



FAUNA *of* AUSTRALIA

53. BALAENIDAE

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DEFINITION AND GENERAL DESCRIPTION

The Balaenidae (right whales) is one of the three families of whalebone or baleen whales (Suborder Mysticeti, within the Order Cetacea). Mysticetes differ from the other cetacean suborder (Odontoceti, toothed whales) by the presence of a highly specialised filter-feeder apparatus made up of baleen plates attached to the gum of the upper jaw (Fig. 53.1).

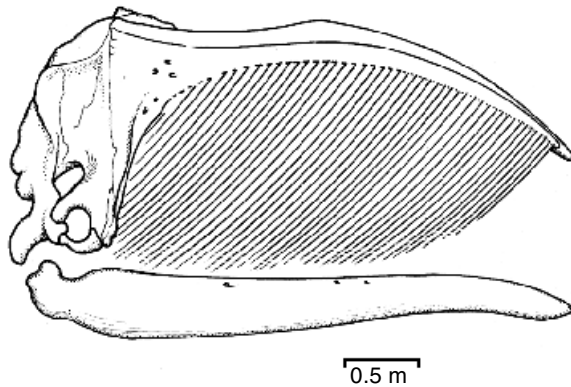


Figure 53.1 Lateral view of the skull of the Southern Right Whale, *Eubalaena australis*, showing the attachment of the baleen plates to the upper jaw. (© ABRS)
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Balaenids are distinguished from the other two mysticete families, the grey whales (Eschrichtiidae) and rorquals (Balaenopteridae), by having long and narrow baleen plates and a highly arched upper jaw. Other balaenid features include: externally, a disproportionately large head, long thin rostrum, huge lower lips and lack of multiple ventral grooves (Fig. 53.2); and internally, the lack of a coronoid process on the lower jaw and fused cervical vertebrae.

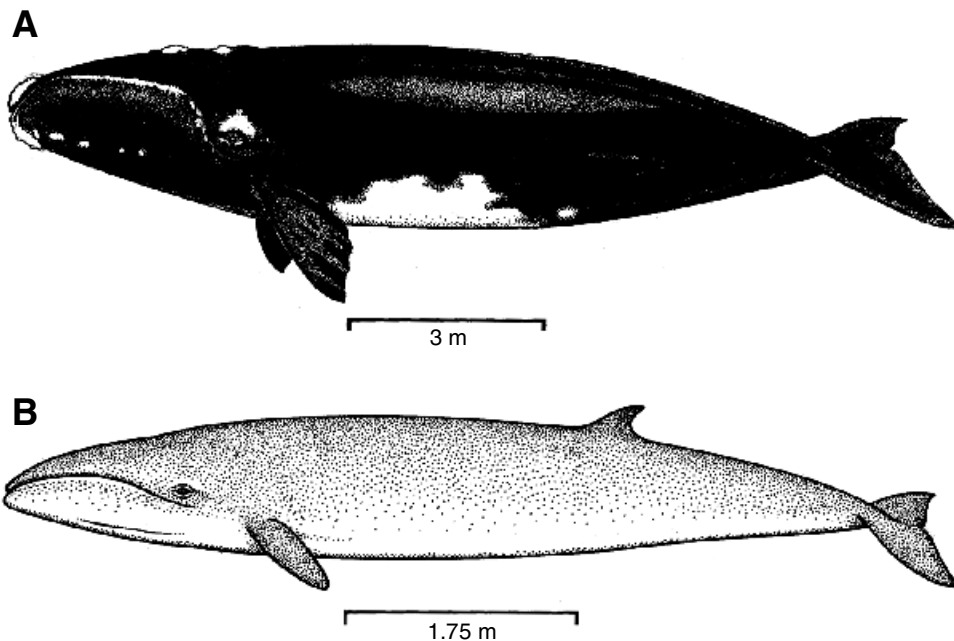


Figure 53.2 Lateral view of: **A**, the Southern Right Whale (*Eubalaena australis*); **B**, the Pygmy Right Whale (*Caperea marginata*). (© ABRS)
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HISTORY OF DISCOVERY

Erected by J.E. Gray in 1825 (Watson 1981), the family contains three genera: *Balaena* Linnaeus, 1758, *Eubalaena* Gray, 1864 and *Caperea* Gray, 1864. Some authors (see Honacki, Kinman & Koeppl 1982) include *Eubalaena* in *Balaena*, but as Schevill (1986a) pointed out, this is contrary to general practice within the last 60–70 years and obscures their obvious dissimilarities, which are greater, for example, than between the various species of *Balaenoptera*.

