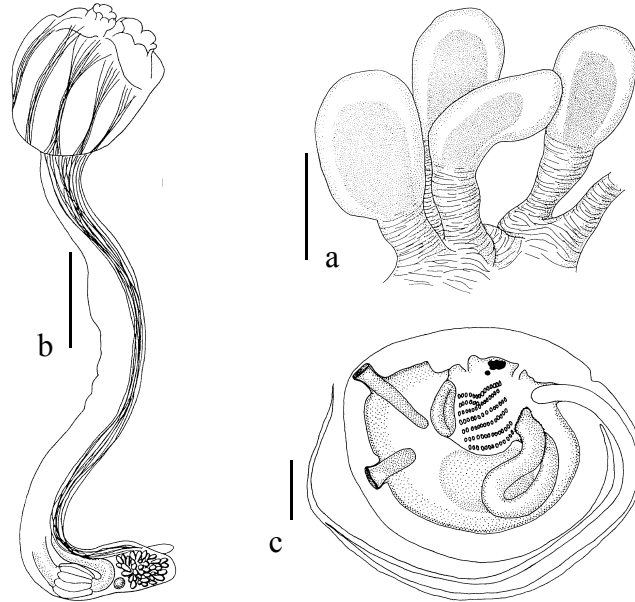


Fig. 5. *Euherdmania digitata* Millar, 1963: **a**, part of a colony; **b**, single zooid; **c**, larva. (Scale bars: **a** = 5.0 mm; **b** = 2.0 mm; **c** = 0.2 mm). [from Kott 1992]

In the family Euherdmaniidae Ritter, 1904 (as in the Placentelidae, Protopolychinidae, Ritterellidae and Pseudodistomidae), atrial and branchial apertures open separately to the exterior by 6-lobed apertures, zooids are either separate (usually joined by basal stolons) or embedded in common test, and gonads are in a posterior abdomen. The Euherdmaniidae are distinguished by certain characters that suggest a close relationship with Pycnoclavellidae, namely, the stomach at the posterior end of a long narrow gut loop; embryos fertilised at the base of the oviduct and incubated as they move up the oviduct to the atrial cavity; and larval adhesive organs in the form of inverted tubes that evert for attachment to the substrate. The lobed apertures, (usually) a posterior abdomen containing the gonads, and replication by strobilation of the abdomen (rather than by generation of clones in the vascular stolon) distinguish the family from Pycnoclavellidae. Longitudinal muscle bands from the thorax converge to a band along each side of the abdomen and the posterior abdomen as in most aplousobranch families.

Euherdmaniinae was originally established as a subfamily in the Polychinidae for aplousobranch genera with separately opening, 6-lobed atrial apertures. Kott (1992) elevated it to family status, basing the amended definition on the type species of *Euherdmania*, *Euherdmania claviformis* (Ritter, 1903). *Euherdmania* is the only known genus in the family. It contains about 10 known species worldwide, three occurring in Australian waters. They are seldom recorded, and the known geographic ranges of most species are limited.

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- Euherdmania* Ritter, 1904**
- Euherdmania*** Ritter, W.E. (1904). *Euherdmania* vs. *Herdmania* preoccupied. *Zool. Anz.* **27**: 650–651 [650].
Type species: *Herdmania claviformis* Ritter, 1903 by original designation.
- Extralimital distribution: pantropical. See: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [415].
- Euherdmania dentatosiphonis* (Millar, 1975)**
- Clavelina dentatosiphonis*** Millar, R.H. (1975). Ascidians from the Indo-West Pacific region in the Zoological Museum, Copenhagen (Tunicata, Ascidiacea). *Steenstrupia* **3**(20): 205–336 [211].
Type data: holotype ZMUC 11.xi.1951*.
Type locality: 100 m, Tasman Sea [30°00'S 154°34'E].
- Distribution: NSW (SE oceanic); known only from type locality.
Ecology: benthic, marine; 100 m on coral.
- Euherdmania digitata* Millar, 1963**
- Euherdmania digitata*** Millar, R.H. (1963). Australian ascidians in the British Museum (Natural History). *Proc. Zool. Soc. Lond.* **141**(4): 689–746 [698].
Type data: holotype BMNH 30.10.8.10a.
Type locality: Cape Boileau, north WA.
- Distribution: Palau, New Caledonia, French Polynesia, QLD (Great Barrier Reef), SA (S Gulfs coast), WA (NW coast); also Ponape.
Ecology: benthic, marine.
Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [417].
- Euherdmania translucida* Kott, 1992**
- Euherdmania translucida*** Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [420].
Type data: holotype SAMA E2092, paratype(s) SAMA E2056, E2093.
Type locality: offshore, North Point, Marum Is., Sir Joseph Banks Group, 8 m, SA.
- Distribution: SA (S Gulfs coast).
Ecology: benthic, marine; sand and in root mats of *Posidonia* [Posidoniaceae].

HOLOZOIDAE

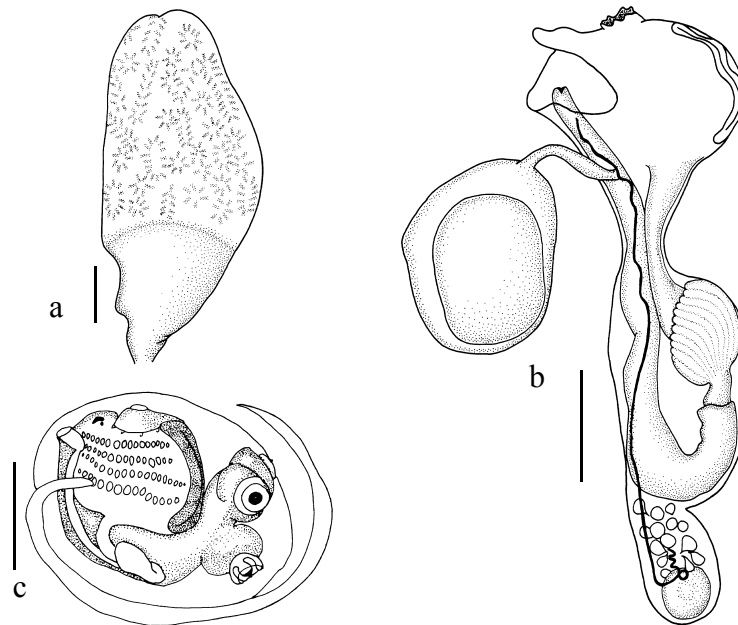


Fig. 6. *Distaplia stylifera* (Kowalevsky, 1874): **a**, colony; **b**, zooid; **c**, larva. (Scale bars: **a** = 10.0 mm; **b**, **c**, = 0.5 mm). [from Kott 1990]

Holozoidae Berrill, 1950 have zooids embedded in soft fleshy test (without sand or other inclusions). Colonies are either sessile cushions or sheets, or they have relatively thick fleshy stalks with rounded to long or fan-shaped heads containing the zooids. Branchial openings are 6-lobed. In certain genera, atrial openings are on 6-lobed siphons either to the exterior (*Polydistoma* Kott, 1990 and *Sigillina* Savigny, 1816), or into a cloacal cavity (*Hypodistoma* Tokioka, 1967). In other genera, the atrial openings are sessile and wide, with an anterior lip, and they expose a great part of the branchial sac directly to a common cloacal cavity. In this family, the gut loop is relatively short and the stomach is about half to two-thirds of the distance down the descending limb. The gonads are in the loop of the gut or project behind it into the top of the vascular stolon, or in a sac separated from the abdomen by a narrow constriction. They are smaller and more contained than those of Clavelinidae, testis follicles being fewer in number and often arranged in a circle, and the ovary small and sac-like. Fertilisation occurs in a brood pouch (formed by a loop of the oviduct) that projects out from the posterior end of the thorax. Body musculature is mostly longitudinal, the fine bands on the thorax continuing along each side of the abdomen and often onto a posterior abdominal vascular stolon (in *Sigillina*, *Hypodistoma*, *Polydistoma* and *Hypsistozoa* Brewin, 1953). Muscles are confined to the thorax in *Neodistoma* Kott, 1990, *Distaplia* Della Vale, 1881 and *Sycozoa* Lesson, 1832. Occasionally some fine circular bands are also in the thorax (in a few species of *Sigillina*). Often a large gastric vesicle is halfway along the gastric duct that extends between stomach and intestine.

HOLOZOIDAE

Replication in *Sycozoa* and *Distaplia* is known to occur by strobilation of an isolated vegetative stolon (which contains vestiges of the left epicardial sac). In the other genera it may occur by strobilation of the posterior abdominal stolon (which also contains the epicardial sacs), although this has not been investigated specifically. The vegetative and vascular stolons are in the stalk or the base of the colony, where rows of developing vegetative zooids often are found.

Although diverse, this family is thought to be monophyletic because of the thoracic brood pouches, long vascular stolons, replication by division of a posterior abdominal stolon, relatively small zooids with short abdomina, and a limited number of rows of stigmata. The highly organised cloacal systems of *Distaplia*, *Sycozoa* and *Neodistoma*, and their zooids with musculature confined to the thorax, are different from the other genera in the family. There are, however, intermediate forms, such as *Hypsistozoa* which do have muscles on a vascular stolon like those of *Sigillina* although their zooids and larvae otherwise resemble those of *Distaplia*; and *Polydistoma* and *Hypodistoma* which have cloacal systems and short almost horizontal gut loops like *Distaplia*, but 6-lobed apertures and muscles on the vascular stolon like *Sigillina*. Further diversity in the zooids is displayed in *Distaplia* which has gonads either projecting posterior to the gut loop in a stalked pouch or enclosed in the gut loop.

Larvae are relatively large in all genera and display generic differences. Larvae of *Sigillina* and *Hypodistoma* are some of the largest known in the Ascidiacea with trunks up to 4.0 mm long and particularly large median adhesive organs. In *Hypsistozoa*, *Distaplia* and *Sycozoa* larvae are smaller, with triradially arranged adhesive organs and sometimes blastozooids developing from a stolon of the oozooid.

The family is well represented in Australian waters. *Sigillina*, *Sycozoa* and *Distaplia* in particular are well represented. *Sigillina* is a genus of the tropical to temperate Australian and African waters; *Sycozoa* is not known north of Japan but is common in the Antarctic and Subantarctic; *Hypsistozoa* is known only from temperate Australia and New Zealand; *Hypodistoma* is known only from South Africa and temperate and tropical Australian waters; and *Polydistoma* and *Neodistoma* are known only from southern Australia. *Distaplia* is the only genus with a cosmopolitan distribution.

The family was proposed first as a subfamily, Holozoinae, of the family Clavelinidae Forbes & Hanley, 1848. It was revised and elevated to family status by Kott (1990).

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Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl Mus.* **251**: 1–242

Distaplia Della Valle, 1881

Holozoa Lesson, R.P. (1832). Zoologie. pp. 256–279, 433–440 in Lesson, R.P. *Voyage autour du Monde sur la Corvette La Coquille pendant 1822–1825*. Paris : P. Pourret Freres Vol. 2(1) [439] [senior synonym, suppressed in favour of *Distaplia* Della Valle, 1881, see Hartmeyer, R. (1915). Ascidium nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258].

Type species: *Holozoa cylindrica* Lesson, 1832 by monotypy.

Distaplia Della Valle, A. (1881). Nuove contribuzioni alla storia naturale delle ascidie composte del Golfo di Napoli. *Atti Accad. nag. Lincei Series 3, Memoir* **10**: 431–498 [455]. Type species: *Distaplia magnilarva* Della Valle, 1881 by original designation.

Julinia Calman, W.T. (1894). On *Julinia*, a new genus of compound ascidians from the Antarctic Ocean. *Q. J. Microsc. Sci.* (2)**37**: 1–17 [1].

Type species: *Julinia australis* Calman, 1894 by monotypy.

Leptobotrylloides Oka, A. (1927). Zur kenntnis der japanischen Botryllidae. *Proc. Imp. Acad. Japan* **3**(9): 607–609 [607].

Type species: *Leptobotrylloides dubium* Oka, 1927 by monotypy.

Taxonomic decision for synonymy: Hartmeyer, R. (1909). Ascidien (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig : C.F. Winter Vol. 3, suppl. pts 81–87 [1437]; Tokioka, T. (1953). *Ascidians of Sagami Bay*. Tokyo : Iwanami Shoten 313 pp. 79 pls [206].

Extralimital distribution: worldwide. See: Hartmeyer, R. (1924). Ascidacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Harant, H. (1929). Ascidies provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1969). Antarctic Ascidacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963.

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Distaplia australiensis Brewin, 1953

Distaplia australiensis Brewin, B.I. (1953). Australian ascidians of the sub-family Holozoinae and a review of the sub-family. *Trans. R. Soc. N.Z.* **81**(1): 53–64 [61].

Type data: holotype AM U3842.

Type locality: south of Tasmania, 43 m, TAS.

Distribution: SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

References: Kott, P. (1990). The Australian Ascidacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [113]; Kott, P. (2004). Ascidacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [46].

Distaplia cuscina Kott, 1990

Distaplia cuscina Kott, P. (1990). The Australian Ascidacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [115].

Type data: holotype QM GH4381, paratype(s) QM GH4124.

Type locality: Wistari Reef, Capricorn Group, QLD.

Distribution: QLD (Great Barrier Reef).

Ecology: benthic, marine; rubble fauna, lowtide.

Distaplia dubia (Oka, 1927)

Leptobotrylloides dubium Oka, A. (1927). Zur kenntnis der japanischen Botryllidae. *Proc. Imp. Acad. Japan* **3**(9): 607–609 [607].

Type data: type status unknown UTZM (depository uncertain, not found).

Type locality: Japan.

Distaplia japonica Tokioka, T. (1951). Contributions to Japanese ascidian fauna. IV. Notes on some ascidians collected in Osaka Bay I. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**(4): 169–182 [169].

Type data: syntypes SMBL 90*.

Type locality: Osaka Bay.

Distaplia yezoensis Tokioka, T. (1951). The fauna of Akkeshi Bay XVIII. Ascidacea. *Publications from the Akkeshi Marine Biological Station* **1**: 1–24 [4].

Type data: type status unknown.

Type locality: Akkeshi Bay, Japan.

Distaplia imaii Hirai, E. (1952). On a new species of compound ascidian, *Distaplia imaii* n.sp. from Japan. *Sci. Rep. Tôhoku Univ.* (4)19(3): 211–214 [211].
Type data: type status unknown.
Type locality: Otaru, Hokkaido, Japan.

Taxonomic decision for synonymy: Tokioka, T. (1953). *Ascidians of Sagami Bay*. Tokyo : Iwanami Shoten 313 pp. 79 pls [206]; Tokioka, T. (1963). Contributions to the Japanese ascidian fauna XX. The outline of Japanese ascidian fauna as compared with that of the Pacific coasts of North America. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 11(1): 131–156 [135].

Distribution: Japan, Lord Howe Island, NSW (SE oceanic).
Ecology: benthic, marine.
Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [116].

Distaplia florida Kott, 1990

Distaplia florida Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [118].
Type data: holotype QM GH4103.
Type locality: reef, Julian Rocks, Byron Bay, 10 m, NSW.

Distribution: NSW (Central E coast), SA (Great Australian Bight), TAS (Bass Strait).
Ecology: benthic, marine.

Distaplia mikropnoa Sluiter, 1909

Distaplia mikropnoa Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* 56B: 1–112 [94].
Type data: holotype ZMA TU 830.
Type locality: 16–32 m, with *Lithothamnion*, anchorage off North-Ubian [6°7.5'S 120°26'E].

Distribution: Indonesia, Palau, NT (N coast), WA (N coast); west Pacific Ocean.
Ecology: benthic, marine.
Reference: Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* 18: 19–55 [24].

Distaplia muriella Kott, 1990

Distaplia muriella Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [119].
Type data: holotype WAM 135.75, paratype(s) WAM 32.75.
Type locality: Blackwall Reach, Swan River estuary, 20 m, WA.

Distribution: WA (Lower W coast); known only from the Swan River estuary.
Ecology: benthic; brackish water.

Distaplia pallida Kott, 1990

Distaplia pallida Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [121].
Type data: holotype QM GH4102, paratype(s) QM G11923.
Type locality: on jetty pile, Portsea, 4 m, VIC.

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).
Ecology: benthic, marine; growing on rubble.

Distaplia prolifera Kott, 1990

Distaplia prolifera Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [122].
Type data: holotype WAM 812.83 (QM GH2103).
Type locality: 11 nautical miles NW Port Hedland, 14 m, WA [20°12'S 118°25'E].

Distribution: WA (NW coast); known only from type locality.
Ecology: benthic, marine.

Distaplia racemosa Kott, 1990

Distaplia racemosa Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [124].
Type data: holotype NTM E9 (QM GH4366).
Type locality: Cootamundra Shoals, 36 m, Arafura Sea, NT [10°49'49"S 129°12'54"E].

Distaplia cuspidis Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* 18: 19–55 [23].
Type data: holotype NTM E171, paratype(s) NTM E198.
Type locality: Darwin, Plater Rock, 8–10 m, NT.
Taxonomic decision for synonymy: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* 20: 37–81 [44].

Distribution: Palau, NT (N coast).
Ecology: benthic, marine.

Distaplia regina Kott, 1990

Distaplia regina Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* 29(1): 1–266 [125].
Type data: holotype QM GH4201, paratype(s) QM GH4202.
Type locality: Capricorn Group, Heron Is., QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.
Ecology: benthic, marine.
Reference: Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* 18: 19–55 [20] (in which this species is said to have been recorded from Darwin in error).

***Distaplia retinaculata* Kott, 1990**

Distaplia retinaculata Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [125].

Type data: holotype MV F53267 (QM GH4127), paratype(s) MV F53268.

Type locality: reef, Ninety Mile Beach, 1.5 km off McGauran's Beach, 15 m, VIC.

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine.

***Distaplia stylifera* (Kowalevsky, 1874)**

Didemnum styliferum Kowalevsky, A. (1874). Ueber die Knospung der Ascidien. *Arch. Mikrosk. Anat. Entwicklungsmech.* **10**: 441–470 [443].

Type data: holotype (probable) ZMUC (depository uncertain, not found).

Type locality: Red Sea.

Distribution: QLD (NE coast), SA (Great Australian Bight), WA (Central W coast, Lower W coast, NW coast); west Pacific Ocean and Indian Ocean.

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [127].

***Distaplia tokiokai* Kott, 1990**

Distaplia tokioka Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [129].

Type data: holotype SAMA E2081, paratype(s) QM GH4179.

Type locality: Avoid Bay, Price Is., Great Australian Bight, 15–20 m, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

***Distaplia turboensis* Kott, 2004**

Distaplia turboensis Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [45].

Type data: holotype NTM E321, paratype(s) QM G308748.

Type locality: Dawson Rock, Bynoe Harbour, 5–8 m, NT.

Distribution: NT (N coast), QLD (Central E coast, NE coast).

Ecology: benthic, marine.

***Distaplia violetta* Kott, 1990**

Distaplia violetta Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [130].

Type data: holotype QM GH1358, paratype(s) QM GH4130.

Type locality: Wistari Reef, Capricorn Group, QLD.

Distribution: QLD (Great Barrier Reef, NE coast); west Pacific Ocean.

Ecology: benthic, marine; rubble fauna.

***Distaplia viridis* Kott, 1957**

Distaplia viridis Kott, P. (1957). Ascidiacea of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [96].

Type data: syntypes AM Y1182, Y2070, Y2069.

Type locality: Victor Harbour, Gulf St Vincent, SA.

Distribution: QLD (NE coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine; to 8 m.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [132].

***Hypodistoma* Tokioka, 1967**

Hypodistoma Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl. Mus.* **251**: 1–242 [124].

Type species: *Distoma deerrata* Sluiter, 1895 by original designation.

Extralimital distribution: west Pacific Ocean. See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

***Hypodistoma deerratum* (Sluiter, 1895)**

Distoma deerrata Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.-Naturw. Ges. Jena* **8**: 163–186; Nachtrag zu den tunicaten: 325–326. [167].

Type data: holotype ZMA TU38.

Type locality: Thursday Is., Torres Strait.

Polycitor coalitus Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [23].

Type data: holotype ZMA TU19.

Type locality: 32 m, Indonesia [1°42'30"S 130°47'30"E].

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [106].

Distribution: NT (Gulf of Carpentaria), QLD (NE coast), WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine; sea floor habitats to 80 m.

***Hypodistoma mirabile* (Kott, 1972)**

Atapozoa mirabilis Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [169].

Type data: holotype SAMA E899, paratype(s) SAMA E896.

Type locality: floor of cave, Elliston Bay, 6 m, SA.

Distribution: SA (Great Australian Bight), VIC (Bass Strait).

Ecology: benthic, marine; often in caves with strong water movement, to 16 m.

Hypsistozoa Brewin, 1953

Hypsistozoa Brewin, B.I. (1953). Australian ascidians of the sub-family Holozoinae and a review of the sub-family. *Trans. R. Soc. N.Z.* **81**(1): 53–64 [56].

Type species: *Distaplia fasmeriana* Michaelsen, 1924 by original designation.

Extralimital distribution: Peru-Chile Trench. See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

Hypsistozoa distomoides (Herdman, 1899)

Amaroucium distomoides Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [448] [*nom. nud.*].

Amaroucium distomoides Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [72].

Type data: holotype AM G2106.

Type locality: Port Jackson, NSW.

Taxonomic decision for new combination: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [134] (as *Hypsistozoa distomoides*).

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast).

Ecology: benthic, marine; to 20 m.

Neodistoma Kott, 1990

Neodistoma Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [135].

Type species: *Neodistoma mammillatum* Kott, 1990 by original designation.

Neodistoma mammillatum Kott, 1990

Neodistoma mammillatum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [135].

Type data: holotype SAMA E1984 (QM GH4104), paratype(s) QM GH2424.

Type locality: reef, Seacliff, Gulf St Vincent, 12 m, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine; low limestone reef, on top of rocks, also in caves and under rocks.

Polydistoma Kott, 1990

Polydistoma Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [101].

Type species: *Polydistoma fungiforme* Kott, 1990 by original designation.

Polydistoma fungiforme Kott, 1990

Polydistoma fungiforme Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [102].

Type data: holotype WAM 881.83, paratype(s) WAM 880.83 (QM GH2111).

Type locality: about 27 km W of Cliff Head, Dongara, 44 m, WA [29°30'S 114°41'18"E–29°31'42"S 114°42'E].

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

Polydistoma longitube (Kott, 1957)

Polycitor longitubis Kott, P. (1957). Ascidians of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [80].

Type data: holotype AM Y802.

Type locality: SW Australia.

Taxonomic decision for new combination: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [104] (as *Polydistoma longitube*).

Distribution: WA (Lower W coast); known only from type locality, from unspecified locality.

Ecology: benthic, marine.

Protoholozoa Kott, 1969

Protoholozoa Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239 [35].

Type species: *Protoholozoa pedunculata* Kott, 1969 by monotypy.

Extralimital distribution: Antarctic Region; west Pacific Ocean, The Azores. See: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655.

Protoholozoa australiensis Kott, 1992

Protoholozoa australiensis Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [628].

Type data: holotype SAMA E2423, paratype(s) SAMA E2422.

Type locality: 1 km NE Margaret Brock Reef off Cape Jaffa, 7–15 m, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine; in overhangs and caverns.

Sigillina Savigny, 1816

Sigillina Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris: G. Dufour. [40].

Type species: *Sigillina australis* Savigny, 1816 by monotypy.

Hyperiodistoma Michaelsen, W. (1930). Ascidiae Krikobranchiae. *Fauna Südwest-Aust.* **5**(7): 463–558 [490]. Type species: *Colella moebiusi* Hartmeyer, 1905 by original designation.

Atapozoa Brewin, B.I. (1956). *Atapozoa marshi*, a compound ascidian from Western Australia. *J. Proc. R. Soc. West. Aust.* **40**(1): 31–32 [3].

Type species: *Atapozoa marshii* Brewin, 1956 by monotypy.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [86].

Extralimital distribution: west Indian Ocean, west Pacific Ocean. See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [86].

***Sigillina australis* Savigny, 1816**

Sigillina australis Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [179].

Type data: holotype MNHP A3 SIG.1*.

Type locality: southwest coast of Australia (as New Holland), 40 m, WA.

Atapozoa marshi Brewin, B.I. (1956). *Atapozoa marshi*, a compound ascidian from Western Australia. *J. Proc. R. Soc. West. Aust.* **40**(1): 31–32 [31].

Type data: holotype AM U3843.

Type locality: Triggs Is., WA.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [87].

Distribution: New Zealand, NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine; roofs of caverns, under reefs.

***Sigillina cyanea* (Herdman, 1899)**

Colella cyanea Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [447] [*nom. nud.*].

Colella cyanea Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [70].

Type data: syntypes AM U153, U346.

Type locality: Port Jackson, NSW.

Sigillina caerulea Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [31].

Type data: type status unknown ZMA (depository uncertain, not found).

Type locality: Pulu Jedan, east coast of Aru Is., 13 m, Indonesia.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [89].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef), WA (Central W coast, Lower W coast, NW coast, SW coast).

Ecology: benthic, marine; to 150 m.

***Sigillina fantasiana* (Kott, 1957)**

Eudistoma fantasiana Kott, P. (1957). Ascidians of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [76].

Type data: holotype AM Y1276.

Type locality: Reevesby Is., SA.

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine; colonies often around stems of seaweed (*Hormosira*) [Phaeophyta].

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [92].

***Sigillina grandissima* Kott, 1990**

Sigillina grandissima Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [93].

Type data: holotype WAM 846.83 (QM GH2114), paratypes WAM 782.83, QM GH1305 (SAMA E1983).

Type locality: Dampier Archipelago, NW of Rosemary Is., 70–72 m, WA.

Distribution: SA (Great Australian Bight), WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine.

***Sigillina mjobergi* Hartmeyer, 1919**

Sigillina mjobergi Hartmeyer, R. (1919). Ascidien. In, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [117] [as *Sigillina mjobergi*].

Type data: holotype NHRM 1487*.

Type locality: 48 miles WSW of Cape Jaubert, 280 m, WA.

Distribution: WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine; epibionts including barnacles, bryozoans on horny stalk, from 30–140 m.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [96].

***Sigillina nigra* (Herdman, 1899)**

Polyclinum nigrum Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [448] [*nom. nud.*].

Polyclinum nigrum Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [84].

Type data: holotype AM U354.

Type locality: Vaucluse, Port Jackson, NSW.

Taxonomic decision for new combination: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [98] (as *Sigillina nigra*).

Distribution: NSW (Lower E coast).

Ecology: benthic, marine.

***Sigillina pulvinus* Kott, 2003**

Sigillina pulvinus Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1618].

Type data: holotype SAMA E2845.

Type locality: Waterfall Bay outside Cathedral Cave, Tasman Peninsula, 10–13 m, TAS.

Distribution: TAS (Tas. coast).

Ecology: benthic, marine.

***Sigillina signifera* (Sluiter, 1909)**

Polycitor signiferus Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [5].

Type data: syntypes ZMA TU808.1, TU808.2.

Type locality: 5700 miles, 279°E from Southpoint of S Lucipara Is., 894 m, and Banda Is., 9–45 m, Indonesia.

Sycozoa sedens Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [34].

Type data: syntypes ZMA TU1071-7.

Type locality: Sulu Is., Karkaralong Group, Karbaena Is., Lucipara Group, Postillon Is., Savu Is., Saleh Bay, Indonesia; reef habitats to 36 m.

Eudistoma viridis Tokioka, T. (1955). Ascidians from the Palao Islands II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **5**(1): 43–57 [49].

Type data: syntypes SMBL 74*.

Type locality: Geruherugaeru, canal, Palau Is., west Pacific Ocean.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [100].

Distribution: Philippines, Indonesia, Palau, QLD (NE coast), WA (NW coast); west Pacific Ocean.

Ecology: benthic, marine; forms extensive mats on coral debris, sides of reefs and surge channels.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

***Sycozoa* Lesson, 1832**

Sycozoa Lesson, R.P. (1832). Zoologie. pp. 256–279, 433–440 in Lesson, R.P. *Voyage autour du Monde sur la Corvette La Coquille pendant 1822–1825*. Paris : P. Pourret Freres Vol. 2(1) [436].

Type species: *Sycozoa sigillinoides* Lesson, 1832 by monotypy.

Colella Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [115].

Type species: *Aplidie pedunculatum* Quoy & Gaimard, 1834 by original designation.

Cyathocormus Oka, A. (1912). On *Cyathocormus mirabilis* n.gen., n.sp., the type of a new family of compound ascidians from Japan. *J. Coll. Sci. Imp. Univ. Tokyo* **32**(12): 1–30 [17].

Type species: *Cyathocormus mirabilis* Oka, 1912 by monotypy.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [137].

Extralimital distribution: Antarctic Region; tropical west Pacific Ocean. See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

***Sycozoa brevicauda* Kott, 1990**

Sycozoa brevicauda Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [140].

Type data: holotype WAM 139.75, paratype(s) WAM 801.83, 1046.83.

Type locality: Cockburn Sound, WA.

Distribution: SA (S Gulfs coast), WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine; on floors of caves.

***Sycozoa cavernosa* Kott, 1990**

Sycozoa cavernosa Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [142].

Type data: holotype WAM 795.83 (QM GH2106), paratype(s) WAM 879.83, 199.75.

Type locality: reef, off Whitford Beach, Cockburn Sound, 5 m, WA.

Distribution: WA (Lower W coast, NW coast).

Ecology: benthic, marine.

***Sycozoa cerebriformis* (Quoy & Gaimard, 1834)**

Aplidie cerebriforme Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [625].

Type data: holotype MNHP A3 SCY.A29*.

Type locality: Westernport, VIC.

Colella plicata Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [611].

Type data: syntypes AM U152, U299–U317.

Type locality: Port Jackson, NSW.

Colella incerta Caullery, M. (1909). Recherches sur la famille des Distomidae. *Bull. Scient. Fr. Belg.* **42**: 1–59 [10].

Type data: holotype MNHP A3 SYC.A18*.

Type locality: Australian (as New Holland).

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [143].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast).

Ecology: benthic, marine; in caves, crevices, and on the sea floor to 50 m.

Sycozoa murrayi (Herdman, 1886)

Collela murrayi Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiæ compositæ. *Zool. Chall. Exped.* **14**(38): 1–425 [115].
Type data: syntypes BMNH 1887.2.4.255, 1887.2.4.256.
Type locality: 240 m, NSW [33°57'18"S 151°39'06"E].

Sycozoa tasmanoides Kott, P. (1954). Tunicata, Ascidiæ. *Rep. B.A.N.Z. Antarct. Res. Exped.* **1**(4): 121–182 [157].
Type data: syntypes AM Y1231.
Type locality: off Maria Is., 174–155 m, TAS.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [146].

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).
Ecology: benthic, marine.

Sycozoa pedunculata (Quoy & Gaimard, 1834)

Aplidie pedunculatum Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in: *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris: Pilet Ainé. [626].
Type data: holotype MNHP A3 SCY.A25*.
Type locality: King George Sound, WA.

Taxonomic decision for new combination: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [147] (as *Sycozoa pedunculata*).

Distribution: TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (SW coast).
Ecology: benthic, marine; hard substrates.

Sycozoa pulchra (Herdman, 1886)

Colella pulchra Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiæ compositæ. *Zool. Chall. Exped.* **14**(38): 1–425 [106].
Type data: type status unknown BMNH (depository uncertain, not found).
Type locality: 10°36'S 141°55'E, 12 m, Torres Strait.

Colella tenuicaulis Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [611].
Type data: syntypes AM U326–U330, U383.
Type locality: Port Stephens and Port Jackson, NSW.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [149].

Distribution: Indonesia, NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast).
Ecology: benthic, marine.

Sycozoa seiziwadae Tokioka, 1952

Sycozoa seiziwadae Tokioka, T. (1952). Ascidiæ collected by Messrs Renzi Wada and Seizi Wada from the Pearl Oyster bed in the Arafura Sea in 1940. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **2**(2): 91–142 [99].
Type data: syntypes SMBL 106*.
Type locality: off Melville Is., Arafura Sea.

Distribution: Philippines, NT (N coast), QLD (NE coast), WA (N coast, NW coast); isolated record from Cronulla, NSW.

Ecology: benthic, marine; subtidal–40 m.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [152].

Sycozoa sigillinoides Lesson, 1832

Sycozoa sigillinoides Lesson, R.P. (1832). Zoologie. pp. 256–279, 433–440 in Lesson, R.P. *Voyage autour du Monde sur la Corvette La Coquille pendant 1822–1825*. Paris: P. Pourret Freres Vol. 2(1) [436].
Type data: type status unknown MNHP (depository uncertain, not found).
Type locality: 53°S, south of Staaten Is., Magellanic region, Tierra de Fuego.

Colella ramulosa Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiæ compositæ. *Zool. Chall. Exped.* **14**(38): 1–425 [120].
Type data: type status unknown BMNH (depository uncertain, not found).
Type locality: west of Straits of Magellan at the south entrance of Smyth Channel, Patagonia [52°45'30"S 73°64'W].

Colella umbellata Michaelsen, W. (1898). Vorläufige Mitteilung über einige Tunicaten aus dem Magalhaenischen Gebiet sowie von Süd-Georgien. *Zool. Anz.* **21**: 363–371 [371].
Type data: syntypes (probable) ZMH*.
Type locality: Grettan Bay, west of Port Pantalan, Tierra del Fuego.

Colella perrieri Caullery, M. (1909). Recherches sur la famille des Distomidae. *Bull. Scient. Fr. Belg.* **42**: 1–59 [33].
Type data: syntypes (probable) MNHN A3 SYC.A10*, MNHN A3 SYC.A11*.
Type locality: Santa Cruz, Patagonia and 53°13'S 68°31'W.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [153].

Distribution: New Zealand, SA (S Gulfs coast), TAS (Tas. coast); circumpolar Antarctic and Subantarctic to Magellanic area.
Ecology: benthic, marine; heads of colonies found floating in tropical plankton.

POLYCITORIDAE

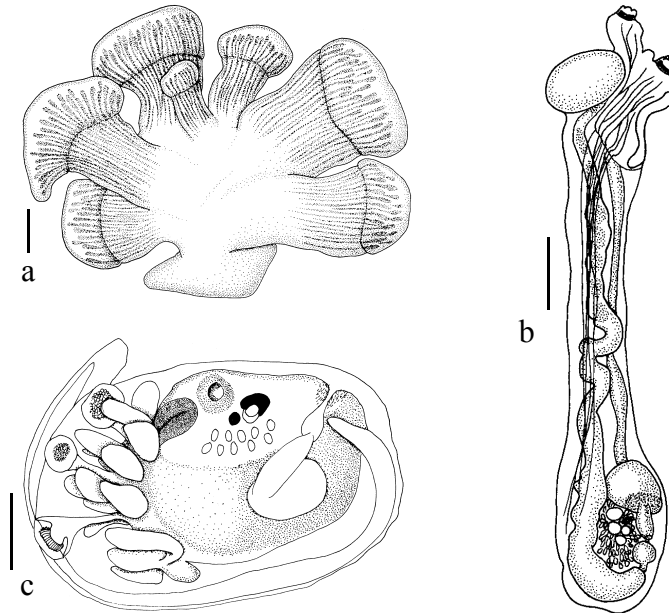


Fig. 7. *Eudistoma* sp.: **a**, colony; **b**, zooid; **c**, larva. (Scale bars: a = 2.0 mm; b = 1.0 mm; c = 0.1 mm).
[from Kott 1990]

The family Polycitoridae Michaelsen, 1904 contains colonial species in which zooids usually are embedded in relatively firm test which often contains embedded sand and other foreign particles. Partially embedded zooids occur only in *Archidistoma* Garstang, 1891, a genus not recorded from Australia. With the exception of *Brevicollus tuberosus* Kott, 1990 (an unusual indigenous species), the zooids are long and narrow, the abdomen being many times the length of the relatively short thorax.

In many species of *Eudistoma* Caullery, 1909, *Polycitor* Renier, 1804, *Eucoelium* Savigny, 1816 (= *Polycitorella* Michaelsen, 1924, a junior synonym) and *Cystodytes* Drasche, 1884, the zooids, arranged in circles with the separately opening 6-lobed atrial apertures in the centre of the circle, form rudimentary cloacal systems. True cloacal systems are developed only in the monotypic genus *Salix* nom. nov. (for *Exostoma* Kott, 1990). In the genera *Cystodytes* and *Eucoelium* the zooids synthesise calcareous spicules—either unique plate-like ones or stellate spicules resembling those of Didemnidae.

Throughout the family, zooids are muscular with an internal layer of circular fibres and external longitudinal fibres on the thorax, the longitudinal ones continuing in a wide band along each side of the abdomen. When disturbed, the zooids contract and withdraw deep into the base or centre of the colony, unlike zooids of Holozoidae and Clavelinidae which appear to draw the abdomen up behind the thorax when disturbed. Kott (1990) has suggested that this reflects the importance of protecting the site of replication from predators—in Polycitoridae replication is from horizontal division of the long, narrow abdomen, while in Clavelinidae and Holozoidae the buds develop from the isolated terminal ampullae or the posterior stolon, both in the stalk or base of the colony.

POLYCITORIDAE

Fertilisation may occur in the upper part of the oviduct, or in the atrial cavity where embryos are found at various stages of development. Larvae of Polycitoridae are of various sizes, but usually differ from Holozoidae and Clavelinidae in the arrangement of adhesive organs in a median vertical row at the anterior end of the trunk, generally having lost the triradial arrangement which is thought to be more primitive.

Although both have a long abdominal gut loop, Polycitoridae differ from Pycnoclavellidae in having lobed (rather than smooth-rimmed) apertures and larval adhesive organs with an axillary cone in an epidermal cup (rather than the inverted tubes of Pycnoclavellidae). The eggs do not appear to be fertilised at the base of the oviduct as they are in Pycnoclavellidae.

The family is well represented in Australian waters, especially by species of the genus *Eudistoma*. The monotypic *Salix*, the only genus with true cloacal systems, is common in tropical waters off the northern coast of the continent. *Brevicollus* Kott, 1990, an unusual indigenous genus with an equally unusual larva, is assigned to this family on the basis of its two 6-lobed, separately opening apertures, by its larval form and the presence of embryos at different stages of development in the atrial cavity.

Michaelsen (1930) proposed *Archidistoma*, *Eudistoma*, *Paessleria* Michaelsen, 1907 and *Hyperiodistoma* Michaelsen, 1930 as subgenera of the genus *Sigillina* Savigny, 1816. The family was revised by Kott (1990) who recognised *Eudistoma*, *Archidistoma* and *Polycitor* as genera of the Polycitoridae, while *Sigillina* was shown to have closer affinities with Holozoidae. The name *Eudistoma* has been given precedence over *Paessleria* (Kott 1995; ICZN Opinion 1865, 1997). *Hyperiodistoma* is a junior synonym of *Sigillina* (Holozoidae).

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- Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266
- Kott, P. (1995). *Eudistoma* Caullery, 1909 (Tunicata): proposed precedence over *Paessleria* Michaelsen, 1907. *Mem. Queensl. Mus.* **52**(3): 254–256
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- Michaelsen, W. (1907). Tunicaten pp. 1–84 in, *Ergebnisse der Hamburger Magalhaensischen Sammelreise*. Hamburg : L. Friederichsen & Co. Vol. 8(5).
- Michaelsen, W. (1924). Ascidae Krikobanchiae von Neuseeland, den Chatham und den Auckland Inseln. *Vidensk. Meddr. Dansk Naturh. Foren.* **77**: 263–434
- Michaelsen, W. (1930). Ascidae Krikobanchiae. *Fauna Südwest-Aust.* **5**(7): 463–558

Renier, S.A. (1804). Prospetto della classe dei Vermi pp. XV–XXVII. Padua (see Porro, C. 1840, 'Nota per una Bibliografia Malacologie, Series III Geografica no. 1–4, pp. I–III and numbered columns 27–130).

Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In, *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour.

***Brevicollus* Kott, 1990**

Brevicollus Kott, P. (1990). The Australian Asciacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [236] [monotypic].

Type species: *Brevicollus tuberatus* Kott, 1990 by original designation.

***Brevicollus tuberatus* Kott, 1990**

Brevicollus tuberatus Kott, P. (1990). The Australian Asciacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [237].

Type data: holotype SAMA E2059 (QM GH4188), paratype(s) NMV F45284 (QM GH4952).

Type locality: The Gap, 15–20 m, SA.

Distribution: NSW (Lower E coast), SA (Great Australian Bight), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (2003). New syntheses and new species in the Australian Asciacea. *J. Nat. Hist.* **37**: 1611–1653 [1625].

***Cystodytes* Drasche, 1884**

Cystodytes Drasche, R. von (1884). Ueber einige neue und weniger gekannte aussereuropäische einfache Ascidien. *Denkschr. Akad. Wiss. Wien* **48**: 369–387 [9].

Type species: *Distoma dellachiajei* Della Valle, 1877 by monotypy.

Extralimital distribution: Pacific Ocean, Atlantic Ocean and Indian Ocean in tropical and temperate latitudes, Mediterranean Sea. See: Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Kott, P. (1990). The Australian Asciacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

Generic reference: López-Legentil, S. & Turon, X. (2005). How do morphotypes and chemotypes relate to genotypes? The colonial ascidian *Cystodytes* (Polycitoridae). *Zool. Scr.* **34**: 3–14.

***Cystodytes dellachiajei* (Della Valle, 1877)**

Distoma dellachiajei Della Valle, A. (1877). *Contribuzioni alla storia naturale delle ascidie composte del Golfo di Napoli con la descrizione di alcune specie e varietà nuove di altre poco note*. Napoli : Tip. Communi [40].

Type data: type status and whereabouts unknown.

Type locality: Gulf of Naples, Mediterranean Sea.

Cystodites cretaceus Drasche, R. von (1883). Die Synascidien der Bucht von Rovigno (Istrien). In, *Ein Beitrag zur Fauna der Adria* Wien : Carl Gerolds Sohn. 41 pp. [18].

Type data: type status unknown NHMW (depository uncertain, not found).

Type locality: Bay of Rovinj, Istra, Gulf of Venice, Adriatic Sea.

Cystodites durus Drasche, R. von (1883). Die Synascidien der Bucht von Rovigno (Istrien). In, *Ein Beitrag zur Fauna der Adria* Wien : Carl Gerolds Sohn. 41 pp. [13].

Type data: type status unknown NHMW (depository uncertain, not found).

Type locality: Bay of Rovinj, Istra, Gulf of Venice, Adriatic Sea.

Cystodytes draschii Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [137].

Type data: holotype BMNH 1887.2.4.284*.

Type locality: off Barra Grande, 800 m, Brazil.

Cystodytes aucklandicus Nott, J.T. (1892). On the composite ascidians of the North Shore Reef. *Trans. N.Z. Inst.* **24**: 305–334 [323].

Type data: type status unknown.

Type locality: North Shore Reef, Rangitoto Channel, Auckland, New Zealand.

Cystodytes perspicuus Nott, J.T. (1892). On the composite ascidians of the North Shore Reef. *Trans. N.Z. Inst.* **24**: 305–334 [326].

Type data: type status and whereabouts unknown.

Type locality: North Shore Reef, Rangitoto Channel, Auckland, New Zealand.

Cystodytes violaceus Van Name, W.G. (1902). The ascidians of the Bermuda Islands. *Trans. Conn. Acad. Arts Sci.* **11**: 325–412 [348].

Type data: syntypes AMNH 1389*, 1219*, 1220*.

Type locality: on underside of rubble, Castle Harbour, Waterloo, Bermuda.

Cystodytes ceylonensis Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [334].

Type data: holotype BMNH 1907.8.30.31*.

Type locality: Talaivillu Paar, 16m Sri Lanka.

Taxonomic decision for synonymy: Michaelsen, W. (1930). Ascidiae Krikobranthiae. *Fauna Südwest-Aust.* **5**(7): 463–558 [501]; Kott, P. (1990). The Australian Asciacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [179]; Kott, P. (2003). New syntheses and new species in the Australian Asciacea. *J. Nat. Hist.* **37**: 1611–1653 [1619].

Distribution: NSW, NT, QLD, SA, TAS, VIC, WA; temperate and tropical zones of Indo-west Pacific Ocean, Atlantic Ocean, Mediterranean.

Ecology: benthic, marine; intertidal–736 m.

***Cystodytes philippinensis* Herdman, 1886**

Cystodytes philippinensis Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [140].
Type data: syntypes BMNH 1887.2.4.285*, 1887.2.4.286*, 1887.2.4.287*.
Type locality: Samboanga, 20 m, Philippines.

Cystodytes hapu Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [64].
Type data: holotype MNHP A3 CYS 39*.
Type locality: Tuheia Pass, Tikehau Atoll, French Polynesia.

Taxonomic decision for synonymy: Kott, P. (2003). New syntheses and new species in the Australian Ascidiaceae. *J. Nat. Hist.* **37**: 1611–1653 [1619].

Distribution: NT (N coast), QLD (Great Barrier Reef); also West Pacific Ocean.

Ecology: benthic, marine.

Reference: Kott, P. (2002). Ascidiaceae (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [27].

***Cystodytes ramosus* Kott, 1992**

Cystodytes ramosus Kott, P. (1992). The Australian Ascidiaceae, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [629].
Type data: holotype QM GH5374.
Type locality: in bay, Haslewood Is., central section Great Barrier Reef, 20 m, QLD.

Distribution: QLD (NE coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (2003). New syntheses and new species in the Australian Ascidiaceae. *J. Nat. Hist.* **37**: 1611–1653 [1621].

***Eucoelium* Savigny, 1816**

Eucoelium Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In: *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [195].
Type species: *Eucoelium hospitolum* Savigny, 1816 by monotypy.

Polycitorella Michaelsen, W. (1924). Ascidiaceae Krikobbranchiae von Neuseeland, den Chatham und den Auckland Inseln. *Vidensk. Meddr. Dansk Naturh. Foren.* **77**: 263–434 [278].
Type species: *Polycitorella mariae* Michaelsen, 1924 by monotypy.

Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2)6 [668] (used the name *Polycitorella*); Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*.

Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. (priority of *Eucoelium* Savigny, 1816 recognised).

Extralimital distribution: Red Sea, west Indian Ocean. See: Kott, P. (1990). The Australian Ascidiaceae Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

***Eucoelium coronarium* (Monniot, 1988)**

Polycitorella coronaria Monniot, F. (1988). Ascidies de Nouvelle-Calédonie V. Polycitoridae du Lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **10A**(2): 197–235 [228].
Type data: holotype MNHP A3-PolB-1.
Type locality: 19 m, Great Australian Bight, SA [33°14'30"S 126°20'E].

Distribution: SA (Great Australian Bight), WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine; 3–190 m.

***Eucoelium orientalis* (Kott, 1990)**

Polycitorella orientalis Kott, P. (1990). The Australian Ascidiaceae Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [187].
Type data: holotype QM GH9477, paratype(s) QM GH4420.
Type locality: Swain Reefs, 8 m, QLD.

Distribution: QLD (Great Barrier Reef), WA (Lower W coast); Coral Sea.

Ecology: benthic, marine.

Reference: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [107] (as *Eucoelium orientalis*).

***Eudistoma* Caullery, 1909**

Distoma Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In: *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [178] [junior homonym of *Distoma* Retzius, 1786 (Trematoda)].
Type species: *Distoma rubrum* Savigny, 1816 by monotypy.

Paessleria Michaelsen, W. (1907). Tunicaten pp. 1–84 in, *Ergebnisse der Hamburger Magalhaensischen Sammelreise*. Hamburg : L. Friederichsen & Co. Vol. 8(5). [68] [suppressed in favour of the name *Eudistoma* Caullery, 1909, see ICZN Opinion 1865. (1997). *Eudistoma* Caullery, 1909 (Tunicata): given precedence over *Paessleria* Michaelsen, 1907. *Bull. Zool. Nomencl.* **54**(1): 70–71].
Type species: *Paessleria magalhaensis* Michaelsen, 1907 by monotypy.

Eudistoma Caullery, M. (1909). Recherches sur la famille des Distomidae. *Bull. Scient. Fr. Belg.* **42**: 1–59 [44] [first introduced as a subgenus of *Distoma* Savigny, 1816; the name *Eudistoma* Caullery, 1909 given preference over *Paessleria* Michaelsen, 1907, see ICZN Opinion 1865. (1997). *Eudistoma* Caullery, 1909 (Tunicata): given precedence over *Paessleria* Michaelsen, 1907. *Bull. Zool. Nomencl.* **54**(1): 70–71].

Type species: *Distoma rubrum* Savigny, 1816 by subsequent designation, see Michaelsen, W. (1930). Ascidiace Krikobanchiae. *Fauna Südwest-Aust.* **5**(7): 463–558 [489].

Taxonomic decision for synonymy: Michaelsen, W. (1930). Ascidiace Krikobanchiae. *Fauna Südwest-Aust.* **5**(7): 463–558 [492].

Extralimital distribution: Afrotropical Region; tropical and temperate Pacific Ocean, Atlantic Ocean, Indian Ocean. See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

Eudistoma amplum (Sluiter, 1909)

Polycitor amplus Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Asciden. *Siboga Exped.* **56B**: 1–112 [21].

Type data: syntypes ZMA TU781, TU770.

Type locality: reef, Sailu Ketil and reef, Banda Is., Indonesia.

Polycitor discolor Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Asciden. *Siboga Exped.* **56B**: 1–112 [17].

Type data: syntypes ZMA TU785.1, TU785.2, TU785.3.

Type locality: reef, Savu Is., 16–23 m, Jedan Is., 13 m, Indonesia [6°07'30"N 120°26'E].

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [194].

Distribution: Philippines, Papua New Guinea, Palau, Federated States of Micronesia, QLD (Great Barrier Reef); Micronesia, Indonesia, Palau Is., Papua New Guinea, Philippines.

Ecology: benthic, marine.

Reference: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1624].

Eudistoma anaematum Kott, 1990

Eudistoma anaematum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [196].

Type data: holotype QM GH4611, paratype(s) QM GH4610, GH4612–3.

Type locality: Wistari Reef, Capricorn Group, QLD.

Distribution: QLD (Great Barrier Reef).

Ecology: benthic, marine; rubble fauna.

Eudistoma angolanum (Michaelsen, 1914)

Polycitor (Eudistoma) paesslerioides angolanum Michaelsen, W. (1914). Ueber einige westÄafrikanische Asciden. *Zool. Anz.* **43**: 423–432 [430] [proposed with subspecific rank in *Polycitor paesslerioides* Michaelsen, 1914].

Type data: holotype (probable) ZMH*.

Type locality: Angola, Ambrizete, West Africa.

Eudistoma snakabri Tokioka, T. & Nishikawa, T. (1976). Contributions to the Japanese ascidian fauna XXX. Further notes on Japanese clavelinids. *Publ. Seto Mar. Biol. Lab.*

Kyoto Univ. **23**(3–5): 341–350 [251].

Type data: syntypes SMBL 134*.

Type locality: Ose, Takarazima, Tokara Is., Japan.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [197].

Distribution: QLD (Great Barrier Reef), WA (Lower W coast, NW coast); Tokara Is., W Africa.

Ecology: benthic, marine.

Eudistoma aureum Kott, 1990

Eudistoma aureum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [199].

Type data: holotype SAMA E2084, paratype(s) SAMA E2085.

Type locality: off West Beach, Gulf St Vincent, 12–20 m, SA.

Distribution: SA (S Gulfs coast).

Ecology: benthic, marine; *Posidonia* [Posidoniaceae] beds.

Eudistoma bulbatum Kott, 1990

Eudistoma bulbatum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [200].

Type data: holotype AM Y2204, paratype(s) AM Y835, Y842, Y1120.

Type locality: off Cronulla, 140 m, NSW.

Distribution: NSW (Lower E coast); known only from type locality.

Ecology: benthic, marine.

Eudistoma carnosum Kott, 1990

Eudistoma carnosum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [201].

Type data: holotype AM Y1289, paratype(s) AM Y1290, Y1291.

Type locality: Fish Hook Bay, Cape Vlamingh, Rottneest Is., WA.

Distribution: NT (N coast), WA (Lower W coast).

Ecology: benthic, marine; under undercut of limestone reefs.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [42].

Eudistoma constrictum Kott, 1990

Eudistoma constrictum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [203].

Type data: holotype SAMA E2083, paratype(s) QM GH2291, GH4186.

Type locality: on headland near Chinaman's Hat Is., York Peninsula, Great Australian Bight, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast).
Ecology: benthic, marine.

***Eudistoma eboreum* Kott, 1990**

Eudistoma eboreum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [205].
Type data: holotype QM GH336.
Type locality: MacGillivray's Reef, near Lizard Is., 14 m, QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.
Ecology: benthic, marine.
Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [39 and Fig. 22a].

***Eudistoma elongatum* (Herdman, 1886)**

Colella elongata Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiæ compositæ. *Zool. Chall. Exped.* **14**(38): 1–425 [110].
Type data: type status unknown BMNH (depository uncertain, not found).
Type locality: Port Jackson, 60 m, NSW.

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast).
Ecology: benthic, marine; muddy habitats and wharf piles in protected waters.
Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [205].

***Eudistoma gilboviride* (Sluiter, 1909)**

Polycitor gilboviridis Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [6].
Type data: lectotype ZMA TU1269, paralectotype(s) ZMA TU788.
Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [186].
Type locality: reef, Kabaena Is., Indonesia.

Distribution: Indonesia, Papua New Guinea, Palau, QLD (Great Barrier Reef).
Ecology: benthic, marine.
References: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [206]; Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [189].

***Eudistoma glaucum* (Sluiter, 1909)**

Polycitor glaucus Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [12].
Type data: holotype ZMA TU790.
Type locality: 274 m, Indonesia [8°19'S 117°41'E].

Eudistoma rigida Tokioka, T. (1955). Ascidians from the Palao Islands II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **5**(1): 43–57 [50].
Type data: syntypes SMBL 98*.
Type locality: reef, off Gadaraku, Palau Is.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [208].

Distribution: Indonesia, QLD (Great Barrier Reef); west Pacific Ocean.
Ecology: benthic, marine.

***Eudistoma globosum* Kott, 1957**

Eudistoma globosum Kott, P. (1957). Ascidians of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [72].
Type data: syntypes AM Y1275 (whereabouts of other syntype(s) unknown).
Type locality: Little Geordie Bay, Rottneest Is., WA.

Distribution: QLD (Great Barrier Reef), WA (Lower W coast).
Ecology: benthic, marine.
Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [210].

***Eudistoma gracilum* Kott, 1990**

Eudistoma gracilum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [211].
Type data: holotype QM GH4531, paratype(s) QM GH4532.
Type locality: north reef, Heron Is., QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.
Ecology: benthic, marine.

***Eudistoma incubitum* Kott, 1990**

Eudistoma incubitum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [212].
Type data: holotype QM GH4537, paratype(s) QM GH4538.
Type locality: NW Wistari Reef, Capricorn Group, QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.
Ecology: benthic, marine.

***Eudistoma laysani* (Sluiter, 1900)**

Distoma laysani Sluiter, C.P. (1900). Tunicaten aus dem Stillen Ocean. *Zool. Jahrb. Syst.* **13**: 1–35 [9].
Type data: syntypes ZMA TU795*.
Type locality: Laysan.

Distoma parva Sluiter, C.P. (1900). Tunicaten aus dem Stillen Ocean. *Zool. Jahrb. Syst.* **13**: 1–35 [6].

Type data: lectotype ZMA TU1301*, paralectotype(s) ZMA TU508, TU803*.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [176].

Type locality: Laysan, Indonesia.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [214].

Distribution: Philippines, Indonesia, Palau, Hawaii, Lord Howe Island, NSW (Central E coast, Lower E coast, SE oceanic), QLD (Central E coast, Great Barrier Reef, NE coast); west Pacific Ocean.

Ecology: benthic, marine; from high intertidal region.

Eudistoma maculosum Kott, 1990

Eudistoma maculosum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [216].

Type data: holotype QM GH1304, paratype(s) QM GH1278, GH2391.

Type locality: Ward Is., 20–25 m, SA.

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

Eudistoma malum Kott, 1990

Eudistoma malum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [217].

Type data: holotype QM G11939, paratype(s) QM G11940.

Type locality: Heron Is., Capricorn Group, 10 m, QLD.

Distribution: QLD (Great Barrier Reef).

Ecology: benthic, marine.

Eudistoma microlarvum Kott, 1990

Eudistoma microlarvum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [218].

Type data: holotype QM GH4520, paratype(s) QM GH4521.

Type locality: Point Lookout, North Stradbroke Is., QLD.

Distribution: QLD (Central E coast).

Ecology: benthic, marine; sandy habitats.

Eudistoma ovatum (Herdman, 1886)

Psammaphidium ovatum Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiacea compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [246].

Type data: holotype BMNH BM 30.9.23.19*.

Type locality: Torres Strait, Cape Boileau, 6–22 m, northern Australia.

Distribution: NT (N coast); west Pacific Ocean.

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [42].

Eudistoma pratulum Kott, 1990

Eudistoma pratulum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [224].

Type data: holotype QM GH4606, paratype(s) QM GH4607.

Type locality: Heron Is., QLD.

Distribution: QLD (NE coast); known only from type locality.

Ecology: benthic, marine; low water mark.

Eudistoma purpureum Kott, 1990

Eudistoma purpureum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [225].

Type data: holotype QM GH4466, paratype(s) QM GH4467, GH4455.

Type locality: near reef edge, Wistari Reef, QLD.

Distribution: QLD (Great Barrier Reef).

Ecology: benthic, marine.

Eudistoma pyriforme (Herdman, 1886)

Psammaphidium pyriforme Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiacea compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [419].

Type data: holotype BMNH 1887.2.4.482.

Type locality: Flinders Passage, 16 m, Torres Strait [10°30'S 142°18'E].

Polycitor arenaceus Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [13].

Type data: holotype ZMA TU782.

Type locality: reef, Sawan, Sian Is., Indonesia.

Eudistoma vulgare Monniot, F. (1988). Ascidiées de Nouvelle-Calédonie V. Polycitoridae du Lagon. *Bull. Mus. Natl. Hist. Nat. Paris (4)* **10A**(2): 197–235 [213].

Type data: holotype MNHP A3 Eud 57.

Type locality: New Caledonia.

Taxonomic decision for synonymy: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [42].

Distribution: Indonesia, QLD (Great Barrier Reef, NE coast), WA (NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [226].

Eudistoma reginum Kott, 1990

Eudistoma reginum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [228].

Type data: holotype QM G11948, paratype(s) QM G11949, G11950, G11951.

Type locality: reef edge, Heron Is., QLD.

Distribution: Indonesia, Palau, QLD (Great Barrier Reef).

Ecology: benthic, marine; underside of rubble behind reef edge.

***Eudistoma sabulosum* Kott, 1990**

Eudistoma sabulosum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [229].

Type data: holotype QM GH937, paratype(s) QM GH4591.
Type locality: Topgallant Is., 5 m, SA.

Distribution: SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine.

***Eudistoma sluiteri* Hartmeyer, 1909**

Eudistoma sluiteri Hartmeyer, R. (1909). Ascidién (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig: C.F. Winter Vol. 3, suppl. pts 81–87 [1488] [*nom. nov.* for *Polycitor mollis* Sluiter, 1909].

Polycitor mollis Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidién. *Siboga Exped.* **56B**: 1–112 [11] [junior homonym of *Eudistoma molle* (Ritter, 1900)].

Type data: holotype ZMA TU801.

Type locality: Kamboragi Bay, Tanal Djampeah, Indonesia.

Eudistoma muscosum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [220] [unnecessary *nom. nov.* for *Polycitor mollis* Sluiter, 1909].

Distribution: Indonesia, NT (N coast), QLD (Great Barrier Reef).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [43].

***Eudistoma superlatum* Kott, 1990**

Eudistoma superlatum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [229].

Type data: holotype WAM 822.83 (QM GH2136), paratype(s) WAM 189.75.

Type locality: near South Passage, Shark Bay, 10–15 m, WA.

Distribution: NT (N coast), WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [27].

***Eudistoma tigrum* Kott, 1990**

Eudistoma tigrum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [231].

Type data: holotype QM G11941, paratype(s) QM G11942–4, GH1362.

Type locality: Heron Is., Great Barrier Reef, QLD.

Distribution: Fiji, QLD (Great Barrier Reef), WA (Lower W coast).

Ecology: benthic, marine; lower water mark, rubble zone.

***Eudistoma tumidum* Kott, 1990**

Eudistoma tumidum Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [232].

Type data: holotype AM Y1068.

Type locality: Gulf of Carpentaria, NT [16°52'42"S 140°56'12"E].

Distribution: QLD (Gulf of Carpentaria); known only from type locality.

Ecology: benthic, marine.

***Polycitor* Renier, 1804**

Polycitor Renier, S.A. (1804). Prospetto della classe dei Vermi pp. XV–XXVII. Padua (see Porro, C. 1840, 'Nota per una Bibliografia Malacologie, Series III Geografica no. 1–4, pp. I–III and numbered columns 27–130). [XVII] [validated under plenary powers, see Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London: International Trust for Zoological Nomenclature 200 pp.].

Type species: *Polycitor crystallinus* Renier, 1804 by monotypy.

Paradistoma Caullery, M. (1909). Recherches sur la famille des Distomidae. *Bull. Scient. Fr. Belg.* **42**: 1–59 [44] [first introduced as a subgenus of *Distoma* Savigny, 1816; junior objective synonym of *Polycitor* Renier, 1804].

Type species: *Polycitor crystallinus* Renier, 1804 by subsequent designation, see Harant, H. (1929). Ascidies provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110 [40].

Tetrazona Michaelsen, W. (1930). Ascidae Krikobanchia. *Fauna Südwest-Aust.* **5**(7): 463–558 [481].

Type species: *Distoma glareosa* Sluiter, 1906 by original designation.

Taxonomic decision for synonymy: Hartmeyer, R. (1912). Die Ascidién der Deutschen Tiefsee Expedition. *Wiss. Ergebn. dt. Tiefsee-Exped. 'Valdivia'* **16**(3): 223–392 [298]; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476 [132].

Generic reference: Caullery, M. (1909). Recherches sur la famille des Distomidae. *Bull. Scient. Fr. Belg.* **42**: 1–59 [43].

***Polycitor annulus* Kott, 1990**

Polycitor annulus Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [165].

Type data: holotype QM GH4350, paratype(s) QM GH4348, GH4351, GH4346.

Type locality: near reef edge, Heron Is., Capricorn Group, QLD.

Distribution: QLD (Great Barrier Reef).
Ecology: benthic, marine.

***Polycitor calamus* Kott, 1990**

Polycitor calamus Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [167].
Type data: holotype SAMA E2058, paratypes SAMA E2051, E2057, QM GH4187–8, GH4308.
Type locality: Archipelago Cove, 40 m, SA.

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast).
Ecology: benthic, marine; common in *Posidonia* [Posidoniaceae] beds.

***Polycitor cerasus* Kott, 1990**

Polycitor cerasus Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [168].
Type data: holotype SAMA E2080, paratype(s) QM GH4365.
Type locality: Breaking Reef, Franklin Is., Nuyts Archipelago, 15 m, SA.

Distribution: SA (Great Australian Bight); known only from type locality.
Ecology: benthic, marine; 15 m, amongst algae.

***Polycitor circes* Michaelsen, 1930**

Polycitor circes Michaelsen, W. (1930). Ascidiace Krikobranchiae. *Fauna Südwest-Aust.* **5**(7): 463–558 [495].
Type data: syntypes (probable) ZMB 3897* (whereabouts of other syntype(s) unknown).
Type locality: Shark Bay, off Dirk Hartog Is., 2.5–4.5 m, WA.

Polycitor gelatinosa Kott, P. (1957). Ascidiaceans of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [83].
Type data: syntypes AM Y1310.
Type locality: Mary Cove, Rottnest Is., WA.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [169].

Distribution: QLD (NE coast), WA (Central W coast, Lower W coast, NW coast); west Pacific Ocean.
Ecology: benthic, marine.

References: Kott, P. (2002). Ascidiacea (Tunicata) from Darwin, Northern Territory, Australia. *Beagle, Rec. Mus. Art Galleries NT* **18**: 19–55 [26]; Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1623].

***Polycitor columna* Kott, 1954**

Polycitor columna Kott, P. (1954). Tunicata, Ascidiaceans. *Rep. B.A.N.Z. Antarct. Res. Exped.* **1**(4): 121–182 [153].
Type data: syntypes AM Y1297.
Type locality: Maria Is., TAS.

Distribution: TAS (Tas. coast).
Ecology: benthic, marine.

***Polycitor emergens* Kott, 1990**

Polycitor emergens Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [170].
Type data: holotype AM Y1124, paratype(s) AM Y837.
Type locality: off Cronulla, 60 m, NSW.

Distribution: NSW (Lower E coast), TAS (Tas. coast).
Ecology: benthic, marine.

***Polycitor giganteus* (Herdman, 1899)**

Polycitor giganteum Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [448] [*nom. nud.*].

Polyclinum giganteum Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [79].
Type data: syntypes AM U163 (G2099).
Type locality: Port Jackson, NSW.

Polyclinum globosum Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [80].
Type data: syntypes AM U157 (G2100), AM G12253.
Type locality: Port Jackson, NSW.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [171].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast).
Ecology: benthic, marine; shallow subtidal waters–24 m.

***Polycitor nubilus* Kott, 1990**

Polycitor nubilus Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [174].
Type data: holotype SAM E2079.
Type locality: Lighthouse Point, Flinders Is., Investigator Group, 8 m, SA.

