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Fisheries Research Bulletin No. 1 (New Series)

The New Zealand Cetacea

By
D. E. Gaskin

FISHERIES RESEARCH DIVISION,
NEW ZEALAND MARINE DEPARTMENT

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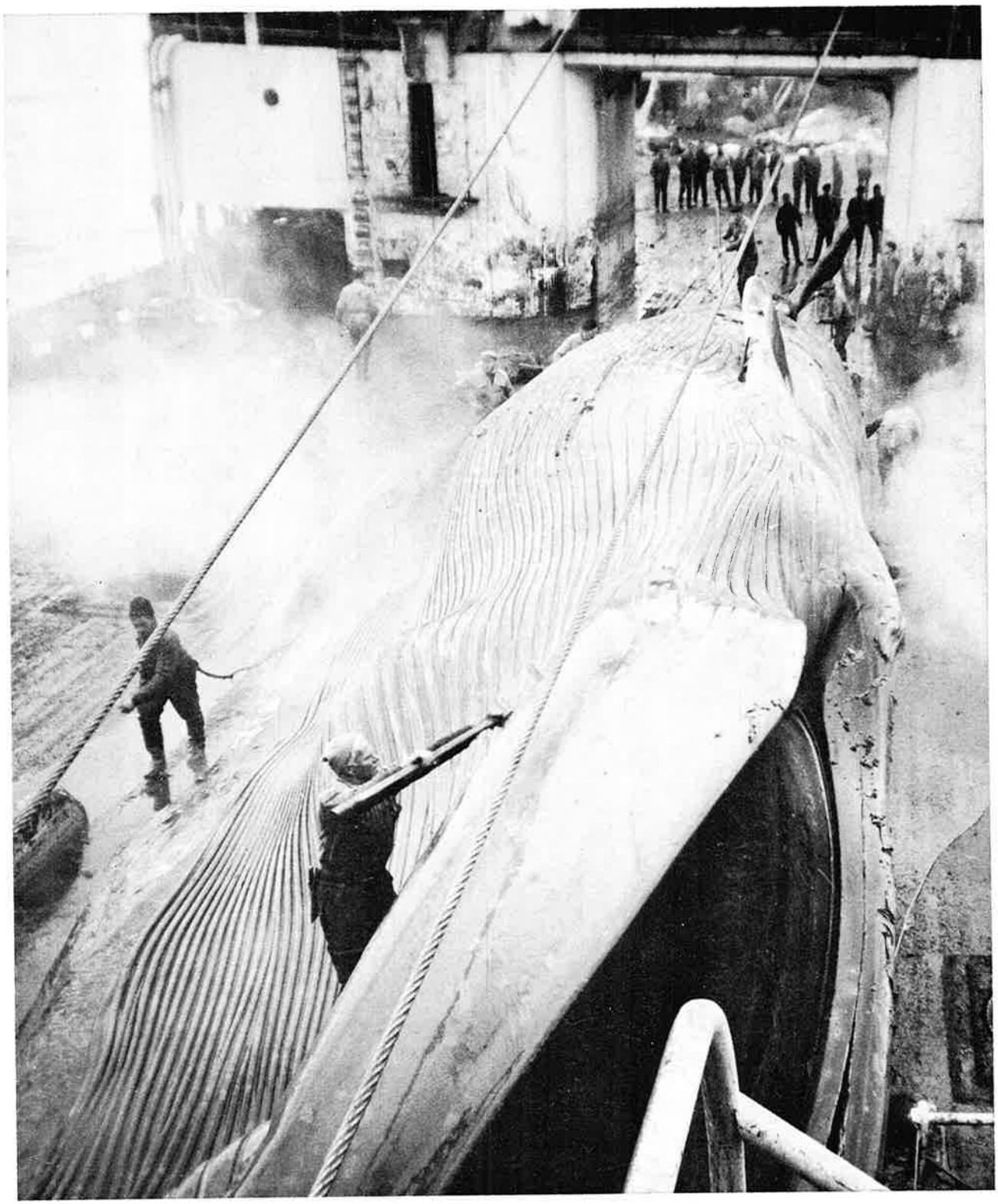

Photograph by D. E. Gaskin.

Frontispiece: A blue whale (*Balaenoptera musculus*) being flensed on the deck of the FF *Southern Venturer* in the Weddell Sea in February 1962.

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The New Zealand Cetacea

By
D. E. Gaskin*

Fisheries Research Division, Marine Department,
Wellington, New Zealand

* Present address: Department of Zoology, Massey University,
Palmerston North

FISHERIES RESEARCH DIVISION,
NEW ZEALAND MARINE DEPARTMENT

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FOREWORD

OVER the past decade there has been a continued interest in the large and small whales of New Zealand.

This activity in the Marine Department and elsewhere followed earlier intensive work on the humpback whale in Victoria University of Wellington. As the humpback industry declined attention turned to the sperm whale. Substantial field studies of this species in local waters were made by the Marine Department. At the same time there has been a steady increase in the data available on strandings of the smaller whales.

The circumstances make it appropriate to provide a handbook of the whale species found in New Zealand waters. This bulletin is presented as a review of the available taxonomic and ecological data and not as a systematic revision of the group.

Such a review as this would not have been possible without the aid of many people both amateur observers and professional scientists.

J. W. BRODIE,
Acting Director,
Fisheries Research Division,
31 January 1967.

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ABSTRACT

Available material on occurrence (much of it previously unpublished) is summarised in this paper for 30 species of cetacean known or reported to occur in New Zealand waters.

Those whose occurrence has been confirmed are: *Eubalaena australis*, *Caperea marginata*, *Balaenoptera musculus intermedia*, *Balaenoptera physalus quoyi*, *Balaenoptera borealis schlegeli*, *Balaenoptera edeni*, *Balaenoptera acutorostrata*, *Megaptera novaeangliae lalandi*, *Physeter catodon*, *Kogia breviceps*, *Berardius arnouxi*, *Ziphius cavirostris*, *Hyperoodon planifrons*, *Mesoplodon grayi*, *Mesoplodon hectori*, *Mesoplodon layardi*, *Mesoplodon bowdoini*, *Tasmacetus shepherdi*, *Orcinus orca*, *Pseudorca crassidens*, *Globicephala melaena edwardi*, *Grampus griseus*, *Tursiops truncatus*, *Lissodelphis peroni*, *Delphinus delphis*, *Lagenorhynchus obscurus*, and *Cephalorhynchus hectori*.

Lagenorhynchus cruciger is suspected to occur and also a species of *Steno* or *Stenella* as yet undescribed. Records of *Steno bredanensis* and *Stenella euphrosyne* are discussed, but are not considered valid.

The biology and distribution of each species in New Zealand waters are discussed. Sighting and stranding data suggest that numbers of blue, fin, and sei whales pass the east and west coasts of New Zealand in migration streams similar to those recorded for the humpback whale by Dr W. H. Dawbin. Bryde's whale appears to be non-migratory in the bight between North Cape and East Cape of the North Island or to carry out local migrations within this area only. Movements of right whales round Campbell Island are discussed. The possible occurrence of two species of minke whale in New Zealand waters is considered.

The occurrence of sperm whales round New Zealand is discussed, and the catches made by the recent sperm whaling industry are listed. Where sufficient data are available, the movements of species of Delphinidae and Ziphiidae in New Zealand waters are discussed.

INTRODUCTION

Forty-six years have elapsed since the last general reviews of the Cetacea occurring in New Zealand waters were published (Oliver, 1922b and 1922c). The only general work previously available was a guide book to the group produced by Waite (1912), which was limited in scope.

Little research on cetacean distribution was carried out in New Zealand before 1950. Cetacean studies in the last century were mainly restricted to taxonomy (Hector, 1873a, 1873b, 1874, 1875, 1877, 1878, and 1881; Hutton, 1875, 1876, and 1877; von Haast, 1870, 1874, 1876, 1877a, 1877b, 1877c, 1880, and 1881). There are numerous studies by Gray, perhaps the most useful being his catalogue of whales and seals (1874a) and two papers on the whalebone whales (1871a and 1874b).

In recent years the migration patterns of the humpback whale (*Megaptera novaeangliae lalandi* (Fischer)) in the New Zealand area have been worked out (Dawbin, 1956a, 1956b, 1959a, 1959b, 1960, 1964, and 1966). From 1962 to 1964 a programme of field observations was carried out by the Marine Department to determine the patterns of sperm whale movement in the New Zealand area and the size of the population. The whale species of New Zealand are similar to those of southern Australia, which have been reviewed by Wood Jones (1925). Results of studies in all branches of cetacean research have been summarised in a recent work by Slijper (1962). A general world bibliography of cetacean research was compiled by Pedersen and Ruud (1946). In the present paper the author has attempted to review the significant literature on each species up to December 1964, when the first manuscript draft was completed. Certain more recent local references (up to June 1967) have been added and also a systematic paper on pygmy sperm whales (Handley, 1966).

Whaling in New Zealand began in 1792, when the first ship searching for sperm whales arrived (Dawbin, 1956a). By 1827 the hunt had turned to the southern right whale. This species was pursued until about 1850, when, as the numbers of right whales declined, the humpback whale became the mainstay of the industry. Whaling in New Zealand has been reviewed by Ommanney (1933), and Maori whaling was described by Dawbin (1954). Whaling stations were opened and closed sporadically all round the coast of New Zealand, but a single station (in Tory Channel, Cook Strait) was able to operate from 1890 to 1963 with hardly a break.

The humpback whale sustained the industry in New Zealand until 1962, when the numbers passing through Cook Strait became insufficient to keep even a single shore whaling station productive. By 1963 sperm whales, which had been relatively unmolested for about 100 years, were again hunted. However, a steady decline in the world sperm whale oil price eventually forced the last whaling station in the country into liquidation at the start of its second sperm whaling season in late 1964 (Gaskin, 1965).

Other species of whale such as blue, finback, and sei have been taken from time to time, though never in large numbers. Most of the records of these animals round the New Zealand coast are of strandings, not of catches by whalers. Before 1963 strandings were virtually the only source of information on the small non-commercial whales. During 1963 some information on the smaller whales was gathered at sea. Recently a survey of the whaling potential of the New Zealand subregion has been completed (Gaskin, 1967a).

Recent taxonomic work in New Zealand has largely consisted of studies on the little known species of beaked whales (Ziphiidae) by McCann (1961, 1962a, 1962b, 1962c, and 1964a). There is still much confusion in taxonomic relationships and nomenclature of the small whales and dolphins. Very few specimens of some species or groups of species are available. McCann (1962b and 1962c) considered that some species, for example, *Mesoplodon pacificus* Longman and *Mesoplodon hectori* (Gray), were invalid because of misidentifications.

MYSTACOCETI, Whalebone Whales

About 12 species or subspecies are recognised in this group, all of which are or were commercially important. Eight have been recorded in New Zealand waters, the exceptions being the Greenland whale, the Californian or Pacific grey whale, the northern right whale, and the northern minke or piked whale. The Mystacoceti are divided into three families: the Balaenidae (right whales), the Balaenopteridae (rorquals), and the Eschrichtiidae (grey whales). Grey whales do not occur in New Zealand waters.

Family **BALAENIDAE,** Right Whales

Two species in this family have been recorded from New Zealand waters: *Eubalaena australis* (Desmoulins) and *Caperea marginata* (Gray). Both are rare.

Genus **Eubalaena** Gray, 1864

Eubalaena australis (Desmoulins, 1822), the Southern Right Whale (Fig. 1)

1822. *Balaena australis* Desmoulins, *in* Dictionnaire Classique d'Histoire Naturelle, vol. 2, p. 161. Algoa Bay, South Africa.

Comments

The seven neck vertebrae of all the right whales are fused, which distinguishes them from the rorquals, in which the vertebrae are separate. Superficially the right whale can be recognised by the peculiar eruption on the anterior end of the snout which whalers call the "bonnet", by the absence of a dorsal fin, by the strongly arched mouth, and by the double spout.

Formerly the animal was called the black whale or the common whale. The name right whale is fairly recent; to the whalers of the Northern Hemisphere it was simply the right whale to catch, since it was easy to pursue, floated when dead, and yielded excellent whalebone and plenty of oil.

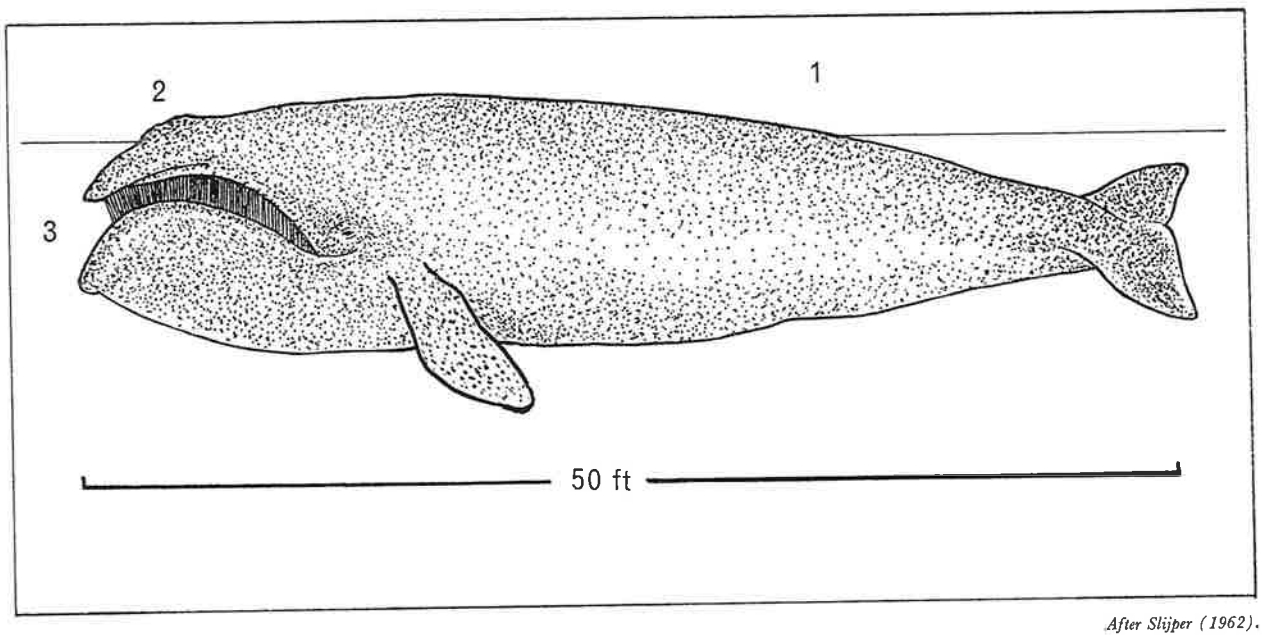
In the Southern Hemisphere the right whale may reach a maximum length of 60 ft at physical maturity, though most specimens seen are smaller. The northern species, *Eubalaena glacialis*, was the first to be described, and its anatomy and general biology have been examined by Andrews (1908a) and more recently by Omura (1958a). The biology of the southern right whale was discussed by Matthews (1938b). The degree of distinction between *glacialis* and *australis* is arguable, but the two animals are now so rare that the chance of first-hand morphological comparison is remote.

The Southern Right Whale in New Zealand Waters

Some information about the migration, natural history, and history of exploitation of the right whale in New Zealand has been published (Gaskin, 1964c). A detailed survey of right whaling in both Australia and New Zealand is being prepared (Dr W. H. Dawbin, pers. comm.).

The species was hunted from about 1820 until 1936 in New Zealand, though it was exploited most from 1825 to 1850. Since 1936 the right whale has been completely protected.

The species feeds on krill among the pack ice in the Antarctic during summer, and in winter and spring it moves north. The best catches of right whales in New Zealand were made between June and September, and the slaughter of them by bay whalers and off-shore pelagic whalers on the New Zealand coast was so great that the species was almost exterminated. The killing continued well into the twentieth century on a much reduced scale. Thirty-six years elapsed between the last recorded sighting of a right whale by the Cook Strait whalers and the sighting of a right whale in Tory Channel in 1963 (Gaskin, 1964c). The areas where the right whale was seasonally abundant are shown in fig. 2, in which the localities of the five 1963 sightings are also marked. The numbers of right whales caught near the New Zealand mainland since 1915 are listed in table 1.



After Slijper (1962).

Fig. 1: *Eubalaena australis*, the southern right whale. Points of identification: 1. Lack of a dorsal fin. 2. The "bonnet". 3. Long whalebone and a strongly arched mouth. NOTE: In this illustration and succeeding illustrations of Cetacea the length shown is that for an average adult male at sexual maturity.

TABLE 1: Numbers of Right Whales Caught off the New Zealand Coast Since 1915*

Years	Tory Channel	Whangamumu	Kaikoura
1915–17	6	0	1
1921–22	1	2	1
1924–27	2	0	0
Totals	9	2	2

*Data from files of the New Zealand Marine Department.

The Otago Museum holds the skeleton of a 29 ft young right whale, and a skeleton from Canterbury is held at the Dominion Museum; a skeleton in the Paris Museum is listed as coming from Akaroa (Oliver, 1922c).

Occurrences near Campbell Island

Sightings of southern right whales at Campbell Island were recorded by whalers in 1911 and 1912 and by meteorological staff there between 1942 and 1964 (tables 2 and 3).

TABLE 2: Campbell Island Right Whale Sightings between 1911 and 1964*

Year	South Coast	NW Bay	Perseverance Harbour	Unspecified	Totals
1911	0	0	0	65	65
1912	0	0	0	31	31
1942	1	92	13	0	106
1943	4	30	9	0	43
1945	0	9	1	0	10
1947	0	20	1	0	21
1957	0	65	0	0	65
1958	0	31	0	0	31
1959	7	19	0	0	26
1960	0	11	24	0	35
1962	0	0	20 (July only)	0	20
1963	0	87	29	0	116
1964	0	30	0	0	30
Totals	12	394	97	96	599

*The data for 1911 and 1912 came from two manuscripts each entitled "Diary of a Whaling Season" from the archives of the Dominion Museum. More recent data are from Bailey and Sorensen (1962), from manuscript reports by Mr J. H. Sorensen, from Department of Civil Aviation files, and from letters and reports by meteorological station staff collected by Messrs A. Wright, A. Poppleton, and P. Ingram.

Regular watches were kept on days of good weather during the 1911 and 1912 whaling seasons. Watches were also kept during the later years, at least on North West Bay and Perseverance Harbour. These observations cannot be standardised, but the whaling diaries and the weather station's reports suggest that consistent watches were kept within each of the two periods. The relative monthly abundance of right whales at Campbell Island can be determined (fig. 3).

The greatest number of right whales now reaches Campbell Island in late winter, but in the 1911–12 period the greatest number reached the island in late autumn and early winter, about two months earlier.

TABLE 3: Sightings of Right Whales at Campbell Island Month by Month in the Two Phases of Observation

Month	1911–12	1942–63
March	0	0
April	5	3
May	25	22
June	21	15
July	27	142
August	10	160
September	8	128
October	0	3
November	0	0

Observers from the meteorological station on the island (Messrs J. H. Sorensen and A. Wright, pers. comm.) were certain that the same individuals and small family groups stayed in the vicinity

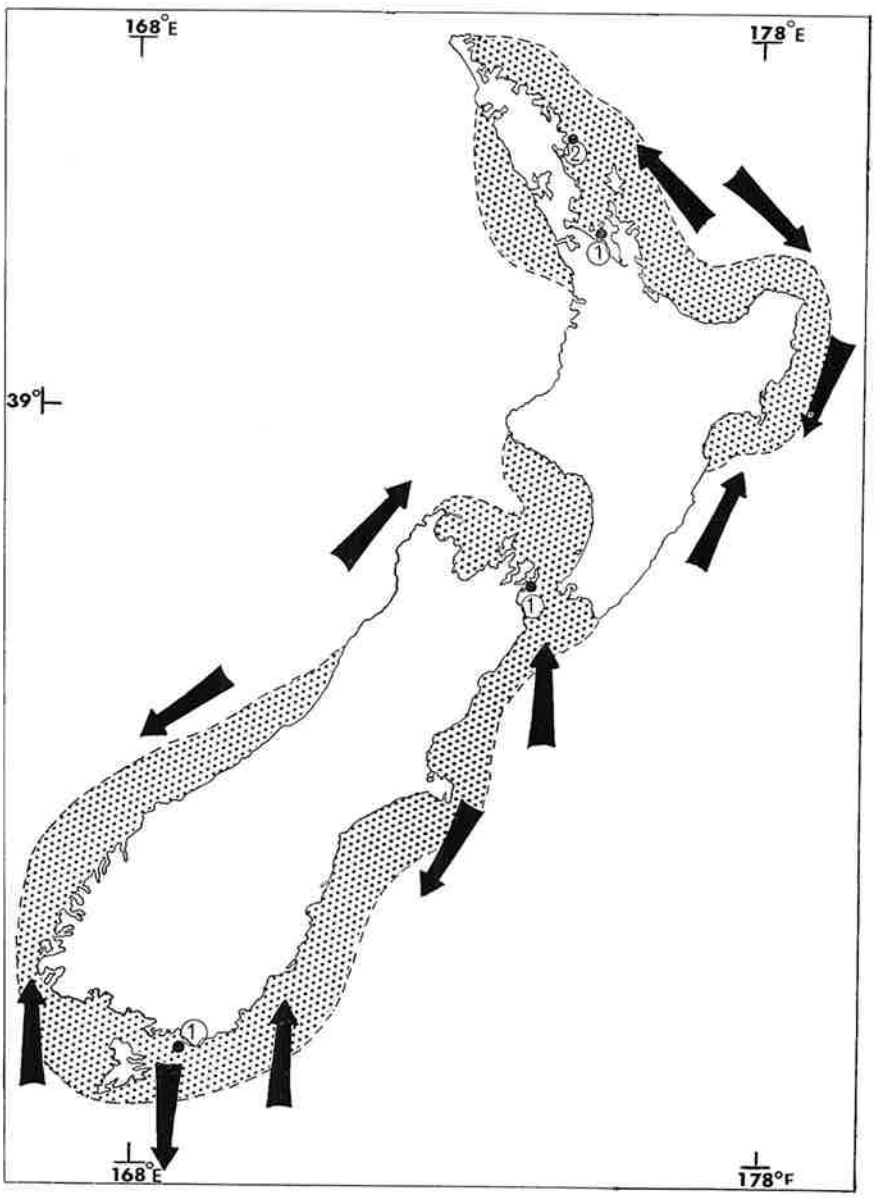


Fig. 2. Areas (dotted) where the southern right whale was once seasonally abundant round New Zealand. The arrows indicate the approximate migration tracks, and the localities where the species was sighted in 1963 are shown by the large black dots. The ringed figures show the numbers of animals sighted.

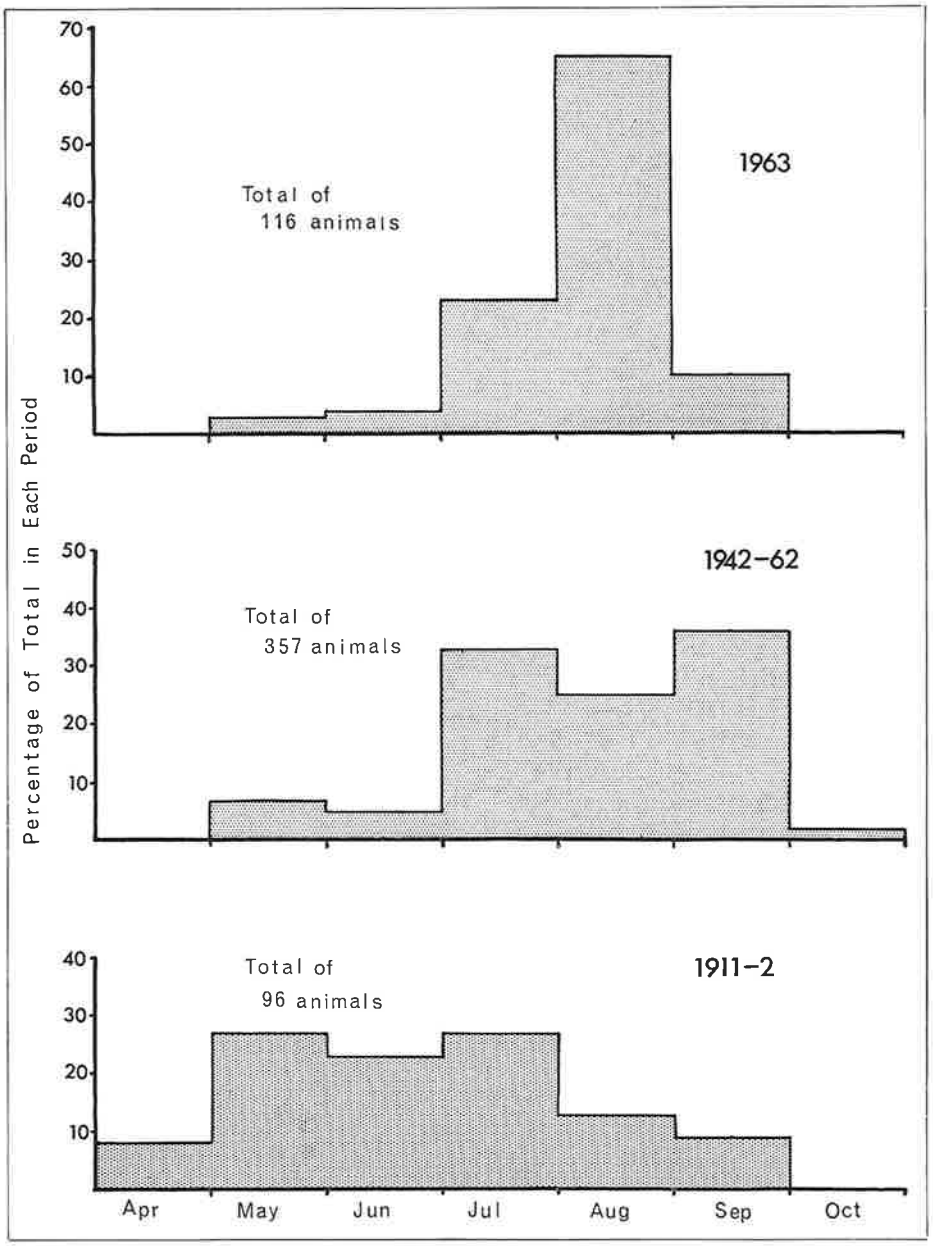
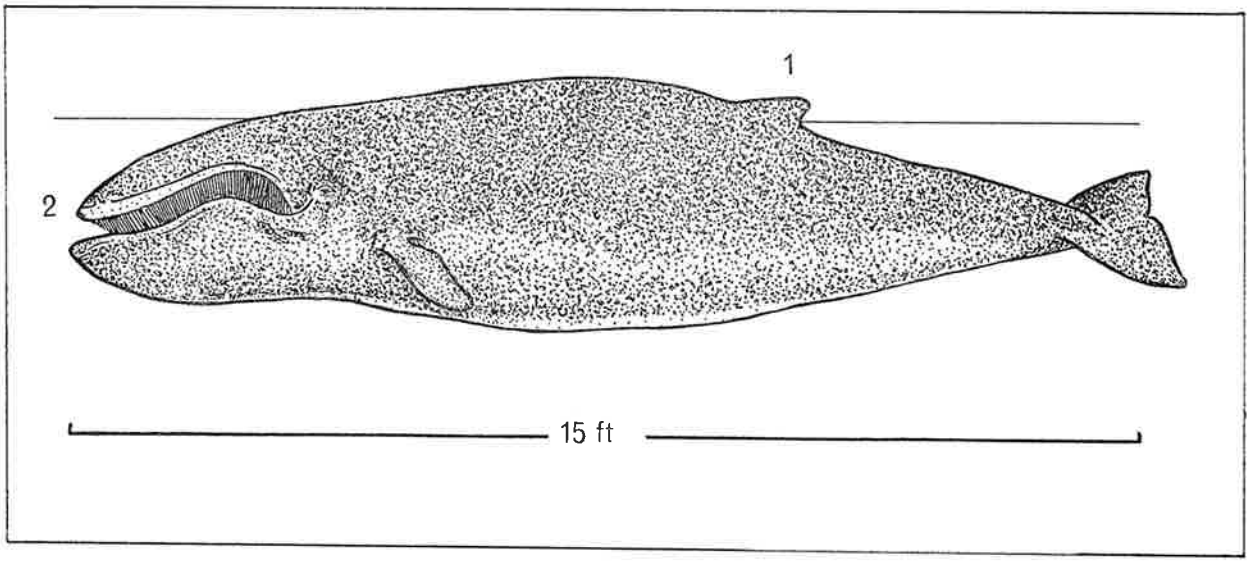


Fig. 3: Sightings] of [southern right whales at Campbell Island between 1911 and 1963, showing the seasonal change in percentage occurrence.

for several weeks (compare the humpback whales, which accumulate in Foveaux Strait on their southward migration (Dawbin, 1956a)). The right whales at Campbell Island have been observed rolling round in pairs at the surface and giving every appearance of mating (Messrs J. H. Sorensen and A. Wright, pers. comm.; Mr A. Poppleton, *in litt.*). Occasionally there are females with calves (Mr A. Wright, pers. comm.), and calves were recorded among the kills of the 1911–12 season. Females with calves have also been noted on rare occasions in recent years on the Australian and New Zealand coasts (Chittleborough, 1956; Dr W. H. Dawbin, pers. comm.; Gaskin, 1964c).

Since the same individuals may be observed on consecutive days, and perhaps weeks, any population estimate based on the gross sightings will almost certainly be too high. Additional evidence that the same whales stay round the island for some time is available. The observers have reported regular movements in the vicinity of the island as if the pairs and family groups moved in and out of the bays.



After Hale (1932b).

Fig. 4: *Caperea marginata*, the pygmy right whale. Points of identification: 1. A dorsal fin. 2. Long yellowish whalebone edged with black in a strongly arched mouth.

Population Estimates

Observations since 1957 of the total number of right whales seen at one time give an estimate of about 45 to 60 near Campbell Island. The total number of animals in the western South Pacific is probably not more than a few hundred (Gaskin, 1964c).

Only 14 southern right whales were sighted by the Russian vessel *Kooperatsiya* in 1957–58 at various localities in the Ross Sea and the Southern Ocean between the longitudes of New Zealand and Easter Island (Zenkovich, 1962).

Genus **Caperea** Gray, 1864

Caperea marginata (Gray, 1846), the Pygmy Right Whale (Fig. 4)

1846. *Balaena marginata* Gray, *in* Richardson and Gray, The Zoology of the Voyage . . . *Erebus* and *Terror* . . . , vol. 1, p. 48, pl. 1 fig. 1. Baleen only. Western Australia.

Comments

This animal differs from the other right whales in having a dorsal fin. Like other right whales, it has seven fused neck vertebrae and no ventral throat grooves. Gray (1871a) gave a note on the

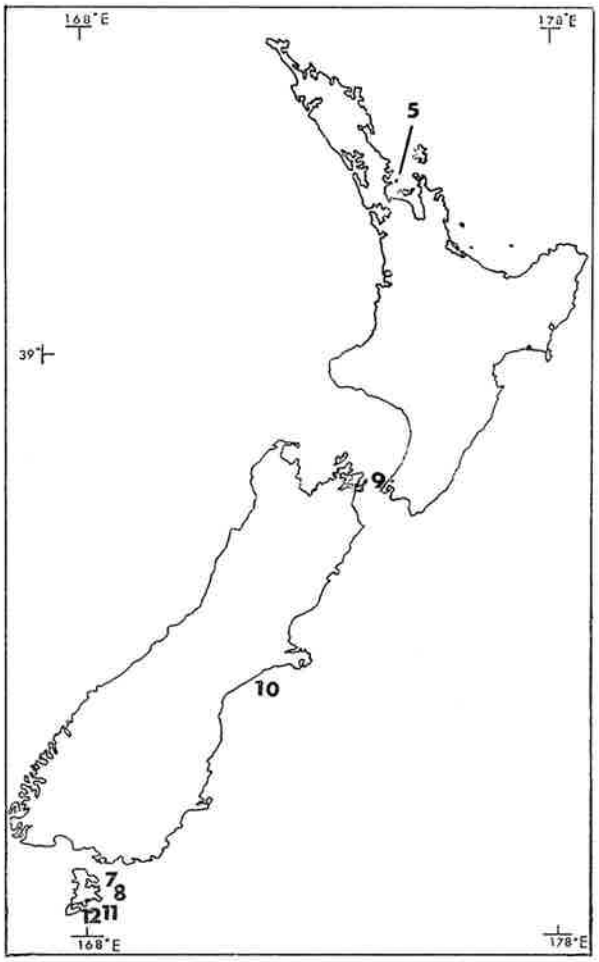


Fig. 5: The localities of known strandings of *Caperea marginata* on the New Zealand coast. The numbers indicating the strandings are the record numbers set out in table 4.

skull. Hector (1875) described a specimen from Stewart Island, stating that it was black with a light stripe on the ventral surface. The dorsal fin was small and not recurved. The baleen plates were yellowish white with blackish margins. The species appears to attain a maximum length of about 20 ft.