Balaena and *Caperea* are monotypic [*Caperea* is now placed in its own family Neobalaenidae ed.]. Two species have been recognised in *Eubalaena*, but the status of Southern Right Whale (*E. australis* Desmoulins) requires further study (Schevill 1986a). It may not be specifically distinct from the Northern or Biscayan Right Whale (*E. glacialis* Borowski). No Australian research has been undertaken on the taxonomy of *Eubalaena*.

Australia is the type locality for the Pygmy Right Whale (*Caperea marginata* Gray 1846). It was first named from three baleen plates collected off Western Australia on the voyage of H.M.S. *Erebus* and H.M.S. *Terror* between 1839 and 1843 and presented to the British Museum. Uniquely among the Balaenidae, the Pygmy Right Whale has a dorsal fin and two throat grooves. Watson (1981) considered the latter to be forerunners of the longer grooves of the Balaenopteridae. Hale (1931, 1964) studied a number of stranded specimens from the South Australian coast. In comparing them, there seems to be little difference from earlier descriptions, particularly that of Beddard (1903a). Beddard believed the Pygmy Right Whale to be transitional between the balaenids and balaenopterids: ‘a right whale with a dash of rorqual about it’.

In 1846, Gray included the Pygmy Right Whale in *Balaena*, but in 1864 he erected a new subgenus, *Caperea*. In 1870, he included it in *Neobalaena*. In 1874, however, Van Beneden showed that name to be a junior synonym of *Caperea*. In 1934, Iredale & Troughton listed the species as *Caperea marginata*. A full synonymy is given in Hershkovitz (1966) and reviewed in Honacki *et al.* (1982).

MORPHOLOGY AND PHYSIOLOGY

Externally, Right Whales are superbly adapted to an aquatic life. As in all cetaceans, the body surface is streamlined, although Right Whales are more rotund than most (Fig. 53.2). The nostrils (blowholes) are placed on the most dorsal point of the head and the skull is telescoped markedly so that the upper and lower jaws extend far forward of the nostrils (Fig. 53.3). The nipples are concealed in slits. Male external genitals are retracted into the body cavity (penis) or are permanently internal (testes). There is no ear pinna.

The modified paddle-like forelimbs or flippers can be pressed against the body. There is no external evidence of hind limbs. The fibrous, horizontally flattened flukes have no skeletal support and the tail stock (caudal peduncle) is flattened laterally, probably to reduce drag during the vertical movement of the flukes.

Although the normal mammalian covering of hair has been lost, some sparse hairs are retained on the snout in some species. They are numerous on the tip of the lower jaw and on the upper jaw of Southern Right Whales. The skin is smooth, resilient and believed to be able to resist turbulence and minimise drag. Most cetaceans possess a dorsal stabilising fin, but in the balaenids a dorsal fin is absent except in Pygmy Right Whales (Fig. 53.2). The Southern Right Whale has unique callosities on the head, a series of raised keratinous patches frequently inhabited by parasitic cyamid crustaceans (Fig. 53.4).