Distribution: SA (S Gulfs coast).
Ecology: benthic, marine; 8 m in caves and overhangs.

***Polycitor obeliscus* Kott, 1972**

Polycitor obeliscum Kott, P. (1972). The ascidiaceans of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [171].
Type data: holotype NMV H167.
Type locality: reef, Investigator Strait, 30 m, SA.

Distribution: SA (S Gulfs coast); known only from type locality.
Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [175].

Polycitor protectans (Herdman, 1899)

Amaroucium protectans Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [73].

Type data: holotype AM U160 (G2105).

Type locality: Port Jackson, New South Wales.

Distribution: NSW (Lower E coast); known only from type locality.

Ecology: benthic, marine.

Reference: Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [139].

Polycitor subarborensis Kott, 1957

Polycitor subarborensis Kott, P. (1957). Ascidians of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [81].

Type data: holotype AM Y1298.

Type locality: Brush Is., off Ulladulla, 90 m, NSW.

Distribution: NSW (Lower E coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

Polycitor translucidus Kott, 1957

Polycitor translucida Kott, P. (1957). Ascidians of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [81].

Type data: syntypes AM Y1301.

Type locality: reef, west of Point John, Point Peron, WA.

Distribution: Philippines, New Caledonia, French Polynesia, QLD (Great Barrier Reef), VIC (Bass Strait), WA (Lower W coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

Salix Kott, nom. nov.

Exostoma Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [233].

Type species: *Polycitor ianthinus* Sluiter, 1909 by original designation.

Salix nom. nov. [for *Exostoma* Kott, 1990].

Extralimital distribution: tropical west Pacific Ocean. See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

Salix ianthina (Sluiter, 1909)

Polycitor ianthinus Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [20].

Type data: lectotype ZMA TU791, paralectotype(s) ZMA TU792.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [186].

Type locality: reef, Nusa Laut Is., Indonesia.

Distribution: Indonesia, New Guinea, QLD (Great Barrier Reef); west Pacific Ocean.

Ecology: benthic, marine; sea grass beds.

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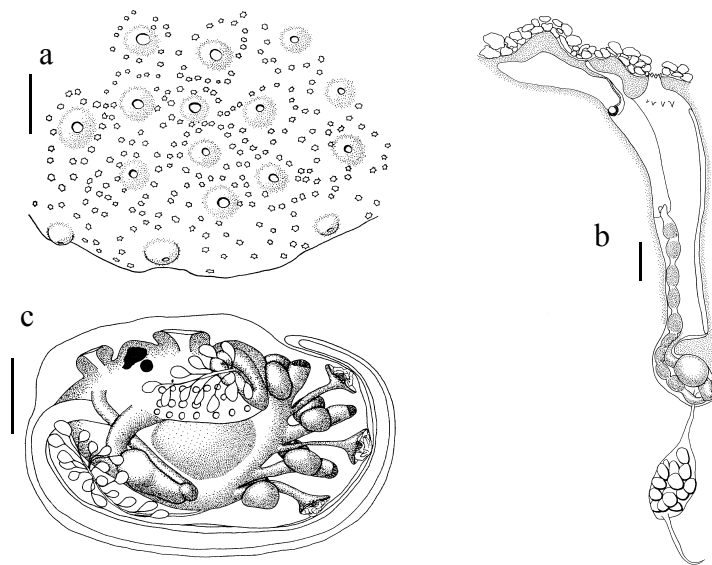


Fig. 8. *Polyclinum* spp.: **a**, colony surface showing common cloacal apertures, each surrounded by a circle of branchial apertures; **b**, zooid in test (sand on surface) showing atrial tongue above cloacal cavity; **c**, larva. (Scale bars: a = 2.0 mm; b, 0.5 mm; c, 0.1 mm). [from Kott 1992]

Polyclinidae Milne-Edwards, 1841 is one of the most diverse families of the Aplousobranchia. Six genera are represented in Australian waters. All have embedded zooids with 6-lobed or (occasionally) 8-lobed branchial apertures and smooth-rimmed atrial apertures, usually with a tongue from the upper rim of the opening or from the body wall anterior to the opening. Zooids may be arranged with their atrial openings into sometimes extensive branching cloacal canals or in circular systems around simple cloacal cavities. Colonies vary from small cushions to large irregular and sometimes lobed masses, or stalked heads, and many species have sand or other particles embedded in the test. Gonads are in a thread- or sac-like posterior abdomen with the testis follicles respectively serially arranged or bunched. The ovary is small and is anterior to the testis follicles. Fertilisation appears to occur in the atrial cavity or the distal end of the oviduct, where embryos are found at different stages of development. The gut loop is relatively short and the stomach is about halfway down the descending limb.

The stomach wall has parallel longitudinal folds in *Aplidium* Savigny, 1816 and is either smooth or has mulberry-like pockets in its wall in *Polyclinum* Savigny, 1816, *Aplidiopsis* Lahille, 1890, *Synoicum* Phipps, 1774, *Morchellium* Giard, 1872 and *Sidneioides* Kesteven, 1909. *Aplidium* often has long, thread-like posterior abdomina. The posterior abdomina of *Synoicum* and *Morchellium* are seldom so long. In *Polyclinum*, *Aplidiopsis* and *Sidneioides* the abdomen is separated from a more or less sac-like posterior abdomen by a constriction. The last three genera have larvae with vesicles separating from posteriorly projecting bilateral strands of larval ectoderm, one strand each side of the dorsal midline, and one each side of the postero-ventral corner of the larvae trunk, as well as anterior epidermal ampullae and adhesive organs. *Aplidium* usually has epidermal vesicles separating from the epidermis at the anterior end of the larval trunk around and amongst the adhesive organs. *Synoicum* has

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a stomach wall and larval epidermal vesicles like *Polyclinum*, *Aplidiopsis* and *Sidneioides*. The phylogenetic position of *Morchellium* is uncertain. It may be allied to *Aplidium*, the stomach being more barrel-shaped than the dorsally shortened stomach of *Polyclinum*. Larvae are not known for the Australian species of *Morchellium*, but the English Channel species, *M. argus* (see Berrill 1950), has anterior vesicles similar to those of *Aplidium*.

Polyclinum has branchial papillae, possible vestiges of the inner longitudinal branchial vessels found also in Protopolyclinidae, suggesting a protopolyclinid ancestry for *Polyclinum* and its related genera *Aplidiopsis*, *Sidneioides* and probably *Synoicum*. However, the folded stomach wall, and thread-like posterior abdomina of Ritterellidae suggest a direct relationship with *Aplidium*. Polyclinidae may therefore be polyphyletic, for although most of the genera are related to one another and appear to have an ancestor in the Protopolyclinidae, *Aplidium* and possibly *Morchellium* may have evolved from Ritterellidae after its isolation from the Protopolyclinidae.

Aplidium is one of the most speciose of the genera in tropical, temperate and polar waters in most parts of the world including Australia where 47 species are recorded. *Synoicum* (22 species) and *Polyclinum* (12 species) are also well represented. Two species each of *Aplidiopsis* and *Morchellium* are known from Australia, as well as one of the two known species of *Sidneioides* (see Kott 1992). As in other families, tropical species appear to have a wider range than temperate ones.

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Aplidiopsis Lahille, 1890

Aplidiopsis Lahille, F. (1890). *Recherches sur les tuniciers des côtes de France*. Toulouse : Lagarde et Sebillé 330 pp. [206].

Type species: *Aplidium vitreum* Lahille, 1887 by monotypy.

Extralimital distribution: tropical Atlantic, Mediterranean Sea, north Atlantic Ocean, temperate west Pacific Ocean. See: Kott, P. (1990). The Australian Ascidacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

Aplidiopsis confluenta Kott, 1992

Aplidiopsis confluenta Kott, P. (1992). The Australian Ascidacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [468].

Type data: holotype QM GH5514.

Type locality: Ninepin Point, 5 m, TAS.

Distribution: TAS (Tas. coast); known only from type locality.

Ecology: benthic, marine.

***Aplidiopsis mammillata* Kott, 1992**

Aplidiopsis mammillata Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [469].

Type data: holotype QM GH4168.

Type locality: Cathedral Rock, near Thistle Is., Spencer Gulf, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

***Aplidiopsis sabulosa* Kott, 1992**

Aplidiopsis sabulosa Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [470].

Type data: holotype QM GH4153.

Type locality: Avoid Bay, Price Is., 15–20 m, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine; 15–20 m.

***Aplidium* Savigny, 1816**

Aplidium Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [182].

Type species: *Aplidium lobatum* Savigny, 1816 by subsequent designation, see Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275.

Sidnyum Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [238].

Type species: *Sidnyum turbinatum* Savigny, 1816 by subsequent designation, see Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275.

Amaroucium Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [283].

Type species: *Amaroucium proliferum* Milne-Edwards, 1841 by original designation.

Parascidia Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [291].

Type species: *Parascidia flavum* Milne-Edwards, 1841 by monotypy.

Circinalium Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [639].

Type species: *Circinalium conrescens* Giard, 1872 by monotypy.

Fragarium Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [638].

Type species: *Fragarium elegans* Giard, 1872 by monotypy.

Psammaplidium Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [237].

Type species: *Psammaplidium spongiforme* Herdman, 1886 by original designation.

Heterotrema Fiedler, K. (1889). *Heterotrema sarasinorum*, eine neue Synascidiengattung aus der familie der Distomidae. *Zool. Jahrb. Jena* **4**: 859–878 [877].

Type species: *Heterotrema sarasinorum* Fiedler, 1889 by monotypy.

Macreteron Redikorzev, V. (1927). Zehn neue Ascidien aus dem fernen Osten. *Zool. Jahrb. Jena* **53**: 373–404 [378].

Type species: *Macreteron ritteri* Redikorzev, 1927 by original designation.

Taxonomic decision for synonymy: Harant, H. (1929). Ascidies provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110 [19, 20]; Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2)6 [666]; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221 [128]; Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [509].

Extralimital distribution: worldwide. See: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

***Aplidium acroporum* Kott, 1992**

Aplidium acroporum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [513].

Type data: holotype SAMA E2554 (QM GH4169), paratype(s) QM GH5443, GH5431.

Type locality: The Gap, near Thistle Is., Spencer Gulf, SA.

Distribution: SA (S Gulfs coast).

Ecology: benthic, marine; in algae covering rocks merging to sand and sea grass, 12 m.

***Aplidium altarium* (Sluiter, 1909)**

Amaroucium altarium Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [105].

Type data: holotype ZMA TU176.

Type locality: Nalahia Bay, Nusa Laut Is., 46 m, Indonesia, see Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200.

Distribution: Indonesia, NT (N coast), QLD (Great Barrier Reef, NE coast), WA (Central W coast, Lower W coast, N coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [519].

***Aplidium amorphatum* Kott, 1963**

Aplidium amorphatum Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [101].

Type data: holotype AM U3918.

Type locality: Bass Strait, 36 m, VIC [28°51'S 146°55'E].

Aplidium pseudobesum Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [101].

Type data: holotype AM Y1292, paratype(s) AM U3924, U3922.

Type locality: Tathra, near Green Cape, NSW.

Taxonomic decision for synonymy: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [522].

Distribution: NSW (Lower E coast), SA (Great Australian Bight), VIC (Bass Strait).

Ecology: benthic, marine.

***Aplidium australiense* Kott, 1963**

Aplidium australiense Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [111].

Type data: holotype AM Y1398, paratype(s) AM U3914.

Type locality: Shoreham, VIC.

Distribution: SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Great Australian Bight, SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [523].

***Aplidium bacculum* Kott, 1992**

Aplidium bacculum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [526].

Type data: holotype QM GH5434.

Type locality: Edithburgh, Yorke Peninsula, 12 m, SA [35°97'S 137°47'24"E].

Distribution: SA (Great Australian Bight, S Gulfs coast).

Ecology: benthic, marine.

***Aplidium brevilarvacium* Kott, 1963**

Aplidium brevilarvacium Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [113].

Type data: holotype AM U3926.

Type locality: Sugarloaf Rock, Cape Naturaliste, S WA.

Aplidium digitatum Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* **99**(1): 1–20 [7].

Type data: holotype SAMA E1030, paratypes QM G7508, AM Y1982.

Type locality: northern Great Australian Bight, 49 m, SA [32°24'S 133°30'E].

Taxonomic decision for synonymy: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [527].

Distribution: SA (Great Australian Bight, S Gulfs coast), WA (Lower W coast); isolated record from Heron Is., QLD.

Ecology: benthic, marine.

***Aplidium caelestis* Monniot, 1987**

Aplidium caelestis Monniot, F. (1987). Ascidies de Nouvelle-Calédonie III. Polyclinidae du lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **9A**(3): 499–535 [517].

Type data: syntypes MNHP A1-Apl B-221*.

Type locality: Woodin Canal, 20–27 m, New Caledonia.

Distribution: New Caledonia, Norfolk Island, QLD (Great Barrier Reef), SA (S Gulfs coast), VIC (Bass Strait, SE oceanic), WA (Central W coast, Lower W coast); Marianas.

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [528].

***Aplidium clivosum* Kott, 1992**

Aplidium clivosum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [530].

Type data: holotype SAMA E2561, paratype(s) QM G1197.

Type locality: on jetty piles, SE Beachport, 6–7 m, SA.

Distribution: NSW (Lower E coast), NT (N coast), QLD (Great Barrier Reef), SA (Great Australian Bight, S Gulfs coast), WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine.

***Aplidium congregatum* Kott, 1992**

Aplidium congregatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [533].

Type data: holotype QM GH5584.

Type locality: Point Lookout, N Stradbroke Is., QLD.

Distribution: QLD (Central E coast); known only from type locality.

Ecology: benthic, marine; tucked into narrow rocky crevices.

***Aplidium coniferum* Kott, 1963**

Aplidium coniferum Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [102].

Type data: holotype AM U3921.

Type locality: near Twofold Bay, 57–65 m, NSW.

Distribution: NSW (Lower E coast), SA (Great Australian Bight), TAS (Bass Strait), VIC (Bass Strait).

Ecology: benthic, marine; to 400 m.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [535].

Aplidium crateriferum (Sluiter, 1909)

Amaroucium crateriferum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Asciden. *Siboga Exped.* **56B**: 1–112 [103].

Type data: lectotype ZMA TU1278, paralectotype(s) ZMA TU179.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [159].

Type locality: Sulu harbour, Sulu Is., 14 m, Indonesia.

Distribution: Philippines, QLD (Great Barrier Reef), WA (NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [536].

Aplidium depressum Sluiter, 1909

Aplidium depressum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Asciden. *Siboga Exped.* **56B**: 1–112 [102].

Type data: holotype ZMA TU201.

Type locality: 521 m, Indonesia [7°35'24"S 117°28'36"E].

Distribution: Indonesia, Hong Kong, QLD (Great Barrier Reef, NE coast).

Ecology: benthic, marine; often on carapace of crabs.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

Aplidium directum Kott, 1972

Aplidium directum Kott, P. (1972). Notes on some ascidians from Port Jackson, Botany Bay and Port Hacking NSW. *Proc. Linn. Soc. N.S.W.* **97**(4): 241–257 [246].

Type data: holotype AM Y1110, paratype(s) AM Y111.

Type locality: off Cronulla, 90 m, NSW.

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast).

Ecology: benthic, marine; 6–140 m on sea floor.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [539].

Aplidium distaplium Kott, 1992

Aplidium distaplium Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [540].

Type data: holotype QM G12728, paratype(s) QM G12729.

Type locality: 560 m off shore, 10 km SW Seaspray, off Ninety Mile Beach, Bass Strait, VIC.

Distribution: SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine; 12 m, fast current on calcarenite reef.

Aplidium elatum Kott, 1972

Aplidium elatum Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [177].

Type data: holotype SAMA E906, paratype(s) SAMA E905.

Type locality: Elliston Bay, 17 m, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [541].

Aplidium filiforme Kott, 1992

Aplidium filiforme Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [542].

Type data: holotype QM GH5527, paratype(s) QM GH5528.

Type locality: Blue Pools, Heron Is., QLD.

Distribution: QLD (Great Barrier Reef), WA (Lower W coast).

Ecology: benthic, marine.

Aplidium fluoescum Kott, 1992

Aplidium fluoescum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [544].

Type data: holotype QM GH5243, paratype(s) QM GH5244, GH5245, GH5246, GH5247.

Type locality: NE Point, Heron Is., QLD.

Distribution: QLD (Great Barrier Reef, NE coast).

Ecology: benthic, marine; reef, rubble fauna.

Aplidium gastrolineatum Kott, 1992

Aplidium gastrolineatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [546].

Type data: holotype SAMA E2584.

Type locality: Anxious Bay, 1 km NW of Waldegrave Is., 23 m, SA [33°33'S 134°46'E].

Distribution: SA (Great Australian Bight).

Ecology: benthic, marine; rocky bottom, slow current.

Aplidium gelasinum Kott, 1992

Aplidium gelasinum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [547].

Type data: holotype QM GH5333.

Type locality: Tydeman Reef, far northern Great Barrier Reef, QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

***Aplidium geminatum* Kott, 1992**

Aplidium geminatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [548].

Type data: holotype QM GH4175, paratype(s) QM GH4229.
Type locality: Avoid Bay, Price Is., SA.

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait), VIC (Bass Strait).

Ecology: benthic, marine.

***Aplidium grisiatum* Kott, 1998**

Aplidium griseum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [551] [junior primary homonym of *Aplidium griseum* Lahille, 1890].

Type data: holotype QM GH5212, paratype(s) QM GH5214, GH5215.

Type locality: near reef edge, Heron Is., QLD.

Aplidium grisiatum Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne: CSIRO Publishing, Australia Vol. 34 298 pp. [119] [*nom. nov.* for *Aplidium griseum* Kott, 1992].

Distribution: Palau, NT (N coast), QLD (Great Barrier Reef).

Ecology: benthic, marine; under rubble near reef edge.

***Aplidium incubatum* Kott, 1992**

Aplidium incubatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [551].

Type data: holotype QM GH5309, paratype(s) QM GH5310.
Type locality: Point Lookout, N Stradbroke Is., QLD.

Distribution: QLD (Central E coast).

Ecology: benthic, marine; rocky substrates, 0–10 m.

***Aplidium inflorescens* Kott, 1992**

Aplidium inflorescens Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [553].

Type data: holotype SAMA E2588.

Type locality: NNE Cape Catastrophe, SW Point, Grindal Is., 18 m, SA.

Distribution: SA (Great Australian Bight), VIC (Bass Strait).

Ecology: benthic, marine.

***Aplidium jacksoni* Kott, 1963**

Aplidium jacksoni Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [110].

Type data: holotype AM U3917.

Type locality: Port Jackson, NSW.

Distribution: NSW (Lower E coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [554].

***Aplidium lenticulum* Kott, 1992**

Aplidium lenticulum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [555].

Type data: holotype QM GH5060, paratype(s) QM GH5061.
Type locality: Heron Is., 3 m, QLD.

Distribution: QLD (Great Barrier Reef), SA (Great Australian Bight), WA (Lower W coast).

Ecology: benthic, marine.

***Aplidium lodix* Kott, 1992**

Aplidium lodix Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [557].

Type data: holotype QM G12712.

Type locality: Crawfish Rock, Western Port, VIC.

Distribution: SA (Great Australian Bight), VIC (Bass Strait).

Ecology: benthic, marine.

***Aplidium longithorax* Monniot, 1987**

Aplidium longithorax Monniot, F. (1987). Ascidiées de Nouvelle-Calédonie III. Polyclinidae du lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4)**9A**(3): 499–535 [525].

Type data: holotype MNHP Al-Apl B-210*.

Type locality: lagoon, Woodin Canal, New Caledonia.

Distribution: Palau, New Caledonia, NSW (Lower E coast), QLD (Great Barrier Reef).

Ecology: benthic, marine; 0–100 m.

Reference: Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [139].

***Aplidium lunacratum* Kott, 1992**

Psammaplidium ordinatum Herdman, W. & Riddell, W. (1913). The Tunicata of the 'Thetis' Expedition. In, Scientific results of the Trawl Expedition Thetis, Part 17. *Mem. Aust. Mus.* **4**: 873–889 [884] [junior primary homonym of *Psammaplidium ordinatum* Sluiter, 1906].

Type data: holotype AM G12216.

Type locality: Manning River, NSW.

Aplidium lunacratum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [558] [*nom. nov.* for *Psammaplidium ordinatum* Herdman & Riddell, 1913].

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

***Aplidium macrolobatum* Kott, 1992**

Aplidium macrolobatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [561].

Type data: holotype QM GH5169, paratype(s) QM GH5170. Type locality: outer edge of reef, NE Heron Is., QLD.

Distribution: QLD (Great Barrier Reef, NE coast).

Ecology: benthic, marine; on under-surface of rubble, outer edge of reef, sometimes on crabs.

***Aplidium magnilarvum* Kott, 1992**

Aplidium magnilarvum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [563].

Type data: holotype SAMA E2582, paratype(s) SAMA E2583.

Type locality: 115 nautical miles SW of Eucla, 180 m, WA [38°17'S 129°37'E].

Distribution: WA (Great Australian Bight).

Ecology: benthic, marine; 180–190 m.

***Aplidium minisculum* Kott, 1992**

Aplidium minisculum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [564].

Type data: holotype QM G11920.

Type locality: Portsea Pier, 2 m, VIC.

Distribution: VIC (Bass Strait).

Ecology: benthic, marine.

***Aplidium multilineatum* Kott, 1992**

Aplidium multilineatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [566].

Type data: holotype AM U3954.

Type locality: Salmon Bay, Rottnest Is., WA.

Distribution: TAS (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

***Aplidium multiplicatum* Sluiter, 1909**

Aplidium multiplicatum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [56].

Type data: lectotype ZMA TU 205, paralectotype(s) ZMA TU 203.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [160].

Type locality: Tual anchorage, Kei Is., 22 m, Indonesia.

Aplidium controversum Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [135].

Type data: holotype MNHP A1 Apl B312*.

Type locality: Marine Lake, Koror State, Palau.

Taxonomic decision for synonymy: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1629].

Distribution: Philippines, Hong Kong, Palau, Kiribati, NSW (Lower E coast), NT (N coast), QLD (Great Barrier Reef, NE coast), SA (S Gulfs coast), WA (Central W coast, Lower W coast, NW coast); also Majura Atoll, Truk, Ponape.

Ecology: benthic, marine.

***Aplidium opacum* Kott, 1963**

Aplidium opacum Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [108].

Type data: holotype AM U3929.

Type locality: Balnarring Beach, VIC.

Aplidium foliorum Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* **99**(1): 1–20 [5].

Type data: holotype SAM E1036.

Type locality: northern Great Australian Bight, SA.

Taxonomic decision for synonymy: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [570].

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

***Aplidium ornatum* Kott, 1992**

Aplidium ornatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [572].

Type data: holotype QM GH5157.

Type locality: NW corner, Wistari Reef, QLD.

Distribution: QLD (Central E coast, Great Barrier Reef).

Ecology: benthic, marine; lower tide, under rubble near reef edge.

***Aplidium paralineatum* Kott, 1992**

Aplidium paralineatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [574].

Type data: holotype SAMA E10648.

Type locality: 45 nautical miles N of Sister Is., 92 m, TAS [39°00'S 148°25'E].

Distribution: TAS (Bass Strait); known only from type locality.

Ecology: benthic, marine; 92 m.

***Aplidium parastigmaticum* Kott, 1992**

Aplidium parastigmaticum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [575].

Type data: holotype QM GH5603.

Type locality: reef slope, Heron Is., 10 m, QLD.

Distribution: QLD (Great Barrier Reef).

Ecology: benthic, marine; 10 m, reef slope.

***Aplidium parvum* Kott, 1963**

Aplidium parvum Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [112].

Type data: syntypes AM Y1832.

Type locality: San Remo, VIC.

Distribution: VIC (Bass Strait), WA (SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [577].

***Aplidium petrosum* Kott, 1992**

Aplidium petrosum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [577].

Type data: holotype QM GH5454.

Type locality: Margaret Brock Lighthouse, Cape Jaffa, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast).

Ecology: benthic, marine.

***Aplidium pronum* Kott, 1975**

Aplidium pronum Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* **99**(1): 1–20 [6].

Type data: holotype NMV H287.

Type locality: Investigator Strait, 19 m, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

***Aplidium ritteri* (Sluiter, 1895)**

Amaroucium ritteri Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.- Naturw. Ges. Jena* **8**: 163–186; Nachtrag zu den tunicaten: 325–326. [170].

Type data: holotype ZMA TU189.

Type locality: Thursday Is., Torres Strait, north Australia.

Distribution: Palau, New Caledonia, French Polynesia, QLD (Great Barrier Reef, NE coast); also Truk, Ponape.

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [581].

***Aplidium robustum* Kott, 1992**

Aplidium robustum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [582].

Type data: holotype QM GH5467, paratype(s) QM GH5506.

Type locality: south of Mt Martin, King George Sound, Albany, 2 m, WA [35°00'48"S 117°57'E].

Distribution: SA (Great Australian Bight), TAS (Tas. coast), WA (SW coast).

Ecology: benthic, marine; in small crevices in flat base rock.

***Aplidium rosarium* Kott, 1992**

Aplidium rosarium Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [583].

Type data: holotype QM GH5224.

Type locality: Blue pools, Heron Is., QLD.

Distribution: QLD (NE coast); known only from type locality.

Ecology: benthic, marine; rubble fauna.

***Aplidium rubricollum* Kott, 1963**

Aplidium rubricollum Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [103].

Type data: holotype AM Y1417, paratype(s) AM Y1403, Y1415.

Type locality: Reevesby Is., SA.

Distribution: SA (Great Australian Bight, S Gulfs coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [584].

***Aplidium solidum* (Herdman, 1891)**

Psammaplidium solidum Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [620] [*Amaroucium solidum* Ritter & Forsyth, 1917 is a junior secondary homonym].

Type data: holotype AM U165 (G2108).

Type locality: Port Jackson, NSW.

Psammaplidium fragile Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [620].

Type data: holotype AM U166 (G2110).

Type locality: Port Jackson, NSW.

Psammaplidium incrustans Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [620].

Type data: holotype AM U167 (G2111).

Type locality: Port Stephens, NSW.

Psammaplidium lobatum Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [620] [junior primary homonym of *Aplidium lobatum* Savigny, 1816].

Type data: holotype QM U164 (G2109).

Type locality: Port Jackson, NSW.

Aplidium arboratum Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [96] [unnecessary *nom. nov.* for *Psammaplidium lobatum* Herdman, 1899].

Synoicum investum Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [90].

Type data: holotype AM U3928.

Type locality: Bargara, Hervey Bay, QLD.

Taxonomic decision for synonymy: Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [586].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), WA (NW coast).

Ecology: benthic, marine.

Aplidium tabascum Kott, 1992

Aplidium tabascum Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [589].

Type data: holotype QM GH5208, paratype(s) QM GH5542, G9727.

Type locality: reef, Heron Is., 15 m, QLD.

Distribution: Papua New Guinea, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Aplidium triggsense Kott, 1963

Aplidium triggsensis Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [104].

Type data: holotype QM V3923, paratypes AM Y1405, AM Y1408, AM Y1421, AM Y1427, AM Y1428.

Type locality: Trigg's Is., near Fremantle, WA.

Distribution: New Caledonia, QLD (Great Barrier Reef), SA (Great Australian Bight), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine; often subjected to surf, turbulence and strong currents.

Reference: Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [590].

Aplidium uteute Monniot & Monniot, 1987

Aplidium uteute Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [79].

Type data: holotype MNHP A APL B194*.

Type locality: Moorea, French Polynesia.

Aplidium latusexitus Monniot, F. (1987). Ascidies de Nouvelle-Calédonie III. Polyclinidae du lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **9A**(3): 499–535 [523].

Type data: holotype MNHP Al-Apl B-213*.

Type locality: New Caledonia, 35 m along Woodwin Canal.

Taxonomic decision for synonymy: Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [592].

Distribution: New Caledonia, French Polynesia, QLD (Great Barrier Reef).

Ecology: benthic, marine.

Morchellium Giard, 1872

Morchellium Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [641].

Type species: *Amaroucium argus* Milne-Edwards, 1841 by monotypy.

Extralimital distribution: Palaearctic Region; western Europe, west Pacific Ocean. See: Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

Morchellium albidum Kott, 1992

Morchellium albidum Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [505].

Type data: holotype QM GH5582.

Type locality: Wedge Is., West Bay, southern Spencer Gulf, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

Morchellium pannosum Kott, 1992

Morchellium pannosum Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [506].

Type data: holotype QM G12722.

Type locality: Port Phillip Heads, 18 m, VIC.

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine.

Polyclinum Savigny, 1816

Polyclinum Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [189].

Type species: *Polyclinum saturnium* Savigny, 1816 by subsequent designation, see Hartmeyer, R. (1915). Ascidium nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258 [257].

Glossophorum Lahille, F. (1887). Système musculaire du *Glossophorum sabulosum* (G.) (*Polyclinum sabulosum*, Giard). *Bull. Soc. Toulouse* **19**: 107–116 [107].

Type species: *Polyclinum sabulosum* Giard, 1872 by original designation.

Taxonomic decision for synonymy: Hartmeyer, R. (1916). Ueber einige Ascidien aus dem Golf von Suez. *Sber. Ges. Naturf. Freunde Berl.* **1915**: 397–430 [428].

Extralimital distribution: temperate and tropical seas to the Faroe IIs. See: Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Kott, P. (1992). The Australian Ascidacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

***Polyclinum fungosum* Herdman, 1886**

Polyclinum fungosum Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [190].
Type data: holotype BMNH 1887.2.4.323*.
Type locality: Port Jackson, 12–30 m, NSW.

Distribution: NSW (Lower E coast), VIC (Bass Strait).
Ecology: benthic, marine.
Reference: Kott, P. (1992). The Australian Ascidacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [447].

***Polyclinum glabrum* Sluiter, 1895**

Polyclinum glabrum Sluiter, C.P. (1895). Tunicaten. In: Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.-Naturw. Ges. Jena* **8**: 163–186; Nachtrag zu den tunicaten: 325–326. [168].
Type data: holotype ZMA TU824*.
Type locality: Ambon, Indonesia.

Distribution: Indonesia, NT (N coast), QLD (Great Barrier Reef, NE coast), WA (NW coast).
Ecology: benthic, marine.
Reference: Kott, P. (1992). The Australian Ascidacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

***Polyclinum incrustatum* Michaelsen, 1930**

Polyclinum neptunium incrustatum Michaelsen, W. (1930). Ascidiae Krikobranthiae. *Fauna Südwest-Aust.* **5**(7): 463–558 [542] [proposed with subspecific rank in *Polyclinum neptunium* Hartmeyer, 1912].
Type data: holotype (probable) ZMB 3892*.
Type locality: Koombana Bay, Geographe Bay, 14.5–18 m, WA.

Taxonomic decision for new combination: Kott, P. (1992). The Australian Ascidacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [450] (as *Polyclinum incrustatum*).

Distribution: SA (Great Australian Bight, S Gulfs coast), WA (Great Australian Bight, SW coast).
Ecology: benthic, marine.

***Polyclinum marsupiale* Kott, 1963**

Polyclinum marsupiale Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [83].
Type data: holotype AM U3915, paratype(s) AM U3916.
Type locality: Hunter Is., Bass Strait, TAS.

Distribution: SA (S Gulfs coast), TAS (Bass Strait), VIC (Bass Strait), WA (SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

***Polyclinum nudum* Kott, 1992**

Polyclinum nudum Kott, P. (1992). The Australian Ascidacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [454].
Type data: holotype QM GH5391, paratype(s) QM GH5387.
Type locality: old jetty piles, Coffs Harbour, 0.5 m, NSW.

Distribution: NSW (Lower E coast).
Ecology: benthic, marine.

***Polyclinum orbitum* Kott, 1992**

Polyclinum orbitum Kott, P. (1992). The Australian Ascidacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [455].
Type data: holotype QM G12730, paratype(s) QM G12731.
Type locality: 560 m offshore, 10 km SW of Seaspray, Ninety Mile Beach, 12 m, VIC.

Distribution: VIC (Bass Strait).
Ecology: benthic, marine; 12 m, fast currents, calcarenite reef.

***Polyclinum psammiferum* Hartmeyer, 1909**

Polyclinum psammiferum Hartmeyer, R. (1909). Ascidiien (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig : C.F. Winter Vol. 3, suppl. pts 81–87 [1461] [*nom. nov.* for *Polyclinum sabulosum* Sluiter, 1909].

Polyclinum sabulosum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidiien. *Siboga Exped.* **56B**: 1–112 [96] [junior homonym of *Polyclinum sabulosum* Giard, 1872 (= *Polyclinum aurantium* Milne-Edwards, 1841)].
Type data: holotype ZMA TU832.
Type locality: Labuan Badjo, Flores, Indonesia.

Polyclinum solum Kott, P. (1992). The Australian Ascidacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [458] [unnecessary *nom. nov.* for *Polyclinum sabulosum* Sluiter, 1909].

Distribution: Indonesia, NT (N coast), QLD (Great Barrier Reef, NE coast).
Ecology: benthic, marine.
Reference: Kott, P. (2004). Ascidacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [46].

***Polyclinum saturnium* Savigny, 1816**

Polyclinum saturnium Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [190].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Suez, Red Sea.

Distribution: Philippines, QLD (NE coast), WA (Lower W coast); Suez, Red Sea.

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [455].

***Polyclinum tenuatum* Kott, 1992**

Polyclinum tenuatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [461].

Type data: holotype AM Y2261, paratype(s) AM Y1356.

Type locality: Shelly Beach, Nornalup, WA.

Distribution: SA (S Gulfs coast), WA (SW coast).

Ecology: benthic, marine.

***Polyclinum terranum* Kott, 1992**

Polyclinum terranum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [461].

Type data: holotype QM GH5460.

Type locality: Rockingham, 15 m, WA [32°15'42"S 115°37'06"E].

Distribution: WA (SW coast); known only from type locality.

Ecology: benthic, marine.

***Polyclinum tsutsuii* Tokioka, 1954**

Polyclinum tsutsuii Tokioka, T. (1954). Contributions to Japanese ascidian fauna VII. Invertebrate fauna of the intertidal zone of the Tokara Islands. VII Ascidiaceans. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **3**(3): 239–264 [240].

Type data: holotype SMBL 127*.

Type locality: Maégomori, Takarazima, Tokara Is., Japan.

Polyclinum pute Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155 [84].

Type data: holotype MNHP A1 POL B33*.

Type locality: Tikehau, French Polynesia.

Polyclinum corbis Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1626].

Type data: holotype WAM 476.91, paratype(s) WAM 475.91.

Type locality: W of Cervantes, WA.

Taxonomic decision for synonymy: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [47].

Distribution: Philippines, Kiribati, French Polynesia, QLD (Great Barrier Reef), WA (Lower W coast, N coast); also Marianas Islands, Tokara Is., West Pacific.

Ecology: benthic, marine.

***Polyclinum vasculosum* Pizon, 1908**

Polyclinum vasculosum Pizon, A. (1908). Ascidies d'Amboine. *Rev. Suisse Zool.* **16**: 195–248 [223].

Type data: holotype GMNH T1/91*.

Type locality: Ambon (as Amboine), Indonesia.

Polyclinum macrophyllum Michaelsen, W. (1919). Die Krikobranchen Ascidien des westlichen Indischen Ozeans: Claveliniden und Synoiciden. *Jahrb. Hamb. Wiss. Anst.* **36**: 71–102 [82].

Type data: holotype ZMH*.

Type locality: Bay of Tuléar, southwest Malagasy.

Taxonomic decision for synonymy: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [464].

Distribution: Philippines, Hawaii, QLD (Central E coast, Great Barrier Reef, NE coast), WA (Central W coast, NW coast); W Indian Ocean.

Ecology: benthic, marine.

***Sidneioides* Kesteven, 1909**

Sidneioides Kesteven, H.L. (1909). Studies on Tunicata no. 1. *Proc. Linn. Soc. N.S.W.* **34**: 276–295 [277].

Type species: *Sidneioides tamaramae* Kesteven, 1909 by original designation.

Extralimital distribution: See: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

***Sidneioides tamaramae* Kesteven, 1909**

Sidneioides tamaramae Kesteven, H.L. (1909). Studies on Tunicata no. 1. *Proc. Linn. Soc. N.S.W.* **34**: 276–295 [277].

Type data: holotype AM U564.

Type locality: Tamaramae Bay, NSW.

Distribution: NSW (Lower E coast), QLD (NE coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [472].

***Synoicum* Phipps, 1774**

Synoicum Phipps, C.J. (1774). pp. 194, 195, 199–200, pl. 13 fig. 3 in, *A Voyage towards the North Pole undertaken by His Majesty's Command, 1773*. London. [199].

Type species: *Synoicum turgens* Phipps, 1774 by subsequent designation, see Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidiaceenfauna auf tiergeographischer Grundlage. *Ingolf-Expedit.* **2**(7): 1–275.

Macroclinum Verrill, A.E. (1871). Descriptions of some imperfectly known and new ascidians from New England. *Amer. J. Sci.* (3) **1**: 54–58, 93–100, 211–212, 288–294, 443–446 [292].

Type species: *Macroclinum crater* Verrill, 1871 (= *Synoicum pulmonaria*, Ellis & Solander, 1786) by original designation.

Atopogaster Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [163].

Type species: *Atopogaster gigantea* Herdman, 1886 by original designation.

Lissamaroucium Sluiter, C.P. (1906). *Tuniciers de l'Expédition antarctique Française (1903–1905)*. Paris : Masson pp. 1–48 5 pls [19].

Type species: *Lissamaroucium magnum* Sluiter, 1906 by original designation.

Taxonomic decision for synonymy: Hartmeyer, R. (1921). Die Gattung *Atopogaster* Herdman (Ascidiaceae). *Zool. Anz.* **53**: 273–281 [273].

Extralimital distribution: Antarctic Region; north Pacific Ocean, Bering Sea, tropical west Pacific Ocean, Atlantic Ocean to New Zealand and Antarctica. See: Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

***Synoicum angustum* Kott, 1992**

Synoicum angustum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [477].

Type data: holotype SAMA E2570, paratype(s) SAMA E2572, E2573.

Type locality: 45 nautical miles NNE of East Sister Is., 92 m, TAS [39°00'S 148°25'E].

Distribution: TAS (Bass Strait); known only from type locality.

Ecology: sand bottom.

***Synoicum arenaceum* (Michaelsen, 1924)**

Macroclinum arenaceum Michaelsen, W. (1924). Ascidiaceae Krikobanchiae von Neuseeland, den Chatham und den Auckland Inseln. *Vidensk. Meddr. Dansk Naturh. Foren.* **77**: 263–434 [406].

Type data: holotype ZMUC*.

Type locality: 2 miles from North Cape, North Island, 110 m, New Zealand.

Taxonomic decision for new combination: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [478] (as *Synoicum arenaceum* (Michaelsen, 1924)).

Distribution: New Zealand, VIC (Bass Strait).

Ecology: benthic, marine; to 274 m.

***Synoicum atopogaster* Kott, 1963**

Synoicum atopogaster Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [89].

Type data: holotype AM U3927.

Type locality: west of Houtman Abrolhos, 36 m, WA [28°33'30"S 113°E].

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [478].

***Synoicum bowerbanki* Millar, 1963**

Synoicum bowerbanki Millar, R.H. (1963). Australian ascidians in the British Museum (Natural History). *Proc. Zool. Soc. Lond.* **141**(4): 689–746 [696].

Type data: holotype BMNH 61.9.20.7*.

Type locality: Fremantle, WA.

Distribution: VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [480].

***Synoicum buccinum* Kott, 1992**

Synoicum buccinum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [481].

Type data: holotype QM GH5045, paratype(s) QM GH5046, GH5047, GH5048.

Type locality: cave, Marion Reef, 8 m, Coral Sea.

Distribution: QLD (Great Barrier Reef, NE oceanic).

Ecology: benthic, marine; rubble zone, sandy substrate.

***Synoicum castellatum* Kott, 1992**

Synoicum castellatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [483].

Type data: holotype QM GH5160, paratype(s) QM GH5163.

Type locality: North Point, Heron Is., 5 m, QLD.

Distribution: NT (Gulf of Carpentaria), QLD (Great Barrier Reef, Gulf of Carpentaria), WA (NW coast).

Ecology: benthic, marine.

***Synoicum chrysanthemum* Kott, 1992**

Synoicum chrysanthemum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [485].

Type data: holotype WAM 1031.83, paratype(s) WAM 1032.83, 850.83 (QM GH2115).

Type locality: NW Bluff Point, 130 m, WA [27°40'S 113°03'E].

Distribution: WA (Lower W coast).

Ecology: benthic, marine.

***Synoicum citrum* Kott, 1992**

Synoicum citrum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [486].

Type data: holotype QM GH5104, paratype(s) NMV F59369.
Type locality: vertical face, Wilson's Promontory, Waterloo Bay, 25 m, VIC.

Distribution: SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

***Synoicum concavatum* Kott, 1992**

Synoicum concavatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [487].

Type data: holotype QM GH5465.

Type locality: reef, Eclipse Is., SW entrance to King George Sound, WA.

Distribution: WA (SW coast); known only from type locality.

Ecology: benthic, marine; rocky granite reef.

***Synoicum erectum* Kott, 1992**

Synoicum erectum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [489].

Type data: holotype NMV F59367.

Type locality: from Sharklines, south of Warrnambool, 350–350 m, VIC.

Distribution: SA (Great Australian Bight), VIC (Bass Strait).

Ecology: benthic, marine.

***Synoicum galei* (Michaelsen, 1930)**

Macroclinum hypurion galei Michaelsen, W. (1930). Ascidiæ Krikobranthiæ. *Fauna Südwest-Aust.* **5**(7): 463–558 [535].

Type data: holotype ZMB*.

Type locality: Fremantle, WA.

Taxonomic decision for new combination: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [490] (as *Synoicum galei*).

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Synoicum intercedens* (Sluiter, 1909)**

Morchellium intercedens Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Asciden. *Siboga Exped.* **56B**: 1–112 [108].

Type data: syntypes ZMA TU694.

Type locality: southeast side of Pearl bank, Sulu Archipelago, 15 m, Indonesia, see Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200.

Distribution: Indonesia, QLD (NE coast); Tahiti.

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

***Synoicum longistriatum* Kott, 1992**

Synoicum longistriatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [493].

Type data: holotype QM GH5583.

Type locality: 110 m, WA [32°S 155°08'E].

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Synoicum macroglossum* (Hartmeyer, 1919)**

Macroclinum macroglossum Hartmeyer, R. (1919). Asciden. In, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [126].

Type data: syntypes NHRM 1096*.

Type locality: 45 miles WSW Cape Jaubert, WA.

Taxonomic decision for new combination: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [494] (as *Synoicum macroglossum*).

Distribution: NT (N coast), QLD (Central E coast, Great Barrier Reef, NE coast), WA (NW coast).

Ecology: benthic, marine.

***Synoicum obscurum* Kott, 1992**

Synoicum obscurum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [496].

Type data: holotype QM G12726, paratype(s) QM G12727.

Type locality: 90 km SW of Lakes Entrance, reef off Ninety Mile Beach, Bass Strait, VIC.

Distribution: NSW (Lower E coast), VIC (Bass Strait).

Ecology: benthic, marine.

***Synoicum papilliferum* (Michaelsen, 1930)**

Macroclinum papilliferum Michaelsen, W. (1930). Ascidiæ Krikobranthiæ. *Fauna Südwest-Aust.* **5**(7): 463–558 [530].

Type data: syntypes (probable) ZMB*.

Type locality: Koombana Bay, near Bunbury, 14.5–18 m, WA.

Distribution: VIC (Bass Strait), WA (SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [497].

***Synoicum prunum* (Herdman, 1899)**

Polyclinum prunum Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [448] [*nom. nud.*].

Polyclinum prunum Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [83].

Type data: holotype AM U159 (G2102).

Type locality: Port Jackson, NSW.

Taxonomic decision for new combination: Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [87] (as *Synoicum prunum*).

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [498].

***Synoicum sacculum* Kott, 1992**

Synoicum sacculum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [499].

Type data: holotype SAMA E2556, paratype(s) QM GH5044, GH10163.

Type locality: in caves, Waldegrave Is., SA.

Distribution: SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine; in caves with 2 m waves, from jetty piles, and to 425 m (TAS).

***Synoicum saxeum* Kott, 1998**

Synoicum durum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [488] [junior primary homonym of *Synoicum durum* Sluiter, 1915].

Type data: holotype AM U3990.

Type locality: Heron Is., QLD.

Synoicum saxeum Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia. Hemichordata, Tunicata, Cephalochordata*. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [127] [*nom. nov.* for *Synoicum durum* Kott, 1992].

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

***Synoicum suarenium* Kott, 1992**

Synoicum suarenium Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [501].

Type data: holotype QM GH5080, paratype(s) QM GH5070.

Type locality: Wilson Reef, Capricorn Group, QLD.

Distribution: Indonesia, QLD (Great Barrier Reef, NE coast).

Ecology: benthic, marine.

***Synoicum tropicum* (Sluiter, 1909)**

Atopogaster tropicum Sluiter, C.P. (1909). Die Tunicaten der Siboga Expedition. Pt II. Die merosomen Ascidien. *Siboga Exped.* **56B**: 1–112 [107].

Type data: holotype ZMA TU291*.

Type locality: off Kapul Is., Sulu Archipelago, 13 m, Philippines.

Taxonomic decision for new combination: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [503] (as *Synoicum tropicum*).

Distribution: Indonesia, WA (NW coast).

Ecology: benthic, marine.

PROTOPOLYCLINIDAE

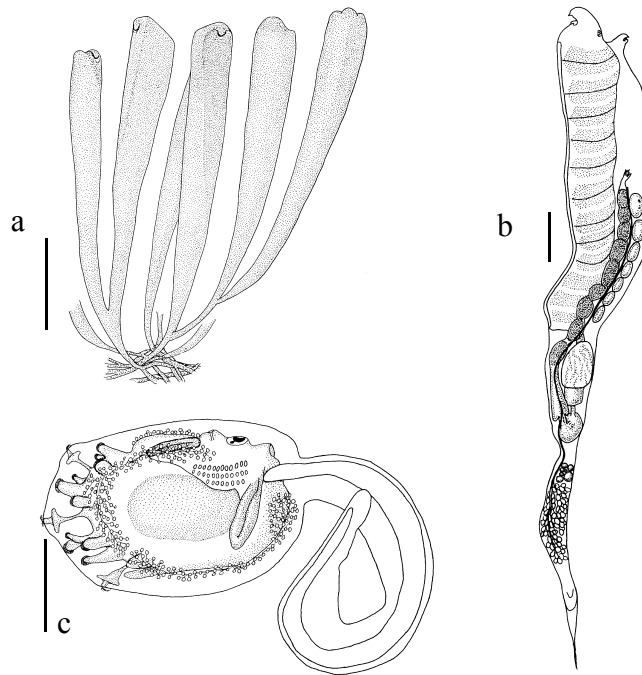


Fig. 9. *Monniotus australis* (Kott, 1957): **a**, part of a colony; **b**, mature zooid with developmental series of embryos in distal end of oviduct; **c**, larva. (Scale bars: a = 10 mm; b = 2.00 mm; c = 0.4 mm).
[from Kott 1992]

Zooids of the family Protopolyclinidae Kott, 1992 are divided into thorax, abdomen and posterior abdomen. The gonads are in the posterior abdomen. Both branchial and atrial openings are 6-lobed. The family contains species with either embedded zooids or zooids joined to one another only at the base. When embedded, the zooids are arranged in an orderly way, usually in systems but these are never cloacal systems. Atrial apertures are directed away from the branchial apertures but they never open into internal cloacal chambers. The abdomen is relatively short, the stomach wall sometimes is folded, the gonads are bunched in the posterior abdomen and the anus opens about halfway up the large thorax. As in *Polyclinum*, internal branchial papillae-possibly vestiges of the internal longitudinal branchial vessels of Cionidae and Diazonidae-usually are present in the branchial sac, suggesting a direct relationship with the Diazonidae. However, larvae have diverged considerably from the small oviparous diazonid larvae. Eggs are fertilised in the distal end of the oviduct which appears to extend alongside the rectum in the posterior half of the branchial sac. The larvae resemble those of Polyclinidae with median stalked adhesive organs, median and lateral epidermal amullae, and lateral epidermal vesicles.

Three genera are known in the family. They are recorded infrequently, and only from the Southern Hemisphere. One of the three genera is indigenous to Australian waters, one is known also from the West Indian Ocean, and the third, *Protopolyclinum* Millar, 1960 is known from a single record from New Zealand.

References

- Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620
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- Condominium*** Kott, 1992
- Condominium*** Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [396].
Type species: *Placentela areolata* Kott, 1963 by original designation.
Extralimital distribution: See: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.
- Condominium areolatum*** (Kott, 1963)
- Placentela areolata*** Kott, P. (1963). The ascidians of Australia IV. Aplousobranchiata Lahille; Polyclinidae Verrill (continued). *Aust. J. Mar. Freshwat. Res.* **14**(1): 70–118 [74].
Type data: holotype AM U3925, paratype(s) AM Y1316.
Type locality: 10 m, Mackay, QLD.
- Placentela ellistoni*** Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [173].
Type data: holotype SAMA E901, paratype(s) SAMA E900.
Type locality: inside caves, Elliston Bay, SA.
- Homoeodistoma omasum*** Monniot, F. (1987). Ascides de Nouvelle-Calédonie III. Polyclinidae du lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4)**9A**(3): 499–535 [503].
Type data: holotype MNHP AI-Hom-1*.
Type locality: Woodin Canal, lagoon of New Caledonia.
Taxonomic decision for synonymy: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [397].
Distribution: New Caledonia, Lord Howe Island, NSW (SE oceanic), QLD (Great Barrier Reef), SA (Great Australian Bight), WA (Lower W coast).
Ecology: benthic, marine, sand bottom.
- Monniotus*** Millar, 1988
- Monniotus*** Millar, R.H. (1988). Ascidians collected during the International Indian Ocean Expedition. *J. Nat. Hist.* **22**: 823–848 [826].
Type species: *Monniotus ramosus* Millar, 1988 by monotypy.
Extralimital distribution: west Indian Ocean. See: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [393].
- Monniotus australis*** (Kott, 1957)
- Euherdmania australis*** Kott, P. (1957). Ascidians of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [103].
Type data: syntypes AM Y1165, Y1317.
Type locality: Port Phillip Heads, VIC.
Taxonomic decision for new combination: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [394] (as *Monniotus australis*).
Distribution: SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).
Ecology: benthic, marine.
- Monniotus radiatus*** Kott, 1992
- Monniotus radiatus*** Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [396].
Type data: holotype AM G10012 (MV F58435).
Type locality: Nambucca Heads, 13 m, NSW.
Distribution: NSW (Lower E coast), VIC (Bass Strait).
Ecology: benthic, marine.

PSEUDODISTOMIDAE

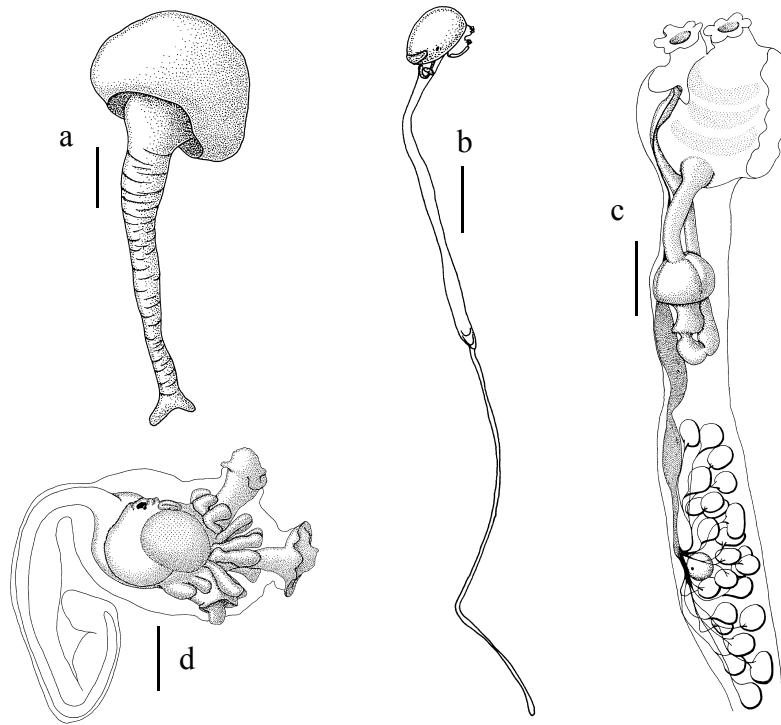


Fig. 10. *Pseudodistoma candens* Kott, 1992: **a**, colony; **b**, whole zooid with huge embryo at top of abdomen; **c**, zooid thorax and abdomen; **d**, larva. (Scale bars: **a** = 10.0 mm; **b** = 2.0 mm; **c** = 0.5 mm; **d** = 0.4 mm). [from Kott 1992]

The family Pseudodistomidae Harant, 1931 has, like Pycnoclavellidae and Euherdmaniidae, 6-lobed apertures opening separately to the exterior, gonads in a long, narrow posterior abdomen, and a moderately long vascular appendix. Like *Sigillina* Savigny, 1816 (Holozoidae), the family consistently has three rows of stigmata, and a gut loop of moderate length with the stomach (divided into four chambers) half to three-quarters of the distance down the descending limb. Fertilisation occurs at the base of the oviduct and embryos develop as they pass up the oviduct into a brood pouch projecting, and sometimes constricted off, from the zooid at the top of the abdomen (rather than in the thorax). Zooids are completely embedded, and the colonies are often (but not always) stalked. The test frequently is hardened with embedded sand.

Genera of this family are distinguished from *Sigillina* by the very long posterior abdomina containing the gonads. As in other families of Aplousobranchia, longitudinal thoracic muscles extend posteriorly in a band along each side of the abdomen and posterior abdomen, but usually not onto the vascular appendix as they do in *Sigillina*. The larvae are large, the trunk from 0.6 to more than 1.0 mm long. Unlike *Sigillina*, the large antero-median adhesive organs have unusual hollow eversible papillary cones (scyphate with an axial vesicle: Cloney 1990) and large lateral epidermal ampullae.

When Kott (1992) defined the family Pseudodistomidae, she overlooked the subfamily Pseudodistominae Harant, 1931. Although Kott's definition excludes other genera (*Ritterella* and *Placentela*) which Harant included, both family level taxa are based on the same nominal genus, and Harant is the author of the family, albeit redefined by Kott (1992).

The family contains two genera, the diverse *Pseudodistoma* and the monotypic *Anadistoma* Kott, 1992. The latter genus, known only from one Australian record, is distinguished by its inner coat of transverse muscles on the thorax, which suggests an affinity with *Eudistoma* Caullery, 1909 (Polycitoridae) rather than with *Sigillina* (Holozoidae). It is possible, therefore, that the family, as presently constituted, is polyphyletic.

The genus *Pseudodistoma* is well represented in Australian waters, especially in temperate waters, although two species are known from the tropics.

References

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- Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620
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Anadistoma Kott, 1992

Anadistoma Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [440].
Type species: *Anadistoma attenuatum* Kott, 1992 by original designation.

Anadistoma attenuatum Kott, 1992

Anadistoma attenuatum Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [440].
Type data: holotype AM Y1315, paratype(s) AM Y2212.
Type locality: Montague South, near Eden, 94 m, NSW.
Distribution: NSW (Lower E coast).
Ecology: benthic, marine.

Pseudodistoma Michaelsen, 1924

Pseudodistoma Michaelsen, W. (1924). Ascidiae Krikobranthiae von Neuseeland, den Chatham und den Auckland Inseln. *Vidensk. Meddr. Dansk Naturh. Foren.* **77**: 263–434 [364].
Type species: *Pseudodistoma cereum* Michaelsen, 1924 by original designation.

Extralimital distribution: Mediterranean Sea, Japanese southern temperate waters, tropical West Pacific Ocean, east Atlantic Ocean. See: Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

Pseudodistoma acutum Kott, 1992

Pseudodistoma acutum Kott, P. (1992). The Australian Asciacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [425].
Type data: holotype SAMA E2120 (QM GH923), paratype(s) QM GH2323.
Type locality: Ward Is., 20–25 m, SA.

Distribution: SA (Great Australian Bight).
Ecology: benthic, marine; 8–25 m, on undercuts and ledges.

Pseudodistoma aureum (Brewin, 1957)

Sigillinaria aurea Brewin, B.I. (1957). Ascidians of New Zealand, Part 10. Ascidians from North Auckland. *Trans. R. Soc. N.Z.* **84**(3): 577–580 [580].

Type data: holotype OMNZ*.

Type locality: coastal rocks, Omapere, Hokianga Harbour, north Auckland, New Zealand.

Pseudodistoma coronatum Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [145].

Type data: holotype MNHP A1 Pse 31.

Type locality: Makada Is., Duke of York Is., Papua New Guinea, 15 m.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [132]; taxonomic decision for new combination: Kott, P. (1981). The ascidians of the reef flats of Fiji. *Proc. Linn. Soc. N.S.W.* **105**(3): 147–212 [157] (as *Pseudodistoma aurea*).

Distribution: New Zealand, French Polynesia, Fiji, Papua New Guinea, QLD (Great Barrier Reef); Majuro Atoll.

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

Pseudodistoma australe Kott, 1957

Pseudodistoma australe Kott, P. (1957). Ascidians of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [101].

Type data: holotype AM Y919.

Type locality: Parrakeet Bay, Rottneet Is., WA.

Distribution: SA (Great Australian Bight), VIC (Bass Strait), WA (Central W coast, Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

Pseudodistoma candens Kott, 1992

Pseudodistoma candens Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [430].

Type data: holotype QM GH977, paratype(s) SAMA E2118.

Type locality: Pearson Is., SA.

Distribution: SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

Pseudodistoma gracilum Kott, 1992

Pseudodistoma gracilum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [433].

Type data: holotype SAMA E2413 (QM GH971), paratype(s) QM GH4167.

Type locality: Top Gallant Is., 10 m, SA.

Distribution: NSW (Lower E coast), QLD (Great Barrier Reef), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine.

Pseudodistoma inflatum Kott, 1992

Pseudodistoma inflatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [435].

Type data: holotype QM G10157, paratype(s) QM G9472.

Type locality: South Solitary Is., 10 m, NSW.

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast).

Ecology: benthic, marine; 15 m, reef.

Pseudodistoma oriens Kott, 1992

Pseudodistoma oriens Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [436].

Type data: holotype NMV H306, paratype(s) QM GH4953.

Type locality: Port Phillip Heads Channel, 20 m, VIC.

Distribution: SA (S Gulfs coast), TAS (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

Pseudodistoma pilatum Kott, 1992

Pseudodistoma pilatum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [439].

Type data: holotype SAMA E2114 (QM GH921), paratypes QM GH922, GH1296, GH4140, SAMA E2409.

Type locality: Ward Is., 20–25 m, SA.

Distribution: SA (Great Australian Bight).

Ecology: benthic, marine.

Pseudodistoma pulvinum Kott, 1992

Pseudodistoma pulvinum Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [439].

Type data: holotype SAMA E2411 (QM GH2396), paratype(s) QM GH2397.

Type locality: Ward Is., in caves, 8 m, SA.

Distribution: SA (Great Australian Bight).

Ecology: benthic, marine.

PYCNOCLOVELLIDAE

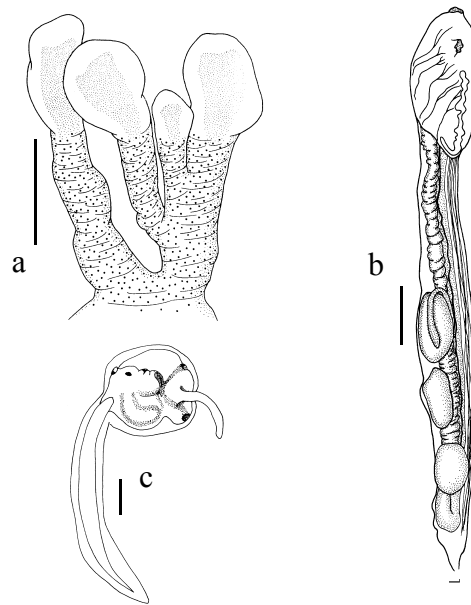


Fig. 11. *Pycnoclavella* sp.: **a**, colony; **b**, zooid with embryos developing in abdomen; **c**, larva with one adhesive organ everted. (Scale bars: a = 5.0 mm; b = 1.0 mm; c = 0.5 mm). [from Kott 1990]

The family Pycnoclavellidae Kott, 1990 has characters that to some extent resemble those of Clavelinidae, having smooth apertures and usually only partially embedded zooids. Pycnoclavellid zooids have small thoraces and a relatively long narrow stalk, containing an invariably long gut loop with the stomach at its posterior end. A vascular stolon extends from the posterior end of the zooid. The compact gonads are in the distal end of the gut loop. Larvae are relatively large, and have two or three tubular adhesive organs invaginated into the larval haemocoel from the anterior end of the larval trunk. To effect settlement, these evert as long cylindrical, anterior projections with terminal adhesive cells. The eggs, fertilised at the base of the oviduct, form a developmental series as they move up towards the atrial cavity.

Pycnoclavellid species were formerly included in the family Clavelinidae owing to the smooth-rimmed apertures and the presence of a vascular stolon. Family status was proposed by Kott (1990) on the basis of its differences from Clavelinidae, namely, its very long gut loop, distinctive larval adhesive organs, relatively small gonads, and replication by horizontal division of the abdomen involving the epicardium (Trason 1963). *Euherdmania* (Euherdmaniidae) has similar adhesive organs and fertilisation at the base of the oviduct and a long gut loop. However, its gonads usually are behind the gut loop, and it has lobed apertures. In defining this family, Kott (1990) included fertilisation at the base of the oviduct as a character distinguishing it from Clavelinidae. However, species in the *Detorta* group of the genus *Pycnoclavella* are an exception, fertilisation occurring in the atrial cavity at the top of the thorax (see Kott 2005).

Two genera are known. The monotypic *Euclavella* Kott, 1990 has a temperate range from New Zealand to eastern Australia, and *Pycnoclavella* Garstang, 1891 is well represented in Australian waters by two tropical and four temperate species, all brightly coloured and forming large clusters of partially embedded zooids with characteristic small, inflated thoraces and long, narrow gut loops.

References

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- Euclavella* Kott, 1990**
- Euclavella*** Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [79].
Type species: *Colella claviformis* Herdman, 1891 by original designation.
- Extralimital distribution: See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [79].
- Euclavella claviformis* (Herdman, 1891)**
- Colella claviformis*** Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [611].
Type data: syntypes AM U151, U241, G12248.
Type locality: Port Jackson, NSW.
- Amaroucium anomalum*** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [76].
Type data: holotype AM U353 (G2107).
Type locality: Port Jackson, NSW.
- Clavelina sigillaria*** Michaelsen, W. (1924). Ascidae Krikobanchiae von Neuseeland, den Chatham und den Auckland Inseln. *Vidensk. Meddr. Dansk Naturh. Foren.* **77**: 263–434 [269].
Type data: holotype ZMUC, paratype(s) ZMH K1287.
Type locality: 10 miles northwest of Cape Maria van Diemen, 10 m North Island, New Zealand.
- Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [79].
- Distribution: New Zealand, NSW (Central E coast, Lower E coast).
Ecology: benthic, marine; 15–60 m.
- Pycnoclavella* Garstang, 1891**
- Pycnoclavella*** Garstang, W. (1891). Report on the Tunicata of Plymouth. Part I. Clavelinidae, Perophoridae, Diazonidae. *J. Mar. Biol. Ass. U.K. (ns)* **2**: 47–67 [65].
Type species: *Pycnoclavella aurilucens* Garstang, 1891 by monotypy.
- Archiascidia*** Jülin, C. (1904). Recherches sur la phylogénèse des tuniciers *Archiascidia neapolitana* nov. gen. *Mitt. Zool. Stat. Neapel* **16**: 489–552 [548].
Type species: *Archiascidia neapolitana* Jülin, 1904 by monotypy.
- Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [67].
- Extralimital distribution: Palaearctic Region; western Europe, tropical west Pacific Ocean. See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.
- Pycnoclavella arenosa* (Kott, 1972)**
- Oxycorynia arenosa*** Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [167].
Type data: holotype NMV H168, paratype(s) NMV H169.
Type locality: Investigator Strait, 30 m, SA.
- Taxonomic decision for new combination: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [69] (as *Pycnoclavella arenosa*).
- Distribution: SA (S Gulfs coast), VIC (Bass Strait).
Ecology: benthic, marine.
- Pycnoclavella aurantia* Kott, 1990**
- Pycnoclavella aurantia*** Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [71].
Type data: holotype QM GH2295.
Type locality: reef, Nuyts Archipelago, Franklin Is., 15 m, SA.
- Distribution: SA (Great Australian Bight).
Ecology: benthic, marine; 15 m breaking reef.
Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655.
- Pycnoclavella detorta* (Sluiter, 1904)**
- Podoclavella detorta*** Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [6].
Type data: syntypes ZMA TU761.1.
Type locality: 15 m, Indonesia [7°55'30"S 114°26'E].
- Taxonomic decision for new combination: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [71] (as *Pycnoclavella detorta*).
- Distribution: Indonesia, QLD (NE coast), WA (Lower W coast); west Pacific Ocean.
Ecology: benthic, marine; to 40 m.

Pycnoclavella diminuta (Kott, 1957)

Clavelina diminuta Kott, P. (1957). Ascidiens of Australia II. Aplousobranchiata Lohille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [89].