The pygmy right whale has been recorded from Tasmania (Davies and Guiler, 1957; Guiler, 1961); South Australia (Hale, 1932b and 1939); Western Australia (Gray, 1846); New South Wales (Iredale and Troughton, 1934); South Africa (Norman and Fraser, 1937); and South America (Norman and Fraser, 1937).

The Pygmy Right Whale in New Zealand Waters

There are 12 records of this species for New Zealand, some of them not well authenticated (table 4 and fig. 5). Eleven of these records were recently summarised by Davies and Guiler (1957) in conjunction with Australian records.

There have been no authenticated sightings of this animal at sea, and very little is known of its biology.

Family **BALAENOPTERIDAE,** Rorquals

The rorquals or fin whales differ from all the right whales except the pygmy right whale in having a dorsal fin. The neck vertebrae are free, not fused. The baleen plates are relatively much shorter than those of the right whales. There are up to a hundred grooves in the skin of the throat and ventral thoracic region. All rorquals are slim with smooth lines, but the larger species of right whale are stout.

There are eight distinct species. One distinct form, the so-called "pygmy" blue whale, does not seem to have been given valid specific status yet, though it can apparently be separated from the true blue whale *musculus* (Ichihara, 1963). The largest concentration of these whales occurs in the Southern Ocean to the south and west of Australia. The spread of the population appears to be reasonably wide, as a specimen has recently been identified at the Durban whaling station in South Africa (Gambell, 1964).

A century ago there was considerable confusion about the identities of the rorqual species, and even until the late nineteenth century it was considered that there were more than one species of blue whale and fin whale (Hector, 1875). Though there is still doubt over the specific status of the pygmy blue whale and the minke

TABLE 4: New Zealand Strandings of *Caperea marginata**

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Not known	Part of skel. in Paris Mus.	Oliver, 1922c
2	1	Not known	Not known	Some material in Aust. Mus.	Davies and Guiler, 1957
3	1	Not known	Not known	Part of skel. in Amer. Mus. Nat. Hist.	Davies and Guiler, 1957
4	1	Before 1864	Not known	Spec. in Brit. Mus.	Hector, 1873a
5	1	Before 1870	Kawau Island	Skull in Dom. Mus.	Hector, 1873a
6	1	Before 1874	Not known	Skull of young animal in Auck. Mus.	Hector, 1875
7	1	Jan 1874	Stewart Island	Skel. of 15 ft 6 in. adult in Brit. Mus.	Hector, 1875
8	1	Not known. 1874?	Stewart Island?	Skel. in Dom. Mus.	Oliver, 1922c
9	1	About 1880	Ohariu Bay	Skel. in Dom. Mus.	Oliver, 1922c
10	1	About 1891	Canterbury	Skel. of 15 ft adult in Aust. Mus.	Oliver, 1922c
11	1	Oct 1944	Stewart Island	Skull in Dom. Mus.	Davies and Guiler, 1957
12	1	Apr 1951	Stewart Island	16 ft adult	L. Gurr, pers. comm.

*Abbreviations used in this table and succeeding tables are:
Amer. Mus. Nat. Hist., American Museum of Natural History, New York; Auck. Mus., Auckland Institute and Museum; Aust. Mus., Australian Museum, Sydney; Bishop Mus., Bernice Pauahi Bishop Museum, Honolulu; Brit. Mus., British Museum, London; Cam. Univ. Zool. Mus., Museum of Zoology, the University of Cambridge; Cant. Mus., Canterbury Museum, Christchurch; Dept., Department; descr., description; Dom. Mus., Dominion Museum, Wellington; Mass. Univ. coll., Massey University collection; Mus. Comp. Zool., Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; Mus. Roy. Coll. Surg., Museum of the Royal College of Surgeons of England, London; Otago Mus., Otago Museum, Dunedin; Paris Mus., Paris Museum; rep., report; skel., skeleton; spec., specimen; str., strandings; U.S. Nat. Mus., United States National Museum Washington, D.C.; U.S.S. Co., Union Steam Ship Co. of New Zealand Ltd.; vert., vertebrae; Wa. Mus., Wanganui Museum.

whales of the Atlantic, Pacific, and Southern Oceans, most of the species are now well known. Bryde's whale was the last of the established species to be described (Olsen, 1913). It was first recognised in South African waters, but has since been described from many other areas.

Analysis of the catch compositions of pelagic whaling expeditions produces valuable information on the exploited populations (Nishiwaki and Hayashi, 1950; Nishiwaki and Oye, 1951). Some studies have suggested that within some and perhaps all whale species there are different races and subpopulations. Evidence for this is sometimes statistical (Jonsgård, 1952) and sometimes biological (Fujino, 1953).

The author accepts six species of rorqual as occurring in New Zealand waters, five in the genus *Balaenoptera*—blue, finback, sei, Bryde's, and minke whales — and one in the genus *Megaptera*, the humpback whale.

Genus **Balaenoptera** Lacépède, 1804

Balaenoptera musculus intermedia Burmeister, 1866, the Southern Blue Whale (Fig. 6)

1758. *Balaena musculus* Linneaus, Systema Naturae, 10th ed., vol. 1, p. 76, 1 January. Scotland.
1866. *Balaenoptera musculus intermedia* Burmeister, *Ann. Mag. nat. Hist., ser. 3, 17*: 102.

Comments

The skin of the blue whale is greyish blue and usually uniform except for dappling or patches of paler colour on the ventral surface. Even on land or on the deck of a factory ship (frontispiece), when it loses much of its shape, the blue whale is a graceful and streamlined animal despite its vast bulk. Specimens over 100 ft long have been recorded. The dorsal fin is small for the size of the animal. The baleen plates are black.

After blue whales have been in the polar seas for some months a film of diatoms begins to accumulate thickly on the skin, mainly on the ventral surface. When it becomes thick this film is yellow or orange, and this has led to the well known term "sulphur bottom" whale, which was formerly considered by some authorities to be perhaps a separate species. The diatom film has been discussed by Omura (1950).

The Southern Blue Whale in New Zealand Waters

Records of this whale in New Zealand coastal waters are scattered over many years. Age studies on this species (Ruud, Jonsgård, and Ottestad, 1950) and other population studies helped to show long ago that the species was being seriously overexploited, and it is now a protected animal. The recorded strandings of *Balaenoptera musculus intermedia* on the New Zealand coast are listed in table 5, and their localities are shown in fig. 7.

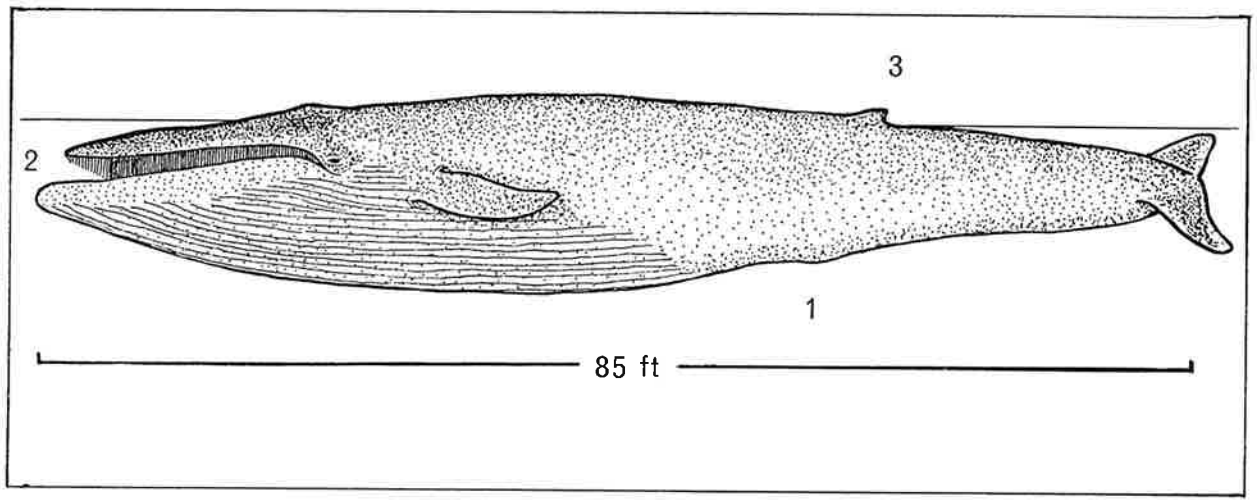


Fig. 6: *Balaenoptera musculus intermedia*, the southern blue whale. Points of identification: 1. A slate blue skin on the ventral surface as well as on the dorsal surface. 2. Black baleen. 3. A dorsal fin.

TABLE 5: New Zealand Strandings of *Balaenoptera musculus*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	1873	Coal Point	No data	Hutton, 1875
2	1	Feb 1908	Okarito	Skel. of 87 ft female in Cant. Mus.	Waite, 1912
3	1	1912	Lyall Bay	70 ft adult	Dom. Mus. str. file
4	1	Apr 1920	Napier	66 ft adult	Dom. Mus. str. file
5	1	1920	New Brighton	62 ft adult	Dom. Mus. str. file
6	1	1925	Orewa	90 ft female	Archey, 1926
7	1	Dec 1932	Hokitika	81 ft adult	Marine Dept. str. file
8	1	1951	Whangaehu	77 ft male	Marine Dept. str. file

Five blue whales were taken by the Tory Channel whalers between 1930 and 1947. Only the lengths of the 1938 and 1947 specimens are known, though it is not known if the standard length was measured on the former. All the known data on these animals are given in table 6, abstracted from records of the Marine Department.

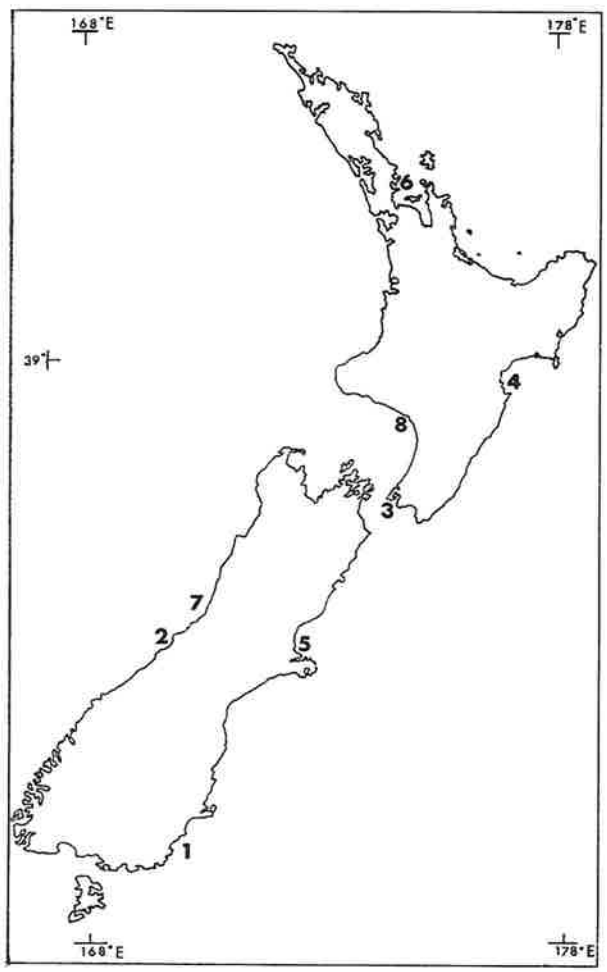


Fig. 7: The localities of known strandings of *Balaenoptera musculus* on the New Zealand coast. The numbers are the record numbers in table 5.

TABLE 6: Blue Whales Taken at Tory Channel, 1930–47

Date	Sex	Length	Other Details
1930	Not known	Not known	None
31 July 1938	Female	98 ft	Uterus contained 1 oz foetus, sex undetermined
1939	Not known	Not known	None
1940	Not known	Not known	None
17 June 1947	Female	85 ft	No foetus. 361 baleen plates per side

Balaenoptera physalus quoyi Fischer, 1829, the Southern Finback Whale (Fig. 8)

1758. *Balaena physalus* Linneaus, Systema Naturae 10th ed., vol. 1, p. 75, 1 January. European seas.

1829. *Balaenoptera physalus quoyi* Fischer, Synopsis Mammalium, p. 524.

Comments

The average length of the male finback, fin, or finner whale or common rorqual is about 67 ft and that of the female about 73 ft. Because of the heavy catches of this species in the Southern Ocean finbacks rarely reach 80 ft now. The longest of 26,364 whales of the species taken in the Southern Ocean in the 1961 Antarctic whaling season was a female finback 85 ft long, which was measured by the author.

The finback is sleeker in build than the blue whale, the head being more streamlined and the snout less blunt. The dorsal surface is light dappled grey. The ventral surface is white (fig. 9), including the under surfaces of the flippers and the flukes. The right side of the lower jaw is white and the left side grey, colouring which seems to

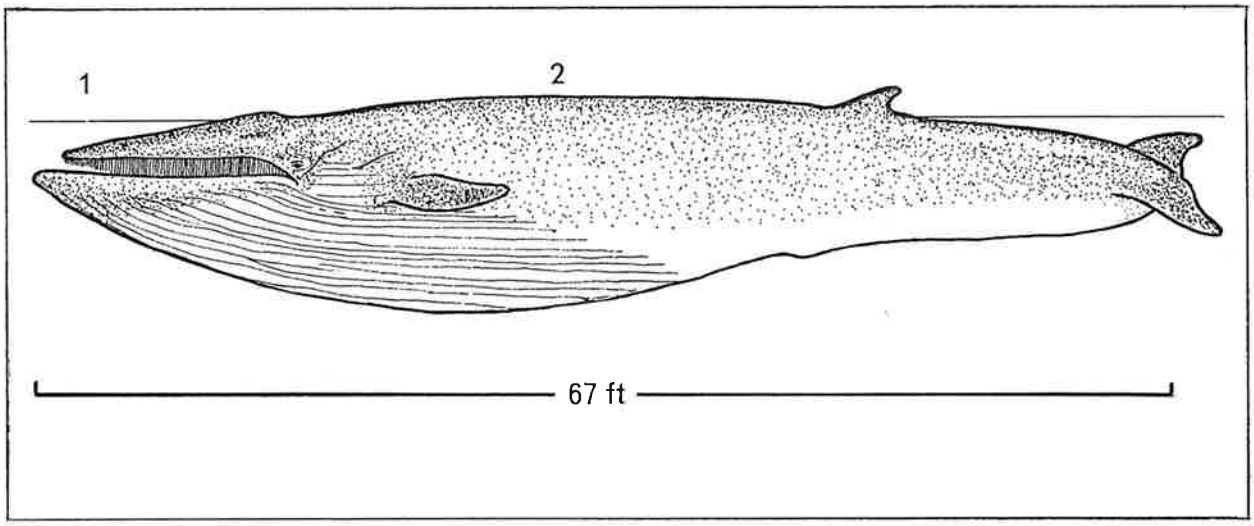


Fig. 8: *Balaenoptera physalus quoyi*, the southern finback whale. Points of identification: 1. Yellowish grey whalebone, white at the anterior end of the right side. 2. Dorsal surface light dappled grey, ventral surface white; the white extends to the under sides of the flukes and flippers.

be associated with the fin whale's habit of swimming tilted to the right when feeding. There is a little variation in the relative amounts of grey and white in the finback.

The northern finback appears to be slightly smaller at maturity than its Southern Hemisphere counterpart (Slijper, 1962). Studies have been made on growth in this species (Fujino, 1954b; Pike, 1953a; Ohsumi, 1960; Ohsumi, Nishiwaki, and Hibiya, 1958) and in the foetus (Laws, 1959b). An examination of a large sample by Nemoto (1962) appeared to show a difference in the shape of the tip of the snout in males and females. The baleen of this species is bluish grey except on the anterior section of the right side of the head, where it is white. The sexes of the fin whale were studied by Brinkmann (1948), and Laws (1959a) described the breeding cycle.

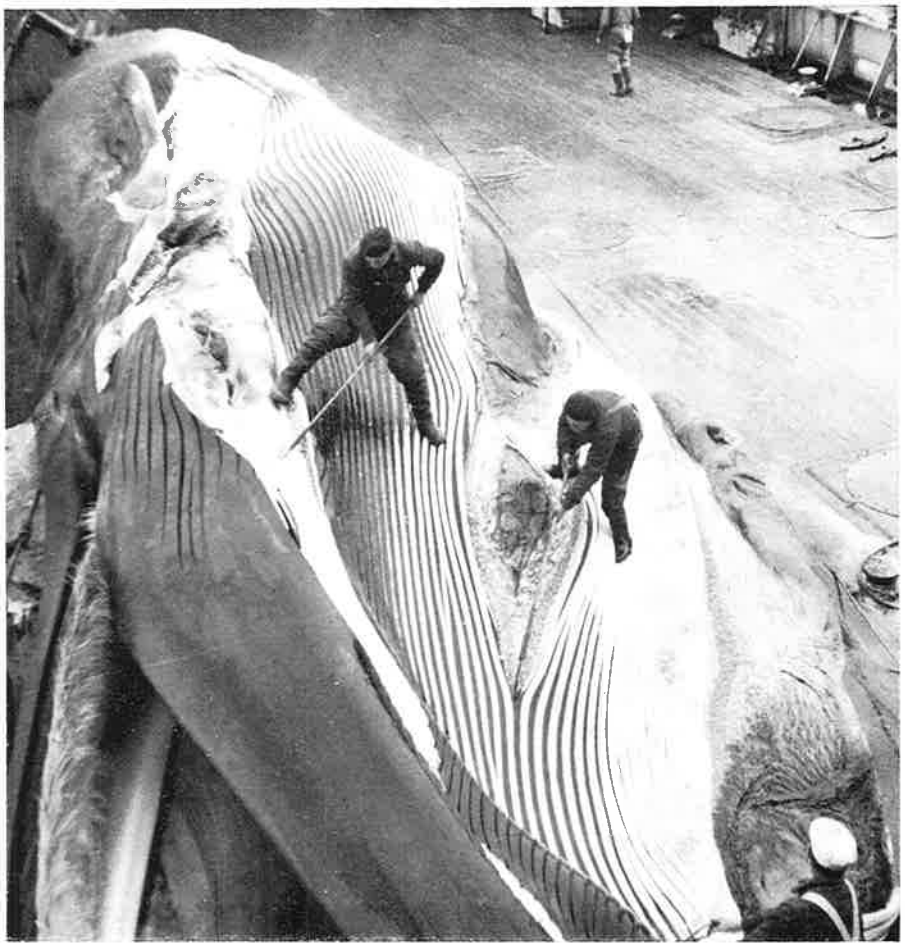
However, since the finback whale is the mainstay of the Southern Ocean industry, most recent biological studies have centred round the sexual cycle and methods of determining the age of animals of the species. General studies on the habits (Gunther, 1949) and the breeding season (Laws, 1959a) have thrown much light on the possible productivity of the species. Kimura (1957) made a survey of the incidence of twinning in the finback, once regarded as very unusual.

Attempts have been made to examine the age structure of finback populations (Wheeler, 1930). Nishiwaki (1950) studied the change in colour of the crystalline lens, and Ruud (1945) studied the growth ridges in the baleen plates. Later it was found that laminations in the earplug were associated with age (Purves and Mountford, 1959). Further studies on the earplug laminations have been carried out in Japan (Nishiwaki, Ichihara, and Ohsumi, 1958). In association with the age studies some definitive studies on the size of the total Antarctic stock have been made; among the earlier ones were those by Mackintosh and Wheeler (1929), Mackintosh (1942), Mackintosh and Brown (1956), and Ottestad (1956). The last author also studied the sustainable yield of the Antarctic stock.

Like the blue whale, the finback is a migratory species and generally seems to stay well away from shore when on passage. The dispersal of blue and fin whales has been studied by Brown (1954). Much has been learnt about the movements of the species by the recovery of whale marks (Brown, 1957). Off the west coast of South America it appears that finback whales are usually found moving north and south about 100 miles from shore (Robert Clarke, 1962). Off the coast of Western Australia finbacks may be found moving between 3 and 20 miles off shore (Chittleborough, 1953).

The Southern Finback Whale in New Zealand Waters

New Zealand Marine Department whale survey vessels and the Tory Channel whale chaser worked off the eastern end of Cook Strait up to 60



Photograph by D. E. Gaskin.

Fig. 9: A finback whale being flensed on the deck of the FF *Southern Venturer* near the South Sandwich Islands in December 1961.

miles from shore for a year (1963–64), when only two finbacks were seen. One of these, a 60 ft male, was caught by the Tory Channel whalers about 8 miles off the Kaikoura Peninsula and appears to be the only one of the species taken by a shorebased whaling establishment on the New Zealand mainland. No finback was recorded by the Tory Channel company as being caught from 1910 to 1963, and though the odd finback whale was sighted by the whalers in Cook Strait, apparently none was taken.

In February and March 1964 the officers of the whale chaser *Orca* began reporting single finbacks moving up the coast about 15 miles from shore in the Kaikoura region at first and later off Cape Palliser.

The Marine Department has records of three finbacks in Cook Strait before 1963, all in 1948. These were a mother and calf, which were reported by the Tory Channel company and which came into Cook Strait, and a single large specimen sighted by the same observers close to

TABLE 7: New Zealand Strandings of *Balaenoptera physalus*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	10 Jun 1873	Port Underwood	Skel. of 70 ft female in Dom. Mus.	Hector, 1875
2	1	20 Apr 1881	New Brighton	66 ft unsexed spec.	von Haast, 1883
3	1	1883	Nelson	Skel. of adult in Otago Mus.	Parker, 1885, as *musculus*
4	1	Jul 1912	Campbell Island	Harpooned by shore whalers	Unpublished diary in Dom. Mus.
5	1	1940	Akatore	70 ft adult	L. Gurr, pers. comm.
6	1	Jan 1950	Warrington	67 ft female	L. Gurr, pers. comm.

Sinclair Head. No dates were recorded, though the reports were filed at the end of March 1948.

Occurrences near Campbell Island

The Department also has records of four finbacks in shallow water at Campbell Island. A pair of this species came into Perseverance Harbour on 7 June 1911 and were recorded by the whalers there. A single finback was harpooned and rendered down by the whalers at Cook's whaling station on the same island in July 1912. A solitary finback was observed in North West Bay on 8 November 1948 and identified by Dr R. A. Falla, then of the Dominion Museum.

Toward the end of winter in 1963 a few whales were reported by the weather station staff at Raoul Island, in the Kermadec Islands, and the descriptions tallied with the characters of finback whales.

A list of strandings has been compiled (table 7) and the locations of these are shown in fig. 10.

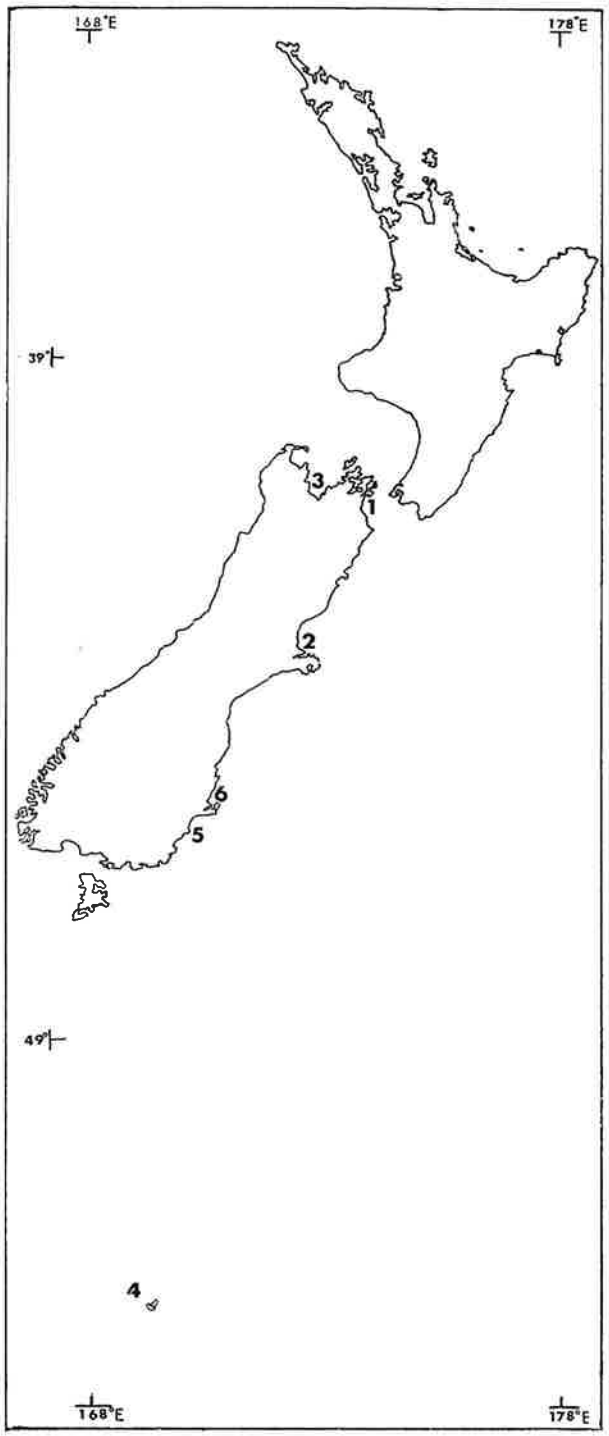


Fig. 10: The localities of known strandings of *Balaenoptera physalus* on the New Zealand coast. The numbers are the record numbers in table 7.

Balaenoptera borealis schlegeli (Flower, 1865), the Southern Sei Whale (Fig. 11)

1828. *Balaenoptera borealis* Lesson, Histoire Naturelle . . . des Mammifères et des Oiseaux Découverts depuis 1788 . . . , Cétacés, p. 342.

1865. *Sibbaldius schlegeli* Flower, *Proc. zool. Soc. Lond. 1864*: 400.

Comments

The sei whale is the smallest rorqual usually exploited in the Southern Ocean, and because of its small oil yield it has been taken in large numbers by factory ships only in fairly recent years. In general outline it is much like a small replica of the finback. The sei whale becomes sexually mature when about 40 to 50 ft long, and a few animals reach 60 ft at physical maturity, whereas the length of the finback at sexual maturity is 67 to 73 ft. The species was hunted extensively in the Northern Hemisphere long before it became important in the Southern Ocean catch. Thus Lydekker (1922) noted that in 1885, 771 sei whales were caught by Norwegian whalers off the coast of northern Norway.

The baleen plates are black with a white fringe. The general colour on the dorsal surface is bluish grey, which merges gradually into white on the ventral surface (fig. 12). This white area does not, however, extend on to the under surface of the flukes and flippers as in the finback, and it is often partly obscured by a pinkish tinge. In a few animals the dorsal surface is so dark that it appears black at a distance, and such specimens

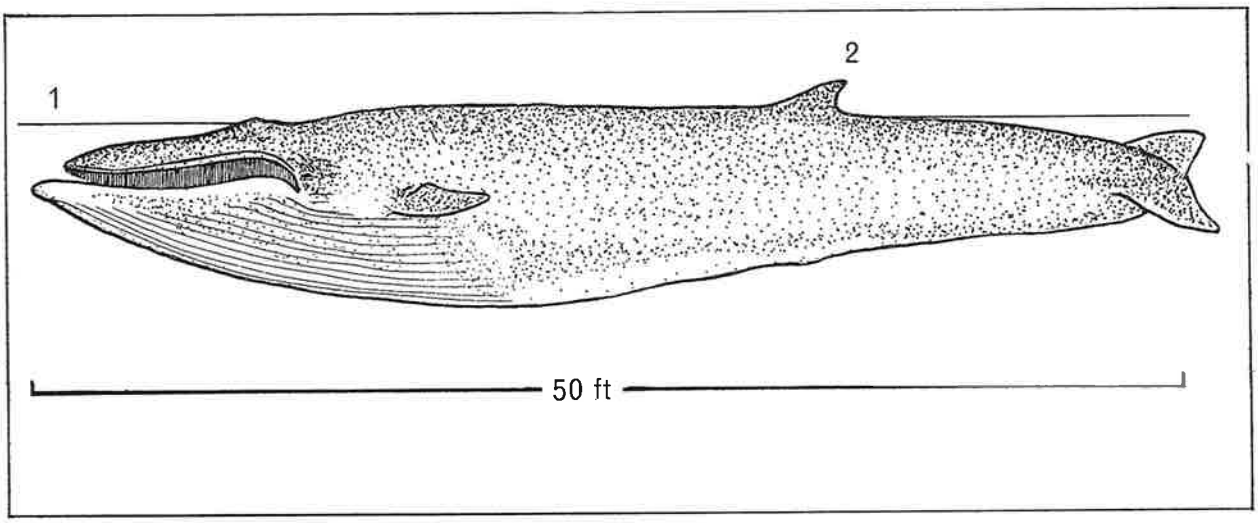


Fig. 11. *Balaenoptera borealis schlegeli*, the southern sei whale. Points of identification: 1. Black whalebone with a white hair fringe. 2. Dorsal surface bluish grey, ventral surface white and pink; the white does not extend on to the under surfaces of the flukes and flippers.

appear quite piebald, like many humpback whales. The external characters of sei whales on the coast of Japan have been discussed by Omura and Fujino (1954). Two major monographs have been produced on this species, one by Andrews (1916) and the other by Matthews (1938c). When it is swimming the species is usually recognised by experienced whalers by its narrow back, the thin spout, and the prominent hooked dorsal fin. The sei and its close relative, Bryde's whale, can swim very fast over short distances, and it has been checked at 35 knots for a few seconds (Slijper, 1962).

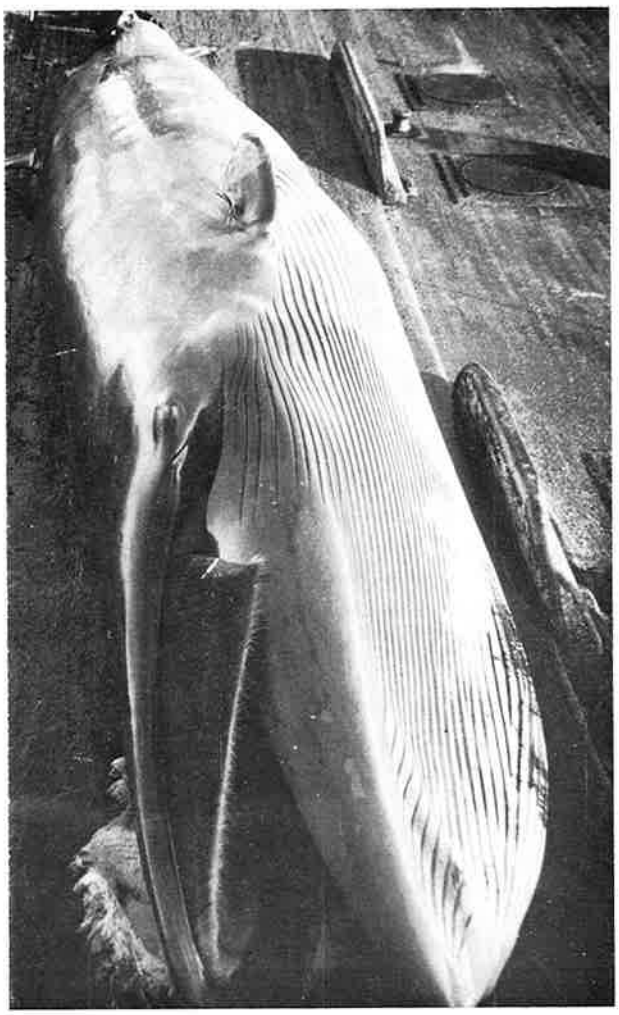


Fig. 12: A sei whale, taken among the South Shetland Islands in March 1962, on the deck of the FF *Southern Venturer*. The white fringe to the whalebone can be seen.

Photograph by D. E. Gaskin.

At present the distributions of sei and Bryde's whales are imperfectly known. Bryde's whale apparently does not migrate to and from the Antarctic like the sei whale (Symons, 1955). It seems almost certain that the populations may mix during part of the year, probably in winter, when sei whales are in tropical and temperate latitudes. The possibility of some populations of intermediate characteristics cannot be discounted. The two species can be distinguished in the water only by a close view of the snout. Bryde's whale has a central rostral ridge and a pair of dorsolateral ridges, but the sei whale has only a single central rostral ridge. The known occurrences of Bryde's whale in certain areas are discussed in the next section.

With the population of blue and fin whales declining the sei whale has become more prominent in Southern Ocean catches. The biology has been studied by Matthews (1938c). Sei whales are also important in the catch of whales on the coast of Japan, where their movements have been studied by Omura and Nemoto (1955), and at the Bonin Islands, where Nishimoto, Tozawa, and Kawakami (1952) have studied the food of the species and where Nishiwaki, Hibiya, and Kimura (1954) have studied its sexual maturity. The anatomy was described by Carte and MacAlister (1868).

The Southern Sei Whale in New Zealand Waters

On 1 February 1922 a "sei" whale was stranded in Porirua Harbour and the length was recorded as 53 ft (Oliver, 1922a). The length and appearance of the belly grooves in a photograph suggest that this specimen could have been *borealis*, not *edeni*. Five other strandings of "sei" whales have been recorded (table 8 and fig. 13).