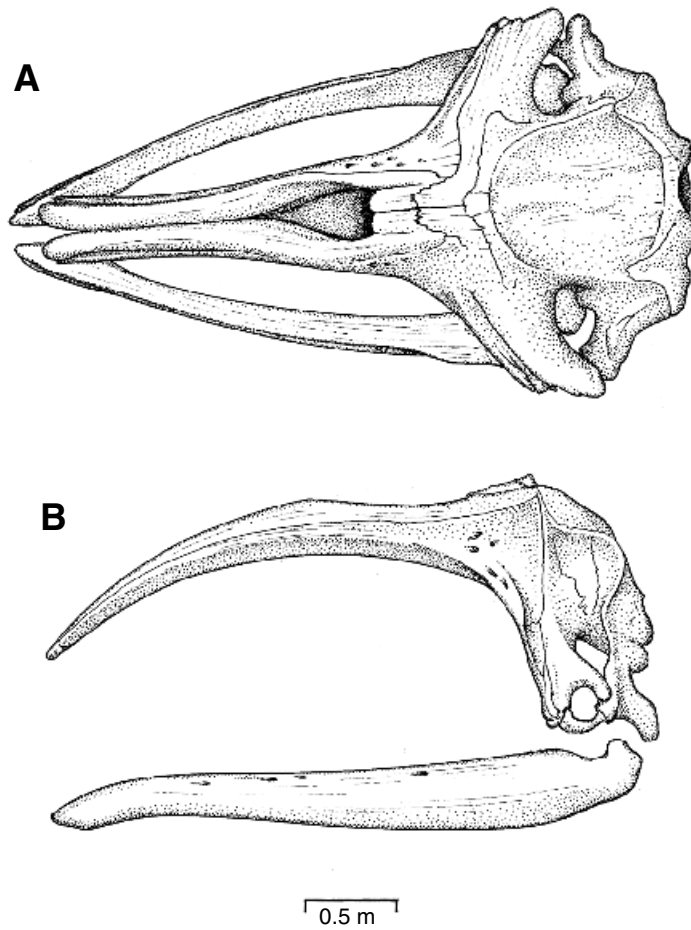


Figure 53.3 The skull of the Southern Right Whale, *Eubalaena australis*: **A**, dorsal view; **B**, lateral view. Note that the baleen is not shown. (© ABRS) [M. Thompson]

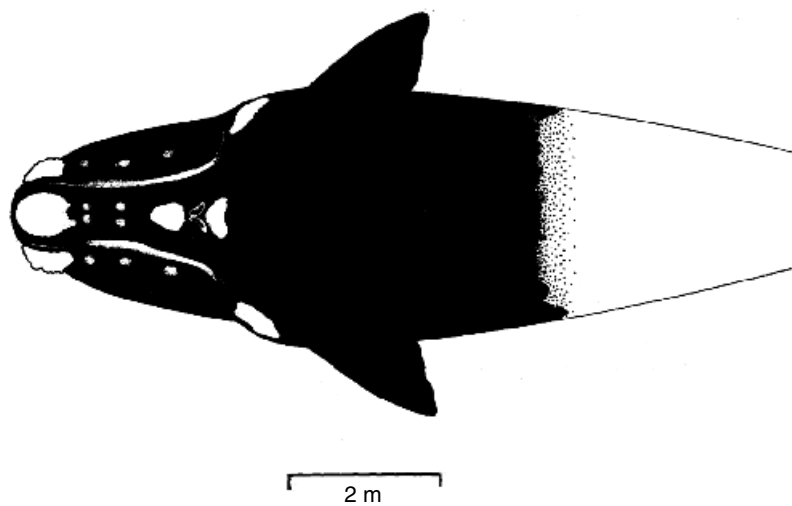


Figure 53.4 Dorsal view of the head of the Southern Right Whale, *Eubalaena australis*, showing the unique callosities found in this genus. (© ABRS) [M. Thompson]

Bowhead Whales (*Balaena mysticetus*) and Southern Right Whales are very large, up to nearly 20 metres in length with a weight of almost 100 tonnes. The Pygmy Right Whale is relatively small, up to only 7 metres and about 5 tonnes. As in all mysticetes, balaenid females tend to be slightly larger than males. Bowhead Whales are almost completely black, apart from a white chin patch and, particularly in older animals, a white band on the caudal peduncle. Southern Right Whales are generally black-brown, frequently with an irregular white ventral patch. Pygmy Right Whales are grey or dark grey dorsally and lighter ventrally.

The head of the Bowhead Whale is enormous, up to one-third of adult body length. It is not so markedly large in Right Whales (a quarter or more of body length) or in Pygmy Right Whales (rather less than a quarter). The huge filter-feeding apparatus Bowhead Whales contains the longest baleen plates found in any whale, up to 4 metres long.

A major peculiarity of Pygmy Right Whales is the number and structure of the ribs. There are 17 pairs, more than in any other cetacean. The ribs become increasingly broadened and flattened towards the tail, providing almost continuous protection for the internal organs.

NATURAL HISTORY

There is no direct evidence of longevity, but by analogy with other large mysticetes, one would expect Bowhead and Southern Right Whales to live for 50 years or more. Little is known of survival rates. Recent work off South Africa on Right Whales, in a population increasing from a very low level (Anon 1986), suggests a high adult survival rate (of 95% or more) coupled with a relatively low age at first parturition (9 years or less). Virtually nothing is known of the life history of Pygmy Right Whales.