Type data: syntypes AM Y1160.

Type locality: Rottneft Is., WA.

Clavelina nodula Kott, P. (1972). The ascidiens of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [166].

Type data: holotype SAMA E898, paratype(s) SAMA E908.

Type locality: off Waldegrave Is., SA.

Archidistoma richeri Monniot, F. (1988). Ascidiens de Nouvelle-Calédonie V. Polycitoridae du Lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4)**10A**(2): 197–235 [199].

Type data: holotype MNHP A3-ARC-4*.

Type locality: lagoon, New Caledonia.

Archidistoma rubripunctum Monniot, F. (1988). Ascidiens de Nouvelle-Calédonie V. Polycitoridae du Lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4)**10A**(2): 197–235 [200].

Type data: holotype MNHP A3-ARC-6*.

Type locality: outside barrier reef, lagoon, 20–25 m, New Caledonia.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [73].

Distribution: Philippines, New Caledonia, Lord Howe Island, NT (N coast), QLD (Great Barrier Reef, SE oceanic), SA (Great Australian Bight, S Gulfs

coast), WA (Central W coast, Lower W coast, N coast).

Ecology: benthic, marine; 5–20 m in caves and under ledges.

Pycnoclavella elongata Kott, 1990

Pycnoclavella elongata Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [76].

Type data: holotype SAMA E1980, paratypes QM GH4082, SAMA E1981.

Type locality: just offshore N of West Is., Nuyts Archipelago, Franklin Is., 8–10 m, SA.

Distribution: SA (Great Australian Bight).

Ecology: benthic, marine; on rock amongst breaking reef, rock and sand patches, 8–15 m.

Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655.

Pycnoclavella tabella Kott, 1990

Pycnoclavella tabella Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [77].

Type data: holotype QM G10161, paratypes QM G9257, SAMA E1982.

Type locality: on reef, Portsea, 1.8 m, VIC.

Distribution: SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine; reef, 1.8–11 m.

RITTERELLIDAE

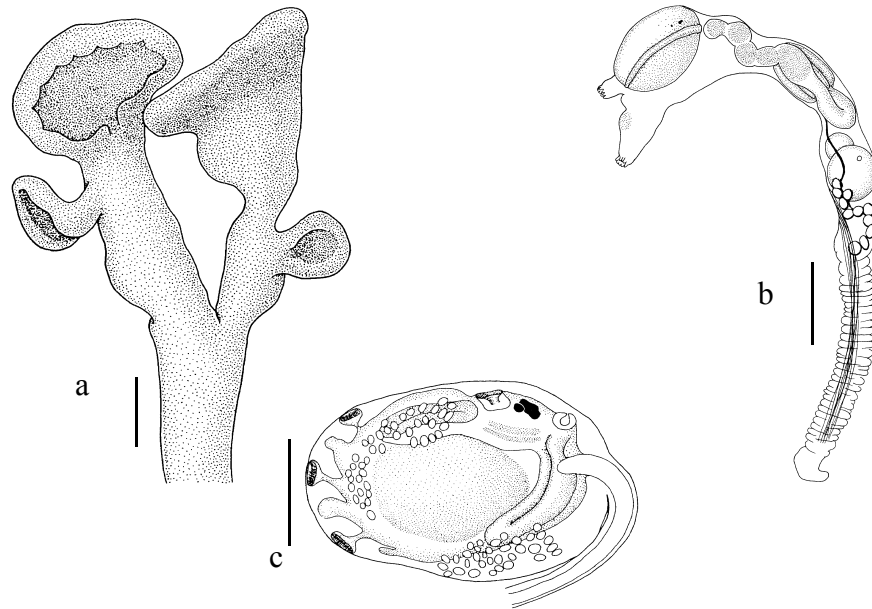


Fig. 12. *Ritterella pedunculata* (Herdman, 1899): **a**, part of colony; **b**, zooid; **c**, larva. (Scale bars: a = 2.0 mm; b = 0.5 mm; c = 0.2 mm). [from Kott 1992]

Genera in the family Ritterellidae Kott, 1992 have 6-lobed, separately opening apertures, a short abdomen, a stomach with a longitudinally folded wall halfway down the descending limb of the gut loop and a long narrow posterior abdomen containing serially arranged gonads. Parastigmatic vessels sometimes cross each row of stigmata and sometimes papillae (possible vestiges of internal longitudinal vessels as in Protopolyclinidae) are on the transverse branchial vessels. Sand often is crowded in the test making it hard and brittle. Zooids always are embedded, often in long, narrow sandy branches in which each terminal branch has zooids arranged in a system with the atrial apertures on one side and branchial apertures in an arc on the other side. These are not true cloacal systems, although in some species zooids are arranged in circles in rudimentary cloacal systems (as in some Polycitoridae). Larvae are incubated in the atrial cavity, where the eggs may be fertilised. Most larvae resemble those of *Polyclinum* Savigny, 1816, with paired dorsal and postero-ventral strands of epidermal vesicles. Only *Ritterella dispar* Kott, 1957 has vesicles between the adhesive organs as in *Aplidium* Savigny, 1816.

Zooids are distinguished from those of Protopolyclinidae and Euherdmaniidae by their long posterior abdomen with serially arranged gonads. Pseudodistomidae have wider thoraces with only three rows of stigmata. The zooids are similar to those of *Aplidium* species, with the gut loop short, stomach folded, and posterior abdomen very long. They possibly share a common ancestor with *Aplidium* and may have evolved from Protopolyclinidae in parallel with *Polyclinum* and other genera of the Polyclinidae. The two known genera, *Ritterella* Harant, 1931 and *Dumus* Brewin, 1952 formerly were included in the Euherdmaniinae Ritter, 1903, a subfamily of the Polyclinidae, together with other genera characterised by their separately opening atrial apertures.

RITTERELLIDAE

A few tropical species are known, but Ritterellidae are mainly temperate, in the western Pacific both north and south of the tropics, and in the eastern Pacific north of the equator. In the Atlantic Ocean only one specimen of a newly described species (*R. glareosa* Monniot, 1974) is reported from an isolated sea-mount off the Azores. The type species of the monotypic genus *Dumus* is one of the few known trans-Tasman species. *Ritterella* is well represented in southern Australian waters.

References

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- Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620
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- Ritter, W.E. (1903). The structure and affinities of *Herdmania claviformis*, the type of a new genus and family of ascidians from the coast of California. pp. 237–261, pls xviii, xix. In, *Mark Anniversary Volume*. New York : Henry Holt & Co.
- Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour.

Dumus Brewin, 1952

Dumus Brewin, B.I. (1952). Ascidians of New Zealand, Part 7 Ascidians from Otago coastal waters, Part 2. *Trans. R. Soc. N.Z.* **79**(3/4): 452–458 [453].

Type species: *Dumus areniferus* Brewin, 1952 by original designation.

Extralimital distribution: See: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

Dumus areniferus Brewin, 1952

Dumus areniferus Brewin, B.I. (1952). Ascidians of New Zealand, Part 7 Ascidians from Otago coastal waters, Part 2. *Trans. R. Soc. N.Z.* **79**(3/4): 452–458 [453].

Type data: holotype OMNZ*.

Type locality: on rocks, intertidal, Victory Beach, Otago, coastal waters, South Island, New Zealand.

Distribution: New Zealand, NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (Great Australian Bight), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

Ritterella Harant, 1931

Ritterella Harant, H. (1931). Contributions à l'histoire naturelle des ascidies et de leurs parasites. *Ann. Inst. Océanogr. Monaco* **8**(4): 229–389 [246].

Type species: *Amaroucium aequalisiphonalis* Ritter & Forsyth, 1917 by monotypy.

Extralimital distribution: tropical west Pacific Ocean, north Pacific Ocean. See: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

Ritterella asymmetrica Millar, 1966

Ritterella asymmetrica Millar, R.H. (1966). Ascidiacea, Port Phillip Survey. *Mem. Natl. Mus. Vic.* **27**: 357–375 [361].

Type data: syntypes NMV H39.

Type locality: Port Phillip Bay, VIC.

Distribution: SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine; sand-adapted species with colonies consolidated by sand and stabilising sandy substrates in association with similar colonies in other taxa.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [384].

***Ritterella compacta* Kott, 1992**

Ritterella compacta Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [403].

Type data: holotype QM GH2399 (SAMA E2094), paratypes QM GH4172 (SAMA E2095), QM GH4177 (SAMA E2096).
Type locality: in caves, Flinders Is., Investigator Group, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast).

Ecology: benthic, marine; 10–15 m.

***Ritterella cornuta* Kott, 1992**

Ritterella cornuta Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [405].

Type data: holotype QM GH4176 (SAMA E2098).

Type locality: Price Is., SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

***Ritterella dispar* Kott, 1957**

Ritterella dispar Kott, P. (1957). Ascidiaceans of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [102].

Type data: holotype AM U3897.

Type locality: Caloundra, QLD.

Distribution: Lord Howe Island, NSW (Central E coast, Lower E coast, SE oceanic), QLD (Central E coast, NE coast, SE oceanic); W Indian Ocean.

Ecology: benthic, marine; favours cryptic habitats high in intertidal.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

***Ritterella multistigmata* Kott, 1992**

Ritterella multistigmata Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [408].

Type data: holotype QM GH5463.

Type locality: near Rockingham, Warnbro Sound, Murray Reef, Sisters Reef, WA [46°21'21"S 115°41'18"E].

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Ritterella papillata* Kott, 1992**

Ritterella papillata Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620 [409].

Type data: holotype QM GH4148 (SAMA E2097), paratype(s) QM GH4217.

Type locality: Price Is., SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

***Ritterella pedunculata* (Herdman, 1891)**

Psammaplidium pedunculatum Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [620].

Type data: syntypes AM U281 (G2112).

Type locality: Port Jackson, NSW.

Ritterella herdmania Kott, P. (1957). Ascidiaceans of Australia II. Aplousobranchiata Lahille; Clavelinidae Forbes and Hanley and Polyclinidae Verrill. *Aust. J. Mar. Freshwat. Res.* **8**(1): 64–110 [102] [*nom. nov.* proposed erroneously for *Psammaplidium pedunculatum* Herdman, 1891, the senior rather than junior homonym of *Ritterella pedunculata* Tokioka, 1953].

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine; to 12 m, often fast flowing currents, colonies often consolidated by, and stabilising, sand.

Reference: Kott, P. (1992). The Australian Ascidiacea Pt 3, Aplousobranchia (2). *Mem. Queensl. Mus.* **32**(2): 377–620.

STOMOZOIDAE

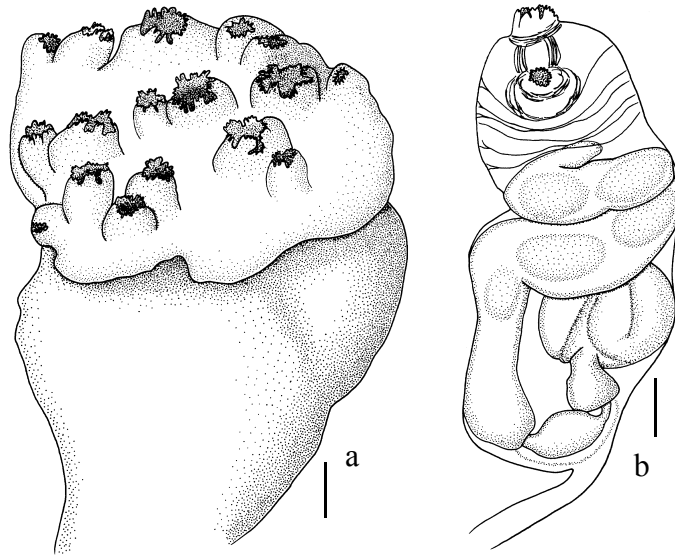


Fig. 13. *Stomozoa australiensis* Kott, 1990: **a**, single lobe of a colony with zooid openings distended; **b**, zooid, much contracted. (Scale bars: a = 2.0 mm; b = 0.5 mm). [from Kott 1990].

The family Stomozoidae Kott, 1990 is small, containing only three known species, two in Australia and one with a cosmopolitan distribution (Kott 1990). The family is distinguished by the fringed lobes that surround each separately opening aperture. These lobes alternate with conspicuous pigment spots, similar to those known in other aplousobranch and phlebobranch ascidians. A siphonal velum projects forwards inside the lobes to form the actual branchial opening. Small gonads with only a one- or two-egg ovary are in the moderately long gut loop. Vascular stolons of moderate length, sometimes branching, project down into the basal test from the embedded zooids, but they do not appear to have terminal ampullae as in Clavelinidae (which is further distinguished by its smooth-rimmed apertures). Longitudinal muscles extend along each side of the thorax and abdomen but not onto the vascular stolon as in *Sigillina* Savigny, 1816 (Holozoidae). The larvae have large triradially arranged adhesive organs (as in Clavelinidae). Nevertheless, the family appears to be most closely related to Polycitoridae (see Kott 1990).

Although they are not inconspicuous, forming fleshy cushion-like colonies, species of this genus are seldom recorded, and possibly their preferred habitat has not yet been located.

References

Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266

Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour.

Stomozoa Kott, 1957

Stomozoa Kott, P. (1957). The sessile Tunicata. *Scient. Rep. John Murray Exped.* **10**(4): 129–149 [131].

Type species: *Stomozoa murrayi* Kott, 1957 by monotypy.

Extralimital distribution: Afrotropical Region, Neotropical Region; Brazilian and Guyana Shelves, Red Sea. See: Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266.

Stomozoa australiensis Kott, 1990

Stomozoa australiensis Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [157].

Type data: holotype QM GH974, paratype(s) QM GH946, GH2392.

Type locality: Topgallant Is., Great Australian Bight, 5 m, SA.

Distribution: SA (Great Australian Bight).

Ecology: benthic, marine; cliffs and caves.

Stomozoa bellissima Kott, 1990

Stomozoa bellissima Kott, P. (1990). The Australian Ascidiacea Pt 2, Aplousobranchia (1). *Mem. Queensl. Mus.* **29**(1): 1–266 [159].

Type data: holotype QM G9267, paratype(s) QM GH4918.

Type locality: Bundegi Reef, Exmouth, WA.

Distribution: QLD (Great Barrier Reef), WA (NW coast).

Ecology: benthic, marine.

UNPLACED SPECIES

The following names cannot be placed with certainty, for reasons given below, and are listed here as *Species Inquirendae*.

Species Inquirenda

Atopogaster aurantiaca Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [168] [may be a *Polycitor* species, although on the basis of the original description, the zooids with many rows of stigmata and gonads spilling over from the abdomen to a posterior abdomen, cannot be assigned to any known genus or species; the holotype has not been re-examined].

Type data: holotype BMNH*.

Type locality: Bass Strait, VIC.

Leptoclinum fimbriatum Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [448] [also in Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 (91)].

Type data: type status and whereabouts unknown*.

Type locality: Port Jackson, NSW.

Amaroucium rotundatum Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [71] [name first listed by Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 (448), *nom. nud.*; probably a colony of *Polycitor giganteum* (Herdman, 1899), its zooids having a long abdomen with gonads in the gut loop; the holotype has not been re-examined].

Type data: holotype AM U112, G2104*.

Type locality: Port Jackson, NSW.

Polyclinum clava Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [77] [name first listed by Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 (448), *nom. nud.*; probably a colony of *Polycitor giganteum* (Herdman, 1899)].

Type data: holotype AM U154.

Type locality: Port Jackson, NSW.

Polyclinum complanatum Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [81] [name first listed by Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1):

443–450 (448), *nom. nud.*; has as its junior synonym, *Polyclinum depressum* Herdman, 1899 (*loc. cit.*, figs Pl. 1, 9–12), and may be a specimen of a *Pseudodistoma* species].

Type data: holotype whereabouts unknown.

Type locality: Port Jackson, NSW.

Polyclinum fuscum Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [82] [name first listed by Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 (448), *nom. nud.*; appears to be a specimen of *Polycitor giganteum* (Herdman, 1899); holotype has not been re-examined].

Type data: holotype AM U156, G2101.

Type locality: Port Jackson, NSW.

Didemnum rotnesti Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334 [322] [species description unsatisfactory and requires revision; holotype and paratype from Rottnest Is. (WA) and Maria Is. (Tasmania) suggest anomalies but the specimens have not been reexamined].

Type data: holotype AM Y1515, paratype(s) AM Y1523.

Type locality: Mary Cove, Rottnest Is., WA.

Trididemnum spiculatum Kott, P. (1962). The ascidians of Australia III. Aplousobranchiata Lahille: Didemnidae Giard. *Aust. J. Mar. Freshwat. Res.* **13**(3): 265–334 [322] [although the holotype and the paratypes AM Y1628, Y 1630-2 are from Rottnest Is. (WA), other paratypes (AM Y1619 and Y1624) are from Tasmania; another paratype (AM Y1627) from Heron Is. has been found to be conspecific with *Trididemnum paracyclops* Kott (1980); the species is ill-defined and requires revision].

Type data: holotype AM Y1626, paratype(s) AM Y1619, Y1624, Y1628, Y1630-2.

Type locality: Thompson's Bay, Rottnest Is., WA.

Polysyncraton victoriense Kott, P. (1976). Ascidian fauna of Western Port Bay, Victoria and a comparison with that of Port Phillip Bay. *Mem. Natl. Mus. Vic.* **37**: 53–96 [73] [the species is inadequately described and requires revision; the holotype has not been reexamined].

Type data: holotype NMV H171.

Type locality: on *Ecklonia* holdfasts, 8 m, Crawfish Rock, Westernport, VIC.

PHLEBOBRANCHIA

The suborder Phlebobranchia (order Enterogona) is characterised by having unpaired gonads present only on the same side of the body as the gut. As in Stolidobranchia, the body is not divided into different sections (such as thorax, abdomen and posterior abdomen) as the gut is folded up in the parietal body wall outside the pharynx and the large branchial sac occupies the whole length of the body. Usually the branchial sac (which is flat, without folds) has internal longitudinal vessels (although only vestiges remain in Agneziidae). Epicardial sacs do not persist in adults as they do in Aplousobranchia, although excretory vesicles (nephrocytes) embedded in the body wall over the gut are known to originate from the embryonic epicardium in Ascidiidae and Corellidae. Most phlebobranchs are solitary. However, Plurellidae Kott, 1973 includes both solitary and colonial forms, and Perophoridae Giard, 1872 are all colonial. Replication in Perophoridae is from ectodermal epithelium (rather than endodermal or mesodermal tissue the mesodermal tissue of the vascular stolon (rather than the endodermal tissue as in most as in Aplousobranchia). The process of replication has not been investigated in Plurellidae.

Phlebobranch taxa occurring in Australia are documented in Kott (1985). Family level taxa are characterised principally by the size and form of the branchial sac including the number of branchial vessels and form of the stigmata; the form, size and position of the gonads; and the habit (colonial or solitary) of the taxon. Berrill (1950) has discussed problems in assessing the phylogeny of Perophoridae.

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AGNEZIIDAE

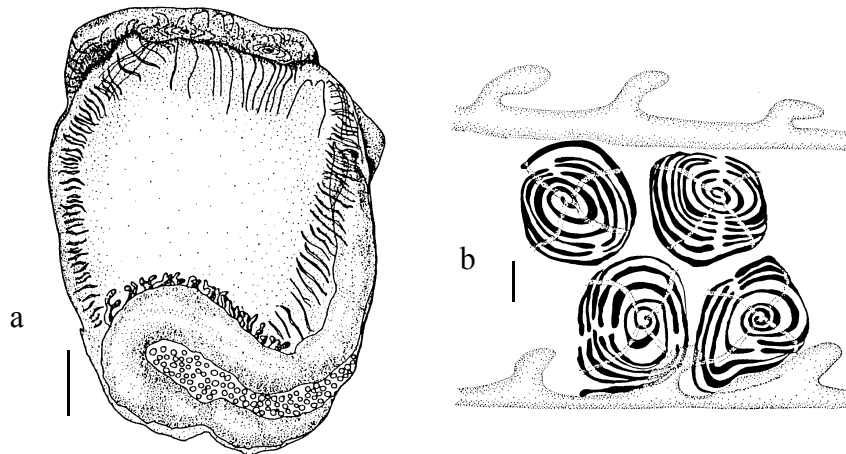


Fig. 14. *Agnezia glaciata* (Michaelsen, 1898): **a**, body removed from the test, from left side; **b**, portion of the branchial sac. (Scale bars: a, 1.0 mm; b, 0.25 mm). [from Kott 1985]

The family Agneziidae Monniot & Monniot, 1991 is a group of diverse genera. There are two subfamilies, Agneziinae Monniot & Monniot, 1991 with stigmata spiralling around cones or infundibula projecting into the pharynx, and Ciallusiinae Huus, 1937 with straight stigmata. The latter subfamily is not yet recorded from Australia. The family is distinguished by the loss of the longitudinal branchial vessels (present in most phlebobranchs), although vestiges in the form of bifid or undivided papillae are present on the transverse vessels.

In Agneziinae the test is thin and often has embedded sand making it stiff and brittle. However (in contrast to the Plurellidae), parts of the body wall are not embedded in the test—rather the body musculature is modified to take advantage of the stiff test in other ways. Thus, short parallel bands of muscles around its outer margin, and along each side of the antero-median apertures, tend to flatten the body. When the muscles are contracted the soft, thin sand-free strips of test in which the sessile apertures are located, are withdrawn and folds of hard, sandy test close over them as protective lips. The short parallel bands of muscle around the median line of the body occur in other taxa in which the sand-embedded test is thin enough to be brittle rather than tough, *e.g.* *Molgula* Forbes, 1848 has species in which the apertures can be withdrawn and covered by the stiff brittle test in the same way.

A single species of *Agnezia* Monniot & Monniot, 1991 (a replacement name for *Agnesia* Michaelsen, 1898) and three of *Adagnesia* Kott, 1963 are recorded from Australia. They are not recorded often and probably occur principally on the sea floor, a habitat seldom explored around this continent. Two of the *Adagnesia* species have a novel orientation of gonoducts through the gut loop and directed anteriorly between the distal limb or pole of the loop and the outside of the parietal body wall. The papillae on the transverse branchial vessels of *Adagnesia* are bifid but in *Agnezia* they are not divided.

Caenagnesia Ärnback, 1938 from the Antarctic, and *Proagnesia* Monniot & Monniot, 1973 from deep water, have not been recorded from Australia.

The family, (as Agnesiidae Huntsman, 1912), is discussed in Kott (1985).

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AGNEZIINAE

Adagnesia Kott, 1963

Adagnesia Kott, P. (1963). *Adagnesia opaca* gen. nov., sp. nov., a remarkable ascidian of the family Agnesiidae from Moreton Bay, Queensland. *Univ. Qd Pap. Dept. Zool.* **2**(3): 75–79 [76].
Type species: *Adagnesia opaca* Kott, 1963 by original designation.

Extralimital distribution: north Atlantic Ocean, south Atlantic Ocean, east and south Pacific basins to 5000 m. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Adagnesia charcoti Monniot & Monniot, 1973

Adagnesia charcoti Monniot, C. & Monniot, F. (1973). Ascides abyssales récoltées au cours de la campagne océanographique Biaçores par le Jean Charcot. *Bull. Mus. Natl. Hist. Nat. Paris* (3)**93**(121): 389–475 [424].
Type data: syntypes MNHP p3.13–21*.
Type locality: abyssal, NE Atlantic Ocean.

Distribution: VIC (Bass Strait); deep basins of north and south Atlantic Ocean.

Ecology: benthic, marine; depth 22–5000 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Adagnesia opaca Kott, 1963

Adagnesia opaca Kott, P. (1963). *Adagnesia opaca* gen. nov., sp. nov., a remarkable ascidian of the family Agnesiidae from Moreton Bay, Queensland. *Univ. Qd Pap. Dept. Zool.* **2**(3): 75–79 [76].
Type data: holotype QM G4907, paratype(s) QM G4936.
Type locality: Moreton Bay, QLD.

Distribution: NSW (Central E coast), QLD (Central E coast), VIC (Bass Strait).

Ecology: benthic, marine, sand bottom.

Adagnesia venusta Kott, 1985

Adagnesia venusta Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [82].
Type data: holotype NMV H381, paratypes NMV F51569, NMV H394.
Type locality: Bass Strait, VIC.

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine; fine sand with abundant sponges.

Agnezia Monniot & Monniot, 1991

Agnesia Michaelsen, W. (1898). Vorläufige Mitteilung über einige Tunicaten aus dem Magalhaenischen Gebiet sowie von Süd-Georgien. *Zool. Anz.* **21**: 363–371 [370]

[junior homonym of *Agnesia* Konnick, 1883 (Mollusca: Palaeozoic gastropod)].

Type species: *Agnesia glaciata* Michaelsen, 1898 by monotypy.

Agnezia Monniot, C. & Monniot, F. (1991). Tunicata: peuplements d'ascidies profondes en Nouvelle-Calédonie. Diversité des stratégies adaptatives. In: Crosnier, A. (ed) Résultats des Campagnes MUSORSTOM. Vol. 8 Mém. Mus. Natl. Hist. Nat. Paris (4)**151**(A): 357–448. [383] [*nom. nov.* for *Agnesia* Michaelsen, 1898].

Extralimital distribution: Afrotropical Region, Antarctic Region; north Pacific Ocean, Kerguelen. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Agnezia glaciata (Michaelsen, 1898)

Agnesia glaciata Michaelsen, W. (1898). Vorläufige Mitteilung über einige Tunicaten aus dem Magalhaenischen Gebiet sowie von Süd-Georgien. *Zool. Anz.* **21**: 363–371 [370].

Type data: syntypes ZMH leg.14.1.93*.

Type locality: Puerto Haberton, Beagle Channel, 14 m, Tierra del Fuego.

Agnesia krausei Michaelsen, W. (1912). Die Tethyiden (Styeliden) des Naturhistorischen Museum zu Hamburg, nebst nachtrag und Anhang einige anderen Familien betreffend. *Jahrb. Hamb. Wiss. Anst.* **28**(2): 109–186 [181].
Type data: syntypes ZMH 2 specimens*.

Type locality: Patagonian Shelf.

Agnesia himeboja Oka, A. (1915). Eine neue Ascidenart aus der Gattung *Agnesia* Michaelsen. *Annot. Zool. Jap.* **9**: 1–6 [1].
Type data: syntypes UTZM 46* (M39).
Type locality: Tateyama Bay, Awa Province, 10–14 m, Japan.

Agnesia sabulosa Oka, A. (1929). Eine zweite japanische Art der Gattung. *Agnesia*. *Proc. Imp. Acad. Japan* **5**: 152–154 [152].

Type data: syntypes UTZM 150* (M236).

Type locality: Hakodate, 20–30 m, Japan.

Agnesia capensis Millar, R.H. (1955). On a collection of ascidians from South Africa. *Proc. Zool. Soc. Lond.* **125**(1): 169–221 [191].

Type data: holotype BMNH 29.4.48*.

Type locality: False Bay, 22–24 m, South Africa.

Taxonomic decision for synonymy: Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239 [97].

Distribution: Japan, New Zealand, South Africa, California, QLD (Central E coast), VIC (Bass Strait); Antarctic Peninsula, Kerguelen.

Ecology: benthic, marine; on hard, wide-spreading, branched, filamentous algae, or sandy bottoms.

ASCIDIIDAE

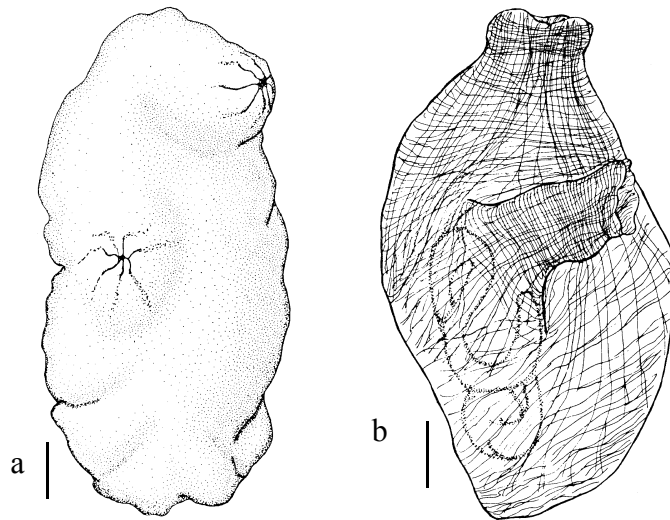


Fig. 15. *Ascidia decepta* Kott, 1985: **a**, external appearance; **b**, body musculature. (Scale bars = 2.0 mm). [from Kott 1985]

The family Ascidiidae Herdman, 1882 contains solitary forms, usually with a relatively firm, inflexible, gelatinous, translucent test. The branchial sac is more or less flat, the branchial wall sometimes having minute undulations but usually lacking internal folds. The large gonads are enclosed in the gut loop and often spread over the inside of the gut, which is bent up in the left parietal body wall. The testis consists of branching follicles joined to a common vas deferens. The tubular ovary also branches. The vas deferens and thick ovarian tube are between two limbs of the gut loop, opening with the anus near the base of the atrial aperture. Body muscles usually form an irregular network over the right side of the body and anterior to the gut on the left, although they are inconspicuous over the gut.

Occasionally the test is brittle with embedded sand, e.g. *Ascidia thompsoni* Kott, 1952 and *Ascidia scaevola* (Sluiter, 1904). In *Ascidia scaevola*, long stiff, cylindrical tubes project up from around each sessile aperture providing channels to and from the surface for the excurrent and incurrent streams of water of individuals submerged in bottom sediments—a habitat that appears to be available owing to the stiff sand-embedded test that forms the rigid tubes. Other aspects of the morphology of this species are associated with the rigid, brittle test which would prevent overall contraction of the body. Generally, the body wall is thin with little or no musculature. However, short strong muscle bands are present across the dorsum to close folds of test over the apertures, and others along the right side narrow and depress the body inside its rigid casing. In addition, an unusual fold of the pharyngeal wall compensates for the narrowing of the right side of the body which has drawn the dorsal mid-line onto the upper surface.

The unusual morphology of *Ascidia scaevola* is unique amongst the otherwise relatively uniform species of this family and demonstrates a dramatic response to environmental pressure that parallel adaptations in *Plurella* spp. which has similar thin, rigid, sandy test.

The family contains three closely related genera:

Ascidrella Mueller, 1776, which contains only one well known species (the type of the genus), is known mostly from Europe. However, it is now recorded from Australia and New Zealand. It may have been spread by ships (Kott 1985). It differs from the other genera in the absence of secondary papillae projecting into the pharynx from the internal longitudinal vessels.

Phallusia Savigny, 1816 species are large with thick, firm and translucent test. The ciliated pit, the primary opening of the neural duct (at the base of the branchial siphon), is one- to two-thirds of the body length distant from the neural gland (just anterior to the atrial siphon). This is an appreciable distance when individuals are up to 60 mm or more in length. The accessory openings of the neural duct into the atrial cavity (characteristic of this genus) may be associated with that long neural duct (see Ruppert 1990 for an account of the role of the neural gland in the regulation of blood volume). Although their species diversity is not high (only five species being known), at least one *Phallusia* species is relatively common around the Australian continent.

Ascidia Linnaeus, 1767, has 19 recorded species in Australian waters. It is possible that this number will increase when more reliable characters (possibly obvious only in living specimens) are demonstrated. Although some species become as large as *Phallusia*, others remain relatively small, often with a thin fragile test, especially on the left side of the body where they are often attached to the substrate. Accessory openings of the neural gland duct do not occur.

Kott (1985) reviewed the family in Australian waters.

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- Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidiæ. *Siboga Exped.* **56A**: 1–126

Ascidia Linnaeus, 1767

Ascidia Linnaeus, C. (1767). *Systema Naturae* per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Editio duodecim. Holmiae: Laurentii Salvii Tom. 2, pp. 1087, 1089, 1294, 1295, 1319 [1087] [without included species; *nomen conservandum*].

Type species: *Ascidia mentula* Mueller, 1776 by subsequent designation, see Hartmeyer, R., Michaelsen, W. & Sluiter, C.P. (1915). Tunicata. Ascidiaceae. In, Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915**: 185–186. [185].

Ascidopsis Verrill, A.E. (1872). Recent additions to the molluscan fauna of New England and the adjacent waters, with notes on the other species. *Am. J. Sci. (ser. 3)* **3**: 209–214, 281–290 pls 6–8 [214].

Type species: *Ascidopsis complanata* Verrill, 1872 by original designation.

Bathyascidia Hartmeyer, R. (1901). Zur Kenntnis des genus *Rhodossoma*. *Arch. Naturg. Suppl.* **67**: 151–168 [166].

Type species: *Abyssascidia vasculosa* Herdman, 1888 by monotypy.

Phallusioides Huntsman, A.G. (1912). Ascidiaceae from the coasts of Canada. *Trans. R. Can. Inst.* **9**: 111–148 [138].

Type species: *Ascidia obliqua* Alder, 1863 by original designation.

Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [672]; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Pubs* **133**: 1–354 [152].

Extralimital distribution: Antarctic Region, Neotropical Region; worldwide. See: Hartmeyer, R. (1924). Ascidiaceae, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidiaceenfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Harant, H. (1929). Ascidiées provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidiaceae. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Millar, R.H. (1962). Further descriptions of South African ascidiaceae. *Ann. S. Afr. Mus.* **56**(7): 113–221; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Nishikawa, T. (1990). The ascidiaceae of the Japan Sea I. *Publ. Seto Mar. Biol. Lab.* **34**(4–6): 73–148.

Ascidia archaia Sluiter, 1890

Ascidia archaia Sluiter, C.P. (1890). Die Evertrebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* **50**: 329–348 [346].

Type data: holotype ZMA TU212.

Type locality: coral reef 'Vader Smit', Bay of Jakarta (as Djakarta), Indonesia.

Ascidia aperta Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidiaceen. *Siboga Exped.* **56A**: 1–126 [38].

Type data: syntypes ZMA TU206, TU211, ZMA TU211.

Type locality: 2.3 miles N 63°W from north point of Nuhua Jaan, 70 m, Kei Is., Indonesia [5°36'30"S 132°55'12"E].

Ascidia rhabdophora Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidiaceen. *Siboga Exped.* **56A**: 1–126 [45].

Type data: holotype whereabouts unknown (see Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [162]).

Type locality: Damar Is., 90 m, Indonesia.

Phallusia corelloides Van Name, W.G. (1924). Bijdragen tot de kennis der fauna van Curaçao. Resultaten einer Reis van Dr C.J. Van der Horst in 1920. Ascidiaceen from Curaçao. *Bijdr. Dierk.* **23**: 23–32 [27].

Type data: holotype AMNH 730*, paratype(s) ZMA TU736.1, TU736.2, TU156*.

Type locality: Caracas Bay, Curaçao, West Indies.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [26].

Distribution: NSW (Central E coast), QLD (Central E coast, Great Barrier Reef), WA (NW coast); West Indies; west Pacific Ocean.

Ecology: benthic, marine; under stones and rubble near reef crest of coral reefs, on sandy bottoms with coral and shells.

Ascidia capillata Sluiter, 1887

Ascidia capillata Sluiter, C.P. (1887). Einfache Ascidiaceen aus der Bai von Batavia. *Nat. Tijdschr. Ned. Ind.* **46**: 242–266 [255].

Type data: holotype ZMA TU219.

Type locality: Bay of Jakarta (as Djakarta), Indonesia.

Ascidia austera Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidiaceen. *Siboga Exped.* **56A**: 1–126 [39].

Type data: holotype ZMA TU267.2.

Type locality: Anchorage north of Salomakië (Damar) Is., 45 m, Indonesia.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [30].

Distribution: Indonesia, NSW (Lower E coast*), NT (N coast), QLD (Great Barrier Reef, NE coast), WA (N coast, SW coast).

Ecology: benthic, marine; on under-surface of rubble, coral reefs, on coral.

Ascidia challengerii Herdman, 1882

Ascidia challengerii Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidiaceae simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [202].

Type data: holotype BMNH 1887.2.4.137.

Type locality: Kerguelen Is., Subantarctic.

Ascidia charcoti Sluiter, C.P. (1905). Note préliminaire sur les ascidiens holosomates de l'Expédition Antarctique Française commandée par le Dr. Charcot. *Bull. Mus. Natl. Hist. Nat. Paris* **11**: 470–475 [471].

Type data: syntypes MNHP p.3 ASC.A 50*, MNHP p.5 ASC.A 118–125*, ZMA TU220.

Type locality: Booth Wandel Is., Antarctica.

Ascidia dispar Ärnback-Christie-Linde, A. (1938). Ascidiacea. *Further zool. Results Swed. Antarct. Exped. 1901–1* 3(4): 1–54 [48].

Type data: holotype NHRM 1504*.

Type locality: Grytviken, 22 m, South Georgia [54°22'S 36°28'W].

Taxonomic decision for synonymy: Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* 13: i–xv 1–239 [90].

Distribution: Heard & McDonald Islands, Kerguelen Island, TAS (Tas. coast); Heard Is., Antarctic Peninsula.

Ecology: benthic, marine; clay and algae.

Ascidia decepta Kott, 1985

Ascidia decepta Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [33].

Type data: holotype QM G10076, paratype(s) QM G9629, G10002, GH2571, GH2572.

Type locality: Fraser Is., 1 km from mouth of Moon Creek, off wreck, QLD.

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), TAS (Bass Strait).

Ecology: benthic, marine, mud bottom, sand bottom; shallow water.

Ascidia empheres Sluiter, 1895

Ascidia empheres Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.- Naturw. Ges. Jena* 8: 163–186; Nachtrag zu den tunicaten: 325–326. [177].

Type data: holotype ZMA TU227.

Type locality: Ambon, Indonesia.

Distribution: Indonesia, QLD (Central E coast, Great Barrier Reef, NE coast).

Ecology: benthic, marine; on under-surfaces of coral rubble.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440.

Ascidia gemmata Sluiter, 1895

Ascidia gemmata Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.- Naturw. Ges. Jena* 8: 163–186; Nachtrag zu den tunicaten: 325–326. [177].

Type data: syntypes ZMA TU235.

Type locality: Ambon, Indonesia.

Distribution: NSW (Lower E coast), NT (N coast), QLD (Great Barrier Reef, NE coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, N coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440.

Ascidia glabra Hartmeyer, 1922

Ascidia glabra Hartmeyer, R. (1922). Miscellanea Ascidiologica. *Mitt. Zool. Mus. Berl.* 10: 299–323 [305].

Type data: syntypes ZMH K1341*, ZMB 3846*.

Type locality: Fremantle, WA.

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef, NE coast), WA (Lower W coast).

Ecology: benthic, marine; under-surfaces of rubble, coral reefs.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440.

Ascidia kreagra Sluiter, 1895

Ascidia kreagra Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.- Naturw. Ges. Jena* 8: 163–186; Nachtrag zu den tunicaten: 325–326. [178].

Type data: holotype ZMA TU238.

Type locality: Ambon, Indonesia.

Distribution: Indonesia, QLD (Great Barrier Reef).

Ecology: benthic, marine; in crevices and on under-surfaces of rubble on coral reefs.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440.

Ascidia latesiphonica Hartmeyer, 1922

Ascidia latesiphonica Hartmeyer, R. (1922). Miscellanea Ascidiologica. *Mitt. Zool. Mus. Berl.* 10: 299–323 [307].

Type data: holotype ZMH K1342*, paratype(s) ZMB 3848*.

Type locality: Shark Bay, Useless Inlet, Perlbanke, east coast of Bellefin Prong, 0–3.5 m, WA.

Ascidia malaca australiensis Hartmeyer, R. (1927). Zur Kenntnis phlebobranchiater und dictyobranchiater Ascidiiden. *Mitt. Zool. Mus. Berl.* 13: 157–194 [161].

Type data: holotype ZMH K1343.

Type locality: Freshwater Bay, Swan River, WA.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440.

Distribution: QLD (Central E coast, NE coast), SA (S Gulfs coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine.

Ascidia liberata Sluiter, 1887

Ascidia liberata Sluiter, C.P. (1887). Einfache Ascidiiden aus der Bai von Batavia. *Nat. Tijdschr. Ned. Ind.* 46: 242–266 [251].

Type data: holotype ZMA TU244.

Type locality: Bay of Jakarta (as Djakarta), 12–20 m, Indonesia.

Ascidia solomonensis Nishikawa, T. (1986). Ascidiaceans from the Gilbert and Solomon Islands and Nauru. I. Perophoridae, Ascidiidae, Corellidae. *Int. Sci. Rev.* **32**: 1–78 4 maps [61]. Type data: holotype SMBL 338*, paratype(s) NSMT Pc682. Type locality: Lavuro, NW Guadalcanal, intertidal, Solomon Is.

Ascidia dorsalis Monniot, C. (1987). Ascidiées de Nouvelle-Calédonie I. Phlebobranchies du Lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **9A**(1): 3–31 [9].

Type data: holotype MNHP P5ASC A179*.

Type locality: Amédée, New Caledonia.

Taxonomic decision for synonymy: Kott, P. (1992). The Australian Ascidiaceae, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [634].

Distribution: Indonesia, Norfolk Island, QLD (Great Barrier Reef, SE oceanic); west Pacific Ocean.

Ecology: benthic, marine; under-surface of rubble.

Ascidia munda Sluiter, 1898

Ascidia translucida Sluiter, C.P. (1890). Die Evertebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* **50**: 329–348 [344] [junior homonym of *Ascidia translucida* Herdman, 1882].

Type data: type status unknown ZMA (depository uncertain, not found, see Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200).

Type locality: 'Vader Smit' Reef, Bay of Jakarta (as Djakarta), Indonesia, see Sluiter, C.P. (1890). Die Evertebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* **50**: 329–348.

Ascidia munda Sluiter, C.P. (1898). Beiträge zur Kenntnis der Fauna von Südafrika II. Tunicaten. *Zool. Jahrb. Syst.* **11**: 1–64 [5] [nom. nov. for *Ascidia translucida* Sluiter, 1890].

Distribution: Indonesia, NSW (Central E coast), QLD (Central E coast), WA (Central W coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Ascidia nereia Kott, 1985

Ascidia nereia Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [46].

Type data: holotype QM G2562, paratype(s) QM GH2563.

Type locality: Gladstone Harbour, 1 km upstream from mouth of Calliope River, QLD.

Distribution: QLD (NE coast); known only from type locality.

Ecology: sand bottom, silt bottom; 8.3 km upstream, possibly in brackish water.

Ascidia occidentalis Kott, 1985

Ascidia occidentalis Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [46].

Type data: holotype WAM 912.83, paratype(s) WAM 118.72, 915.83, 916.83, 939.83.

Type locality: Cockburn Sound, off Rockingham, WA.

Distribution: WA (SW coast).

Ecology: benthic; Swan River estuary in brackish water.

Ascidia parasamea Kott, 1985

Ascidia parasamea Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [50].

Type data: holotype QM GH776, paratype(s) QM GH2521, GH2516.

Type locality: off Gordonvale, QLD [17°03'S 145°55'36"E].

Distribution: QLD (Great Barrier Reef, NE coast).

Ecology: benthic, marine; dredged, sandy substrate.

Ascidia prolata Kott, 1985

Ascidia prolata Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [50].

Type data: holotype QM GH2023.

Type locality: Ninepin Point, TAS.

Distribution: TAS (Tas. coast); known only from type locality.

Ecology: benthic, marine; wedged in crevices.

Ascidia scaevola (Sluiter, 1904)

Styelopsis scaevola Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidiaceen. *Siboga Exped.* **56A**: 1–126 [89].

Type data: holotype ZMA TU1066.

Type locality: 32 m, Indonesia [1°42'30"S 130°47'30"E].

Ascidia aclara Kott, P. (1952). Ascidiaceans of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [309].

Type data: holotype AM Y1648.

Type locality: 5–6 miles E of Lakes Entrance, 38 m, VIC.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [53].

Distribution: Indonesia, QLD (Central E coast, NE coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait); west Pacific Ocean.

Ecology: benthic, marine; on and in sandy sediments, sand, small stones and shells.

Ascidia sydneyensis Stimpson, 1855

Ascidia sydneyensis Stimpson, W. (1855). Tunicata in descriptions of some new marine invertebrates. *Proc. Acad. Nat. Sci. Phila.* **7**: 387–388 [387].

Type data: syntypes (probable) HMN Case Nr22*.

Type locality: Port Jackson, low tide, NSW.

Ascidia canaliculata Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 83–109 [84–91].

Type data: type status unknown NHMW (depository uncertain, not found).

Type locality: Cape of Good Hope, South Africa.

Ascidia pyriformis Herdman, W.A. (1880). Preliminary report on the Tunicata of the *Challenger* expedition. Ascidiidae. *Proc. R. Soc. Edinb.* 10(1): 458–472 [468].

Type data: syntypes BMNH 1887.2.4.174, 1887.2.4.175.

Type locality: Port Jackson, 12 m, NSW.

Phallusia longitubis Traustedt, M.P.A. (1882). Vestindiske Ascidiæ Simplicis, Forste Afdeling. Phallusiadae. *Vidensk. Meddr. Dansk Naturh. Foren.* 1881: 257–288 [277].

Type data: holotype ZMUC*.

Type locality: St Thomas, West Indies.

Ascidia diplozoon Sluiter, C.P. (1887). Einfache Ascidiën aus der Bai von Batavia. *Nat. Tijdschr. Ned. Ind.* 46: 242–266 [249].

Type data: holotype ZMA TU224.

Type locality: Bay of Jakarta (as Djakarta), Indonesia.

Ascidia limosa Sluiter, C.P. (1887). Einfache Ascidiën aus der Bai von Batavia. *Nat. Tijdschr. Ned. Ind.* 46: 242–266 [257].

Type data: lectotype ZMA TU245.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* 1(13): 157–200 [162].

Type locality: Bay of Jakarta (as Djakarta), 16–20 m, Indonesia.

Ascidia divisa Sluiter, C.P. (1898). Beiträge zur Kenntnis der Fauna von Südafrika II. Tunicaten. *Zool. Jahrb. Syst.* 11: 1–64 [43] [= *Ascidia canaliculata* Heller: Sluiter, 1885: 176].

Type data: type status unknown ZMA (depository uncertain, not found).

Type locality: between Mendano Is. and Billiton, Indonesia.

Ascidia incerta Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* 7(1): 443–450 [446] [nom. nud.].

Ascidia incerta Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [11].

Type data: holotype AM U135 (G2088).

Type locality: Port Jackson, NSW.

Ascidia bisulca Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidiën. *Siboga Exped.* 56A: 1–126 [43].

Type data: holotype ZMA TU267.3.

Type locality: Anchorage off Kilsuin, W coast of Kur Is., 20–45 m, Indonesia.

Ascidia donnani Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* 39: 295–348 [303].

Type data: holotype BMNH*.

Type locality: Novakaddu Paar, Gulf of Manaar, Sri Lanka.

Taxonomic decision for synonymy: Hartmeyer, R. & Michaelsen, W. (1928). Ascidiæ Diktyobranchiæ und Ptychobranchiæ. *Fauna Südwest-Aust.* 5: 251–460 [285]; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [54].

Distribution: Japan, South Africa; circumaustralian, QLD, NSW, VIC, SA, TAS, WA, NT, west Pacific Ocean, west Indian Ocean, Atlantic Ocean.

Ecology: benthic, marine, mud bottom, sand bottom, silt bottom.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440.

Ascidia thompsoni Kott, 1952

Ascidia thompsoni Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* 3(3): 206–333 [312].

Type data: holotype AM Y1668.

Type locality: Great Taylor Bay, 9 m, TAS.

Distribution: SA (S Gulfs coast), TAS (Tas. coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440.

Ascidiella Roule, 1883

Ascidiella Roule, L. (1883). Sur la faune des Phallusiadées ascidiées des côtes de Provence. *Compt. Rend. Acad. Sci. Paris* 97: 1014–1016 [1015].

Type species: *Ascidia cristata* Risso, 1826 (= *Ascidia aspersa*, Mueller 1776, see Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* 1915b: 247–258) by original designation.

Extralimital distribution: Palaearctic Region; Mediterranean Sea, northeast Atlantic Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440.

Ascidiella aspersa (Mueller, 1776)

Ascidia aspersa Mueller, O.F. (1776). pp. 224–226 in, *Zoologiae Danicae*. Copenhagen : Prodrömus. [225].

Type data: type status unknown.

Type locality: Adriatic Sea.

Ascidia patula Mueller, O.F. (1776). pp. 224–226 in, *Zoologiae Danicae*. Copenhagen : Prodrömus. [225].

Type data: type status unknown.

Type locality: Christiana Fjord, Norway.

Ascidia scabra Mueller, O.F. (1776). pp. 224–226 in, *Zoologiae Danicae*. Copenhagen : Prodrömus. [225].

Type data: type status unknown.

Type locality: Adriatic Sea.

Ascidia cristata Risso, A. (1826). *Histoire naturelle des principales productions de l'Europe méridionale*. Vol. 4. Paris & Strasbourg pp. 273–285. [276].

Type data: type status unknown.

Type locality: Adriatic Sea, see Roule, L. (1884). Recherches sur les ascidiées simples des côtes de Provence 1. Phallusiadées. *Ann. Mus. Hist. Nat. Marseille* 2(1): 1–270.

Ascidia pedunculata Hoffman, F. (1829). Einige Bemerkungen über die Vegetation und die fauna von Helgoland. *Sber. Ges. Naturf. Freunde Berl.* **1**: 228–260 [242].

Type data: type status unknown.
Type locality: Denmark.

Ascidia opalina Macgillivray, W. (1843). *A History of the Molluscos Animals of the Counties of Aberdeen, Kincardine and Banff*. London and Aberdeen: Cunningham and Mortimer pp. 307–314 [312].

Type data: type status unknown.
Type locality: Aberdeen, Scotland.

Ascidia albida Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [200] [dated 1846–1850].

Type data: type status and whereabouts unknown.
Type locality: Cullercoats, Northumberland, England.

Ascidia elliptica Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [201] [dated 1846–1850].

Type data: syntypes HMN*.
Type locality: Cullercoats, Northumberland, England.

Ascidia pellucida Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [202] [dated 1846–1850].

Type data: holotype HMN*.
Type locality: Cullercoats, Northumberland, England.

Ascidia sordida Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [199] [dated 1846–1850].

Type data: holotype HMN*.
Type locality: Cullercoats, Northumberland, England.

Ascidia aculeata Alder, J. (1863). Observations on the British Tunicata with descriptions of several new species. *Ann. Mag. Nat. Hist.* (3)**11**: 153–173 [156].

Type data: syntypes HMN*.
Type locality: Lamlash Bay, Arran, Scotland and Bantry Bay, SW Ireland.

Ascidia pustulosa Alder, J. (1863). Observations on the British Tunicata with descriptions of several new species. *Ann. Mag. Nat. Hist.* (3)**11**: 153–173 [154].

Type data: holotype HMN*.
Type locality: Fowey Harbour, Cornwall, England.

Ascidia affinis Hancock, A. (1870). On the larval state of *Molgula* with a description of several new species of simple ascidians. *Ann. Mag. Nat. Hist.* (4)**6**: 353–368 [361].

Type data: holotype HMN*, paratype(s) BMNH 88.5.7.261*.
Type locality: Roach River, Essex, England.

Ascidia normanni Alder, J. & Hancock, A. in Hancock, A. (1870). On the larval state of *Molgula*; with descriptions of several new species of simple ascidians. *Ann. Mag. Nat. Hist.* (4)**6**: 353–368 [361].

Type data: holotype BMNH 98.5.7.272*.
Type locality: Strangford Lough.

Ascidia trianularis Herdman, W.A. (1881). Notes on the British Tunicata with descriptions of new species. *Proc. Linn. Soc. Lond.* **15**: 274–290.

Type data: type status and whereabouts unknown.
Type locality: Firth of Clyde, Scotland.

Ascidia truncata Herdman, W.A. (1881). Notes on the British Tunicata with descriptions of new species. *Proc. Linn. Soc. Lond.* **15**: 274–290 [280].

Type data: type status unknown.
Type locality: Firth of Clyde, Scotland.

Ascidia expansa Kiaer, J. (1893). Oversigt over Norges ascidiae simplices. *Forh. Vidensk. Selsk. Krist.* **9**: 1–105 [26].

Type data: type status and whereabouts unknown.

Type locality: Bergen, Norway.

Ascidia minuta Kiaer, J. (1893). Oversigt over Norges ascidiae simplices. *Forh. Vidensk. Selsk. Krist.* **9**: 1–105.

Type data: type status and whereabouts unknown.

Type locality: Aure, Norway.

Taxonomic decision for synonymy: Roule, L. (1884). Recherches sur les ascidies simples des côtes de Provence I. Phallusiadées. *Ann. Mus. Hist. Nat. Marseille* **2**(1): 1–270 [220]; Hartmeyer, R. (1915). Alder and Hancock's Britische Tunicaten. Eine Revision. *Mitt. Zool. Mus. Berl.* **7**: 303–344 [320]; Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275 [81].

Distribution: Ireland, New Zealand, TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast, SW coast); Mediterranean Sea, English Channel, Irish Sea, west coast of Ireland and Scotland.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Phallusia Savigny, 1816

Phallusia Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris: G. Dufour. [101].

Type species: *Ascidia mammillata* Cuvier, 1815 by original designation.

Pachychlaena Herdman, W.A. (1880). Preliminary report on the Tunicata of the *Challenger* expedition. Ascidiidae. *Proc. R. Soc. Edinb.* **10**(1): 458–472 [461] [introduced as a subgenus of *Ascidia*].

Type species: *Ascidia (Pachychlaena) oblonga* Herdman, 1880 by original designation.

Phallusiopsis Hartmeyer, R. (1908). Zur Terminologie der Familien und Gattungen der Ascidien. *Zool. Annln.* **3**: 1–63 [14].

Type species: *Phallusia nigra* Savigny, 1816 by original designation.

Plurascidia Monniot, F. & Monniot, C. (2000). Ascidiacea: Plurellidae collected in the Pacific Ocean by the cruises MUSORSTOM, KARUBAR and the "Coral Reef Research Foundation". In Crosnier, A. (ed.) Résultats des Campagnes MUSORSTOM, Volume 21. *Mémoires du Muséum National d'Histoire Naturelle, Paris*, **184** pp. 703–721 [714].

Type species: *Plurascidia marquesana* F. & C. Monniot, 2000 by original designation.

Taxonomic decision for synonymy: Hartmeyer, R. (1909). Ascidién (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig: C.F. Winter Vol. 3, suppl. pts 81–87 [1403]; Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1631] (*Plurascidia*).

Extralimital distribution: Afrotropical Region; Mediterranean Sea, northeast Atlantic Ocean, Indo-west Pacific Ocean. See: Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidiénfauna auf tier-geographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Phallusia arabica Savigny, 1816

Phallusia arabica Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris: G. Dufour. [164].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Gulf of Suez.

Phallusia philippinensis Millar, R.H. (1975). Ascidiens from the Indo-West Pacific region in the Zoological Museum, Copenhagen (Tunicata, Ascidiacea). *Steenstrupia* **3**(20): 205–336 [273].

Type data: holotype ZMUC*.

Type locality: Banda Is., Waling Cesar, 25 m, Indonesia.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [63] (excepting *Phallusia julinea* Sluiter, 1915 (*sic*) and its synonyms, included erroneously on p. 61).

Distribution: Sri Lanka, Philippines, NT (N coast), QLD (Great Barrier Reef, NE coast); Gulf of Suez, Red Sea. Ecology: benthic, marine.

Phallusia barbarica Kott, 1985

Phallusia barbarica Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [63].

Type data: holotype QM GH3086, paratype(s) QM GH2488.

Type locality: Cleveland Point, Moreton Bay, QLD.

Distribution: QLD (Central E coast).

Ecology: benthic, marine.

Phallusia julinea Sluiter, 1919

Phallusia julinea Sluiter, C.P. (1919). Ueber einige alte neue Ascidién aus dem Zoologischen Museum von Amsterdam. *Bijdr. Dierk.* **21**: 1–12 [7] [figures published separately, see Sluiter, C.P. (1919). Ueber einige alte neue Ascidién aus dem Zoologischen Museum von Amsterdam. *Bijdr. Dierk.* **21**: 1–12 (figs 1–20)].

Type data: holotype ZMA TU742.

Type locality: Java Sea, Nassi Besar Is., 20 m, Indonesia.

Distribution: Indonesia, Palau, New Caledonia, Malagasy, NT (N coast), QLD (Central E coast, NE coast), WA (N coast, NW coast).

Ecology: benthic, marine; mostly to 30 m, wedged amongst coral rubble.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Phallusia millari Kott, 1985

Phallusia millari Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [66].

Type data: holotype QM GH699, paratype(s) QM GH700.

Type locality: Abbot Bay, Euri Creek, 16 m, QLD.

Distribution: Singapore, Philippines, NT (Gulf of Carpentaria, N coast), QLD (NE coast), WA (Central W coast, Lower W coast, N coast, NW coast).

Ecology: benthic, marine; sandy mud bottom.

Phallusia obesa (Herdman, 1880)

Ascidia (Pachychlaena) obesa Herdman, W.A. (1880). Preliminary report on the Tunicata of the *Challenger* expedition. Ascidiidae. *Proc. R. Soc. Edinb.* **10**(1): 458–472 [462].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: East Moncoeur Is., Bass Strait, 80 m, VIC.

Ascidia (Pachychlaena) oblonga Herdman, W.A. (1880). Preliminary report on the Tunicata of the *Challenger* expedition. Ascidiidae. *Proc. R. Soc. Edinb.* **10**(1): 458–472 [461].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: East Moncoeur Is., Bass Strait, 80 m, VIC.

Ascidia phallusioides Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [446] [*nom. nud.*].

Ascidia phallusioides Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [12].

Type data: syntypes AM U136 (G2089), AM U252, AM U235, AM U259 (G2090).

Type locality: Port Jackson, 12–16 m, NSW.

Taxonomic decision for synonymy: Hartmeyer, R. & Michaelsen, W. (1928). Ascidiæ Diktyobranchiæ und Ptychobranchiæ. *Fauna Südwest-Aust.* **5**: 251–460 [308].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast, SW coast).

Ecology: benthic, marine, sand bottom; harbour piles.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Phallusia polytrema (Herdman, 1906)

Ascidia polytrema Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [306].

Type data: holotype BMNH 1907.8.30.6.

Type locality: south ends of Cheval and Periya Paars, Sri Lanka.

Ascidia pandora Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [48].

Type data: holotype QM GH2045.

Type locality: Wistari Reef, 3 m, Capricorn Group, Great Barrier Reef, QLD.

Plurascidia marquesana Monniot, F. & Monniot, C. (2000). Ascidiacea: Plurellidae collected in the Pacific Ocean by the cruises MUSORSTOM, KARUBAR and the "Coral Reef Research Foundation". In Crosnier, A. (ed.) *Résultats des*

Campagnes MUSORSTOM, Volume 21. *Mémoires du Muséum National d'Histoire Naturelle, Paris*, **184** pp. 703–721 [714].

Type data: holotype MNHP P7 Plu 2.

Type locality: Marquesas IIs, (Hiva Oa), 85–87 m [9°44.5'S 138°49.9'W].

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [149]; Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1631].

Distribution: Sri Lanka, French Polynesia, QLD (Great Barrier Reef); Indian Ocean, Gulf of Manaar.

Ecology: benthic, marine.

CORELLIDAE

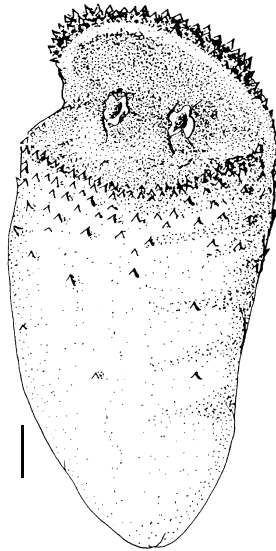


Fig. 16. *Rhodosoma turcicum* (Savigny, 1816).
(Scale bar = 5.0 mm). [from Kott 1985]

The family Corellidae Herdman, 1882, in common with most phlebobranchs, contains robust ascidians with a firm gelatinous test and a large flat branchial sac. It is distinguished by the position of the gut loop and gonads in the parietal body wall to the right (rather than to the left) of the pharynx. The family is represented by two subfamilies, Corellinae Herdman, 1882 (with coiled stigmata), and Rhodosomatinae Seeliger, 1893 (with straight stigmata).

Among Corellinae, *Corella eumyota* Traustedt, 1882 is the only species presently known from Australia. It is recorded from both temperate and tropical waters. However, appreciable populations have not been detected in shallow littoral waters, although it has been found in large numbers on the sea floor around New Zealand (Kott 1969).

The only species in the subfamily Rhodosomatinae recorded from Australia, *Rhodosoma turcicum* (Savigny, 1816), is widely distributed in temperate and tropical waters of the Atlantic, Pacific and Indian Oceans and the Mediterranean Sea. Though

taken from a vast latitudinal range, it has been recorded in crowded populations only in deeper (175–155 m) waters off north-eastern Tasmania. The species is readily identified by the fold that projects into the body almost completely isolating an anterior flap or lid which closes down over the apertures, the body muscles being modified to operate the lid.

References

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- Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239
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- Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour.

Seeliger, O. (1893). Appendicularien und Ascidien, Tunicata. Manteltiere. pp. 1–48 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig : C.F. Winter Vol. 3 Suppl. 1

Traustedt, M.P.A. (1882). Vestindiske Ascidiae Simplicis, Forste Afdeling. Phallusiadae. *Vidensk. Meddr. Dansk Naturh. Foren.* **1881**: 257–288

Corella Alder, 1870

Corella Alder, J. & Hancock, A. in Hancock, A. (1870). On the larval state of *Molgula*; with descriptions of several new species of simple ascidians. *Ann. Mag. Nat. Hist.* (4) **6**: 353–368 [362].

Type species: *Ascidia parallelogramma* Mueller, 1776 by subsequent designation, see Hartmeyer, R. (1924). Ascidacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275.

Extralimital distribution: Antarctic Region, Palaearctic Region; northeast Pacific Ocean, tropical west Pacific Ocean, northeast Atlantic Ocean, tropical west Atlantic Ocean, Mediterranean Sea. See: Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Corella eumyota Traustedt, 1882

Corella eumyota Traustedt, M.P.A. (1882). Vestindiske Ascidiae Simplicis, Forste Afdeling. Phallusiadae. *Vidensk. Meddr. Dansk Naturh. Foren.* **1881**: 257–288 [271].

Type data: holotype ZMUC*.

Type locality: Valparaíso, Chile, Pacific Ocean.

Corella novarae Drasche, R. von (1884). Ueber einige neue und weniger gekannte aussereuropäische einfache Ascidien. *Denkschr. Akad. Wiss. Wien* **48**: 369–387 [382].

Type data: type status unknown.

Type locality: St Paul Is., Indian Ocean.

Corella antarctica Sluiter, C.P. (1905). Note préliminaire sur les ascidiens holosomates de l'Expédition Antarctique Française commandée par le Dr. Charcot. *Bull. Mus. Natl. Hist. Nat. Paris* **11**: 470–475 [471].

Type data: syntypes MNHP P4 COR.A 23–24*.

Type locality: Wandel Is., Antarctica.

Corella valentinae Kesteven, H.L. (1909). Studies on Tunicata no. 1. *Proc. Linn. Soc. N.S.W.* **34**: 276–295 [286].

Type data: syntypes AM U565, U566.

Type locality: Hobart Harbour, 9 m, TAS.

Corella benedeni Beneden, E. van & Sélys-Longchamps, M. (1913). Tuniciers. Caducichordata (Ascidiacés et Thaliacés). *Résult. Voyage S.Y. Belgica Zoologie* **5**(2): 1–122 [9].

Type data: type status and whereabouts unknown.

Type locality: Nasse Is., 436 m, Grahamland [71°15'S 87°44'W], see Ärnäck-Christie-Linde, A. (1938). Ascidacea. *Further zool. Results Swed. Antarct. Exped. 1901–1* **3**(4): 1–54.

Corella dohrni Beneden, E. van & Sélys-Longchamps, M. (1913). Tuniciers. Caducichordata (Ascidiacés et Thaliacés). *Résult. Voyage S.Y. Belgica Zoologie* **5**(2): 1–122 [15].

Type data: type status and whereabouts unknown.

Type locality: 580 m, Grahamland [70°00'S 80°48'E], see Ärnäck-Christie-Linde, A. (1938). Ascidacea. *Further zool. Results Swed. Antarct. Exped. 1901–1* **3**(4): 1–54.

Taxonomic decision for synonymy: Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476 [212].

Distribution: Chile, Argentina, New Zealand, South Africa, SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast); Magellanic region and Antarctic Peninsula.

Ecology: benthic, marine; sometimes in crowded populations on sea floor, also on rocks and harbour fittings.

References: Kott, P. (1969). Antarctic Ascidacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Rhodosoma Ehrenberg, 1828

Rhodosoma Ehrenberg, C.G. (1828). Zoologica Vol. 1, Praefatio. fol. 3. In, *Symbolae Physicae* seu Icones et descriptiones corporum naturalium novorum aut minus cognitorum, quae ex itineribus per Libyam, Aegyptum, Nubium, Dongalam, Syriam, Arabiam, et Hemprich st Christiani Godofredi Ehrenberg ... studio annis MDCCCXX–MDCCCXXV redierunt. Vol. 3. Berolini : Officina Academica. [3].

Type species: *Phallusia turcica* Savigny, 1816 by monotypy.

Schizascus Stimpson, W. (1855). Description of some new marine invertebrata from the Chinese and Japanese Seas. *Proc. Acad. Nat. Sci. Phila.* **7**: 377–378 [377].