The 1963 Marine Department whale survey vessels twice saw what were probably sei whales near Cape Palliser in February and again in June. A specimen of *borealis* was captured by the Tory Channel company in 1956. A description of the baleen in a Marine Department record indicates that this identification was correct.

Four sei whales were taken by the company in December 1964, and detailed descriptions obtained then show clearly that these whales were *borealis*, not *edeni*. Several other probable sei whales were seen by the company's whale chaser in December 1964, though they were not taken, and others were sighted in March of the same year. Several animals of this species were also reported from the Akaroa lighthouse and an RNZAF aircraft in March 1964. Sei whales seen and reported by merchant vessels off the west coast of the North Island and in the central Tasman Sea in May and June 1963 could have been either species. These schools were moving north.

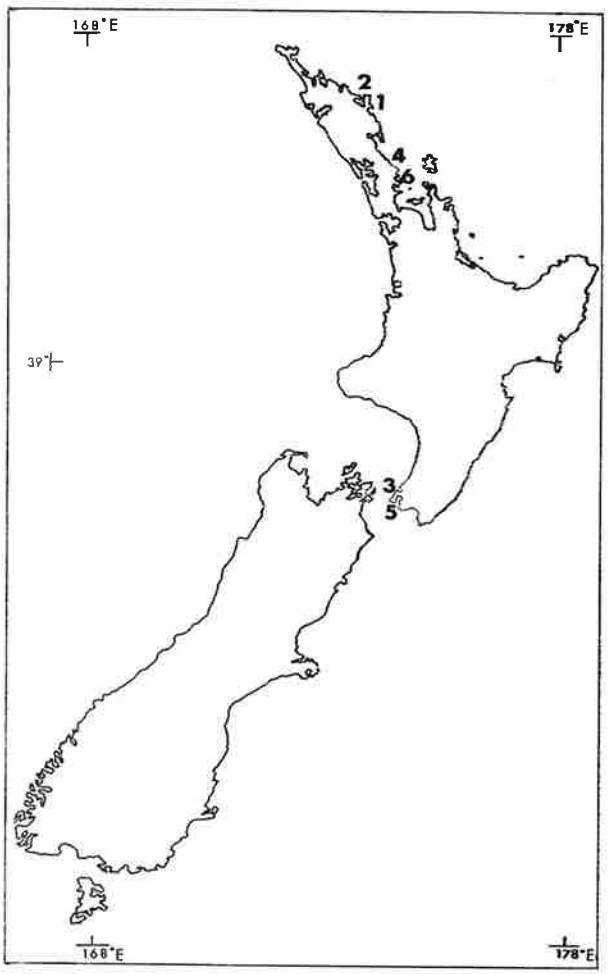


Fig. 13: The localities of known strandings of "sei" whales on the New Zealand coast. The numbers are the record numbers in table 8.

Balaenoptera borealis is thus among the Cetacea recorded in New Zealand waters. However, the six records of stranded baleen whales assigned to this species include only one undoubted occurrence—the Lyall Bay specimen.

TABLE 8: New Zealand Strandings of "Sei" Whales

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	5 Dec 1911	Whangamumu	46 ft male	Oliver, 1922c
2	1	1912	Bay of Islands	46 ft adult	Lillie, 1915
3	1	1 Feb 1922	Porirua Harbour	53 ft female	Oliver, 1922a
4	1	1923	Mangawhai	Adult	Marine Dept. str. file
5	1	Aug 1948	Lyall Bay	46 ft adult	C. McCann, pers. comm.
6	1	6 Oct 1963	Motuora Island	39 ft female	Marine Dept. record from A.R.S. Chamberlin

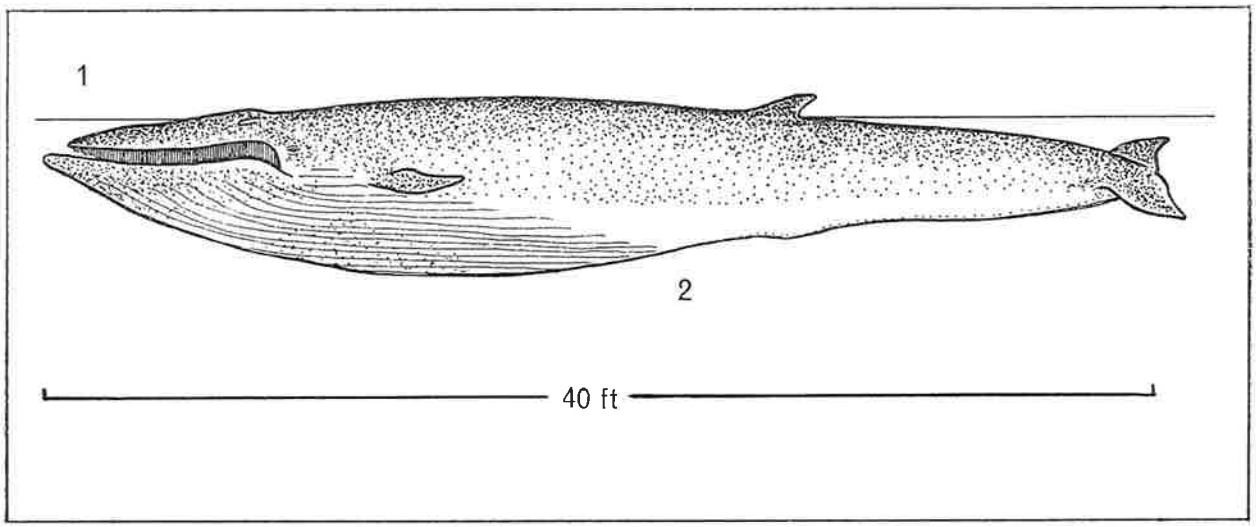


Fig. 14: *Balaenoptera edeni*, Bryde's whale. Points of identification: 1. Coarse blackish whalebone without a pale fringe, though some anterior plates are streaked with white. 2. The ventral grooves extend to the navel.

Balaenoptera edeni Anderson, 1878, Bryde's Whale (Fig. 14)

1878. *Balaenoptera edeni* Anderson, Anatomical and Zoological Researches . . . Expeditions to Western Yunnan . . . , p. 551.

Comments

Though the species was first described by Anderson, so that his name, *edeni*, must take precedence, the full specific and positive description of the new species was given by Olsen (1913). Anderson's section on *edeni* gives the impression that he did not really believe that he was describing anything but a variety of the sei whale, *borealis*. Olsen described the species from the coast of South Africa.

Though intermediate types are not unknown, Bryde's whale can usually be distinguished by the following characters:

1. The general build of the body is much slimmer than that of *borealis*.

2. The rostrum bears three ridges, one median and the others dorso-lateral.

3. The grooves under the lower jaw extend much further posteriorly than those of *borealis*.

4. The baleen plates are more robust and coarser than those of *borealis*, in keeping with the normal diet of *edeni*, which is fish, not krill. Anteriorly the baleen is usually grey and white instead of black as in *borealis;* posteriorly it is black.

5. Bryde's whale matures sexually at a smaller size in both sexes than *borealis*. The species becomes sexually mature at about 39 ft, compared with the 40 to 50 ft of *borealis*.

The geographical areas occupied by *borealis* and *edeni* may be impossible to define. Bryde's whale has been positively identified from the Malacca Straits (Junge, 1950), Brazil (Omura, 1962a), Japan (Omura, 1959 and 1962b), the western side of South Africa (Best, 1960) and the eastern side (Olsen, 1913), the former French Equatorial Africa (Ruud, 1952), the Caribbean (Slijper, 1962), the Bay of Bengal (Slijper, 1962), and Western Australia (Chittleborough, 1959b).

Bryde's Whale in New Zealand Waters

Samples from "sei" whales taken in northern New Zealand waters in recent years by the whaling station formerly at Great Barrier Island have been examined. These indicated that the animals frequently noted near Great Barrier Island were *Balaenoptera edeni* (Dr W. H. Dawbin, pers. comm.). Data collected from a specimen stranded in the Hauraki Gulf in 1963 (fig. 15) and examined by the author confirm this view, though the baleen plates were not exactly the same as those described from other parts of the world (Slijper, 1962). A preliminary note has

already been published on this population (Dawbin, 1956b). It has since been found by the author that this population is a little more extensive than was then believed.

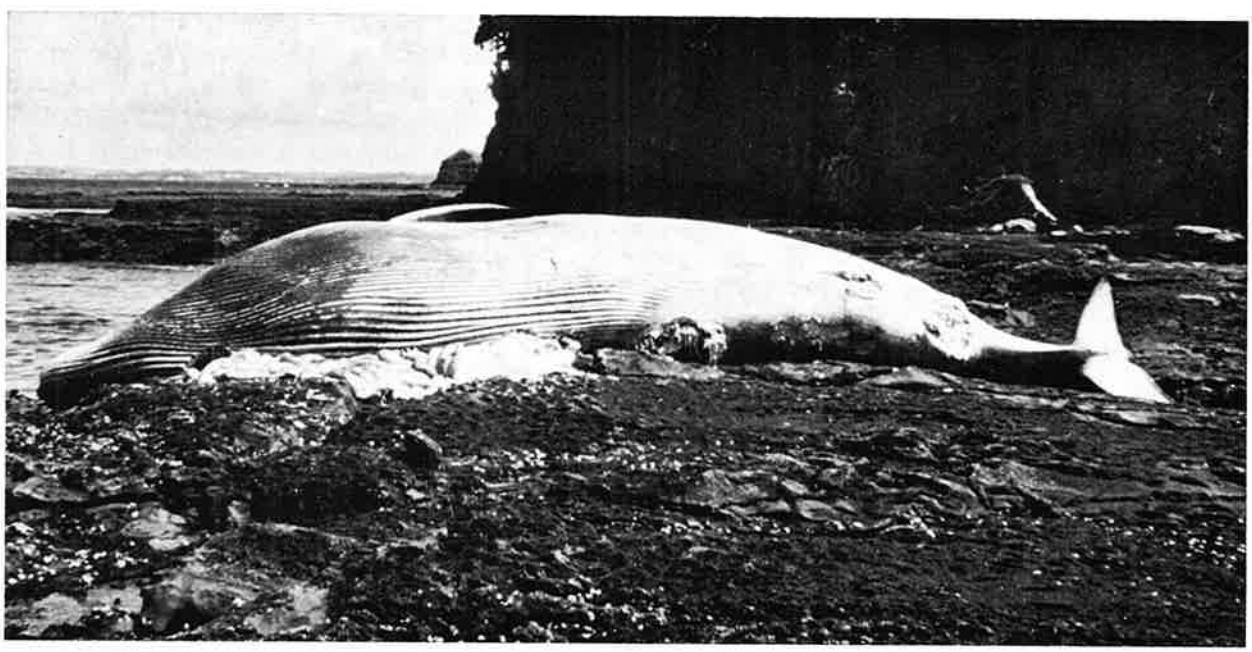
Since a sighting network was set up to find sperm whales round the coast of New Zealand many reports of "sei" whales have been received from the area between North Cape and East Cape. Formerly it was thought that these animals might be confined to an area between lat. 35° and 37° S and long. 174° and 176° E (Dawbin, 1956b). The animals also seemed to be plentiful near White Island, and it seems almost certain from the constancy of sightings throughout the year that these animals are non-migratory in the broad geographical sense and make only local and seasonal movements. At present the whales are not exploited and they are now reappearing in the Hauraki Gulf only a few miles outside Auckland Harbour.

From the catch figures of the defunct Great Barrier Island whaling station and observations made during the Marine Department whaling survey of 1963 it seems certain that the species can be found in the Hauraki Gulf - Bay of Plenty area in any month of the year. All the available length-sex data on the animals caught by the station on Great Barrier Island in 1956, 1957, 1959, and 1961 are given in table 9.

TABLE 9: Length-sex Data of Catches of *Balaenoptera edeni* by the Great Barrier Island Whaling Station in 1956, 1957, 1959, and 1961

	Males		Females	
	Number	Length	Number	Length
		ft		ft
	1	36	1	39
	1	43	1	42
	1	44	3	43
	2	45	1	44
	1	48	1	45
	..	..	2	46
	..	..	2	47
	..	..	1	48
	..	..	1	49
Mean	..	43.5	..	44.8

The migrations of *borealis* are not known, but in late summer a stream appears to come up from the Subantarctic, passing north along the east coast of the South Island until it reaches Cape Palliser. Probably most of these whales continue up the coast past East Cape, though some turn and pass through Cook Strait. There are no records of *edeni* south of East Cape (fig. 16).



Photograph by A. R. S. Chamberlin.

Fig. 15: A stranded Bryde's whale at Motuora Island, Auckland, in October 1963.

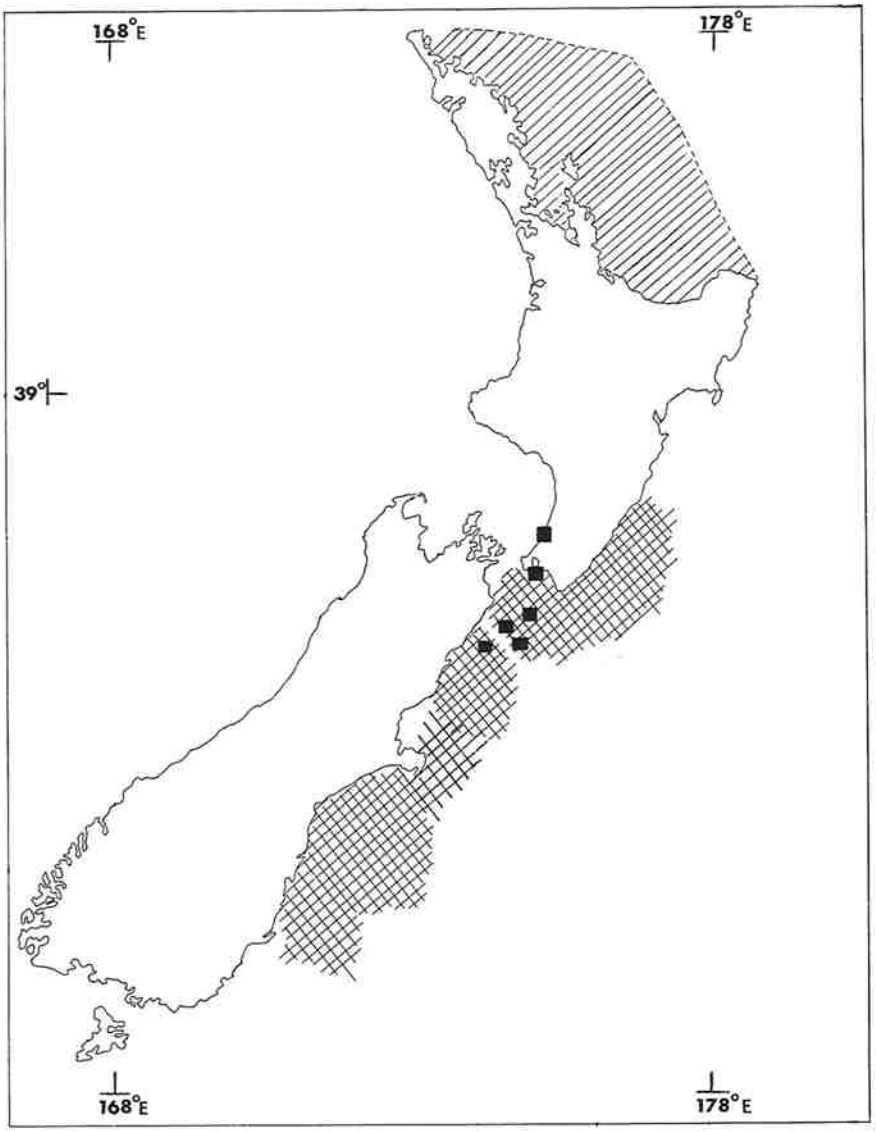


Fig. 16: Areas round New Zealand where *Balaenoptera borealis* and *Balaenoptera edeni* have been recorded. The localities of catches and strandings of *B. borealis* are shown by the black squares. The single diagonal hatching indicates the area where *B. edeni* is known to occur and the crossed hatching the area where "sei" whales have been observed but the species has not been determined.

Balaenoptera acutorostrata Lacépède, 1804, the Piked or Minke Whale (Fig. 17)

1804. *Balaenoptera acutorostrata* Lacépède, Histoire Naturelle des Cétacées . . . , p. 37. European seas.

Comments

There was much confusion in some of the older literature between this species and *B. borealis* and *B. edeni*. In different papers the synonymy varies. Thus Weber (1923) considered that *B. rostrata* was a synonym of *B. borealis*, as did Lydekker (1922); von Haast (1881) and Benham (1902b) noted *B. rostrata* as a synonym of *B. acutorostrata*. Gray (1874b) described a separate species, *B. huttoni*. Oliver (1922c) re-examined the material described by Gray, von Haast, and Benham and reassigned the specimens to *acutorostrata*.

There may be two species of minke whale in the Southern Hemisphere, *B. acutorostrata* and *B. bonaerensis* Burmeister, 1867. The latter species was first described by Burmeister (1867), but was considered a synonym of *acutorostrata* until Williamson (1961) discussed the question. The problem has recently been discussed again in relation to specimens caught by Japanese factory ships (Kasuya and Ichihara, 1965). *Balaenoptera huttoni* may be referable to *B. bonaerensis*.

In the Southern Ocean this species is probably the commonest of the rorquals, because it is the smallest and has the lowest oil yield. Often the

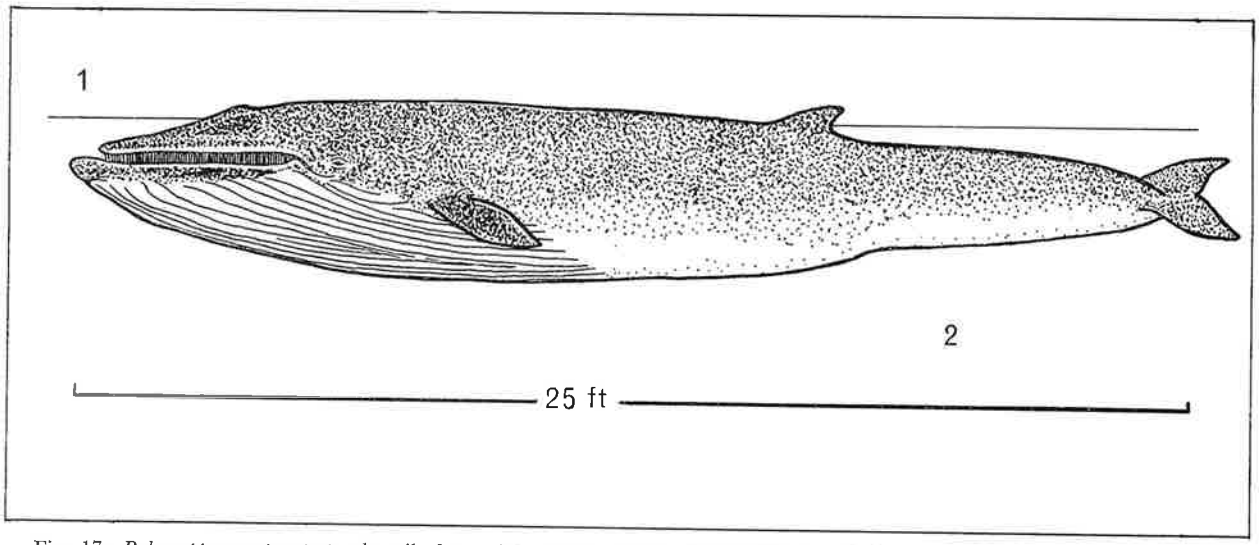
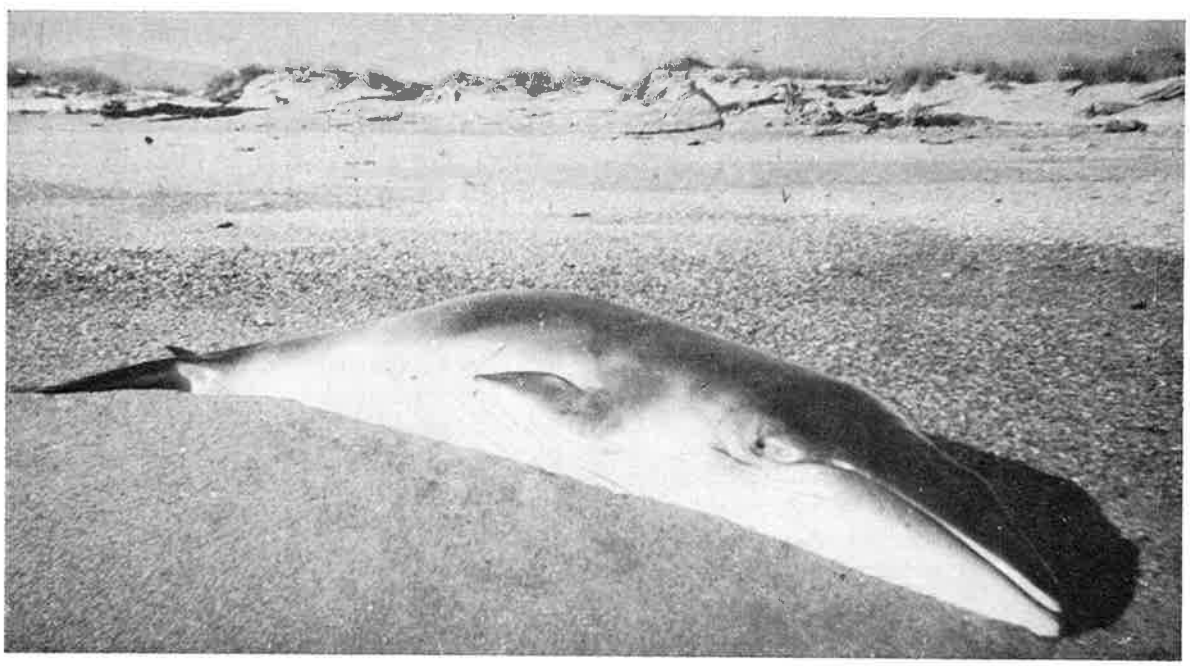


Fig. 17: *Balaenoptera acutorostrata,* the piked or minke whale. Points of identification: 1. Short, yellow whalebone. 2. The length hardly ever exceeds 30 ft.

species is seen in leads among the dense pack on the very edge of the Antarctic mainland. Taylor (1957) recorded the species restricted to small pools of free water in the ice and fighting a slowly losing battle to stop the holes freezing over.

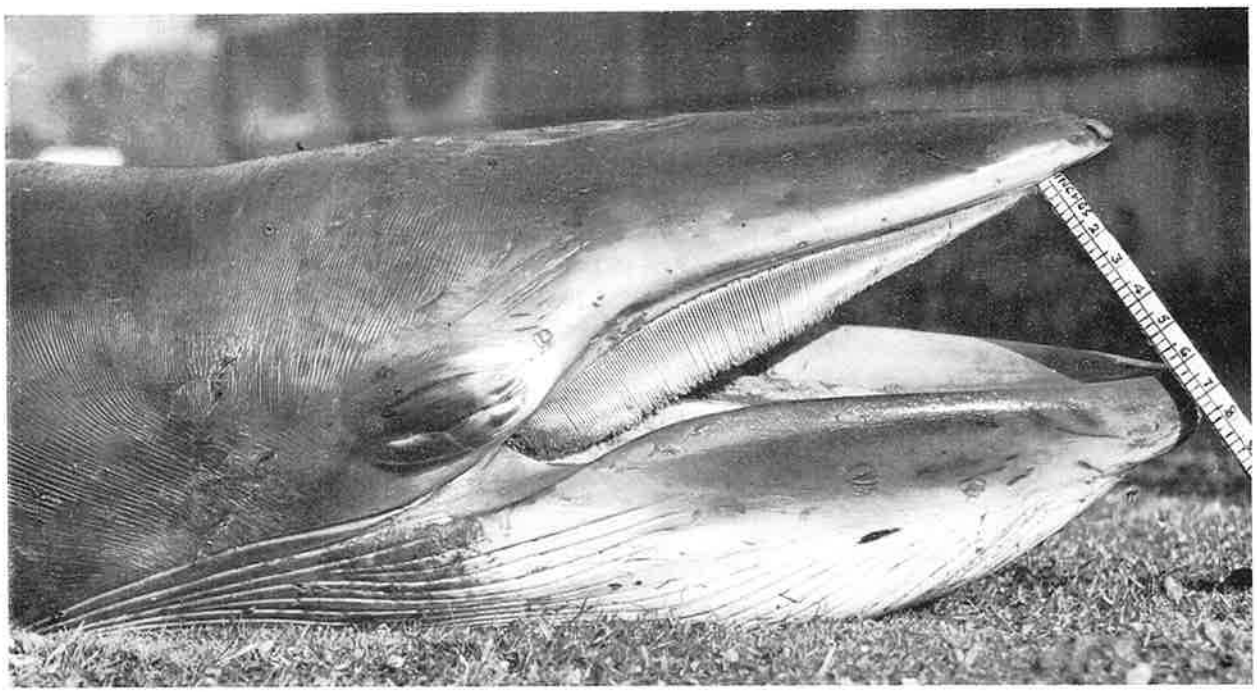
Balaenoptera acutorostrata is very widely distributed. It has been recorded from the northern islands of Scotland (Turner, 1891); the North Atlantic Ocean (Moore and Palmer, 1955); western South America (Robert Clarke, 1962); Norway (Jonsgård, 1951); Japan (Matsuura, 1936; Omura and Sakiura, 1956; Omura, 1957); California (Abbott, 1930; Fry, 1935; Rice, 1963a); Western Australia (Chittleborough, 1953); and Oregon and Washington (Cowan, 1939). In Japan it is the only rorqual to be kept for a short time in an aquarium (Kimura and Nemoto, 1956).

The greatest size recorded for this species is about 30 ft, but none of the specimens stranded in New Zealand has been as long. The whale is



Photograph by Mrs R. Wells, by courtesy of Dominion Museum, Wellington.

Fig. 18: A stranded minke whale at Haast in August 1958.



Photograph by C. M. Hale, by courtesy of Dominion Museum, Wellington.

Fig. 19: The head of a minke whale stranded at Plimmerton in June 1954.

bluish grey on the dorsal surface and pure white beneath (fig. 18). Norman and Fraser (1937) stated that the easiest external character to note for identification in this species is a patch of white on the outer side of the flipper. At least some New Zealand minke whales have lacked this. The baleen is very short (fig. 19) and dull yellow.

The whales described by Kasuya and Ichihara (1965) lacked a white patch on the flippers and were caught to the south of Australia. If *B. bonaerensis* is a distinct species, many of the New Zealand specimens recorded in table 10 may be referable to it instead of to *B. acutorostrata*. External descriptions are not available for most of this material, and separation will not be possible unless reliable skeletal or cranial characters are found for each species.

The Minke Whale in New Zealand Waters

There is little indication that the minke whale is common in New Zealand coastal waters. Two minke whales sighted by the whale chaser *Orca* near the Kaikoura Peninsula in December 1963

TABLE 10: New Zealand Strandings of *Balaenoptera acutorostrata*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Oct 1873	Otago Heads	Skel. with baleen of 16 ft spec., sex unknown, in Brit. Mus.	Gray, 1874b (type of *B. huttoni*)
2	1	7 Feb 1880	Sumner	Skel. of 23 ft male in Cant. Mus.	von Haast, 1881; Oliver, 1922c
3	1	1885	Port Ahuriri	"Young"	Oliver, 1922c
4	1	1885	Moeraki	Skull, "incomplete", in Otago Mus.	Oliver, 1922c
5	1	1900	Lyttelton Harbour	10 ft female	Dom. Mus. str. file
6	1	Aug 1900	Otago Heads	Young female	Benham, 1902b; Oliver, 1922c
7	1	16 Jun 1949	Waikouaiti	19 ft male	L. Gurr, pers. comm. and photograph
8	1	1954	Plimmerton	Cast of calf in Dom. Mus.	C. McCann, pers. comm. and photograph
9	1	1958	Haast	Small male	Dom. Mus. str. file
10	1	19 May 1958	Sinclair Head	7 ft 6 in. male	C. McCann, pers. comm.
11	1	14 Sep 1958	Palliser Bay	10 ft 6 in. female	C. McCann, pers. comm. and photograph
12	1	Sep 1960	Baring Head	No data	C. McCann, pers. comm.

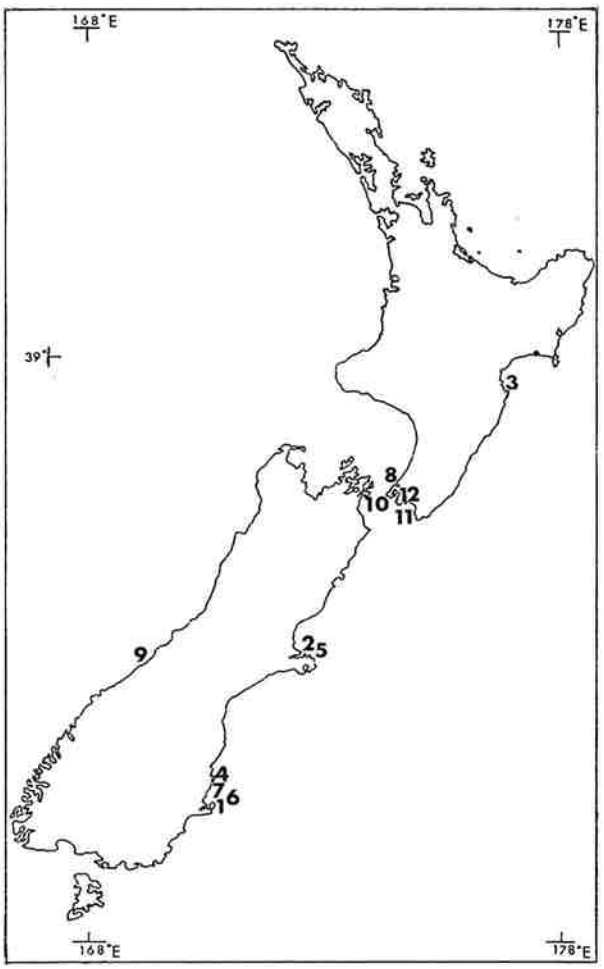


Fig. 20: The localities of known strandings of *Balaenoptera acutorostrata* on the New Zealand coast. The numbers are the record numbers in table 10.

were estimated to be 18 ft and 20 ft long respectively. There are 12 records of this species being stranded in New Zealand (table 10 and fig. 20).

The species may have occurred more frequently than the table indicates; there is a long gap between 1900 and 1949 and yet since 1949 six specimens have been reported. Since this is a small whale, there is a strong likelihood that a specimen coming ashore in a remote area might not be reported.

Genus **Megaptera** Gray, 1846

Megaptera novaeangliae lalandi (Fischer, 1829), the Southern Humpback Whale (Fig. 21)

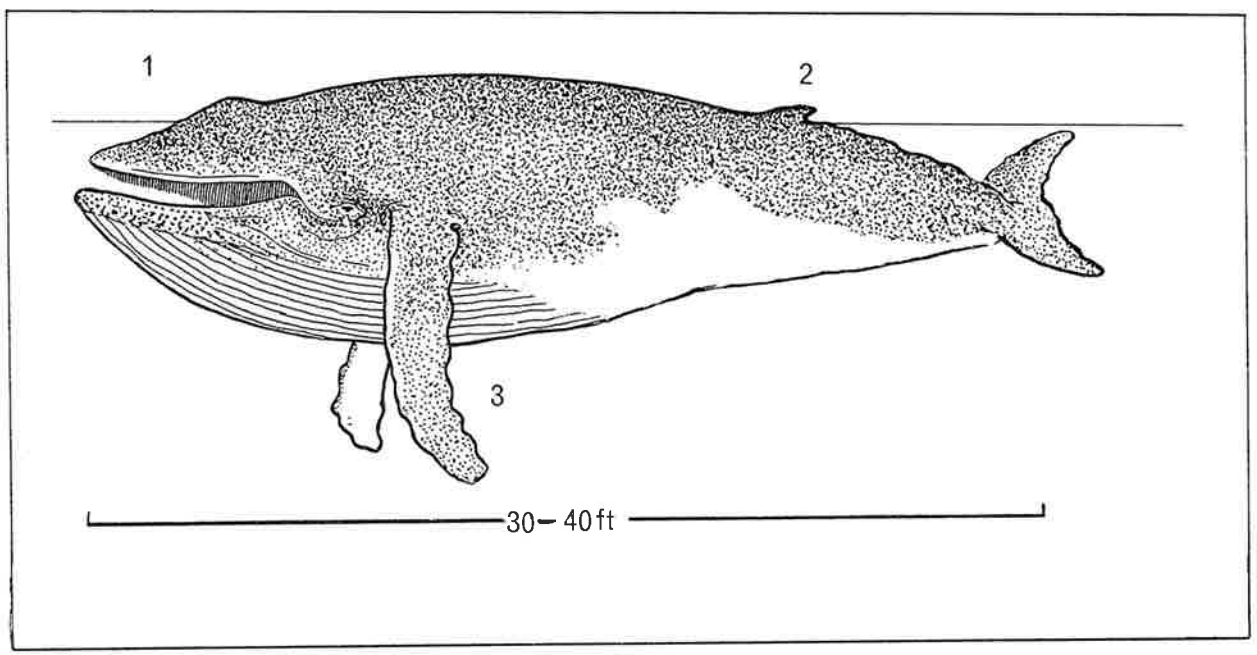
1781. *Balaena novae-angliae* Borowski, Gemeinnüzzige Naturgeschichte des Thierreichs . . . , vol. 2, p. 21. New England coast, U.S.A.