Balaenids generally feed on swarms of small species of planktonic crustacea, such as euphausiids. In warmer Southern Hemisphere waters, Southern Right Whales probably feed mainly on copepods, as apparently do Pygmy Right Whales. The only natural predators are likely to be killer whales or sharks. The Bowhead Whale undertakes long summer feeding migrations, for example, from wintering grounds south of the Bering Straits into the Bering, Chukchi and Beaufort Seas. Nothing so well defined has been recorded for Right Whales which seem to be dispersed widely in the open ocean in summer, approaching warmer water coasts in winter and spring. Southern Right Whales do not seem to penetrate far into the coldest waters, probably not much further south than 60°S. Movement away from coasts by this species in early summer is confirmed by differences in the timing of early whaling operations off southern Western Australia. 'Bay' whaling of this species was conducted on the coast in winter and spring and open ocean whaling in late spring and summer (Bannister 1986a). The same data confirm that there is some segregation of sexual classes 'offshore' and 'on the coast', with adult females and calves occurring more commonly close to the coast in winter than adult males.

Reproductive behaviour of Southern Right Whales has been studied in detail by Payne (1986) off Argentina. Observations off South Africa and southern Australia confirm these findings. Females come close inshore in winter/early spring and give birth a short time after arrival. Cow/calf pairs may stay close to the coast for some time. The maximum period so far recorded off the Western Australian southern coast, where Southern Right Whale numbers and movements have been monitored since 1976 (Bannister 1986b), is 87 days. There is a strong 3-year periodicity in calving off Argentina, to some extent confirmed by recent Western Australian data, where the average elapsed time

between sightings of 11 cow/calf pair ‘between year matches’, was 3.8 years (mode 3 years, range 2–8 years). Adult males also approach the coast, but apparently less often and for a shorter time.

Mating behaviour has been observed, but it seems that mating resulting in conception occurs away from the coast. By analogy with other mysticetes, gestation is thought to last approximately 12 months. The mean length at birth (recorded off South Africa) has been estimated at 6.1 metres. There seems to be no evidence of permanent pair-bonding or any paternal care of the young. Adult females with apparent yearlings have been observed near the coast the year following calving. Up to 26 animals at one time have been seen recently in bays off southern Western Australia. Particular bays seem to be favoured, possibly because they provide shelter from prevailing winds (Payne 1986).

Mysticete feeding has been characterised as ‘skimming’ or ‘gulping’, or a combination of both (Watson 1981). Balaenids are ‘skimmers’; they swim with their mouths open, continuously filtering water and food organisms through the baleen apparatus. In this way Right Whales for example, can take advantage of the relatively low concentrations of zooplankton that occur in the lower latitudes they frequent.

Balaenid vocalisation has been little studied. The size of the US/Canadian Arctic Bowhead Whale population is now being monitored from recordings of low frequency ‘moans’ emitted by migrating individuals passing a hydrophone array. No such work has been undertaken on Right Whales, although moans and ‘belches’ have been recorded from that species. There is as yet no evidence from any mysticete that echolocation occurs, in contrast to the odontocetes.

All balaenids swim fairly slowly, probably at not more than 5 knots. They feed close to the surface and are unlikely to dive very deep except when hunted. Right Whale behaviour at the surface includes basking, rolling on to the back, even ‘sailing’ with the tail held out of the water at right angles to the wind. Leaping out of the water (‘breaching’) is not uncommon. Being a coastal animal, at least in winter and spring, Southern Right Whales rarely strand.

Balaenids were the first cetaceans economically and/or culturally important to man. Their common name, Right Whale, comes from the fact that they were the ‘right’ whales to catch. They swim slowly, float when dead and produce large quantities of product, mainly oil for lighting and lubrication.

Basque whalers had established a fishery for in the Bay of Biscay by the 12th Century (Matthews 1968). By the mid-16th Century, activity had spread to the Newfoundland coast, moving north (for Bowhead Whales) towards Greenland and Spitzbergen in the 17th Century, but continued off the North American coast for Northern Right Whales into the 18th Century. The development of pelagic sperm whaling, at first in the North Atlantic but then into southern seas, led to ruthless exploitation of Southern Right Whales in the Southern Hemisphere in the early 19th Century, where excessive catches soon made right whaling unproductive.