Type species: *Schizascus pellucidus* Stimpson, 1855 by original designation.

Peroïdes Macdonald, J.D. (1864). On the representative relationships of the fixed and free Tunicata, regarded as two subclasses of equivalent value; with some general remarks on their morphology. *Trans. R. Soc. Edinburgh* **23**(2): 171–183 [179].

Type species: *Pera huxleyi* Macdonald, 1862 by monotypy.

Chevreulius Lacaze-Duthiers, F.J.H. (1865). Sur un genre nouveau d'ascidien, le *Chevreulius callensis* Lac.-Duth. *Ann. Sci. Nat. Zool.* (5) **4**: 293–316 [293].

Type species: *Chevreulius callensis* Lacaze-Duthiers, 1865 by monotypy.

Corellascidia Hartmeyer, R. (1900). Nachtrag zu Monascidien von Ternate. *Abh. Senckenb. Naturforsch. Ges.* **25**(1): 235–242 [235].

Type species: *Corellascidia herdmani* Hartmeyer, 1900 by monotypy.

Taxonomic decision for synonymy: Hartmeyer, R. (1901). Zur Kenntnis des genus *Rhodosoma*. *Arch. Naturg. Suppl.* **67**: 151–168 [158]; Hartmeyer, R. & Michaelsen, W. (1928). Ascidiæ Diktyobranchiæ und Ptychobranchiæ. *Fauna Südwest-Aust.* **5**: 251–460 [313]; Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [156] (for *Peroides*).

Extralimital distribution: Palaearctic Region; pan-tropical, temperate west Pacific Ocean, temperate east Pacific Ocean, Mediterranean Sea. See: Hartmeyer, R. & Michaelsen, W. (1928). Ascidiæ Diktyobranchiæ und Ptychobranchiæ. *Fauna Südwest-Aust.* **5**: 251–460; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Rhodosoma turcicum (Savigny, 1816)

Phallusia turcica Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [102].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Red Sea.

Rhodosoma verecundum Ehrenberg, C.G. (1828). Zoologica Vol. 1, Praefatio. fol. 3. In, *Symbolae Physicae* seu Icones et descriptiones corporum naturalium novorum aut minus cognitorum, quae ex itineribus per Libyam, Aegyptum, Nubium, Dongalam, Syriam, Arabiam, et Hemprich st Christiani Godofredi Ehrenberg ... studio annis MDCCCXX-MDCCCXXV redierunt. Vol. 3. Berolini : Officina Academica. [3].

Type data: syntypes (probable) ZMB 129, 130*.

Type locality: Red Sea.

Schizascus papillosus Stimpson, W. (1855). Description of some new marine invertebrata from the Chinese and Japanese Seas. *Proc. Acad. Nat. Sci. Phila.* **7**: 377–378 [377].

Type data: type status and whereabouts unknown.

Type locality: between Gulzlaff Is. and Hsia-men, 86 m, China coast.

Schizascus pellucidus Stimpson, W. (1855). Description of some new marine invertebrata from the Chinese and Japanese Seas. *Proc. Acad. Nat. Sci. Phila.* **7**: 377–378 [377].

Type data: type status and whereabouts unknown.

Type locality: China coast.

Pera huxleyi Macdonald, J.D. (1862). On a new Tunicata occurring on one of the Bellona Reefs. *Proc. Linn. Soc. Lond.* **6**: 78–81 [78].

Type data: type status unknown.

Type locality: Bellona Reefs, New Caledonia [21°51'S 159°29'E].

Chevreulius callensis Lacaze-Duthiers, F.J.H. (1865). Sur un genre nouveau d'ascidien, le *Chevreulius callensis* Lac.-Duth. *Ann. Sci. Nat. Zool.* (5)**4**: 293–316 [293].

Type data: syntypes MNHP P4 RHO3*.

Type locality: La Calle, Mediterranean Sea.

Rhodosoma seminudum Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 83–109 [89].

Type data: type status unknown NHMW (depository uncertain, not found).

Type locality: Jamaica, West Indies.

Rhodosoma pyxis Traustedt, M.P.A. (1882). Vestindiske Ascidiæ Simplicæ, Forste Afdeling. Phallusiadae. *Vidensk. Meddr. Dansk Naturh. Foren.* **1881**: 257–288 [274].

Type data: holotype ZMUC*.

Type locality: Chile.

Corellascidia herdmani Hartmeyer, R. (1900). Nachtrag zu Monascidien von Ternate. *Abh. Senckenb. Naturforsch. Ges.* **25**(1): 235–242 [236].

Type data: holotype SMF* (depository uncertain).

Type locality: littoral, Ternate, Indonesia.

Rhodosoma ceylonicum Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [302].

Type data: holotype BMNH 1907.8.30.4.

Type locality: Palk Bay, Sri Lanka.

Taxonomic decision for synonymy: Hartmeyer, R. & Michaelsen, W. (1928). Ascidiæ Diktyobranchiæ und Ptychobranchiæ. *Fauna Südwest-Aust.* **5**: 251–460 [313].

Distribution: Philippines, Indonesia, China (People's Republic), Chile, Japan, California, NSW (Central E coast, Lower E coast), NT (N coast), QLD (Central E coast, NE coast), SA (Great Australian Bight, S Gulfs coast), WA (Lower W coast, N coast, NW coast); Coral Sea, Indian Ocean, Red Sea, Mediterranean, Atlantic Ocean.

Ecology: benthic, marine; generally in shallow water, but taken in large numbers off NE Tasmania at 174–155 m.

References: Hartmeyer, R. (1901). Zur Kenntnis des genus *Rhodosoma*. *Arch. Naturg. Suppl.* **67**: 151–168; Kott, P. (1954). Tunicata, Ascidiæ. *Rep. B.A.N.Z. Antarct. Res. Exped.* **1**(4): 121–182; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

PEROPHORIDAE

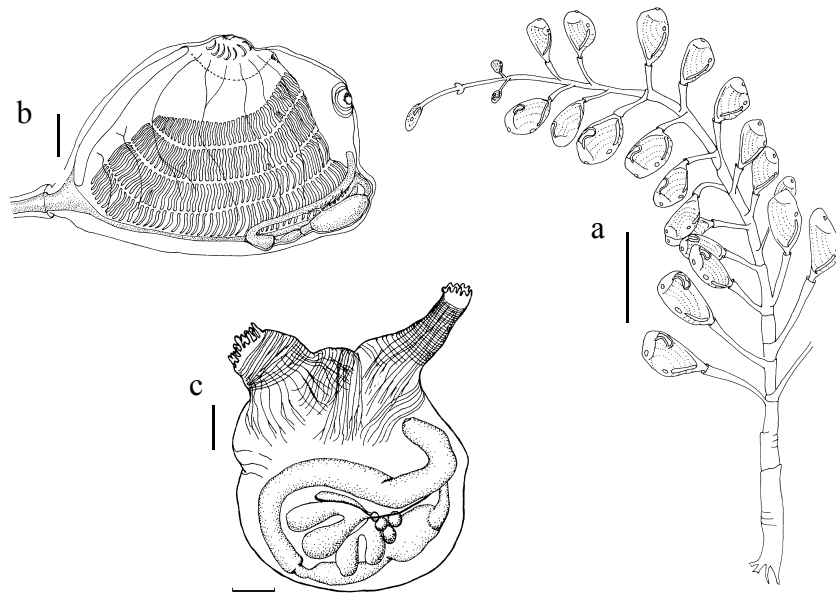


Fig. 17. a, b, *Perophora namei* Hartmeyer & Michaelsen, 1928, colony and contracted zooid removed from test; c, *Perophora multistigmata* Kott, 1952, zooid test. (Scale bars: a = 5.0 mm; b = 0.5 mm; c = 0.2 mm). [from Kott 1985]

Species of the family Perophoridae Giard, 1872 are colonies in which small zooids develop from the mesodermal tissue in the vessels of the thin axial or basal stolons which connect them to one another. The gut loop is to the left of the flat branchial sac, and internal longitudinal vessels and from four to 25 rows of stigmata are in the branchial sac. The apertures have up to 14 lobes around each rim. Gonads are in the gut loop. The ovary is small and sac-like. The testis is undivided or lobed or divided into up to ten long club-shaped follicles (*Perophora* Wiegmann, 1835); or it is a mass of small pyriform or branched follicles (*Ecteinascidia* Herdman, 1880). The genus *Perophora* has been revised by Goodbody (1994).

Embryos are incubated in a brood pouch in the parietal body wall. They are large with ocellus and otolith and antero-median adhesive organs with axillary cones in ectodermal cups like aplousobranch ascidians. The aplousobranch-like viviparous larvae of Perophoridae and the role of the mesodermal tissue in the replicative process has led Berrill (1950) to postulate a clavelinid rather than phlebobranch affinity for the family. The proposal is supported by the fact that an epicardium has not been detected. However, nor have traces of phlebobranch nephrocytes or excretory vesicles been found around the gut or elsewhere in the body wall. Nevertheless, the gut loop in the parietal body wall, the gonads enclosed in the gut loop and the form of the pharynx are all significant phlebobranch characters and arguments for a phlebobranch affinity appear to be the most compelling. The aplousobranch-like appearance of the larval trunk probably is the result of convergence associated with viviparity, for the

sessile adhesive organs are only superficially similar to the stalked ones of aplousobranch species. A viviparous habit occurs in most colonial ascidians, and appears to be adaptive rather than indicative of a phylogenetic relationship.

The family is well represented in Australian waters by eight species of the exclusively tropical genus *Ecteinascidia* and six species of *Perophora*, a genus known from both tropical and temperate waters. *Perophora hutchisoni* is one of the few known trans-Tasman species. Kott (1985, 2003) has documented the Australian members of the family and reviewed its affinities.

References

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- Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662
- Goodbody, I. (1994). The tropical western Atlantic Perophoridae (Asciadiacea): 1. The genus *Perophora*. *Bull. Mar. Sci* **55**(1): 176–192
- Herdman, W.A. (1880). Preliminary report on the Tunicata of the *Challenger* expedition. Part 2. Ascidiidae. *Proc. R. Soc. Edinb.* **10**: 714–726
- Kott, P. (1985). The Australian Asciadiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440
- Kott, P. (2003). New syntheses and new species in the Australian Asciadiacea. *J. Nat. Hist.* **37**: 1611–1653
- Wiegmann, A.F.A. (1835). Tunicata. *Arch Naturg.* **1**(1): 309
- Ecteinascidia* Herdman, 1880**
- Ecteinascidia* Herdman, W.A. (1880). Preliminary report on the Tunicata of the *Challenger* expedition. Part 2. Ascidiidae. *Proc. R. Soc. Edinb.* **10**: 714–726 [722].
Type species: *Ecteinascidia turbinata* Herdman, 1880 by subsequent designation, see Beneden, E. van (1887). Les genres *Ecteinascidia* Herd., *Rhopalaea* Phil. et *Sluiteria* n.g. Note pour servir à la classification des Tuniciers. *Bull. Acad. R. Belg. Cl. Sci.* (3)**14**(7): 19–44.
- Sluiteria* Beneden, E. van (1887). Les genres *Ecteinascidia* Herd., *Rhopalaea* Phil. et *Sluiteria* n.g. Note pour servir à la classification des Tuniciers. *Bull. Acad. R. Belg. Cl. Sci.* (3)**14**(7): 19–44 [33].
Type species: *Ecteinascidia rubricollis* Sluiter, 1885 by monotypy.
- Perophoropsis* Lahille, F. (1890). *Recherches sur les tuniciers des côtes de France*. Toulouse : Lagarde et Sebillé 330 pp. [286].**
Type species: *Perophoropsis herdmani* Lahille, 1890 by monotypy.
- Taxonomic decision for synonymy: Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354 [141].
- Extralimital distribution: tropical Indo-west Pacific Ocean, tropical Atlantic Ocean, Mediterranean Sea. See: Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Kott, P. (1985). The Australian Asciadiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.
- Ecteinascidia diaphanis* Sluiter, 1885**
- Ecteinascidia diaphanis* Sluiter, C.P. (1885). Ueber einige einfachen Ascidien von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [168].
Type data: holotype ZMA TU524.
Type locality: between Mendanau and Billiton, 12 m, Indonesia, see Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200.
- Ecteinascidia hataii* Tokioka, T. (1950). Ascidians from the Palao Is. I. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**(3): 115–150 [127] [publication date established from Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl Mus.* **251**: 1–242].**
Type data: type status unknown SMLB (depository uncertain, not found).
Type locality: Palau Is., W Pacific Ocean.
- Ecteinascidia koumaci* Monniot, C. (1987). Ascidies de Nouvelle-Calédonie I. Phlebobranches du Lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4)**9A**(1): 3–31 [28].**
Type data: holotype MNHP P2 ECT 41*, paratype(s) MNHP P2 ECT 42*.
Type locality: Passe de Koumac, lagoon, New Caledonia.

Ecteinascidia ndouae Monniot, C. (1991). Ascidies de Nouvelle-Calédonie VIII. Phlébobranches (suite). *Bull. Mus. Natl. Hist. Nat. Paris* (4) **12A**(3–4): 491–515 [505].
Type data: holotype MNHP P2 ECT 49*.
Type locality: Cape N'Dona, south of la Grande Terre, New Caledonia.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [90]; Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [635].

Distribution: Palau, New Caledonia, NSW (Central E coast), NT (N coast), QLD (Central E coast, Great Barrier Reef); west Pacific Ocean.
Ecology: benthic, marine; under-surface of boulders, under ledges.

Ecteinascidia flora Kott, 1952

Ecteinascidia flora Kott, P. (1952). Ascidiaceans of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [316].
Type data: syntypes AM U3903, U3970.
Type locality: 28°03'S 113°E, 35 m, WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Ecteinascidia imperfecta Tokioka, 1950

Ecteinascidia imperfecta Tokioka, T. (1950). Ascidiaceans from the Palau Is. I. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**(3): 115–150 [129] [publication date established from Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl. Mus.* **251**: 1–242].
Type data: type status unknown SMLB (depository uncertain, not found).
Type locality: Palau Is., W Pacific Ocean.

Ecteinascidia remanea Monniot, F. & Monniot, C. (2001). Ascidiaceans from the tropical western Pacific. *Zoosystema* **23**(2): 201–383 [302].

Type data: holotype MNHP P2 ECT 83.

Type locality: Shrimp Lake, marine lake on E side Ngeruktabel Island, Ngeremdiu, mangrove roots/carbonate rock, 1 m, Palau Is. [7°15.27'N 134°26.68'E].

Taxonomic decision for synonymy: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1636].

Distribution: Palau, QLD (Great Barrier Reef); Korrör.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [92].

Ecteinascidia maxima Kott, 1985

Ecteinascidia maxima Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [93].

Type data: holotype QM GH50.

Type locality: reef, Sugarloaf, Lord Howe Is., 17 m.

Distribution: Lord Howe Island, NSW (SE oceanic); known only from type locality.

Ecology: benthic, marine; reef.

Ecteinascidia nexa Sluiter, 1904

Ecteinascidia nexa Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [11].

Type data: syntypes ZMA TU558.5.

Type locality: reef, Karkaralong Group, Indonesia.

Ecteinascidia hornelli Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [298].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Navakaddu Paar, south part of Gulf of Manaar, 16 m, India.

Ecteinascidia tokaraensis Tokioka, T. (1954). Contributions to Japanese ascidian fauna VII. Invertebrate fauna of the intertidal zone of the Tokara Islands. VII Ascidiaceans. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **3**(3): 239–264 [255].

Type data: holotype SMLB 138*.

Type locality: Takarazima, Tokara Is., Japan.

Ecteinascidia aequale Monniot, C. (1987). Ascidies de Nouvelle-Calédonie I. Phlébobranches du Lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **9A**(1): 3–31 [25].

Type data: holotype MNHP P2 ECT.43*.

Type locality: lagoon, New Caledonia.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [94]; Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [635].

Distribution: Sri Lanka, Philippines, Indonesia, Solomon Islands, New Caledonia, Fiji, Lord Howe Island, QLD (Great Barrier Reef, NE coast, SE oceanic); west Pacific Ocean and Indian Ocean, Tokara Is.

Ecology: benthic, marine; common under rubble at low tide.

Ecteinascidia rubricollis Sluiter, 1885

Ecteinascidia rubricollis Sluiter, C.P. (1885). Ueber einige einfachen Ascidien von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [163].

Type data: holotype ZMA TU978.

Type locality: Billiton, 12 m, Indonesia, see Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200.

Ecteinascidia koumaci Monniot, C. (1987). Ascidies de Nouvelle-Calédonie I. Phlébobranches du Lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **9A**(1): 3–31 [28].

Type data: holotype MNHP P2 ECT 41*, paratype(s) MNHP P2 ECT 42*.

Type locality: Passe de Koumac, lagoon, New Caledonia.

Taxonomic decision for synonymy: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1637].

Distribution: Indonesia, New Caledonia, Mozambique, QLD (Great Barrier Reef, NE coast).

Ecology: benthic, marine.

Ecteinascidia sluiteri Herdman, 1906

Ecteinascidia sluiteri Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [300].

Type data: holotype BMNH 1907.8.30.2.

Type locality: off north end Karativo Is., 20–50 m, Sri Lanka.

Ecteinascidia vitta Monniot, C. (1992). Ascidiées de Nouvelle-Calédonie XI. Phlebobranches et Stolidobranches du Plateau des Chesterfield. *Bull. Mus. Natl. Hist. Nat. Paris (4)* **14A**(1): 3–22 [10].

Type data: holotype MNHP P2 ECT54.

Type locality: Chalcal, Chesterfield Is., Coral Sea.

Taxonomic decision for synonymy: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1639].

Distribution: Sri Lanka, Singapore, Palau, New Caledonia, Federated States of Micronesia, Mozambique, NT (N coast), QLD (Great Barrier Reef, NE coast).

Ecology: benthic, marine; on rubble at low tide, often with epibionts.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Ecteinascidia thurstoni Herdman, 1890

Ecteinascidia thurstoni Herdman, W.A. (1890). On the genus *Ecteinascidia* and its relations; with descriptions of two new species, and a classification of the family Clavelinidae. *Proc. Trans. Liverpool Biol. Soc.* **5**: 144–163 [151].

Type data: syntypes MAD W.18/7 (Zoology, Invertebrate Gallery).

Type locality: Pearl Banks, Gulf of Manaar.

Distribution: Sri Lanka, South Africa, WA (Lower W coast, NW coast); Gulf of Manaar, Gulf of Aden, Gulf of Suez.

Ecology: benthic, marine.

Reference: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1640].

Perophora Wiegmann, 1835

Perophora Wiegmann, A.F.A. (1835). Tunicata. *Arch Naturg.* **1**(1): 309 [309] [without included species].

Type species: *Perophora listeri* Forbes, 1848 by subsequent monotypy, see Forbes, E. & Hanley, S.C.T. (1952). *A History of British Mollusca and their Shells*. (1848–1952). London : John van Voorst Vol. 1,2 & 4 (appendix) pp. 1–54, 369–376, 244–246 [28].

Extralimital distribution: tropical west Pacific Ocean to Japan, north-east Pacific Ocean, tropical west Atlantic Ocean, east Atlantic Ocean, Mediterranean Sea. See: Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidiidenfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Perophora clavata Kott, 1985

Perophora clavata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [102].

Type data: holotype QM G12732.

Type locality: 2 km off Ninety Mile Beach, Bass Strait, 17 m, VIC.

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine.

Perophora hutchisoni Macdonald, 1859

Perophora hutchisoni Macdonald, J.D. (1859). On the anatomical characters of an Australian species of *Perophora*. *Trans. Linn. Soc. Lond.* **22**: 377–379 [377].

Type data: type status unknown.

Type locality: King Georges Sound, Albany, SW WA.

Perophora boltenina Michaelsen, W. (1922). Ascidiæ Ptychobranchiæ und Diktyobranchiæ von Neuseeland und dem Chatham-Inseln. Papers from Dr. Th. Mortensen's Pacific Expedition 1914–1916, XI. *Vidensk. Meddr. Dansk Naturh. Foren.* **73**: 359–498 [488].

Type data: holotype ZMUC*.

Type locality: Stewart Is., 70 m, New Zealand.

Taxonomic decision for synonymy: Hartmeyer, R. & Michaelsen, W. (1928). Ascidiæ Diktyobranchiæ und Ptychobranchiæ. *Fauna Südwest-Aust.* **5**: 251–460 [269].

Distribution: New Zealand, TAS (Tas. coast), VIC (Bass Strait), WA (Lower W coast, SW coast).

Ecology: benthic, marine, sand bottom; 5–20 m subject to heavy surge and sand scour.

References: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [103]; Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1633].

***Perophora longicaulis* Kott, 2003**

Perophora longicaulis Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1633].

Type data: holotype WAM 206.87.

Type locality: SW Long Is., 18 m, Wallabi Group, Houtman's Abrolhos, WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Perophora modificata* Kott, 1985**

Perophora modificata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [104].

Type data: holotype QM GH283.

Type locality: channel face, Deltaic Reef, northern Great Barrier reef, QLD.

Distribution: Philippines, Palau, New Caledonia, NT (N coast), QLD (Great Barrier Reef, NE oceanic); NE oceanic (Lihou Reef).

Ecology: benthic, marine; 17–27 m, channel faces or in lagoons.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [41].

***Perophora multiclathrata* (Sluiter, 1904)**

Ecteinascidia multiclathrata Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [12].

Type data: holotype ZMA TU558.4.

Type locality: reef, Nusalaut Is., Indonesia.

Ecteinascidia formosana Oka, A. (1931). Ueber eine neue species von *Ecteinascidia* aus Formosa. *Proc. Imp. Acad. Japan* **7**: 173–175 [173].

Type data: syntypes BLIH 203*.

Type locality: Hoko-kô, Taiwan (as Formosa).

Perophora orientalis Ärnäck-Christie-Linde, A. (1935). A notable case of relation in *Perophora*. *Ark. Zool.* **28B**(9): 1–6 [6].

Type data: syntypes NHRM 1496*.

Type locality: Misaki Biological Station, Japan.

Perophora africana Millar, R.H. (1955). On a collection of ascidians from the Gold Coast. *Proc. Zool. Soc. Lond.* **123**(11): 277–325 [304].

Type data: holotype BMNH 1959.5.27.10*.

Type locality: Dix Cove Shore, Gold Coast, W Africa.

Taxonomic decision for synonymy: Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl. Mus.* **251**: 1–242 [136]; Nishikawa, T. (1984). Ascidians from the Truk Islands, Ponape Island, and Majuro Atoll (Tunicata, Ascidiacea). *Proc. Jpn. Soc. Syst. Zool.* **27**:

107–140 [123]; Nishikawa, T. (1986). Ascidians from the Gilbert and Solomon Islands and Nauru. I. Perophoridae, Ascidiidae, Corellidae. *Int. Sci. Rev.* **32**: 1–78 4 maps [31]; Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [635].

Distribution: Japan, NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef, NE coast), WA (Lower W coast); west Pacific Ocean, tropical Atlantic Ocean and west Indian Ocean.

Ecology: benthic, marine; shallow depths, rubble and shells, epizoid on other ascidians, under stones with good water circulation.

***Perophora multistigmata* Kott, 1952**

Perophora multistigmata Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [313].

Type data: syntypes AM U3904, AM U3969.

Type locality: Dunwich, Moreton Bay, QLD.

Distribution: QLD (Central E coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [108].

***Perophora namei* Hartmeyer & Michaelsen, 1928**

Perophora namei Hartmeyer, R. & Michaelsen, W. (1928). Ascidae Diktyobranchiae und Ptychobranchiae. *Fauna Südwest-Aust.* **5**: 251–460 [270].

Type data: holotype USNM 5926*.

Type locality: near Zamboanga Light, Mindadas, 20 m, Philippines.

Distribution: Philippines, QLD (NE oceanic).

Ecology: benthic, marine; 26 m, base of drop off on front reef near sandy bottom, common on vertical surface of dead coral.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [108].

***Perophora sabulosa* Kott, 1990**

Perophora sabulosa Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [267].

Type data: holotype QM GH3894, paratype(s) QM GH3902, GH4265.

Type locality: off Dunwich, Moreton Bay, 6 m, QLD.

Distribution: QLD (Central E coast).

Ecology: benthic, marine; in rock crevices, high in intertidal zone in rock outcrops on sandy beach.

PLURELLIDAE

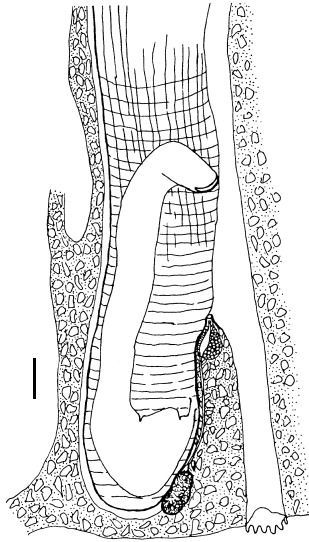


Fig. 18. *Plurella elongata* Kott, 1973, portion of zooid in test. (Scale bar = 1.0 mm).

[from Kott 1985]

In the family Plurellidae Kott, 1973, parts of the body wall along the dorsal mid-line, both anterior and posterior to the atrial aperture and including the neural complex and the gonads, are embedded in the test. Ovary and testis are separate, the undivided testis being embedded near the posterior end of the body, and the ovaries around the base of the atrial siphon. An arc of the body wall around the ventral border of the gut loop to the left of the mid-ventral line, containing the heart, is also embedded in the test. The duct of the neural gland, embedded in the test between the atrial and branchial apertures, opens into the atrial cavity by numerous simple ciliated pits along its length.

In the genus *Plurella* Kott, 1973, the male duct divides into distal branches, each expanded into a seminal vesicle to open with the separate short, wide, almost sessile oviducal openings of about six ovarian sacs arranged around the posterior rim of the base of the atrial siphon. *Microgastra* Kott, 1985 has only one ovarian sac and the vas deferens does not divide distally.

In both colonial *Plurella* and solitary *Microgastra* the test is sandy, hard and sometimes brittle, and the very thin body wall generally has few and delicate transverse muscles in a short band down the right side. The body musculature closely resembles and is probably convergent with that of *Ascidia scaevola* (Sluiter, 1904) which shares the characteristically brittle test of the solitary plurellids, *Microgastra* spp. Also, the right side of the body is narrower than the left and it has a fold of the branchial sac on the right side of the body resembling that of *A. scaevola*.

Plurella is known from four species, three tropical (*Plurella kottae* Monniot, F. & C., 1996, *P. monogyna* Monniot, F. & C., 2000, and *P. testacea* Monniot, F. & C., 2000) from the Philippines) and one temperate Australian species (*P. elongata* Kott, 1973). *Microgastra* is known from one species, common on sandy substrates from Bowen to Indonesia, Sri Lanka and Japan (Kott 1990).

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- Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279

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Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126

***Microgastra* Kott, 1985**

Microgastra Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [70].

Type species: *Ascidia granosa* Sluiter, 1904 by original designation.

Extralimital distribution: See: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298.

***Microgastra granosa* (Sluiter, 1904)**

Ascidia granosa Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [36].

Type data: holotype ZMA TU267.8.

Type locality: 8°30'S 119°07'E, 73 m, Indonesia.

Ascidia lapidosa Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [32].

Type data: syntypes ZMA TU240, TU241, TU242, TU243.

Type locality: 27–54 m, Damar Is., 45 m; reef, Waru-bai, Seram; reef Banda Is., Indonesia [8°25'12"S 127°18'24"E].

Ascidia mikrenterica Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [37].

Type data: syntypes ZMA TU254.

Type locality: 204 m, Indonesia [5°28'24"S 132°00'12"E].

Ascidia aenigmatica Nishikawa, T. (1986). Some ascidians dredged around the Oki Islands, the Japan Sea. *Mem. Natl. Sci. Mus. (Tokyo)* **19**: 175–188 [177].

Type data: holotype SMBL 339*, paratype(s) NSMT Pc683*.

Type locality: off SW coast, Dogo Is., Oki, Japan Sea.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [70]; Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [267].

Distribution: Sri Lanka, Japan, Indonesia, QLD (Central E coast, NE coast).

Ecology: benthic, marine; loose coral, sandy substrate, at about 6 m.

***Plurella* Kott, 1973**

Plurella Kott, P. (1973). Plurellidae, a new phlebobranchiate family of the Ascidiacea. *Proc. Linn. Soc. Lond.* **97**(4): 258–261 [258].

Type species: *Plurella elongata* Kott, 1973 by original designation.

Extralimital distribution: west Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Plurella elongata* Kott, 1973**

Plurella elongata Kott, P. (1973). Plurellidae, a new phlebobranchiate family of the Ascidiacea. *Proc. Linn. Soc. Lond.* **97**(4): 258–261 [258].

Type data: holotype NMV 164, paratype(s) NMV 165, 166.

Type locality: Investigator Strait, SA.

Distribution: SA (S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine; to 92 m in sandy habitats.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

UNPLACED SPECIES

The following names cannot be placed with certainty, for reasons given below, and are listed as *Species Inquirendae*.

Species Inquirenda

Ascidia aurora Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [605] [described as 'aurore un peu foncé avec des bandes verticales violettes se portant sur les tubes'; it may be a specimen of *Pyura robusta* Hartmeyer, 1922, which has radial tracts of overlapping iridescent spines from the siphons down the sides of the body and which on one occasion has been described as brick red with black oral siphons (see Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440); at this stage, more living specimens need to be observed to confirm its identity].

Type data: holotype whereabouts unknown.

Type locality: Western Port, VIC.

Ascidia reticulata Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [606] [neither the species nor the genus is evident from the original description].

Type data: holotype whereabouts unknown.

Type locality: King Georges Sound, WA.

Ascidia tumulus Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet

Ainé. [607] [this is the designated type species of *Syphonotethis*, a senior synonym of *Molgula* suppressed in favour of the latter name; Pizon, A. (1898). Etude anatomique et systématique des molgulidées appartenant aux collections du Muséum de Paris. *Ann. Sci. Nat.* (8) **7**: 305–381 redescribed the type specimen of *Ascidia tumulus* which may be the senior synonym of *Molgula ficus* (Macdonald, 1859)]. Type data: syntypes (probable) MNHP*.

Type locality: Western Port, VIC and Jervis Bay, NSW.

Ascidia succida Stimpson, W. (1855). Tunicata in descriptions of some new marine invertebrates. *Proc. Acad. Nat. Sci. Phila.* **7**: 387–388 [388] [unrecognisable from the original description].

Type data: holotype whereabouts unknown.

Type locality: Port Jackson, NSW.

Ascidia cylindracea Herdman, W.A. (1880). Preliminary report on the Tunicata of the *Challenger* expedition. Part 2. Ascidiidae. *Proc. R. Soc. Edinb.* **10**: 714–726 [714] [Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 (30) thought that this may be synonymous with *A. capillata* Sluiter, 1887, but the type locality is outside the usual range of *A. capillata*].

Type data: holotype whereabouts unknown.

Type locality: off Twofold Bay, NSW.

STOLIDOBANCHIA

Like Phlebobranchia, the suborder Stolidobranchia (order Pleurogona) has the gut embedded in the parietal body wall outside the large branchial sac with its internal longitudinal branchial vessels. However, the branchial sac itself is folded (unlike the unfolded pharyngeal wall of Phlebobranchia), and the regenerative tissue in replication is ectodermal, from test vessels or the parietal body wall (unlike the endodermal-epicardial-regenerative tissue in most Aplousobranchia and the mesodermal tissue in Clavelinidae and Perophoridae).

The suborder appears to have evolved from a phlebobranch ancestor through selection for adaptations associated with relatively large solitary organisms. Thus, in comparison with Phlebobranchia, the muscles of the parietal body wall form thicker layers of crowded fibres; the filtering area of the branchial sac is amplified by the development of the deep folds; the glandular part of the stomach wall projects out into folds or pockets and sometimes an arborescent liver branches off the pyloric region; gonads are on both sides of the body, and their size or number is increased to the extent that they sometimes cover much of the body wall outside the gut loop, although sometimes the gonads on the left side are enclosed in the gut loop. The test has become more fibrous and tough (unlike the firm but gelatinous test of most phlebobranch ascidians) with strong adhesive properties. Stalks and root-like extensions contribute to firm adherence or stability in sandy substrates and sometimes hair-like extensions grow out all over the test and attach a thick layer of insulating and protective sand around it. Sand and other foreign particles are often included in the test, making it hard and brittle (as in some aplousobranch colonies and a few phlebobranch species). Decoration of the outer surface of the test with hairs, spines and scales also occurs. Usually both siphons are lined with crowded overlapping scales or spines directed outwards toward the external aperture and usually they continue onto the test around the outside of the opening, directed away from it. Probably also protective, possibly detecting and/or filtering larger particles or predators from the incurrent water, are the branched and bushy tentacles at the base of the branchial siphon that are characteristic of both Pyuridae and Molgulidae. In the Styelidae (as in other suborders) the tentacles are simple and unbranched, but crowded.

The genus *Cynthia* Savigny, 1816 contained sessile ascidians with coriaceous test, four-lobed apertures, branchial folds, simple or branched tentacles and gut and gonads at the side of the pharynx. In fact all stolidobranch taxa were contained in the four subgenera or divisions of *Cynthia*, namely, *Simplices*, *Caesira*, *Pandocia* and *Dendrodoa*. Savigny did not assign type species to either *Cynthia* or its subgenera and in due course the genus was recognised as a supra-generic grouping, new genera were erected, and some pre-existing ones were found to accommodate the various components of the hyper-genus *Cynthia* (Heller 1877).

Colonial forms occur in subfamilies of the Styelidae, but not in Pyuridae or Molgulidae. Changes associated with the evolution of this habit are the reverse of those that occurred in the evolution of Stolidobranchia: they parallel the evolutionary changes in Aplousobranchia, namely size reduction and simplification of zooids, development of colonial systems, viviparity, and the development of larval organs.

The characters relevant at familial level are the body muscles; The numbers of branchial folds and form of the stigmata; the form of digestive diverticula; the numbers and position of gonads, the form of branchial tentacles; and the colonial status of the taxa. Most families, with the exception only of some abyssal ones, occur in Australian waters (Kott 1985).

References

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- Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440

HEXACROBYLIDAE

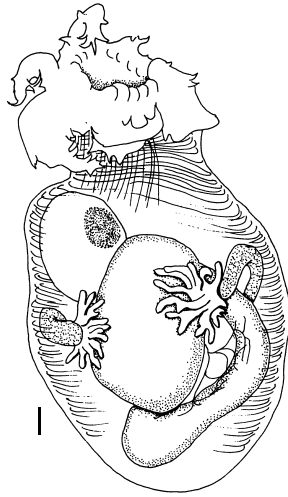


Fig. 19. *Oligotrema psammites* Bourne, 1903, individual, removed from test, from ventral surface. (Scale bar = 2.0 mm). [from Kott 1989]

The family Hexacroblyidae Seeliger, 1906 is characterised by a large buccal cavity surrounded by six arms (usually branched) containing muscles (continuous with longitudinal bands of the body wall), a reduced pharynx (limited to a short band behind the buccal cavity), ciliated stigmata opening into the atrial cavity from complex branchial pouches in the pharyngeal wall, a long oesophagus (with or without a large digestive diverticulum), a large stomach, gonads of the molgulid type with testis follicles separate from the ovarian tube, and a large vesicle (that appears to be a homologue of the molgulid kidney).

A proposal (Monniot *et al.* 1975) that the family represents a class of Tunicata separate from the Ascidiacea cannot be sustained (see Kott 1989). The family has close affinities with Molgulidae—closer than between Molgulidae and other taxa of the Ascidiacea. It appears to have evolved, probably from a molgulid ancestor, by profound changes in the pharynx and other parts of the gut. The powerful, branched,

muscular, external arms, large stomach and conspicuous gut diverticula appear to be adaptations for a carnivorous habit, probably following isolation in ocean trenches.

This is one of the few deep (abyssal) water families so far recorded from the Australian region. Its occurrence in Australian waters has been reviewed by Kott (1989, 1992).

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***Asajirus* Kott, 1989**

Asajirus Kott, P. (1989). The family Hexacroblyidae Seeliger, 1906 (Asciadiacea, Tunicata). *Mem. Queensl. Mus.* **27**(2): 517–534 [520].

Type species: *Hexacroblylus indicus* Oka, 1913 by original designation.

Hexadactylus Monniot, C. & Monniot, F. (1990). Revision of the class Sorberacea (benthic tunicates) with descriptions of seven new species. *Linn. Soc. Zool.* **99**: 239–290 [271] [junior objective synonym of *Asajirus*].

Type species: *Hexacroblylus indicus* Oka, 1913 by original designation.

Extralimital distribution: Arctic, north Atlantic Ocean, southeast Atlantic Ocean, southwest Atlantic Ocean, tropical central Atlantic Ocean, east Pacific and Indian Ocean basins. See: Kott, P. (1989). The family Hexacroblyidae Seeliger, 1906 (Asciadiacea, Tunicata). *Mem. Queensl. Mus.* **27**(2): 517–534. Generic reference: Kott, P. (1992). The Australian Asciadiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [648].

***Asajirus indicus* (Oka, 1913)**

Hexacroblylus indicus Oka, A. (1913). Zur Kenntnis der zwei aberranten Ascidien Gattungen *Dicopia* Sluiter and *Hexacroblylus* Sluiter. *Zool. Anz.* **43**: 1–10 [6].

Type data: syntypes (probable) IM*.

Type locality: near Sri Lanka, 4000 m, Indian Ocean.

Hexacroblylus arcticus Hartmeyer, R. (1923). Asciadiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365 [133].

Type data: holotype ZMUC*.

Type locality: 67°40'N 15°40'W, 890 m, and 63°26'N 7°30'W, 1280 m, NE Atlantic Ocean.

Hexacroblylus eunuchus Monniot, C. & Monniot, F. (1976). Tuniciers abyssaux du bassin argentin récoltés par 'l'Atlantis II'. *Bull. Mus. Natl. Hist. Nat. Paris* (3) **269**(387): 629–662 [658].

Type data: holotype MNHP H-HEX 8, slides H36, H37*.

Type locality: west Atlantic Ocean (type locality not recorded).

Hexadactylus longitestis Monniot, C. & Monniot, F. (1990). Revision of the class Sorberacea (benthic tunicates) with descriptions of seven new species. *Linn. Soc. Zool.* **99**: 239–290 [275].

Type data: syntypes MNHP H-HEX33*.

Type locality: south of New Caledonia on both sides of the Norfolk Ridge [24°19'06"S 167°48'42"E].

Hexadactylus millari Monniot, C. & Monniot, F. (1990). Revision of the class Sorberacea (benthic tunicates) with descriptions of seven new species. *Linn. Soc. Zool.* **99**: 239–290 [277].

Type data: syntypes (probable) ZMUC (depository uncertain, not found).

Type locality: 600 m, Bali Sea, Indonesia [03°25'S 117°03'E].

Hexadactylus seeligeri Monniot, C. & Monniot, F. (1990). Revision of the class Sorberacea (benthic tunicates) with descriptions of seven new species. *Linn. Soc. Zool.* **99**: 239–290 [281].

Type data: syntypes MNHP H-HEX 17*.

Type locality: 3450 m, Comoro Is., Indian Ocean [11°59'S 45°42'36"E].

Taxonomic decision for synonymy: Kott, P. (1992). The Australian Asciadiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [648].

Distribution: NSW (SE oceanic), QLD (NE oceanic, SE oceanic), TAS (SE oceanic); abyssal basins of the Indian Ocean, west, north and northeast Atlantic Ocean, south Indian and Pacific Basins.

Ecology: benthic, marine; depths of 800–5000 m.

***Oligotrema* Bourne, 1903**

Oligotrema Bourne, G.C. (1903). *Oligotrema psammites*; a new ascidian belonging to the family Molgulidae. *Q. J. Microsc. Sci.* **47**: 233–272 [233].

Type species: *Oligotrema psammites* Bourne, 1903 by monotypy.

Hexacroblylus Sluiter, C.P. (1905). Zwei merkwürdige Ascidien von der Siboga-Expedition. *Tijdschr. Ned. Dierk. Ver.* (2) **9**: 325–327 [325].

Type species: *Hexacroblylus psammattodes* Sluiter, 1905 by monotypy.

Gasterascidia Monniot, C. & Monniot, F. (1968). Les ascidies de grandes profondeurs récoltées par le navire océanographique Américain 'Atlantis II'. *Bull. Inst. Océanogr. Monaco* **67**(1379): 1–48 [36].

Type species: *Gasterascidia sandersi* Monniot & Monniot, 1968 by monotypy.

Sorbera Monniot, C. & Monniot, F. (1974). Ascidies abyssales de l'Atlantique récoltées par le 'Jean Charcot' (Campagnes, Naratlante, Walda Polygas A). *Bull. Mus. Natl. Hist. Nat. Paris* (3) **154**(226): 721–786 [777].

Type species: *Sorbera unigonas* Monniot & Monniot, 1974 by monotypy.

Taxonomic decision for synonymy: Kott, P. (1989). The family Hexacroblyidae Seeliger, 1906 (Asciadiacea, Tunicata). *Mem. Queensl. Mus.* **27**(2): 517–534 [524].

Extralimital distribution: north Atlantic Ocean, east Atlantic Ocean, west Indian Ocean, tropical west Pacific Ocean basin, southern polar Pacific Ocean basin. See: Kott, P. (1989). The family Hexacroblyidae Seeliger, 1906 (Asciadiacea, Tunicata). *Mem. Queensl. Mus.* **27**(2): 517–534.

***Oligotrema psammites* Bourne, 1903**

Oligotrema psammites Bourne, G.C. (1903). *Oligotrema psammites*; a new ascidian belonging to the family Molgulidae. *Q. J. Microsc. Sci.* **47**: 233–272 [233].

Type data: holotype whereabouts unknown.

Type locality: near Lifu, 90 m, New Britain.

Hexacroblylus psammattodes Sluiter, C.P. (1905). Zwei merkwürdige Ascidien von der Siboga-Expedition. *Tijdschr. Ned. Dierk. Ver.* (2) **9**: 325–327 [326].

Type data: holotype ZMA TU564.

Type locality: 1158 m, Laut Banda, Indonesia [5°40'42"S 120°45'30"E].

HEXACROBYLIDAE

- Sorbera digonas*** Monniot, C. & Monniot, F. (1984). Nouvelles Sorberacea (Tunicata) profondes de l'Atlantique sud et de l'Océan Indien. *Cahiers de Biologie Marine* **25**: 197–215 [209].
Type data: holotype MNHP H-SOR13*.
Type locality: 11°44'S 47°35'E, 3716 m, Comoro Is., Indian Ocean, see Monniot, C. & Monniot, F. (1990). Revision of the class Sorberacea (benthic tunicates) with descriptions of seven new species. *Linn. Soc. Zool.* **99**: 239–290.
- Taxonomic decision for synonymy: Kott, P. (1989). The family Hexacrobylidae Seeliger, 1906 (Asciadiacea, Tunicata). *Mem. Queensl. Mus.* **27**(2): 517–534 [524]; Kott, P. (1992). The Australian Asciadiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [650].
- Distribution: Indonesia, New Caledonia, NSW (SE oceanic), Papua New Guinea; SE Atlantic Basin.
Ecology: benthic, marine; depths of 1200–4600 m and 92 m off New Britain.

MOLGULIDAE

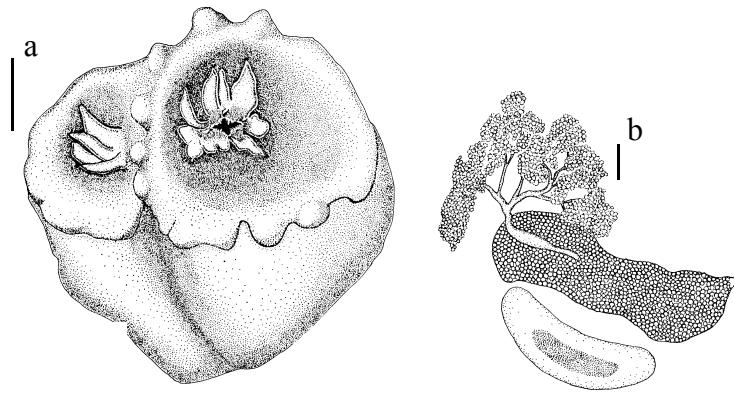


Fig. 20. *Molgula sabulosa* (Quoy & Gaimard, 1934): **a**, external appearance of nodose specimen; **b**, right side of body showing kidney and gonad with clumps of male follicles at proximal end of ovary. (Scales: a = 5.0 mm; b = 2.0 mm). [from Kott 1985]

The Molgulidae Lacaze-Duthiers, 1877 have a thin but often sand-embedded test, branched branchial tentacles and stigmata coiled around cones that project into the branchial folds, or that coil on a flat branchial wall or around cones that project independently into the pharynx. They also have a closed kidney derived from the embryonic epicardial sacs on the parietal wall of the right side of the body and compact folds and pouches (probably glandular) occur in the stomach wall. As in Pyuridae, a single gonad on each side of the body is inside or outside the gut loop or crosses over it. The testis follicles spread out on the body wall around the tubular or sac-like ovary, or parts of it, and do not form a compact covering over the ovary, nor are the gonads subdivided (as usually is the case in Pyuridae). The body muscles are formed into bands and in some species short parallel bands are aligned around the apertures to withdraw them between folds of brittle sand-filled test or to flatten the body (like the sandy phlebobranchs, *Ascidia scaevola*, *Microgastra granosa* and certain Agneziidae).

Certain species of the Molgulidae, like some *Polycarpa* (Styelidae), have viviparous larvae and some develop directly without passing through a tailed larval stage. Berrill (1955) has suggested that these species, characterised by the brittle sand-embedded test and muscles to withdraw apertures and flatten the body, are adapted for life on the open sea floor and have evolved strategies that reduce the time that either gametes or larvae are vulnerable to dispersal.

The family is well represented in Australia by the genus *Molgula* (12 species), *Eugyra* (3 species) and a species of *Pareugyrioides*. In *Molgula* the left gonad is outside the gut loop. *Eugyrioides*, with gonads on both sides of the body, is very likely a synonym of *Eugyra* which has a gonad only on the left (partially or completely enclosed in the gut loop).

The genera not represented in the Australian fauna are known from polar waters or from deeper abyssal waters (see Kott 1985). Around the Australian coast, deeper waters have not yet been explored adequately for these benthic organisms.

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- Eugyra* Alder & Hancock, 1870**
- Eugyra*** Alder, J. & Hancock, A. in Hancock, A. (1870). On the larval state of *Molgula*; with descriptions of several new species of simple ascidians. *Ann. Mag. Nat. Hist.* (4) **6**: 353–368 [367].
Type species: *Molgula arenosa* Alder & Hancock, 1848 by original designation.
- Gamaster*** Pizon, A. (1896). Description d'un nouveau genre d'ascidie simple de la famille des Molgulidées, *Gamaster dakarensis*. *Compt. Rend. Acad. Sci. Paris* **122**: 1345–1347 [1345].
Type species: *Gamaster dakarensis* Pizon, 1896 by monotypy.
- Eugyrioides*** Seeliger, O. (1906). Appendicularien und Ascidien, Tunicata. Manteltiere. pp. 1041–1168 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig : C.F. Winter Vol. 3 Suppl. [1189].
Type species: *Cynthia glutinans* Moeller, 1842 by original designation.
- Taxonomic decision for synonymy: Ärnäck-Christie-Linde, A. (1928). Northern and Arctic invertebrates in the collection of the Swedish State Museum. IX Tunicata, Part 3. Molgulidae and Pyuridae. *K. Sven. Vetensk.-Akad. Handl.* (3) **4**(9): 1–101 [72]; Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2) **6** [677].
- Extralimital distribution: worldwide. See: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Ärnäck-Christie-Linde, A. (1928). Northern and Arctic invertebrates in the collection of the Swedish State Museum. IX Tunicata, Part 3. Molgulidae and Pyuridae. *K. Sven. Vetensk.-Akad. Handl.* (3) **4**(9): 1–101; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440;
- Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.
- Eugyra mammillata* Kott, 1985**
- Eugyra mammillata*** Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [390].
Type data: holotype WAM 83.75, paratype(s) QM GH757.
Type locality: Albatross Bay, Gulf of Carpentaria, northern Australia.
- Distribution: QLD (Gulf of Carpentaria, NE coast).
Ecology: benthic, marine.
- Eugyra millimetra* Kott, 1985**
- Eugyra millimetra*** Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [391].
Type data: syntypes NMV F51475.
Type locality: Bass Strait, 5 m, VIC [40°09'12"S 147°31'54"E].
- Distribution: VIC (Bass Strait); known only from type locality.
Ecology: sand bottom; shell substrate.
- Eugyra molguloides* Sluiter, 1904**
- Caesira pellucida*** Macdonald, J.D. (1859). On the anatomical characters of three Australian species of Tunicata referable to Savigny's subgenus *Caesira*. *Trans. Linn. Soc. Lond.* **22**: 367–371 [369] [*Caesira* Fleming, 1822 was suppressed in favour of its junior synonym *Molgula* Forbes, 1848; *Pera* Stimpson, 1852 also is a junior synonym of *Molgula*; *Caesira pellucida* Macdonald, 1859 consequently became a junior homonym of *Molgula pellucida* (Stimpson, 1852)].
Type data: type status unknown.
Type locality: Shark Bay, WA.
- Eugyra molguloides*** Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [111].
Type data: lectotype ZMA TU1265, paralectotype(s) ZMA TU534.
Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [178].
Type locality: Salibabu Is., 36 m, Indonesia.
- Eugyra moretonensis*** Kott, P. (1972). Some sublittoral ascidians in Moreton Bay and their seasonal occurrence. *Mem. Queensl. Mus.* **16**(2): 233–260 [252].

Type data: holotype QM G6328, paratype(s) QM G5961–71, G5974–6.

Type locality: 0.5 mile SE of Southwest Rocks, 7–2 m, Moreton Bay, QLD.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [393]; Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. (new status assignment for *Eugyra molguloides*).

Distribution: Indonesia, QLD (Central E coast, NE coast), VIC (Bass Strait), WA (Central W coast, Lower W coast).

Ecology: benthic, marine, viviparous.

Molgula Forbes, 1848

Caesira Fleming, J. (1822). *The Philosophy of Zoology*. Vol. 2. Edinburgh and London pp. 508–518. [511] [senior synonym suppressed in favour of *Molgula* Forbes, 1848 as *nomen conservandum*, see Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London : International Trust for Zoological Nomenclature 200 pp.; Hartmeyer, R. (1908). Zur Terminologie der Familien und Gattungen der Ascidiaceen. *Zool. Annl.* **3**: 1–63 (18)]. Type species: *Cynthia dione* Savigny, 1816 by original designation.

Cystingia Macleay, W.S. (1825). Anatomical observations on the natural group of the Tunicata, with the description of three species collected in the Fox Channel. *Trans. Linn. Soc. Lond.* **14**: 527–555 [541] [senior synonym suppressed in favour of *Molgula* Forbes, 1848, as *nomen conservandum*, see Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London : International Trust for Zoological Nomenclature 200 pp.; Huntsman, A.G. (1922). The ascidian family Caesiridae. *Trans. R. Soc. Canada (3)* **16**: 211–234 (216)]. Type species: *Cystingia griffithsi* Macleay, 1825 by original designation.

Syphonotethis Gervais, F.L.P. (1840). *Ascidiées*. In: Dictionnaire des Sciences Naturelles. *Suppl. 1*. Paris and Strasbourg : F.G. Levrault [407] [senior synonym suppressed in favour of *Molgula* Forbes, 1848, as *nomen conservandum*, see Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London : International Trust for Zoological Nomenclature 200 pp.; Hartmeyer, R. (1914). Diagnosen einiger neuer Molgulidae aus der Sammlung des Berliner Museums nebst Bemerkungen über die Systematik und Nomenklatur dieser Familie. *Sber. Ges. Naturf. Freunde Berl.* **1914**: 1–27 (4)]. Type species: *Ascidia tumulus* Quoy & Gaimard, 1834 (see also under *Species Inquirendae*) by original designation.

Molgula Forbes, E. (1848). In: Forbes, E. & Hanley, S.C.T. *A History of British Mollusca and their Shells*. Vol. 1 pp. 1–54. London : John van Voorst. [36] [*nomen conservandum* Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London : International Trust for Zoological Nomenclature 200 pp.; Hartmeyer, R. (1914). Diagnosen einiger neuer

Molgulidae aus der Sammlung des Berliner Museums nebst Bemerkungen über die Systematik und Nomenklatur dieser Familie. *Sber. Ges. Naturf. Freunde Berl.* **1914**: 1–27 (7)].

Type species: *Molgula oculata* Forbes, 1848 by subsequent designation, see Hartmeyer, R. (1915). *Ascidium nomina conservanda*. pp. 247–258 in Apstein, C. *Nomina Conservanda*. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258.

Pera Stimpson, W. (1852). Several new ascidians from the coast of the United States. *Proc. Bost. Soc. Nat. Hist.* **4**: 228–232 [232].

Type species: *Pera pellucida* Stimpson, 1852 by monotypy.

Gymnocystis Giard, A.M. (1872). Etudes critique des travaux d'embryogénie relatifs à la parenté des Vertébrés et de Tuniciers. *Arch. Zool. Exp. Gén.* **1**: 233–235, 397–428 [405]. Type species: *Molgula ampulloides* Beneden, 1847 by original designation.

Lithonephyra Giard, A.M. (1872). Etudes critique des travaux d'embryogénie relatifs à la parenté des Vertébrés et de Tuniciers. *Arch. Zool. Exp. Gén.* **1**: 233–235, 397–428 [405].

Type species: *Molgula complanata* Alder & Hancock, 1870 by original designation.

Anurella Lacaze-Duthiers, F.J.H. (1877). Histoire des ascidies simples des côtes de France Pt 2. *Arch. Zool. Exp. Gén.* **6**: 457–676 [495].

Type species: *Anurella bleizi* Lacaze-Duthiers, 1877 by monotypy.

Ctenicella Lacaze-Duthiers, F.J.H. (1877). Histoire des ascidies simples des côtes de France Pt 2. *Arch. Zool. Exp. Gén.* **6**: 457–676 [604].

Type species: *Molgula appendiculata* Heller, 1877 by original designation.

Ascopera Herdman, W.A. (1881). Preliminary report on the Tunicata of the Challenger Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [238].

Type species: *Ascopera gigantea* Herdman, 1881 by original designation.

Eugyropsis Roule, L. (1885). Recherches sur les ascidies simples des côtes de Provence (Cynthiades). *Ann. Sci. Nat.* (6) **20**: 136–229 [205].

Type species: *Eugyropsis intermedia* Roule, 1885 by monotypy.

Astropera Pizon, A. (1898). Etude anatomique et systématique des molgulidées appartenant aux collections du Muséum de Paris. *Ann. Sci. Nat.* (8) **7**: 305–381 [343].

Type species: *Astropera sabulosa* Pizon, 1898 by monotypy.

Meristocarpus Pizon, A. (1899). Description d'un nouveau genre d'ascidie simple de la famille des Molgulidées, *Meristocarpus*. *Bull. Mus. Natl. Hist. Nat. Paris* **5**: 42–43 [42].

Type species: *Meristocarpus fuscus* Pizon, 1899 by monotypy.

Molgulidium Seeliger, O. (1907). Appendicularien und Ascidiaceen, Tunicata. Manteltiere. pp. 1041–1280 in Bronn, H.G. (ed.) *Klassen und Ordnungen des Tier-Reichs*. Leipzig : C.F. Winter Vol. 3 Suppl. 68–80 [1174] [junior objective synonym of *Ctenicella* Lacaze-Duthiers, 1877].

Type species: *Molgula appendiculata* Heller, 1877 by original designation.

Molgulina Hartmeyer, R. (1914). Diagnosen einiger neuer Molgulidae aus der Sammlung des Berliner Museums nebst Bemerkungen über die Systematik und Nomenklatur dieser Familie. *Sber. Ges. Naturf. Freunde Berl.* **1914**: 1–27 [8].
Type species: *Molgula eugyriodes* Traustedt, 1883 by original designation.

Euritteria Huntsman, A.G. (1922). The ascidian family Caesiridae. *Trans. R. Soc. Canada (3)* **16**: 211–234 [225].
Type species: *Caesira cooperi* Huntsman, 1922 by original designation.

Taxonomic decision for synonymy: Hartmeyer, R. (1914). Diagnosen einiger neuer Molgulidae aus der Sammlung des Berliner Museums nebst Bemerkungen über die Systematik und Nomenklatur dieser Familie. *Sber. Ges. Naturf. Freunde Berl.* **1914**: 1–27 [5]; Huntsman, A.G. (1922). The ascidian family Caesiridae. *Trans. R. Soc. Canada (3)* **16**: 211–234 [216]; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239 [156].

Extralimital distribution: Antarctic Region; worldwide. See: Huntsman, A.G. (1922). The ascidian family Caesiridae. *Trans. R. Soc. Canada (3)* **16**: 211–234; Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Molgula calvata Sluiter, 1904

Molgula calvata Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [116].
Type data: holotype ZMA TU690.1.
Type locality: reef, Saleyer Is., Indonesia.

Molgula reducta Hartmeyer, R. (1922). Miscellanea Ascidiologica. *Mitt. Zool. Mus. Berl.* **10**: 299–323 [306].
Type data: syntypes (probable) ZMB 3829*.
Type locality: Oyster Harbour, 0.75–5.5 m, Albany, WA.

Molgula medusa Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [297].
Type data: syntypes AM Y794, Y1900.
Type locality: Oyster Harbour, Albany, WA.

Molgula minuta Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [295].
Type data: syntypes AM Y793.
Type locality: reef undercuts, Triggs Is., WA.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [369].

Distribution: WA (SW coast); NE coast, central E coast, lower E coast, QLD, NSW.
Ecology: benthic, marine, viviparous.

Molgula diversa Kott, 1972

Molgula diversa Kott, P. (1972). Some sublittoral ascidians in Moreton Bay and their seasonal occurrence. *Mem. Queensl. Mus.* **16**(2): 233–260 [252].
Type data: holotype QM G6320, paratype(s) QM G5992, G6321, G5989, G5991.
Type locality: 0.5 mile S of Southwest Rocks, Moreton Bay, 7.7 m, QLD.

Distribution: Hong Kong, QLD (Central E coast, NE coast).

Ecology: benthic, marine; sand, shell grit and sandy mud substrates.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Molgula ellistoni Kott, 1972

Molgula ellistoni Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [190].
Type data: holotype SAMA E907.
Type locality: Elliston Bay, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine, viviparous; development direct, in caves subjected to strong swell.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Molgula ficus (Macdonald, 1859)

Caesira ficus Macdonald, J.D. (1859). On the anatomical characters of three Australian species of Tunicata referable to Savigny's subgenus *Caesira*. *Trans. Linn. Soc. Lond.* **22**: 367–371 [368].
Type data: type status unknown.
Type locality: Shark Bay, WA.

Molgula forbesi Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae; Molgulidae. *Proc. R. Soc. Edinb.* **11**(4): 233–240 [236].
Type data: holotype (probable) BMNH* (depository uncertain, not found in BMNH).
Type locality: Port Jackson, 4–20 m, NSW.

Molgula martensii Traustedt, M.P.A. (1885). Ascidiae simplices far det Stille Ocean. *Vidensk. Meddr. Dansk Naturh. Foren.* **1884**: 1–160 [19].

Type data: syntypes ZMH K14*, USNM 5557*.

Type locality: Dampier Archipelago, WA.

Ascopera nana Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [57].

Type data: syntypes AM U268, G2501.

Type locality: Port Jackson, NSW.

Molgula godeffroyi Michaelsen, W. (1908). Die Molguliden des Naturhistorischen Museums zu Hamburg. *Mitt. Zool. Mus. Hamburg* **25**(2): 117–152 [142].

Type data: holotype ZMH*.

Type locality: Bowen, QLD.

Molgula mortoni Kesteven, H.L. (1909). Studies on Tunicata no. 1. *Proc. Linn. Soc. N.S.W.* **34**: 276–295 [289].

Type data: holotype AM U559.

Type locality: Hobart, 14–40 m, TAS.

Molgula batemani Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [296].

Type data: syntypes AM Y789, Y1884.

Type locality: piles and ship's hull, Fremantle Harbour, WA.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [374]; Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne: CSIRO Publishing, Australia Vol. 34 298 pp. [173] (*Ascopera nana*; see also *Ascidia tumulus* Quoy & Gaimard, 1834 under *Species Inquirendae* p.250.).

Distribution: Singapore, Hong Kong; circum-australian, QLD, NSW, VIC, TAS, SA, WA, NT, Gulf of Siam.

Ecology: benthic, marine.

Molgula incidata Kott, 1985

Molgula incidata Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [377].

Type data: holotype QM GH1806, paratype(s) QM GH1807.

Type locality: Mission Beach, QLD.

Distribution: New Caledonia, Norfolk Island, QLD (NE coast, SE oceanic).

Ecology: benthic, marine, viviparous; epibiont on *Ascidia* sp., intertidal on rubble.

Molgula malvinensis Ärnäck., 1938

Molgula malvinensis Ärnäck-Christie-Linde, A. (1938). Ascidacea. *Further zool. Results Swed. Antarct. Exped. 1901–1* **3**(4): 1–54 [5].

Type data: syntypes NHRM 1499*.

Type locality: Falkland Is., Subantarctic.

Molgula spiralis Kott, P. (1954). Tunicata, Ascidians. *Rep. B.A.N.Z. Antarct. Res. Exped.* **1**(4): 121–182 [134].

Type data: holotype AM Y1921.

Type locality: Enderby Land, 193 m, Antarctica.

Molgula herdmani Brewin, B.I. (1958). Ascidians of New Zealand, Part 11. Ascidians of the Stewart Island region. *Trans. R. Soc. N.Z.* **85**(3): 439–453 [451].

Type data: holotype OMNZ*.

Type locality: Stewart Is., New Zealand.

Molgula bathamae Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117 [91].

Type data: holotype MONZ ASC12*, paratype(s) MONZ ASC11*.

Type locality: continental slope E of Otago, 480 m, South Island, New Zealand [45°56'S 171°00'E].

Molgula longivascula Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117 [93].

Type data: holotype NZOI H-270*, paratype(s) NZOI P-528*.

Type locality: near Macquarie Is., 91 m, New Zealand [54°36'24"S 158°57'E].

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [378].

Distribution: New Zealand, VIC (Bass Strait); Antarctica, Subantarctica.

Ecology: benthic, marine.

Molgula manhattensis (DeKay, 1843)

Ascidia manhattensis DeKay, J.E. (1843). Mollusca Part 5. In, DeKay, J.E. (ed.) *Natural History of New York*. Albany: New York Assembly vii + 271 pp. [259].

Type data: type status unknown AMNH (depository uncertain, not found).

Type locality: Manhattan Is., New York, USA.

Molgula sordida Stimpson, W. (1852). Several new ascidians from the coast of the United States. *Proc. Bost. Soc. Nat. Hist.* **4**: 228–232 [229].

Type data: syntypes (probable) HMN* (whereabouts of other syntype(s) unknown).

Type locality: Charleston Harbour, South Carolina, USA.

Taxonomic decision for synonymy: Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476 [385].

Distribution: Japan, United States of America, California, NSW (Central E coast, Lower E coast), QLD (Central E coast), VIC (Bass Strait); Atlantic coast, USA, Mediterranean.

Ecology: benthic, marine; wharf piles, ships etc, sea grass, sand or muddy substrates in large aggregates, to 30 m, in salinity 11 to over 20 parts/thousand.

Reference: Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [379].

Molgula mollis Herdman, 1899

Molgula mollis Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [444] [nom. nud.].

Molgula sydneyensis Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [444] [nom. nud.].

Molgula mollis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [54].
Type data: syntypes AM G12226, G2052.
Type locality: Port Jackson, NSW.

Molgula sydneyensis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [55].
Type data: holotype AM U276.
Type locality: Port Jackson, NSW.

Taxonomic decision for synonymy: Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [298].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), VIC (Bass Strait).
Ecology: benthic, marine.

Molgula mortenseni Michaelsen, 1922

Ctenicella mortenseni Michaelsen, W. (1922). Ascidiæ Ptychobranchiæ und Diktyobranchiæ von Neuseeland und dem Chatham-Inseln. Papers from Dr. Th. Mortensen's Pacific Expedition 1914–1916, XI. *Vidensk. Meddr. Dansk Naturh. Foren.* **73**: 359–498 [365].
Type data: holotype ZMUC*.
Type locality: Bay of Islands, New Zealand.

Distribution: New Zealand, VIC (Bass Strait).
Ecology: sand bottom; shell substrate.

Molgula rima Kott, 1972

Molgula rima Kott, P. (1972). Some sublittoral ascidians in Moreton Bay and their seasonal occurrence. *Mem. Queensl. Mus.* **16**(2): 233–260 [250].
Type data: holotype QM G6324, paratypes QM G6023–8, QM G6030–6, QM G6325–7, QM G6037–44.
Type locality: 0.5 mile S of Southwest Rocks, Moreton Bay, 7.7 m, QLD.

Distribution: QLD (Central E coast).
Ecology: benthic, marine; sand, shell-grit, sandy mud, to 10 m.
Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Molgula sabulosa (Quoy & Gaimard, 1834)

Ascidea sabulosa Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Aîné. [614].
Type data: syntypes MNHP S3 MOL.A 178–181.
Type locality: Westernport, VIC.