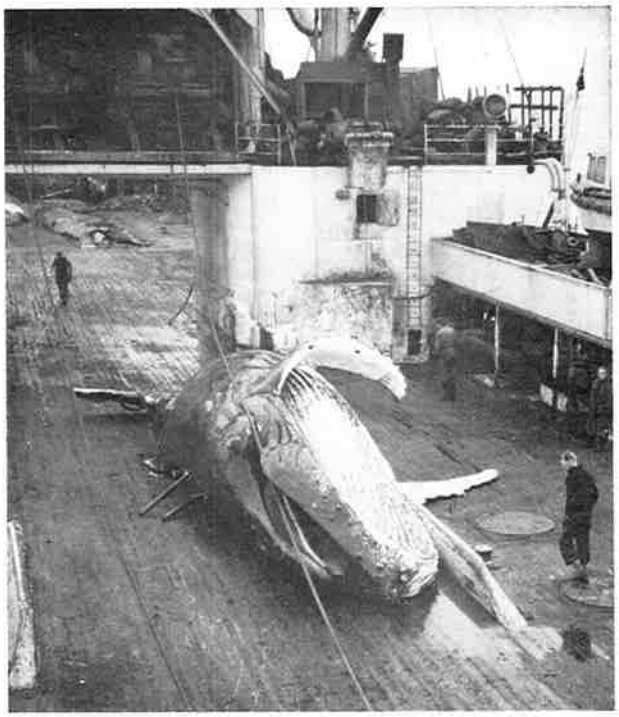
1829. *Balaena lalandi* Fischer, Synopsis Mammalium. p. 525. Cape of Good Hope, South Africa.

Comments

The humpback whale reaches a maximum length of 45 ft at physical maturity. The dorsal fin is not usually a very prominent feature and it is set well back on the hunched and rounded

Fig. 21. *(below)*: *Megaptera novaeangliae lalandi*, the southern humpback whale. Points of identification: 1. Black whalebone. 2. A small dorsal fin. 3. Very long flippers. The animal is usually covered with barnacles.





Photograph by D. E. Gaskin.

Fig. 22: A humpback whale on the deck of the FF *Southern Venturer* north of Princess Astrid Land in January 1962.

dorsal surface. There is a considerable range of colour variation. Normally the dorsal surface is black and the ventral surface white, the two areas or zones of colour meeting in the lateral mid-line, but there have been all-black and all-white animals. The whalebone is black.

The flippers are much longer in proportion to the length of the body than those of the other rorquals (figs. 21 and 22). The spout is thick and well formed, and the hunched back and small

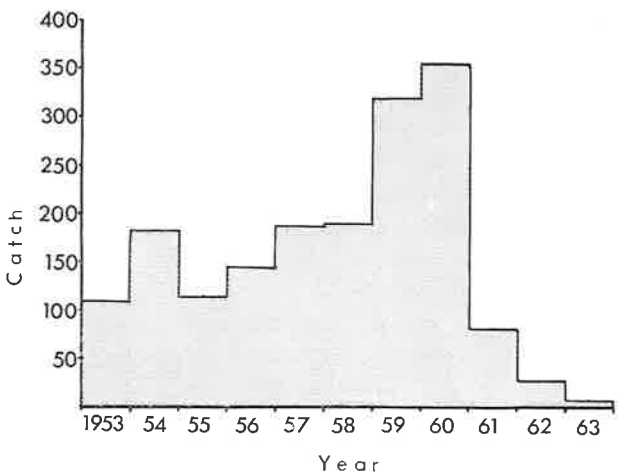


Fig. 23: New Zealand catches of humpback whales between 1953 and 1963.

dorsal fin are quite characteristic. Most animals are smothered with clumps of barnacles, especially on the jaws and the flippers.

The humpback is now protected in the North Atlantic. It once formed a significant part of the Antarctic catch (Omura, 1953; Symons and Weston, 1958), but its numbers decreased so much that it is now completely protected in the Antarctic also. It was an important part of the whale catch at the Ryukyu Islands near Japan (Nishiwaki, 1959 and 1960) and in Australia (Chittleborough, 1953, 1954, 1956, 1958a, 1958b, 1959a, 1959b, 1959c, 1962, 1963, and 1965) and it supported the New Zealand whaling industry almost completely for many decades (Ommanney, 1933; Dawbin, 1956a, 1956b, 1959a, 1959b, 1960, 1964, and 1966).

An early study of the habits of the humpback whale was made by Andrews (1909), and Matthews's discussion (1937) of the species was based mainly on the catches at South Georgia. The biological studies of this species were quite extensive, in keeping with its importance to

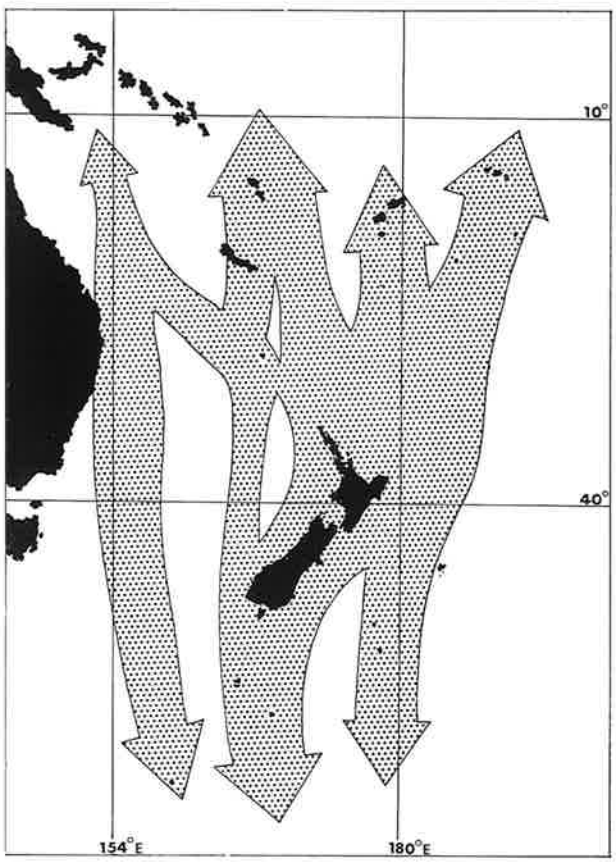


Fig. 24: Migration movements of humpback whales in the South-west Pacific and the Tasman Sea. (Modified from data published by Dawbin, 1956a *et seq.*)

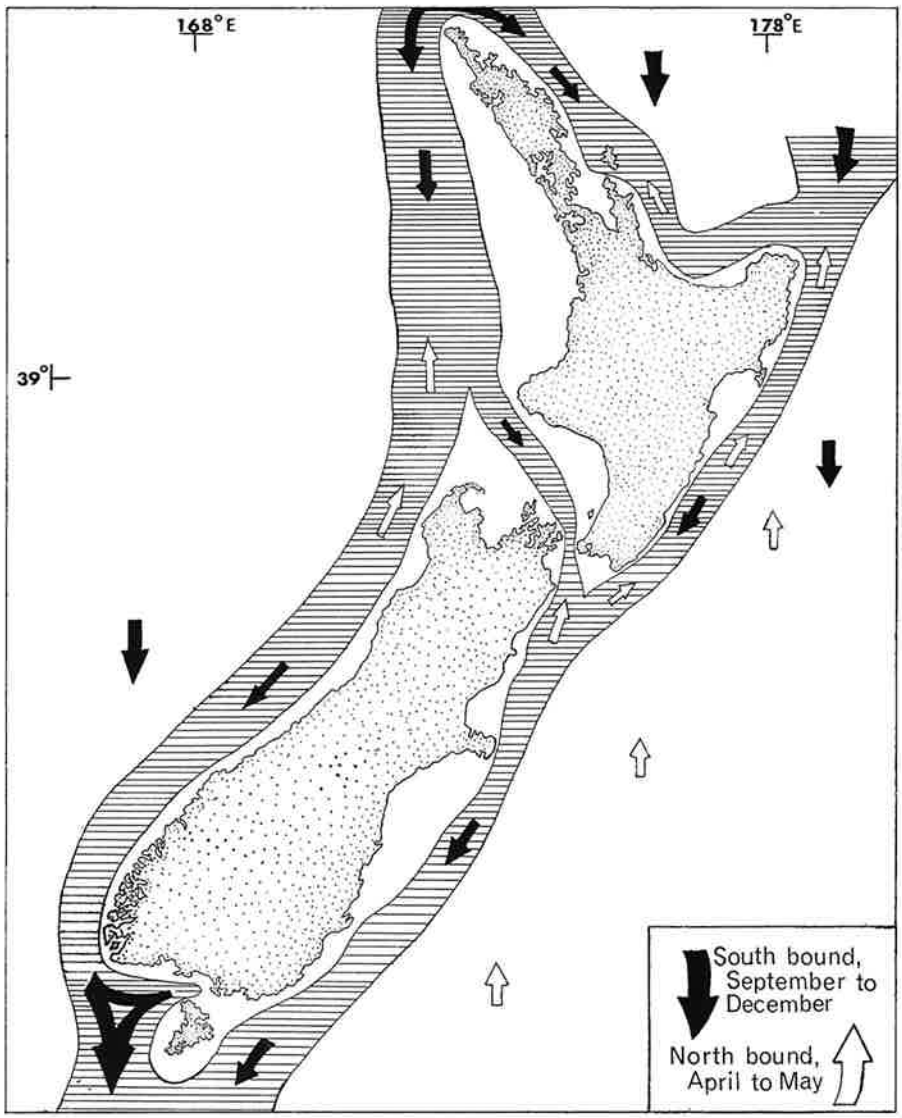


Fig. 25: The movements of humpback whales round the coast of New Zealand in summer and winter. The horizontal hatching indicates probable paths of movement of the greatest concentrations of whales. (Modified from two maps by Dawbin, 1956a.)

coastal whaling nations. The breeding cycle and associated movements were studied by Chittleborough (1954 and 1958a), and age studies and growth rate studies were made by Chittleborough (1959c) and Dawbin (1959b). Aspects of the female reproductive system were recorded by Stump, Robins, and Garde (1960) and by Dunstan (1957). Further age studies were made by Robins (1960).

The Southern Humpback Whale in New Zealand Waters

The humpback whale is the best known cetacean in the New Zealand area, but it is no longer the commonest large rorqual. It seems that the stock of these whales in the east Australia - New Zealand region is now only a few hundred animals. The catch results and sighting figures have been very carefully examined (Dawbin, 1956a, 1956b, 1959a, 1959b, 1960, 1964, and 1966), and the possibility of changed migration routes is most unlikely.

The marked decline between 1954 and 1963 in the numbers of this species passing the coasts of New Zealand is shown in table 11. Fig. 23 shows the decline in catches from 1960 to 1963.

Considerable research was carried out on the humpback whale in Australia and New Zealand in view of its great importance to shore whaling in these countries. Most of this work has already been published (Chittleborough, 1953, 1954, 1958a, 1958b, 1959a, 1959c, 1962, 1963, and 1965; Dawbin, 1956a, 1956b, 1959a, 1959b, 1960, 1964, and 1966). Dempsey and Wislocki (1941)

TABLE 11: Sightings of Humpback Whales on the Coast of New Zealand in 1954 and 1963

Year	Sighting Localities	No. Sighted
1954	Cook Strait only, on northward migration*	495
1963	Both north and south migrations, from all available sighting points round the coast	27

*These data are taken from Dawbin (1956). The 1963 data are from the Marine Department whale survey. Of the 27 whales sighted during 1963, 16 were seen on the northward migration and nine of these were caught. The remaining 11 were sighted on the southward migration.

described the structure of the ovary in this species. The following synopsis of humpback whale movements round New Zealand has been taken almost entirely from the papers published by Dr W. H. Dawbin.

Humpbacks passing the coasts of New Zealand and eastern Australia in a northward direction between May and August are on their way to the breeding grounds north of New Zealand and the Tasman Sea. They begin to return south after a few weeks among the islands of the tropical South-west Pacific. Moving south, they pass the coasts of New Zealand and eastern Australia between September and December. In summer they feed on krill to the south of New Zealand and the Tasman Sea, often close to the edge of Antarctica.

Within broad limits the humpback whales of this stock keep to fairly strict north-south paths of migration every year (Dawbin, 1964). This population of humpbacks is referred to as the Antarctic area V or group V stock. The Antarctic area V has been designated as stretching from long. 130° E to 170° W and from the edge of Antarctica to lat. 40° S. In a mimeographed paper to a subcommittee of scientists of the International Whaling Committee Dr W. H. Dawbin in 1963 suggested that there were distinct breeding subunits which could not be recognised in the Antarctic, but appeared to frequent specific island groups when breeding. Such subpopulations have been recognised in the Antarctic finback whale populations (Fujino, 1964).

Whale marking has shown that whales of this species may cross from the coast of New Zealand to that of New South Wales and Queensland in one season either direct or via the Antarctic feeding grounds (Dawbin, 1964). Interchanges of humpbacks occur between Antarctic area V groups and groups in areas IV and VI on each side of it. However, this kind of interchange is thought to be fairly uncommon. It was believed (Dawbin, 1956a) that most of the whales which pass the New Zealand coast feed round the Balleny Islands and on the western edge of the Ross Sea. Humpbacks were also occasionally seen near Campbell Island and Auckland Island early in 1963 by the author. Some whales of this stock appear to move north and south past the Chatham Islands, separate from the main stock. The general movements of humpback whales in the South-west Pacific area are shown in fig. 24. Northward and southward movements round the coast are shown in fig. 25. Both these maps were constructed from data in the papers by Dr W. H. Dawbin.

ODONTOCETI, Toothed Whales

All the whales of the group Odontoceti are separated from the Mystacoceti by the possession of true teeth, functional at least in the lower jaw. In some whales the teeth may be visible in the upper jaw, as in the sperm whale, but not functional. In some of the Ziphiidae females the teeth of the upper jaw almost always stay buried in the gum.

Most taxonomists recognise four families of toothed whales—the Physeteridae or sperm whales, the Ziphiidae or beaked whales, the Delphinidae or true dolphins, and the Platanistidae or river dolphins. All occur in New Zealand waters except the Platanistidae. The Delphinidae are a heterogeneous group which might be further split.

Family **PHYSETERIDAE,** Sperm Whales

There are only two genera in this family: the genus *Physeter*, with a single species, the giant sperm whale, and the genus *Kogia*, the pygmy sperm whales, of which there are two species. The sperm whale reaches a maximum length at physical maturity of about 60 ft; the pygmy sperm whales attain a maximum length of only about 14 to 15 ft. Despite the large difference in bulk between the genera the sperm whales have very distinct similarities.

The functional teeth are in the lower jaw in both genera. In the sperm whale there are up to 15 pairs of maxillary teeth, many quite deeply embedded in the gum.

The blowhole is single in both genera, and the nasal passage is twisted to the left, so that the blowhole is placed on the left side of the head, very markedly so in the giant sperm whale. The orifice in the giant sperm whale is in a very forward position, at the left side of the tip of the snout. Each species has a complex and characteristic structure called the spermaceti organ in the head. The function of this organ, which is very large, is not known, but it is assumed to play some part in the deep dives of which the giant sperm whale is capable.

Genus **Physeter** Linnaeus, 1758

Physeter catodon Linnaeus, 1758, the Sperm Whale or Cachalot (Fig. 26)

1758. *Physeter catodon* Linnaeus, Systema Naturae, 10th ed., vol. 1, p. 76.

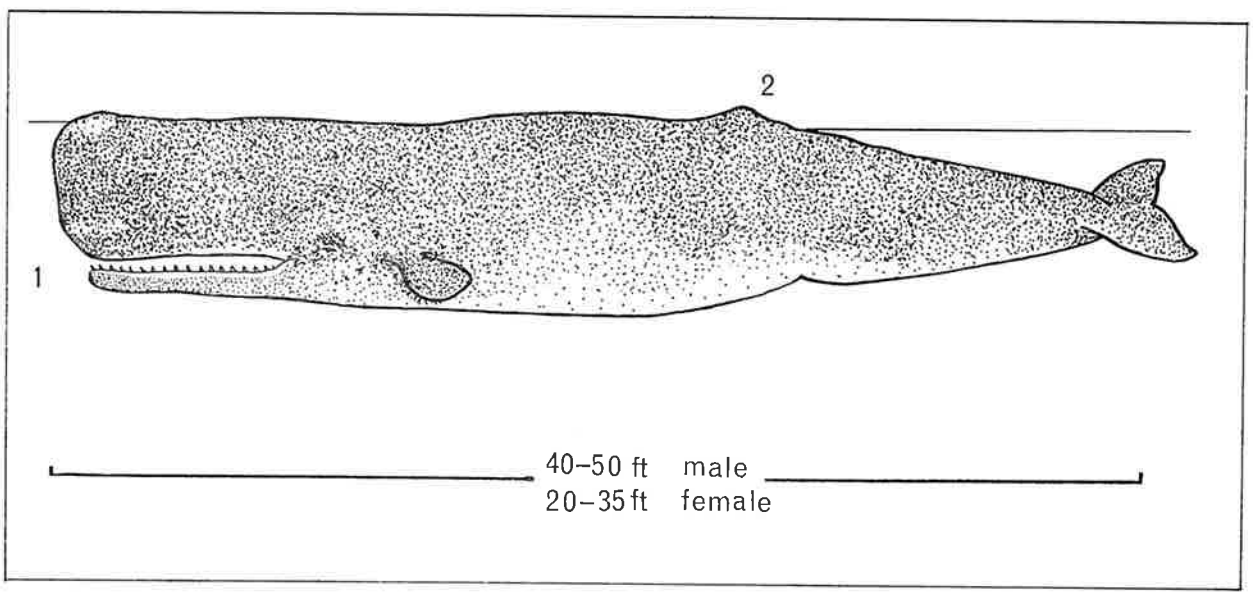


Fig. 26: *Physeter catodon*, the sperm whale. Points of identification: 1. A boom-shaped toothed jaw. 2. No true dorsal fin.

Comments

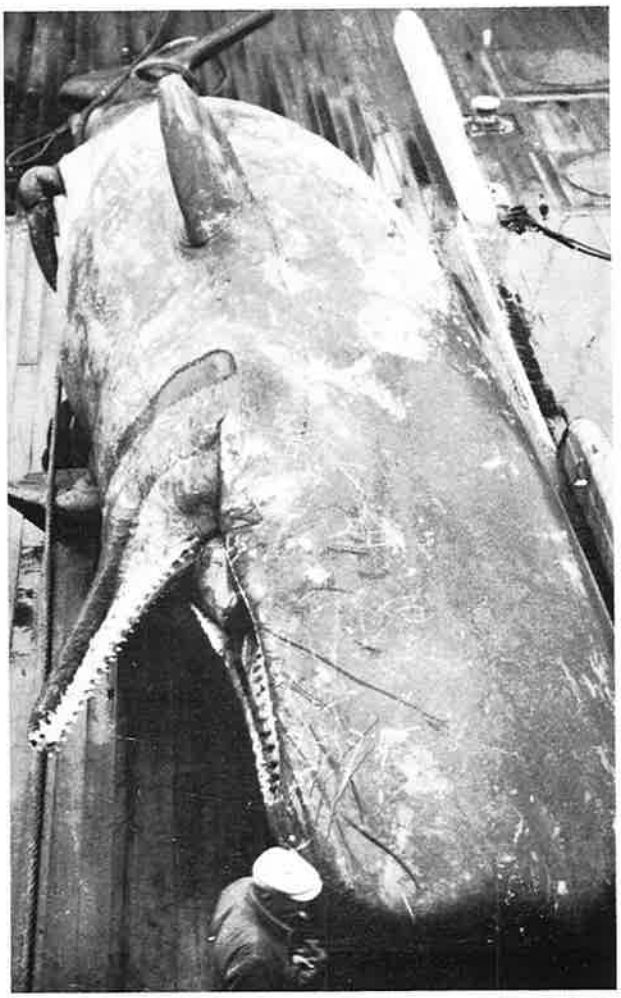
The male sperm whale reaches a much greater size than the female at physical maturity. Males up to 60 ft long have been recorded in the Southern Ocean, but a length of 40 ft at physical maturity is an extreme size for a female sperm whale. There is a degree of sexual segregation in the species. Some males wander into southern latitudes in summer, occasionally being caught at lat. 65° S, but the females stay between the broad limits of lat. 40° N and 40° S.

The sperm whale is easily distinguished from other large whales in the water. The back is purplish brown in the living animal. There is no dorsal fin; instead the whale has one or more humps where the rorquals and beaked whales have a fin. The single blowhole on the left side at the tip of the snout sends up an oblique spout about 8 to 10 ft high. Except when viewed from directly behind the animal the shape of the spout is quite distinctive. The sperm whale will reach a speed of about 10 or 12 knots when pursued, but normally it cruises at 2 or 3 knots.

The head, containing the huge spermaceti organ, is very long in relation to the length of the body, being almost a third of the total. The boom-shaped lower jaw fits snugly into a depression on the under side of the head (fig. 27). The eyes are small and relatively inconspicuous. The flippers are relatively small and stout. There are records of sperm whales with the hind limbs protruding through the blubber (Ogawa and Kamiya, 1957).

The skin of the sperm whale turns from purplish brown to grey on the dorsal surface and from grey to white on the ventral surface as the animal ages. Older animals are frequently covered with fighting scars on the flanks. Circular scars round the jaws are attributed to the suckers of squid species, which are the staple diet of the whale in most parts of the world. The teeth in old animals are usually very worn and broken. Methods of reading the age of Odontoceti whales have been developed in Japan (Nishiwaki and Yagi, 1954) and applied particularly to sperm whale populations (Nishiwaki, Hibiya, and Ohsumi, 1958; Ohsumi, Kasuya, and Nishiwaki, 1963).

An early monograph on the species was written by Beale (1839), and the species was also discussed by Beddard (1900). After studying the biology of the sperm whale at Durban and South Georgia, Matthews produced a monograph (1938a). In recent years Robert Clarke (1955 and 1956) has studied the species at the whaling stations of the Azores Islands in the North Atlantic. Much of the material used by M. R. Clarke in his study of cephalopods (1962) was derived from the stomachs of sperm whales. As the species became more important to the world whaling industry interest in it quickened. Kojima (1951) studied the brain of the species, and Nemoto and Nasu (1963) and Okutani and Nemoto (1964) studied the feeding habits of the sperm whale. The breeding cycle and the maturity of the species in various parts of the world were studied by Chuzhakina (1955); Nishiwaki and Hibiya (1951 and 1952); Nishiwaki (1955); and Nishiwaki, Hibiya, and Kimura (1956). An early study of the teeth was made by Boschma (1938).



Photograph by D. E. Gaskin.

Fig. 27: A sperm whale on the deck of the FF *Southern Venturer* near Bouvet Island, Southern Ocean, in December 1961.

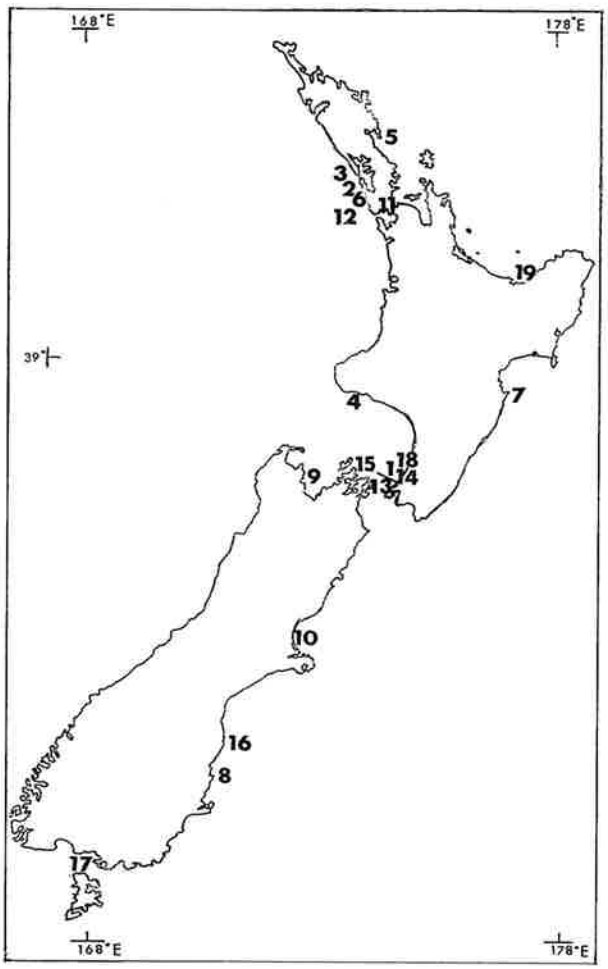


Fig. 28: The localities of known strandings of *Physeter catodon* on the New Zealand coast. The numbers are the record numbers in table 12.

The distribution and movements of this species in the Southern Ocean have been discussed by Holm and Jonsgård (1959). Aspects of the skeletal system have been discussed by Omura, Nishiwaki, Ichihara, and Kasuya (1962). Sub-populations of this species have been studied by Cushing, Fujino, and Calaprice (1963) by blood groups in the same way that some baleen whale populations have been studied by the same workers. The habit of this whale of stranding *en masse* at fairly frequent intervals has been discussed by Gilmore (1959).

The Sperm Whale in New Zealand Waters

With humpback numbers severely reduced, the sperm whale is probably the commonest large whale in the New Zealand area.

Strandings of sperm whales in New Zealand have been frequent (fig. 28). All the data available on these animals are listed in table 12. Whale survey work has shown that sperm whales are not often found in the shallow water of North Taranaki Bight and South Taranaki Bight despite the apparent evidence of many strandings there. Many of these stranded animals could have died in the Tasman Sea or become sick there and been drawn in by the branch of the East Australian Current which moves into the Taranaki Bights (McCann, 1964b).

Charts prepared by Townsend (1935) show that the areas near New Zealand most often worked with good results by the old sperm whaling ships from America were (1) the Middle Ground, off the west coast in the Tasman Sea, (2) the Kermadec Ground, to the north of the North Island, (3) the Fiji Ground, (4) the Chatham Islands Ground, and (5) the Solander Ground, to the south-west of Stewart Island (fig. 29).

The sperm whale does not seem to migrate in the same way as the baleen whale. From the data in table 12 it appears that the sperm whale occurs round the New Zealand coast at all times of the year and this has been supported by information obtained during whaling operations and whaling research in 1963–64. There is a movement of some bull sperms into southern latitudes, where food is more plentiful than in the tropics and sub-tropics, in spring and summer. The movements of male sperm whales in temperate and Sub-antarctic latitudes are apparently controlled as much by feeding needs as by the breeding cycle. The sperm whale feeds mainly on species of squid in the Southern Ocean and also on deep-water fish. The animals move from one oceanic bank to another in search of food or from oceanic banks to coastal shelf regions. Sperm whales come close to land only where there is a steep coastal shelf. The expanse of shallow water between the mainland and the Barrier Islands could prevent or deter sperm whales from coming as close inshore in the Auckland area as they do near Wellington and Kaikoura. The diet and feeding habits of sperm whales in the Cook Strait region have recently been studied by Gaskin and Cawthorn (1967a and 1967b).

In Cook Strait, where the Tory Channel whaling company hunted for sperm whales between 1963 and 1964, the population was predominantly male (table 13). Nursery schools

TABLE 12: New Zealand Strandings of *Physeter catodon*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	1873	Waikanae Beach	Decomposed head	Hector, 1873a; Oliver, 1922c
2	27	1895	Kaipara	Males, females, and calves	Oliver, 1922c, and Dom. Mus. str. file
3	25	11 Mar 1918	Dargaville	Males and females from 22 to 45 ft	Oliver, 1922c, and photograph in Dom. Mus. str. file
4	1	18 Dec 1940	Ohawe Beach	43 ft male	Marine Dept. str. file
5	1	22 Feb 1944	Ruakaka	22 ft male	Marine Dept. str. file
6	1	6 Sep 1944	Muriwai	42 ft male	Marine Dept. str. file
7	1	18 Apr 1948	Clifton, Hawke's Bay	56 ft male	Marine Dept. str. file
8	1	11 Jan 1950	Shag Point	50 ft male	L. Gurr, pers. comm.
9	1	10 Oct 1950	Motueka	45 ft male	L. Gurr, pers. comm. and photograph
10	1	22 Jan 1952	Leithfield	50 ft male	Photograph in Marine Dept. str. file
11	1	18 Feb 1953	Laingholm	42 ft male	Photograph in Marine Dept. str. file
12	13	4 Jul 1958	Muriwai	Females, from 16 to 39 ft	Photograph in Marine Dept. str. file
13	1	17 Jun 1959	Titahi Bay	46 ft male	Marine Dept. str. file
14	1	11 May 1960	Paraparaumu Beach	34 ft female	Marine Dept. str. file
15	1	31 Dec 1961	Raumati Beach	48 ft male	Marine Dept. str. file and photograph
16	1	17 Sep 1962	Oamaru	50 ft male	Newspaper photographs
17	1	20 Sep 1962	Colac Bay	15 ft male	Coloured photograph and details from R. J. Street
18	1	18 Oct 1963	Foxton Beach	44 ft male	Photograph and rep. by B. Ellis, Fisheries Inspector
19	1	21 Dec 1963	Opotiki	52 ft male	Photograph by local studio to author

TABLE 13: Numbers of Sperm Whales Taken by Tory Channel Whaling Company between April 1963 and December 1964

Lengths (ft)	Sex	
	Males	Females
35	2	3
36	2	3
37	4	0
38	2	1
39	10	0
40	10	0
41	10	0
42	15	0
43	15	0
44	13	0
45	24	0
46	24	0
47	12	0
48	14	0
49	22	0
50	28	0
51	16	0
52	13	0
53	1	0
54	1	0
55	3	0
Totals	241	7

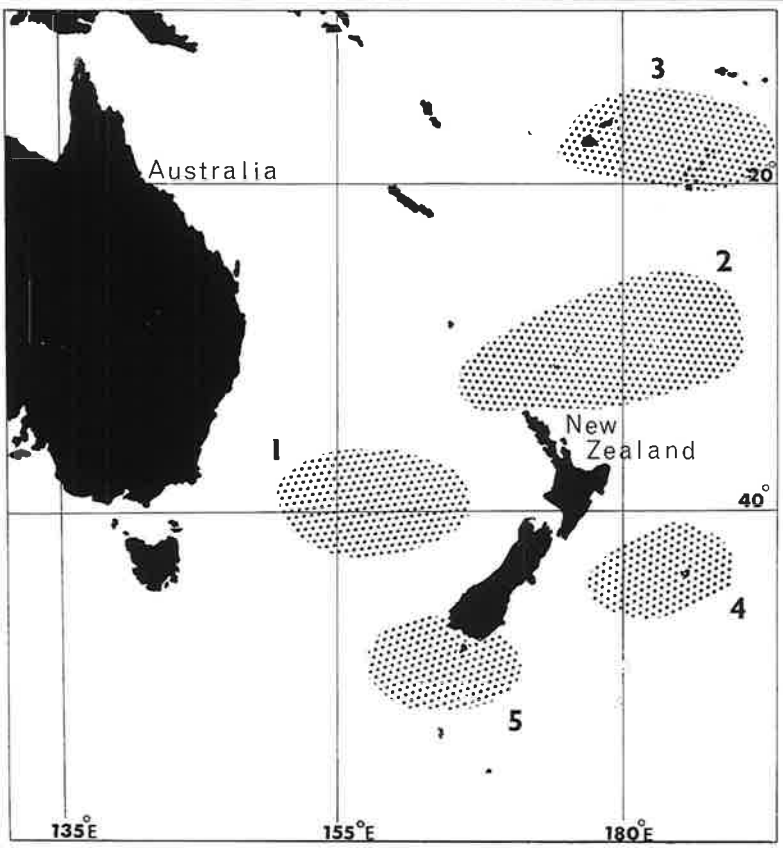


Fig. 29: Areas where sperm whale concentrations occurred and which were intensively worked by the American sperm whalers between 1790 and 1900. 1. The Middle Ground. 2. The Kermadec Ground. 3. The Fiji Ground. 4. The Chatham Islands Ground. 5. The Solander Ground. (Modified from maps by Townsend, 1935.)

of females and calves may move into shallow water more often than males, as one of these schools was reported to the Marine Department and photographed by the RNZAF in the summer of 1963.

A few other sperm whales were taken between 1947 and 1962 by the company. The animals taken in 1947 were from a large school of about 100 which moved into the narrows of Cook Strait in early July. Of the nine animals taken three were pregnant females.

Genus **Kogia** Gray, 1846

Kogia breviceps (Blainville, 1838), the Pygmy Sperm Whale (Fig. 30)

1838. *Physeter breviceps* Blainville, *Ann. franc. d'Anat. Phys. 2*: 337. Cape of Good Hope, South Africa.