The brief heyday of southern right whaling is illustrated by the situation in the south-western Indian Ocean in the 1830s and 1840s (Bannister 1986a). From information in whaling logbooks, American vessels took Southern Right Whales on the ‘Coast of New Holland Ground’ (off the south-western and southern coasts of Western Australia) from at least 1838 to 1849, with a peak of activity in 1839 and 1840. Activity was concentrated chiefly offshore from late spring to summer, with a peak in November and December. Some vessels undertook ‘bay’ whaling earlier in the season, from June to October. Up to 1843, the operational pattern generally seems to have involved a voyage from the North Atlantic via the Cape of Good Hope and across the southern Indian Ocean, to arrive on the whaling ground in late spring/early summer. Right whaling would then proceed, probably from October to December or January. The vessel might then proceed

northwards, sperm whaling towards the East Indies. The following year, the vessel would sperm whale southwards, arriving off Western Australia in June or July, bay whaling then until October, when it would proceed seawards, right whaling through the early summer months westwards towards the Cape of Good Hope and home. After 1843, there was a change in the pattern. Vessels would pass rather rapidly eastwards through the Coast of New Holland Ground en route for Tasmania or New Zealand, arriving there in January or February and then sailing off 'to the north-west'—the north-east Pacific 'North-west Ground' in the Gulf of Alaska—eventually returning home via Cape Horn.

Australian 'bay' whaling, carried out from the shore, began in Tasmania in 1806, declining after 1850. Initially, Southern Right Whales were the main quarry although in some places the balaenopterid Humpback Whale (*Megaptera novaeangliae*) was a major feature of the catch. Southern Right Whales were originally abundant enough to be a danger to small boats in the Derwent River, Tasmania (Dakin 1963).

Southern Right Whales have been protected internationally from hunting since 1935, although stocks have only recently shown signs of recovery. Annual recovery rates of around 7% have been recorded off South Africa and Argentina since 1971. Present stock sizes in those areas are estimated as 400–600 (Anon 1986). Off southern Western Australia the present stock size is probably 100–200; up to 96 animals recently have been recorded in one year (1984), but repeat sightings of the same individual are undoubtedly included. In an aerial survey of Southern Right Whales along the coast from Cape Leeuwin to Sydney in August 1984, the minimum number present, allowing for multiple identification, was 52. A review of sightings recorded by biologists and fishery authorities this century off the southern Australian coast (Bannister 1986b) shows a scarcity of records from 1900–1960, with only 12 instances of sightings (17 individuals) reported. From then until 1982 there was a distinct increase, with greater increase from 1975 and 128 instances (272 animals) recorded altogether. Unfortunately, with no possibility of quantifying the effort leading to those recent records (but with the strong likelihood that this has itself increased), no unequivocal statement can be made that populations are growing again off southern Australia, although that seems very likely.

All balaenids now are protected from commercial, as opposed to aboriginal, hunting under regulations imposed by the International Whaling Commission. Bowhead Whales are still pursued by Alaskan Eskimos, amid controversy over the size of the catch (about 20 per year) given the lack of firm information on population size (at around 4000) and reproductive rate (which is believed to be rather low). Probable main threats to continued recovery in Southern Right Whales are pollution, reduction of coastal breeding areas through development, or harassment of individuals near human population centres. Off Australia, the latter is prohibited under provisions of the Whale Protection Act 1980. An additional possible threat is competition for food resources with the Sei Whale (*Balaenoptera borealis*). This species also feeds on small planktonic crustacea and tends to inhabit warmer waters more often than other Antarctic balaenopterids such as the Blue Whale (*Balaenoptera musculus*) and the Fin Whale (*Balaenoptera physalus*). It has been suggested that the very great 19th Century depletion of Southern Hemisphere Southern Right Whale stocks allowed the Sei Whale to expand its range and increase its population size, effectively preventing the Southern Right Whale recovering from over-exploitation. In the 1960s and 1970s, Sei Whales were heavily exploited, which some believe may have led to the apparent increase seen in Southern Right Whale numbers. There is, however, very little information available on Sei Whale feeding strategies and the possibility of competition between the two species in the Southern Hemisphere remains hypothetical (Anon 1986).