Caesira parasitica Macdonald, J.D. (1859). On the anatomical characters of three Australian species of Tunicata referable to Savigny's subgenus *Caesira*. *Trans. Linn. Soc. Lond.* **22**: 367–371 [367].
Type data: type status unknown.
Type locality: King George's Sound, Albany, WA.

Molgula nodosa Hartmeyer, R. (1922). Miscellanea Ascidiologica. *Mitt. Zool. Mus. Berl.* **10**: 299–323 [304].
Type data: syntypes (probable) ZMB 3827, 3728*.
Type locality: Cottesloe Beach, WA.

Molgula janis Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [295].
Type data: syntypes AM Y792, Y1891.
Type locality: Victor Harbour, west side of Granite Is., SA.
Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [386].

Distribution: SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast, SW coast).
Ecology: benthic, marine.

Molgula sphaera Kott, 1972

Molgula sphaera Kott, P. (1972). Some sublittoral ascidians in Moreton Bay and their seasonal occurrence. *Mem. Queensl. Mus.* **16**(2): 233–260 [251].
Type data: holotype QM G6319, paratype(s) QM G6081–4, G6318.
Type locality: 0.5 mile S of Southwest Rocks, Moreton Bay, QLD.

Molgula discogona Millar, R.H. (1975). Ascidiens from the Indo-West Pacific region in the Zoological Museum, Copenhagen (Tunicata, Ascidiacea). *Steenstrupia* **3**(20): 205–336 [325].
Type data: holotype ZMUC 12.xii.1906*.
Type locality: Singapore.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [388].

Distribution: Singapore, QLD (Central E coast), WA (SW coast).
Ecology: benthic, marine; sand, shell-grit and sandy mud, to 10 m.

Pareugyrioides Hartmeyer, 1914

Pareugyrioides Hartmeyer, R. (1914). Diagnosen einiger neuer Molgulidae aus der Sammlung des Berliner Museums nebst Bemerkungen über die Systematik und Nomenklatur dieser Familie. *Sber. Ges. Naturf. Freunde Berl.* **1914**: 1–27 [22].
Type species: *Eugyrioides dalli* Ritter, 1913 by original designation.

Extralimital distribution: Antarctic Region; north, tropical west Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Pareugyrioides exigua (Kott, 1972)

Molgula exigua Kott, P. (1972). Some sublittoral ascidians in Moreton Bay and their seasonal occurrence. *Mem. Queensl. Mus.* **16**(2): 233–260 [249].
Type data: holotype QM 5990, paratype(s) QM 5993–8, 6000–19, 6021–2, 6323.
Type locality: 0.5 miles S of Southwest Rocks, Moreton Bay, 7.7 m, QLD.

MOLGULIDAE

Eugyra flabelligona Millar, R.H. (1975). Ascidians from the Indo-West Pacific region in the Zoological Museum, Copenhagen (Tunicata, Ascidiacea). *Steenstrupia* **3**(20): 205–336 [328].

Type data: holotype ZMUC 5.iv.29*.

Type locality: Bali Strait, 70 m, Indonesia [8°23'S 114°29'E].

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [394].

Distribution: Indonesia, QLD (Central E coast), VIC (Bass Strait).

Ecology: benthic, marine; sand and shell-grit, to 10 m.

PYURIDAE

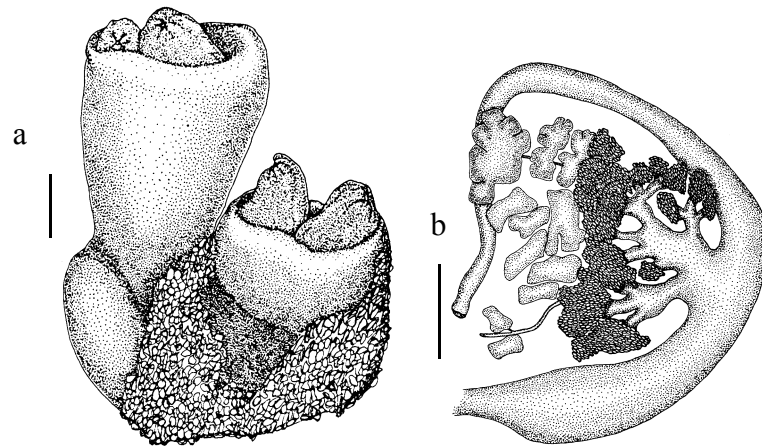


Fig. 21. *Pyrua* spp.: **a**, *Pyrua stolonifera* (Heller, 1878), external appearance; **b**, *Pyrua abrasdata* Kott, 1985, gut with arborescent liver, and gonad. (Scale bars: a = 10.0 mm; b = 5.0 mm). [from Kott 1985]

The family Pyuridae Hartmeyer, 1908 contains robust species with tough fibrous tests, branched branchial tentacles, more than four branchial folds on each side of the body and usually a single gonad on each side (although often it is lobed or partially divided along its length). Glandular folds, lobes and sometimes branched diverticula from the pyloric region of the gut wall are particularly elaborate. The body muscles are strong, the bands radiating out from each of the siphons and crossing one another over the sides of the body. These muscle bands usually form an almost continuous coat.

Siphonal and test armature such as spines, bristles and scale-like thickenings often occur in the surface test, as well as hair and root-like extensions of the test that adhere to sand and other foreign particles creating a coating around the outside of the test, and/or forming a firm attachment in sediments or on hard substrates. In some species, the hard test forms a long, narrow stalk from the anterior end of the body which holds it above the substrate and enables it to move with surge or currents, always presenting the incurrent aperture to the on-coming current to enhance the ciliary feeding capacity (Kott 1989). At the same time, the excurrent aperture is pointed in the opposite direction, expelling the waste products and gametes into the passing stream of water. Many species (e.g. those of *Pyura* and *Herdmania*) have calcareous spicules embedded in the test.

Pyuridae are represented in Australian waters by the diverse shallow water genera, namely, *Pyura* Molina, 1782 (26 species, with dorsal languets and an arborescent liver) and *Microcosmus* Heller, 1877 (11 species, with dorsal lamina). In addition, five of the less diverse genera are each represented by one or two species: *Hartmeyeria* Ritter, 1913 (one species), *Halocynthia* Verrill & Rathbun, 1879 (two species), *Herdmania* Lahille, 1888 (two species), and *Claudenus* (nom. nov. for *Ctenicella* Kott, 1972; one species) and *Ctenyura* Van Name, 1918 (two species). *Boltenia* Savigny, 1816 is the only well known genus from continental shelf locations recorded from Indonesia as well as the Northern Hemisphere that has not been reported from Australia.

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***Claudenus* Kott, 1998**

Ctenicella Kott, P. (1972). The ascidians of South Australia I. Spencer Gulf, St Vincent Gulf and Encounter Bay. *Trans. R. Soc. S. Aust.* **96**(1): 1–52 [44] [junior homonym of *Ctenicella* Lacaze-Duthiers, 1877].
Type species: *Ctenicella antipoda* Kott, 1972 by subsequent designation, see Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [177].

Claudenus Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [177] [*nom. nov.* for *Ctenicella* Kott, 1972].

Extralimital distribution: known only from type species.

***Claudenus antipodus* (Kott, 1972)**

Ctenicella antipoda Kott, P. (1972). The ascidians of South Australia I. Spencer Gulf, St Vincent Gulf and Encounter Bay. *Trans. R. Soc. S. Aust.* **96**(1): 1–52 [44].
Type data: holotype SAMA E877.
Type locality: off Yankalilla Bay, 12–20 m, SA.

Distribution: SA (S Gulfs coast).
Ecology: benthic, marine; to 20 m.
Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Ctenyura* Van Name, 1918**

Ctenyura Van Name, W.G. (1918). Ascidians from the Philippines and adjacent waters. *Bull. U.S. Natl Mus.* **100**(1): 49–174 [71].
Type species: *Ctenyura intermedia* Van Name, 1918 by monotypy.

Extralimital distribution: tropical west Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Ctenyura tetraplexa* Kott, 1985**

Ctenyura tetraplexa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [334].
Type data: holotype ZMUC, paratype(s) ZMUC.
Type locality: off Cape Howe, 60–100 m, VIC [37°05'S 150°05'E].

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine; 60–100 m.

***Ctenyura tortuosa* Kott, 1985**

Ctenyura tortuosa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [336].
Type data: holotype NMV H379, paratypes NMV H740, NMV F51564.
Type locality: Bass Strait, 84 m, VIC [29°01'S 143°22'06"E].

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine.

***Culeolus* Herdman, 1881**

Culeolus Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [82].
Type species: *Culeolus murrayi* Herdman, 1882 by subsequent designation, see Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt 1, Ascidiaceae simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [91].

***Culeolus herdmani* Sluiter, 1904**

Culeolus herdmani Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidiaceen. *Siboga Exped.* **56A**: 1–126 [105].
Type data: syntypes ZMA TU 397.1-4*.
Type locality: 0°23.8'N 127°29'E, 472 m, channel between Makjan and Halmahera; 5°28.4'S 132°0.2'E, 204 m; 7°35.4'S 117°28.6'E, 521 m; 10°27.9'S 123°28.7'E, 216 m, Indonesia.

Distribution: Philippines, Indonesia, New Caledonia, WA (NW coast); Sea of Japan.

Ecology: benthic, marine; 200–1,700 m depth.

Reference: Kott, P. (2002). *Culeolus herdmani* Sluiter, 1904 (Ascidiacea, Tunicata) from the north-western Australian continental slope with an overview of the genus. *Rec. West. Aust. Mus.* **21**: 63–70.

***Halocynthia* Verrill, 1879**

Tethyum Bohadsch, J.B. (1761). *Bohadsch dequibusdam Animalibus marinis eorumque protietatibus liber. cap. vii* (De *Tethys*), pp. 128–135 pl. x fig. 1–6 Dresden. [130] [senior homonym suppressed in favour of *Halocynthia*

Verrill, 1879, see Melville, R.V. (1981). Opinion 1182. Tethyidae in Mollusca, Porifera and Tunicata: Removal of homonymy. *Bull. Zool. Nomencl.* **38**(3): 174–177; Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; Hartmeyer, R., Michaelsen, W. & Sluiter, C.P. (1915). Tunicata. Ascidiaceae. In, Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915**: 185–186].
Type species: *Tethyum papillosum* Gunnerus, 1765 by subsequent designation, see Huntsman, A.G. (1912). Ascidiaceae from the coasts of Canada. *Trans. R. Can. Inst.* **9**: 111–148 [135].

Halocynthia Verrill, A.E. (1879). Contributions to the natural history of Arctic America, made in connection with the Howgate Polar Expedition, 1877–78. Molluscoids. *Bull. U.S. Natl. Mus.* **15**: 147–150 [147] [*nomina conservandum*, see Melville, R.V. (1981). Opinion 1182. Tethyidae in Mollusca, Porifera and Tunicata: Removal of homonymy. *Bull. Zool. Nomencl.* **38**(3): 174–177; Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; Hartmeyer, R., Michaelsen, W. & Sluiter, C.P. (1915). Tunicata. Ascidiaceae. In, Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915**: 185–186].
Type species: *Tethyum papillosum* Gunnerus, 1765 by subsequent designation, see Huntsman, A.G. (1912). Ascidiaceae from the coasts of Canada. *Trans. R. Can. Inst.* **9**: 111–148 [135].

Extralimital distribution: north Pacific Ocean to California and Japan, north Atlantic Ocean, Mediterranean Sea, Red Sea, Indian Ocean. See: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiaceenfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Harant, H. (1929). Ascidiaceae provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidiaceans. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Millar, R.H. (1962). Further descriptions of South African ascidiaceans. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Nishikawa, T. (1991). The ascidiaceans of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

***Halocynthia dumosa* (Stimpson, 1855)**

Cynthia dumosa Stimpson, W. (1855). Tunicata in descriptions of some new marine invertebrates. *Proc. Acad. Nat. Sci. Phila.* **7**: 387–388 [388].
Type data: type status unknown USNM (depository uncertain, not found).
Type locality: Port Jackson, NSW.

Cynthia hispida Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [61].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Bass Strait, VIC.

Cynthia crinitistellata Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* 7(1): 443–450 [445] [*nom. nud.*].

Cynthia crinitistellata Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [34].

Type data: syntypes AM U273 (G2068), AM G12230.

Type locality: Port Jackson, NSW.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne: CSIRO Publishing, Australia Vol. 34 298 pp. [178] (based on Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [342]).

Distribution: Sri Lanka, NSW (Lower E coast), QLD (NE coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

***Halocynthia papillosa* (Gunnerus, 1765)**

Tethyum coriaceum Bohadsch, J.B. (1761). *Bohadsch dequibusdam Animalibus marinis eorumque protietatibus liber. cap. vii (De Tethys)*, pp. 128–135 pl. x fig. 1–6 Dresden. [senior synonym suppressed in favour of *Tethyum papillosum* Gunnerus, 1765, see Hartmeyer, R., Michaelsen, W. & Sluiter, C.P. (1915). Tunicata. Ascidiæ. In, Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* 1915: 185–186.].

Type data: type status unknown.

Type locality: Mediterranean.

Tethyum papillosum Gunnerus, J.E. (1765). Sõe-Pungen (*Tethyum sociabile*) fulständige beskreven. *Trondhj. Selsk. Skrift.* 3: 81–102 [100] [Translated 1767: Vollständige Beschreibung des Seebeutels. *Drontheim Gesellsh. Shrift* 3: 69 [100]].

Type data: type status unknown.

Type locality: Mediterranean.

Ascidia rustica Risso, A. (1826). *Histoire naturelle des principales productions de l'Europe méridionale*. Vol. 4. Paris & Strasbourg pp. 273–285. [274] [as *Ascidea rustica*; junior homonym of *Ascidia rustica* Linnaeus, 1767 (= *Styela rustica* (Linnaeus, 1767))].

Type data: type status and whereabouts unknown.

Type locality: Europe méridionale.

Taxonomic decision for synonymy: Hartmeyer, R. (1909). Ascidiæ (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig: C.F. Winter Vol. 3, suppl. pts 81–87 [1340]; Huntsman, A.G. (1912). Ascidiæ from the coasts of Canada. *Trans. R. Can. Inst.* 9: 111–148 [135].

Distribution: New Caledonia, NSW (SE oceanic), QLD (Great Barrier Reef, SE oceanic); Atlantic coast of France, Mediterranean Sea.

Ecology: benthic, marine; coralline algae, sand and shell grit, coral debris, 13 m (Heron Is.).

References: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [344]; Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* 29(1): 267–298 [288].

***Hartmeyeria* Ritter, 1913**

Hartmeyeria Ritter, W.E. (1913). The simple ascidians from the north-eastern Pacific in the collection of the United States National Museum. *Proc. U. S. Natl. Mus.* 45: 427–505 [461]. Type species: *Hartmeyeria triangularis* Ritter, 1913 by original designation.

Ectorchis Huntsman, A.G. (1922). The ascidian family Caesiridae. *Trans. R. Soc. Canada (3)* 16: 211–234 [222].

Type species: *Caesira hupferi* Michaelsen, 1908 by original designation.

Taxonomic decision for synonymy: Monniot, C. & Monniot, F. (1976). Les ascidies de la côte du Mozambique. *Rev. Zool. Afr.* 90(2): 357–393 [380].

Extralimital distribution: north Pacific Ocean, Gulf of Aden, west and east coast of Africa, west Pacific Ocean (China and Japan). See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [362].

***Hartmeyeria formosa* Herdman, 1881**

Hartmeyeria formosa Herdman, W.A. (1881). Preliminary report on the Tunicata of the Challenger Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* 11(3): 52–88 [58].

Type data: holotype BMNH 1887.2.4.51.

Type locality: Torres Strait.

Cynthia spinifera Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* 7(1): 443–450 [445] [*nom. nud.*].

Cynthia spinifera Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [32] [junior homonym of *Ascidia spinifera* Quoy & Gaimard, 1834 = *Pyura spinifera* (Quoy & Gaimard, 1834)].

Type data: holotype AM G2067.

Type locality: Port Jackson, NSW.

Microcosmus acanthifera Hartmeyer, R. (1909). Ascidiæ (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig: C.F. Winter Vol. 3, suppl. pts 81–87 [1341] [unnecessary *nom. nov.* for *Cynthia spinifera* Herdman, 1899].

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [363].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), TAS (Bass Strait), VIC (Bass Strait).

Ecology: benthic, marine; to 95 m.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* 29(1): 267–298.

***Herdmania* Lahille, 1888**

Herdmania Lahille, F. (1888). Etude systématique des tuniciers. *Compt. Rend. Ass. Fr. Avanc. Sci.* **1887**(2): 667–677 [677].

Type species: *Cynthia momus* Savigny, 1816 by original designation.

Rhabdocynthia Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [575].

Type species: none designated; originally included nominotypical species: *Rhabdocynthia complanata* Herdman, 1882; *Rhabdocynthia pallida* Heller, 1878; *Rhabdocynthia papietensis* Herdman, 1892; *Rhabdocynthia subfusca* Herdman, 1891; *Rhabdocynthia tenuis* Herdman, 1891.

Taxonomic decision for synonymy: Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476 [341].

Extralimital distribution: Australian Region; pantropical. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Herdmania fimbriae* Kott, 2002**

Herdmania fimbriae Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [361].

Type data: holotype SAMA E2892, paratype(s) SAMA E2891.

Type locality: Point Turton jetty on piles and weed, 3–4 m, SA.

Distribution: QLD (NE coast), SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast).

Ecology: benthic, marine.

***Herdmania grandis* (Heller, 1878)**

Cynthia grandis Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 83–109 [97].

Type data: holotype ZMH*.

Type locality: Port Jackson, NSW.

Cynthia complanata Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidiæ simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [145].

Type data: holotype BMNH*.

Type locality: Port Jackson, NSW.

Microcosmus julinii Drasche, R. von (1884). Ueber einige neue und weniger gekannte aussereuropäische einfache Ascidien. *Denkschr. Akad. Wiss. Wien* **48**: 369–387 [371].

Type data: type status and whereabouts unknown*.

Type locality: Port Jackson, NSW.

Microcosmus draschii Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [575].

Type data: holotype AM U138.

Type locality: Port Stephens, NSW.

Herdmania armata Monniot, F. & Monniot, C. (2001). Ascidians from the tropical western Pacific. *Zoosystema* **23**(2): 201–383 [337].

Type data: holotype MNHP S2 HER 20.

Type locality: 10–18 m, Nivani, Papua New Guinea [10°47.46'S 152°33.08'E].

Taxonomic decision for synonymy: Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [363–365].

Distribution: Papua New Guinea, NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast, SW coast).

Ecology: benthic, marine.

***Herdmania mentula* Kott, 2002**

Herdmania mentula Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [365].

Type data: holotype WAM Z11771, paratype(s) WAM Z11759.

Type locality: Mary Anne Passage, 27 m, NW Australia [21°15'S 115°50'E].

Distribution: WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine.

***Herdmania momus* (Savigny, 1816)**

Cynthia momus Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. *In Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [143].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Red Sea.

Cynthia papietensis Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidiæ simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [143].

Type data: holotype BMNH*.

Type locality: Tahiti.

Herdmania momus curvata Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [143] [as *Herdmania momus* var. *curvata*].

Type data: holotype AM Y1811.

Type locality: Northwest Is., Capricorn Group, Great Barrier Reef, QLD.

Herdmania contorta Monniot, C. (1992). Ascidies de Nouvelle-Calédonie XI. Phlebobranchies et Stolidobranchies du Plateau des Chesterfield. *Bull. Mus. Natl. Hist. Nat. Paris* (**4**)**14A**(1): 3–22 [18].

Type data: holotype MNHP 52 HERI*.

Type locality: Bampton Is., Chesterfield IIs, New Caledonia.

Taxonomic decision for synonymy: Michaelsen, W. (1918). *Ascidia Ptychobranchia und Dictyobranchia des Roten Meeres. Expedition Schiff Pola in das Rote Meer, nördliche und südliche Hälfte 1895/1896–1897/1898. Zoologische Ergebnisse* **32**: 1–120 3 pls [30]; Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [366].

Distribution: Philippines, Indonesia, French Polynesia, Fiji, QLD (Central E coast, Great Barrier Reef); Coral Sea Plateau, Indian Ocean, Red Sea.

Ecology: benthic, marine; to 100 m.

Reference: Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [366].

***Herdmania pallida* (Heller, 1878)**

Cynthia pallida Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 83–109 [96].

Type data: syntypes (probable) ZMH* (depository uncertain).

Type locality: Mauritius, Palau IIs, Tahiti.

Rhabdocynthia ceylonica Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [309].

Type data: holotype BMNH*.

Type locality: Sri Lanka.

Taxonomic decision for synonymy: Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [369–372].

Distribution: Japan, Taiwan, Philippines, Indonesia, Palau, Hawaii, Fiji, South Africa, QLD (NE coast), WA (Central W coast, Lower W coast, NW coast); also west Indian Ocean, south China Sea, Tahiti, Arafura Sea.

Ecology: benthic, marine.

***Microcosmus* Heller, 1877**

Microcosmus Heller, C. (1877). Untersuchungen über die Tunicaten des Adriatischen und Mittelmeeres (3). *Denkschr. Akad. Wiss. Wien* **37**(1): 241–275 [243].

Type species: *Ascidia sulcatus* Coquebert, 1797 (= *Microcosmus vulgaris* Heller, 1877) by subsequent designation, see Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365 [177].

Extralimital distribution: pantropical, western Europe to Adriatic Sea, N Atlantic. See: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1985). The Australian

Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

***Microcosmus australis* Herdman, 1899**

Microcosmus australis Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [444] [*nom. nud.*].

Microcosmus australis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [23].

Type data: syntypes AM G2060.

Type locality: Port Jackson, NSW.

Microcosmus ramsayi Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [25].

Type data: syntypes AM G2061.

Type locality: Port Jackson, NSW.

Taxonomic decision for synonymy: Hartmeyer, R. & Michaelsen, W. (1928). Ascidae Diktyobranchiae und Ptychobranchiae. *Fauna Südwest-Aust.* **5**: 251–460 [404].

Distribution: NSW (Central E coast, Lower E coast), NT (Gulf of Carpentaria), QLD (Central E coast, NE coast), VIC (Bass Strait), WA (Central W coast, Lower W coast).

Ecology: benthic, marine.

***Microcosmus curvus* Tokioka, 1954**

Microcosmus curvus Tokioka, T. (1954). Contributions to Japanese ascidian fauna VII. Invertebrate fauna of the intertidal zone of the Tokara Islands. VII Ascidiens. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **3**(3): 239–264 [263].

Type data: syntypes SMBL 142, TK88*.

Type locality: Takarazima, Tokara IIs, Japan.

Microcosmus bitunicatus Monniot, F. & Monniot, C. (2001). Ascidiens from the tropical western Pacific. *Zoosystema* **23**(2): 201–383 [348].

Type data: holotype MNHP S2 MIC 157.

Type locality: Cebu Straits, Cabilao Is., 10 m, Philippines [9°53.39'N 123°45.45'E,].

Taxonomic decision for synonymy: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1649].

Distribution: Wake Island, Palau, QLD (Great Barrier Reef); Marianas Is., Tokara Is., Tahiti, Indian Ocean, Gulf of Manar.

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298.

***Microcosmus exasperatus* Heller, 1878**

Microcosmus distans Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [18].

Type data: type status unknown NHMW (depository uncertain, not found).

Type locality: Jamaica, West Indies.

Microcosmus exasperatus Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [17].

Type data: type status unknown NHMW (depository uncertain, not found).

Type locality: Jamaica, West Indies.

Microcosmus variegatus Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [17].

Type data: type status unknown NHMW (depository uncertain, not found).

Type locality: Antilles, tropical west Atlantic Ocean.

Microcosmus biconvolutus Sluiter, C.P. (1898). Tuniciers r  cueillis en 1896 par la *Chazalie* dans la Mers des Antilles. *Mem. Soc. Zool. Fr.* 11: 5–34 [26].

Type data: type status unknown ZMA TU618*.

Type locality: Schottegat, Cura  o, West Indies.

Microcosmus miniatus Verrill, A.E. (1900). Additions to the Tunicata and Molluscoidea of the Bermudas. *Trans. Connecticut Acad. Sci.* 10: 588–594 [590].

Type data: type status and whereabouts unknown.

Type locality: shallow water, on reefs, under stones, Bermuda.

Microcosmus haemisphaerium Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidi  n. *Siboga Exped.* 56A: 1–126 [52].

Type data: syntypes ZMA TU635.2*.

Type locality: reef, Saleyer Is., Indonesia.

Taxonomic decision for synonymy: Hartmeyer, R. & Michaelsen, W. (1928). Ascidi  e Diktyobranchi  e und Ptychobranchi  e. *Fauna S  dwest-Aust.* 5: 251–460 [403].

Distribution: Fiji, Philippines, Hawaii, New Caledonia, Bermuda, Brazil, Indonesia, Florida, NSW (Central E coast, Lower E coast), NT (N coast), QLD (Central E coast, NE coast), WA (Central W coast, Lower W coast, N coast, NW coast); West Indies, E Africa, Red Sea.

Ecology: benthic, marine.

References: Kott, P. (1985). The Australian Ascidi  acea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [348]; Kott, P. (2004). Ascidi  acea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* 20: 37–81 [73].

Microcosmus helleri Herdman, 1881

Microcosmus helleri Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* 11(3): 52–88 [54].

Type data: holotype BMNH 1887.2.4.44.

Type locality: Torres Strait, 58 m, north Australia [9  59'S 139  42'E].

Microcosmus manaarensis Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* 39: 295–348 [311].

Type data: syntypes BMNH 1907.8.30.11* (whereabouts of other syntype(s) unknown).

Type locality: Sri Lanka.

Microcosmus goanus Michaelsen, W. (1918). Die Ptychobranchen und Diktyobranchen Ascidi  n des westlichen Indischen Ozeans. *Jahrb. Hamb. Wiss. Anst.* 35(2): 1–71 [12].

Type data: holotype (probable) ZMH*.

Type locality: Delgoa Bay, Maputo, Mozambique (as near Louren  o Marques, Portuguese East Africa).

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidi  acea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [349].

Distribution: Taiwan, Sri Lanka, Singapore, Indonesia, NT (Gulf of Carpentaria), QLD (Gulf of Carpentaria, NE coast), SA (S Gulfs coast), VIC (Bass Strait), WA (Lower W coast, NW coast); West Indies, East Africa.

Ecology: benthic, marine.

Microcosmus madagascariensis Michaelsen, 1918

Microcosmus madagascariensis Michaelsen, W. (1918). Die Ptychobranchen und Diktyobranchen Ascidi  n des westlichen Indischen Ozeans. *Jahrb. Hamb. Wiss. Anst.* 35(2): 1–71 [20].

Type data: holotype (probable) ZMH*.

Type locality: Nossi B  , Malagasy.

Microcosmus agglutinans Hartmeyer, R. (1919). Ascidi  n. In, Results of Dr E. Mj  berg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* 60(4): 1–150. [26].

Type data: holotype NHRM 1490**.

Type locality: 45 miles WSW Cape Jaubert, 144 m, N WA.

Taxonomic decision for synonymy: Hartmeyer, R. & Michaelsen, W. (1928). Ascidi  e Diktyobranchi  e und Ptychobranchi  e. *Fauna S  dwest-Aust.* 5: 251–460 [398].

Distribution: Malagasy, WA (Central W coast, Lower W coast, NW coast, SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidi  acea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* 29(1): 267–298 [291].

Microcosmus planus Kott, 1975

Microcosmus planus Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* 99(1): 1–20 [15].

Type data: holotype NMV 4284, paratypes SAMA E1032, QM G7510.

Type locality: off Ceduna, south of Goat Is., Great Australian Bight, 31 m, SA.

Distribution: SA (Great Australian Bight), VIC (Bass Strait).

Ecology: benthic, marine; 31 m, upright habit and sandy habitat.

References: Kott, P. (1985). The Australian Ascidi  acea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [291]; Kott, P. (1990).

The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298.

***Microcosmus propinquus* Herdman, 1881**

Microcosmus propinquus Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [55].

Type data: holotype BMNH 1887.2.4.45–46.

Type locality: E of Moncoeur Is., Bass Strait, 76–80 m, VIC.

Microcosmus nichollsi Kott, P. (1952). Ascidiaceans of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [290].

Type data: syntypes AM Y1800.

Type locality: Flinders Is., VIC.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [353].

Distribution: QLD (Central E coast), SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine; 8–80 m.

***Microcosmus pupa* (Savigny, 1816)**

Cynthia pupa Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris: G. Dufour. [151].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Red Sea.

Microcosmus pacificus Monniot, F. & Monniot, C. (2001). Ascidiaceans from the tropical western Pacific. *Zoosystema* **23**(2): 201–383 [349].

Type data: holotype MNHP S2 MIC 159.

Type locality: Milne Bay Province, Samurais Is., 27 m, Papua New Guinea [10°36.98'S 150°39.77'E].

Taxonomic decision for synonymy: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1649].

Distribution: Philippines, Papua New Guinea, QLD (NE coast); the Red Sea.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [356].

***Microcosmus squamiger* Michaelsen, 1927**

Microcosmus exasperatus australis Michaelsen, W. (1908). Die Pyuriden (Halocynthiiden) des Naturhistorischen Museum zu Hamburg. *Mitt. Zool. Mus. Hamburg* **25**(2): 227–287 [272] [junior homonym of *Microcosmus australis* Herdman, 1899].

Type data: syntypes ZMH*.

Type locality: Bowen, QLD.

Microcosmus claudicans squamiger Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidiaceen. *Zool. Anz.* **71**: 193–203 [197] [*nom. nov.* for *Microcosmus exasperatus australis* Michaelsen, 1908].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, SW coast).

Ecology: benthic, marine; rocky substrate, on concrete, cave walls, often among oysters.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [356].

***Microcosmus stoloniferus* Kott, 1952**

Microcosmus stolonifera Kott, P. (1952). Ascidiaceans of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [291].

Type data: syntypes AM Y1798.

Type locality: coast of King Is., Bass Strait.

Distribution: QLD (Central E coast, NE coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait); Torres Strait.

Ecology: benthic, marine.

References: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [359]; Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [291].

***Microcosmus tuberculatus* Kott, 1985**

Microcosmus tuberculatus Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [361].

Type data: holotype QM GH1405, paratype(s) QM GH1406.

Type locality: Swain Reefs, Great Barrier Reef, QLD [21°52'24"S 142°12'36"E].

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [646].

***Pyura* Molina, 1782**

Pyura Molina, G.I. (1782). *Animali de Chili. In, Saggio sulla storia naturale de Chili*. Bologna: Stamperia di S. Tomaso d'Aquino 2 1810th Edn 367 pp. [196, 349] [English Translation 1808; *nomen conservandum*, see Melville, R.V. (1981). Opinion 1182. Tethyidae in Mollusca, Porifera and Tunicata: Removal of homonymy. *Bull. Zool. Nomencl.* **38**(3): 174–177].

Type species: *Pyura chilensis* Molina, 1782 by monotypy.

Forbesia Lacaze-Duthiers, F.J.H. & Delage, Y. (1892). Faune des Cynthiades de Roscoff et côtes de Bretagne. *Mém. pres. div. Sav. Acad. Sci. Inst. Fr.* **45**(2): 1–319 [138]. Type species: *Cynthia tessellata* Forbes, 1848 by original designation.

Cynthiopsis Michaelsen, W. (1904). Die stolidobranchiaten Ascidien der deutschen Tiefsee-Expedition. *Wiss. Ergebn. dt. Tiefsee-Exped. 'Valdivia'* 7: 183–260 [200].

Type species: *Cynthiopsis valdivia* Michaelsen, 1904 (= *Cynthia stolonifera* Heller, 1878) by original designation.

Pyuropsis Michaelsen, W. (1912). Die Tethyiden (Styeliden) des Naturhistorischen Museum zu Hamburg, nebst nachtrag und Anhang einige anderen Familien betreffend. *Jahrb. Hamb. Wiss. Anst.* 28(2): 109–186 [112].

Type species: *Cynthia stubenrauchi* Michaelsen, 1900 by original designation.

Podocynthia Oka, A. (1929). Ueber eine neue gestielte Monascidie *Podocynthia turboja* n.g. n.sp. *Proc. Imp. Acad. Japan* 5: 94–95 [94].

Type species: *Podocynthia turboja* Oka, 1929 by monotypy.

Hyalocynthia Oka, A. (1930). Ueber eine merkwürdige Cynthiide aus der Bucht von Sagami. *Proc. Imp. Acad. Japan* 6: 317–320 [317].

Type species: *Hyalocynthia hystrix* Oka, 1930 by monotypy.

Paracynthia Ärnäck-Christie-Linde, A. (1938). Ascidiacea. *Further zool. Results Swed. Antarct. Exped. 1901–1* 3(4): 1–54 [125].

Type species: *Paracynthia distincta* Ärnäck, 1938 (= *Cynthia paessleri* Michaelsen, 1900) by original designation.

Taxonomic decision for synonymy: Hartmeyer, R. (1911). Die Ascidien der Deutschen Südpolar Expedition 1901–1903. *Dt. Südpol-Exped. (1905–1931)* 12(4): 407–606 [554]; Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* 2(6): 1–365 [174]; Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [677]; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* 84: 1–476 [329, 330].

Extralimital distribution: Afrotropical Region, Neotropical Region; worldwide. See: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* 2(6): 1–365; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* 84: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* 133: 1–354; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* 13: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* 85: 1–117; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440; Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 35(1–3): 26–170.

Pyura abradata Kott, 1985

Pyura abradata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [287].

Type data: holotype QM G10001.

Type locality: American River Inlet, Kangaroo Is., SA.

Distribution: SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine.

Pyura arenosa (Herdman, 1881)

Cynthia arenosa Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* 11(3): 52–88 [59].

Type data: holotype BMNH 1887.2.4.52/4.

Type locality: Arafura Sea.

Cynthia jacatrensis Sluiter, C.P. (1890). Die Evertrebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* 50: 329–348 [331].

Type data: holotype ZMA TU387.

Type locality: Bay of Jakarta (as Djakarta), Indonesia.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [289].

Distribution: Indonesia, Palau, NT (N coast), QLD (NE coast), VIC (Bass Strait), WA (Lower W coast, N coast); Arafura Sea.

Ecology: benthic, marine; common component of benthic fauna of sandy substrates in shallow water.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* 29(1): 267–298.

Pyura australis (Quoy & Gaimard, 1834)

Sea Tulips

Ascidia australis Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris: Pilet Ainé [614].

Type data: syntypes MNHP S2 PYU67*, MNHP S2 PYU68*, MNHP S2 PYU260*, MNHP S2 PYU261*, MNHP S2 PYU263*, MNHP S2 PYU264*.

Type locality: King George Sound, Albany, WA.

Pyura australis parvispinatus Kott, P. (1952). Ascidians of Australia. I. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* 3(3): 206–333 [268] [as *Pyura australis* var. *parvispinatus*].

Type data: holotype AM 1836.

Type locality: Rottneest Is., WA.

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Great Australian Bight, Lower W coast, SW coast); one record from Lizard Is., QLD.

Ecology: benthic, marine; subtidal waters–20 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [291].

***Pyura confragosa* Kott, 1985**

Pyura confragosa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [293].

Type data: holotype QM GH366.

Type locality: Moreton Is., Moreton Bay, 15 m, QLD.

Distribution: New Caledonia, QLD (Central E coast, Great Barrier Reef, NE coast).

Ecology: benthic, marine; shallow, subtidal–60 m.

***Pyura crassacipitata* Kott, 1985**

Pyura crassacipitata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [295].

Type data: holotype QM G11910.

Type locality: on black beacon, reef edge, Mudjimbah, Maroochydhore, QLD.

Distribution: QLD (Central E coast), SA (S Gulfs coast), WA (Lower W coast).

Ecology: benthic, marine; shallow, sublittoral water–10 m.

***Pyura curvigona* Tokioka, 1950**

Pyura curvigona Tokioka, T. (1950). Ascidiens from the Palao Is. I. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**(3): 115–150 [147] [publication date established from Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl Mus.* **251**: 1–242].

Type data: holotype SMBL 100*.

Type locality: Palau Island, west Pacific Ocean.

Distribution: Indonesia, Palau, QLD (Great Barrier Reef), WA (Central W coast).

Ecology: benthic, marine; 5–37 m.

Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [645].

***Pyura elongata* Tokioka, 1952**

Pyura elongata Tokioka, T. (1952). Ascidiens collected by Messrs Renzi Wada and Seizi Wada from the Pearl Oyster bed in the Arafura Sea in 1940. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **2**(2): 91–142 [136].

Type data: type status and whereabouts unknown.

Type locality: pearl oyster beds, Arafura Sea.

Distribution: Indonesia, Hong Kong, NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef, NE coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, N coast, NW coast, SW coast); Arafura Sea.

Ecology: benthic, marine; to 15 m, wedged in crevices, adheres to under-surfaces.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [299].

***Pyura fissa* (Herdman, 1881)**

Cynthia fissa Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. *Cynthiidae*, *Molgulidae*. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [58].

Type data: holotype BMNH 1887.2.4.48–9.

Type locality: Bass Strait, VIC.

Distribution: VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [301].

***Pyura gangelion* (Savigny, 1816)**

Cynthia gangelion Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. *In Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [90].

Type data: no type designated; Red Sea.

Halocynthia sansibarica Michaelsen, W. (1908). Die Pyuriden (Halocynthiiden) des Naturhistorischen Museum zu Hamburg. *Mitt. Zool. Mus. Hamburg* **25**(2): 227–287 [251].

Type data: holotype MGH T 91*.

Type locality: Zanzibar.

Pyura obesa Hartmeyer, R. (1919). Ascidien. *In*, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [14] [junior homonym of *Pyura obesa* Sluiter, 1912].

Type data: holotype NHRM 1041.

Type locality: 45 miles WSW Cape Jaubert, 120–144 m, WA.

Pyura robusta Hartmeyer, R. (1922). Miscellanea Ascidiologica. *Mitt. Zool. Mus. Berl.* **10**: 299–323 [319] [*nom. nov.* for *Pyura obesa* Hartmeyer, 1919].

Pyura albanyensis Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidien. *Zool. Anz.* **71**: 193–203 [193].

Type data: holotype MGH K1395.

Type locality: Oyster Harbour, Albany, 0.75–5.5 m, WA.

Pyura scoresbiensis Kott, P. (1972). The ascidians of South Australia I. Spencer Gulf, St Vincent Gulf and Encounter Bay. *Trans. R. Soc. S. Aust.* **96**(1): 1–52 [36].

Type data: holotype SAMA E876, paratype(s) SAMA E892, E912.

Type locality: off Semaphore, Gulf St Vincent, 18 m, SA.

Pyura tongaea Monniot, C. & Monniot, F. (1976). Les ascidies de la côte du Mozambique. *Rev. Zool. Afr.* **90**(2): 357–393 [381].

Type data: holotype MNHP S2 PYU 21.

Type locality: d'Inhaca, Mozambique.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [315] (*P. albanyensis*, *P. scoresbiensis*); Monniot, C. (2002). Stolidobranch ascidians from the tropical western Indian Ocean. *J. Linn. Soc. London Zool.* **135**: 65–102 [100] (*Halocynthia sansibarica*); Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [73].

Distribution: Papua New Guinea, Palau, New Caledonia, Djibouti, NT (N coast), SA (S Gulfs coast), WA (N coast, SW coast); Red Sea, Zanzibar.
Ecology: benthic, marine.

***Pyura gibbosa* (Heller, 1878)**

Taxonomic decision for subspecific arrangement: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [302].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast).

***Pyura gibbosa draschii* Kott, 1972**

Pyura pachydermatina draschii Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [187].

Type data: holotype WAM 1246.83.
Type locality: Cockburn Sound, WA.

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast).
Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [305].

***Pyura gibbosa gibbosa* (Heller, 1878)**

Cynthia gibbosa Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [27].

Type data: holotype (probable) ZMH.
Type locality: Bass Strait, VIC.

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [302].

***Pyura irregularis* (Herdman, 1881)**

Cynthia irregularis Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [60].

Type data: type status unknown BMNH (depository uncertain, not found).
Type locality: Port Jackson, NSW.

Distribution: NSW (Lower E coast), TAS (Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine; 5–60 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [305].

***Pyura isobella* Kott, 1985**

Pyura isobella Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [307].

Type data: holotype QM GH1448, paratype(s) QM G8576.
Type locality: on rocks, Ulladulla, NSW.

Distribution: NSW (Lower E coast), WA (Lower W coast).

Ecology: benthic, marine.

***Pyura littoralis* (Kott, 1956)**

Culeolus littoralis Kott, P. (1956). A new species of ascidian (Genus *Culeolus* Herdman, Family Pyuridae) from the west coast of Tasmania. *Rec. Aust. Mus.* **24**(6): 59–60 [59].

Type data: syntypes AM Y1745, QM GH2311.

Type locality: between Lighthouse Point and Cutter Rock, Cuvier Bay, west coast Hunter Is., NW TAS.

Taxonomic decision for new combination: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [310] (as *Pyura littoralis*).

Distribution: TAS (Bass Strait); known only from type locality.

Ecology: benthic, marine; intertidal zone.

***Pyura molguloides* (Herdman, 1899)**

Cynthia molguloides Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Cynthia molguloides Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [27].

Type data: holotype AM U275.

Type locality: Port Jackson, NSW.

Pyura tendata Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [187].

Type data: holotype NMV H156.

Type locality: Investigator Strait, 30 m, SA.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [312]; taxonomic decision for new combination: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [312] (as *Pyura molguloides*).

Distribution: NSW (Lower E coast), SA (Great Australian Bight), VIC (Bass Strait).

Ecology: benthic, marine; 22–220 m.

***Pyura navicula* Kott, 1985**

Pyura navicula Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [314].

Type data: holotype QM GH369.

Type locality: Cowan Cowan, Moreton Is., Moreton Bay, 20 m, QLD.

Distribution: QLD (Central E coast); known only from type locality.
Ecology: benthic, marine.

Pyura ostreophila Michaelsen, 1927

Pyura ostreophila Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidiën. *Zool. Anz.* **71**: 193–203 [195].
Type data: holotype ZMB 3786* (an aggregate of 40 specimens).
Type locality: Oyster Harbour, Albany, 0.75–5.5 m, WA.

Distribution: VIC (Bass Strait), WA (SW coast).
Ecology: benthic, marine; relatively shallow (to 5 m), aggregates embedded in sponge *Halisarca* sp. [Halisarcidae].
Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [318].

Pyura rapaformis Kott, 1990

Pyura rapaformis Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [287].
Type data: holotype WAM 190.87, paratypes WAM 27.87, QM GH4309.
Type locality: reef near pylon, Cottesloe, 2 m, WA.

Distribution: SA (Great Australian Bight, S Gulfs coast), WA (Lower W coast, SW coast).
Ecology: benthic, marine; on jetty piles.
Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [646].

Pyura sacciformis (Drasche, 1884)

Cynthia sacciformis Drasche, R. von (1884). Ueber einige neue und weniger gekannte aussereuropäische einfache Ascidiën. *Denkschr. Akad. Wiss. Wien* **48**: 369–387 [376].
Type data: holotype (probable) ZMB 57*.
Type locality: Yokohama, Japan.

Cynthia japonica Traustedt, M.P.A. (1885). Ascidiæ simplices far det Stille Ocean. *Vidensk. Meddr. Dansk Naturh. Foren.* **1884**: 1–160 [30].
Type data: holotype ZMUC*.
Type locality: Japan.

Cynthia sanderi Traustedt, M.P.A. & Weltner, W. (1894). Bericht über die von Herrn Dr Sander gesammelten Tunicaten. *Arch. Naturgesch.* **60**(1): 10–14 [11].
Type data: syntypes (probable) ZMB 382, 383*.
Type locality: Nagasaki, Japan.

Halocynthia jokoboja Oka, A. (1906). Notizen über japanische ascidien I. *Annot. Zool. Jpn.* **6**(1): 37–52 [47].
Type data: holotype UTZM 338 M22*.
Type locality: Tatyama, Japan.

Halocynthia michaelseni Oka, A. (1906). Notizen über japanische ascidien I. *Annot. Zool. Jpn.* **6**(1): 37–52 [46].
Type data: type status unknown UTZM (depository uncertain, not found).
Type locality: Ozika Peninsula, Japan.

Halocynthia histrix Oka, A. (1930). Ueber eine merkwürdige Cynthiide aus der Bucht von Sagami. *Proc. Imp. Acad. Japan* **6**: 317–320 [317].
Type data: holotype UTZM 242* (M124).
Type locality: Sagami Bay, Japan.

Pyura aspera Tokioka, T. (1949). Contributions to the Japanese ascidian fauna I. Ascidiens collected by Prof. Mijadi and Mr Masui during the bottom survey 1934–1940. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**: 1–18 [10].
Type data: holotype SMBL 357*.
Type locality: Matoya Bay, Japan.

Pyura masuii Tokioka, T. (1949). Contributions to the Japanese ascidian fauna II. Notes on some ascidiens collected chiefly along the coast of Kii Peninsula. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**(2): 39–64 [57].
Type data: syntypes SMBL 102*.
Type locality: Tokyo Bay, Japan.

Pyura plicata Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [278].
Type data: holotype AM Y1856.
Type locality: on jetty piles, Hamelin Bay, WA.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [321]; Nishikawa, T. (1991). The ascidiens of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170 [131].

Distribution: Korea, Japan, Fiji, NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), TAS (Tas. coast), WA (SW coast).
Ecology: benthic, marine; sometimes covered with sand or epibionts including Porifera.

Pyura scortea Kott, 1985

Pyura scortea Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [324].
Type data: holotype QM G9666.
Type locality: Cockburn Sound, WA.

Distribution: WA (Lower W coast); known only from type locality.
Ecology: benthic, marine.

Pyura spinifera (Quoy & Gaimard, 1834)

Ascidia spinifera Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [617].
Type data: holotype MNHP S2 PYU 265*.
Type locality: King George Sound, Albany, WA.

Boltenia australiensis Carter, H.J. (1885). Descriptions of sponges from the neighbourhood of Port Phillip Heads, South Australia, continued. *Ann. Mag. Nat. Hist.* (5) **15**: 196–222 [197].
Type data: holotype ZMH K51.
Type locality: Back Stairs Passage, Port Phillip Bay, VIC.

Boltenia tuberculata Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [571].

Type data: syntypes AM U286, AM U290 (G2056), AM U350 (G2057).

Type locality: Port Jackson, NSW.

Cynthia multiradicata Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Cynthia multiradicata Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [30].

Type data: holotype AM U384 (G2065).

Type locality: Port Stephens, NSW.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [325].

Distribution: NSW (Lower E coast), TAS (Bass Strait), WA (Lower W coast, SW coast).

Ecology: benthic, marine; to 80 m, whole body, including stalk, covered with sponge *Halisarca australiensis* Carter, 1885 [Halisarcidae].

Pyura spinosa (Quoy & Gaimard, 1834)

Ascidie spinosa Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in: *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [615].

Type data: holotype MNHP S2 PYU 160*.

Type locality: King George Sound, Albany, WA.

Cynthia cerebriformis Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [57].

Type data: holotype BMNH 1887.2.4.47.

Type locality: Port Jackson, NSW.

Cynthia cataphracta Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Cynthia cataphracta Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [31].

Type data: syntypes AM U250 (G2066).

Type locality: Port Jackson, NSW.

Pyura leeuwinia Kott, P. (1952). Ascidiaceans of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [277].

Type data: syntypes AM Y1840, Y1841.

Type locality: north side of Trigg's Is., WA.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [327].

Distribution: NSW (Lower E coast), TAS (Tas. coast), VIC (Bass Strait), WA (SW coast).

Ecology: benthic, marine; turbulent conditions off rocky coasts.

Pyura stolonifera (Heller, 1878)

Cunjevoi

Cynthia praeputialis Heller, C. (1878). Beiträge zur näheren Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [12].

Type data: holotype ZMH K93.

Type locality: Port Jackson, NSW.

Cynthia stolonifera Heller, C. (1878). Beiträge zur näheren Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [10].

Type data: type status unknown NHMW (depository uncertain).

Type locality: Simons Bay, South Africa.

Microcosmus herdmanni Drasche, R. von (1884). Ueber einige neue und weniger gekannte aussereuropäische einfache Asciden. *Denkschr. Akad. Wiss. Wien* **48**: 369–387 [370].

Type data: holotype (probable) ZMB (depository uncertain).

Type locality: Simons Bay, South Africa.

Microcosmus coalitus Sluiter, C.P. (1898). Beiträge zur Kenntnis der Fauna von Südafrika II. Tunicaten. *Zool. Jahrb. Syst.* **11**: 1–64 [57].

Type data: holotype ZMA TU603*.

Type locality: Port Nolloth, SW coast, South Africa.

Cynthiopsis valdiviae Michaelsen, W. (1904). Die stolidobranchiaten Asciden der deutschen Tiefsee-Expedition. *Wiss. Ergebn. dt. Tiefsee-Exped. 'Valdivia'* **7**: 183–260 [201].

Type data: holotype (probable) ZMH K96, paratype(s) (probable) ZMB 1654, 1681*.

Type locality: Plettenberg Bay, 100 m, South Africa [34°07'18"S 23°27'48"E].

Halocynthia vanhoeffeni Michaelsen, W. (1904). Die stolidobranchiaten Asciden der deutschen Tiefsee-Expedition. *Wiss. Ergebn. dt. Tiefsee-Exped. 'Valdivia'* **7**: 183–260 [197].

Type data: holotype ZMB 1653*.

Type locality: Luderitz Bay, South Africa.

Pyura bradleyi Van Name, W.G. (1931). New North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **61**: 207–225 [221].

Type data: holotype YPM 2934*, paratype(s) AMNH 871*.

Type locality: Zorritos, Peru.

Taxonomic decision for synonymy: Michaelsen, W. (1923). Neue und altbekannte asciden aus dem Reichsmuseum zu Stockholm. *Mitt. Zool. Mus. Hamburg* **40**: 1–60 [50]; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [328].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, SW coast); equatorial west coasts of South America and west and south-east Africa.

Ecology: benthic, marine; aggregations on sediment free rocky substrate, solitary on sandy substrate.

PYURIDAE

Pyura tasmanensis Kott, 1985

Pyura tasmanensis Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [331].

Type data: holotype TMH D1881, paratype(s) TMH D720.

Type locality: Neck Canal, Ralph's Bay, TAS.

Distribution: TAS (Tas. coast).

Ecology: benthic, marine; to 154 m, large numbers washed up on beaches after storms.

Pyura viarecta Kott, 1985

Pyura viarecta Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [333].

Type data: holotype QM GH1388.

Type locality: southern reef slope, Heron Is., 10 m, QLD.

Distribution: QLD (NE coast); known only from type locality.

Ecology: benthic, marine.

STYELIDAE

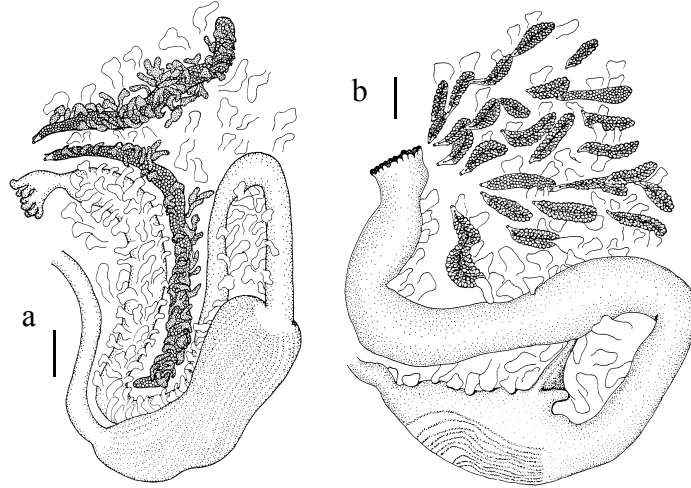


Fig. 22. Styelid species, left body wall showing gut and gonads, with scattered endocarps: **a**, *Styela plicata* (Lesueur, 1823); **b**, *Polycarpa aurita* (Sluiter, 1890). (Scale bars = 2.0 mm). [from Kott 1985]

The family Styelidae Sluiter, 1895 is diverse, containing solitary species (Styelinae) as well as colonial ones, some with cloacal systems (Botryllinae) and others without (Polyzoinae). Family characters, evident in the larger solitary species, are often reduced or absent in the smaller and more simplified zooids of colonial taxa. Basically the family is distinguished by having four pharyngeal folds on each side of the body, simple (unbranched) branchial tentacles, a thick external coat of circular muscles over a layer of longitudinal muscle bands, internal glandular folds in the stomach wall, usually more than one gonad on each side of the body, those on the left outside the gut loop, and the internal parietal body wall often raised into upright leaf-like or flat-topped bodies known as endocarps projecting into the atrial cavity. The function of the endocarps is not known, although it appears that they would interrupt the excurrent stream of water as it moves through the atrial cavity and in some cases (e.g. in *Polycarpa*) may impede the release of gametes from the atrial cavity.

The best known genera of the solitary Styelinae are *Styela* Fleming, 1822, with branching male follicles in the body wall around the outside of the long ovarian tubes that converge to the atrial apertures; *Cnemidocarpa* Huntsman, 1912, with similar ovarian tubes but with compact testis follicles closely applied to the sides or beneath the ovarian tube, the vasa efferentia joining the vas deferens along the mesial surface of the ovary, and *Polycarpa* Heller, 1877, with many short ovarian sacs (often in several rows, or scattered), their short ducts usually distant from the excurrent aperture. The testis follicles are beneath the ovaries. *Asterocarpa* Brewin, 1946 has branched gonads of the cnemidocarp type around the ventral margin of the body; and *Monandrocarpa* Michaelsen, 1904 has polycarp-type gonads but each gonad has only a single pair of testis follicles. In *Styela* and *Cnemidocarpa* the number of gonads on the left is often only one or two, although they are more numerous on the right.

Polycarpa is unusual in having some viviparous species in which the oviducts are directed ventrally or in which the ovaries with their short oviducts are present only ventrally, resulting in the retention of eggs in the atrial cavity where they are fertilised and the embryos are incubated. Berrill (1955) has proposed that viviparous species are adapted for life in the open

sea in that gametes are less vulnerable to dispersal and populations are maintained more tightly. *Polycarpa* (like *Molgula*, in the Molgulidae) contains solitary species with a morphology amenable to adaptations for egg retention, and with test and body shape that can adapt to a free living existence on the open sea floor, e.g. with a strong feeding current from a large branchial sac rather than the small currents of colonial zooids; and with a rigid sand-encrusted test that protects the body from eroding sediments. The viviparous larvae in these genera also tend to lack the light sensitive ocellus—implying that light sensitivity is not advantageous where there are no shadows, such as on the open sea floor (see Berrill 1955).

Like Aplousobranchia (which are almost exclusively colonial), colonial subfamilies Polyzoinae and Botryllinae have viviparous larvae. These are convergent with aplousobranch larvae and it appears, therefore, that viviparity is associated with a colonial habit rather than an open sea habitat. Like aplousobranch larvae, the larvae of Botryllidae and Polyzoinae are light sensitive (negatively phototropic on settlement, being attracted into shaded habitats such as in crevices and on under-surfaces).

Polyzoinae, characterised by their separately opening atrial apertures, are a diverse subfamily with numerous genera, ranging from semi-independent zooids joined by basal stolons, to fully embedded ones. The subfamily well demonstrates the trend to simplification of morphology with replication and size reduction of zooids. The smaller zooids have flat branchial sacs with as few as three internal longitudinal vessels, and small and ephemeral gonads, while the larger forms (e.g. *Polyandrocarpa*) have all the characteristics of genera of the Styelinae—well-formed branchial folds and larger and persistent gonads. In the Botryllinae, the zooids form well-integrated cloacal systems comparable with those in the aplousobranch families Polyclinidae and Didemnidae and certain genera in the Holozoidae (*Sycozoa*, *Distaplia*, *Hypsistozoa* and *Hypodistoma*). Species have been assigned to one of two genera, *Botryllus* and *Botrylloides*, although a high degree of intraspecific variability in many of the taxa and a simple zooid morphology have resulted in difficulties in defining the parameters of both species and genera (see Sabbadin 1979; Monniot & Monniot 1987; Monniot 1988; Kott 2003).

The most diverse genera of the Styelinae in Australian waters are *Cnemidocarpa* (14 species) and *Polycarpa* (33 species). Both genera are well represented especially by indigenous species. The Indo-west Pacific tropical genus *Polycarpa* is known in Tasmania and New Zealand but not further south. *Styela*, never speciose, is represented by three, possibly introduced, opportunistic species, each with a cosmopolitan range. *Monandrocarpa* Michaelsen, 1904 and *Asterocarpa* Brewin, 1946 are each represented by a single species, and both genera are known only from the Southern Hemisphere.

Polyzoinae, are also well represented by the *Polycarpa*-like *Polyandrocarpa* Michaelsen, 1904 (10 species of which eight are indigenous), *Oculinaria* Gray, 1868 (monotypic) and *Eusynstyela* Michaelsen, 1904 (two species); one genus with reduced numbers of branchial folds, *Stolonica* Lacaze-Duthiers & Delage, 1892 (10 species); and those without branchial folds, *Polyzoa* Lesson, 1830 (one species), *Metandrocarpa* Michaelsen, 1904 (three species), *Symplegma* Herdman, 1886 (three species) and *Chorizocarpa* Michaelsen, 1904 (three species). In Botryllinae, four species each in both *Botryllus* Gaertner, 1774 and *Botrylloides* Milne-Edwards, 1841 are presently recorded from Australia.

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BOTRYLLINAE

Botrylloides Milne-Edwards, 1841

Botrylloides Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [301].

Type species: *Botrylloides rotifera* Milne-Edwards, 1841 by original designation.

Sarcobotrylloides Drasche, R. von (1883). Die Synascidien der Bucht von Rovigno (Istrien). In: *Ein Beitrag zur Fauna der Adria* Wien : Carl Gerolds Sohn. 41 pp. [14].

Type species: *Sarcobotrylloides superbum* Drasche, 1883 by monotypy.

Metrocarpa Ärnäck-Christie-Linde, A. (1923). Northern and Arctic invertebrates in the collection of the Swedish State Museum. IX Tunicata, Part 2. Botryllidae. *K. Sven. Vetensk.-Akad. Handl.* (2) **63**(9): 1–25 [5] [junior subjective synonym of *Botrylloides* Milne-Edwards, 1841].

Type species: *Botryllus leachii* Savigny, 1816 by original designation.

Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2)6 [674].

Extralimital distribution: worldwide in temperate and tropical seas. See: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publ.* **133**: 1–354; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155; Monniot, C. (1988). Ascidies de Nouvelle-Calédonie IV. Styelidae (suite). *Bull. Mus. Natl. Hist. Nat. Paris* (4) **10A**(2): 163–196; Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

Botrylloides anceps (Herdman, 1891)

Sarcobotrylloides anceps Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [609].

Type data: holotype AM U272 (G2118; with *Chorizocormus subfuscus* Herdman, 1891).

Type locality: Port Jackson, NSW.

Botrylloides nigrum magnicoecum Hartmeyer, R. (1912). Die Ascidien der Deutschen Tiefsee Expedition. *Wiss. Ergebn. dt. Tiefsee-Exped. 'Valdivia'* **16**(3): 223–392 [271].

Type data: holotype NHMW 57816*.

Type locality: South Africa.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [276].

Distribution: Hong Kong, South Africa, NSW (Lower E coast), QLD (NE coast), SA (Great Australian Bight, S Gulfs coast), South Island, TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast). Ecology: benthic, marine.

Botrylloides firmus (F. Monniot & C. Monniot, 1996)

Botryllus firmus Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [238].

Type data: holotype MNHP S1 Bot B 108.

Type locality: Port Moresby, Basilisk Passage, 28 m, Papua New Guinea [9°32.32'S 147°08.04'E].

Distribution: Papua New Guinea, Palau, QLD (Central E coast, NE coast).

Ecology: benthic, marine.

References: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [279]; Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1647] (as *Botrylloides violaceus*).

Botrylloides leachii (Savigny, 1816)

Botryllus leachii Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [199].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: ?Mediterranean Sea.

Botrylloides albicans Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [304].

Type data: type status unknown.

Type locality: unknown.

Botrylloides rotifera Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [303].

Type data: type status unknown.

Type locality: unknown.

Botrylloides rubrum Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [303].

Type data: type status unknown.

Type locality: unknown.

Botrylloides radiata Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [206] [dated 1846–1850].

Type data: holotype HMN*.

Type locality: Cullercoates, Yorkshire, England.

- Botrylloides ramulosa*** Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [207] [dated 1846–1850].
Type data: type status unknown BMNH or HMN (depository uncertain, not found).
Type locality: unknown.
- Botrylloides pusilla*** Alder, J. (1863). Observations on the British Tunicata with descriptions of several new species. *Ann. Mag. Nat. Hist.* (3)**11**: 153–173 [173].
Type data: type status unknown BMNH or HMN (depository uncertain, not found).
Type locality: Grand Havre, Guernsey.
- Botrylloides sparsa*** Alder, J. (1863). Observations on the British Tunicata with descriptions of several new species. *Ann. Mag. Nat. Hist.* (3)**11**: 153–173 [172].
Type data: holotype HMN*.
Type locality: St Peters Port, Guernsey, Channel Islands.
- Botrylloides clavelina*** Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [632].
Type data: type status unknown (destroyed with Wimereux Laboratory).
Type locality: unknown.
- Botrylloides insigne*** Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [633].
Type data: type status unknown (destroyed with Wimereux Laboratory).
Type locality: (on beaches after storms).
- Botrylloides prostratum*** Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [632].
Type data: type status unknown (destroyed with Wimereux Laboratory).
Type locality: unknown.
- Botrylloides boloniense*** Giard, A.M. (1875). Laboratoire de Zoologie maritime à Wimereux (Pas-de-Calais). *Compt. Rend. Ass. Fr. Avanc. Sci.* **3**: 72, 77 [77].
Type data: type status unknown (destroyed with Wimereux Laboratory).
Type locality: Bologne, English Channel.
- Botrylloides fulgurale*** Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [52].
Type data: holotype BMNH 1883.12.13.62*.
Type locality: 530 fathoms, north Atlantic Ocean [59°26'N 7°20'W].
- Botrylloides purpureum*** Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [41] [junior primary homonym of *Botrylloides purpureum* Drasche, 1883].
Type data: holotype BMNH (depository uncertain, lost?).
Type locality: off the Philippines [11°37'N 123°31'E].
- Botrylloides tyreum*** Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [41, 344, 381] [*nom. nov.* for *Botrylloides purpureum* Herdman, 1886].
- Botrylloides cyanescens*** Giard, A.M. (1888). Le Laboratoire de Wimereux en 1888 (recherches fauniques). *Bull. Scient. Fr. Belg.* **9**: 495–496, 512–513 [513].
Type data: type status unknown (destroyed with Wimereux Laboratory).
Type locality: English Channel.
- Botrylloides parvulus*** Huitfield-Kaas, H.J. (1896). Synascidiae. *Den Norske Nordhavs-Expedition 1876–1878, 23 Zoology*, Tunicata **1**: 1–27. pp. 1–27 [24].
Type data: type status unknown BMBN (depository uncertain, not found).
Type locality: Norwegian coast, north Atlantic Ocean.
- Sarcobotrylloides espevaerense*** Huitfield-Kaas, H.J. (1896). Synascidiae. *Den Norske Nordhavs-Expedition 1876–1878, 23 Zoology*, Tunicata **1**: 1–27. pp. 1–27 [25].
Type data: type status unknown BMBN (depository uncertain, not found).
Type locality: north Atlantic Ocean.
- Botrylloides leptum*** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [101].
Type data: syntypes AM U361 (G2120), AM Y1584.
Type locality: Port Jackson, NSW.
- Sarcobotrylloides jacksonianum*** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [102].
Type data: syntypes AM G2121.
Type locality: Port Jackson, NSW.
- Sarcobotrylloides pannosum*** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [105].
Type data: syntypes AM Y2123.
Type locality: Port Stephens, NSW.
- Botrylloides translucidum*** Hartmeyer, R. (1912). Die Ascidien der Deutschen Tiefsee Expedition. *Wiss. Ergebn. dt. Tiefsee-Exped. 'Valdivia'* **16**(3): 223–392 [272].
Type data: syntypes NHMW 57817, 57818*.
Type locality: Cape of Good Hope, South Africa.
- Botrylloides vinosa*** Alder, J. & Hancock, A. (1912). The British Tunicata III J. Hopkinson, editor. *Ray Soc. Publs* **8**: 1–113 [81].
Type data: type status and whereabouts unknown.
Type locality: Japan.
- Taxonomic decision for synonymy: Hartmeyer, R. (1923). Ascidacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365 [361]; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354 [224].
- Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (Great Australian Bight), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast, SW coast); north-east Atlantic Ocean, North Sea, Mediterranean Sea, Black Sea, Adriatic, Red Sea and tropical Indo-west Pacific Ocean.
Ecology: benthic, marine.
Reference: Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [275].

Botrylloides perspicuus Herdman, 1886

Botrylloides perspicuum Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [45].

Type data: syntypes BMNH 1887.2.4.209, 1887.2.4.210*.

Type locality: 20 m, Philippines [6°54'N 122°18'E].

Distribution: Philippines, Indonesia, Hong Kong, Lord Howe Island, QLD (Central E coast, SE oceanic), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [278].

Botrylloides saccus Kott, 2003

Botrylloides saccus Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1645].

Type data: syntypes SAMA E2868.