Comments

The head of this whale is blunt and looks much like that of a shark. The lower jaw, which is set back beneath the head (fig. 31), is small and triangular, heightening the resemblance. It has well developed teeth in the lower jaw. There are also teeth in the upper jaw, though these may be hard to find, as they are embedded deep in the gum. The blowhole is single and set slightly to the left of the mid-line of the head immediately above the angle of the lower jaw. There is a small hooked dorsal fin about half way along the body and a distinct notch between the flukes of the tail.

The name pygmy sperm whale hides two distinct species (Norman and Fraser, 1937; Scheffer and Rice, 1963; Handley, 1966)—*Kogia simus*, which is sexually mature at about 9 to 10 ft, and *Kogia breviceps*, maturing at between 12 and 13 ft. All the recorded specimens from the New Zealand coast appear to have been *breviceps*.

The pygmy sperm whale has been recorded from many parts of the world: From New South Wales (Wall, 1851); South and Western Australia (Hale, 1939 and 1947); Borneo (Harrison and Jamuh, 1958); Formosa and Japan (Hirasaka, 1937; Yamada, 1954); Hawaii (Edmondson, 1948); in the Atlantic Ocean (Allen, 1941); the east coast of the U.S.A. (Hobbs, 1885; True, 1885; Ulmer, 1941; Tompkins, 1934); the coast of Texas (Gunter, Hubbs, and Beal, 1955); the Pacific and west coast of the U.S.A. (Hubbs, 1951b); Indonesia (Weber, 1923); South-east Asia (Serene, 1934); India (Owen, 1866); and South Africa (Sclater, 1901).

Notes on the biology of this little known whale have been published by Yamada (1954), Benham (1901, 1902a, and 1902c), Enders (1942), Schulte and Smith (1918), Ratcliffe (1942), and Johnston and Mawson (1939), the last named of whom examined the internal parasites.

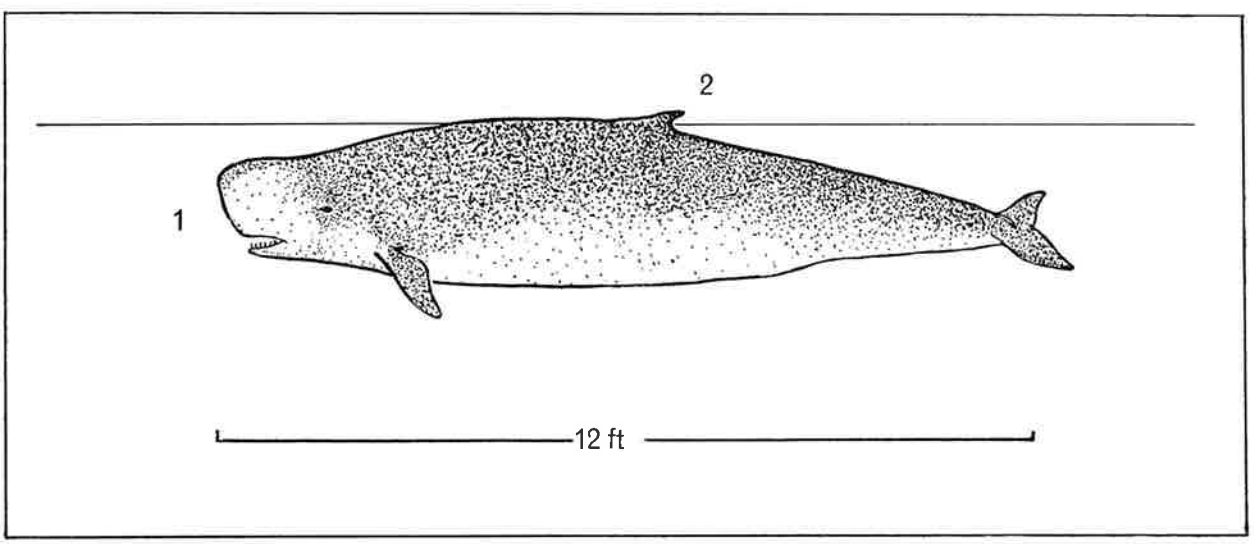


Fig. 30: *Kogia breviceps*, the pygmy sperm whale. Points of identification: 1. A small triangular mouth under the head. 2. A small dorsal fin.

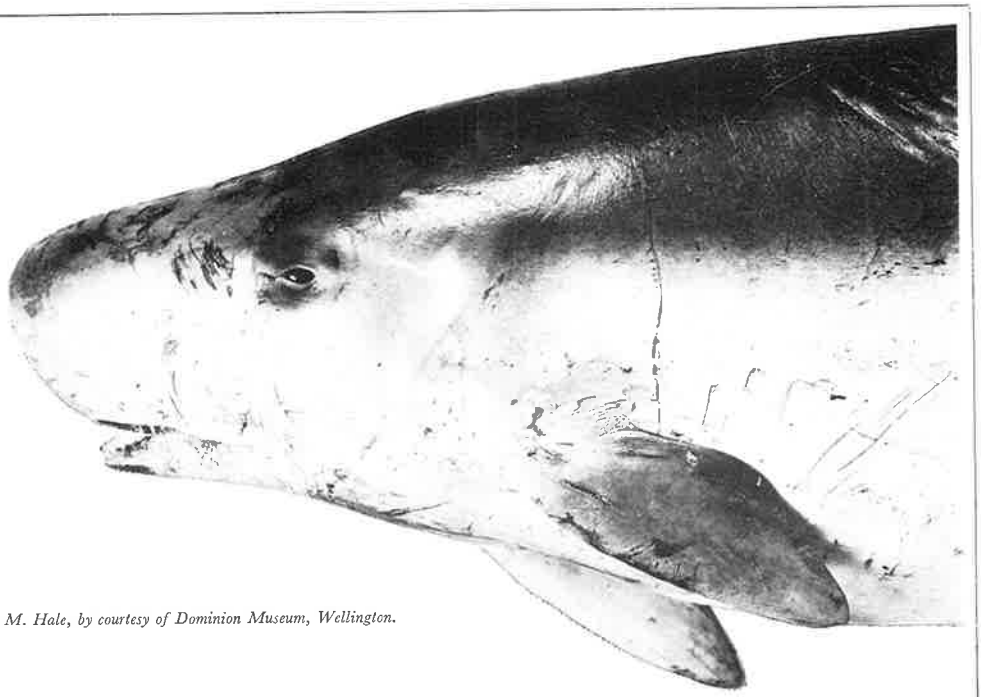


Fig. 31: The head of a pygmy sperm whale stranded at Lyall Bay in 1950.

Photograph by C. M. Hale, by courtesy of Dominion Museum, Wellington.

The Pygmy Sperm Whale in New Zealand Waters

Dell (1960) summarised all that was known of the pygmy sperm whale in New Zealand waters before 1959 and also summarised biological data. Data on specimens stranded since have been published recently (Gaskin, 1966b). There are 20 stranding records for New Zealand (table 14 and fig. 32). Most of the data in this table are from Dell (1960).

The species has been described as occurring in inshore waters round the St. Vincent Gulf, Australia, during winter (Hale, 1962a). For most of the year the whale probably stays far from

TABLE 14: New Zealand Strandings of *Kogia breviceps*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Wanganui	Skel. and stuffed skin in Wa. Mus.	Oliver, 1922c
2	1	Not known	Port Underwood	Mandible in Dom. Mus.	Oliver, 1922c
3	1	17 Aug 1873	Lyttelton Harbour	Skel. of 7 ft 2 in. female in Cant. Mus.	von Haast, 1874 (type of *E. pottsi*)
4	2	1880	Lyall Bay	Cow and calf	Oliver, 1922c
5	1	About 1881	Poverty Bay	Skel. in Mus. Comp. Zool.	Dell, 1960
6	2	1884	Petone	Cow and calf	Oliver, 1922c
7	1	1887	Lyall Bay	Skel. in Dom. Mus.	Oliver, 1922c
8	1	1892	Napier	Skull in Otago Mus.	Oliver, 1922c
9	1	23 Aug 1900	Purakanui	Skel. of male in Cam. Univ. Zool. Mus.	Benham, 1901
10	3	3 Feb 1909	Wanganui Heads	One a 6 ft male	Oliver, 1922c
11	1	23 Jan 1929	Breaker Bay	11 ft 6 in. pregnant female	Dell, 1960
12	1	27 May 1948	Paekakariki	10 ft adult, minus tail	Dell, 1960
13	1	12 Apr 1950	Lyall Bay	Cast of 9 ft 9 in. female in Dom. Mus.	Dell, 1960
14	1	11 Jan 1955	Clifton, Hawke's Bay	Pregnant female	Dell, 1960
15	1	31 Jan 1956	Wanganui	10 ft adult, unsexed	Dell, 1960
16	1	27 Feb 1959	Lake Ferry, Palliser Bay	9 ft female	Dom. Mus. str. file
17	1	6 Feb 1960	Otaki Beach	Skull of 7 ft male in Mass. Univ. coll.	L. Gurr, pers. comm.; Gaskin, 1966b
18	1	7 Dec 1960	Orewa	12 ft male?	J. W. D. Hall, pers. comm. and photograph; Gaskin, 1966b
19	1	7 Feb 1965	Paekakariki	Skull and some vert. of 7 ft 7 in. female in Dom. Mus.	Gaskin, 1966b
20	1	10 Jun 1965	Nuhaka	Tooth of 9 ft 6 in. male in Mass. Univ. coll.	Gaskin, 1966b

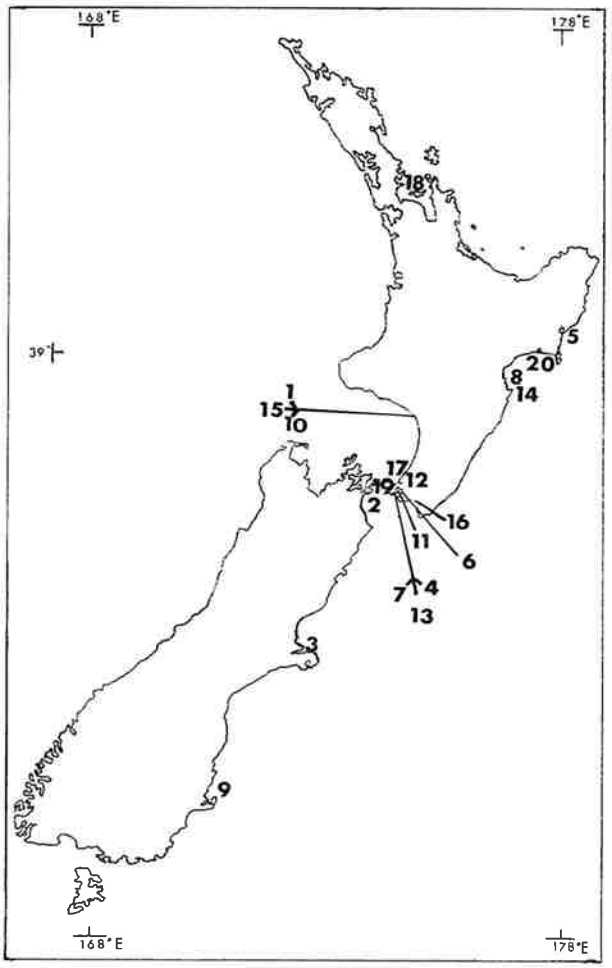


Fig. 32: The localities of known strandings of *Kogia breviceps* on the New Zealand coast. The numbers are the record numbers in table 14.

shore, and though it may be sighted often, it is probably mistaken for a dolphin or a shark. The major items of diet of this species appear to be squid and crustaceans (Dell, 1960).

Family **ZIPHIIDAE**, Beaked Whales

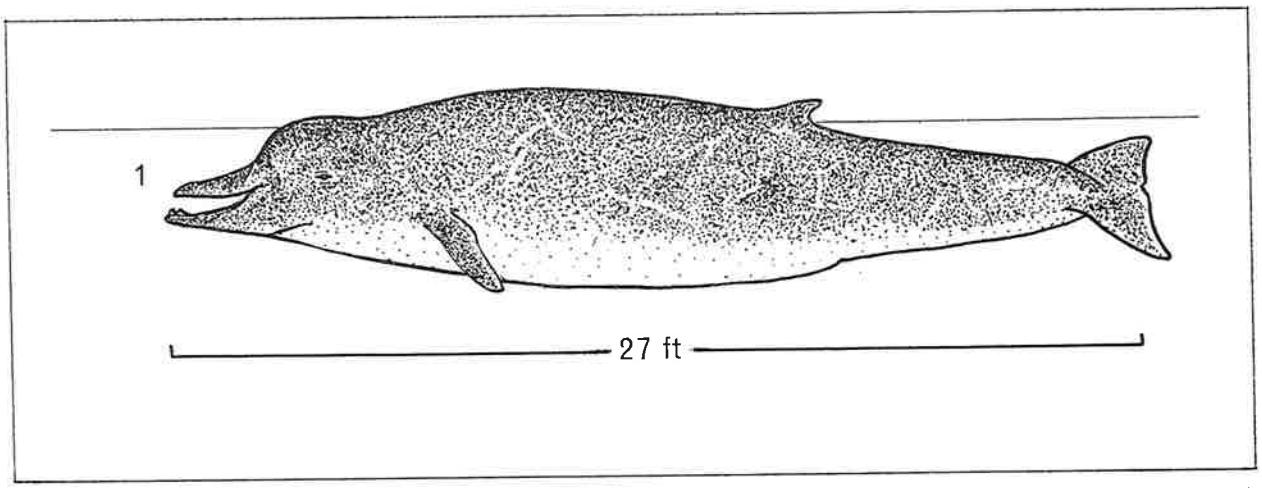
The Ziphiidae are among the least known Cetacea. They are toothed whales, distantly related to the sperm whales, but are characterised by a snout frequently drawn out into the "beak", the character which has given the group its common name. Under the throat there are two characteristic grooves in a V shape, though these do not meet. Beaked whales differ from the sperm whales in the form of the flukes, which are not notched centrally, but are joined across the middle to form a single undivided unit.

The arrangement of the teeth varies greatly. Those of some female beaked whales remain buried in the gum. Only one beaked whale, *Tasmacetus shepherdi*, has functional teeth in both upper and lower jaws. Functional teeth, at least one pair of them, are visibly confined to the lower jaw in all other species.

The following genera are recognised: *Berardius*, *Ziphius*, *Hyperoodon*, *Mesoplodon*, and *Tasmacetus*. There is considerable dispute about the relationships of these genera and the exact number of species in them. Very few specimens of many of the species of beaked whales are known, and some specimens are no more than skulls and a few other bones. Though measurements can be taken from these specimens, in some "species" the number of available measurements is too small for the groups to be compared statistically.

Early descriptions and discussions of the beaked whale group were undertaken by Knox (1871), who referred to some New Zealand specimens, and Flower (1879). A major account was given by True later (1910). The anatomy of various beaked whales has been described by Forbes (1893), who dealt with the development of the rostrum in the genus *Mesoplodon*; Fraser (1936) has examined the dentition in the genus *Ziphius*, and Boschma (1950 and 1951) discussed the teeth of several genera.

All the Ziphiidae are medium-sized cetaceans, with the species of *Mesoplodon* generally smaller than 20 ft long. *Ziphius* specimens may reach 30 ft and many *Hyperoodon* and *Berardius* specimens are longer. Specimens of the whale *Berardius bairdi* on the coast of Japan and on the coast of California have been recorded as exceeding 40 ft. Few of the species could be considered well known. *Berardius bairdi* is taken commercially on the coasts of Japan and California (Omura, Fujino, and Kimura, 1955; Rice, 1963b). Recently *Ziphius* has also been taken on the coast of Japan (Omura *et al.*, 1955). Specimens of *Mesoplodon* are also taken and used occasionally in the same locality (Nishiwaki and Kamiya, 1958 and 1959; Nishiwaki, 1962a and 1962b). The northern bottlenosed whale *Hyperoodon rostratus* is taken commercially by the small whale fishing industry on the Norwegian coast (Jonsgård and Oynes, 1952). Hardly any statistics have been collected on beaked whales which are detailed enough to



Modified from McCann (1962a).

Fig. 33: *Berardius arnouxi*, the large beaked whale. Point of identification: 1. Two pairs of teeth at the tip of the lower jaw in the male.

enable modern techniques of population analysis to be carried out.

Genus **Berardius** Duvernoy, 1851

Berardius arnouxi Duvernoy, 1851, the Large Beaked Whale (Fig. 33)

1851. *Berardius arnuxii* Duvernoy, *Annls Sci. nat., ser. 3 (Zool.), 15*: 51.

Comments

Two species are recognised in the genus *Berardius*. The first, *B. bairdi* Stejneger, 1883, occurs in the North Pacific and the Bering Sea (Omura *et al.*, 1955; Slipp and Wilke, 1953; Scheffer and Slipp, 1948; Pike, 1953b; Scheffer, 1949). The blood groups of this species have been studied by Fujino (1954a). The other species is *B. arnouxi*, of the Southern Ocean and adjacent regions toward the Antarctic (Taylor, 1957). Some notes on the southern species were made by Gray (1871b) and Hale (1962b). The skeleton was described by Flower (1872).

Though *B. bairdi* is the larger of the two species, specimens of *B. arnouxi* have been recorded as exceeding 30 ft. The large beaked whale is a solid, cylindrical animal and presumably fast moving. The rostrum is very prominent in this species, with two pairs of teeth at the tip of the lower jaw. In the females these teeth may not protrude through the gum. The forehead has a pronounced bulge in adult males, but generally the bulge is directed upward and forward rather than just forward as in adult male *Hyperoodon* specimens. Immature specimens and females of almost all the beaked whales are very difficult to identify, since most of the species are separated by osteological characters.

Large beaked whales vary in colour, but usually are black or grey on the dorsal surface and white or light grey on the ventral surface. Patches of pale colour on the dorsal surface, as in the killer and pilot whale, are not rare. Both males and females are often covered with scars perhaps caused by intraspecific fighting. The remains of cuttlefish species have been found in the stomachs of stranded specimens (Mr C. McCann, pers. comm.). However, there seem to be no quantitative or qualitative data on the diet and feeding habits of *B. arnouxi*.

The Large Beaked Whale in New Zealand Waters

Table 15 sets out strandings of *B. arnouxi* in New Zealand, and the localities are shown in fig. 34.

All these strandings occurred between early January and mid March, and males and females were equally common in the strandings. Variation in the recorded lengths is not great. The peak of occurrence in *B. arnouxi*, as shown by the stranding records, is summer. No sightings of this species were made during the 1962–64 whale survey by Marine Department vessels, though in

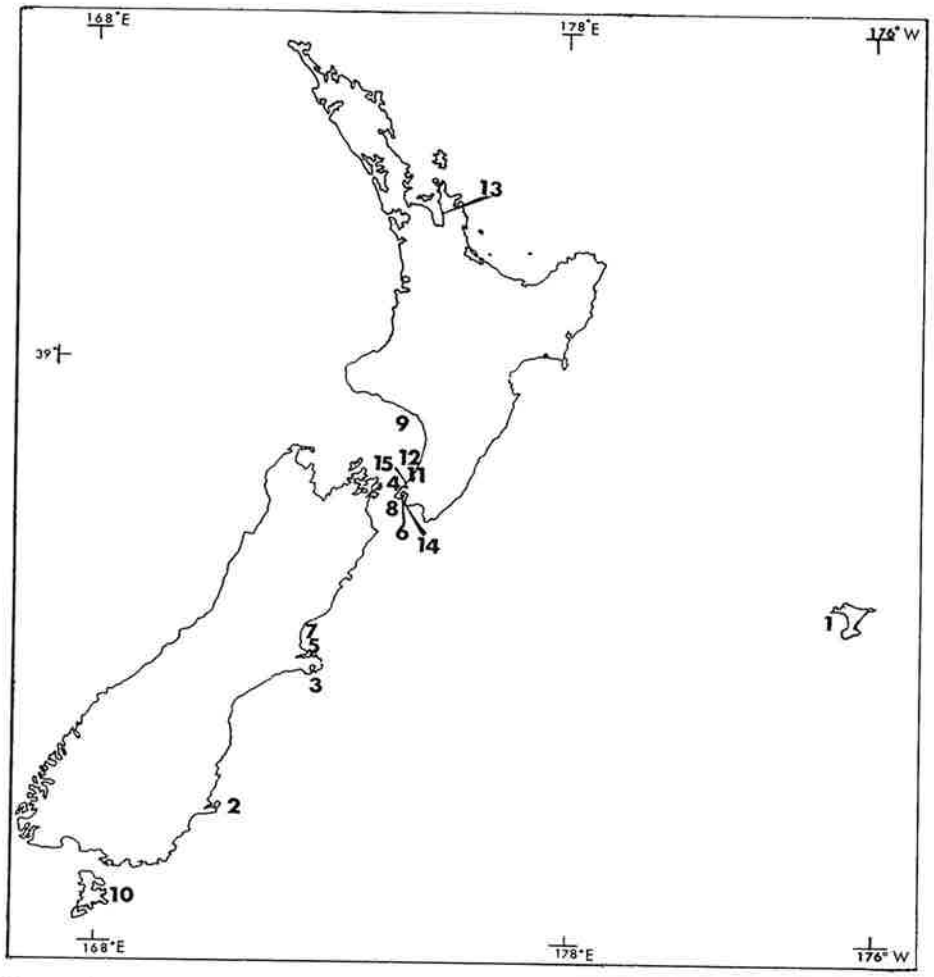


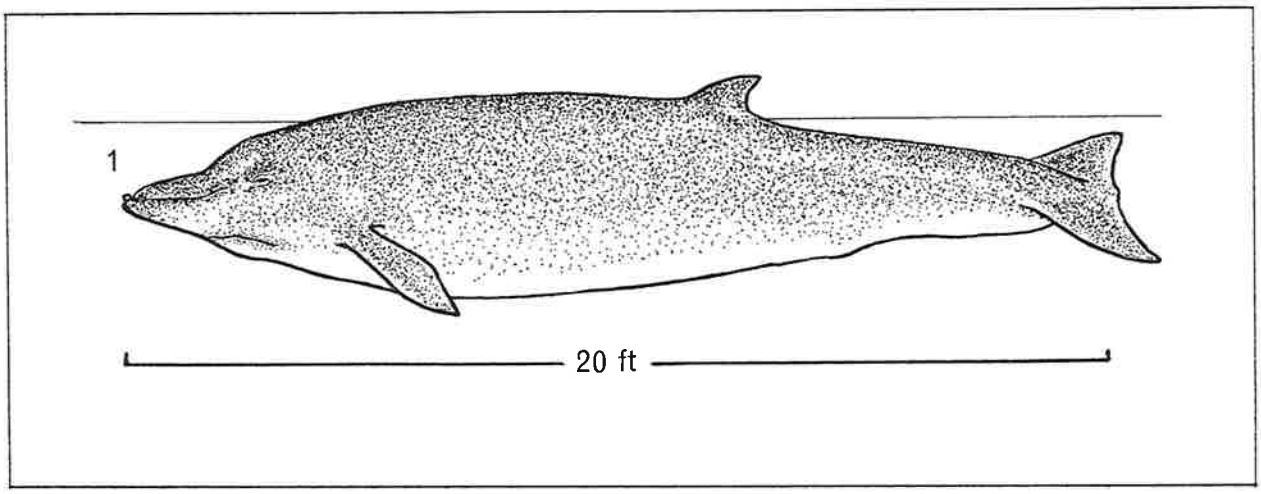
Fig. 34: The localities of known strandings of *Berardius arnouxi* round the New Zealand coast. The numbers are the record numbers in table 15.

November 1964 the crew of the Tory Channel whaling company's spotter plane logged three very large beaked whales swimming north about 7 miles off the Kaikoura Peninsula; the observers estimated these whales to be longer than 30 ft. There is thus a strong likelihood that these animals were *B. arnouxi*. Very little is known of the movements or breeding habits of either of the species of *Berardius*. Omura (1958b) has described an embryo of *B. bairdi* found in Japan, and

TABLE 15: New Zealand Strandings of *Berardius arnouxi**

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Chatham Islands	Skull in Otago Mus.	Oliver, 1922c
2	1	1840	Otago Peninsula	Mandibles in Otago Mus.	Flower, 1872; Oliver, 1922c
3	1	1846	Akaroa	Skull in Paris Mus.	Oliver, 1922c
4	1	Jan 1862	Porirua Harbour	27 ft male	Knox, 1871
5	1	16 Dec 1868	New Brighton	Skel. in Mus. Roy. Coll. Surg.	von Haast, 1870; Oliver, 1922c
6	1	Jan 1870	Worser Bay	Skull in Dom. Mus.	Oliver, 1922c
7	1	27 Dec 1873	Saltwater Creek, North Canterbury	Skel. in Cant. Mus.	Oliver, 1922c
8	1	12 Jan 1877	Lyall Bay	Skel. in Dom. Mus.	Hector, 1878; Oliver, 1922c
9	1	1920	Wanganui	Skel. in Wa. Mus.	Oliver, 1922c
10	1	1929	Stewart Island	No data	McCann, 1964b
11	1	13 Jan 1931	Te Horo Beach	28 ft male	McCann, 1964b
12	1	4 Jan 1934	Otaki Beach	28 ft female	McCann, 1964b
13	2	13 Mar 1944	Tapu, Thames	No data	McCann, 1964b
14	2	194?	Pencarrow Head	30 ft male, 20 ft female	Dom. Mus. str. file
15	1	18 Feb 1960	Pukerua Bay	28 ft 6 in. female	McCann, 1964b

*Information in this table is based on a manuscript list prepared by Mr C. McCann. Skeletal material of specimens after 1922 is held at the Dominion Museum. McCann (1962b) regards two other strandings, originally described as *Mesoplodon hectori*, as belonging to this species. These records have been retained under the heading of *M. hectori*.



After von Haast (1880) and Norris and Prescott (1961).

Fig. 35: *Ziphius cavirostris*, Cuvier's beaked whale. Point of identification: 1. One pair of teeth at the tip of the lower jaw in the male.

Ohsumi (1964) has described the accumulation of corpora albicantia in the ovaries of 13 specimens of this whale. *Berardius arnouxi* has also been recorded in South Australia (Hale, 1962b) and the Falkland Islands and Dependencies (Norman and Fraser, 1937).

Genus **Ziphius** Cuvier, 1823

Ziphius cavirostris Cuvier, 1823, Cuvier's Beaked Whale (Fig. 35)

1823. *Ziphius cavirostris* Cuvier, Recherches sur les Ossemens Fossiles . . . , 2nd ed., vol. 5, p. 352.

Comments

A good description of this species was published by von Haast (1880) under *Z. novaezealandiae*, and the outline in fig. 35 is based partly on the drawing by that author and partly on a photograph of an immature female taken in California (Norris and Prescott, 1961). This species is spread throughout the whole Pacific area and has frequently been recorded from the western coast of North America (Orr, 1948; Hubbs, 1946 and 1951a; Roest, Storm, and Dumas, 1953; Houck, 1958). It has been recorded at several localities in Europe, including Britain (Turner, 1872; Norman and Fraser, 1937), and on the coast of South America (Norman and Fraser, 1937). It is well known from South Africa and India (Norman and Fraser, 1937) and from Australia and Tasmania (Norman and Fraser, 1937; Iredale and Troughton, 1934). Several authors, for instance, von Haast (1880), have erected species other than *cavirostris* in the genus, but at present the concept of a single wide-ranging species is accepted by most authorities.

There is a well defined beak in *Ziphius*, particularly in the females; many of these animals have no pronounced bulge at the forehead. The distance between the tip of the upper jaw and the blowhole is about one-ninth of the total length of the whale. The male has a single pair of protruding teeth. Vestigial teeth are present in the gums, as in other ziphioids. The anterior pair of teeth, characteristic of the adult male, do not protrude through the gum of the females even with advancing age. Male *Ziphius* specimens can be separated from most male specimens of *Berardius* by the size and character of teeth. *Ziphius* has one pair of mandibular teeth, round or oval in section; *Berardius* has two pairs of mandibular teeth which are markedly laterally compressed. Separation of the females of all the beaked whales usually has to be done by a cetacean taxonomist.

Fresh specimens of this animal are usually purplish black on the dorsal surface and grey or white beneath, but colour is very variable in *Ziphius* and is no guide to identification. Oval scars like those on the skin of rorquals are quite common. Longitudinal scars are probably caused by fighting. Such scars were numerous on the

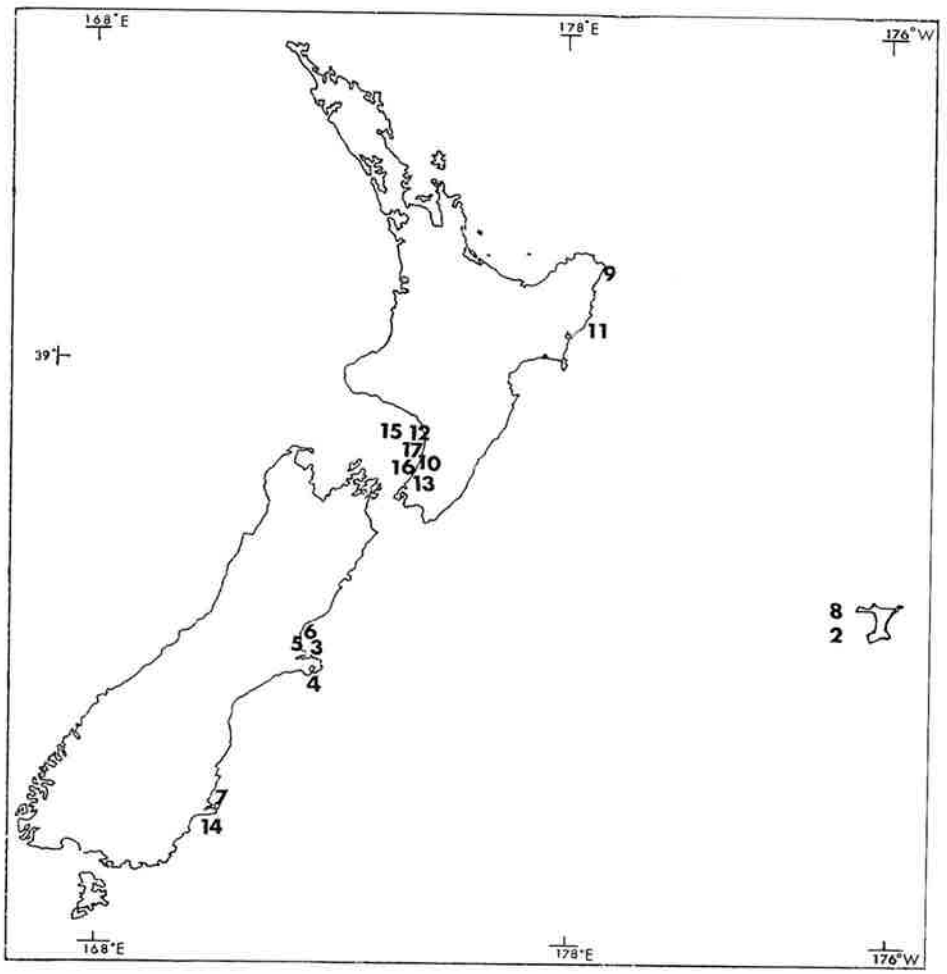


Fig. 36: The localities of known strandings of *Ziphius cavirostris* round the New Zealand coast. The numbers are the record numbers in table 16.

Lyttelton Harbour specimen (July 1872) described by von Haast (1877a). Smaller scars round the mouth may be caused by the beaks and hooks of squid, which are frequently found in the stomachs of stranded specimens. The species attains a length of about 28 ft at physical maturity.

This whale is occasionally taken commercially on the coast of Japan (Omura *et al.*, 1955). The accumulation rate of corpora albicantia has been studied by Ohsumi (1964), and Kenyon (1961) has made some biological observations on the species based on animals stranded in the Aleutian Islands.

Cuvier's Beaked Whale in New Zealand Waters

The New Zealand strandings of *Ziphius cavirostris* are given in table 16, and their localities are shown in fig. 36.

Genus **Hyperoodon** Lacépède, 1804

Hyperoodon planifrons Flower, 1882, the Southern Bottlenosed Whale (Fig. 37)

1882. *Hyperoodon planifrons* Flower, *Proc. zool. Soc. Lond. 1882*: 392. Lewis Island, Dampier Archipelago, Australia.

Comments

This is one of the least known of the ziphioid whales. However, the closely related Northern Hemisphere species *H. rostratus* is well known and is taken commercially near the coast of Norway. The males of the genus *Hyperoodon* have a bulbous forehead like that of the pilot whale. The dorsal fin is small and placed far posteriorly. Males of *H. rostratus* have been recorded as being up to 30 ft long; females appear to reach a maximum length at physical maturity of about 25 ft (Norman and Fraser, 1937).