BIOGEOGRAPHY AND PHYLOGENY

Distribution

Bowhead Whales are found only in the Arctic, with up to five possibly distinct stocks of which the only substantial one now remains in the Bering, Chukchi and Beaufort Seas. Right Whales were once abundant in temperate waters, particularly near land masses in both hemispheres. Remnant populations now exist in the North Atlantic and North Pacific. Because of geographical barriers, differences in timing of northern and southern breeding seasons and an apparent discontinuity across the tropics, there seems to be no opportunity for significant mixing between Northern and Southern Right Whales. There have been a few records from near the equator, but they cannot be attributed definitely to either (Anon 1986).

Historically, Southern Right Whales had a circumpolar distribution between about 20°S and 60°S. They concentrated in winter off the major southern continents and clustered around oceanic islands such as Kerguelen, Campbell and Auckland. The total population may have exceeded 100 000 before exploitation in the 19th Century (Leatherwood & Reeves 1983). Recent reviews of population status (Anon 1986) have treated the stocks by ocean basin.

Information on the distribution of Southern Right Whales in the South Pacific/Indian ocean area indicates a disjunction between animals along the west coast of South America and New Zealand. Different catch histories around New Zealand and off Campbell and Auckland Islands suggest a possible stock distinction between animals in those two areas and separation between New Zealand and Australia. Although there is no discontinuity in catch records along the southern coast of Australia, for statistical purposes an arbitrary boundary has been adopted at Longitude 130°W. A westward limit, again based on 19th Century catch data, has been proposed at 90°E in the Indian Ocean. Populations centred on Southern Ocean islands such as Kerguelen, Amsterdam/St Paul and the Crozets have been considered separate from those off southern Africa.

No information is available on possible stock distinctions in Pygmy Right Whales. Its distribution is based mainly on records of stranded animals, most from Australia. The majority of Australian records have been from South Australia and Tasmania.

Phylogeny

Living mysticetes and odontocetes arose from primitive extinct toothed whales (Archaeocetes – first found in the Early Eocene) that in turn probably evolved from archaic ungulates. Very few archaeocetes, and then only supposed ones, have been described from Australia (Fordyce 1982a). Fordyce believed that *Mammalodon colliveri* from the late Oligocene, Torquay, Victoria, formerly described as an archaeocete, is in fact a proto-mysticete. One cetothere, the major early mysticete group, has been described from Murkbo, South Australia (see Fordyce 1982a).

The balaenid fossil record extends back to the Early Miocene, but even early examples have typically modern balaenid features such as the narrow arched rostrum (Fordyce 1982a). The only Australian specimens are incomplete and none have been described formally; they include earbones (periotics) from uppermost Miocene or lowermost Pliocene deposits at Beaumaris and Grange Burn, Victoria (Fordyce 1984).

Collection and Preservation

With total protection for all cetaceans under the Australian Whale Protection Act 1980, no person may kill, injure, take or interfere with any whale or process any whale unlawfully killed or imported, except under permit. Permits may be given, but only for very good reasons, including scientific research.

Stranded animals remain an important source of information on taxonomy, anatomy, life history (including feeding, growth and reproduction), pathology (both disease and pollutants) and distribution, bearing in mind that diseased or dead animals may be out of their normal range. Standardised measurements and specimen collection formats are available in Baker (1983) or from relevant State Museums, National Parks or Fisheries and Wildlife Authorities, from whom information on rescue of living stranded animals also can be obtained.

KEY TO AUSTRALIAN BALAENID GENERA, EXTERNAL CHARACTERS

- 1 Whales with baleen plates present in the mouth; blowhole double Mysticetes 3
- 2 Whales with teeth present, sometimes rudimentary or absent, but no baleen plates; blowhole single Odontocetes
- 3 Mysticetes with highly arched upper jaw; baleen plates very much longer than wide; rostrum narrow; no or only two ventral grooves Balaenidae 5, 6
- 4 Mysticetes with relatively straight upper jaw; baleen plates short, (less than 1 m), broad and triangular; rostrum wide Balaenopteridae
- 5 Balaenids with no dorsal fin; adults large (to 20 m); callosities present on rostrum; baleen plates dark, more than 2 m long in adult *Eubalaena australis*
- 6 Balaenids with a dorsal fin; adults small (to 7 m); no callosities on rostrum; baleen plates pale with a dark outer border, less than 1 m long in adult *Caperea marginata*

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