Type locality: Peneshaw Jetty, 4–6 m, Kangaroo Is., SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

Botryllus Gaertner, 1774

Alcyonium Pallas, P.S. (1766). *Elenchus zoophytorum sistens generum adumbrationes generaliores et specierum cognitarum succinctas descriptiones cum selectis auctorum synonymis*. Hagae-comitum: P. van Cleef 451 pp. [342] [senior synonym suppressed in favour of *Botryllus* Gaertner, 1774 as *nomen conservandum*, see Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London: International Trust for Zoological Nomenclature 200 pp. [47]; Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; junior homonym of *Alcyonium* Linnaeus, 1758 (Coelenterata), see Neave, S.A. (1975). *Nomenclator Zoologicus [1940–1975]*. London: The Zoological Society Vol. 1–7].

Type species: *Alcyonium schlosseri* Pallas, 1766 by monotypy.

Botryllus Gaertner, J. (1774). Zoophyta, quaedam minuta. pp. 24–41 in Pallas, P.S. *Specilegia Zoologia*. Berolini: G.A. Lange fasc. 10 [35] [*nomen conservandum*, see Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258].

Type species: *Botryllus stellatus* Gaertner, 1774 by subsequent designation, see Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London: International Trust for Zoological Nomenclature 200 pp.

Polycyclus Lamarck, J.B.P. (1815). Suites des Polypiers empâtés. *Mém. Mus. Natl. Hist. Paris* **1**: 331–340 [338].

Type species: *Polycyclus renieri* Lamarck, 1815 by monotypy.

Leptobotrylloides Oka, A. (1927). Zur kenntnis der japanischen Botryllidae. *Proc. Imp. Acad. Japan* **3**(9): 607–609 [607].

Myxobotrus Oka, A. (1931). Ueber *Myxobotrus*, eine neue Synascidien-Gattung. *Proc. Imp. Acad. Japan* **7**(6): 238–240 [238].

Type species: *Myxobotrus japonicus* Oka, 1931 by monotypy.

Psammobotrus Oka, A. (1932). Ueber *Psammobotrus purpureus* n.g. n.sp., eine mit sand bedeckte Botryllide. *Proc. Imp. Acad. Japan* **8**: 102–104 [102].

Type species: *Psammobotrus purpureus* Oka, 1932 by monotypy.

Parabotryllus Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* **99**(1): 1–20 [11].

Type species: *Parabotryllus nemorus* Kott, 1975 by monotypy.

Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [674]; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [267, 269].

Extralimital distribution: worldwide in temperate and tropical seas. See: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155; Monniot, C. (1988). Ascidies de Nouvelle-Calédonie IV. Styelidae (suite). *Bull. Mus. Natl. Hist. Nat. Paris* (4)**10A**(2): 163–196; Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

Botryllus purpureus (Oka, 1932)

Psammobotrus purpureus Oka, A. (1932). Ueber *Psammobotrus purpureus* n.g. n.sp., eine mit sand bedeckte Botryllide. *Proc. Imp. Acad. Japan* **8**: 102–104 [102].

Type data: syntypes UTZM 255 * (S408).

Type locality: Japan.

Distribution: Japan, WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [267].

Botryllus schlosseri (Pallas, 1766)

Sea Daisies

Alcyonium schlosseri Pallas, P.S. (1766). *Elenchus zoophytorum sistens generum adumbrationes generaliores et specierum cognitarum succinctas descriptiones cum selectis auctorum synonymis*. Hagae-comitum : P. van Cleef 451 pp. [355].

Type data: type status unknown.

Type locality: Falmouth, English Channel.

Botryllus stellatus Gaertner, J. (1774). Zoophyta, quaedam minuta. pp. 24–41 in Pallas, P.S. *Specilegia Zoologia*. Berolini : G.A. Lange fasc. 10 [37].

Type data: type status unknown.

Type locality: shores of Cornwall to Penzance, England.

Alcyonium borlasii Turton, W. (1807). pp. 132, 207–208 in, *The British Fauna, containing a compendium of the Zoology of the British Islands*. Swansea : J. Evans [207].

Type data: type status and whereabouts unknown.

Type locality: Mounts Bay, English Channel.

Botryllus polycyclus Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [47, 84, 202].

Type data: type status unknown.

Type locality: Suez Canal.

Botryllus gemmeus Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [203].

Type data: type status and whereabouts unknown.

Type locality: Suez Canal.

Botryllus minutus Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [204].

Type data: type status and whereabouts unknown.

Type locality: Suez Canal.

Aplidium verrucosum Dalyell, J.D. (1839). *Edinburgh New Philosophy Journal*. **26**: 152–158. [155].

Type data: type status and whereabouts unknown.

Type locality: Firth of Forth, Scotland.

Botryllus violaceus Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [305] [junior homonym of *Botryllus violaceus* Quoy & Gaimard, 1834].

Type data: type status and whereabouts unknown.

Type locality: Saint-Vaast-la-Hougue, (Channel coast) France.

Botryllus smaragdus Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [307].

Type data: type status and whereabouts unknown.

Type locality: Saint-Vaast-la-Hougue, (Channel coast) France.

Botryllus bivittatus Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [308].

Type data: type status and whereabouts unknown.

Type locality: Langrune, (Channel coast) France.

Botryllus rubens Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [204] [dated 1846–1850].

Type data: type status and whereabouts unknown.

Type locality: Cullercoats, Northumberland, England.

Botryllus castaneus Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [205] [dated 1846–1850].

Type data: holotype HMN*.

Type locality: Cullercoats, Northumberland, England.

Botryllus virescens Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [205] [dated 1846–1850].

Type data: holotype HMN*.

Type locality: Cullercoats, Northumberland, England.

Botryllus gouldii Verrill, A.E. (1871). Descriptions of some imperfectly known and new ascidians from New England. *Amer. J. Sci.* (3) **1**: 54–58, 93–100, 211–212, 288–294, 443–446 [211].

Type data: syntypes (probable) YPM 1383* (whereabouts of other syntype(s) unknown).

Type locality: Brooklyn, Long Island, New York.

Botryllus calendula Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [623].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus pruinus Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [627].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus aurolineatus Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [629].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus morio Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [629].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus marionis Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [630].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus rubigo Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [631].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus violatinctus Hartmeyer, R. (1909). Ascidien (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig : C.F. Winter Vol. 3, suppl. pts 81–87 [1379] [*nom. nov.* for *Botryllus violaceus* Milne-Edwards, 1841].

- Botryllus badius*** Alder, J. & Hancock, A. (1912). The British Tunicata III J. Hopkinson, editor. *Ray Soc. Publs* **8**: 1–113 [70].
Type data: holotype HMN*.
Type locality: Isle of Man, England.
- Botryllus calyculatus*** Alder, J. & Hancock, A. (1912). The British Tunicata III J. Hopkinson, editor. *Ray Soc. Publs* **8**: 1–113 [70].
Type data: holotype HMN*.
Type locality: Peterhead, east coast of Scotland.
- Botryllus miniatus*** Alder, J. & Hancock, A. (1912). The British Tunicata III J. Hopkinson, editor. *Ray Soc. Publs* **8**: 1–113 [76].
Type data: holotype HMN*.
Type locality: Falmouth, Cornwall, England.
Taxonomic decision for synonymy: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365 [344].
- Distribution: Hong Kong, New Zealand, QLD (Central E coast, NE coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast); north Atlantic Ocean, North Sea, Mediterranean Sea, Black Sea and Adriatic.
Ecology: benthic, marine; mainly in temperate waters.
References: Sabbadin, A. (1979). Ascidian colonial structure and genetics. pp. 433–444 in Larwood, G.L. & Rosen, B.R. (eds) *Biology and Systematics of Colonial Organisms*. London: Academic Press; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [267].
- Botryllus stewartensis*** Brewin, 1958
- Botryllus stewartensis*** Brewin, B.I. (1958). Ascidians of New Zealand, Part 11. Ascidians of the Stewart Island region. *Trans. R. Soc. N.Z.* **85**(3): 439–453 [447].
Type data: holotype OMNZ*.
Type locality: Paterson Inlet, Stewart Is., 18 fathoms, New Zealand.
- Parabotryllus nemorus*** Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* **99**(1): 1–20 [11].
- Type data: holotype SAMA E1031, paratypes AM Y1981, QM G7507.
Type locality: upper Spencer Gulf, 9 m, SA.
Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [269].
- Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (S Gulfs coast), South Island, VIC (Bass Strait).
Ecology: benthic, marine.
Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655.
- Botryllus tuberatus*** Ritter & Forsyth, 1917
- Botryllus tuberatus*** Ritter, W.E. & Forsyth, R.A. (1917). Ascidians of the littoral zone of southern California. *Univ. Calif. Publ. Zool.* **16**: 439–512 [461].
Type data: type status and whereabouts unknown.
Type locality: Santa Barbara, California, USA.
- Botryllus communis*** Oka, A. (1927). Zur kenntnis der japanischen Botryllidae. *Proc. Imp. Acad. Japan* **3**(9): 607–609 [607].
Type data: syntypes (probable) UTZM 4(S33)*, UTZM 87(S184)*, UTZM 108(S15)*, UTZM 336(S175)*, UTZM 364(S1)*.
Type locality: Japan.
- Botryllus gracilis*** Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidiend. *Zool. Anz.* **71**: 193–203 [203].
Type data: syntypes ZMH*.
Type locality: South Passage, Dirk Hartog Is., Shark Bay, WA.
Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [271].
- Distribution: Japan, Indonesia, Palau, Kiribati, California, NSW (Central E coast), QLD (Central E coast, NE coast), WA (Lower W coast); southern California.
Ecology: benthic, marine; reef flat habitats on the under-surface of rubble.
Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298.

POLYZOINAE

Botrylllocarpa Hartmeyer, 1909

Protobotryllus Pizon, A. (1908). Ascidies d'Amboine. *Rev. Suisse Zool.* **16**: 195–248 [233] [proposed as a genus in the Botryllinae; junior homonym of *Protobotryllus* Rankin, 1903 (= *Botryllus* Gaertner, 1774)].

Type species: *Protobotryllus viridis* Pizon, 1908 by monotypy.

Botrylllocarpa Hartmeyer, R. (1909). Ascidien (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig: C.F. Winter Vol. 3, suppl. pts 81–87 [1484] [*nom. nov.* for *Protobotryllus* Pizon, 1908].

Extralimital distribution: west Pacific Ocean. See: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298.

Botrylllocarpa elongata Kott, 1990

Botrylllocarpa elongata Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [283].

Type data: holotype AM Y2122.

Type locality: Phillip Is., Bass Strait, VIC.

Distribution: TAS (Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

Chorizocarpa Michaelsen, 1904

Chorizocarpa Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [92].

Type species: *Chorizocormus sydneyensis* Herdman, 1891 by original designation.

Extralimital distribution: west Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Chorizocarpa guttata Michaelsen, 1904

Chorizocarpa guttata Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [104].

Type data: syntypes ZMH, AM Y2012, Y2013 (depository uncertain).

Type locality: Port Jackson, NSW, to 20 m.

Distribution: NSW (Lower E coast); known only from type locality.

Ecology: benthic, marine; 20 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [261].

Chorizocarpa michaelsoni (Sluiter, 1900)

Synstyela michaelsoni Sluiter, C.P. (1900). Berichtigung über eine *Synstyela*-Art. *Zool. Anz.* **23**: 110 [110].

Type data: holotype ZMA TU1081.

Type locality: Thursday Is., Torres Strait.

Distribution: New Caledonia, QLD (Gulf of Carpentaria).

Ecology: benthic, marine.

Reference: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1644].

Chorizocarpa sydneyensis (Herdman, 1891)

Chorizocormus sydneyensis Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [636].

Type data: syntypes AM U261, U257.

Type locality: Port Jackson, NSW.

Chorizocormus leucophaeus Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [636].

Type data: syntypes AM U169 (G2119).

Type locality: Port Jackson, NSW.

Chorizocormus subfuscus Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [636].

Type data: holotype AM U272 (G2118).

Type locality: Port Jackson, NSW.

Gynandrocarpa purpurea Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [96].

Type data: syntypes ZMA TU551, TU552, TU553.

Type locality: reef, Pulu Sebangkatan; reef, Kabaena Is.; reef, North Top of Tiur Is., Indonesia.

Gynandrocarpa systematica Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [98].

Type data: lectotype ZMA TU562.4, paralectotype(s) ZMA TU1264.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200.

Type locality: reef, NE tip of Timor, Indonesia.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [262].

Distribution: Indonesia, NSW (Lower E coast), QLD (NE coast); west Pacific Ocean.

Ecology: benthic, marine.

***Eusynstyela* Michaelsen, 1904**

Michaelsenia Van Name, W.G. (1902). The ascidians of the Bermuda Islands. *Trans. Conn. Acad. Arts Sci.* **11**: 325–412 [380] [junior homonym of *Michaelsenia* Ude, 1896 (Oligochaeta)].

Type species: *Michaelsenia tincta* Van Name, 1902 by monotypy.

Eusynstyela Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [36] [*nom. nov.* for *Michaelsenia* Van Name, 1902].

Extralimital distribution: tropical west Atlantic Ocean, west Pacific Ocean to Japan, the Red Sea and Gulf of Suez. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Eusynstyela grandis* Kott, 1990**

Eusynstyela grandis Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [276].
Type data: holotype QM GH4281.

Type locality: Wistari Reef, Capricorn Group, Great Barrier Reef, QLD.

Distribution: New Caledonia, QLD (Great Barrier Reef).

Ecology: benthic, marine; under rubble near reef crest.

***Eusynstyela latericius* (Sluiter, 1904)**

Gynandrocarpa latericius Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidiiden. *Siboga Exped.* **56A**: 1–126 [94].

Type data: holotype ZMA TU562.1.

Type locality: Sarassa Is., 36 m, Indonesia.

Gynandrocarpa (Eusynstyela) imthurni Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [330].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Chilaw Paar, 16–22 m, Sri Lanka.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [228].

Distribution: Japan, Vietnam, Thailand, Sri Lanka, Philippines, Indonesia, New Caledonia, NT (N coast), QLD (Central E coast, NE coast), WA (N coast, NW coast); Gulf of Thailand, Indian Ocean.

Ecology: benthic, marine; to 82 m, often epibiont on other stolidobranch ascidians.

***Metandrocarpa* Michaelsen, 1904**

Metandrocarpa Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [69].

Type species: *Goodsiria dura* Ritter, 1896 by monotypy.

Okamia Brewin, B.I. (1948). Ascidians of the Hauraki Gulf, Part 1. *Trans. R. Soc. N.Z.* **77**(1): 115–138 [122].

Type species: *Metandrocarpa thilenii* Michaelsen, 1922 by monotypy.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [250].

Extralimital distribution: Nearctic Region; west coast of North America, west Pacific Ocean to New Zealand. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Metandrocarpa agitata* Kott, 1985**

Metandrocarpa agitata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [251].

Type data: holotype WAM 970.83, paratype(s) WAM 41.84.
Type locality: 92 km W of Dongara, 110 m, WA [29°07'30"S 113°57'24"E].

Distribution: QLD (Central E coast), WA (Lower W coast).

Ecology: benthic, marine; to 110 m, rubble with sponges.

***Metandrocarpa indica* Kott, 1972**

Metandrocarpa indica Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [182].

Type data: holotype NMV H159, paratype(s) NMV H158.

Type locality: Investigator Strait, 23 m, SA.

Distribution: SA (S Gulfs coast), WA (Lower W coast).

Ecology: benthic, marine; to 44 m, sand and shell bottom in strong surge.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [253].

***Metandrocarpa miniscula* Kott, 1985**

Metandrocarpa miniscula Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [254].

Type data: syntypes QM GH1500.

Type locality: Mission Beach, QLD.

Distribution: QLD (NE coast).

Ecology: benthic, marine; intertidal epibiont on *Ascidia* sp., underside of rubble.

***Oculinaria* Gray, 1868**

Oculinaria Gray, J.E. (1868). Note on *Oculinaria*, a new genus of social Ascidia. *Proc. Zool. Soc. Lond.* **1868**: 564–565 [564].

Type species: *Oculinaria australis* Gray, 1868 by monotypy.

***Oculinaria australis* Gray, 1868**

Oculinaria australis Gray, J.E. (1868). Note on *Oculinaria*, a new genus of social Ascidia. *Proc. Zool. Soc. Lond.* **1868**: 564–565 [564].

Type data: holotype BMNH 1861.9.20.12*.

Type locality: Fremantle, WA.

Distribution: NSW (Lower E coast), SA (Great Australian Bight), TAS (Bass Strait), VIC (Bass Strait), WA (Lower W coast, SW coast).

Ecology: benthic, marine; to 44 m, around stems of weed and other material.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [226].

***Polyandrocarpa* Michaelsen, 1904**

Polyandrocarpa Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [34].

Type species: *Goodsiria lapidosa* Herdman, 1891 by monotypy.

Extralimital distribution: tropical east Atlantic Ocean, west Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Polyandrocarpa abjornseni* (Michaelsen, 1927)**

Polycarpa abjornseni Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidien. *Zool. Anz.* **71**: 193–203 [200].

Type data: syntypes (probable) ZMB 3800*, ZMB 3801.

Type locality: Fremantle, south of the town, Cockburn sound, on the beach, WA.

Distribution: WA (Lower W coast).

Ecology: benthic, marine.

***Polyandrocarpa australiensis* Kott, 1952**

Polyandrocarpa australiensis Kott, P. (1952). Ascidiaceans of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [249].

Type data: syntypes AM Y796, AM Y797, AM Y1570, AM Y1572, AM Y1573.

Type locality: reef, just south of the jetty, Thompson Bay, Rottnest Is., WA.

Distribution: QLD (NE coast), WA (Lower W coast).

Ecology: benthic, marine; to 24 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [217].

***Polyandrocarpa colemani* Kott, 1992**

Polyandrocarpa colemani Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [641].

Type data: holotype QM GH5724, paratype(s) QM GH5392.

Type locality: Cook Is., off Queensland border, 9 m, NSW.

Distribution: NSW (Central E coast, Lower E coast).

Ecology: benthic, marine; top of ridges where subjected to maximum current.

Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [641].

***Polyandrocarpa lapidosa* (Herdman, 1891)**

Goodsiria lapidosa Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [637].

Type data: syntypes AM U352 (G2116).

Type locality: Port Jackson, NSW.

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine; hard vertical surfaces, strong currents, to 25 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [219].

***Polyandrocarpa rollandi* Tokioka, 1961**

Polyandrocarpa rollandi Tokioka, T. (1961). Ascidiaceans collected during the Melanesian Expedition of the Osaka Museum of Natural History. I. Ascidiaceans presented by Dr R.L.A. Catala of the aquarium of Noumea. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **9**(1): 103–138 [116].

Type data: syntypes OMNH IV1321*.

Type locality: Noumea, New Caledonia.

Distribution: New Caledonia, French Polynesia, Mauritius, QLD (NE coast).

Ecology: benthic, marine; to 15 m.

Reference: Monniot, C. (1987). Ascidiées de Nouvelle-Calédonie I. Phlebobranches du Lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4)**9A**(1): 3–31 [303].

***Polyandrocarpa simulans* Kott, 1972**

Polyandrocarpa simulans Kott, P. (1972). The ascidiaceans of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [184].

Type data: holotype NMV H162, paratype(s) NMV H160, H161, H163.

Type locality: Investigator Strait, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [222].

***Polyandrocarpa sparsa* Kott, 1985**

Polyandrocarpa sparsa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [222].

Type data: holotype QM G9591.

Type locality: N Solitary Is., 6 m, NSW.

Distribution: NSW (Lower E coast); known only from type locality.
Ecology: benthic, marine.

***Polyandrocarpa triggsiensis* Kott, 1952**

Polyandrocarpa triggsiensis Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [248].
Type data: syntypes AM Y1301, Y1575.
Type locality: north outer reef, Trigg's Is., WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [224].

***Polyandrocarpa watsonia* Kott, 1985**

Polyandrocarpa watsonia Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [225].
Type data: holotype NMV H170.
Type locality: 28 km S off Mallacoota Inlet, Rams Head, 6 m, VIC.

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine; to 6 m.

***Polyzoa* Lesson, 1831**

Polyzoa Lesson, R.P. (1831). Zoologie. pp. 433–440 in Lesson, R.P. *Voyage autour du Monde sur la Corvette La Coquille pendant 1822–1825*. Paris : P. Pourret Freres Vol. 2(1) [437].
Type species: *Polyzoa opuntia* Lesson, 1831 by monotypy.

Goodsiria Cunningham, R.O. (1871). Notes on the reptiles, amphibia, fishes, Mollusca and Crustacea obtained during the voyage of H.M.S. *Nassau* in the years 1866–1869. *Trans. Linn. Soc. Lond.* **27**: 465–502 [489].
Type species: *Goodsiria coccinea* Cunningham, 1871 by monotypy.

Chorizocormus Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiæ compositæ. *Zool. Chall. Exped.* **14**(38): 1–425 [345].
Type species: *Chorizocormus reticulatus* Herdman, 1886 by monotypy.

Monobotryllus Oka, A. (1915). Report upon the Tunicata in the collection of the Indian Museum. *Mem. Indian Mus.* **6**: 1–33 [20].
Type species: *Monobotryllus violaceus* Oka, 1915 by monotypy.

Dictyostyela Oka, A. (1926). On the mode of gemmation in *Dictyostyela depressa* n.g., n.sp. (Ascidiæ Sociales). *Proc. Imp. Acad. Japan* **2**: 348–351 [348].
Type species: *Dictyostyela depressa* Oka, 1926 by monotypy.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [249].

Extralimital distribution: Antarctic Region; subantarctic, southern California, Indo-West Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Polyzoa exigua* Kott, 1990**

Polyzoa exigua Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [280].
Type data: holotype QM GH4628, paratype(s) QM GH4629–30.
Type locality: Albany, WA.

Distribution: WA (SW coast); known only from type locality.

Ecology: benthic, marine; epizooic on *Polycarpa flava* [Styelidae] from seagrass beds.

***Polyzoa nodosa* Kott, 1990**

Polyzoa nodosa Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [282].
Type data: holotype SAMA E2031, paratype(s) QM GH4154.
Type locality: Price Is., SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine; 15–20 m.

***Polyzoa violacea* (Oka, 1915)**

Monobotryllus violacea Oka, A. (1915). Report upon the Tunicata in the collection of the Indian Museum. *Mem. Indian Mus.* **6**: 1–33 [20].
Type data: syntypes IM*.
Type locality: Puri, Orissa, on oyster shell, India.

Dictyostyela depressa Oka, A. (1926). On the mode of gemmation in *Dictyostyela depressa* n.g., n.sp. (Ascidiæ Sociales). *Proc. Imp. Acad. Japan* **2**: 348–351 [348].
Type data: type status unknown UTZM (depository uncertain, not found).
Type locality: Honshu, on *Haliotis* [Mollusca] shell, Japan.

Polyzoa sagamiana Tokioka, T. (1953). *Ascidiæ of Sagami Bay*. Tokyo : Iwanami Shoten 313 pp. 79 pls [245].
Type data: holotype BLIH 199*.
Type locality: Hasaki, off Sazima, Sagami Bay, 16 m, Japan.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [249].

Distribution: Japan, Fiji, QLD (NE coast), WA (NW coast); Indian Ocean.

Ecology: benthic, marine; often growing on *Cnemidocarpa areolata* [Styelidae] and *Herdmania momus* [Pyuridae], also from rubble shells and other material, intertidal waters–64 m.

***Stolonica* Lacaze-Duthiers & Délage, 1892**

Stolonica Lacaze-Duthiers, F.J.H. & Délage, Y. (1892). Faune des Cynthiades de Roscoff et côtes de Bretagne. *Mém. pres. div. Sav. Acad. Sci. Inst. Fr.* **45**(2): 1–319 [249]. Type species: *Cynthia aggregata* Forbes, 1848 (*nom. nov.* for *Stolonica socialis* Hartmeyer, 1903, see Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiengfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365) by original designation.

Amphicarpa Michaelsen, W. (1922). Ascidae Ptychobranchiae und Diktyobranchiae von Neuseeland und dem Chatham-Inseln. Papers from Dr. Th. Mortensen's Pacific Expedition 1914–1916, XI. *Vidensk. Meddr. Dansk Naturh. Foren.* **73**: 359–498 [415]. Type species: *Stolonica prolifera* Sluiter, 1905 by original designation.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [277].

Extralimital distribution: northeast Atlantic, tropical west Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Stolonica agnata* Kott, 1985**

Stolonica agnata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [232]. Type data: holotype QM GH723. Type locality: off mouth of Don River, Abbot Point, 15 m, QLD.

Distribution: New Caledonia, QLD (NE coast), WA (Lower W coast). Ecology: benthic, marine; 15 m, coarse sand with mud.

***Stolonica aluta* Kott, 1985**

Stolonica aluta Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [233]. Type data: holotype WAM 968.83, paratype(s) WAM 40.84, 969.83. Type locality: 82 km W of Dongara, 164 m, WA [29°14'S 114°04'E–29°14'48"S 114°05'06"E].

Distribution: WA (Lower W coast). Ecology: benthic, marine; 164 m, small stones and sand with sponges.

***Stolonica australis* Michaelsen, 1927**

Stolonica australis Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Asciden. *Zool. Anz.* **71**: 193–203 [202]. Type data: syntypes ZMH K1522*. Type locality: Middleton Beach, Albany, 5.5–8 m, WA.

Amphicarpa meridiana Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [246].

Type data: holotype QM GH2231, paratype(s) QM G10172. Type locality: Fly Point, Port Stephens, 10 m, NSW.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [278].

Distribution: SA (S Gulfs coast), TAS (Tas. coast), WA (SW coast).

Ecology: benthic, marine.

***Stolonica brevigastra* Kott, 2003**

Stolonica brevigastra Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1644].

Type data: holotype SAMA E2853, paratype(s) QM GH1308, GH1310.

Type locality: Top Gallant Is., in caves and overhangs, 20 m, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

***Stolonica carnosa* Millar, 1963**

Stolonica carnosa Millar, R.H. (1963). Australian ascidians in the British Museum (Natural History). *Proc. Zool. Soc. Lond.* **141**(4): 689–746 [735].

Type data: holotype BMNH 1962.1.12.25.

Type locality: Cottesloe, WA.

Distribution: SA (S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Stolonica diptycha* (Hartmeyer, 1919)**

Distomus diptychos Hartmeyer, R. (1919). Asciden. In, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [87].

Type data: holotype NHRM 714*, paratype(s) ZMH K1533. Type locality: 45 miles WSW Cape Jaubert, 144 m, north WA.

Distribution: WA (Central W coast, NW coast, SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Stolonica duplopicata* Sluiter, 1913**

Stolonica duplopicata Sluiter, C.P. (1913). Asciden von den Aru-Inseln. *Abh. Senckenb. Naturforsch. Ges.* **35**: 65–78 [67].

Type data: syntypes ZMA TU986.

Type locality: Pulu Bambu, Aru Is., 10 m, Indonesia.

Distribution: Philippines, WA (NW coast); Torres Strait.

Ecology: benthic, marine; 10–64 m.

***Stolonica nodula* (Kott, 1985)**

Amphicarpa nodula Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [247].

Type data: holotype QM GH702.

Type locality: Abbot Point, 20 m, QLD.

Taxonomic decision for new combination: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [279] (as *Stolonica nodula*).

Distribution: QLD (NE coast).

Ecology: benthic, marine; 20 m, sandy mud.

***Stolonica reducta* (Sluiter, 1904)**

Styela reducta Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [72].

Type data: syntypes ZMA TU1050.

Type locality: 73 m, Indonesia [8°30'S 119°07'30"E].

Amphicarpa elongata Kott, P. (1952). Ascidiaceans of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [236].

Type data: syntypes AM Y1597, Y1599.

Type locality: north end of outer reef, Trigg's Is., WA.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [280].

Distribution: Indonesia, WA (Lower W coast); Coral Sea.

Ecology: benthic, marine.

***Stolonica styeliformis* Van Name, 1918**

Stolonica styeliformis Van Name, W.G. (1918). Ascidiaceans from the Philippines and adjacent waters. *Bull. U.S. Natl. Mus.* **100**(1): 49–174 [107].

Type data: holotype USNM 6042, paratype(s) USNM 5994, 5995, 5996.

Type locality: off Jolo Light, 58 m, Philippines.

Distribution: Philippines, NT (Gulf of Carpentaria).

Ecology: benthic, marine.

Reference: Kott, P. (1972). The fauna of the Gulf of Carpentaria: Ascidiacea (Chordata: Tunicata). *Fish. Notes Qld (n.s.)* **2**: 39–54 [50] (see *Amphoplicata duplopicata*).

***Stolonica truncata* Kott, 1972**

Stolonica truncata Kott, P. (1972). The ascidiaceans of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [183].

Type data: holotype SAMA E893, paratype(s) SAMA E894, E909.

Type locality: 1 km NW Waldegrave Is., Great Australian Bight, 23 m, SA.

Distribution: SA (Great Australian Bight), WA (Lower W coast).

Ecology: benthic, marine; rocky bottom with sand patches, 3–25 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [238].

***Symplegma* Herdman, 1886**

Symplegma Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [144].

Type species: *Symplegma viride* Herdman, 1886 by monotypy.

Diandrocarpa Van Name, W.G. (1902). The ascidiaceans of the Bermuda Islands. *Trans. Conn. Acad. Arts Sci.* **11**: 325–412 [382].

Type species: *Diandrocarpa botrylloopsis* Van Name, 1902 by monotypy.

Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [675].

Extralimital distribution: tropical west Pacific, Atlantic Ocean. See: Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Symplegma arenosa* Kott, 1972**

Symplegma arenosa Kott, P. (1972). The ascidiaceans of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [182].

Type data: holotype SAMA E904, paratype(s) SAMA E985.

Type locality: off Waldegrave Is., Great Australian Bight, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Symplegma bahraini* C. & F. Monniot, 1997**

Symplegma bahraini Monniot, C. & Monniot, F. (1997). Records of ascidiaceans from Bahrain, Arabian Gulf, with three new species. *J. Nat. Hist.* **31**: 1623–1643 [1638].

Type data: holotype MNHP S1 SYM 51, paratype(s) MNHP SYM 52.

Type locality: Bahrain, 7 m, on seagrass, Mozambique [24°09.07'N 50°39.32'E].

Distribution: Mozambique, NT (N coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [70].

Symplegma brakenhielmi (Michaelsen, 1904)

Diandrocarpa brakenhielmi Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [50].
Type data: holotype MGH T205.
Type locality: Veracruz, Gulf of Mexico.

Gynandrocarpa quadricornulis Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [126].
Type data: holotype ZMA TU562.4.
Type locality: Tual Anchorage, Kei Islands, Indonesia.

Symplegma oceania Tokioka, T. (1961). Ascidians collected during the Melanesian Expedition of the Osaka Museum of Natural History. I. Ascidians presented by Dr R.L.A. Catala of the aquarium of Noumea. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **9**(1): 103–138 [114].
Type data: syntypes OMNH IV1320*.
Type locality: encrusting polychaete tubes, Noumea, New Caledonia.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [203] (based on Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 (207)); Kott, P. (2004). Ascidacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [71].

Distribution: Indonesia, Hong Kong, China (People's Republic), Palau, New Caledonia, Fiji, Sri Lanka, NT (N coast), QLD (Central E coast, Great Barrier Reef, NE coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast); Noumea, also West Indian Ocean, Gulf of Mexico, Caribbean.
Ecology: benthic, marine.

Symplegma rubra Monniot, 1972

Symplegma rubra Monniot, C. (1972). Ascidies stolidobranches des Bermudes. *Bull. Mus. Natl. Hist. Nat. Paris (3(57) Zoology)* **43**: 617–643 [622].
Type data: type status unknown* (not found).
Type locality: Bermuda.

Distribution: Jamaica, Guadeloupe, Brazil, Bermuda, NT (N coast); Atlantic Ocean, West Indian Ocean.
Ecology: benthic, marine.
Reference: Kott, P. (2004). Ascidacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [72].

Symplegma teruakii Kott, 2004

Symplegma teruakii Kott, P. (2004). Ascidacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [72].
Type data: holotype QM GH2603, paratype(s) QM GH2636.
Type locality: Wistari Reef, low tide rubble fauna, QLD.

Distribution: QLD (Great Barrier Reef).
Ecology: benthic, marine.

STYELINAE

Asterocarpa Brewin, 1946

Asterocarpa Brewin, B.I. (1946). Ascidiens in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Trans. R. Soc. N.Z.* **76**(2): 87–131 [113].
Type species: *Styela cerea* Sluiter, 1900 by original designation.

Extralimital distribution: temperate waters of Indian and Pacific Oceans. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Asterocarpa humilis (Heller, 1878)

Styela humilis Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 83–109 [107].

Type data: type status unknown NHMW (depository uncertain, not found).

Type locality: New Zealand.

Styela cerea Sluiter, C.P. (1900). Tunicaten aus dem Stillen Ocean. *Zool. Jahrb. Syst.* **13**: 1–35 [24].

Type data: holotype ZMA TU1087.

Type locality: d'Urville Is., New Zealand.

Dendrodoa gregaria Kesteven, H.L. (1909). Studies on Tunicata no. 1. *Proc. Linn. Soc. N.S.W.* **34**: 276–295 [291].

Type data: syntypes AM U563, U562, ZMB 2562*.

Type locality: Hobart, TAS.

Tethyum (Styela) asymmetron Hartmeyer, R. (1912). Die Ascidiens der Deutschen Tiefsee Expedition. *Wiss. Ergebn. dt. Tiefsee-Exped. 'Valdivia'* **16**(3): 223–392 [253].

Type data: holotype ZMB 22.x.1885*, paratype(s) ZMB 1077*.

Type locality: Cape of Good Hope, S. Africa (Expedition 'Prince Adalbert').

Cnemidocarpa robinsoni Hartmeyer, R. (1916). Neue und alte Styeliden aus der Sammlung des Berliner Museums. *Mitt. Zool. Mus. Berl.* **8**(2): 203–230 [224].

Type data: syntypes (probable) ZMB 2256*.

Type locality: Juan Fernandez.

Cnemidocarpa aucklandica Bovien, P. (1922). Ascidiæ from the Auckland and Campbell Islands (holosomatous forms). Papers from Dr. Th. Mortensen's Pacific Expedition 1914–1916 No. IV. *Vidensk. Meddr. Dansk Naturh. Foren.* **73**: 33–47 [36].

Type data: type status unknown ZMUC (depository uncertain, not found).

Type locality: Auckland, New Zealand.

Taxonomic decision for synonymy: Michaelsen, W. (1922). Ascidiæ Ptychobranchiæ und Diktyobranchiæ von Neuseeland und dem Chatham-Inseln. Papers from Dr. Th. Mortensen's Pacific Expedition 1914–1916, XI. *Vidensk. Meddr. Dansk Naturh. Foren.* **73**: 359–498 [418]; Van Name, W.G. (1945). The North and South American ascidiens. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476 [271].

Distribution: New Zealand, South Africa, SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), WA (SW coast); east Pacific Ocean.

Ecology: benthic, marine.

Cnemidocarpa Huntsman, 1912

Cnemidocarpa Huntsman, A.G. (1912). Ascidiens from the coasts of Canada. *Trans. R. Can. Inst.* **9**: 111–148 [132].

Type species: *Styela joannae* Herdman, 1898 (= *Polycarpa finmarkiensis* Kiaer, 1893) by subsequent designation, see Huntsman, A.G. (1913). The classification of the Styelidae. *Zool. Anz.* **41**: 482–501 [500].

Ypsilocarpa Ärnäck-Christie-Linde, A. (1922). Northern and Arctic invertebrates in the collection of the Swedish State Museum VIII: Tunicata. I. Styelidae and Polyzoidea. *K. Sven. Vetensk.-Akad. Handl.* (2) **63**: 1–62 [24].

Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [676].

Extralimital distribution: worldwide. See: Hartmeyer, R. (1923). Ascidiaceae, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiensfauna auf tier-geographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Van Name, W.G. (1945). The North and South American ascidiens. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Millar, R.H. (1962). Further descriptions of South African ascidiens. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1969). Antarctic Ascidiaceae. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Nishikawa, T. (1991). The ascidiens of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

Cnemidocarpa aculeata Kott, 1985

Cnemidocarpa aculeata Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [121].

Type data: holotype QM GH1326, paratype(s) AM GH1327, GH1328.

Type locality: Cleveland Bay, QLD [18°42'S 147°01'E].

Distribution: QLD (NE coast), VIC (Bass Strait).

Ecology: benthic, marine; 20–92 m, muddy sand.

Cnemidocarpa amphora Kott, 1992

Cnemidocarpa amphora Kott, P. (1992). The Australian Ascidiaceae, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [636].

Type data: holotype SAMA E2531, paratype(s) SAMA E2536.

Type locality: 200 m offshore, North Point, Sir Joseph Banks Group, 7 m, SA.

Distribution: SA (Great Australian Bight).

Ecology: benthic, marine; sand, rubble, seagrass beds.

***Cnemidocarpa barbata* Vinogradova, 1962**

Cnemidocarpa barbata Vinogradova, N.G. (1962). Ascidiæ simplices of the Indian part of the Atlantic. Biological results of the Soviet Antarctic Expedition (1955–1958). 1, Explorations of the fauna of the seas. *Akad. Nauk. SSSR Zoological Institute* **1**(9): 195–215 [202].

Type data: holotype (probable) VNIRO* (depository uncertain).

Type locality: 65°14'S 107°33'E, 639 m, Antarctica.

Distribution: Kerguelen Island, NSW (Central E coast); Indian Ocean.

Ecology: benthic, marine; 1200–1639 m.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [268].

***Cnemidocarpa completa* Kott, 1985**

Cnemidocarpa completa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [124].

Type data: holotype NMV H634.

Type locality: Little Squally Cove, Deal Is., 10 m, VIC.

Distribution: NSW (Central E coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1641].

***Cnemidocarpa fissa* Kott, 1985**

Cnemidocarpa fissa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [125].

Type data: holotype WAM 223.73.

Type locality: E side Cockburn Sound, 9–10 m, WA [32°10'51"S 115°45'12"E].

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

***Cnemidocarpa floccosa* (Sluiter, 1904)**

Styela floccosa Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [64].

Type data: lectotype ZMA TU976.13, paralectotype(s) ZMA TU1260.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [193].

Type locality: reef, Key Is., Indonesia.

Distribution: QLD (Central E coast, NE coast); Arafura Sea.

Ecology: benthic, marine; on sand, coral and mud substrates.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [126].

***Cnemidocarpa intestinata* Kott, 1985**

Cnemidocarpa intestinata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [128].

Type data: holotype QM G9681.

Type locality: Gladstone Harbour, 9 m, QLD [24°48'39"S 151°13'19"E].

Distribution: NT (N coast), QLD (Central E coast, NE coast).

Ecology: benthic, marine; mud and coarse sand with mud, concrete blocks at about 10 m.

***Cnemidocarpa irene* (Hartmeyer, 1906)**

Styela esther Hartmeyer, R. (1906). Ein Beitrag zur Kenntnis der japanischen Ascidiënfauna. *Zool. Anz.* **31**: 1–30 [8].

Type data: syntypes ZMB 2799*.

Type locality: Fukuura, Sagami Bay, Japan.

Styela irene Hartmeyer, R. (1906). Ein Beitrag zur Kenntnis der japanischen Ascidiënfauna. *Zool. Anz.* **31**: 1–30 [7].

Type data: holotype ZMB 2230*.

Type locality: Myazu, Wakasa Bay, Japan.

Cnemidocarpa valborgi Hartmeyer, R. (1919). Ascidiën. In, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [35].

Type data: holotype NHRM 1491*.

Type locality: 45 miles WSW Cape Jaubert, 144 m, WA.

Cnemidocarpa hartogi Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidiën. *Zool. Anz.* **71**: 193–203 [198].

Type data: holotype (probable) ZMB* (depository uncertain).

Type locality: Brown Station, Dirk Hartog Is., Shark Bay, 0.5–3 m, WA.

Cnemidocarpa irma Hartmeyer, R. (1927). Zur Kenntnis phlebobranchiater und dictyobranchiater Ascidiën. *Mitt. Zool. Mus. Berl.* **13**: 157–194 [168].

Type data: holotype ZMB 3830*.

Type locality: NNE of Northpoint of Heirisson Prong, Shark Bay, 11–12.5 m, WA.

Styela pavementis Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [226].

Type data: holotype AM Y1696.

Type locality: jetty piles, Thompson's Bay, Rottneest Is., WA.

Cnemidocarpa legalli Gravier, R. (1955). Ascidiées récoltées par le Président Théodore Tissier (campagne de printemps 1951). *Revue Travaux de l'Institut des Pêches Maritime* **19**: 611–631 [621].

Type data: type status and whereabouts unknown.

Type locality: Lesser Antilles, Caribbean.

Taxonomic decision for synonymy: Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl Mus.* **251**: 1–242 [181]; Monniot, C. & Monniot, F. (1984). Ascidiées littorales de Guadeloupe VII. Espèces

nouvelles et complémentaire à l'inventaire. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **6A**(3): 567–582 [577] (as *Cnemidocarpa areolata* Heller, 1878); Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [122] (as *Cnemidocarpa areolata* Heller, 1878); Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170 [96].

Distribution: Vietnam, Hong Kong, Palau, New Caledonia, Fiji, Japan, NSW (Central E coast, Lower E coast), NT (N coast), QLD (Central E coast, Great Barrier Reef, NE coast), SA (S Gulfs coast), VIC (Bass Strait), WA (Lower W coast, N coast, NW coast, SW coast); west Pacific Ocean, Marianas, Korea, Guadeloupe.

Ecology: benthic, marine; shallow waters–70 m.

***Cnemidocarpa lobata* (Kott, 1952)**

Styela lobata Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [222].

Type data: syntypes AM Y1683 1 specimen (whereabouts of other syntype(s) unknown).

Type locality: D'Entrecasteaux Channel, TAS.

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast, SW coast).

Ecology: benthic, marine; on wharf piles, on muddy or sandy substrates.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [129].

***Cnemidocarpa longata* (Kott, 1954)**

Styela longata Kott, P. (1954). Tunicata, Ascidians. *Rep. B.A.N.Z. Antarct. Res. Exped.* **1**(4): 121–182 [145].

Type data: holotype AM Y996.

Type locality: off north-east Tasmania.

Distribution: TAS (Tas. coast); known only from type locality.

Ecology: benthic, marine.

***Cnemidocarpa oligocarpa* (Sluiter, 1885)**

Styela oligocarpa Sluiter, C.P. (1885). Ueber einige einfachen Ascidien von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [187].

Type data: syntypes ZMA TU1032.

Type locality: between Mendanau and Belleton, 12 m, Indonesia.

Distribution: Indonesia, QLD (NE coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [131].

***Cnemidocarpa pedata* (Herdman, 1881)**

Polycarpa pedata Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [71].

Type data: holotype BMNH 1887.2.4.125.

Type locality: Philippines.

Styela whiteleggii Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Styela whiteleggii Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [40].

Type data: syntypes AM U142, U282.

Type locality: Port Stephens and Port Jackson, NSW.

Taxonomic decision for synonymy: Van Name, W.G. (1918). Ascidians from the Philippines and adjacent waters. *Bull. U.S. Natl. Mus.* **100**(1): 49–174 [97]; taxonomic decision for new combination: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 (as *Cnemidocarpa pedata*).

Distribution: Japan, Philippines, Indonesia, NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef, NE coast), SA (Great Australian Bight), VIC (Bass Strait).

Ecology: benthic, marine; 10–60 m.

***Cnemidocarpa personata* (Herdman, 1899)**

Styela personata Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Styela personata Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [41].

Type data: syntypes AM U144 (G2074).

Type locality: Port Jackson, NSW.

Tethyum (Styela) godeffroyi Michaelsen, W. (1912). Die Tethyiden (Styeliden) des Naturhistorischen Museum zu Hamburg, nebst nachtrag und Anhang einige anderen Familien betreffend. *Jahrb. Hamb. Wiss. Anst.* **28**(2): 109–186 [125].

Type data: syntypes (probable) ZMH*.

Type locality: Sydney, NSW.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [134].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef), TAS (Tas. coast).

Ecology: benthic, marine.

***Cnemidocarpa posthuma* Hartmeyer, 1927**

Cnemidocarpa posthuma Hartmeyer, R. (1927). Zur Kenntnis phlebobranchiater und dictyobranchiater Ascidien. *Mitt. Zool. Mus. Berl.* **13**: 157–194 [169].

Type data: holotype (probable) ZMB* (depository uncertain).

Type locality: NW of Heirison Prong, Shark Bay, 11–12.5 m, WA.

Distribution: WA (Central W coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [136].

Cnemidocarpa radicata (Herdman, 1882)

Styela radicata Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidae simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [163].

Type data: holotype BMNH 1887.2.4.86.

Type locality: Bass Strait, VIC.

Styela etheridgii Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Styela etheridgii Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [38].

Type data: syntypes AM U143 (G2071), AM G12232.

Type locality: Port Stephens, NSW.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [136]; taxonomic decision for new combination: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 (as *Cnemidocarpa radicata*).

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine; to 50 m in *Macrocystis* [Lessoniaceae] beds, on sandy or rocky substrates.

Cnemidocarpa stolonifera (Herdman, 1899)

Styela stolonifera Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Styela stolonifera Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [42].

Type data: holotype AM U145 (G2075).

Type locality: Moreton Bay, QLD.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [138].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef, NE coast).

Ecology: benthic, marine; sandy substrates, to 33 m.

Cnemidocarpa tribranchiata Kott, 1992

Cnemidocarpa tribranchiata Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [638].

Type data: holotype SAMA E2533, paratype(s) SAMA E2534.

Type locality: Seal Rocks, Encounter Bay, 15 m, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

Cnemidocarpa tripartita Kott, 1985

Cnemidocarpa tripartita Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [140].

Type data: holotype NMV H728, paratype(s) NMV H725.

Type locality: Bass Strait, 76 m, VIC [40°10'48"S 145°44'12"E].

Distribution: VIC (Bass Strait).

Ecology: benthic, marine; mud with sponges, 68–76 m.

Monandrocarpa Michaelsen, 1904

Monandrocarpa Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [53].

Type species: *Monandrocarpa tritonis* Michaelsen, 1904 by monotypy.

Monoandrocarpa Kott, P. (1972). Notes on some ascidians from Port Jackson, Botany Bay and Port Hacking NSW. *Proc. Linn. Soc. N.S.W.* **97**(4): 241–257 [250].

Type species: *Monoandrocarpa plana* Kott, 1972 by original designation.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [210].

Extralimital distribution: tropical west Pacific Ocean.

See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Monandrocarpa plana (Kott, 1972)

Monoandrocarpa plana Kott, P. (1972). Notes on some ascidians from Port Jackson, Botany Bay and Port Hacking NSW. *Proc. Linn. Soc. N.S.W.* **97**(4): 241–257 [250].

Type data: holotype AM Y852.

Type locality: off Cronulla, 160 m, NSW.

Polycarpa simplicigona Millar, R.H. (1975). Ascidians from the Indo-West Pacific region in the Zoological Museum, Copenhagen (Tunicata, Ascidiacea). *Steenstrupia* **3**(20): 205–336 [286].

Type data: holotype ZMUC*.

Type locality: 15 miles W of Jolo, 457 m, Philippines.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [210].

Distribution: Philippines, NSW (Lower E coast).

Ecology: benthic, marine.

Polycarpa Heller, 1877

Pandocia Fleming, J. (1822). *The Philosophy of Zoology*. Vol. 2. Edinburgh and London pp. 508–518. [511] [senior synonym suppressed in favour of *Polycarpa* Heller, 1877 as *nomen conservandum*, see Hartmeyer, R. (1915). *Ascidium nomina conservanda*. pp. 247–258 in Apstein, C. *Nomina Conservanda. Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; Snell, J.A. & Gulliksen, B. (1975). *Ascidia*

singularis Gunnerus, 1770 and *Distomus mammillaris* Pallas, 1774: proposed suppression; *Polycarpa* Heller, 1877 (Tunicata, Ascidiacea) proposed type species designation under the Plenary Powers. *Bull. Zool. Nomencl.* **32**(3): 158–160].

Type species: *Pandocia conchilega* Fleming, 1822 by original designation.

Glandula Stimpson, W. (1852). Several new ascidians from the coast of the United States. *Proc. Bost. Soc. Nat. Hist.* **4**: 228–232 [230] [senior synonym suppressed in favour of *Polycarpa* Heller, 1877 as *nomen conservandum*, see Hartmeyer, R. (1915). *Ascidium nomina conservanda*. pp. 247–258 in Apstein, C. *Nomina Conservanda. Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; Hartmeyer, R. (1924). *Ascidacea*, part II. *Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. Ingolf-Exped.* **2**(7): 1–275; Sneli, J.A. & Gulliksen, B. (1975). *Ascidia singularis* Gunnerus, 1770 and *Distomus mammillaris* Pallas, 1774: proposed suppression; *Polycarpa* Heller, 1877 (Tunicata, Ascidiacea) proposed type species designation under the Plenary Powers. *Bull. Zool. Nomencl.* **32**(3): 158–160].

Type species: *Glandula fibrosa* Stimpson, 1852 by subsequent designation, see Heller, C. (1875). Untersuchungen über die Tunicaten des Adriatischen Meeres (2). *Denkschr. Akad. Wiss. Wien* **36**: 107–125.

Polycarpa Heller, C. (1877). Untersuchungen über die Tunicaten des Adriatischen und Mittelmeeres (3). *Denkschr. Akad. Wiss. Wien* **37**(1): 241–275 [259] [*nomen conservandum*, see Hartmeyer, R. (1915). *Ascidium nomina conservanda*. pp. 247–258 in Apstein, C. *Nomina Conservanda. Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; Hartmeyer, R. (1923). *Ascidacea*, part I. *Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. Ingolf-Exped.* **2**(6): 1–365]. Type species: *Polycarpa varians* Heller, 1877 (= *Cynthia pomaria* Heller, 1816) by original designation.

Paratona Huntsman, A.G. (1913). The classification of the Styelidae. *Zool. Anz.* **41**: 482–501 [501]. Type species: *Polycarpa elata* Heller, 1878 by original designation.

Taxonomic decision for synonymy: Huus, J. (1937). *Ascidacea*. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [676].

Extralimital distribution: Neotropical Region, Palaearctic Region; subtropical convergence to tropical west Pacific Ocean, Japan, Mediterranean, tropical Atlantic Ocean, northeast Atlantic Ocean. See: Hartmeyer, R. (1923). *Ascidacea*, part I. *Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. Ingolf-Exped.* **2**(6): 1–365; Harant, H. (1929). *Ascidies provenant des croisières du Prince Albert 1er de Monaco. Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publ.* **133**: 1–354; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221;

Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

Polycarpa argentata (Sluiter, 1890)

Styela argentata Sluiter, C.P. (1890). Die Evertrebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* **50**: 329–348 [340].

Type data: holotype ZMA TU993.

Type locality: Bay of Jakarta (as Djakarta) on coral reef between Leiden Is. and Enkhuizen Is., 20 m, Indonesia.

Styela nutrix Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [86].

Type data: syntypes ZMA TU976.18, TU976.19*.

Type locality: Haingsisi, reef, Samau Is., Indonesia.

Polycarpa iwayamae Tokioka, T. (1950). Ascidians from the Palau Is. I. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**(3): 115–150 [143] [publication date established from Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl. Mus.* **251**: 1–242].

Type data: syntypes SMBL 77*.

Type locality: Palau Islands, west Pacific Ocean.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [148].

Distribution: Indonesia, Palau, Kiribati, NSW (Central E coast), QLD (Central E coast, Great Barrier Reef, NE coast), WA (NW coast); west Pacific Ocean. Ecology: benthic, marine.

Polycarpa aurata (Quoy & Gaimard, 1834)

Ascidia aurata Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris: Pilet Ainé. [559].

Type data: holotype MNHP S1 POL.B 121*.

Type locality: New Guinea.

Polycarpa sulcata Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidiae simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [179].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Banda, Moluccas, 34 m, Indonesia.

Styela psoloessa Sluiter, C.P. (1890). Die Evertrebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* **50**: 329–348 [337].

Type data: syntypes ZMA TU1048*.

Type locality: Ambon, Indonesia.

Styela (Polycarpa) pneumonodes Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.-Naturw. Ges. Jena* **8**: 163–186; Nachtrag zu den tunicaten: 325–326. [179].

Type data: syntypes ZMA TU1046*.

Type locality: Ambon, Indonesia.

Pandocia (Polycarpa) botryllifera Michaelsen, W. (1912). Die Tethyiden (Styeliden) des Naturhistorischen Museum zu Hamburg, nebst nachtrag und Anhang einige anderen Familien betreffend. *Jahrb. Hamb. Wiss. Anst.* **28**(2): 109–186 [143].

Type data: holotype ZMH*.

Type locality: Samoa, west Pacific Ocean.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [150].

Distribution: Sri Lanka, Philippines, Indonesia, Palau, New Guinea, QLD (Great Barrier Reef, NE coast); Caroline Is., west Pacific Ocean.

Ecology: benthic, marine; 3–20 m.

Polycarpa aurita (Sluiter, 1890)

Styela aurita Sluiter, C.P. (1890). Die Evertbraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* **50**: 329–348 [338].

Type data: lectotype ZMA TU1011, paralectotype(s) ZMA TU1255.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [192].

Type locality: Bay of Jakarta (as Djakarta), between Leiden Is. and Enkhuzen Is., 20 m, Indonesia.

Styela circumarata Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [70].

Type data: holotype ZMA TU1108.

Type locality: 16–23 m, Indonesia [6°07'30"N 120°26'E].

Polycarpa polyphlebodes Hartmeyer, R. (1919). Asciden. In, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [74].

Type data: syntypes NHRM 1097*.

Type locality: 45 miles WSW of Cape Jaubert, 144 m, WA.

Styela ramificata Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [214].

Type data: holotype AM Y1691.

Type locality: southside, Peel Is., Moreton Bay, QLD.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [152].

Distribution: Philippines, Indonesia, New Caledonia, NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), WA (Central W coast, Lower W coast, N coast, NW coast); Japan Sea, Caribbean, west Pacific Ocean, tropical west Atlantic Ocean.

Ecology: benthic, marine; low tide–40 m, on silt, sand and coral substrates.

Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [640].

Polycarpa biforis (Sluiter, 1904)

Styela biforis Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [78].

Type data: holotype ZMA TU101.4.

Type locality: 32 m, Indonesia [1°42'S 130°47'30"E].

Distribution: Philippines, Indonesia, QLD (Great Barrier Reef), WA (Lower W coast); Coral Sea.

Ecology: benthic, marine; known from carapace of xanthid crab.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [155].

Polycarpa chinensis (Tokioka, 1967)

Cnemidocarpa chinensis Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl. Mus.* **251**: 1–242 [188].

Type data: holotype USNM 11799, paratype(s) USNM 11800.

Type locality: Hsia-men, China.

Distribution: Vietnam, China (People's Republic), QLD (Central E coast, NE coast), VIC (Bass Strait), WA (Lower W coast, NW coast).

Ecology: benthic, marine; partially embedded in sandy substrates.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [157].

Polycarpa clavata Hartmeyer, 1919

Polycarpa aurata clavata Hartmeyer, R. (1919). Asciden. In, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [40] [proposed with subspecific rank in *Polycarpa aurata* Quoy & Gaimard, 1834].

Type data: syntypes NHRM 687*.

Type locality: 45 miles WSW Cape Jaubert, 108 m, WA.

Distribution: New Caledonia, QLD (Great Barrier Reef, NE coast), SA (Great Australian Bight, S Gulfs coast), WA (Central W coast, Lower W coast, NW coast, SW coast); west Pacific Ocean.

Ecology: benthic, marine; sandy and rocky substrates, to 40 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [159].

Polycarpa contecta (Sluiter, 1904)

Styela contecta Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [66].

Type data: syntypes ZMA TU1019.

Type locality: Banda Is., 18–36 m, Indonesia.

Distribution: Indonesia, New Caledonia, QLD (NE coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [162].

Polycarpa decipiens Herdman, 1906

Polycarpa decipiens Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [324].

Type data: holotype BMNH 1907.8.3.20.

Type locality: 10 miles N of Cheval Paar, 18 m, Sri Lanka.

Polycarpa sigmilineata Millar, R.H. (1975). Ascidiaceans from the Indo-West Pacific region in the Zoological Museum, Copenhagen (Tunicata, Ascidiacea). *Steenstrupia* **3**(20): 205–336 [287].

Type data: holotype ZMUC*, paratype(s) ZMUC*.

Type locality: low tide, Singapore.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [163].

Distribution: Sri Lanka, Singapore, QLD (NE coast).
Ecology: benthic, marine; 8–30 m, on silt and sand substrates.

Polycarpa directa Kott, 1990

Polycarpa directa Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [271].

Type data: holotype NMV F54203, paratype(s) NMV F53298, F53306.

Type locality: Western Port, Crib Point, 15 m, VIC.

Distribution: VIC (Bass Strait).

Ecology: benthic, marine.

Polycarpa flava Kott, 1985

Polycarpa flava Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [165].

Type data: holotype QM GH48.

Type locality: reef, Point Nepean, 16 m, VIC.

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (SW coast).

Ecology: benthic, marine; common in seagrass beds.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [171].

Polycarpa fungiformis Herdman, 1899

Polycarpa fungiformis Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [446] [*nom. nud.*].

Polycarpa fungiformis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [43].

Type data: holotype AM U146 (G2081).

Type locality: Moreton Bay, QLD.

Distribution: QLD (NE coast).

Ecology: benthic, marine; stalk and lower half of body reported to be buried in sandy substrate in sparse sea grass beds, also in shell and grit.

References: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [166]; Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [272].

Polycarpa hartmeyeri Michaelsen, 1927

Polycarpa hartmeyeri Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidien. *Zool. Anz.* **71**: 193–203 [199].

Type data: holotype ZMB 3745.

Type locality: Shark Bay, 12 m, WA.

Polycarpa lucilla Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [171].

Type data: holotype QM GH1396.

Type locality: deep, Abbot Point, 20 m, QLD.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [209].

Distribution: QLD (NE coast), SA (S Gulfs coast), WA (NW coast, SW coast).

Ecology: benthic, marine; temperate records from seagrass beds.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [272].

Polycarpa intonata Kott, 1985

Polycarpa intonata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [168].

Type data: holotype QM GH681, paratypes QM GH669, QM GH682–3, QM GH732, QM GH738.

Type locality: Euri Creek, Abbot Point, 15–20 m, QLD.

Distribution: QLD (NE coast).

Ecology: benthic, marine, viviparous; 4–20 m, sand, and sand and silt substrates.

Polycarpa kapala Kott, 1990

Polycarpa kapala Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [272].

Type data: holotype AM Y2123, paratype(s) AM Y2124.
Type locality: off the Continental Shelf, 1200 m, NSW [34°27'S 151°02'E].

Distribution: NSW (SE oceanic); known only from type locality.

Ecology: benthic, marine; 1200 m.

***Polycarpa longiformis* Tokioka, 1952**

Polycarpa longiformis Tokioka, T. (1952). Ascidiens collected by Messrs Renzi Wada and Seizi Wada from the Pearl Oyster bed in the Arafura Sea in 1940. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **2**(2): 91–142 [119].
Type data: syntypes SMBL 108*.
Type locality: Arafura Sea.

Distribution: QLD (NE coast), WA (NW coast); Arafura Sea.

Ecology: benthic, marine; to 40 m.

References: Tokioka, T. (1955). Ascidiens from the Palao Islands II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **5**(1): 43–57 [213]; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Polycarpa molguloides* Herdman, 1882**

Polycarpa molguloides Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidiace simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [173].
Type data: syntypes BMNH 1887.2.4.99–100*.
Type locality: Bass Strait, VIC.

Distribution: VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [173].

***Polycarpa nigricans* Heller, 1878**

Polycarpa nigricans Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [20].
Type data: holotype ZMH*, paratypes ZMA TU726, ZMB 698*, ZMUC 26/6-1902*, USNM 5558*.
Type locality: Mauritius.

Distribution: Philippines, Indonesia, QLD (Great Barrier Reef, NE coast), WA (Lower W coast); west Pacific Ocean, west Indian Ocean.

Ecology: benthic, marine; in habitats with strong water movement, to 20 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [174].

***Polycarpa nota* Kott, 1985**

Polycarpa nota Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [176].
Type data: holotype QM GH940.
Type locality: reef flat, Heron Is., QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [274].

***Polycarpa obscura* Heller, 1878**

Polycarpa obscura Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [22].

Type data: lectotype ZMH*.

Subsequent designation: Michaelsen, W. (1905). Revision von Heller's Ascidiens-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* **8**: 71–120 (by holotype inference, syntype material from Bowen, Bass Strait and Samoa: Bowen specimen not found, Samoan specimen considered to be conspecific with *Polycarpa aurita* (Quoy & Gaimard, 1834), Bass Strait specimen redescribed as 'holotype').

Type locality: Bass Strait, VIC.

Styela cryptocarpa Sluiter, C.P. (1885). Ueber einige einfachen Ascidiens von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [210].

Type data: lectotype ZMA TU1280*, paralectotype(s) ZMA TU102*.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [193].

Type locality: between Mendanau and Billiton, 12 m, Indonesia.

Polycarpa bassi Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiace compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [413].

Type data: holotype BMNH*.

Type locality: Bass Strait, VIC.

Styela albomarginata Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidiens. *Siboga Exped.* **56A**: 1–126 [65].

Type data: lectotype ZMA TU992.1, paralectotype(s) ZMA TU991.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [191].

Type locality: Hamgsisi, Samau Is., Indonesia.

Polycarpa unilineata Kott, P. (1952). Ascidiens of Australia. I. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [246].

Type data: holotype AM Y1776.

Type locality: Mackay, 10 m, QLD.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [177]; Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne: CSIRO Publishing, Australia Vol. 34 298 pp. [211] (for *Polycarpa bassi*).

Distribution: Indonesia, QLD (Central E coast, Great Barrier Reef, NE coast), VIC (Bass Strait), WA (Lower W coast, NW coast); west Pacific Ocean.

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298.

Polycarpa olitoria (Sluiter, 1890)

Styela olitoria Sluiter, C.P. (1890). Die Evertrebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* **50**: 329–348 [341].

Type data: holotype ZMA TU1034.

Type locality: Bay of Jakarta (as Djakarta), between Leiden Is. and Enkhuizen Is., 20 m, Indonesia.

Styela solvens Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.- Naturw. Ges. Jena* **8**: 163–186; Nachtrag zu den tunicaten: 325–326 [182].

Type data: syntypes ZMA TU1060.

Type locality: Ambon, Indonesia.

Polycarpa seriata Michaelsen, W. (1905). Revision von Heller's Ascidi-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* **8**: 71–120 [112] [= *Styela elata* Heller: Sluiter, 1885].

Type data: holotype (probable) ZMB 2003*.

Type locality: Billiton, Indonesia.

Styela ascidioides Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [317].

Type data: holotype BMNH 1907.8.30.14*.

Type locality: Alentura Paar, Gulf of Manaar, 18–52 m, Sri Lanka.

Pandocia (Polycarpa) madagascariensis Michaelsen, W. (1912). Die Tethyiden (Styeliden) des Naturhistorischen Museum zu Hamburg, nebst nachtrag und Anhang einige anderen Familien betreffend. *Jahrb. Hamb. Wiss. Anst.* **28**(2): 109–186 [139].

Type data: holotype ZMB* (depository uncertain).

Type locality: Nossi-Bé, Malagasy.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [180].

Distribution: Sri Lanka, Indonesia, Malagasy, QLD (NE coast), VIC (Bass Strait), WA (Central W coast, NW coast); west Indian Ocean.

Ecology: benthic, marine.

Polycarpa ovata Pizon, 1908

Polycarpa ovata Pizon, A. (1908). Ascidiées d'Amboine. *Rev. Suisse Zool.* **16**: 195–248 [211].

Type data: syntypes GMNH T1/88*.

Type locality: Ambon (as Amboine), Indonesia.

Distribution: Indonesia, QLD (NE coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [182].

Polycarpa papillata (Sluiter, 1885)

Styela capiosa Sluiter, C.P. (1885). Ueber einige einfachen Asciden von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [202].

Type data: holotype ZMA TU1015*.

Type locality: between Mendanau and Billiton, 12 m, Indonesia.

Styela papillata Sluiter, C.P. (1885). Ueber einige einfachen Asciden von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [192].

Type data: lectotype ZMA TU1035, paralectotype(s) ZMA TU1279.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [195].

Type locality: between Mendanau and Billiton, 8 m, Indonesia.

Styeloides abranchiata Sluiter, C.P. (1885). Ueber einige einfachen Asciden von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [219].

Type data: holotype ZMA TU990*.

Type locality: between Mendanau and Billiton, 12 m, Indonesia.

Styela (Polycarpa) phaula Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.- Naturw. Ges. Jena* **8**: 163–186; Nachtrag zu den tunicaten: 325–326. [182].

Type data: holotype ZMA TU1044*.

Type locality: Thursday Is., Torres Strait.

Polycarpa attollens Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [446] [*nom. nud.*].

Polycarpa attollens Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [53].

Type data: holotype AM U149 (G2086).

Type locality: Port Jackson, NSW.

Polycarpa mutilans Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [319].

Type data: syntypes BMNH 1907.8.30.22*.

Type locality: north part of Gulf of Manaar, Sri Lanka.

Polycarpa capricornia Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [239].

Type data: holotype AM Y1747.

Type locality: Thursday Is., 6–9 m, QLD.

Polycarpa intestinata Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [238].

Type data: holotype AM Y1750.

Type locality: near Point Charles, WA [24°54'S 113°16'E].

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [184].