TABLE 16: New Zealand Strandings of *Ziphius cavirostris**

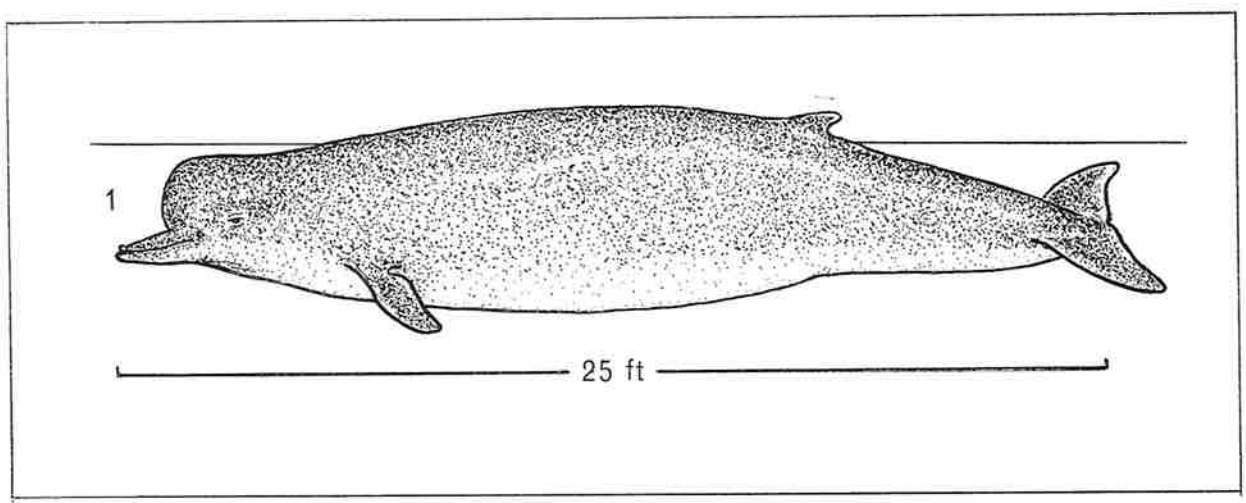
Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Not known	Skull of young animal in Brit. Mus.	Oliver, 1922c
2	1	1872	Chatham Islands	Teeth in Brit. Mus.	Hector, 1875; Oliver, 1922c
3	1	Jul 1872	Lyttelton Harbour	Skel. of 26 ft female in Cant. Mus.	von Haast, 1877a
4	2	Jul 1873	Akaroa	Female and calf	von Haast, 1877a
5	1	17 Nov 1878	New Brighton	19 ft 6 in. female	von Haast, 1880
6	1	15 May 1879	Kaiapoi	Skel. of 21 ft 6 in. female in Brit. Mus.	von Haast, 1880
7	1	6 Nov 1884	Warrington	Skel. in Otago Mus.	Scott and Parker, 1889
8	1	1887	Chatham Islands	Skull in Dom. Mus.	Hector, 1873a (type of *Epiodon chathamiensis*
9†	1	1912	East Cape	Teeth and mandible fragment in Dom. Mus.	Waite, 1912
10	1	1923	Otaki Beach	No data	C. McCann, pers. comm.
11	1	11 Apr 1943	Makorori, Poverty Bay	No data	C. McCann, pers. comm.
12	1	Jan 1945	Himatangi	No data	C. McCann, pers. comm.
13	1	13 Apr 1948	Waikanae Beach	No data	C. McCann, pers. comm.
14	2	22 Aug 1948	Pipikaretu Beach	21 ft 5 in. female and 13 ft 1 in. male. One skull in Otago Mus.	L. Gurr (Otago Mus. at that date), pers. comm.
15	1	14 Sep 1957	Himatangi	No data	C. McCann, pers. comm.
16	1	4 Jun 1958	Te Horo Beach	21 ft female	C. McCann, pers. comm.
17	1	9 Oct 1959	Foxton Beach	Male	C. McCann, pers. comm.

*Most of the information in this table is based on a manuscript list prepared by Mr C. McCann.
†McCann (1961) considers this specimen to be *Hyperoodon planifrons*.

Hyperoodon rostratus has a short but well defined beak and a large single pair of teeth at the tip of the lower jaw that usually do not break through the gum surface. Norman and Fraser (1937) note that the genus *Hyperoodon* is readily confused with the genus *Ziphius*, and that diagnostic features are hard to define, though the blowhole is placed in a more posterior position than in *Ziphius*.

The Southern Bottlenosed Whale in New Zealand Waters

McCann (1961) considers that only two of the beaked whales recorded as stranding on the New Zealand coast were *H. planifrons*. The first was identified by Waite (1913). However, Oliver (1922c) considered that the specimens of skeletal material should be referred to *Ziphius cavirostris*. McCann (1961) disagrees and lists his



Modified from McCann (1962a).

Fig. 37: *Hyperoodon planifrons*, the southern bottlenosed whale. Point of identification: 1. A single pair of teeth at the tip of the lower jaw in the male. The adult male has a bulbous forehead.

reasons. The jaw and teeth were rescued from a decaying carcass on a beach at East Cape in 1912. The second specimen came ashore at Winchester, near Timaru, before 1959. McCann has identified this as *H. planifrons*.

Twice during the New Zealand Marine Department whale survey, in the Bay of Plenty and off Timaru in the Canterbury Bight, schools of moderate length to large beaked whales were seen and were tentatively identified as *H. planifrons* (Gaskin, 1963 and 1964a).

Hyperoodon planifrons apparently has a wide distribution, according to the recorded strandings. A full list has been given by McCann (1961). This includes South Australia (Hale, 1932a); the type specimen from north-west Australia (Flower, 1882); and the Falkland Islands Dependencies (Fraser, 1945).

Genus **Mesoplodon** Gervais, 1850

Six species of *Mesoplodon* have been reported from the South-west Pacific area. On the coast of New Zealand about 40 to 45 specimens have been reported. These were referred to the following species: *Mesoplodon grayi*, *M. layardi*, *M. bowdoini* (= *M. stejnegeri* (McCann, 1962a and 1964b)), and *M. hectori*. McCann (1962b) considers that *M. hectori* is synonymous with *Berardius arnouxi*. However, to avoid confusion the two strandings of *hectori* have been left here under the name they were given at description (table 18). Two other species have been recorded from the eastern Australian coast; one, *M. pacificus*, has been considered to be *Hyperoodon planifrons* (McCann, 1962c). The other species, *M. densirostris*, has been recorded from: Lord Howe Island (Krefft, 1870); Yeppoon, Queensland (Longman, 1926); and Marrawah, Tasmania (Dr E. R. Guiler, *in litt.*) Thus three undoubted species are found in New Zealand waters.

In general body form the species of *Mesoplodon* are similar—stoutly built and rather thick in the caudal region. The flukes are not notched. The flippers are short in relation to the total body length, as in most ziphioid whales, and are not a pronounced feature as, for instance, in the pilot whale. Size and body colour are not helpful features for identification, though the species of *Mesoplodon* do not reach the lengths of *Ziphius* and *Berardius* at maturity. The known species appear to reach full growth between 12 and 20 ft. Body colour is very variable, but the general pattern in all species is for the dorsal surface to be dark grey or black and the ventral surface to be white or pale grey. Each species has a well developed dorsal fin. As in other beaked whales and the sperm whales, the male reaches a larger size at maturity than the female. Adult *Mesoplodon* males are readily separable on teeth characteristics; the females are difficult to distinguish without extracting the unerupted teeth. A great many specimens are known only from skeletal material. Most of the species of *Mesoplodon* have been distinguished by osteological characters, especially those of the skull. The size and position of the teeth are regarded as very important criteria for separation.

Several reviews of the genus have been published, a recent one being by Moore (1966), but until sufficient specimens of each species have been measured and the ranges of variation analysed statistically for significance, the number of species cannot be considered to be accurately known.

This difficult genus has been discussed by Flower (1879), Forbes (1893), True (1910), and Harmer (1924). The distribution of the genus in the Pacific and on the east coast of the U.S.A. has been considered by Moore (1953 and 1963). Sclater (1901) has discussed the distribution of the genus in South Africa. Andrews (1908b) described the type of *M. bowdoini* from New Zealand. Jellison (1953) discussed *Mesoplodon* in the North Pacific and described a specimen from the Aleutian Islands. Fraser (1950) considered that a skull found in the Falkland Islands was identical to those of the specimens of *M. hectori* previously recorded in New Zealand. Hale (1932a) described *M. layardi* from South Australia, and Warneke (1963) recorded the same species from the coast of Victoria. Glauert (1947) described *M. grayi* and *M. bowdoini* from Western Australia. *Mesoplodon layardi* has also been recorded from South Africa and the Falkland Islands (Norman and Fraser, 1937), and *M. grayi* from Patagonia (Norman and Fraser, 1937).

Slijper (1962) notes that nine species of the genus are now generally recognised. This list can be extended if the new species *carlhubbsi* is recognised (Moore, 1963) and *bowdoini* is considered to be distinct from *stejnegeri*. Moore (1963) considered *M. bowdoini* and *M. stejnegeri* to be quite distinct, the former being confined to the South Pacific and the latter to the North Pacific.

Two other species have also been recently described, *M. gervaisi* and *M. ginkgodens*. The six species not recorded for the South-west Pacific are: *M. mirus* from South Africa (McCann and Talbot, 1963) and from North Carolina, New England, the Outer Hebrides, and Ireland (Norman and Fraser, 1937); *M. stejnegeri* from the North Pacific (Norman and Fraser, 1937); *M. europeus* from the English Channel and New Jersey coast (Norman and Fraser, 1937); *M. bidens* from the North Atlantic (Norman and Fraser, 1937); *M. gervaisi* from the Gulf of Mexico (Moore and Wood, 1957); and *M. ginkgodens* from Japan (Nishiwaki and Kamiya, 1958).

Some authorities (Scheffer and Rice, 1963) prefer to separate *Mesoplodon* into two subgenera: *Mesoplodon*, containing the small-toothed species such as *M. grayi*, and *Dioplodon*, containing the large-toothed species such as *bowdoini*, *layardi*, *stejnegeri*, and *densirostris*. Iredale and Troughton (1934) give *Dioplodon* full generic status.

Mesoplodon grayi von Haast, 1876, Gray's Beaked Whale (Fig. 38)

1876. *Mesoplodon grayi* von Haast, *Proc. zool. Soc. Lond. 1876*: 7. Chatham Islands, New Zealand.

Comments

The teeth are triangular in this species and relatively inconspicuous, which enables adult males to be separated from those in *M. layardi* and *M. bowdoini*. The teeth are placed toward the posterior end of the mandibular symphysis. There are no distinguishing external features which can be reliably used to separate female and immature male specimens of this species from the others in New Zealand waters. This whale was first described, from New Zealand, by von Haast (1876 and 1877c). The species attains a maximum length at physical maturity of about 18 ft.

Gray's Beaked Whale in New Zealand Waters

Mesoplodon grayi has been recorded as stranding on the New Zealand coast more often than any other member of the genus.

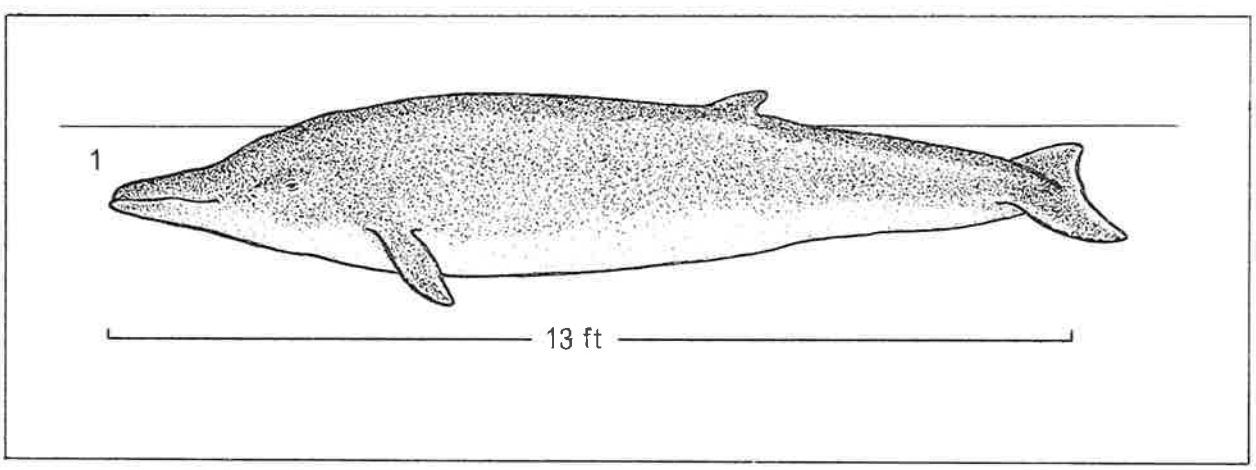
The strandings in New Zealand of *Mesoplodon grayi* are set out in table 17, and their localities are shown in fig. 39. The information available on this species does little more than indicate that the species occurs in New Zealand coastal waters in summer and may calve in the area.

Mesoplodon hectori (Gray, 1871), Hector's Beaked Whale

1871. *Berardius hectori* Gray, *Ann. Mag. nat. Hist., ser. 4, 8*: 115–7. Titahi Bay, New Zealand.

Comments

There is no available description of the external form of this species, if it is a distinct species. It is distinguished from other *Mesoplodon* species (except *M. mirus*) in having the pair of teeth in the lower jaw almost at the tip of the mandibular symphysis. In shape the teeth are flat and tri-



Modified from McCann (1962a).

Fig. 38: *Mesoplodon grayi*, Gray's beaked whale. Point of identification: 1. Teeth inconspicuous in the male.

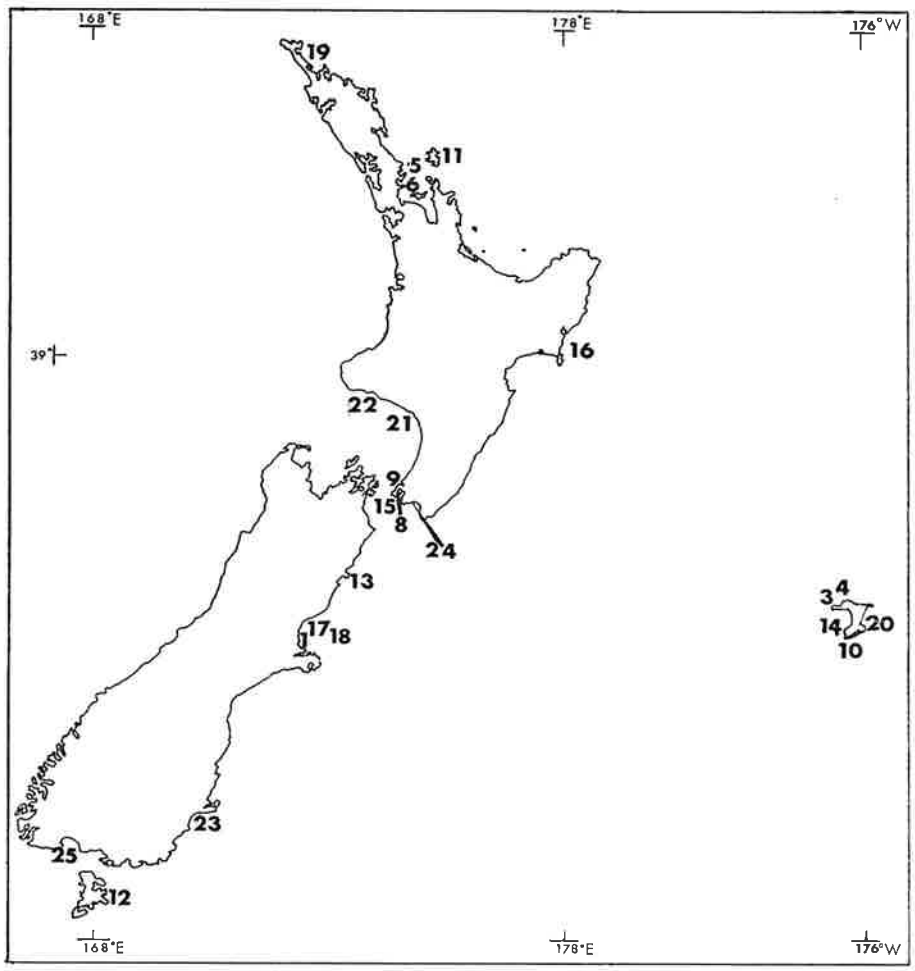


Fig. 39: The localities of known strandings of *Mesoplodon grayi* round the New Zealand coast. The numbers are the record numbers in table 17.

angular. McCann (1962b) was convinced that *M. hectori* specimens were no more than the juveniles of *Berardius arnouxi*.

Hector's Beaked Whale in New Zealand Waters

Three specimens of *M. hectori* are known, one from the Falkland Islands (Fraser, 1950) and the other two from New Zealand (table 18 and fig. 40).

Mesoplodon layardi (Gray, 1865), the Strap-toothed Whale (Fig. 41)

1865. *Ziphius layardi* Gray, *Proc. zool. Soc. Lond. 1865*: 358, 26 August. Cape of Good Hope, South Africa.

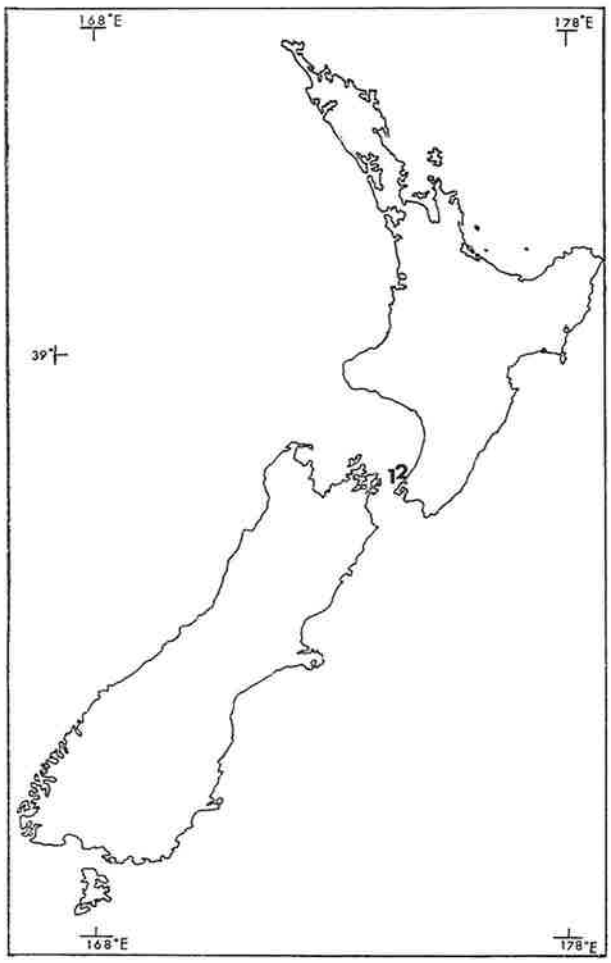
Comments

Though basically similar to *M. grayi* in general appearance, *M. layardi* appears to attain a larger size at maturity in both sexes. Large males may reach a length of 18 to 20 ft. The body colour is variable, but is usually black or dark grey dorsally and pale grey or yellowish grey on the ventral surface.

The males of this species can be distinguished from other male beaked whales by the pair of functional mandibular teeth, the length of which has caused this whale to be called strap-toothed. In mature males the pair of teeth point upward and backward from their position half way along the lower jaw and project above the upper jaw rather like the tusks of a boar. In females the teeth are not developed to the same extent (fig. 42). The crescent-shaped blowhole of the Ziphiidae is shown in a female of this species (fig. 43).

The Strap-toothed Whale in New Zealand Waters

Very little is known of the habits of this species, though females with calves and small foetuses have been among the specimens recorded on the



coast of New Zealand. Most of the strandings have been in summer, but the two pregnant females were recorded in the middle of winter. Nineteen specimens from New Zealand are listed in table 19; the localities are shown in fig. 44.

Fig. 40: The localities of known strandings of *Mesoplodon hectori* on the New Zealand coast. The numbers are the record numbers in table 18.

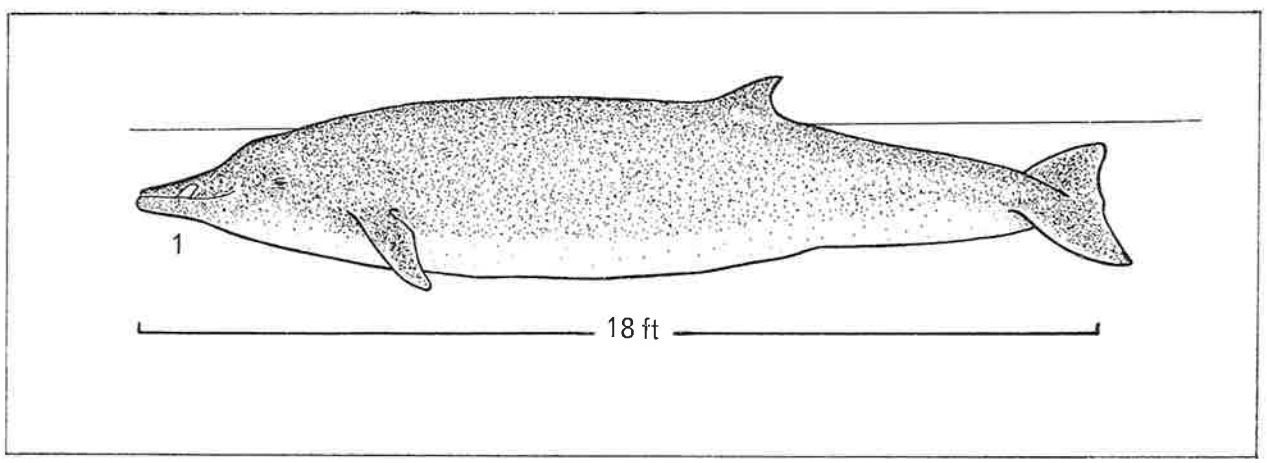
Mesoplodon bowdoini Andrews, 1908, Andrews's Beaked Whale (Fig. 45)

1908. *Mesoplodon bowdoini* Andrews, *Bull. Am. Mus. nat. Hist. 24*: 203–15. New Brighton, New Zealand. Type specimen.

Comments

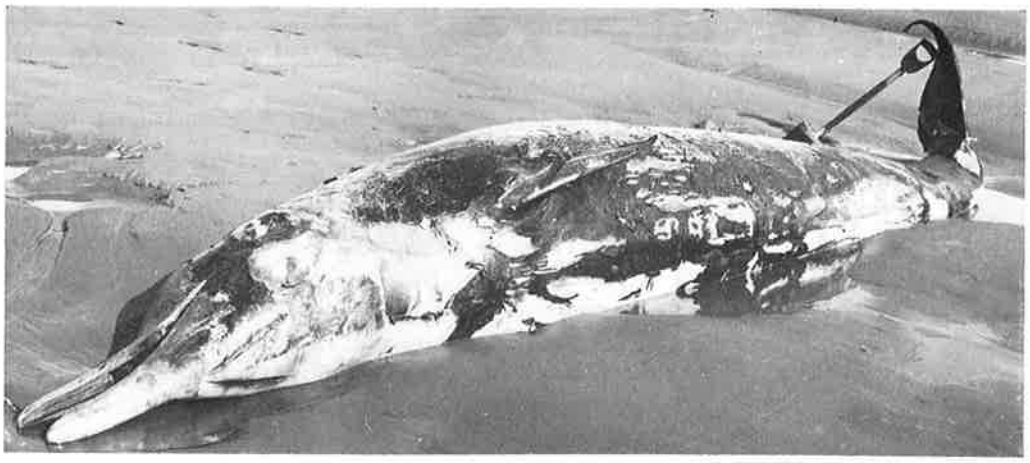
The two species *M. bowdoini* and *M. stejnegeri* are regarded as synonyms by McCann (1964b), and in his paper keying the beaked whales (1962a) the animal called *stejnegeri* represents *bowdoini* Andrews. At physical maturity this species attains a maximum length of about 16 ft and is the smallest of the beaked whales known to occur round New Zealand. The functional mandibular pair of teeth in this species are situated behind the symphysis of the lower jaw. They are very broad and massive in the males, but much less so in the females, in which the teeth do not always protrude through the gum (fig. 46).

Mesoplodon bowdoini has been recorded in the Southern Hemisphere only from New Zealand and Western Australia (Glauert, 1947), but *M. stejnegeri* has been noted from the eastern North Pacific (Norman and Fraser, 1937; Moore, 1953) and from the coast of Japan (Nishiwaki and Kamiya, 1959). Nishiwaki has published an anomalous report of a specimen of *M. bowdoini* on the coast of Japan (1962a), but this has supported a



Modified from McCann (1962a).

Fig. 41: *Mesoplodon layardi*, the strap-toothed whale. Point of identification: 1. A large tusk-like, projecting median pair of teeth in the lower jaw.



Photograph by courtesy of Dominion Museum, Wellington.

Fig. 42: A female strap-toothed whale stranded at Castlepoint in 1955. This specimen lacks the prominent teeth in the lower jaw which are characteristic of the males.

TABLE 17: New Zealand Strandings of *Mesoplodon grayi**

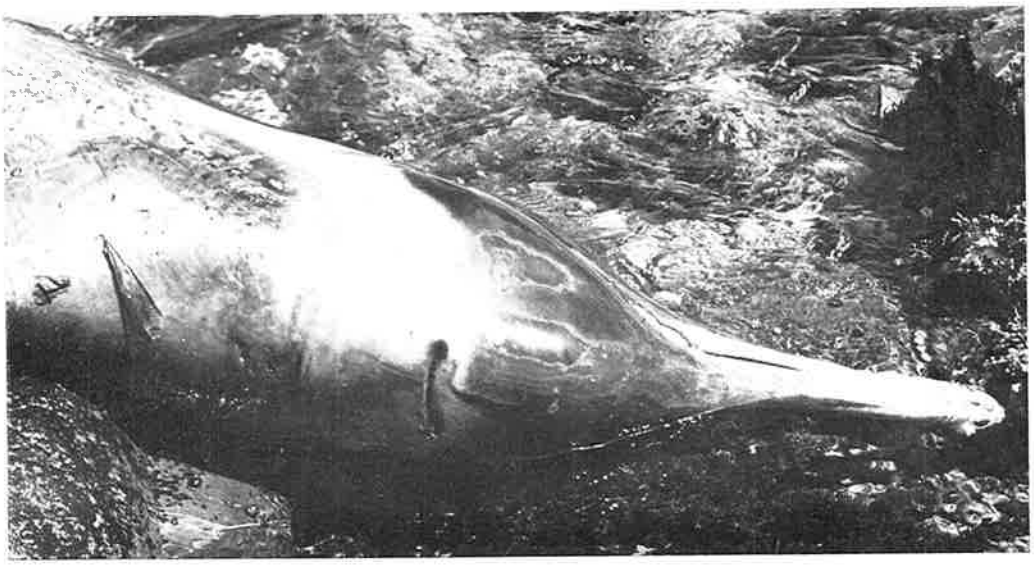
Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Kaiapoi	Skull in Cant. Mus.	Hector, 1873b
2	1	Not known	Not known	Skel. in Paris Mus.	Oliver, 1922c
3	1	Not known	Chatham Islands	Skel. in U.S. Nat. Mus.	Oliver, 1922c
4	1	Not known	Chatham Islands	Skull in Brit. Mus.	Forbes, 1893
5	1	Not known	Goat Island, Northland	No data	McCann, 1964b
6	1	Not known	Orewa	No data	McCann, 1964b
7	1	Not known	Not known	Skull in Otago Mus.	C. McCann, pers. comm.
8	1	Not known	Wellington	Skel. in Amer. Mus. Nat. Hist.	Oliver, 1922c
9	1	Not known	Plimmerton	No data	McCann, 1964b
10	1	Not known	Chatham Islands	Skel. in Bishop Mus.	Oliver, 1922c
11	1	Not known	Great Barrier Island	No data	McCann, 1964b
12	1	Not known	Stewart Island	No data	McCann, 1964b
13	1	8 Oct 1873	Kaikoura	No data	Hector, 1875; Oliver, 1922c
14	25	1875	Waitangi, Chatham Islands	3 skulls in Cant. Mus., 2 in Otago Mus.	von Haast, 1876 (one skull male type of *Oulodon grayi*); Oliver, 1922c
15	1	12 Jan 1875	Lyall Bay	Skel. in Brit. Mus.	Hector, 1875
16	1	1 Dec 1875	East Coast, North Island	Rostrum of male in Mus. Roy. Coll. Surg.	Flower, 1879 (type of *M. haasti*)
17	1	15 Dec 1876	Saltwater Creek, North Canterbury	Male	Oliver, 1922c
18	3	29 Dec 1876	Saltwater Creek, North Canterbury	2 males and 1 female, 1 skel. in Cant. Mus.	Forbes, 1893; Oliver, 1922c
19	1	1911	Great Exhibition Bay, near North Cape	Skull and scapula in Brit. Mus.	Lillie, 1915; Oliver, 1922c
20	1	23 Feb 1926	Chatham Islands	No data	McCann, 1964b
21	1	25 Sep 1931	Wanganui	No data	McCann, 1964b
22	1	Dec 1935	Hawera	No data	McCann, 1964b
23	1	1937	Brighton	Skull in Otago Mus.	L. Gurr, pers. comm.
24	1	7 Apr 1956	Palliser Bay coast	No data	McCann, 1964b
25	1	1961	Orepuki	No data	McCann, 1964b

*This list is partly based on a manuscript list compiled by Mr C. McCann.

TABLE 18: New Zealand Strandings of *Mesoplodon hectori* (after McCann, 1962b)

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Jan 1866	Titahi Bay	Skull in Brit. Mus.	Hector, 1874
2*	1	25 Jan 1937	Plimmerton	Skel. in Dom. Mus.	Dom. Mus. str. file; McCann, 1962b

*Regarded by McCann (1964b) as *B. arnouxi*.



Photograph by courtesy of Dominion Museum, Wellington.

Fig. 43: The head of a female strap-toothed whale stranded at Makara in October 1960. The characteristic crescentic blowhole of the ziphioid whales is shown.

previous record of *bowdoini* from the North Pacific coast of the U.S.A. (Hubbs, 1946). The distributions of *stejnegeri* and *bowdoini*, if they are two separate species, seem to be unknown except in the broadest division of South and North Pacific.

Andrews's Beaked Whale in New Zealand Waters

There are only six specimens of *M. bowdoini* recorded for the New Zealand area, details of which are given in table 20; the localities of the

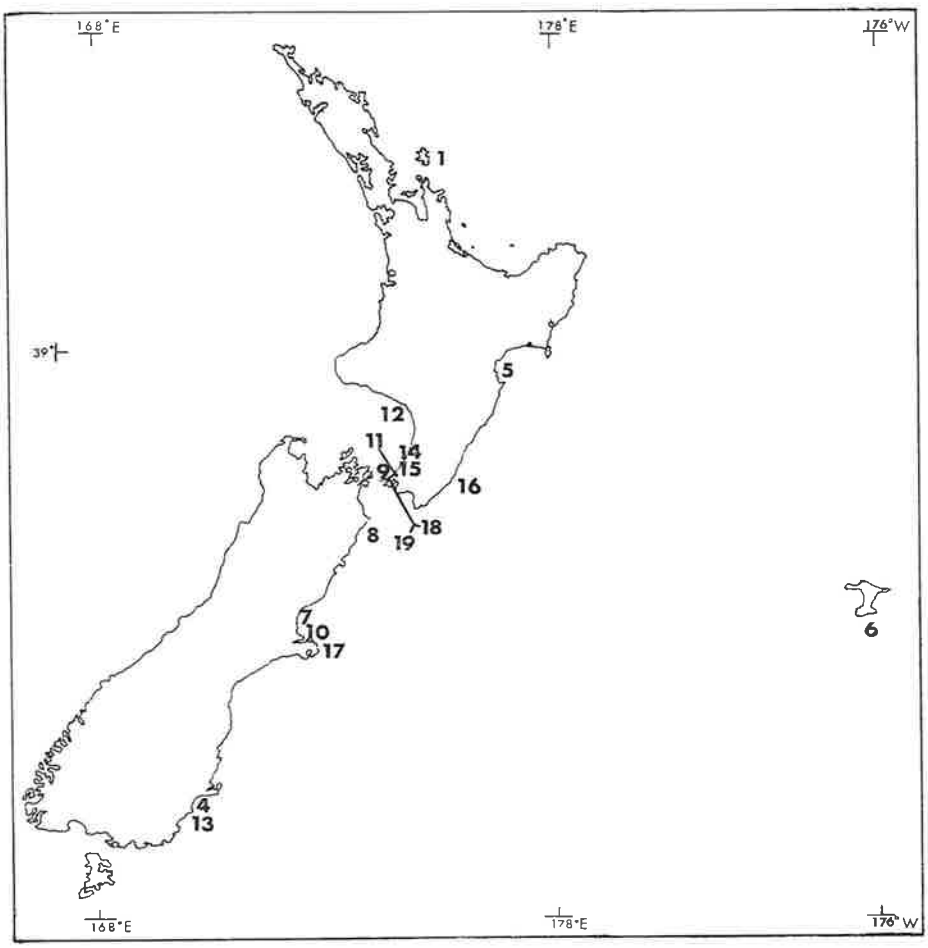


Fig. 44: The localities of known strandings of *Mesoplodon layardi* round the New Zealand coast. The numbers are the record numbers in table 19.

TABLE 19: New Zealand Strandings of *Mesoplodon layardi**

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Great Barrier Island	Skull in Cant. Mus.	Oliver, 1922c
2	1	Not known	Not known	Skull in Dom. Mus.	Oliver, 1922c
3	1	Not known	Not known	Skel. in Dom. Mus.	Oliver, 1922c
4	1	Not known	Tokomairiro	No data	McCann, 1964b
5	1	Not known	Napier	Teeth in Otago Mus.	Oliver, 1922c
6	1	1872	Pitt Island, Chatham Islands	Mandible	Hector, 1873a
7	1	16 Mar 1874	Saltwater Creek, North Canterbury	Skel. in Cant. Mus.	von Haast, 1877b (type of *M. floweri*)
8	1	1879	Marlborough	Skull in Dom. Mus.	Oliver, 1922c
9	1	10 Jan 1901	Titahi Bay	No data	McCann, 1964b and pers. comm.
10	1	22 Mar 1912	Lyttelton Harbour	Half cast in Cant. Mus.	Waite, 1912; Oliver, 1922c
11	1	Jan 1924	Kaitawa Point, Porirua Harbour	Tooth in Dom. Mus.	Oliver, 1924a
12	1	Oct 1937	Wanganui	No data	McCann, 1964b and pers. comm.
13	1	1940	Chrystalls Beach	Skull in Otago Mus.	L. Gurr, pers. comm.
14	1	6 Jul 1943	Waikanae Beach	Female, with 2 ft 6 in. foetus	McCann, 1964b and pers. comm.
15	1	29 Mar 1954	Paraparaumu Beach	Female	McCann, 1964b and pers. comm.
16	1	3 Jun 1955	Castlepoint	Female with small foetus	McCann, 1964b and pers. comm.
17	1	Oct 1955	Long Bay, Banks Peninsula	Rostrum in Cant. Mus.	M. Darby, pers. comm.
18	1	7 Oct 1960	Makara	Skull of 13 ft 9 in. female in Dom. Mus.	McCann, 1964b and pers. comm.
19	1	23 Feb 1964	Makara	Skull of 14 ft male in Dom. Mus.	Identified by C. McCann and D. E. Gaskin.

*Some of the data in this table were compiled in a manuscript list by Mr C. McCann.

strandings are shown in fig. 47. Little is known of the movements or habits of this species in this area except that, like *M. layardi*, the species may calve in spring or early summer.

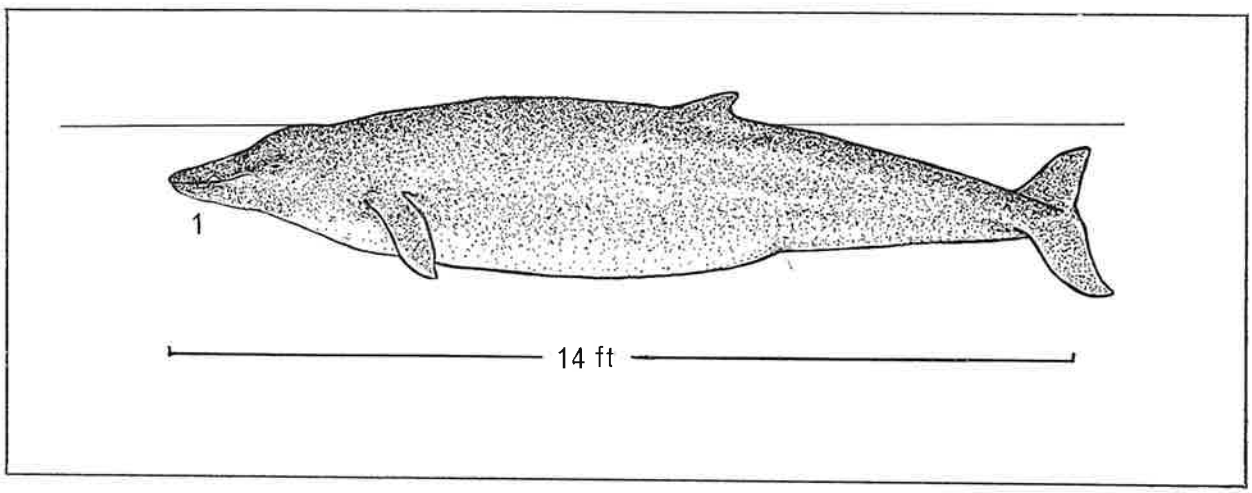
Genus **Tasmacetus** Oliver, 1937

Tasmacetus shepherdi Oliver, 1937, Shepherd's Beaked Whale (Fig. 48)

1937. *Tasmacetus shepherdi* Oliver, *Proc. zool. Soc. Lond. 107, ser. B,*: 371–81.

Comments

This whale (fig. 49) is so far unique to New Zealand waters and is the sole species in the genus. It is a large animal, reaching a maximum length at physical maturity of about 20 ft. Generally it resembles a *Mesoplodon*, but it differs from all other beaked whales in having functional teeth in both jaws. The type specimen had 19 pairs of teeth in the upper jaw and 27 pairs in the lower jaw, the pair at the tip of the jaw being especially well developed. Specimens so far recorded have



Modified from McCann (1962a).

Fig. 45: *Mesoplodon bowdoini*, Andrews's beaked whale. Point of identification: 1. A broad blunt pair of teeth in the middle of the lower jaw in the male.

Photograph by courtesy of Dominion Museum, Wellington.

Fig. 46: The head of a female Andrews's beaked whale stranded at Stewart Island in May 1951. The large median teeth are not protruding through the gums as they do in the males.

been black on the dorsal surface, grey or greyish yellow on the sides, and white beneath.

Only five records of this animal are known (table 21 and fig. 50). The type specimen was from Wanganui (Oliver, 1937).

Family **GLOBICEPHALIDAE,** Great Dolphins

Nishiwaki (1963 and 1964) has considered the taxonomy of the delphinid group as a whole and has come to conclusions for separation which are partly justified. The separation of the sperm whales and pygmy sperm whales into two families, Physeteridae and Kogiidae, is not followed, though it is admitted there is some justification for this, but in most other respects the system of classification laid down by Nishiwaki is followed. The "dolphins and porpoises" of the New Zealand area are thus clearly divisible into two families: the Globicephalidae and the Delphinidae, with one anomaly. The Delphinidae are characterised by a long, narrow beak and the Globicephalidae by a blunt, short beak. The anomalous species is the Risso's dolphin or grampus, which differs from all others by usually

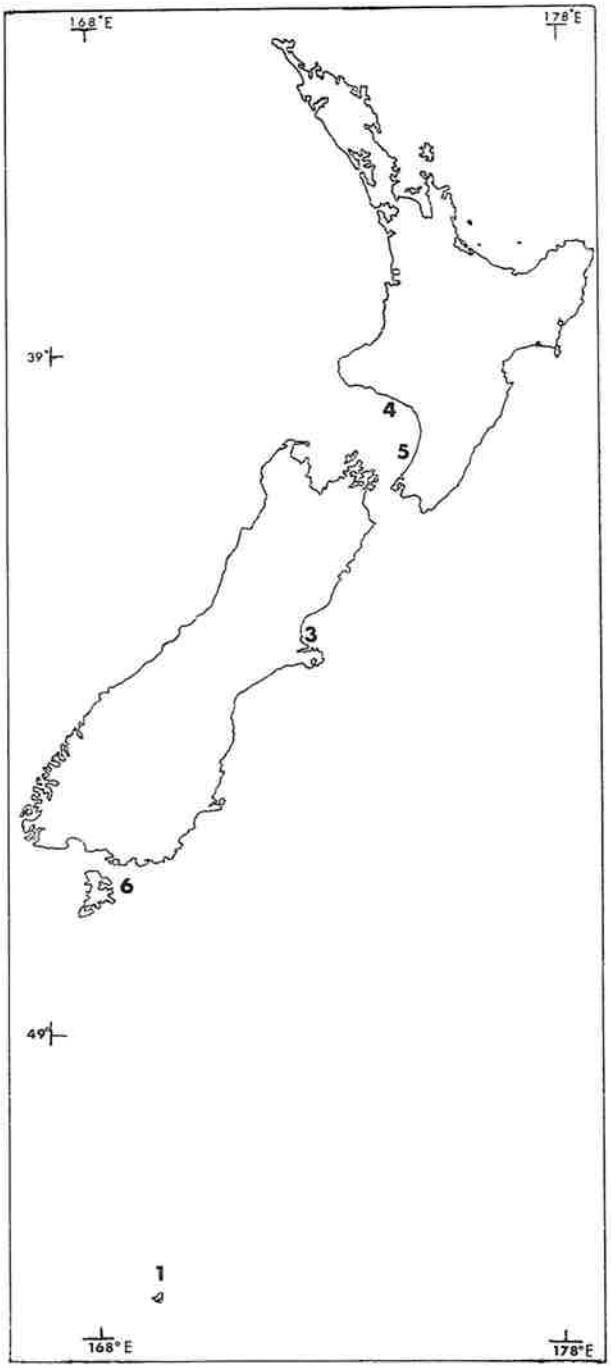


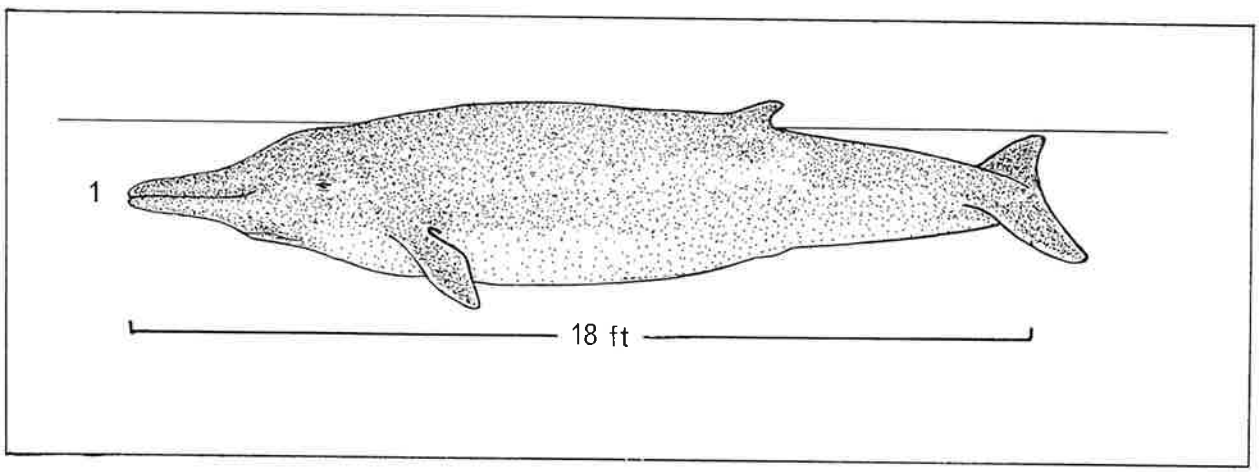
Fig. 47: The localities of known strandings of *Mesoplodon bowdoini* on the New Zealand coast. The numbers are the record numbers in table 20.

having no maxillary teeth. Nishiwaki's plan (1964) to split the group further and erect a new family, Grampidae, containing the Risso's dolphin, is therefore too extreme. *Grampus griseus* is best left in the Delphinidae, as Fraser and Purves (1960) consider the species to have more affinities with

TABLE 20: New Zealand Strandings of *Mesoplodon bowdoini**

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Campbell Island	Two teeth in Dom. Mus.	Dom. Mus. str. file
2	1	Not known	Not known	Skel. in Dom. Mus.	Oliver, 1922c
3	1	1904	New Brighton	Skel. in Amer. Mus. Nat. Hist.	Andrews, 1908b
4	1	1930	Waitotara	Male	McCann, 1964b
5	1	28 Sep 1937	Manawatu Heads	14 ft female with 5 ft foetus. Spec. in Dom. Mus.	McCann, 1962a
6	1	May 1951	Stewart Island	14 ft female	McCann, 1964b and pers. comm.

*Some of the data in this table were compiled in a manuscript list by Mr C. McCann. The New Zealand specimens of this whale are considered by McCann (1962a, 1964b, and pers. comm.) to be referable to *M. stejnegeri*. Since his diagnostic reasons for this are still in manuscript form, the identification has been retained as *M. bowdoini*.



Modified from McCann (1962a).

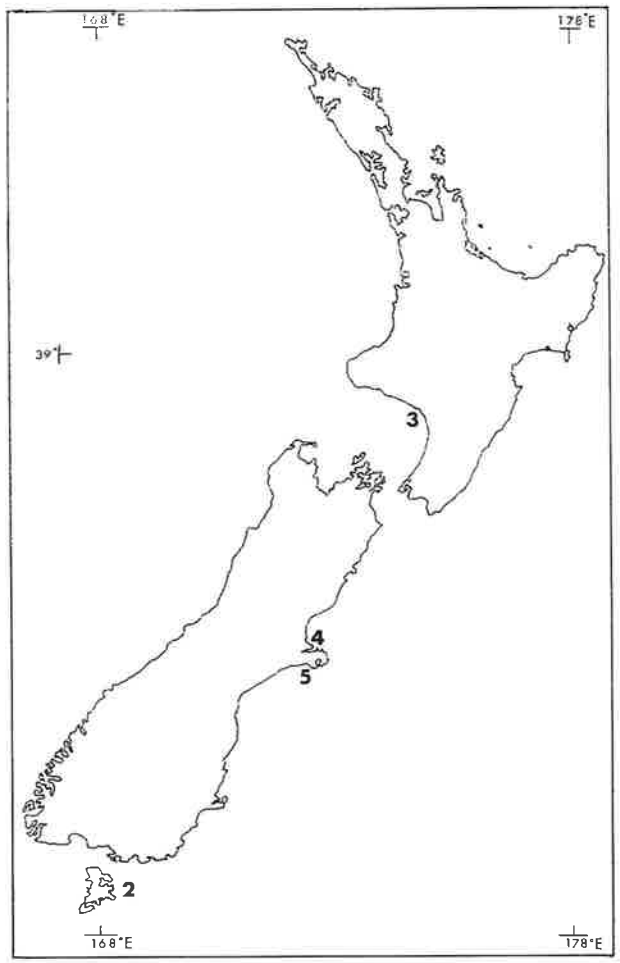
Fig. 48: *Tasmacetus shepherdi*, Shepherd's beaked whale. Point of identification: 1. Teeth in both jaws.

Photograph by Mrs J. Harrison, by courtesy of Dominion Museum, Wellington.

Fig. 49: A specimen of Shepherd's beaked whale stranded at Mason Bay, Stewart Island, in 1933.

TABLE 21: New Zealand Strandings of *Tasmacetus shepherdi*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Not known	Mandible in Dom. Mus.	C. McCann, pers. comm.
2	2	Feb 1933	Stewart Island	20 ft male and 30 ft male	Sorensen, 1940
3	1	Oct 1933	Wanganui	Adult female with foetus	Oliver, 1937 (type specimen of this species)
4	1	17 Mar 1951	Avon-Heathcote estuary	Adult	*N.Z. Weekly News*, 15 July 1959
5	1	1962	Birdling's Flat	Adult	B. Stonehouse, pers. comm.



Lagenorhynchus than with any of the Globicephalidae.

According to Nishiwaki's classification the Globicephalidae are distinguished by the following characteristics: The beak or rostrum is short and blunt. The body length at maturity is over 8 ft. There are fewer than 15 pairs of teeth in the upper jaw. In the skull and vertebrae the atlas, axis, and third cervical vertebra are fused. Three species are known from the New Zealand area: *Orcinus orca*, the killer whale; *Pseudorca crassidens*, the false killer whale; and *Globicephala melaena*, the pilot whale.

Fig. 50: The localities of known strandings of *Tasmacetus shepherdi* on the New Zealand coast. The numbers are the record numbers in table 21.

Genus **Orcinus** Fitzinger, 1860

Orcinus orca (Linnaeus, 1758), the Killer Whale (Fig. 51)

1758. *Delphinus orca* Linnaeus, Systema Naturae, 10th ed., vol. 1, p. 77, 1 January. Europe.

Comments

The male killer whale has the largest dorsal fin of any whale, 5 ft high in a mature specimen.

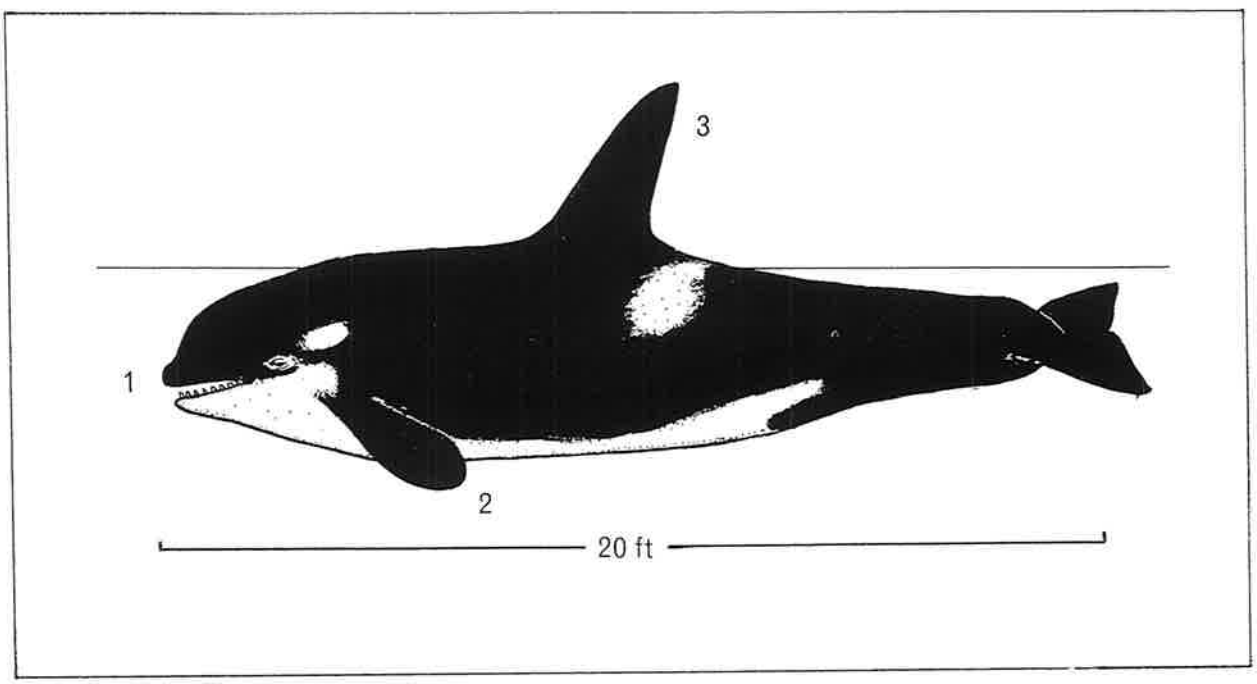
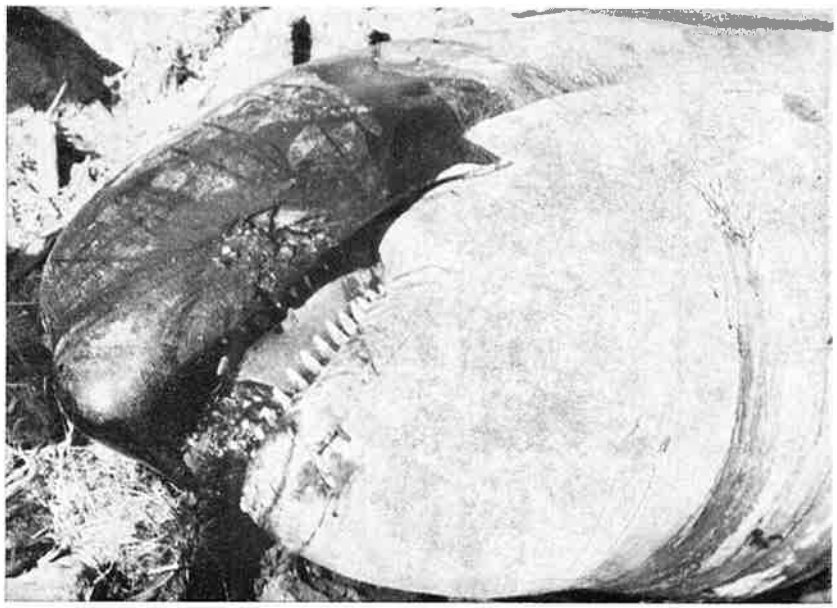


Fig. 51: *Orcinus orca*, the killer whale. Points of identification: 1. A blunt head with massive teeth in both jaws. 2. Paddle-shaped flippers. 3. A massive dorsal fin. There is a white patch on the dorsal surface behind the fin.



Photograph by C. McCann, by courtesy of Dominion Museum, Wellington.

Fig. 52: The head of a killer whale stranded at Paraparaumu Beach in May 1955.

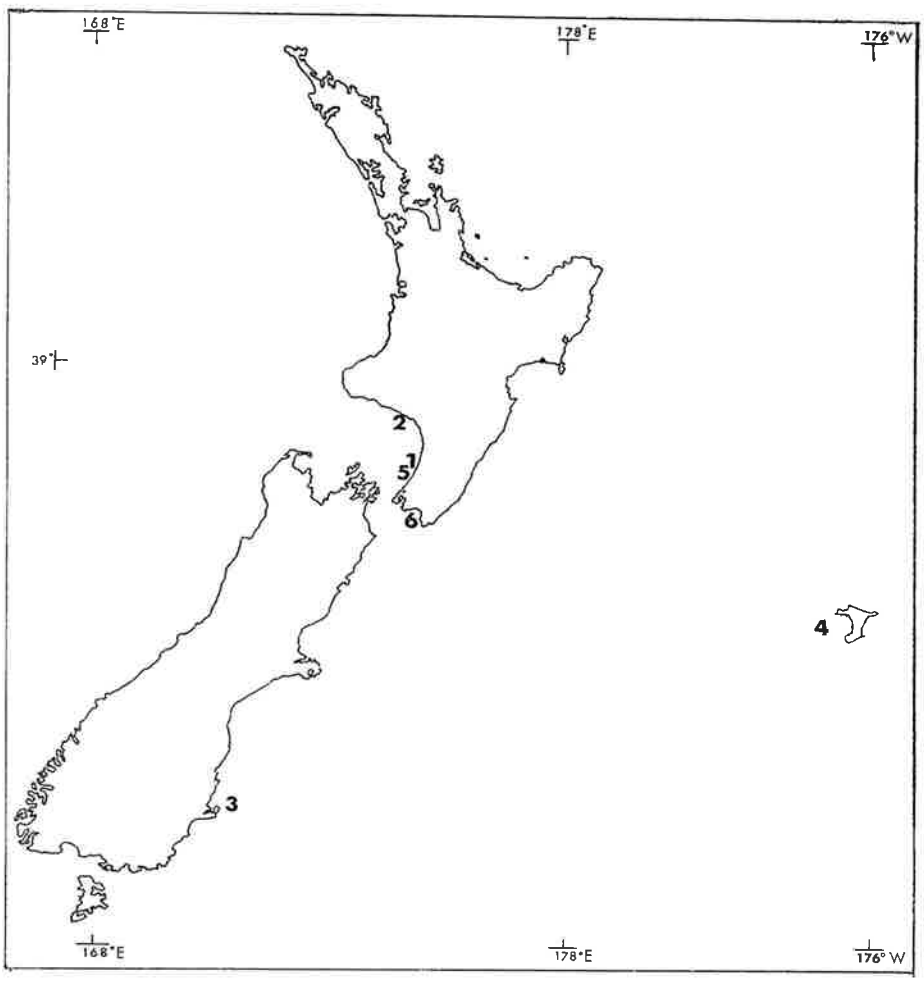


Fig. 53: The localities of known strandings of *Orcinus orca* round the New Zealand coast. The numbers are the record numbers in table 22.

The fin of the female is also well developed, but is smaller in proportion to the body than that of the male. The posterior margin of the dorsal fin of the female is more curved than the male's. The dorsal surface of the killer whale is black or dark purplish brown, the ventral surface white. There are usually pale patches on the upper flanks and back, and these vary from pink or yellow to white as the animal ages. The pectoral flippers are large and rounded. The head of the animal is smooth, and there is usually a short but distinct beak. The teeth are massive (fig. 52) and circular in cross section. The species reaches a maximum size of about 28 ft at physical maturity.

Most authorities recognise only a single world-wide species of killer whale. The animal in the North Pacific was discussed by Nishiwaki and Handa (1958). Scheffer and Slipp (1948) examined the occurrence of the killer whale on the west coast of the U.S.A. Iredale and Troughton (1933) have discussed the very confused synonymy of this whale.

The killer whale is a wide-ranging predator and has been noted in most parts of the Southern Ocean; the author has seen packs of 200 killer whales among the South Shetland Islands and near Clarence and Elephant Islands and the South Orkneys. Schools of this size have never been reported in New Zealand coastal waters, where the smaller schools seem to be of mixed sexes.

The Killer Whale in New Zealand Waters

There are six records of stranded killer whales in New Zealand (table 22 and fig. 53). Seventeen of these animals, identified by Dr W. H. Dawbin and Mr C. McCann, were stranded together on Paraparaumu Beach, near Wellington, on 13 May 1955.

The strandings contribute only little to the available information on this species in New Zealand coastal waters. During the Marine Department whale survey of 1963 many sightings were made by the survey vessels and by auxiliary observers working for the survey from various merchant vessels. All these observers were either familiar with cetaceans or were supplied with keys for identification. All the undoubted sightings of this species are listed in table 23 and plotted in fig. 54. These sightings indicate that the killer whale is more common on the east coast, but the survey vessels were largely confined to the east coasts of the North and South Islands, which tends to bias the sightings.

The killer whale is very common in the Bay of Plenty, particularly near the off-shore islands such as Motiti, White, and Mayor Islands and the Mercury Islands. Reports from fishermen in the area indicate that at least part of the population is resident throughout the year.

Genus **Pseudorca** Reinhardt, 1862

Pseudorca crassidens (Owen, 1846), the False Killer Whale (Fig. 55)

1846. *Phocaena crassidens* Owen, A History of British Fossil Mammals . . . , p. 516. Fossil, Lincoln, England.

Comments

There are superficial similarities between this species and both the killer whale and the pilot whale. In the water it is easily separated from the killer whale by the colouring and the shape of the dorsal fin and less easily from the pilot whale by the shape of the head and the shape of the dorsal fin. Like pilot whales, false killer whales sometimes travel in large schools of up to 1,000.

TABLE 22: New Zealand Strandings of *Orcinus orca*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Waikanae Beach	Skull in Dom. Mus.	Dom. Mus. str. file
2	1	Not known	Wanganui	Skel. in Dom. Mus.	Oliver, 1922c
3	1	Not known	Otago Heads	Skull in Otago Mus.	Hector, 1875; Oliver, 1922c
4	1	Not known	Chatham Islands	Skull in Cant. Mus.	Oliver, 1922c
5	17	13 May 1955	Paraparaumu Beach	Males and females	Dom. Mus. str. file
6	3	25 May 1960	Palliser Bay	2 males, 1 female	Dom. Mus. str. file

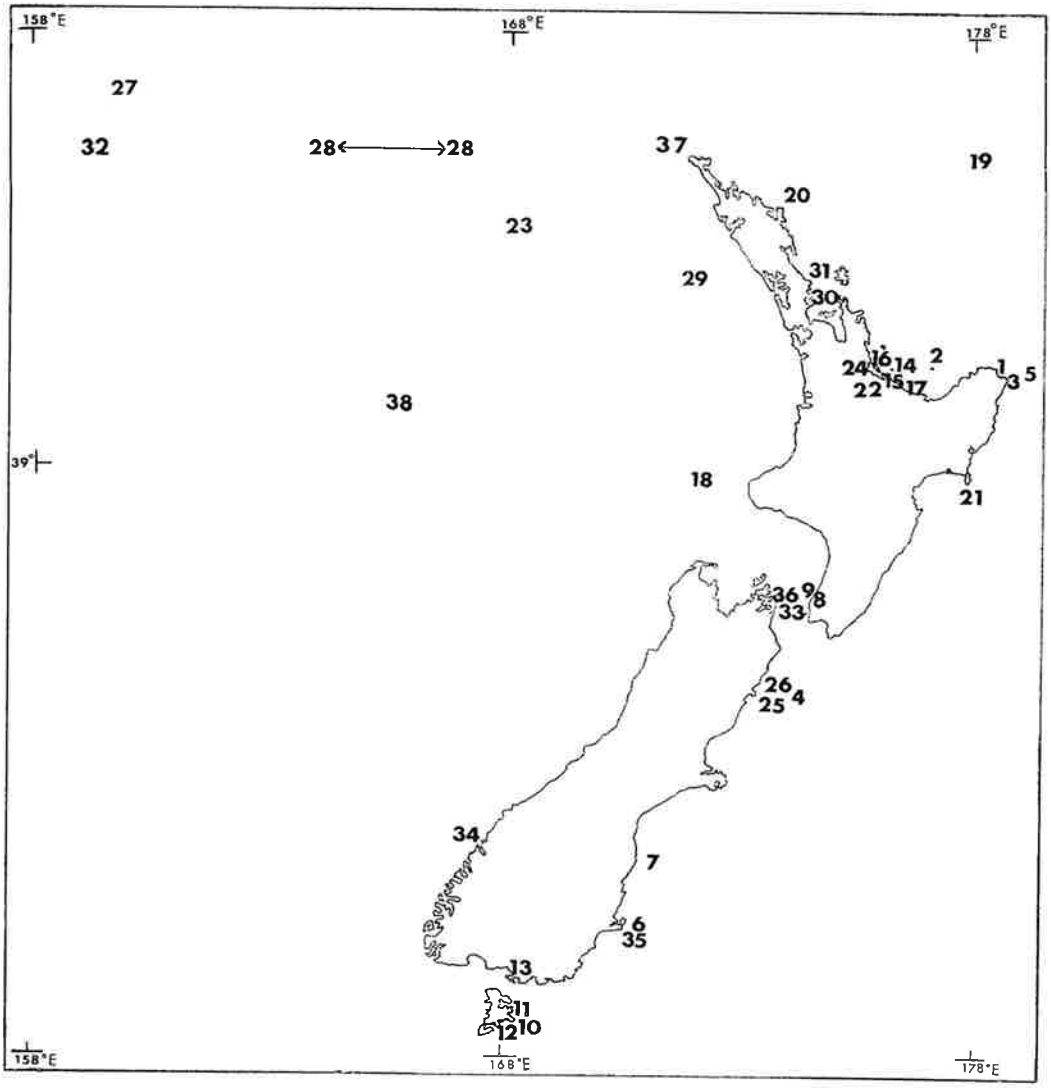


Fig. 54: The localities of confirmed sightings of *Orcinus orca* in the New Zealand area. The numbers are the record numbers in table 23.

Some animals have attained a length of 18 ft (Norman and Fraser, 1937), but this appears to be exceptional. A big school recorded off the coast of California in 1959 (Norris and Prescott, 1961) was composed of about 300 animals, which were estimated to vary in length from 5 to 10 ft.

The head of the false killer whale is more tapered than that of the pilot whale and it lacks the beak of the killer. The dorsal fin is much smaller in relation to the body than in the pilot whale. The flippers are not rounded, as in the killer, but pointed, as in the pilot whale. They are not, however, as long in relation to the total body length.

Almost all specimens of the false killer whale examined have been black. Any pale markings are usually small scars. The species lacks the pale patches characteristic of the true killer whale.

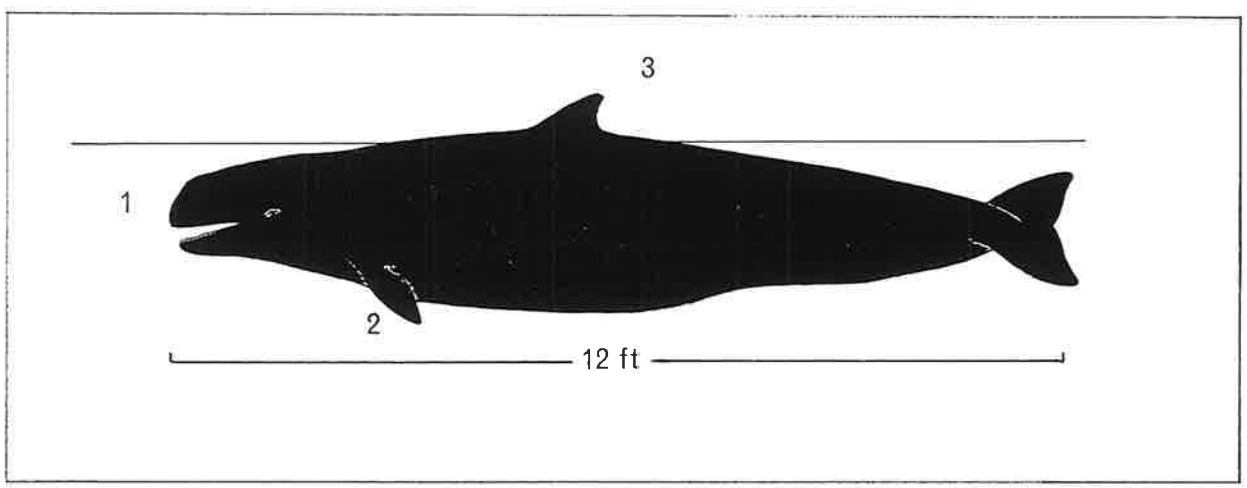
Badly decomposed specimens of the killer, false killer, and pilot whale can be identified by the teeth. The pilot whale has only a semicircle of small, peg-like maxillary teeth, but the upper jaw teeth are well developed in the true and false killer whales. The teeth of the killer are oval in cross section, but those of the false killer are circular. Like many other toothed whales, this species is said to feed on squid.