Distribution: Indonesia, Solomon Islands, Palau, Sri Lanka, Malagasy, NSW (Central E coast*, Lower E coast), NT (Gulf of Carpentaria, N coast), QLD (Central E coast, Great Barrier Reef, Gulf of Carpentaria, NE coast), SA (S Gulfs coast), VIC (Bass Strait), WA (Central W coast, Lower W coast,

N coast, NW coast); Arafura Sea, west Pacific Ocean, Marianas, west Indian Ocean.
Ecology: benthic, marine.

***Polycarpa papyra* Kott, 1985**

Polycarpa papyra Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [188].
Type data: holotype QM GH1501, paratype(s) QM GH1502.
Type locality: 4.6 km SSW John Brewer Reef, Cleveland Bay, QLD.

Distribution: QLD (NE coast); known only from type locality.
Ecology: benthic, marine.

***Polycarpa pedunculata* Heller, 1878**

Polycarpa pedunculata Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [24].
Type data: syntypes ZMH* (depository uncertain).
Type locality: Bass Strait, VIC.

Polycarpa radicata Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [74].
Type data: syntypes BMNH*.
Type locality: Port Jackson and Twofold Bay, NSW.

Taxonomic decision for synonymy: Michaelsen, W. (1905). Revision von Heller's Asciden-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* **8**: 71–120 [98].

Distribution: New Caledonia, NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).
Ecology: benthic, marine.
Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [189].

***Polycarpa pigmentata* Herdman, 1906**

Polycarpa pigmentata Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [318].
Type data: type status unknown BMNH (depository uncertain, not found).
Type locality: Jokkenpiddi Paar, Gulf of Manaar, 17–20 m, Sri Lanka.

Polycarpa picteti Pizon, A. (1908). Ascides d'Amboine. *Rev. Suisse Zool.* **16**: 195–248 [207].
Type data: holotype GMNH T1/87*.
Type locality: Ambon (as Amboine), Indonesia.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [192].

Distribution: Japan, Sri Lanka, Indonesia, Solomon Islands, Kiribati, Fiji, NSW (Central E coast), QLD (Central E coast, Great Barrier Reef), VIC (Bass

Strait), WA (Lower W coast, NW coast); west Pacific Ocean — Marshall Is., Truk Is.; Red Sea.
Ecology: benthic, marine; common in shallow, non-cryptic habitats around coral reefs.

***Polycarpa plenovata* Kott, 1985**

Polycarpa plenovata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [194].
Type data: holotype NMV F51567, paratype(s) NMV F51568.
Type locality: Bass Strait, 71 m, VIC [38°53'42"S 147°55'12"E].

Distribution: VIC (Bass Strait).
Ecology: benthic, marine; sand, shelly sand substrates.

***Polycarpa procera* (Sluiter, 1885)**

Styela procera Sluiter, C.P. (1885). Ueber einige einfachen Asciden von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [196].
Type data: holotype ZMA TU1047.
Type locality: between Mendanau and Billiton, 12 m, Indonesia.

Polycarpa doderleini Hartmeyer, R. (1906). Ein Beitrag zur Kenntnis der japanischen Ascidenfauna. *Zool. Anz.* **31**: 1–30 [15] [as *Polycarpa döderleini*].
Type data: syntypes ZMB 2232*.
Type locality: Sagami Bay, 100–200 m, Japan.

Polycarpa fristedti Michaelsen, W. (1923). Neue und altbekannte asciden aus dem Reichsmuseum zu Stockholm. *Mitt. Zool. Mus. Hamburg* **40**: 1–60 [46].
Type data: holotype NHRM 1486*.
Type locality: Sri Lanka.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [196].

Distribution: Japan, Sri Lanka, Singapore, Indonesia, NSW (Central E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast).
Ecology: benthic, marine; sea floor habitats, partially embedded in substrate.

***Polycarpa reniformis* (Sluiter, 1904)**

Styela reniformis Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [67].
Type data: holotype ZMA TU976.30.
Type locality: Sailus Ketjil, Paternoster Is., Indonesia.

Distribution: Indonesia, Norfolk Island, QLD (Great Barrier Reef, SE oceanic); Torres Strait.
Ecology: benthic, marine.

***Polycarpa rigida* Herdman, 1881**

Polycarpa longisiphonica Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [77].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Port Jackson, NSW.

Polycarpa rigida Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [76].

Type data: syntypes BMNH 1887.2.4.117, BMNH 1887.2.4.118.

Type locality: Bass Strait, TAS.

Polycarpa sluiteri Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [446] [*nom. nud.*].

Polycarpa sluiteri Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [46].

Type data: holotype AM U254 (G2083).

Type locality: Port Jackson, NSW.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [199].

Distribution: NSW (Lower E coast), SA (Great Australian Bight), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine; to 180 m.

Polycarpa sobria (Sluiter, 1904)

Styela sobria Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [63].

Type data: syntypes ZMA TU976.32.

Type locality: reef, Saloyer Is., Indonesia.

Taxonomic decision for new combination: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 (as *Polycarpa sobria*).

Distribution: Indonesia, WA (Lower W coast).

Ecology: benthic, marine; to 50 m.

Polycarpa stirpes Kott, 1985

Polycarpa stirpes Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [202].

Type data: holotype QM G9771.

Type locality: between Lizard Is. and Nymph Is., 18–29 m, QLD.

Distribution: Philippines, Indonesia, New Caledonia, QLD (NE coast).

Ecology: benthic, marine.

Polycarpa thelyphanes (Sluiter, 1904)

Styela thelyphanes Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [68].

Type data: holotype ZMA TU976.33.

Type locality: Sulu Archipel, 14 m, Philippines.

Distribution: Philippines, VIC (Bass Strait), WA (Lower W coast, SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Polycarpa tinctor (Quoy & Gaimard, 1834)

Ascidia tinctor Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [608].

Type data: syntypes MNHP 51 POL.B 113*.

Type locality: Cape Dromedary, NSW.

Distribution: NSW (Lower E coast).

Ecology: benthic, marine, viviparous; development direct.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [205].

Polycarpa tinctorella Kott, 1985

Polycarpa tinctorella Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [207].

Type data: holotype ZMUC, paratype(s) ZMUC.

Type locality: 60–100 m, off Cape Howe, VIC [37°05'S 150°05'E].

Distribution: known only from type locality, lower E coast, VIC.

Ecology: benthic, marine, viviparous; development direct.

Polycarpa viridis Herdman, 1881

Polycarpa viridis Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [74].

Type data: holotype BMNH 1887.2.4.127*, paratype(s) BMNH 1887.2.4.89–92*.

Type locality: Bass Strait, VIC.

Polycarpa moebii Michaelsen, W. (1905). Revision von Heller's Asciden-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* **8**: 71–120 [104].

Type data: holotype (probable) ZMH*.

Type locality: Bass Strait, TAS.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [208].

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

Styela Fleming, 1822

Styela Fleming, J. (1822). *The Philosophy of Zoology*. Vol. 2. Edinburgh and London pp. 508–518. [511].

Type species: *Cynthia canopus* Savigny, 1816 by original designation.

- Goniocarpa** Huntsman, A.G. (1912). Ascidiens from the coasts of Canada. *Trans. R. Can. Inst.* **9**: 111–148 [131].
Type species: *Ascidia lovenii* Sars, 1851 (= *Cynthia coriacea* Alder & Hancock, 1848) by original designation.
- Katatropa** Huntsman, A.G. (1912). Ascidiens from the coasts of Canada. *Trans. R. Can. Inst.* **9**: 111–148 [139].
Type species: *Katatropa vancouverensis* Huntsman, 1912 by original designation.
- Redikorzevia** Oka, A. (1929). Ueber *Redikorzevia* eine neue Genus von einfachen Ascidiens. *Proc. Imp. Acad. Japan* **5**: 434–437 [434].
Type species: *Redikorzevia cylindrica* Oka, 1929 by monotypy.
- Vannamea** Oka, A. (1932). Ueber *Vannamea*, eine neue Styeliden-Gattung. *Proc. Imp. Acad. Japan* **8**: 321–323 [321].
Type species: *Vannamea kurilensis* Oka, 1932 by monotypy.
- Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [676].
- Extralimital distribution: worldwide. See: Hartmeyer, R. (1924). Ascidiaceae, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidiensfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Harant, H. (1929). Ascidiens provenant des croisières du Prince Albert Ier de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidiens. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Kott, P. (1969). Antarctic Ascidiaceae. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Nishikawa, T. (1991). The ascidiens of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.
- Styela canopus** (Savigny, 1816)
- Cynthia canopus** Savigny, J.C. (1816). Recherches anatomiques sur les ascidiens composés et sur les ascidiens simples—Système de la classe des Ascidiens pp. 1–239. *In Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris: G. Dufour. [45].
Type data: type status unknown MNHP (depository uncertain, not found).
Type locality: Red Sea.
- Styela partita** Stimpson, W. (1852). Several new ascidiens from the coast of the United States. *Proc. Bost. Soc. Nat. Hist.* **4**: 228–232 [231].
Type data: syntypes (probable) ANSP* (depository uncertain).
Type locality: Boston Harbour, west of Governor's Island, USA.
- Styela variabilis** Hancock, A. (1868). On the anatomy and physiology of the Tunicata. *J. Linn. Soc. Lond. Zool.* **9**: 309–346 [318].
Type data: holotype (probable) HMN*, paratype(s) BMNH 00.4.4.90*.
Type locality: Herm and Guernsey, Channel Is., UK.
- Cynthia stellifera** Verrill, A.E. (1871). Descriptions of some imperfectly known and new ascidiens from New England. *Amer. J. Sci.* (3) **1**: 54–58, 93–100, 211–212, 288–294, 443–446 [93].
Type data: type status and whereabouts unknown.
Type locality: Vineyard Sound, New Haven, Connecticut, USA.
- Styela canopoides** Heller, C. (1877). Untersuchungen über die Tunicaten des Adriatischen und Mittelmeeres (3). *Denkschr. Akad. Wiss. Wien* **37**(1): 241–275 [254].
Type data: holotype (probable) NHMW* (depository uncertain).
Type locality: Lesina, Adriatic Sea.
- Styela partita bermudiensis** Van Name, W.G. (1902). The ascidiens of the Bermuda Islands. *Trans. Conn. Acad. Arts Sci.* **11**: 325–412 [338] [as *Styela partita* var. *bermudiensis*].
Type data: type status and whereabouts unknown.
Type locality: Bermuda.
- Styela orbicularis** Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidiens. *Siboga Exped.* **56A**: 1–126 [71].
Type data: lectotype ZMA TU976.22, paralectotype(s) ZMA TU976.21.
Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [195].
Type locality: 538 m, Indonesia [7°19'24"S 116°49'30"E].
- Styela marquesana** Michaelsen, W. (1918). Die Ptychobranchen und Diktyobranchen Ascidiens des westlichen Indischen Ozeans. *Jahrb. Hamb. Wiss. Anst.* **35**(2): 1–71 [27].
Type data: holotype ZMB 3300*.
Type locality: Delgoa Bay, near Lourenço Marques, Mozambique.
- Styela barbaris** Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [224].
Type data: holotype AM Y1689.
Type locality: southside, Peel Is., 3 m, Moreton Bay, QLD.
- Styela rectangularis** Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [224].
Type data: syntypes AM Y1700, Y783.
Type locality: jetty piles, or hull of ship, Fremantle, WA.
- Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [112].
- Distribution: Japan, France, Indonesia, Hong Kong, NSW (Central E coast), QLD (Central E coast, NE coast), WA (Lower W coast, NW coast); Torres Strait, Coral Sea, west Pacific Ocean, Korea, tropical and temperate Atlantic Ocean, Persian Gulf,

Adriatic, Mediterranean, Ascension Is., Channel Is., west coast of France.
Ecology: benthic, marine.

Styela clava Herdman, 1881

Styela clava Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [70].
Type data: holotype BMNH 1887.2.4.82*.
Type locality: off Kobé, 16 m, Japan [34°35'N 135°10'E].

Styela mammiculata Carlisle, D.B. (1954). *Styela mammiculata* n.sp., a new species of ascidian from the Plymouth area. *J. Mar. Biol. Ass. U.K.* **32**(2): 329–334 [329].
Type data: type status unknown.
Type locality: Plymouth, UK.

Distribution: Japan, VIC (Bass Strait); English Channel, Irish Sea, north-west Pacific Ocean.

Ecology: benthic, marine; probably introduced to Australian waters.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [115].

Styela plicata (Lesueur, 1823)

Ascidia plicata Lesueur, C.A. (1823). Descriptions of several new species of *Ascidia*. *J. Acad. Nat. Sci. Philad.* **3**(1): 2–8 [5].

Type data: holotype ANSP* (depository uncertain).
Type locality: on bottom of vessel, Philadelphia Harbour, USA.

Styela gyrosa Heller, C. (1877). Untersuchungen über die Tunicaten des Adriatischen und Mittlemeeres (3). *Denkschr. Akad. Wiss. Wien* **37**(1): 241–275 [255].

Type data: holotype (probable) ZMB 2288*.

Type locality: Adriatic Sea, Trieste.

Styela pinguis Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Styela pinguis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [40].

Type data: syntypes AM U141 (G2070).

Type locality: Port Jackson, NSW.

Taxonomic decision for synonymy: Van Name, W.G. (1921). Ascidiaceans of the West Indian region and south-eastern United States. *Bull. Am. Mus. Nat. Hist.* **44**: 283–494 [435].

Distribution: Japan, Philippines, NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast, NW coast); west Indian Ocean, West Indies.

Ecology: benthic, marine; tolerates brackish and polluted waters.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [116].

UNPLACED SPECIES

The following names cannot be placed with certainty, for reasons given below, and are listed here as *Species Inquirendae*.

Species Inquirenda

Cynthia sabulosa Stimpson, W. (1855). Tunicata in descriptions of some new marine invertebrates. *Proc. Acad. Nat. Sci. Phila.* 7: 387–388 [387] [not *Ascidia sabulosa* Quoy & Gaimard, 1834 (= *Molgula sabulosa*); it is a styelid, although the generic placement cannot be determined from the original description].

Type data: holotype whereabouts unknown.

Type locality: Port Jackson, NSW.

Molgula inconspicua Stimpson, W. (1855). Tunicata in descriptions of some new marine invertebrates. *Proc. Acad. Nat. Sci. Phila.* 7: 387–388 [387] [unidentifiable from the information given].

Type data: holotype whereabouts unknown.

Type locality: Port Jackson, NSW.

Cynthia arcuata Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [11] [may be a specimen of *Pyura stolonifera* (Heller, 1878), see Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [331]].

Type data: holotype whereabouts unknown.

Type locality: New South Wales.

Polycarpa elata Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [25] [Michaelson, W. (1905). Revision von Heller's Ascidien-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* 8: 71–120 (112) redescribed the holotype including the upright endocarps on the body wall, lobed anal border, and numerous sausage-shaped gonads; Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 (1814) thought it a probable senior synonym of *Polycarpa papillata* (Sluiter, 1885); the holotype has not been re-examined].

Type data: holotype ZMH*.

Type locality: Bowen, QLD.

Polycarpa nebulosa Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [24] [Michaelson, W. (1905). Revision von Heller's Ascidien-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* 8: 71–120 redescribed the holotype; it is possible synonym of *Polycarpa papillata* (Sluiter, 1885) the anal border being fringed with long lobes, but the arrangement of endocarps and gonads that would confirm its identity is not known; the holotype has not been re-examined].

Type data: holotype ZMH* (depository uncertain).

Type locality: QLD.

Polycarpa stimpsoni Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [23] [has a wide gut loop and the atrial aperture further back along the dorsal surface than in *Polycarpa tinctor* (Quoy & Gaimard, 1834) and *Polycarpa procera* (Sluiter, 1885), which otherwise have similar egg-shaped bodies with sand-encrusted test; Michaelson, W. (1905). Revision von Heller's Ascidien-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* 8: 71–120 found the holotype dried out and other details of its structure could not be determined; a specimen

from Bass Strait identified by Heller as *P. stimpsoni* is not conspecific; Heller thought the species may be identical *Cynthia sabulosa* Stimpson, 1855, from the same locality, but there is no evidence that this is so].

Type data: holotype ZMH* (depository uncertain).

Type locality: Port Jackson, NSW.

Styela exigua Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* 11(3): 52–88 [68] [Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [141] believed that this is a member of the genus *Cnemidocarpa*, however insufficient information is available to confirm either the generic or specific identity; gonads were not detected in the holotype].

Type data: holotype BMNH 1887.2.4.79.

Type locality: Port Jackson, NSW.

Cynthia laevissima Stimpson, W. (1855). Tunicata in descriptions of some new marine invertebrates. *Proc. Acad. Nat. Sci. Phila.* 7: 387–388 [387] [described as having a pale orange, smooth, glossy body with small red apertures; the presence of 20 branchial folds (10 per side?) and 'fimbriated' tentacles suggests the genus *Microcosmus*, although at this stage its identity cannot be determined].

Type data: holotype whereabouts unknown.

Type locality: Port Jackson, NSW.

Cynthia solanoides Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [29] [Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 (318) thought it was *Microcosmus solanoides*; it may be a specimen of *Pyura stolonifera* (Heller, 1878) but the holotype is in poor condition and it is not possible to confirm its identity].

Type data: holotype AM U360.

Type locality: Port Jackson, NSW.

Molgula recumbens Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [56] [name first listed by Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* 7(1): 443–450 (444), *nom. nud.*; Kott, P. (1985). The Australian Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 (379) suggests that this may be an early introduction of *Molgula manhattensis* (Kay, 1843)].

Type data: holotype whereabouts unknown.

Type locality: Port Jackson, NSW.

Polycarpa sacciformis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [48] [name first listed by Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* 7(1): 443–450 [446], *nom. nud.*; Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* 3(3): 206–333 (241) found the holotype in poor condition, only the gut being intact, but inadequate for confident characterisation].

UNPLACED SPECIES

Type data: holotype AM U249/ G2084.

Type locality: Port Jackson, NSW.

Polycarpa stephenensis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [45] [although Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 thought this probably conspecific with *Polycarpa pigmentata* Herdman, 1906, this may be a valid species with more numerous gonads than others in the *pendunculata* group].

Type data: holotype AM U148/ G2082.

Type locality: Port Jackson, NSW.

Halocynthia flynni Herdman, W.A. (1923). Ascidae simplices. *Sci. Rep. Aust. Antarctic Exped. 1911–1914 (C)3(3)*: 1–35 2 pls [22] [the 2cm, ovate specimen has a tough

coriaceous test and overlapping pointed spines lining the siphons; it may be conspecific with *Pyura tasmanensis* but the single specimen taken has not been located to confirm this].

Type data: holotype whereabouts unknown*.

Type locality: NE Tasmania.

Polycarpa jacksoniana Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [50] [name first listed by Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7(1)**: 443–450 [446], *nom. nud.*; information on gonads that would allow precise characterisation is not available; the holotype has not been re-examined].

Type data: holotype AM G2085.

Type locality: Port Jackson, NSW.

THALIACEA

Thaliacea are the most speciose of the two planktonic tunicate classes. The geographic ranges of most species are vast, being defined by the courses of ocean currents, rather than geographic areas. No indigenous species are known in this group. New species are rare, and very few have been added to the list of known species in the last 50 years. Twenty-six species are known from Australian waters.

The class Thaliacea contains the salps and doliolids, both of which have solitary and colonial generations, and the pyrosomids which are only colonial. Each of these groups is given ordinal rank in the class as Cyclomyaria (or Doliolida), Desmomyaria (or Salpida) and Pyrosomatida. Each order contains only one family—the Doliolidae, the Salpidae and the Pyrosomatidae, respectively. Only the Salpidae are reasonably diverse, with two subfamilies, Cyclosalpinx and Salpinx.

Thaliacea are characterised by their translucent test, branchial and atrial siphons at opposite ends of the body and the atrial cavity posterior to the large pharynx. Budding takes place from an endostylar stolon. Species are separated by the numbers and arrangement of the muscle bands that encircle their bodies.

Thaliacea are most prolific. In certain seasons some species occur in vast swarms that exclude most other zooplankters from surface waters. Such swarms of *Thalia democratica* (Forskål, 1775) are characteristic of the Australian eastern coastal waters in autumn and spring. Thaliaceans gain the energy for their prolific sexual reproduction and vegetative replication from their voracious filter feeding activity as they pass through the water—jet-propelled by their ciliary feeding stream.

Most known taxa of the Thaliacea were described from the collections made on one or other of the great European scientific voyages of the 19th century, namely, the French *Astrolabe* (Quoy & Gaimard 1833, 1834), the British *Challenger* (Herdman 1888), the great German Plankton Expedition and the Deep Sea Expedition of the *Valdivia* (Traustedt 1893; Seeliger 1895; Apstein 1906a, 1906b; Neumann 1906, 1913), and the Dutch *Siboga* (Ihle 1910). Later, the American Fisheries Bureau *Albatross* (Metcalf 1919) also made collections in the western Pacific. The taxonomy and biology of Thaliacea have been reviewed in Bone (1998).

In Australian waters, a small plankton collection made by the German expedition to south-western Australia yielded only one thaliacean (*Doliolum denticulatum*) from Shark Bay (Lohmann 1909), and Russell & Coleman (1935) reported on collections made around Low Isles (Great Barrier Reef). Species occurring in eastern Australian waters from the Tropic of Capricorn to South Australia were determined and reported by Thompson (1945) from the collections made by the CSIRO research vessel FRV *Warreen* in just over two years (1938–1941). Since then, no systematic planktological work has been pursued in Australian waters; and neither have the western, southern or tropical Australian waters been surveyed for Thaliacea, although Heron (1972–1988), produced seminal work on the biology of *Thalia democratica*.

The whereabouts of the majority of the type specimens of thaliacean nominal species occurring in Australian waters are not known. Material reported by Quoy & Gaimard (1825, 1833, 1834) from the Voyage de l'*Astrolabe* was discovered in the Laboratoire de Biologie des Invertébrés marins et Malacologie in the Muséum National d'Histoire Naturelle, Paris. However, although there are vials labelled '*Biphores*' and '*Salpes*', the external labels have either been lost or never existed (C. Monniot, *pers. comm.*). Not one of the type specimens of the eleven species from Australian waters, ascribed to these authors, has been located. Type specimens of the four from the *Challenger* Expedition (1888) have not been located in the BMNH; nor are the types of the species described by Ritter (two species), Brooks (two species) and Metcalf (two species) to be found in the U.S. National Museum. Relevant type specimens from Tilesius, Otto, Desor, Dall, Vogt, Todara, Sigl, Borgert, Uljanin (each being the author of a single species) have not been located, and may never have been assigned. Similarly, the type specimens for species described by Bosc (two species), Sars (two species) and Traustedt (three species) and three of the four described by Apstein have not been located.

Cuvier (six species) did not designate types, nor apparently did Forskål (six species), Blainville (four species), Chamisso (four species) and Pallas (one species). Of the six species described by Lesson, and by Péron and Lesueur in the early part of last century, only one (*Pyrosoma giganteum* Lesueur, 1815) has been located in the Muséum National d'Histoire Naturelle, Paris. The only other thaliacean type specimens located are *Thalia cicar* Van Soest, 1973 and *Thalia rhinoceros* Van Soest, 1975 in the Zoological Museum of Amsterdam, *Salpa amboinensis* Apstein, 1904 in the Muséum d'Histoire Naturelle, Geneva, and *Pyrosoma triangulum* Neumann, 1909 in the Museum für Naturkunde, Berlin.

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DOLIOLIDAE

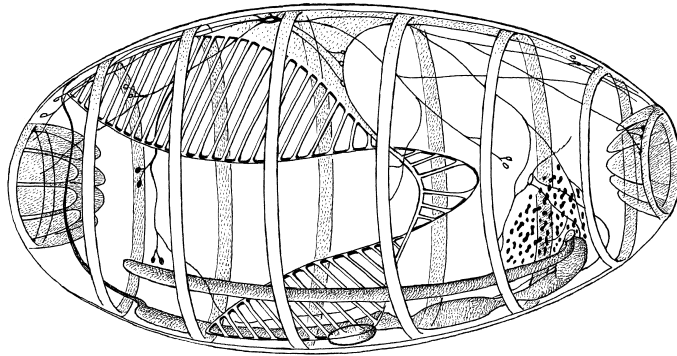


Fig. 23. *Doliolum denticulatum* Quoy & Gaimard, 1834. (Scale bar = 1.0 mm). [after Herdman 1888]

The Doliolidae Bronn, 1862 are the only family in the order Doliolida. All doliolids are free swimming barrel-shaped organisms with eight to nine circular muscle rings around the body, which is open at each end, the mouth anteriorly and atrial aperture posteriorly. Stigmata are in an S-shaped band at the posterior end of the pharynx.

Doliolids are polymorphic. Fertilisation is external, eggs being liberated through the atrial aperture. Tailed larvae are produced as in the Ascidiacea. Loss of the tail results in a functional oozoid with a ventral vegetative stolon from which a continuous series of buds (blastozooids) is produced. These migrate around the right side of the body to the postero-dorsal surface, forming a colony with the oozoid ('nurse'). The blastozooids, attached to the dorsal spur of the 'nurse', are trophozooids (or gastrozooids) in the lateral rows and phorozooids in a median line. The sexual gonozooids of the next generation are eventually produced by, and break free from, the phorozooids. This complex life cycle sometimes is abbreviated by the omission of one or more stages (Braconnot 1963).

Doliolidae are not diverse although both *Doliolum denticulatum* Quoy & Gaimard, 1834 and *Dolioletta gegenbauri* (Uljanin, 1884) are common components of the eastern Australian jelly plankton. The family has been reviewed by Garstang (1933) and Neumann (1935). Thompson (1945) has documented the group as it occurs in eastern Australian waters.

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Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls

Uljanin, B.N. (1884). Die Arten des Gattung *Doliolum* in Golfe von Neapel und den angrenzten den Meeresabschnitten. *Fauna und Flora des Golfes von Neapel*. pp. 1–140 pls i–xii

***Dolioletta* Borgert, 1894**

Dolioletta Borgert, A.H.C. (1894). Die Thaliacea der Plankton-Expedition. C. Vertheilung der Doliolen. *Ergebn. Plankt.-Exped. Humboldt-Stiftung* 2(E.a.C.): 1–66 pls v–viii [1] [initially introduced as a subgenus of *Doliolum* Quoy & Gaimard, 1834].

Type species: *Doliolum gegenbauri* Uljanin, 1884 by original designation.

Compiled from secondary sources: Mueller, J. (1846). Bericht über einige neue Theirformen der Nordsee. *Müllers Arch. Anat. Phys. Wiss. Med.* 1846: 106; Mueller, J. (1847). Bericht über einige neue Theirformen der Nordsee. *Müllers Arch. Anat. Phys. Wiss. Med.* 1847: 158.

Extralimital distribution: cosmopolitan, Indian Ocean, Pacific Ocean, north Atlantic Ocean, south Atlantic Ocean; in cool waters. See: Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* 133: 1–354; Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 8(2): 351–443.

***Dolioletta gegenbauri* (Uljanin, 1884)**

Doliolum gegenbauri Uljanin, B.N. (1884). Die Arten des Gattung *Doliolum* in Golfe von Neapel und den angrenzten den Meeresabschnitten. *Fauna und Flora des Golfes von Neapel*. pp. 1–140 pls i–xii [1].

Type data: type status and whereabouts unknown.

Type locality: Gulf of Naples, Mediterranean Sea.

Doliolum tritonis Herdman, W.A. (1888). Report upon the Tunicata collected during the voyage of H.M.S. 'Challenger', during the years 1873–1876. *Zool. Chall. Exped.* 27(76): 1–166 pls i–xi [47].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: North Atlantic Ocean.

Taxonomic decision for synonymy: Garstang, W. (1933). Report on the Tunicata. 1. Doliolida. *Brit. Antarct. Terra Nova' Exped. 1910, Zool.* 4: 195–251 [195].

Distribution: TAS (Bass Strait*, Tas. coast*), VIC (Bass Strait*); cool waters in Indian and Pacific Oceans and north and south Atlantic.

Ecology: marine, planktonic; tolerant of colder waters, to 250 m; nurse forms to 3000 m.

References: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2); Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 8(2): 351–443.

***Doliolum* Quoy & Gaimard, 1834**

Doliolum Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [599].

Type species: *Doliolum denticulatum* Quoy & Gaimard, 1834 by original designation.

Extralimital distribution: cosmopolitan, warm waters of Indian Ocean, west and east Pacific Ocean, equatorial Atlantic Ocean currents. See: Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 8(2): 351–443.

***Doliolum denticulatum* Quoy & Gaimard, 1834**

Doliolum denticulatum Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [559].

Type data: type status unknown NHMP (depository uncertain, not found).

Type locality: Ile Vanikoro, Pacific Ocean.

Distribution: NSW (Central E coast), QLD (Central E coast, Great Barrier Reef); warmer waters of Indian, east and west Pacific, and Atlantic Oceans and Mediterranean.

Ecology: marine, planktonic; warm water species favours tropical, subtropical waters.

References: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2); Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 8(2): 351–443.

PYROSOMATIDAE

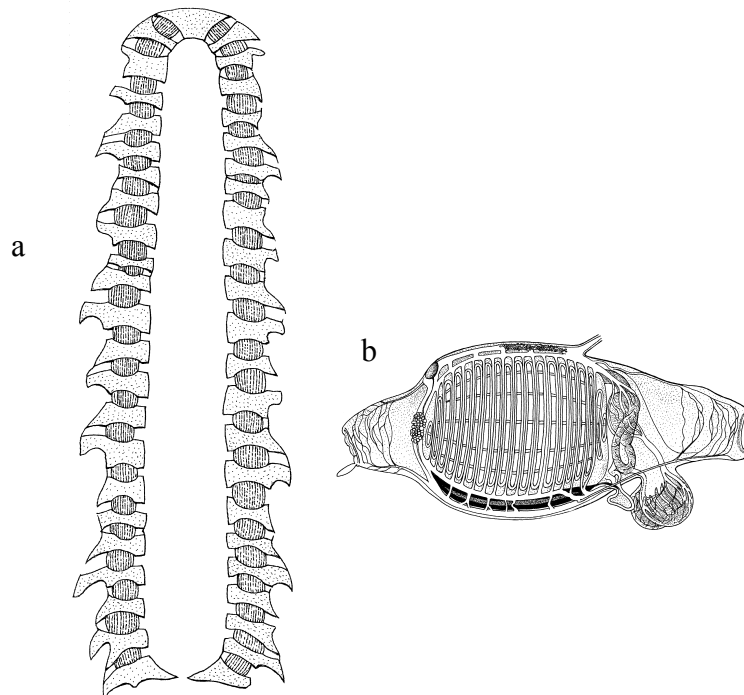


Fig. 24. *Pyrosoma atlanticum* Péron, 1804: **a**, diagrammatic longitudinal section through colony; **b**, schematic figure of a zooid. (a, about life size).
[a, after Burghause 1914; b, after Metcalf & Hopkins 1919]

The family Pyrosomatidae Lahille, 1888, the only known family of the thaliacean order Pyrosomatida, contains species with free swimming tubular colonies of numerous zooids embedded in common transparent test, with their branchial (incurrent) apertures around the outside of the colony and the atrial (excurrent) apertures opening into the central (cloacal) cavity. The central cavity is open at the posterior end of the colony and the excurrent stream of water is forced out through this opening, creating the jet by which the colony is propelled through the water. The pharynx is perforated by numerous long, parallel stigmata, and the short gut loop is postero-ventral to it. The atrial chamber opens at the posterior end of the zooid. Luminous organs are on each side of the anterior end of the pharynx. A vegetative stolon is at the posterior end of the endostyle.

There are two subfamilies, Pyrosomatinae (*Pyrosoma* Péron, 1804 and *Pyrosomella* Van Soest, 1979) and Pyrostremmatinae (*Pyrostremma* Garstang, 1929). In the Pyrosomatinae replication is by isolation of a bud (from the tip of a vegetative stolon) which moves towards the open end of the colony. In the Pyrostremmatinae, the buds form in continuous chains from the stolon, and even after separation lie more or less in rows in the colony. Eggs are fertilised *in situ* in the parent zooid, and develop into rudimentary colonies before liberation from the parental common cloaca.

PYROSOMATIDAE

Pyrosomella differs from *Pyrosoma* in its strictly parallel rows of zooids. This genus has not been recorded from Australian waters although it is known in the tropical Indo-west Pacific. The order Pyrosomatida is reviewed by Neumann (1935) and Van Soest (1979, 1981). Thompson (1945) has reviewed the species recorded from Australian waters.

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PYROSOMATINAE

Pyrosoma Péron, 1804

Pyrosoma Péron, F. (1804). Mémoire sur le nouveau genre *Pyrosoma*. *Ann. Mus. Hist. Nat. Paris* **4**(12): 437–446 pl. lxxii [437].
Type species: *Pyrosoma atlanticum* Péron, 1804 by original designation.

Dipleurosoma Brooks, W.K. (1906). The affinities of pelagic tunicates. No. 1. On a new *Pyrosoma* and *Dipleurosoma elliptica*. *Mem. Natl Acad. Sci. Wash.* **10**: 149–156 [149, 154].
Type species: *Dipleurosoma ellipticum* Brooks, 1906 by monotypy.

Extralimital distribution: worldwide in tropical and temperate latitudes. See: Van Soest, R.W.M. (1981). A monograph of the order Pyrosomatida (Tunicata, Thaliacea). *J. Plankton Res.* **3**(4): 603–631.

Pyrosoma atlanticum Péron, 1804

Pyrosoma atlanticum Péron, F. (1804). Mémoire sur le nouveau genre *Pyrosoma*. *Ann. Mus. Hist. Nat. Paris* **4**(12): 437–446 pl. lxxii [437].
Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: equatorial Atlantic Ocean between Mauritius and Europe.

Compiled from secondary source: Herdman, W.A. (1888). Report upon the Tunicata collected during the voyage of H.M.S. 'Challenger', during the years 1873–1876. *Zool. Chall. Exped.* **27**(76): 1–166 pls i–xi.

Pyrosoma elegans Lesueur, C.A. (1813). Mémoire sur quelques nouvelle espèce d'animaux mollusques et radiates recueillies dans la Méditerranée, près de Nice. *Arch Naturg.* **3**: 281–285 [283].
Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Nice, Mediterranean Sea.

Compiled from secondary source: Herdman, W.A. (1888). Report upon the Tunicata collected during the voyage of H.M.S. 'Challenger', during the years 1873–1876. *Zool. Chall. Exped.* **27**(76): 1–166 pls i–xi.

Pyrosoma giganteum Lesueur, C.A. (1815). Mémoire sur l'organisation des Pyrosomes et sur la place qu'ils semblent devoir occuper dans une classification naturel. *Bull. Soc. Philomath. Paris* **4**: 70–74 pl. i [70].

Type data: holotype (probable) MNHP TP163*.

Type locality: Nice, Mediterranean Sea.

Compiled from secondary source: Herdman, W.A. (1888).

Report upon the Tunicata collected during the voyage of H.M.S. 'Challenger', during the years 1873–1876. *Zool. Chall. Exped.* **27**(76): 1–166 pls i–xi.

Pyrosoma rufum Quoy, J.R.C. & Gaimard, J.P. (1824). Zoologie pp. 497–516. in, *Le voyage autour du Monde, sur les corvettes de S.M. l' Uranie et la Physicienne 1817–1820*. Paris : Pilet Ainé. [514].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: environs of the Cape of Good Hope, 4400 m S Atlantic [38°23'S 37°28'W].

Dipleurosoma ellipticum Brooks, W.K. (1906). The affinities of pelagic tunicates. No. 1. On a new *Pyrosoma* and *Dipleurosoma elliptica*. *Mem. Natl Acad. Sci. Wash.* **10**: 149–156 [151].

Type data: type status unknown USNM (depository uncertain, not found).

Type locality: Gulf Stream off Beaufort, North Carolina.

Pyrosoma triangulum Neumann, G. (1909). Mitteilung über eine neue Pyrosomen Art der Deutschen Tiefsee Expedition. *Zool. Anz.* **33**(24–25): 792 [792].

Type data: holotype ZMB 2978*.

Type locality: South Atlantic Ocean.

Pyrosoma benthica Monniot, C. & Monniot, F. (1966). Un pyrosome benthique: *Pyrosoma benthica* n.sp. *C.R. Seances Acad. Sci.* **263**(D): 368–370 [368].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Cape Verde Is., between Boavista and Maio [15°34'30"N 23°11'30"W].

Taxonomic decision for synonymy: Van Soest, R.W.M. (1981). A monograph of the order Pyrosomatida (Tunicata, Thaliacea). *J. Plankton Res.* **3**(4): 603–631 [612].

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait), VIC (Bass Strait); east and west Pacific, Atlantic and Indian Oceans and Mediterranean.

Ecology: marine, planktonic; most plentiful below 250 m, in waters of 7°C to 30°C.

References: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2); Ivanova-Kazas, O.M. (1962). Sur les forme primitive du développement chez les Pyrosomida. *Cahiers de Biologie Marine* **3**: 191–208.

PYROSTREMMATINAE

Pyrostremma Garstang, 1929

Pyrostremma Garstang, W. (1929). Tunicates. *Encyclopedia Britannica* **14**: 549–555 [549] [publication date established from Van Soest, R.W.M. (1981). A monograph of the order Pyrosomatida (Tunicata, Thaliacea). *J. Plankton Res.* **3**(4): 603–631; first introduced as a subgenus of *Pyrosoma* Péron, 1804].

Type species: *Pyrosoma spinosum* Herdman, 1888 by original designation.

Propyrosoma Ivanova-Kazas, O.M. (1962). Sur les forme primitive du développement chez les Pyrosomida. *Cahiers de Biologie Marine* **3**: 191–208 [193] [junior objective synonym of *Pyrostremma* Garstang, 1929].

Type species: *Pyrosoma spinosum* Herdman, 1888 by original designation.

Extralimital distribution: all oceans between 40°N and 45°S. See: Van Soest, R.W.M. (1981). A monograph of the order Pyrosomatida (Tunicata, Thaliacea). *J. Plankton Res.* **3**(4): 603–631.

Generic reference: Van Soest, R.W.M. (1981). A monograph of the order Pyrosomatida (Tunicata, Thaliacea). *J. Plankton Res.* **3**(4): 603–631 [607].

Pyrostremma spinosum (Herdman, 1888)

Pyrosoma excelsior Perrier, J.O.E. (1886). Les Ascidies. pp. 225–229 in, *Les Explorations sous-marines. Bibliothèque des Ecoles et des Familles*. Paris : Librairie Hachette et Cie. 332 pp. [229] [this is a little used name, and for stability in nomenclature, *Pyrostremma spinosum* Herdman, 1888 is maintained here as the valid name, pending an application to

the International Commission on Zoological Nomenclature].

Type data: type status and whereabouts unknown.

Type locality: tropical north Atlantic.

Pyrosoma spinosum Herdman, W.A. (1888). Report upon the Tunicata collected during the voyage of H.M.S. 'Challenger', during the years 1873–1876. *Zool. Chall. Exped.* **27**(76): 1–166 pls i–xi [29] [for stability in nomenclature this name is maintained here as the valid name, pending an application to the International Commission on Zoological Nomenclature to have it conserved].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: 4400 m, S Atlantic Ocean [38°23'S 37°28'W].

Pyrosoma sedentarium Sebastian, V.O. (1971). *Pyrosoma sedentarium n.sp.*. *Bull. Dept. Mar. Biol. Oceanogr. Univ. Cochin* **5**: 77–79 [77].

Type data: type status unknown.

Type locality: Cochin to Puvur, Kerala Coast of India, below 200m.

Taxonomic decision for synonymy: Van Soest, R.W.M. (1981). A monograph of the order Pyrosomatida (Tunicata, Thaliacea). *J. Plankton Res.* **3**(4): 603–631 [607].

Distribution: New Zealand, NSW (Lower E coast); lower E coast, NSW, VIC; all oceans between 40°N and 45°S.

Ecology: marine, planktonic.

References: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2); Ivanova-Kazas, O.M. (1962). Sur les forme primitive du développement chez les Pyrosomida. *Cahiers de Biologie Marine* **3**: 191–208.

SALPIDAE

The family Salpidae Lahille, 1888 (with subfamilies Cyclosalpinae and Salpinae) is the most diverse of the thaliacean families, and the only family in the order Salpida. Salps are transparent, with atrial and branchial apertures at opposite ends of a more or less streamlined body. An aggregate (blastozoid) sexual generation alternates with a solitary (oozoid) vegetative generation. There is no tailed larva.

Circular muscles surrounding the body are divided into oral, atrial and body muscles. The oral muscle closes the mouth, while the body muscles contract to force water out posteriorly through the atrial aperture. Gill slits are absent, the atrial and branchial cavities being almost continuous, interrupted only by a large ciliated gill bar, the cilia driving the mucous net to the oesophageal opening. A tight, compact 'nucleus' at the posterior end of the body of the aggregate form contains the gut loop and gonads. Embryos (usually one at a time) develop attached to the atrial lining in the aggregated blastozoids.

The subfamily Cyclosalpinae (*Cyclosalpa* Blainville, 1827 and *Helicosalpa* Todara, 1902) in which circular whorls of zooids are produced from the stolon of the solitary vegetative generation, has a particularly thin test and a straight gut stretched along the gill bar. In Salpinae the test is often thick and firm, forming keels, spines, *etc.*, the aggregates of blastozoids are in double rows rather than whorls and the gut is coiled.

Eleven genera are recognised in the Salpinae, and all are represented in Australian waters. The most commonly occurring species is *Thalia democratica* (Forskål, 1775), which occurs in two swarms, spring and autumn, off the coast of New South Wales. Its biology is discussed by Heron (1972) who observed that the population growth of the salp reflected that of the phytoplankton blooms it exploits as its food. The phytoplankton blooms presumably are associated with the incursions of nutrient rich deeper waters onto the continental shelf at those times of the year.

Ihle (1935) reviewed the Salpidae. Van Soest (1974a, 1974b, 1975) has more recently revised many of the genera. Thompson (1945) discussed their occurrence in Australian waters.

References

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- Forskål, P. (1775). *Salpa*. pp. 112–117 in, *Descriptions Animalium ...; quae in itinere orientali observavit*. Hauniae : Heineck & Faber 164 pp.
- Heron, A.C. (1972). Population ecology of a colonizing species: the pelagic tunicate *Thalia democratica*. I. Individual growth rate and generation time; II. Population growth rate. *Oecologia* **10**: 289–293
- Ihle, J.E.W. (1935). *Desmomyaria*. pp. 401–544 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Vol. 5(2, 5) Berlin : Walter de Gruyter.
- Lahille, F. (1888). Etude systématique des tuniciers. *Compt. Rend. Ass. Fr. Avanc. Sci.* **1887**(2): 667–677
- Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls
- Todara, F. (1883). Sopra una nuova forma di *Salpa* (*S. dolicosoma*). *Atti. Accad. Lincei* **8**: 41–43
- Van Soest, R.W.M. (1974a). Taxonomy of the subfamily Cyclosalpinae Yount, 1954, with descriptions of two new species. *Beaufortia* **22**(288): 17–55

SALPIDAE

- Van Soest, R.W.M. (1974b). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* **22**(293): 153–191
- Van Soest, R.W.M. (1975). Observations on taxonomy and distribution of some salps (Tunicata, Thaliacea), with descriptions of three new species. *Beaufortia* **23**: 105–130

CYCLOSALPINAE

Cyclosalpa Blainville, 1827

Cyclosalpa Blainville, H.M.D. de (1827). *Salpa*. *Bull. Zool. Nomencl.* **26**(3): 136–138 [108] [*nomen conservandum*, see Melville, R.V. (1969). *Salpa* Forskål, 1775 (Tunicata): Validated under the Plenary Powers with designation of a type species for *Thalia* Blumenbach, 1798. *Bull. Zool. Nomencl.* **26**(3): 136–138].
Type species: *Salpa pinnata* Forskål, 1775 by original designation.

Extralimital distribution: worldwide in tropical and temperate latitudes. See: Van Soest, R.W.M. (1974). Taxonomy of the subfamily Cyclosalpinae Yount, 1954, with descriptions of two new species. *Beaufortia* **22**(288): 17–55 [17].

Cyclosalpa affinis (Chamisso, 1819)

Salpa affinis Chamisso, A. von (1819). *De Animalibus quibusdam e classe Vermium Linnaeana. Circumnavigatione Terrae auspicante comite N. Romanzoff, duce Ottone de Kotzbue, annis 1815–1818 peracta*. Fasc. 1 De Salpha. Berolini : Apud. Ferd. Dümmlerum 24 pp. 1 pl. [11].
Type data: type status and whereabouts unknown.
Type locality: Hawaii (as Sandwich Is.), Pacific Ocean.
Compiled from secondary source: Van Soest, R.W.M. (1974). Taxonomy of the subfamily Cyclosalpinae Yount, 1954, with descriptions of two new species. *Beaufortia* **22**(288): 17–55 [29].

Cyclosalpa chamissonis Brooks, W.K. (1893). The genus *Salpa*. A monograph, with a supplementary paper by Maynard M. Metcalf. *Mem. Biol. Lab. Johns Hopkins Univ.* **2**: 1–396 pls i–lvii [376].
Type data: type status and whereabouts unknown.
Type locality: Atlantic coast of North America.

Taxonomic decision for synonymy: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls [108].

Distribution: NSW (Lower E coast); eastern, central and western north Atlantic, eastern and central equatorial Atlantic, Mediterranean, north-east and north-west Indian Ocean, east and north Pacific.

Ecology: marine, planktonic.

Reference: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2).

Cyclosalpa bakeri Ritter, 1905

Cyclosalpa bakeri Ritter, W.E. (1905). The pelagic Tunicata of the San Diego Region, excepting the Larvacea. *Univ. Calif. Publ. Zool.* **2**(3): 51–112 pls ii, iii [54].
Type data: type status and whereabouts unknown.
Type locality: San Diego region, California.

Distribution: NSW (Lower E coast), VIC (Bass Strait); east and west Pacific and warmer parts of Atlantic.

Ecology: marine, planktonic; 500 m to the surface.

References: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2); Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls [114].

Cyclosalpa floridana (Apstein, 1894)

Salpa floridana Apstein, C. (1894). Die Thaliacea der Plankton-Expedition. B. Vertheilung der Salpen. *Ergebn. Plankt.-Exped. Humboldt-Stiftung* **2**(E.a.B.): 1–68 pls ii–iv [9].
Type data: type status and whereabouts unknown (not in ZMB).
Type locality: 400 miles south of Newfoundland, west North Atlantic Ocean [32–41°N 56–63°W].
Compiled from secondary source: Van Soest, R.W.M. (1974). Taxonomy of the subfamily Cyclosalpinae Yount, 1954, with descriptions of two new species. *Beaufortia* **22**(288): 17–55.

Distribution: Indonesia, Mexico, Bahamas, QLD (Central E coast); west part of north Atlantic, Gulf of Mexico.

Ecology: marine, planktonic; rare.

References: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2); Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls [111] (as *Cyclosalpa floridana*).

Cyclosalpa polae Sigl, 1912

Cyclosalpa polae Sigl, M.A. (1912). *Cyclosalpa polae*, n.sp. aus dem östlichen mittellmeer. *Zool. Anz.* **39**(2): 66–74 [68].
Type data: type status unknown ZMB (depository uncertain, not found).
Type locality: eastern Mediterranean Sea [31–39°N 19–34°E].
Compiled from secondary source: Van Soest, R.W.M. (1974). Taxonomy of the subfamily Cyclosalpinae Yount, 1954, with descriptions of two new species. *Beaufortia* **22**(288): 17–55.

Distribution: Indonesia, NSW (Central E coast*, Lower E coast), QLD (Central E coast*); warmer waters of Pacific Ocean and the Atlantic and Indian Oceans.

Ecology: marine, planktonic; favours temperate waters.

Reference: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2).

Cyclosalpa sewelli Metcalf, 1927

Cyclosalpa pinnata sewelli Metcalf, M.M. (1927). Seymour Sewell on 'Salps of the Indian Seas'. *Science N.Y.* **65**: 257 [257] [proposed with subspecific rank in *Cyclosalpa pinnata* Forskål, 1775].

Type data: type status and whereabouts unknown.

Type locality: Nankauri Harbour, Nicobar Is.

Compiled from secondary source: Van Soest, R.W.M. (1974). Taxonomy of the subfamily Cyclosalpinae Yount, 1954, with descriptions of two new species. *Beaufortia* 22(288): 17–55.

Distribution: QLD (NE oceanic), WA (NW oceanic, W oceanic); Indo-Pacific waters roughly between 30°N and 30°S, records not often distinguished from those of *Cyclosalpa polae* and *Cyclosalpa pinnata* [Salpidae].

Ecology: marine, planktonic.

Reference: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2).

***Helicosalpa* Todara, 1902**

Helicosalpa Todara, F. (1902). Sopra gli organi scrittori delle Salpidi. *Atti Accad. Lincei* (5)11(1): 405–407 [405].

Type species: *Salpa virgula* Vogt, 1854 by original designation.

Extralimital distribution: between 50°N and 30°S in the Atlantic Ocean, 40°N and 40°S in the Indo-Pacific Ocean, Mediterranean Sea. See: Van Soest, R.W.M.

(1974). Taxonomy of the subfamily Cyclosalpinae Yount, 1954, with descriptions of two new species. *Beaufortia* 22(288): 17–55 [43].

***Helicosalpa virgula* (Vogt, 1854)**

Salpa virgula Vogt, C. (1854). Recherches sur les animaux inférieurs de la Méditerranée. Sci. Mém. sur les Tuniciers nageants de la mer de Nice. *Mém. Inst. Genévois* 2(3): 1–102 pls v–x [11].

Type data: type status unknown.

Type locality: Villefranche-sur-Mer, Mediterranean Sea.

Salpa dolichosoma Todara, F. (1883). Sopra una nuova forma di *Salpa* (*S. dolichosoma*). *Atti. Accad. Lincei* 8: 41–43 [41].

Type data: type status and whereabouts unknown.

Type locality: Mediterranean Sea.

Taxonomic decision for synonymy: Van Soest, R.W.M. (1974). Taxonomy of the subfamily Cyclosalpinae Yount, 1954, with descriptions of two new species. *Beaufortia* 22(288): 17–55 [41].

Distribution: NSW (Central E coast); Mediterranean, east equatorial Atlantic and central Indian Ocean.

Ecology: marine, planktonic.

Reference: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2).

SALPINAE

Brooksia Metcalf, 1918

Brooksia Metcalf, M.M. (1918). The Salpidae; a taxonomic study. *Bull. U.S. Natl Mus.* (2)**100**(2): 5–193 pls i–xiv [50]. Type species: *Salpa rostrata* Traustedt, 1893 by original designation.

Extralimital distribution: west Pacific, west Indian, Atlantic Oceans between 30°N and 20°S, and Mediterranean Sea. See: Van Soest, R.W.M. (1975). Observations on taxonomy and distribution of some salps (Tunicata, Thaliacea), with descriptions of three new species. *Beaufortia* **23**: 105–130 [114].

Brooksia rostrata (Traustedt, 1893)

Salpa rostrata Traustedt, M.P.A. (1893). Die Thaliacea der Plankton-Expedition. A. Systematische Bearbeitung. In, *Ergebn. Plankt.-Exped. Humboldt-Stiftung*. Vol. 2(E.a.A.): 1–16 pl. I. [8].

Type data: type status unknown ZMUC (depository uncertain).

Type locality: Atlantic Ocean [31°07'N 42°07'–43°06'W; 28°03'–09°N 34°03'–35°W].

Distribution: NSW (Central E coast, Lower E coast), VIC (Bass Strait*); tropical Atlantic and Indian Oceans, west and east Pacific.

Ecology: marine, planktonic.

References: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2); Van Soest, R.W.M. (1975). Observations on taxonomy and distribution of some salps (Tunicata, Thaliacea), with descriptions of three new species. *Beaufortia* **23**: 105–130 [115].

Iasis Savigny, 1816

Iasis Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [125] [junior homonym of *Iasis* Savigny, 1816].

Type species: *Salpa cylindrica* Cuvier, 1804 by original designation.

Weelia Yount, J.L. (1954). The taxonomy of the Salpidae (Tunicata) of the Central Pacific Ocean. *Pac. Sci.* **8**: 276–330 [304] [unnecessary *nom. nov.* for *Iasis* Savigny, 1816, not *Iasis* Lahille, 1890].

Extralimital distribution: warm waters of all oceans between 35°N and 30°S, and north Atlantic Ocean to about 42°N. See: Van Soest, R.W.M. (1975). Observations on taxonomy and distribution of some salps (Tunicata, Thaliacea), with descriptions of three new species. *Beaufortia* **23**: 105–130.

Iasis cylindrica (Cuvier, 1804)

Salpa cylindrica Cuvier, G. (1804). Mémoire sur les Thalides (*Thalia* Browne) et sur les Biplores (*Salpa* Forskål). *Ann. Mus. Hist. Nat. Paris* **4**: 360–382 pl. lxviii [381].

Type data: type status unknown.

Type locality: unknown, see Van Soest, R.W.M. (1975). Observations on taxonomy and distribution of some salps (Tunicata, Thaliacea), with descriptions of three new species. *Beaufortia* **23**: 105–130 [111].

Salpa coerulescens Chamisso, A. von (1819). *De Animalibus quibusdam e classe Vermium Linnaeana. Circumnavigatione Terrae auspicate comite N. Romanzoff, duce Ottone de Kotzebue, annis 1815–1818 peracta*. Fasc. 1 De Salpha. Berolini : Apud. ferd. Dummlerum 24 pp. 1 pl. [22].

Type data: type status and whereabouts unknown.

Type locality: equatorial Atlantic Ocean.

Compiled from secondary source: Deshayes, G.P. & Milne-Edwards, H. (1840). Tuniciers. pp. 473–541 in Lamarck, J.B.P.A. *Histoire naturelle des Animaux sans Vertèbres*. Paris : J.B. Ballière Vol. 3 2nd Edn 770 pp. [520].

Salpa elongata Blainville, H.M.D. de (1827). *Salpa*. *Bull. Zool. Nomencl.* **26**(3): 136–138 [113].

Type data: syntypes (probable) whereabouts unknown.

Type locality: Straits of Gibraltar.

Taxonomic decision for synonymy: Traustedt, M.P.A. (1885). *Spolia Atlantica* I. Bidrag til Kundskab om Salperne. *Danske Vid. Selsk. Skrift.* **6**(2): 337–400 pls i, ii [377].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef); north-west, central and south-east north Atlantic, equatorial Atlantic, and south Atlantic, Indian Ocean, west and east Pacific.

Ecology: marine, planktonic; not below 100 m.

Ihlea Metcalf, 1919

Apsteinia Metcalf, M.M. (1918). The Salpidae; a taxonomic study. *Bull. U.S. Natl Mus.* (2)**100**(2): 5–193 pls i–xiv [71] [first introduced as a subgenus of *Salpa* Forskål, 1775; junior homonym of *Apsteinia* Schmeil, 1894 (Crustacea)]. Type species: *Salpa punctata* Forskål, 1775 by original designation.

Ihlea Metcalf, M.M. (1919). Metcalf and Bell upon Salpidae. *Science N.Y.* **50**(1279): 19–20 [19] [*nom. nov.* for *Apsteinia* Metcalf, 1918].

Extralimital distribution: temperate and tropical waters of three oceans between 60°N in the north Atlantic Ocean to the Antarctic convergence. See: Van Soest, R.W.M. (1975). Observations on taxonomy and distribution of some salps (Tunicata, Thaliacea), with descriptions of three new species. *Beaufortia* **23**: 105–130.

Ihlea magalhanica (Apstein, 1894)

Salpa magalhanica Apstein, C. (1894). Die Thaliacea der Plankton-Expedition. B. Vertheilung der Salpen. *Ergebn. Plankt.-Exped. Humboldt-Stiftung* **2**(E.a.B.): 1–68 pls ii–iv [20].

Type data: type status unknown ZMB (depository uncertain, not found).

Type locality: Straits of Magellan.

Compiled from secondary source: Metcalf, M.M. (1918). The Salpidae; a taxonomic study. *Bull. U.S. Natl Mus.* (2)100(2): 5–193 pls i–xiv.

Distribution: TAS (Bass Strait*), VIC (Bass Strait*); Straits of Magellan and to the south, and Cape of Good Hope.

Ecology: marine, planktonic; low tolerance of warm water, favours water between 11.6° and 22.25°C.

Reference: Foxton, P. (1971). On *Ihlea magalhanica* and *Ihlea racovitzai*. *Discovery Rep.* 35: 179–198.

***Metcalfina* Ihle & Ihle-Landenberg, 1933**

Metcalfina Ihle, J.E.W. & Ihle-Landenberg, M.E. (1933). Anatomische Untersuchungen über Salpen. III. Der Nucleus; IV. Allgemeines über den Darmkanal der Salpen. *Zool. Anz.* 104: 194–200 [199].

Type species: *Salpa hexagona* Quoy & Gaimard, 1824 by original designation.

Extralimital distribution: east Atlantic Ocean, north Indian Ocean, tropical west Pacific Ocean. See: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne: Council for Scientific and Industrial Research 196 pp. 75 pls [129].

***Metcalfina hexagona* (Quoy & Gaimard, 1824)**

Salpa hexagona Quoy, J.R.C. & Gaimard, J.P. (1824). Zoologie pp. 497–516. in, *Le voyage autour du Monde, sur les corvettes de S.M. l' Uranie et la Physicienne 1817–1820*. Paris: Pilet Ainé. [505].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Madeira Is., NE Atlantic Ocean.

Distribution: QLD (Central E coast); from warm waters of Indian Ocean, Atlantic, Pacific Ocean.

Ecology: marine, planktonic; rare, often in deeper waters to 200 m.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne: Council for Scientific and Industrial Research 196 pp. 75 pls.

***Pegea* Savigny, 1816**

Pegea Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris: G. Dufour. [124].

Type species: *Salpa confoederata* Forskål, 1775 by original designation.

Extralimital distribution: all oceans between 50°N and 45°S. See: Van Soest, R.W.M. (1974). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* 22(293): 153–191 [170].

***Pegea confoederata* (Forskål, 1775)**

Salpa confoederata Forskål, P. (1775). *Salpa*. pp. 112–117 in, *Descriptions Animalium ...; quae in itinere orientali observavit*. Hauniae: Heineck & Faber 164 pp. [115] [publication date established from Melville, R.V. (1969).

Salpa Forskål, 1775 (Tunicata): Validated under the Plenary Powers with designation of a type species for *Thalia* Blumenbach, 1798. *Bull. Zool. Nomencl.* 26(3): 136–138].

Type data: type status and whereabouts unknown.

Type locality: eastern Mediterranean Sea.

Compiled from secondary source: Van Soest, R.W.M. (1974). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* 22(293): 153–191 [171].

Salpa gibba Bosc, L.A.G. (1802). *Histoire Naturelle des Vers*. In, *Encyclopédie Méthodique Paris and. Liege*: Panckoucke Vol. 2 [178].

Type data: type status unknown ZMUC (depository uncertain).

Type locality: Atlantic Ocean, see Blainville, H.M.D. de (1827). *Salpa*. *Bull. Zool. Nomencl.* 26(3): 136–138 [110].

Salpa octophora Cuvier, G. (1804). Mémoire sur les Thalides (*Thalia* Browne) et sur les Biphores (*Salpa* Forskål). *Ann. Mus. Hist. Nat. Paris* 4: 360–382 pl. lxxviii [379].

Type data: type status unknown.

Type locality: unknown.

Salpa scutigera Cuvier, G. (1804). Mémoire sur les Thalides (*Thalia* Browne) et sur les Biphores (*Salpa* Forskål). *Ann. Mus. Hist. Nat. Paris* 4: 360–382 pl. lxxviii [379].

Type data: type status unknown.

Type locality: unknown.

Salpa vivipara Péron, F. & Lesueur, C.A. (1807). pp. 45–46, & c pls xxx, xxxi (part) in, *Voyage de découvertes aux Terres Australes ... 1800–1804*. Vol. 1. Paris. [pl. 31] [after Traustedt, M.P.A. (1885). *Spolia Atlantica* 1. Bidrag til Kundskab om Salperne. *Danske Vid. Selsk. Skrift.* 6(2): 337–400 pls i, ii].

Type data: type status unknown ZMUC (depository uncertain).

Type locality: unknown.

Salpa ferruginea Chamisso, A. von (1819). *De Animalibus quibusdam e classe Vermium Linnaeana. Circumnavigatione Terrae auspicate comite N. Romanzoff, duce Ottone de Kotzbue, annis 1815–1818 peracta*. Fasc. 1 De Salpha. Berolini: Apud. ferd. Dummlerum 24 pp. 1 pl. [23] [after Traustedt, M.P.A. (1885). *Spolia Atlantica* 1. Bidrag til Kundskab om Salperne. *Danske Vid. Selsk. Skrift.* 6(2): 337–400 pls i, ii].

Type data: type status unknown ZMUC (depository uncertain, not found).

Type locality: Mediterranean Sea.

Salpa femoralis Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris: Pilet Ainé. [577].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Atlantic Ocean near Tropic of Cancer.

Salpa quadrata Herdman, W.A. (1888). Report upon the Tunicata collected during the voyage of H.M.S. 'Challenger', during the years 1873–1876. *Zool. Chall. Exped.* 27(76): 1–166 pls i–xi [84].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: North Atlantic Ocean [10°55'N 17°04'W].

Taxonomic decision for synonymy: Van Soest, R.W.M. (1974). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* **22**(293): 153–191 [171]; Madin, L.P. & Harbison, G.R. (1978). Salps of the genus *Pegea* Savigny, 1816 (Tunicata: Thaliacea). *Bull. Mar. Sci.* **28**(2): 335–344.

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (Great Australian Bight), TAS (Bass Strait*, Tas. coast), VIC (Bass Strait*); warm and temperate parts of all oceans and Mediterranean.

Ecology: marine, planktonic.

Ritteriella Metcalf, 1918

Ritteriella Metcalf, M.M. (1918). The Salpidae; a taxonomic study. *Bull. U.S. Natl Mus.* (2) **100**(2): 5–193 pls i–xiv [55]. Type species: *Salpa picteti* Apstein, 1904 by original designation.

Extralimital distribution: tropical and temperate latitudes in all oceans. See: Van Soest, R.W.M. (1974). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* **22**(293): 153–191 [175].

Ritteriella amboinensis (Apstein, 1904)

Salpa amboinensis Apstein, C. (1904). Salpes d'Amboine. *Rev. Suisse Zool.* **12**: 649–656 pl. xii [651]. Type data: syntypes GMNH T1/98 (3 jars). Type locality: near Ambon, Indonesia.

Distribution: NSW (Central E coast), QLD (Central E coast), VIC (Bass Strait); Indian and Pacific Oceans between 30°S and 30°N.

Ecology: marine, planktonic; favours waters 200 m to surface, warmer waters, but coldest times of the year. Reference: Van Soest, R.W.M. (1974). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* **22**(293): 153–191 [177].

Ritteriella retracta (Ritter, 1906)

Salpa (Cyclosalpa) retracta Ritter, W.E. (1906). *Cyclosalpa retracta*, a new Salpoid from the coast of Japan. *Annot. Zool. Jpn.* **6**(1): 1–5 [1].

Type data: type status unknown USNM (depository uncertain, not found).

Type locality: Suruga Bay, Japan.

Compiled from secondary sources: Oka, A. (1931). Ueber *Myxobotrus*, eine neue Synascidien-Gattung. *Proc. Imp. Acad. Japan* **7**(6): 238–240; Van Soest, R.W.M. (1974). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* **22**(293): 153–191 [179].

Distribution: QLD (Central E coast); all oceans between 40°S and 40°N, to 60°N in the Atlantic.

Ecology: benthic, marine.

Salpa Forskål, 1775

Salpa Forskål, P. (1775). *Salpa*. pp. 112–117 in, *Descriptions Animalium ...; quae in itinere orientali observavit*. Hauniae: Heineck & Faber 164 pp. [115] [publication date established from Melville, R.V. (1969). *Salpa* Forskål, 1775 (Tunicata): Validated under the Plenary Powers with designation of a type species for *Thalia* Blumenbach, 1798. *Bull. Zool. Nomencl.* **26**(3): 136–138; *nomen conservandum*; senior homonym, *Salpa* Edwards, 1771 (Pisces) suppressed].

Type species: *Salpa maxima* Forskål, 1775 by original designation.

Biphora Brugière, J.G. (1792). Histoire Naturelle des Vers. pp. 23–24, 26, 141–157, 178–188 pl. 75 fig. 5 in, *Encyclopédie Méthodique* Vol. 1. Paris and Liege: Panckoucke. [*nom. nov.* for *Salpa* Forskål, 1775].

Extralimital distribution: worldwide. See: Van Soest, R.W.M. (1974). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* **22**(293): 153–191 [157].

Salpa fusiformis Cuvier, 1804

Salpa fusiformis Cuvier, G. (1804). Mémoire sur les Thalides (*Thalia* Browne) et sur les Biphores (*Salpa* Forskål). *Ann. Mus. Hist. Nat. Paris* **4**: 360–382 pl. lxviii [382].

Type data: type status unknown.

Type locality: unknown.

Compiled from secondary source: Van Soest, R.W.M. (1974). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* **22**(293): 153–191 [166].

Salpa runcinata Chamisso, A. von (1819). *De Animalibus quibusdam e classe Vermium Linnaeana. Circumnavigatione Terrae auspicante comite N. Romanzoff, duce Ottone de Kotzbue, annis 1815–1818 peracta*. Fasc. 1 De Salpha. Berolini: Apud. ferd. Dummlerum 24 pp. 1 pl. [16].

Type data: type status and whereabouts unknown.

Type locality: near the Azores, Atlantic Ocean.

Compiled from secondary source: Deshayes, G.P. & Milne-Edwards, H. (1840). Tuniciers. pp. 473–541 in Lamarck, J.B.P.A. *Histoire naturelle des Animaux sans Vertèbres*. Paris: J.B. Ballière Vol. 3 2nd Edn 770 pp.

Biphora depressa Sars, M. (1829). *Bidrag til Söedyrenes Naturhistorie*, Forste Hæfte. Bergen. 160 pp. [51].

Type data: type status and whereabouts unknown.

Type locality: ?off Norway.

Biphora tricuspidata Sars, M. (1829). *Bidrag til Söedyrenes Naturhistorie*, Forste Hæfte. Bergen. 160 pp. [56].

Type data: type status and whereabouts unknown.

Type locality: ?off Norway.

Salpa coerulea Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris: Pilet Ainé. [589] ['biphore bleu' figured in Quoy, J.R.C. & Gaimard, J.P. (1833). Zoologie, Zoophytes pp. 304–306. in, *Voyage de découvertes de l'Astrolabe 1824–1829* Vol. 4. Paris: Pilet Ainé. (pl. 89, figs 20–24)].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: 30°S 51°W, Atlantic Ocean.

Taxonomic decision for synonymy: Van Soest, R.W.M. (1974). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* 22(293): 153–191 [166].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), TAS (Bass Strait*, Tas. coast), VIC (Bass Strait*); Atlantic between 55°S to 60°N, Mediterranean Sea, Indian Ocean, Pacific Ocean between 40°S and 30°N to Bering Sea.

Ecology: marine, planktonic; water temperature 7–25.7°C, able to withstand low temperatures.

References: Deshayes, G.P. & Milne-Edwards, H. (1840). Tuniciers. pp. 473–541 in Lamarck, J.B.P.A. *Histoire naturelle des Animaux sans Vertèbres*. Paris : J.B. Ballière Vol. 3 2nd Edn 770 pp. (*Salpa runcinata* Chamisso, 1819 as *Salpa ruminata* (sic), *Salpa coerulea* Quoy & Gaimard, 1834 as *Salpa caeculia* (sic)); Foxton, P. (1961). On *Salpa fusiformis* Cuvier and related species. *Discovery Rep.* 32: 1–32.

Salpa maxima Forskål, 1775

Salpa africana Forskål, P. (1775). *Salpa*. pp. 112–117 in, *Descriptions Animalium ...; quae in itinere orientali observavit*. Hauniae : Heineck & Faber 164 pp. [116] [publication date established from Melville, R.V. (1969). *Salpa* Forskål, 1775 (Tunicata): Validated under the Plenary Powers with designation of a type species for *Thalia* Blumenbach, 1798. *Bull. Zool. Nomencl.* 26(3): 136–138]. Type data: type status and whereabouts unknown. Type locality: near the Tunisian coast, Mediterranean Sea. Compiled from secondary source: Bosc, L.A.G. (1802). *Histoire Naturelle des Vers*. In, *Encyclopédie Méthodique Paris and. Liege* : Panckoucke Vol. 2 [180].

Salpa maxima Forskål, P. (1775). *Salpa*. pp. 112–117 in, *Descriptions Animalium ...; quae in itinere orientali observavit*. Hauniae : Heineck & Faber 164 pp. [112] [publication date established from Melville, R.V. (1969). *Salpa* Forskål, 1775 (Tunicata): Validated under the Plenary Powers with designation of a type species for *Thalia* Blumenbach, 1798. *Bull. Zool. Nomencl.* 26(3): 136–138]. Type data: type status and whereabouts unknown. Type locality: off Tunisian coast, Mediterranean Sea. Compiled from secondary source: Van Soest, R.W.M. (1974). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* 22(293): 153–191.

Salpa birostrata Blainville, H.M.D. de (1827). *Salpa*. *Bull. Zool. Nomencl.* 26(3): 136–138 [119] [*nom. nov.* for *Salpa maxima* Forskål: Quoy & Gaimard, 1824].

Salpa forskalii Lesson, R.P. (1830). *Zoologie*. pp. 256–279, 433–440 in Lesson, R.P. *Voyage autour du Monde sur la Corvette La Coquille pendant 1822–1825*. Paris : P. Pourret Frères Vol. 2(1) [272]. Type data: type status and whereabouts unknown. Type locality: Mediterranean Sea.

Taxonomic decision for synonymy: Van Soest, R.W.M. (1974). A revision of the genera *Salpa* Forskål, 1775, *Pegea* Savigny, 1816 and *Ritteriella* Metcalf, 1919 (Tunicata, Thaliacea). *Beaufortia* 22(293): 153–191 [158].

Distribution: Chile, NSW (Lower E coast), TAS (Bass Strait*, Tas. coast), VIC (Bass Strait*); north Atlantic Ocean, Cape Horn and coast of Chile, east and west Pacific Ocean to Bering Sea, Mediterranean Sea.

Ecology: marine, planktonic; temperatures 12.7–23.8°C.

Reference: Neumann, G. (1935). Thaliacea. pp. 203–500 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2).

Soestia Kott, 1998

Iasis Lahille, F. (1890). *Recherches sur les tuniciers des côtes de France*. Toulouse : Lagarde et Sebillé 330 pp. [11] [junior homonym of *Iasis* Savigny, 1816].

Type species: *Holothurium zonarium* Pallas, 1774 by monotypy, see Metcalf, M.M. (1918). The Salpidae; a taxonomic study. *Bull. U.S. Natl Mus.* (2)100(2): 5–193 pls i–xiv.

Soestia Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [231] [*nom. nov.* for *Iasis* Lahille, 1890].

Extralimital distribution: Atlantic Ocean between 40°S and Iceland, Mediterranean Sea, tropical Indo-west Pacific Ocean, Japan and east Pacific Ocean between Straits of Magellan and 56°N. See: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls [132].

Soestia zonaria (Pallas, 1774)

Holothurium zonarium Pallas, P.S. (1774). In, *Spicelegia Zoologica. Pt 10*. Berolini : G.A. Lange Vol. 1 41 pp. [26].

Type data: type status unknown.

Type locality: near island of Antigua.

Compiled from secondary source: Deshayes, G.P. & Milne-Edwards, H. (1840). Tuniciers. pp. 473–541 in Lamarck, J.B.P.A. *Histoire naturelle des Animaux sans Vertèbres*. Paris : J.B. Ballière Vol. 3 2nd Edn 770 pp. [518].

Salpa polycratica Forskål, P. (1775). *Salpa*. pp. 112–117 in, *Descriptions Animalium ...; quae in itinere orientali observavit*. Hauniae : Heineck & Faber 164 pp. [116] [publication date established from Melville, R.V. (1969). *Salpa* Forskål, 1775 (Tunicata): Validated under the Plenary Powers with designation of a type species for *Thalia* Blumenbach, 1798. *Bull. Zool. Nomencl.* 26(3): 136–138]. Type data: type status unknown.

Type locality: Egypt, Mediterranean Sea.

Compiled from secondary source: Deshayes, G.P. & Milne-Edwards, H. (1840). Tuniciers. pp. 473–541 in Lamarck, J.B.P.A. *Histoire naturelle des Animaux sans Vertèbres*. Paris : J.B. Ballière Vol. 3 2nd Edn 770 pp.

Salpa cordiformis Blainville, H.M.D. de (1827). *Salpa*. *Bull. Zool. Nomencl.* **26**(3): 136–138 [120].

Type data: type status unknown.

Type locality: Straits of Gibraltar, Mediterranean Sea.

Salpa microstoma Quoy, J.R.C. & Gaimard, J.P. (1827). Observations zoologiques faites à bord de l'*Astrolabe* en mai 1826, dans le détroit de Gibraltar. *Ann. Sci. Nat.* **1**(10): 172–237 & c pls i, ii, viiiA [226].

Type data: type status unknown MNHP (not found).

Type locality: Straits of Gibraltar.

Salpa unicuspidata Blainville, H.M.D. de (1827). *Salpa*. *Bull. Zool. Nomencl.* **26**(3): 136–138 [116].

Type data: type status unknown.

Type locality: Straits of Gibraltar.

Salpa nitida Herdman, W.A. (1888). Report upon the Tunicata collected during the voyage of H.M.S. 'Challenger', during the years 1873–1876. *Zool. Chall. Exped.* **27**(76): 1–166 pls i–xi [81].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: north of Admiralty Is. [2°15'N 146°16'E].

Taxonomic decision for synonymy: Metcalf, M.M. (1918). The Salpidae; a taxonomic study. *Bull. U.S. Natl Mus.* (2)**100**(2): 5–193 pls i–xiv [100].

Distribution: Japan, Alaska, NSW (Central E coast, Lower E coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait); Atlantic Ocean between 40°S and Iceland, western and central Mediterranean Sea, Indian Ocean, west Pacific Ocean to Japan, and east Pacific from Straits of Magellan to Alaska.

Ecology: marine, planktonic; common in most temperate waters.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne: Council for Scientific and Industrial Research 196 pp. 75 pls.

***Thalia* Blumenbach, 1798**

Thalia Blumenbach, J.F. (1798). *Abbildungen naturhistorischer Gegenstände*. No. 30, pl. xxxi–*Thalia lingulata*. Göttingen. [30] [publication date established from Melville, R.V. (1969). *Salpa* Forskål, 1775 (Tunicata): Validated under the Plenary Powers with designation of a type species for *Thalia* Blumenbach, 1798. *Bull. Zool. Nomencl.* **26**(3): 136–138].

Type species: *Salpa democratica* Forskål, 1775 by subsequent designation, see Waal, J.P. (1966). *Salpa* Edwards, 1771 (Pisces): proposed suppression under the Plenary Powers in favour of *Salpa* Forskål, 1775 together with the designation of a type species for *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea): Z.N.(S.) 1651. *Bull. Zool. Nomencl.* **23**: 232 (under Plenary Powers, with all type designations for nominal genus *Thalia* Blumenbach made prior to 1969 ruling see above, being set aside).

Dubreuillia Lesson, R.P. (1832). Zoologie. pp. 256–279, 433–440 in Lesson, R.P. *Voyage autour du Monde sur la Corvette La Coquille pendant 1822–1825*. Paris: P. Pourret Freres Vol. 2(1) [433].

Type species: *Dubreuillia cirrhosa* Lesson, 1830 by monotypy.

Taxonomic decision for synonymy: Van Soest, R.W.M. (1973). The genus *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea) with descriptions of two new species. *Beaufortia* **20**: 193–212 [193].

Extralimital distribution: tropical and temperate Atlantic Ocean between 40°N and 40°S, west south Pacific Ocean, Red Sea, Mediterranean Sea. See: Van Soest, R.W.M. (1973). The genus *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea) with descriptions of two new species. *Beaufortia* **20**: 193–212.

***Thalia cicar* Van Soest, 1973**

Thalia cicar Van Soest, R.W.M. (1973). The genus *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea) with descriptions of two new species. *Beaufortia* **20**: 193–212 [202].

Type data: holotype ZMA TU1355, TU1356–7.

Type locality: north of Curaçao [12°40'30"–09°N 68°55'W–69°02'36"W].

Distribution: Japan, Indonesia, QLD (Great Barrier Reef); tropical west Atlantic Ocean, central south Atlantic Ocean, Arabian Sea and Gulf of Eilat.

Ecology: marine, planktonic.

***Thalia democratica* (Forskål, 1775)**

Salpa democratica Forskål, P. (1775). *Salpa*. pp. 112–117 in, *Descriptions Animalium ...; quae in itinere orientali observavit*. Hauniae: Heineck & Faber 164 pp. [113] [publication date established from Melville, R.V. (1969). *Salpa* Forskål, 1775 (Tunicata): Validated under the Plenary Powers with designation of a type species for *Thalia* Blumenbach, 1798. *Bull. Zool. Nomencl.* **26**(3): 136–138].

Type data: type status unknown (Cole, L. (1989). Catalog of tunicate type specimens in the United States National Museum collections. *Smithson. Contrib. Zool.* **487**: 1–12 lists types USNM 6473, USNM 6474 from Luzon (Philippines) which are not types and are probably collections of the US Bureau of Fisheries Albatross, see Metcalf, M.M. (1918). The Salpidae; a taxonomic study. *Bull. U.S. Natl Mus.* (2)**100**(2): 5–193 pls i–xiv).

Type locality: Mallorca, west Mediterranean Sea.

Compiled from secondary source: Van Soest, R.W.M. (1973). The genus *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea) with descriptions of two new species. *Beaufortia* **20**: 193–212 [197].

Salpa mucronata Forskål, P. (1775). *Salpa*. pp. 112–117 in, *Descriptions Animalium ...; quae in itinere orientali observavit*. Hauniae: Heineck & Faber 164 pp. [114] [publication date established from Melville, R.V. (1969). *Salpa* Forskål, 1775 (Tunicata): Validated under the Plenary Powers with designation of a type species for *Thalia* Blumenbach, 1798. *Bull. Zool. Nomencl.* **26**(3): 136–138].

Type data: type status unknown.

Type locality: Egypt, Mediterranean Sea.

Compiled from secondary source: Van Soest, R.W.M. (1973). The genus *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea) with descriptions of two new species. *Beaufortia* **20**: 193–212 [197].

Salpa spinosa Otto, A.W. (1823). Beschreibung einiger neuen Mollusken und Zoophyten. *Nova Acta Acad. Leop.-Caroe.* **11**(2): 273–314 [303].

Type data: type status unknown.

Type locality: Mediterranean Sea.

Compiled from secondary source: Van Soest, R.W.M. (1973). The genus *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea) with descriptions of two new species. *Beaufortia* **20**: 193–212 [197].

Dubreuillia cirrhosa Lesson, R.P. (1830). Zoologie. pp. 256–279, 433–440 in Lesson, R.P. *Voyage autour du Monde sur la Corvette La Coquille pendant 1822–1825*. Paris : P. Pourret Frères Vol. 2(1) [278].

Type data: type status and whereabouts unknown.

Type locality: unknown.

Salpa caboti Desor, P.J.E. (1848). *Salpa caboti* sp.n. exhibited and described. *Proc. Bost. Soc. Nat. Hist.* **3**: 75–76 [75].

Type data: type status and whereabouts unknown.

Type locality: Nantucket, Atlantic coast of North America.

Taxonomic decision for synonymy: Waal, J.P. (1966). *Salpa* Edwards, 1771 (Pisces): proposed suppression under the Plenary Powers in favour of *Salpa* Forskål, 1775 together with the designation of a type species for *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea): Z.N.(S.) 1651. *Bull. Zool. Nomencl.* **23**: 232; Van Soest, R.W.M. (1973). The genus *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea) with descriptions of two new species. *Beaufortia* **20**: 193–212 [197].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef, NE coast), TAS (Bass Strait), VIC (Bass Strait); in all tropical and temperate seas except Mediterranean Sea and West Indies.

Ecology: marine, planktonic; favours warmer waters 11.5–25.6°C, in upper 25 m layer.

Thalia longicauda (Quoy & Gaimard, 1824)

Salpa longicauda Quoy, J.R.C. & Gaimard, J.P. (1824). Zoologie pp. 497–516. in, *Le voyage autour du Monde, sur les corvettes de S.M. l' Uranie et la Physicienne 1817–1820*. Paris : Pilet Ainé. [509].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Port Jackson, NSW.

Salpa democratica flagellifera Traustedt, M.P.A. (1885). Spolia Atlantica I. Bidrag til Kundskab om Salperne. *Danske Vid. Selsk. Skrift.* **6**(2): 337–400 pls i, ii [369] [proposed with subspecific rank in *Salpa democratica* Forskål, 1775].

Type data: syntypes ZMUC 2 specimens.

Type locality: Benguela current, Atlantic Ocean.

Compiled from secondary source: Van Soest, R.W.M. (1973). The genus *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea) with descriptions of two new species. *Beaufortia* **20**: 193–212.

Taxonomic decision for synonymy: Godeaux, J. (1967). Une salpe peu connue, *Thalia longicauda* (Quoy & Gaimard, 1824). *Ann. Soc. R. Zool. Belg.* **97**(2): 91–102 [91].

Distribution: NSW (Central E coast); south Indian Ocean and south Atlantic Ocean, 15°S–55°S.

Ecology: marine, planktonic; water temperature 16°–21°C.

Reference: Van Soest, R.W.M. (1973). The genus *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea) with descriptions of two new species. *Beaufortia* **20**: 193–212 [205].

Thalia rhinoceros Van Soest, 1975

Thalia rhinoceros Van Soest, R.W.M. (1975). Observations on taxonomy and distribution of some salps (Tunicata, Thaliacea), with descriptions of three new species. *Beaufortia* **23**: 105–130 [123].

Type data: holotype BMNH 1930.4.3.27*, paratype(s) MSUMZ TU1370*.

Type locality: west Pacific between 21°N and 21°S and 124°E and 160°W, see Van Soest, R.W.M. (1975). Observations on taxonomy and distribution of some salps (Tunicata, Thaliacea), with descriptions of three new species. *Beaufortia* **23**: 105–130.

Distribution: QLD (Great Barrier Reef); other parts of west Pacific Ocean between 21°N and 21°S.

Ecology: marine, planktonic.

Thalia rhomboides (Quoy & Gaimard, 1824)

Salpa rhomboides Quoy, J.R.C. & Gaimard, J.P. (1824). Zoologie pp. 497–516. in, *Le voyage autour du Monde, sur les corvettes de S.M. l' Uranie et la Physicienne 1817–1820*. Paris : Pilet Ainé. [510].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: between Réunion and Australia (as New Holland).

Compiled from secondary source: Van Soest, R.W.M. (1973). The genus *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea) with descriptions of two new species. *Beaufortia* **20**: 193–212 [199].

Salpa pyramidalis Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [593].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Agulhas Banks, off Cape Espérance, South Africa.

Taxonomic decision for synonymy: Van Soest, R.W.M. (1973). The genus *Thalia* Blumenbach, 1798 (Tunicata, Thaliacea) with descriptions of two new species. *Beaufortia* **20**: 193–212 [199].

Distribution: Indonesia, QLD (Great Barrier Reef); Coral Sea, central Pacific Ocean and north and south West Indian Ocean.

Ecology: marine, planktonic.

Thetys Tilesius, 1802

Thetys Tilesius, W.G. von (1802). Abbildung und Beschreibung eines sonderbaren Seebeutels oder einer neuen *Thetys*—Species aus dem Atlantischen Ocean, *Thetys vagina*. *Jahrb. Naturg. Leipzig* **1**: 150–165 [150].

Type species: *Thetys vagina* Tilesius, 1802 by monotypy.

Extralimital distribution: east Atlantic Ocean between 30°S and English Channel, west Atlantic Ocean (Bay of Fundy & Bahamas), Mediterranean Sea, south and

west Indian Ocean, central south and east Pacific Ocean between California and the Bering Sea. See: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls [136].

Thetys vagina Tilesius, 1802

Thetys vagina Tilesius, W.G. von (1802). Abbildung und Beschreibung eines sonderbaren Seebeutels oder einer neuen *Thetys*—Species aus dem Atlantischen Ocean, *Thetys vagina*. *Jahrb. Naturg. Leipzig* **1**: 150–165 [156].

Type data: type status unknown.

Type locality: east Atlantic Ocean.

Salpa tilesii Cuvier, G. (1804). Mémoire sur les Thalides (*Thalia* Browne) et sur les Biphores (*Salpa* Forskål). *Ann. Mus. Hist. Nat. Paris* **4**: 360–382 pl. lxxviii [360].

Type data: type status unknown.

Type locality: unknown.

Salpa costata Quoy, J.R.C. & Gaimard, J.P. (1825). Observations sur les Biphores et les Béroës, faites pendant le voyage aultour du monde de la corvette *l'Uranie*, commandée par M. Louis de Freycinet. *Ann. Sci. Nat.* **16**: 28–51 [37].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Isles Bourbon, Indian Ocean.

Compiled from secondary source: Deshayes, G.P. & Milne-Edwards, H. (1840). Tuniciers. pp. 473–541 in Lamarck, J.B.P.A. *Histoire naturelle des Animaux sans Vertèbres*. Paris : J.B. Ballière Vol. 3 2nd Edn 770 pp. [521].

Salpa herculea Dall, W.H. (1872). Descriptions of sixty new forms of mollusks from the west coast of North America and the north Pacific Ocean. *Am. J. Conch.* **7**: 157–159 [157].

Type data: type status unknown.

Type locality: north Pacific Ocean.

Taxonomic decision for synonymy: Yount, J.L. (1954). The taxonomy of the Salpidae (Tunicata) of the Central Pacific Ocean. *Pac. Sci.* **8**: 276–330 [314].

Distribution: Japan, New Zealand, California, TAS (Tas. coast); east Atlantic Ocean between 30°S and the English Channel, west Atlantic Ocean east of Bahamas, the Bay of Fundy, west Mediterranean Sea, Indian Ocean, west Pacific Ocean from New Zealand to Japan, east Pacific Ocean from California to Bering Sea.

Ecology: marine, planktonic; tolerates colder waters than most salps.

Traustedtia Metcalf, 1918

Traustedtia Metcalf, M.M. (1918). The Salpidae; a taxonomic study. *Bull. U.S. Natl Mus.* (2)**100**(2): 5–193 pls i–xiv [143].

Type species: *Salpa multitentaculata* Quoy & Gaimard, 1834 by monotypy.

Extralimital distribution: warmer parts of all oceans between 40°N and 30°S. See: Van Soest, R.W.M. (1975). Observations on taxonomy and distribution of some salps (Tunicata, Thaliacea), with descriptions of three new species. *Beaufortia* **23**: 105–130 [107].

Traustedtia multitentaculata (Quoy & Gaimard, 1834)

Salpa multitentaculata Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [596].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: near New Ireland, east of New Guinea.

Salpa henseni Traustedt, M.P.A. (1893). Die Thaliacea der Plankton-Expedition. A. Systematische Bearbeitung. In, *Ergebn. Plankt.-Exped. Humboldt-Stiftung*. Vol. 2(E.a.A.): 1–16 pl. I. [9].

Type data: type status unknown ZMUC (depository uncertain, not found).

Type locality: off Rio de Janeiro, Atlantic Ocean.

Compiled from secondary source: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Salpa verrucosa Apstein, C. (1894). Die Thaliacea der Plankton-Expedition. B. Vertheilung der Salpen. *Ergebn. Plankt.-Exped. Humboldt-Stiftung* **2**(E.a.B.): 1–68 pls ii–iv [12].

Type data: type status unknown ZMB (depository uncertain, not found).

Type locality: warmer waters of the Atlantic Ocean.

Salpa radiata Metcalf, M.M. (1918). The Salpidae; a taxonomic study. *Bull. U.S. Natl Mus.* (2)**100**(2): 5–193 pls i–xiv [152].

Type data: type status unknown.

Type locality: unknown.

Taxonomic decision for synonymy: Van Soest, R.W.M. (1975). Observations on taxonomy and distribution of some salps (Tunicata, Thaliacea), with descriptions of three new species. *Beaufortia* **23**: 105–130 [108].

Distribution: NSW (Lower E coast), QLD (Central E coast); tropical Atlantic, Indian Ocean, west Pacific.

Ecology: marine, planktonic; favours warmer waters, down to 200 m, water temperature 14.8–23.1°C.

APPENDICULARIA

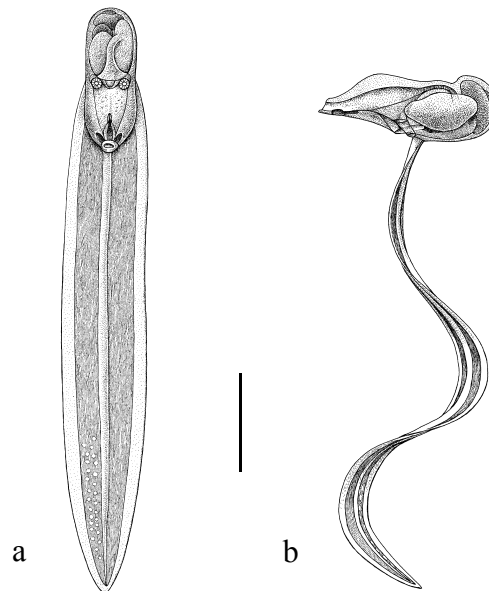


Fig. 26. *Oikopleura albicans* (Leuckart, 1854), a commonly occurring appendicularian species: **a**, dorsal view; **b**, lateral view. (Scale bar = 0.1 mm).

[after T. Prentiss, reproduced with permission, from Alldredge 1976]

Appendicularians are small free swimming planktonic tunicates, their bodies consisting of a short trunk and a tail (containing the notochord cells) which is present through the life of the individual. Glandular (oikoplast) epithelium on the trunk secretes the mucous house which encloses the whole or part of the body and contains the complex filters which strain food from the water driven through them (Deibel 1998; Flood & Deibel 1998). Unlike other tunicates, there is no peribranchial cavity and a pair of pharyngeal perforations (spiracles) surrounded by a ring of cilia open directly to the exterior from the floor of the pharynx.

The early studies of these organisms, begun with Chamisso's description of *Appendicularia flagellum* Chamisso, 1821, were confounded by questions of its phylogenetic affinity. Chamisso classified his species with medusoids, Mertens (1830) with molluscs, and Quoy & Gaimard (1833) with zoophytes. Only in 1851 were appendicularians correctly assigned to the Tunicata by Huxley. At the time of this placement, the existence of more than one taxon was only just beginning to be recognised, and despite Huxley's work, they were not universally regarded as adult organisms—some authors still insisting that they were ascidian larvae or a free swimming generation of the sessile ascidians (Fenaux 1993). Subsequently, these questions were resolved by the work of Fol (1872) on material from the Straits of Messina, which forms the basis of later studies on the large collections of the great expeditions of the 19th century that revealed their true diversity in the oceanic plankton.

Appendiculariadae Brown, 1862 (at family level) and Appendicularia (as a tribe) were the first collective names given to this group of organisms. Fol (1872) applied the family name Appendiculaires to the group. Appendicularia predates Copelata Haeckel, 1866, Larvacea Herdman, 1882 and other names at ordinal or class level (see Fenaux 1993). It is, accordingly, the name given to the class in the present work.

APPENDICULARIA

Lohmann (1892–1931) and Lohmann & Bückmann (1926) made important contributions to the study of the group, as did Aida (1907–1908) and Tokioka (1940 *et seq.*) in Japanese waters, and Ritter (1905) and Essenberg (1926) off California. Fenaux *et al.* (1990) published a bibliography and Fenaux (1993) completely revised the group and reviewed its history. The taxonomy and biology are reviewed in Bone (1998).

The classification within the class is generally that originally proposed by Lohmann (1896a) and followed, with minor modifications, by later workers. The families are Oikopleuridae Lohmann, 1896a, Fritillariidae Seeliger, 1895 and Kowalevskiidae Lahille, 1888. They are distinguished from one another by characteristics of body shape, endostyle, pharyngeal perforations, stomach wall, oikoplast epithelium and tail.

In Australia, the appendicularians of the eastern coast collected by the CSIRO research vessel FRV *Warreen* between the Tropic of Capricorn and South Australia were studied and recorded by Thompson (1945). A few species were recorded from Shark Bay and off Fremantle by Lohmann (1909), but there is no systematic study on this group in western Australian waters or in the tropical or the southern coastal waters of the Australian continent. So far, no indigenous species are known.

As with the thaliaceans, the geographic ranges of most species are great, being defined by the course of the relevant ocean currents rather than by geographic regions. Tokioka (1960) reviewed the geographic distribution of species in the class.

The search for the location of type specimens of the class has been unsuccessful. In particular, the collections of the Humboldt Plankton Expedition (Lohmann) and the Deutsch Tiefsee Expedition (Lohmann 1892–1931) have not been found. At this stage, no relevant larvacean type specimens have been located in the Natural History Museum (London), U.S. National Museum of Natural History (Washington, D.C.), the American Museum of Natural History (New York), the Muséum d'Histoire Naturelle, (Geneva), the Natural History Museum (Vienna), the Muséum National d'Histoire Naturelle (Paris), the Naturhistoriske Riksmuseum (Stockholm), Museum für Naturkunde (Berlin) or the Japanese collections. Hopefully, the publication of this section of the *Catalogue* will advertise the need for information on the location of the type specimens in this taxon of the Tunicata, although it is probable that many were lost during World War II (Fenaux 1993).

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FRITILLARIIDAE

The members of the family Fritillariidae Seeliger, 1895 (as amended by Lohmann, 1915) have dorsoventrally compressed or spindle-shaped trunks. The endostyle is curved upwards. The pharyngeal perforations (spiracles) are in the anterior part of the pharynx and each (with its ring of cilia) opens directly to the exterior, rather than through a tubular passage. The stomach wall consists of few large cells. The oikoplast epithelium lacks a row of conspicuous oikoplast cells (Fol's fibroblasts) dorsally, and ventrally is a small anterior area only.

The family is represented in Australian waters by seven species of *Fritillaria* and one of *Tectillaria*. It has been reviewed by Lohmann (1933) and Fenaux (1993) and its occurrence in Australian waters is documented by Thompson (1945).

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Fritillaria Fol, 1872

Fritillaria Fol, H. (1872). Etudes sur les Appendiculaires du détroit de Messine. *Mém. Soc. Phys. Hist. Nat. Genève* **21**(2): 445–499 pls i–xi [473].

Type species: *Euryercus pellucidus* Busch, 1851 by original designation.

Extralimital distribution: worldwide. See: Lohmann, H. (1933). Appendicularia. pp. 3–192 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2); Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls [191].

Fritillaria borealis Lohmann, 1896

Taxonomic decision for subspecific arrangement: Lohmann, H. (1905). Die Appendicularien des arktischen und antarctischen Gebiets, ihr Beziehungen zueinander und zu den arten des Gebietes der warmen Ströme. *Zool. Jahrb. (Suppl.)* **8**: 353–382 [361]; Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **8**(2): 351–443.

Distribution: NSW (Central E coast, Lower E coast), QLD (Great Barrier Reef), VIC (Bass Strait).

***Fritillaria borealis allongata* Lohmann, 1899**

Fritillaria borealis allongata Lohmann, H. (1899). Untersuchungen über den Auftrieb des Strasse von Messina mit besonderer Berücksichtigung der Appendicularien und Challengerien. *Sber. K. Preuss. Akad. Wiss. Berl. Math. Naturwiss.* **20**(587): 384–400 [386] [as *Fritillaria borealis* var. *allongata*].

Type data: type status and whereabouts unknown.

Type locality: Straits of Messina.

Fritillaria borealis intermedia Lohmann, H. (1905). Die Appendicularien des arktischen und antarktischen Gebiets, ihr Beziehungen zueinander und zu den arten des Gebietes der warmen Ströme. *Zool. Jahrb. (Suppl.)* **8**: 353–382 [361].

Type data: type status and whereabouts unknown.

Type locality: North Sea.

Fritillaria tenebra Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [419].

Type data: type status and whereabouts unknown.

Type locality: San Diego region, winter months, surface, 14.5°C.

Fritillaria pulchrituda Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [437].

Type data: type status and whereabouts unknown.

Type locality: San Diego region, surface, 14.23°C.

Fritillaria artus Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [447].

Type data: type status and whereabouts unknown.

Type locality: San Diego.

Fritillaria juncea Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [452].

Type data: type status and whereabouts unknown.

Type locality: San Diego, surface, 13.76°C.

Fritillaria nitida Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [458].

Type data: type status and whereabouts unknown.

Type locality: San Diego, surface, 13.6°C.

Fritillaria gigas Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [464].

Type data: type status and whereabouts unknown.

Type locality: San Diego 13.2–13.8°C.

Fritillaria brevicollis Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [477].

Type data: type status and whereabouts unknown.

Type locality: San Diego, surface, 15.0–15.6°C.

Fritillaria claudaria Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [478].

Type data: type status and whereabouts unknown.

Type locality: San Diego, surface, 13.4°C.

Fritillaria borealis mediterranea Vernieres, P. (1933). Essai sur l'histoire naturelle des Appendiculaires de Banyuls et de Sète. *Bull. Inst. Océanogr. Monaco* **30**(617): 1–60 [41] [as

Fritillaria borealis acuta formae *mediterranea*].

Type data: type status and whereabouts unknown.

Type locality: Banyuls-sur-Mer.

Taxonomic decision for synonymy: Tokioka, T. (1940). Some additional notes on the Japanese appendicularian fauna. *Rec. Oceanogr. Works, Japan* **11**(1): 1–26 [15]; Tokioka, T. & Caabro, J.A.S. (1956). Appendicularias de los mares cubanos. *Mem. Soc. Cuba. Hist. Nat. 'Felipe Poey'* **23**(1): 37–95 [71]; Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **8**(2): 351–443 [360–362]; Fenaux, R. (1993). The classification of the Appendicularia (Tunicata): History and current state. *Mém. Inst. Océanogr. Monaco*. **17**: i–vii, 1–123 [62] (as *Fritillaria borealis intermedia*).

Distribution: QLD (Great Barrier Reef); North Sea, Baltic Sea, Mediterranean Sea.

Ecology: marine, planktonic; warm and mixed waters.

***Fritillaria borealis sargassi* Lohmann, 1896**

Fritillaria sargassi Lohmann, H. (1896). Die Appendicularien der Plankton-Expedition. *Ergebn. Plankt.-Exped.* **2**(E.C.): 1–148 pls i–xxiv [51].

Type data: type status and whereabouts unknown.

Type locality: equatorial stream to Cape Verde.

Fritillaria ritteri Aida, T. (1907). Appendicularia of Japanese waters. *J. Coll. Sci. Imp. Univ. Tokyo* **23**(5): 1–25 pls i–iv [4].

Type data: type status and whereabouts unknown.

Type locality: near western coast of Kinshu, Japan.

Fritillaria trigonis Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [432].

Type data: type status and whereabouts unknown.

Type locality: San Diego, surface, 13.7°C.

Fritillaria angularis Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [437].

Type data: type status unknown.

Type locality: San Diego, surface, 14.9°C.

Fritillaria diafana Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [440].

Type data: type status and whereabouts unknown.

Type locality: San Diego region, surface, 13.4–14.5°C.

Fritillaria plana Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [453].

Type data: type status and whereabouts unknown.

Type locality: San Diego, surface, 12–15.6°C.

Fritillaria clava Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [459].

Type data: type status and whereabouts unknown.

Type locality: San Diego, surface, 14.5°C.

Fritillaria velocita Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [467].

Type data: type status and whereabouts unknown.

Type locality: San Diego, surface, 14.4°C.

Fritillaria borealis crassa Vernieres, P. (1933). Essai sur l'histoire naturelle des Appendiculaires de Banyuls et de Sète. *Bull. Inst. Océanogr. Monaco* **30**(617): 1–60 [41] [as *Fritillaria borealis truncata crassa*].

Type data: type status and whereabouts unknown.

Type locality: Banyuls-sur-Mer.

Taxonomic decision for synonymy: Tokioka, T. (1940). Some additional notes on the Japanese appendicularian fauna. *Rec. Oceanogr. Works, Japan* **11**(1): 1–26 [15, 16]; Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **8**(2): 351–443 [361–363].

Distribution: NSW (Central E coast, Lower E coast), VIC (Bass Strait); Atlantic Ocean, Pacific Ocean and Indian Ocean.

Ecology: marine, planktonic; warm waters.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls [61].

Fritillaria formica Fol, 1872

Fritillaria formica Fol, H. (1872). Etudes sur les Appendiculaires du détroit de Messine. *Mém. Soc. Phys. Hist. Nat. Genève* **21**(2): 445–499 pls i–xi [479].

Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Distribution: NSW (Central E coast), QLD (Central E coast); equatorial regions in north and south Atlantic Equatorial Streams, west Pacific Ocean.

Ecology: marine, planktonic; not deeper than 200 m, water temperature 24.1–26.5°C, salinity 34.8–36.8 parts per thousand.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Fritillaria fraudax Lohmann, 1896

Fritillaria fraudax Lohmann, H. (1896). Die Appendicularien der Plankton-Expedition. *Ergebn. Plankt.-Exped.* **2**(E.C.): 1–148 pls i–xxiv [35].

Type data: syntypes (probable) ZMH* (depository uncertain).

Type locality: Sargasso Sea, Atlantic Ocean.

Distribution: NSW (Central E coast), QLD (Central E coast); north Atlantic Stream circuit, Sargasso Sea, and Guinea, S Equatorial and Benguela Streams.

Ecology: marine, planktonic; to 200 m and more, water temperature 21–27°C, salinity 36.2–37.4 parts per thousand.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Fritillaria haplostoma Fol, 1872

Fritillaria haplostoma Fol, H. (1872). Etudes sur les Appendiculaires du détroit de Messine. *Mém. Soc. Phys. Hist. Nat. Genève* **21**(2): 445–499 pls i–xi [478].

Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Fritillaria abjornseni Lohmann, H. (1909). Copelata und Thaliacea. pp. 143–149 in Michaelsen, W. & Hartmeyer, R. (eds) *Die Fauna Südwest-Australiens*. 2(10) Jena : Fischer [147].

Type data: holotype ZMB* (depository uncertain).

Type locality: Swan River, North Fremantle, WA.

Fritillaria lohmanni Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [424].

Type data: type status and whereabouts unknown.

Type locality: San Diego region, 13.68–14.82°C.

Fritillaria amygdala Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [426].

Type data: type status and whereabouts unknown.

Type locality: San Diego region, 14.98–15.15°C.

Fritillaria campila Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [445].

Type data: type status and whereabouts unknown.

Type locality: San Diego region, 13–17.3°C.

Fritillaria tacita Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [465].

Type data: type status and whereabouts unknown.

Type locality: San Diego region, 14.75°C.

Fritillaria tereta Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [473].

Type data: type status unknown.

Type locality: San Diego region, 14.7°C.

Taxonomic decision for synonymy: Tokioka, T. (1956). *Fritillaria arafuera* n.sp. a form of the sibling species: *Fritillaria haplostoma*-complex (Appendicularia: Chordata). *Pac. Sci.* **10**(4): 403–406 [405].

Distribution: Japan, California, NSW (Central E coast, Lower E coast), QLD (Central E coast), TAS (Tas. coast); Mediterranean Sea, Atlantic Ocean, South Equatorial Stream, south California, rare in west Pacific Ocean.

Ecology: marine, planktonic; water temperature 23.3–29.5°C, salinity 34.8–37 parts per thousand.

References: Fol, H. (1874). Note sur un nouveau genre d'Appendiculaires. *Arch. Zool. Exp. Gén.* **3**(Notes et revue): XLIX–LIII, pl. 18 (figs 1–5); Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Fritillaria megachile Fol, 1872

Fritillaria megachile Fol, H. (1872). Etudes sur les Appendiculaires du détroit de Messine. *Mém. Soc. Phys. Hist. Nat. Genève* **21**(2): 445–499 pls i–xi [477].

Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Fritillaria dispar Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [472].

Type data: type status and whereabouts unknown.

Type locality: San Diego region.

Fritillaria macrotrachela Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [438].

Type data: type status and whereabouts unknown.

Type locality: San Diego region, surface, 14.2°C.

Taxonomic decision for synonymy: Tokioka, T. (1940). Some additional notes on the Japanese appendicularian fauna. *Rec. Oceanogr. Works, Japan* **11**(1): 1–26 [16]; Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **8**(2): 351–443 [361].

Distribution: NSW (Central E coast); Mediterranean Sea, Atlantic Ocean, South Equatorial Stream, tropical west Pacific Ocean.

Ecology: marine, planktonic; warm water, surface temperature 22.1–23.3°C.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Fritillaria pellucida (Busch, 1851)

Eurycercus pellucidus Busch, W. (1851). *Beobachtungen über Anatomie und Entwicklung einiger wirbellosen Seethiere*. Berlin pp. 118–120 pls i–xvi. [118].

Type data: holotype (probable) ZMB* (depository uncertain).

Type locality: Gibraltar.

Distribution: NSW (Lower E coast); also in warm waters of all oceans.

Ecology: marine, planktonic; not deeper than 200 m, water temperature 15.3–27.2°C, salinity 34.8–37.4 parts per thousand.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Fritillaria venusta Lohmann, 1896

Fritillaria venusta Lohmann, H. (1896). Die Appendicularien der Plankton-Expedition. *Ergebn. Plankt.-Exped.* **2**(E.C.): 1–148 pls i–xxiv [46].

Type data: type status and whereabouts unknown.

Type locality: Cape Verde, equatorial and Guinea currents.

Fritillaria bicornis Lohmann, H. (1896). Die Appendicularien der Plankton-Expedition. *Ergebn. Plankt.-Exped.* **2**(E.C.): 1–148 pls i–xxiv [47].

Type data: type status and whereabouts unknown.

Type locality: equatorial regions, north and south Atlantic streams.

Fritillaria inverta Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [423].

Type data: type status and whereabouts unknown.

Type locality: San Diego, 0–200 m, surface temperature, 20.2°C.

Taxonomic decision for synonymy: Tokioka, T. (1951). Pelagic tunicates and chaetognaths collected during the cruises to the new Yamoto Bank in the Sea of Japan. *Publ. Seto Mar. Biol. Lab.* **2**(1): 1–25 [14].

Distribution: NSW (Central E coast), QLD (Central E coast); rare, also equatorial regions in north and south Atlantic Streams, tropical west Pacific Ocean and Mediterranean Sea.

Ecology: marine, planktonic; not deeper than 200 m, temperature 24.10–26.5°C, salinity 34.8–36.8 parts per thousand.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Tectillaria Lohmann & Bückmann, 1926

Tectillaria Lohmann, H. & Bückmann, A. (1926). Die Appendicularien der Deutschen Südpolar-Expedition 1901 bis 1903. *Ergebn. Deutsch. Südp.-Exped.* **18**(Zool. 10): 63–231 [159].

Type species: *Fritillaria fertilis* Lohmann, 1896 by monotypy.

Extralimital distribution: warm oceanic waters of the tropical Atlantic Ocean, Pacific Ocean and Indian Ocean. See: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Tectillaria fertilis (Lohmann, 1896)

Fritillaria fertilis Lohmann, H. (1896). Die Appendicularien der Expedition. *Zool. Ergebn. Ges. Erdk. Berlin Gronland-Exped. Bi* **20**(2): 25–44 [29].

Type data: syntypes (probable) ZMH* (depository uncertain).

Type locality: north and south Atlantic equatorial currents.

Distribution: NSW (Central E coast); the Atlantic Ocean, Florida Stream, E Sargasso Sea, North Equatorial Stream, west Pacific Ocean and Indian Ocean.

Ecology: marine, planktonic; not deeper than 200 m, water temperature 24.5–26.6°C, salinity 35.6–37.0 parts per thousand.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

KOWALEVSKIIDAE

The family Kowalevskiidae Lahille, 1888 is characterised by a short trunk, and lacks both endostyle and heart. The ciliated ring around the internal opening of each spiracle is compressed into a long narrow slit with upper and lower rims. The stomach wall consists of few, large, conspicuous cells; a spectacular, large, button-shaped cell is on the upper part of the oikoplast epithelium. The outline of the tail is fusiform or spindle-shaped.

One of the two known species is recorded from Australia—being taken only once off southeastern Queensland and once off central New South Wales (Thompson 1945).

References

Lahille, F. (1888). Etude systématique des tuniciers. *Compt. Rend. Ass. Fr. Avanc. Sci.* **1887**(2): 667–677

Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls

Kowalevskia Fol, 1872

Kowalevskia Fol, H. (1872). Etudes sur les Appendiculaires du détroit de Messine. *Mém. Soc. Phys. Hist. Nat. Genève* **21**(2): 445–499 pls i–xi [481].

Type species: *Kowalevskia tenuis* Fol, 1872 by monotypy.

Extralimital distribution: north east Atlantic Ocean, Mediterranean Sea, west and east Pacific Ocean. See: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Kowalevskia tenuis Fol, 1872

Kowalevskia tenuis Fol, H. (1872). Etudes sur les Appendiculaires du détroit de Messine. *Mém. Soc. Phys. Hist. Nat. Genève* **21**(2): 445–499 pls i–xi [481].

Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Distribution: Portugal, Japan, California, NSW (Central E coast), QLD (Central E coast); warm waters from Portugal to equator, Mediterranean Sea, Benguela stream, south California.

Ecology: marine, planktonic; in surface waters, temperature 13–14°C.

References: Fol, H. (1874). Note sur un nouveau genre d'Appendiculaires. *Arch. Zool. Exp. Gén.* **3**(Notes et revue): XLIX–LIII, pl. 18 (figs 1–5); Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

OIKOPLEURIDAE

Oikopleuridae have ovoid bodies, straight endostyles, and the spiracles have tubular passages from the internal pharyngeal openings to the external ones in the vicinity of the rectum. Stomach walls have numerous small cells and a row of only a few large cells. A row of large (Fol's) fibroblasts is on both parts of the antero-dorsal oikoplast epithelium.

Appendicularia flagellum Chamisso, 1821, the first recorded organism of the class, although barely recognisable at family level, has a species description and accompanying figures that make the general affinity of the organism clear enough (see Fenaux 1993). Mertens (1830) believed that he had the same species from the Bering Strait but renamed it *Oikopleura chamissonis*. Fenaux (1993) believes that either *Oikopleura labradoriensis* Lohmann, 1892 or *Oikopleura vanhoeffeni* Lohmann, 1896 could be conspecific with either *Appendicularia flagellum* or *Oikopleura chamissonis* Mertens, 1830, type species of the genus *Oikopleura* Mertens, 1830, or with both. Whichever species are found to be synonyms, the genus name *Appendicularia* Chamisso has priority over *Oikopleura* Mertens and this is emphasised in discussions on a case put to the International Commission on Zoological Nomenclature (Case 23, 1922). At the time the decision was to table the question until more information was presented. However, the much used names *Oikopleura* and Oikopleuridae are used here pending an application to the Commission for Zoological Nomenclature to validate them. Further, the description of a neotype from (Bering Strait) is required to establish the identity of *O. chamissonis*, as the type specimen is not available.

The family is the most diverse in the class. It is represented in Australian waters by nine species of *Oikopleura* Mertens, 1830, and one each of *Megalocercus* Chun, 1887, *Stegosoma* Chun, 1887, *Althoffia* Lohmann, 1892 (all in the subfamily Oikopleurinae); and one of *Bathochordaeus* Chun, 1900 (in the subfamily Bathochordaeinae; Fenaux & Youngbluth 1990). The commonly occurring species are *Oikopleura rufescens* Fol, 1872, *Oikopleura dioica* Fol, 1872 and *Oikopleura longicauda* (Vogt, 1854). The family has been reviewed by Lohmann (1933) and Fenaux (1993), and Thompson (1945) has documented its occurrence in eastern Australian waters.

References

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- Lohmann, H. (1892). Vorberichte über die Appendicularien der Plankton-Expedition. *Ergebn. Plankt.-Exped.* **1**(A): 139–149
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- Lohmann, H. (1933). Appendicularia. pp. 3–192 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2)
- Mertens, C.H. (1830). Beschreibung der *Oikopleura*, einer neuen Mollusken-Gattung. *Mém. Acad. Imp. Sci. St Pétersburg* **6**(1)**2**: 205–220 2 pls
- Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls
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BATHOCHORDAEINAE

Bathochordaeus Chun, 1900

Bathochordaeus Chun, C. (1900). pp. 136, 149, 210, 289, 518, 519 in, *Aus den Tiefen des Weltmeeres. Schilderungen von der deutschen Tiefsee-Expedition*. Jena : Gustav Fischer 550 pp. 390 figs 46 pls [519].

Type species: *Bathochordaeus charon* Chun, 1900 by monotypy.

Extralimital distribution: southwest Atlantic Ocean, South-Equatorial Stream. See: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls; Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 8(2): 351–443.

Bathochordaeus charon Chun, 1900

Bathochordaeus charon Chun, C. (1900). pp. 136, 149, 210, 289, 518, 519 in, *Aus den Tiefen des Weltmeeres. Schilderungen von der deutschen Tiefsee-Expedition*. Jena : Gustav Fischer 550 pp. 390 figs 46 pls [519].

Type data: syntypes (probable) ZMB* (depository uncertain).

Type locality: Benguela Stream, southwest Atlantic Ocean.

Distribution: NSW (SE coastal); SW Atlantic Ocean. Ecology: marine, planktonic; rare, in vertical hauls from 2000 m and 200 m.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

OIKOPLEURINAE

Althoffia Lohmann, 1892

Althoffia Lohmann, H. (1892). Vorberichte über die Appendicularien der Plankton-Expedition. *Ergebn. Plankt.-Exped.* **1**(A): 139–149 [146].

Type species: *Althoffia tumida* Lohmann, 1892 by monotypy.

Extralimital distribution: Atlantic Ocean, Pacific Ocean and Indian Ocean. See: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne: Council for Scientific and Industrial Research 196 pp. 75 pls; Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **8**(2): 351–443.

Althoffia tumida Lohmann, 1892

Althoffia tumida Lohmann, H. (1892). Vorberichte über die Appendicularien der Plankton-Expedition. *Ergebn. Plankt.-Exped.* **1**(A): 139–149 [147].

Type data: type status and whereabouts unknown.

Type locality: Sargasso Sea, Atlantic Ocean.

Distribution: NSW (Central E coast), QLD (Central E coast); Sargasso Sea, Florida Stream, South Equatorial Stream and in Indian Ocean and Pacific Ocean.

Ecology: marine, planktonic; not taken at surface or deeper than 20 m, present where surface temperature between 15.8–27°C and salinity 35.5–37.4 parts per thousand.

References: Lohmann, H. (1896). Die Appendicularien der Plankton-Expedition. *Ergebn. Plankt.-Exped.* **2**(E.C.): 1–148 pls i–xxiv; Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne: Council for Scientific and Industrial Research 196 pp. 75 pls.

Megalocercus Chun, 1887

Megalocercus Chun, C. (1887). Die pelagische Thierwelt in grösseren Meerestiefen und ihre Beziehungen zu der Oberflächenfauna. *Bibl. Zool., Stuttgart* **1**(1): 1–66 pls i–v [40]. Type species: *Megalocercus abyssorum* Chun, 1887 by monotypy.

Extralimital distribution: Indian Ocean, west Pacific Ocean, Atlantic Ocean, Mediterranean Sea. See: Lohmann, H. (1933). Appendicularia. pp. 3–192 in Küenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2); Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **8**(2): 351–443.

Megalocercus huxleyi (Ritter, 1905)

Oikopleura huxleyi Ritter, W.E. In, Ritter, W.E. & Byxbee, E.S. (1905). The pelagic Tunicata. Rep. Sci. Res. Expl. Trop. Pac. St. 'Albatross' VIII. *Mus. Comp. Zool., Harvard Coll.*

26(8): 195–214 pls i–ii [206].

Type data: type status and whereabouts unknown.

Type locality: north of New Guinea [2°38'N 137°22'E].

Oikopleura megastoma Aida, T. (1907). Appendicularia of Japanese waters. *J. Coll. Sci. Imp. Univ. Tokyo* **23**(5): 1–25 pls i–iv [11].

Type data: type status and whereabouts unknown.

Type locality: Japan.

Taxonomic decision for synonymy: Ihle, J.E.W. (1908). *Oikopleura megastoma* Aida, identisch mit *Megalocercus huxleyi* (Ritter). *Zool. Anz.* **32**: 775–776 [775].

Distribution: Japan, NSW (Central E coast, Lower E coast), QLD (Central E coast), VIC (Bass Strait*); Indian Ocean, Indo-west Pacific Ocean.

Ecology: marine, planktonic; warm water up to 29.3°C.

Oikopleura Mertens, 1830

Oikopleura Mertens, C.H. (1830). Beschreibung der *Oikopleura*, einer neuen Mollusken-Gattung. *Mém. Acad. Imp. Sci. St Pétersburg* **6**(1)2: 205–220 2 pls [205].

Type species: *Oikopleura chamissonis* Mertens, 1830 (= ?*Oikopleura labradoriensis* Lohmann, 1896, or ?*Oikopleura vanhoeffeni* Lohmann, 1896, see Fenaux, R. (1993). The classification of the Appendicularia (Tunicata): History and current state. *Mém. Inst. Océanogr. Monaco*. **17**: i–vii, 1–123) by original designation.

Vexillaria Mueller, J. (1846). Bericht über einige neue Theiformen der Nordsee. *Müllers Arch. Anat. Phys. Wiss. Med.* **1846**: 106 [106].

Type species: *Vexillaria flabellum* Mueller, 1846 by monotypy.

Oikomikron Swainson, G. (1890). Appendicularia, with its 'haus'. *Int. J. Microsc. Nat. Sci.* (3)4: 10–19 [18].

Type species: *Oikomikron mitratetum* Swainson, 1890 by monotypy.

Haplopleura Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publ.* **133**: 1–354 [309].

Type species: *Appendicularia longicauda* Vogt, 1854 by monotypy.

Taxonomic decision for synonymy: Fenaux, R. (1993). The classification of the Appendicularia (Tunicata): History and current state. *Mém. Inst. Océanogr. Monaco*. **17**: i–vii, 1–123 [58].

Extralimital distribution: worldwide. See: Lohmann, H. (1933). Appendicularia. pp. 3–192 in Küenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2); Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **8**(2): 351–443.

Oikopleura albicans (Leuckart, 1854)

Appendicularia albicans Leuckart, (1854). Zur Anatomie und Entwicklungsgeschichte der tunicaten Beschreibung einer Schwaermencker Ascidienlarve (*Appendicularia albicans*). *Zool. Unters Gressen* 2: 77–93 [81].

Type data: type status unknown.

Type locality: Mediterranean Sea.

Distribution: Japan, California, NSW (Lower E coast); Indian Ocean, Atlantic Ocean, Mediterranean, Californian coast.

Ecology: marine, planktonic; water temperatures to 27.2°C, a warm water species usually found with *Oikopleura longicaudata* (Vogt, 1854) and *O. rufescens* Fol, 1872, but less numerous.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Oikopleura cophocerca Gegenbaur, 1855

Oikopleura (Vexillaria) cophocerca Gegenbaur, C. (1855). Bemerkungen über die organisation der appendicularian. *Zeit. Wiss. Zool.* 6(4): 406–427 [408].

Type data: type status unknown.

Type locality: Messina, Mediterranean Sea.

Distribution: Japan, Indonesia, NSW (Central E coast, Lower E coast), QLD (Central E coast), VIC (Bass Strait), WA (Central W coast); warmer sections of Indian and Atlantic Oceans (including West Indies), and western and eastern Pacific Ocean, including Indonesia and Japan.

Ecology: marine, planktonic; warm water species, not taken at depths greater than 200 m in waters 13–28°C and salinity to 34.4‰.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Oikopleura cornutogastra Aida, 1907

Oikopleura cornutogastra Aida, T. (1907). Appendicularia of Japanese waters. *J. Coll. Sci. Imp. Univ. Tokyo* 23(5): 1–25 pls i–iv [15].

Type data: type status and whereabouts unknown.

Type locality: off Japan.

Distribution: NSW (Lower E coast); off Agulhas, Benguela and South Equatorial Streams.

Ecology: marine, planktonic; water temperature 19°C or higher.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Oikopleura dioica Fol, 1872

Vexillaria flabellum Mueller, J. (1846). Bericht über einige neue Theiformen der Nordsee. *Müllers Arch. Anat. Phys. Wiss. Med.* 1846: 106 [106] [this is a little used name, and for stability in nomenclature, *Oikopleura dioica* Fol, 1872 is maintained here as the valid name, pending an application to

the International Commission on Zoological Nomenclature]. Type data: type status and whereabouts unknown.

Type locality: North Sea.

Oikopleura dioica Fol, H. (1872). Etudes sur les Appendiculaires du détroit de Messine. *Mém. Soc. Phys. Hist. Nat. Genève* 21(2): 445–499 pls i–xi [472] [for stability in nomenclature this name is maintained here as the valid name, pending an application to the International Commission on Zoological Nomenclature to have it conserved].

Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Vexillaria speciosa Eisen, A.G. (1874). *Vexillaria speciosa* n. sp. ett bidrag till Appendiculariornas Anatomi. *K. Sven. Vetensk.-Akad. Handl. (ser. 4)* 12(9): 1–15 pls i–iii [1].

Type data: type status and whereabouts unknown.

Type locality: Fiskelbäckskil, Gullmarfjorden, Sweden.

Oikopleura malmii Hartmann, R. (1878). Einige Mittheilungen über Appendicularien. *Sitzungs-Ber. Ges. naturforsch. Freunde Ber.* 1878: 97–100 [100].

Type data: type status and whereabouts unknown.

Type locality: Kattegat.

Oikomicron mitratetum Swainson, G. (1890). Appendicularia, with its 'haus'. *Int. J. Microsc. Nat. Sci.* (3)4: 10–19 [18].

Type data: type status and whereabouts unknown.

Type locality: Irish Sea.

Taxonomic decision for synonymy: Lohmann, H. (1895). Ueber die Verbreitung der Appendicularien im Atlantischen Ozeane. *Verh. Ges. Dtsch. Naturforsch. Aerzte* 67(2, 1): 113–120 [116]; Lohmann, H. (1896). Die Appendicularien der Plankton-Expedition. *Ergebn. Plankt.-Exped.* 2(E.C.): 1–148 pls i–xxiv [76].

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait*, Tas. coast*), VIC (Bass Strait*), WA (Central W coast, Lower W coast); Tas. coast, VIC; also in warmer parts of all oceans 3.2–29.5°C, rare in open sea.

Ecology: marine, planktonic; never deeper than 200 m, water temperature 3.2–29.5°C, salinity 11.4–36.7 parts per thousand.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

Oikopleura fusiformis Fol, 1872

Oikopleura fusiformis Fol, H. (1872). Etudes sur les Appendiculaires du détroit de Messine. *Mém. Soc. Phys. Hist. Nat. Genève* 21(2): 445–499 pls i–xi [473].

Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Distribution: Japan, NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef), VIC (Bass Strait*), WA (Central W coast); Great Barrier Reef, central E coast, lower E coast, QLD, NSW, VIC, ; also Indian Ocean, Indo-Pacific Ocean.

Ecology: marine, planktonic; warm water to 29.3°C.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

***Oikopleura intermedia* Lohmann, 1896**

Oikopleura intermedia Lohmann, H. (1896). Die Appendicularien der Plankton-Expedition. *Ergebn. Plankt.-Exped.* 2(E.C.): 1–148 pls i–xxiv [62].

Type data: syntypes (probable) ZMB* (depository uncertain).

Type locality: ?Atlantic Ocean.

Oikopleura microstoma Aida, T. (1907). Appendicularia of Japanese waters. *J. Coll. Sci. Imp. Univ. Tokyo* 23(5): 1–25 pls i–iv [14].

Type data: type status and whereabouts unknown.

Type locality: Japan.

Oikopleura tortugensis Kellner, K. (1908). On *Oikopleura tortugensis*, a new appendicularian from the Tortugas, Florida, with notes on its embryology. pp. 89–94 in Brooks, W.K. The pelagic Tunicata of the Gulf Stream. *Publ. Carnegie Inst. (Washington)* 102: 89–94 [90].

Type data: type status and whereabouts unknown.

Type locality: Tortugas, Florida, USA.

Taxonomic decision for synonymy: Lohmann, H. (1913). Die Appendicularien (Ausbeute von Küenthal und Hartmeyer in Westindien). *Zool. Jahrb. Suppl.* 11(3): 343–350 [343]; Tokioka, T. (1940). Some additional notes on the Japanese appendicularian fauna. *Rec. Oceanogr. Works, Japan* 11(1): 1–26 [3].

Distribution: Japan, NSW (Lower E coast), VIC (Bass Strait*); to 35°11'S in Benguela Stream, Atlantic Ocean.

Ecology: marine, planktonic; water temperature to 27°C, salinity to 37.3 parts per thousand.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

***Oikopleura longicauda* (Vogt, 1854)**

Appendicularia longicauda Vogt, C. (1854). Recherches sur les animaux inférieurs de la Méditerranée. *Sci. Mém. sur les Tuniciers nageants de la mer de Nice. Mém. Inst. Génèvois* 2(3): 1–102 pls v–x [74].

Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: off Nice, Mediterranean Sea.

Oikopleura spissa Fol, H. (1872). Etudes sur les Appendiculaires du détroit de Messine. *Mém. Soc. Phys. Hist. Nat. Genève* 21(2): 445–499 pls i–xi [470].

Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Oikopleura velifera Langerhans, P. (1880). Über Madeira's Appendicularien. *Zeit. Wiss. Zool.* 34: 144–146 pl. vi [145].

Type data: type status and whereabouts unknown.

Type locality: Madeira, NE Atlantic Ocean.

Taxonomic decision for synonymy: Lohmann, H. (1896). Die Appendicularien der Plankton-Expedition. *Ergebn. Plankt.-Exped.* 2(E.C.): 1–148 pls i–xxiv [59].

Distribution: Peru, California, NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef), SA (S Gulfs coast), VIC (Bass Strait), WA (Central W coast); Mediterranean Sea, and most warmer oceanic waters, including areas where mixing with cold waters off Peru and S California.

Ecology: marine, planktonic; water temperature 11.2–29.7°C, salinity 12.8–37.3 parts per thousand.

***Oikopleura rufescens* Fol, 1872**

Oikopleura rufescens Fol, H. (1872). Etudes sur les Appendiculaires du détroit de Messine. *Mém. Soc. Phys. Hist. Nat. Genève* 21(2): 445–499 pls i–xi [471].

Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Distribution: California, NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Central W coast); in all oceans but rare in Mediterranean Sea, SE Atlantic Ocean and southern California.

Ecology: marine, planktonic; water temperature 13–29°C, salinity 34.7–37.4 parts per thousand.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

***Stegosoma* Chun, 1888**

Stegosoma Chun, C. (1887). Die pelagische Thierwelt in grösseren Meerestiefen und ihre Beziehungen zu der Oberflächenfauna. *Bibl. Zool., Stuttgart* 1(1): 1–66 pls i–v [37].

Type species: *Stegosoma pellucidum* Chun, 1888 (= *Oikopleura magnum* Langerhans, 1880) by monotypy.

Extralimital distribution: worldwide. See: Lohmann, H. (1933). Appendicularia. pp. 3–192 in Küenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2); Tokioka, T. (1960). Studies on the distribution of appendicularians and some thaliaceans of the North Pacific, with some morphological notes. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 8(2): 351–443.

***Stegosoma magnum* (Langerhans, 1880)**

Oikopleura magnum Langerhans, P. (1880). Über Madeira's Appendicularien. *Zeit. Wiss. Zool.* 34: 144–146 pl. vi [145].

Type data: type status and whereabouts unknown.

Type locality: Madeira, NE Atlantic Ocean.

Stegosoma pellucidum Chun, C. (1887). Die pelagische Thierwelt in grösseren Meerestiefen und ihre Beziehungen zu der Oberflächenfauna. *Bibl. Zool., Stuttgart* 1(1): 1–66 pls i–v [37].

Type data: type status and whereabouts unknown.

Type locality: to 1300 m, Mediterranean Sea.

OIKOPLEURIDAE: OIKOPLEURINAE

Megalocercus diegensis Essenberg, C.E. (1926). Copelata from the San Diego Region. *Univ. Calif. Publ. Zool.* **28**(22): 399–521 [508].

Type data: type status unknown.

Type locality: off San Diego, California.

Taxonomic decision for synonymy: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls [52].

Distribution: NSW (Lower E coast), QLD (Central E coast*); Indian Ocean and Pacific Ocean, Mediterranean Sea.

Ecology: marine, planktonic; surface waters of warmer oceanic regions, down to 1300 m in Mediterranean Sea.

Reference: Thompson, H. (1945). *Pelagic Tunicates of Australia*. Melbourne : Council for Scientific and Industrial Research 196 pp. 75 pls.

TAXONOMIC DECISION

Salix nom. nov. for *Exostoma* Kott, 1990
(Polycitoridae), see p. 91.

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APPENDIX I

ABBREVIATIONS AND SYMBOLS

ACT	Australian Capital Territory
alt.	altitude
Art.	Article
Bd	Band
E	east, eastern
ed. / eds	editor / editors
edn	edition
emend.	emendation
fasc.	fascicle
fig. / figs	figure / figures
ft	feet
ICZN	International Code of Zoological Nomenclature
Is. / IIs	Island / Islands
km	kilometre
Lfg	Lieferung
livr.	livraison
m	metre
ms	manuscript
Mt / Mtn / Mts	Mount / Mountain / Mountains
N	north, northern
Nat.	Natural
Natl	National
no.	number
<i>nom. nov.</i>	<i>nomen novum</i> (new replacement name)
<i>nom. nud.</i>	<i>nomen nudum</i> (not an available name)
<i>nov. comb.</i>	<i>nova combinatio</i> (new combination)
ns	new series
NSW	New South Wales
NT	Northern Territory
p. / pp.	page / pages
pl. / pls	plate / plates
pt / pts	part / parts
QLD	Queensland
S	south, southern
SA	South Australia
ser.	series
sp. / spp.	species
TAS	Tasmania
Tom.	Tome / Tomus
var.	variety
Verl.	Verlag
VIC	Victoria
Vol.	Volume
W	west, western
WA	Western Australia
[name]	square brackets enclosing a valid or available name indicate a qualification of the use of that name in the context in which it appears.
*	an asterisk associated with type data indicates the type(s) has not been seen by the author; an asterisk associated with a distribution or an ecological descriptor implies that the information has not been confirmed.
♂	male(s)
♀	female(s)

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