The false killer whale is spread throughout the world. It has been discussed by Harmer (1931), Norman and Fraser (1937), and Slijper (1939).

TABLE 23: New Zealand Records of Confirmed Sightings of *Orcinus orca*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	2	24 Feb 1963	Hicks Bay, East Cape	1 male, 1 female	B. Beck, survey rep.
2	12	21 Apr 1963	White Island	2 males, 10 females	B. Beck, survey rep.
3	2	23 May 1963	East Cape	2 males	D. E. Gaskin, survey rep.
4	5	8 Jun 1963	6 m. east of Kaikoura	Small males?	B. Beck, survey rep.
5	6	13 Jun 1963	East Cape	1 male, 5 females	B. Beck, survey rep.
6	1	21 Aug 1963	Otago Heads	1 male	M. W. Cawthorn, survey rep.
7	6	21 Aug 1963	10 m. east of Oamaru	Small animals	M. W. Cawthorn, survey rep.
8	3	29 Aug 1963	Kapiti Island	No data	L. J. Paul, rep.
9	4	29 Aug 1963	Kapiti Island	No data	L. J. Paul, rep.
10	2	Sep 1963	Stewart Island	No data	Fisherman's rep.*
11	4	Sep 1963	Stewart Island	No data	Fisherman's rep.*
12	8	Sep 1963	Stewart Island	No data	Fisherman's rep.*
13	4	Sep 1963	Bluff Harbour	No data	Marine Dept. inspector's rep.
14	3	4 Oct 1963	Motiti Island	2 males, 1 female	D. E. Gaskin, survey rep.
15	9	4 Oct 1963	Motiti Island	3 males, 6 females	M. W. Cawthorn, survey rep.
16	6	4 Oct 1963	Motiti Island	Small animals	D. E. Gaskin, survey rep.
17†	3	4 Oct 1963	Motiti Island	1 male, 2 females	D. E. Gaskin and M. W. Cawthorn, survey rep.
18	5	5 Oct 1963	60 m. west of Cape Egmont	No data	U.S.S. Co. vessel rep.
19	4	19 Oct 1963	34° 26′ S, 178° 10′ E	No data	U.S.S. Co. vessel rep.
20	3	20 Oct 1963	10 m. north-east of Cape Brett	No data	MV *Ikatere* rep.
21	12	23 Oct 1963	Mahia Peninsula	No data	U.S.S. Co. vessel rep.
22	7	24 Oct 1963	Tauranga Harbour	3 males, 4 females	K. Fraser rep.
23	1	27 Oct 1963	35° 25′ S, 168° 20′ E	No data	U.S.S. Co. vessel rep.
24	2	29 Oct 1963	Tauranga Harbour	2 males	K. Fraser rep.
25	6	Nov 1963	7 m. east of Kaikoura	No data	U.S.S. Co. vessel rep.
26	3	Nov 1963	12 m. north-east of Kaikoura	No data	U.S.S. Co. vessel rep.
27	5	5 Nov 1963	33° 20′ S, 160° 00′ E	No data	U.S.S. Co. vessel rep.
28	13	13 Nov 1963	34° 20′ S, 164° to 167° E	No data	U.S.S. Co. vessel rep.
29	15	15 Nov 1963	36° 15′ S, 172° 22′ E	No data	U.S.S. Co. vessel rep.
30	2	7 Dec 1963	Kawau Island	No data	MV *Ocean Star* rep.
31	2	7 Dec 1963	Hauraki Gulf	No data	MV *Ocean Star* rep.
32	30	10 Dec 1963	34° 00′ S, 159° 30′ E	No data	U.S.S. Co. vessel rep.
33	6	23 Dec 1963	Tory Channel	1 male, 5 females?	M. W. Cawthorn, survey rep.
34	6	7 Jan 1964	Milford Sound	6 males?	A. G. York, rep.
35	7	12 Jan 1964	Cape Saunders	No data	U.S.S. Co. vessel rep.
36	12	17 Feb 1964	Tory Channel	3 males, 9 females	M. W. Cawthorn, survey rep.
37	2	12 Jul 1964	34° 02′ S, 172° 18′ E	No data	U.S.S. Co. vessel rep.
38	20	20 Aug 1964	37° 55′ S, 165° 47′ E	No data	U.S.S. Co. vessel rep.

*Name not attached to reports.
†Two of these animals were tagged with *Discovery* markers 21,661 and 21,665.



After Fraser in *Norman and Fraser (1937)*.

Fig. 55: *Pseudorca crassidens*, the false killer whale. Points of identification: 1. A blunt head, with teeth circular in cross section. 2. Flippers of moderate length, not paddle-shaped as in the killer whale. 3. A small dorsal fin.

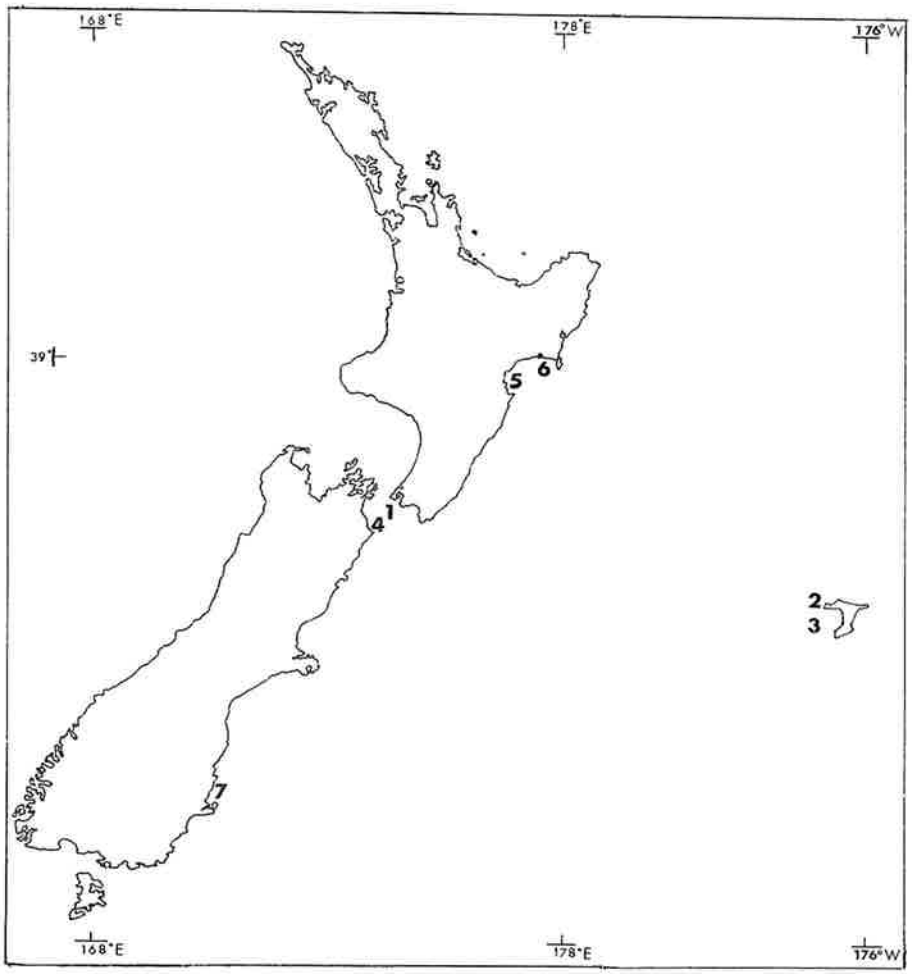


Fig. 56: The localities of known strandings of *Pseudorca crassidens* round the New Zealand coast. The numbers are the record numbers in table 24.

Stranded specimens on the coast of the U.S.A. were discussed by Miller (1920), and Bullis and Moore (1956). The female reproductive system has been studied by Comrie and Adam (1938).

The False Killer Whale in New Zealand Waters

Over 100 specimens of the false killer whale have been recorded from the Chatham Islands and 50 from the New Zealand mainland. However, all these animals make up only seven recorded strandings in 90 years (table 24 and fig. 56). The species has been reported several times by the whale chaser *Orca* at the eastern end of Cook Strait and off the Marlborough coast. The strandings listed in table 24 are all that could be found. Two of these strandings were previously considered to be blackfish or pilot whale strandings, but the descriptions and photographs in the Dominion Museum and Marine Department strandings files were detailed enough to enable correct identification to be made.

TABLE 24: New Zealand Strandings of *Pseudorca crassidens*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	18 Jan 1870	Lyall Bay	Skull in Dom. Mus.	Hector, 1873b; Oliver, 1922c
2	100	Mar 1906	Chatham Islands	No data	Oliver, 1922c
3	1	1932	Chatham Islands	No data	Dom. Mus. str. file
4	1	May 1933	Awatere River	No data	Dom. Mus. str. file
5	29	17 Jun 1936	Napier	Males and females	Dom. Mus. str. file
6	1	8 Apr 1943	Opoutama	No data	Dom. Mus. str. file
7	19	23 Jul 1962	Warrington	Males and females	Marine Dept. str. file

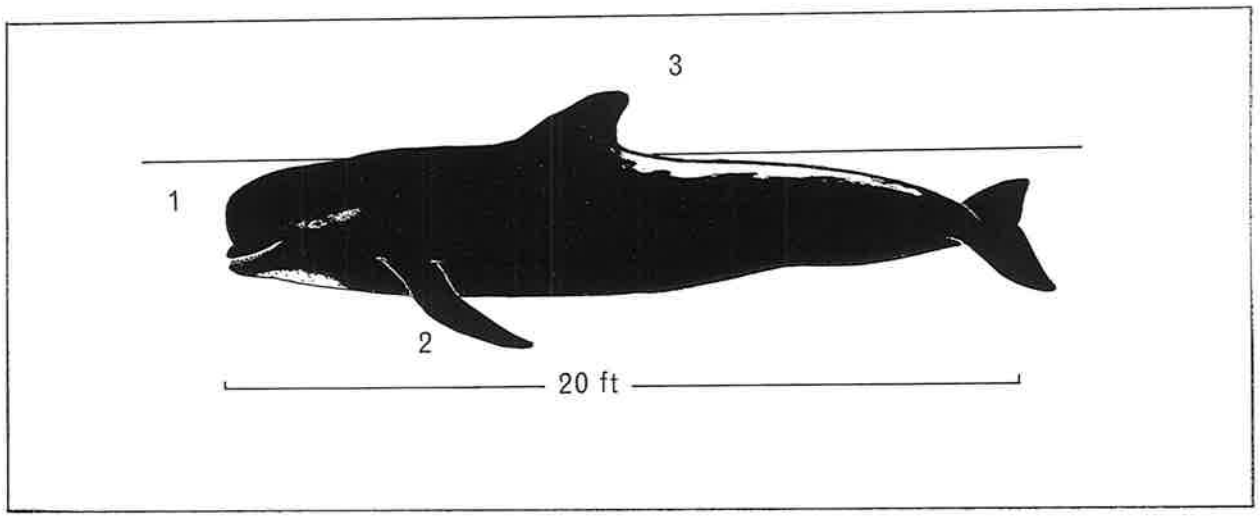


Fig. 57: *Globicephala melaena edwardi*, the southern pilot whale. Points of identification: 1. A bulging forehead with a short beak, peg-like teeth in the anterior parts of the upper and lower jaws. 2. Long pointed flippers. 3. A large dorsal fin.

Genus **Globicephala** Lesson, 1828

Globicephala melaena edwardi (Smith, 1834), the Southern Pilot Whale (Fig. 57)

1809. *Delphinus melas* Traill, *J. nat. Philos., 2nd ser., 22*: 81, February. North Atlantic.
1834. *Phocaena edwardi* Smith, *South Afr. quart. J. 2*: 239. Slangkop, South Africa.

Comments

The southern pilot whale is black except for a pale zone under the jaw (fig. 58), a white streak on the ventral surface, and a similar streak behind the dorsal fin. It has long, slender flippers and a large triangular dorsal fin set characteristically forward on the back. The forehead bulges typically and has been given the name "melon" by whalers (fig. 58). Observations by Norris and Prescott (1961) show that the melon is used in head butting between males and females during the breeding season.

At physical maturity the males of the species attain a maximum length of about 22 ft and the females are smaller.

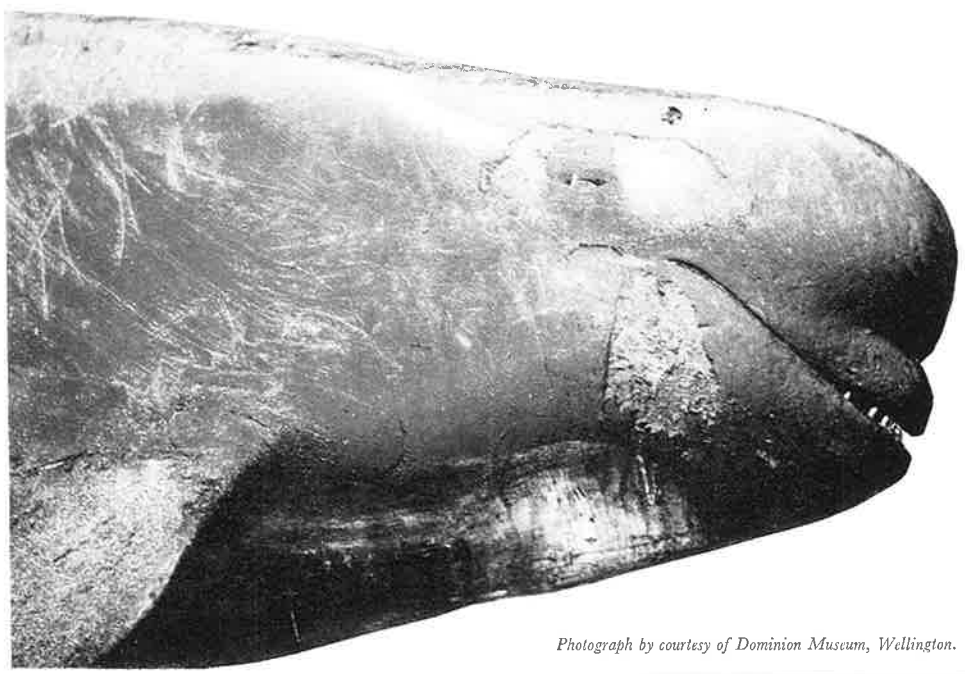


Fig. 58: The head of a pilot whale stranded at Ngunguru in 1955.

Photograph by courtesy of Dominion Museum, Wellington.

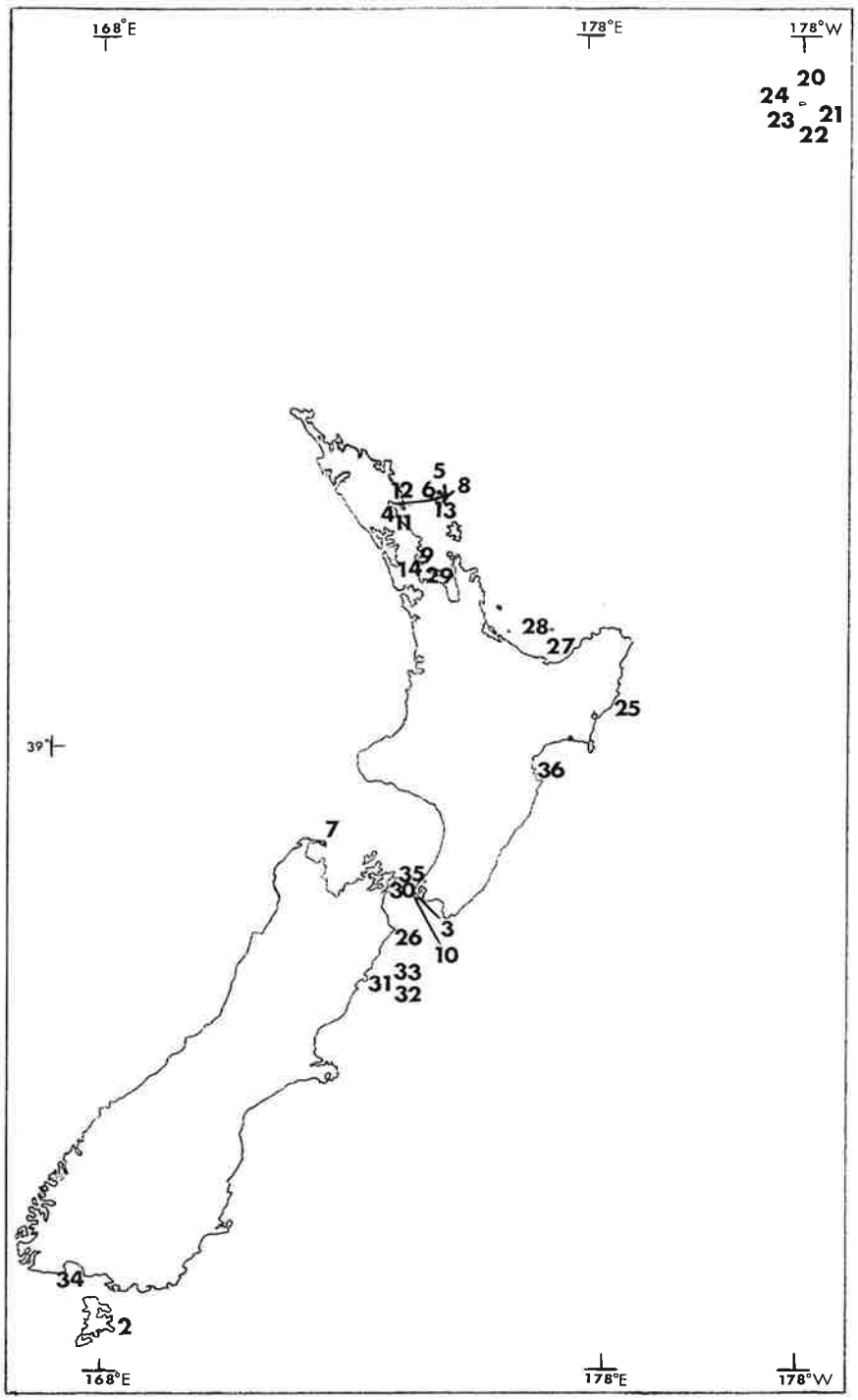


Fig. 59: The localities of known strandings and sightings of *Globicephala melaena* in the New Zealand area. The numbers are the record numbers in table 25. Record numbers 15, 16, 17, 18, and 19 have not been included because the sightings were made in the Southern Ocean.

There are grounds for separating several species of pilot whale. The southern form *G. melaena edwardi* has been discussed by Davies (1960). Other species and subspecies which have been recognised are: *G. scammoni* from the North Pacific; *G. melaena melaena* from the North Atlantic; *G. indica* from the Indian Ocean and the Bay of Bengal; and *G. brachyptera* from the west coast of North America (Norman and Fraser, 1937). Sergeant (1962a) based his studies of the biology of *G. melaena* on catches off the coast of Newfoundland. The same author has also studied the morphometry and growth of several species (1962b). The female reproductive system was

TABLE 25: New Zealand Strandings and Sightings of *Globicephala melaena*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	6	Not known	Not known. 2 from Cook Strait?, 1 from Chatham Islands?	1 skull in Auck. Mus., 1 skel. and 2 skulls in Dom. Mus., 1 skel. in Cant. Mus., 1 skel. in Otago Mus.	Oliver, 1922c
2	1	Jan 1874	Stewart Island	Skel. in Otago Mus.	Hector, 1875; Oliver, 1922c
3	10	Jan 1876	Lyall Bay	1 skel. in Dom. Mus., 2 skel. in Brit. Mus.	Hector, 1878; Oliver, 1922c
4	68	4 Aug 1923	Marsden Point	Stranded	Oliver, 1924b
5	40	16 Feb 1928	Whangarei	Stranded	Dom. Mus. str. file
6	93	5 Nov 1930	Whangarei	Stranded	Dom. Mus. str. file
7	140	31 Dec 1937	Farewell Spit	Stranded	Dom. Mus. str. file
8	49	1 Nov 1938	Whangarei	Stranded	Dom. Mus. str. file
9	71	17 Nov 1946	Hatfields Beach	Stranded	Dom. Mus. str. file
10	2	4 May 1951	Island Bay	Stranded	R. A. Falla, pers. comm.
11	130	2 Jul 1952	Ruakaka	Stranded	Dom. Mus. str. file
12	60	21 Oct 1955	Ngunguru	Stranded	Dom. Mus. str. file
13	40	17 Sep 1958	Whangarei	Stranded	Dom. Mus. str. file
14	100	23 Sep 1958	Wade River	Stranded	Marine Dept. str. file
15*	30	9 Jan 1963	60° 00′ S, 165° 00′ E	Sighted	D. E. Gaskin from U.S.S. *Durant*
16*	10	10 Jan 1963	61° 00′ S, 164° 35′ E	Sighted	D. E. Gaskin from U.S.S. *Durant*
17*	100	11 Jan 1963	60° 00′ S, 164° 50′ E	Sighted	D. E. Gaskin from U.S.S. *Durant*
18*	40	15 Jan 1963	60° 00′ S, 164° 40′ E	Sighted	D. E. Gaskin from U.S.S. *Durant*
19*	200	17 Jan 1963	62° 00′ S, 164° 05′ E	Sighted	D. E. Gaskin from U.S.S. *Durant*
20	20	19 Jan 1963	Raoul Island	Sighted	Weather station rep.
21	15	21 Jan 1963	Raoul Island	Sighted	Weather station rep.
22	6	22 Jan 1963	Raoul Island	Sighted	Weather station rep.
23	50	23 Jan 1963	Raoul Island	Sighted	Weather station rep.
24	2	22 Feb 1963	Raoul Island	Sighted	Weather station rep.
25	4	24 Feb 1963	Gable End Foreland	Sighted	U.S.S. Co. vessel rep.
26	7	30 May 1963	Cape Campbell	Sighted	D. E. Gaskin and B. Beck, survey rep.
27	350	12 Sep 1963	Southern Bay of Plenty	Sighted	U.S.S. Co. vessel rep.
28	1	1 Nov 1963	Bay of Plenty	Sighted. Lying at surface (sick?)	D. E. Gaskin survey rep.
29	4	13 Nov 1963	Hauraki Gulf	Sighted	MV *Ocean Star* rep.
30	1	20 Dec 1963	Makara	Stranded	Identified by D. E. Gaskin and M. W. Cawthorn
31	55	19 Jan 1964	6 m. east of Kaikoura	Sighted	Whaling co. rep.
32	200	22 Jan 1964	10 m. east of Kaikoura	Sighted	Whaling co. rep.
33	130	27 Jan 1964	7 m. north-east of Kaikoura	Sighted	Whaling co. rep.
34	2	7 Apr 1964	Orepuki	Stranded	D. H. Stead, rep.
35	1	24 Sep 1964	Titahi Bay	Stranded	C. McCann, pers. comm.
36	45	20 Jan 1965	Clifton, Hawke's Bay	Stranded	Marineland of N.Z. rep.

*These sightings were made in the Southern Ocean.

studied by Harrison (1949). Observations of the pilot whale in captivity in the U.S.A. were made by Kritzler (1949 and 1952) and Brown (1960). The young of this species were studied by Starrett and Starrett (1955).

The Southern Pilot Whale in New Zealand Waters

The pilot whale is one of the most common cetaceans in the coastal waters of New Zealand. Well over 2,000 specimens have been recorded as stranded or sighted by the Marine Department (table 25 and fig. 59).

Though a single pilot whale could become stranded through being sick or because it was dying or dead before beaching, this would not be the cause of the mass strandings which have occurred at least a dozen times on the coast of New Zealand and the Chatham Islands in the last 40 years and of the similar strandings of the false killer whale.

The data available suggest that the species makes migrations near New Zealand, since in some areas it has been recorded more often in spring and summer than at other times of the year. The large schools may be formed only in certain areas and in certain months. Movement of pilot whales toward shore and away from shore with behaviour which suggested mating was reported to the author by weather station observers at Raoul Island, in the Kermadecs. A

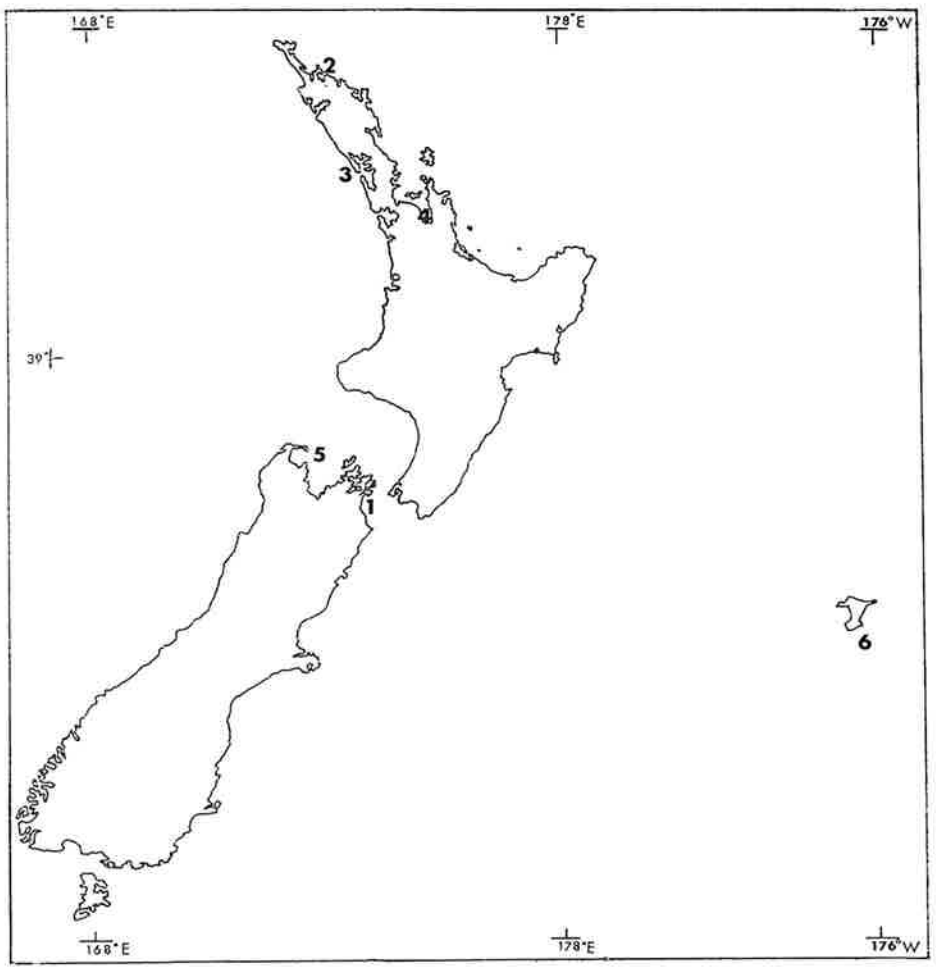


Fig. 60: Localities of strandings of "blackfish" which could have been either *Globicephala melaena* or *Pseudorca crassidens*. The numbers are the record numbers in table 26.

number of very large schools of both this species and the false killer whale were reported by the whale chaser *Orca* during January and February 1964 to be moving south past the Kaikoura Peninsula and Cape Campbell. Norris and Prescott (1961) reported apparent mating behaviour in winter (February) near the coast of California. The study by Sergeant (1962a) on the coast of Newfoundland showed that maximum pairings occurred between April and July, and this conclusion is consistent with observations near New Zealand that the pilot whale mates in early summer.

Table 25, which lists strandings and sightings of *Globicephala melaena*, is not complete. Strandings of the pilot whale have been very frequent round New Zealand, but as the animals are almost invariably disposed of swiftly before they can become a health menace, the identification, counting, and sexing of the animals are rarely possible by biologists. In table 26 a number of "blackfish" strandings have been grouped; the localities are shown in fig. 60. These animals were not positively identified and could be either false killers or pilot whales.

Family **DELPHINIDAE,** Lesser Dolphins

All the other genera and species of Cetacea found in New Zealand coastal waters remain in the family Delphinidae. Eight genera have been recorded from the area: *Grampus*, *Tursiops*, *Lissodelphis*, *Stenella*, *Delphinus*, *Steno*, and *Cephalorhynchus*, with one species each, and *Lagenorhynchus*, with two species. Of these nine species, three—*Lagenorhynchus cruciger*, *Steno bredanensis*, and *Stenella euphrosyne*—are of dubious occurrence. *Lagenorhynchus cruciger* has been retained, though the taxonomic status of the southern forms of *Lagenorhynchus*, including *obscurus*, needs critical re-examination (Fraser, 1966). However, sightings

TABLE 26: New Zealand Strandings of "Blackfish", which Could be Either *Globicephala melaena* or *Pseudorca crassidens*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	38	20 Sep 1935	Cloudy Bay	No data	Marine Dept. str. file
2	40	21 Oct 1941	Doubtless Bay	No data	Marine Dept. str. file
3	80	21 Mar 1955	Kaipara	No data	Marine Dept. str. file
4	74	24 Aug 1958	Thames	No data	Marine Dept. str. file
5	90	23 Oct 1962	Golden Bay	No data*	Marine Dept. str. file, with photographs
6	129	31 Aug 1963	Pitt Island, Chatham Islands	No data	Administration officer, Chatham Islands, pers. comm.

*Examination of the photographs was not conclusive, as they did not clearly show diagnostic features, and nowhere was there a clear view of a head. Though from the general body shape and some pale patches these animals were almost certainly *G. melaena*, some doubt remains.

of dolphins of the *cruciger* type have been made and the name is therefore retained.

There is no reason to retain *Steno* and *Stenella* on the New Zealand faunal list; it appears almost certain that their previous inclusion was a result of faulty locality labelling. There has been a suggestion (Oliver, 1922c) that beside *Stenella euphrosyne*, *S. pseudodelphis* (Schlegel, 1841) has been recorded in New Zealand. This identification is based on a skull in the Dominion Museum collection labelled "Parapara". Hector doubted the authenticity of this label as far back as 1873. There is no current evidence that either of these *Stenella* species has occurred in New Zealand waters.

The names *Steno*, *Stenella*, *Clymenia*, *Prodelphinus*, and *Sousa* have been used generically in a very confusing fashion. The taxonomy of this group of dolphins is still obscure. Iredale and Troughton (1934, pages 65 to 68) considered that some uses at least of *Steno*, *Stenella*, and *Prodelphinus*, as well as *Clymenia*, are synonymous. However, on page 68 they show *Sousa* and *Steno* as synonyms; so the synonymy is not consistent. The situation is further confused by Gray's use, shown on page 65 of Iredale and Troughton, of "*euphrosyne*" as both a generic and specific name on the same type specimen. Apparently in the *euphrosyne - attenuatus* group of dolphins *Prodelphinus* = *Clymenia* = *Stenella*; in the specific names *Stenella attenuatus* = *S. pseudodelphis*. *Stenella attenuatus* (*pseudodelphis*) and *S. euphrosyne* appear to be distinct (Norman and Fraser, 1937). However, those authors consider that *Steno* and *Prodelphinus* are distinct genera and that *Sotalia* (*Sousa*) is distinct from *Steno*. They do not mention *Stenella*, but appear to assume that *Stenella* and *Steno* are synonymous. Lydekker (1922) considered that *Steno* and *Sotalia* are separate, but added a further complication by referring *L. obscurus* to the genus *Prodelphinus*.

The naming system used here for at least some of the dolphins recorded as occurring off the New Zealand coast cannot be considered as final. The taxonomy of the Delphinidae has been considered by Flower (1883), True (1889), Hutton (1877), and Hector (1873a and 1873b), the last two of whom dealt with the New Zealand forms. Scott and Lord (1920a, 1920b, and 1921) and Scott (1942) have examined some of the dolphins of Tasmanian waters. An account of Tasmanian dolphins has been published by Pearson (1936). Longman (1926) has listed the species recorded from the coast of Queensland. Norris and Prescott (1961) have discussed the biology of the dolphins of the Californian coast, and Scheffer and Slipp (1948) have examined the species occurring further north on the coast of Washington State. Sergeant and Fisher (1957) have published an account of the small cetaceans of Canadian waters. The biology of some species has been examined by Sleptsov (1940), who studied methods of age determination, and Scheffer (1953), who studied the stomach contents of 11 species. Sinclair (1962) examined the anatomy of a North Pacific *Steno* by serial section approach.

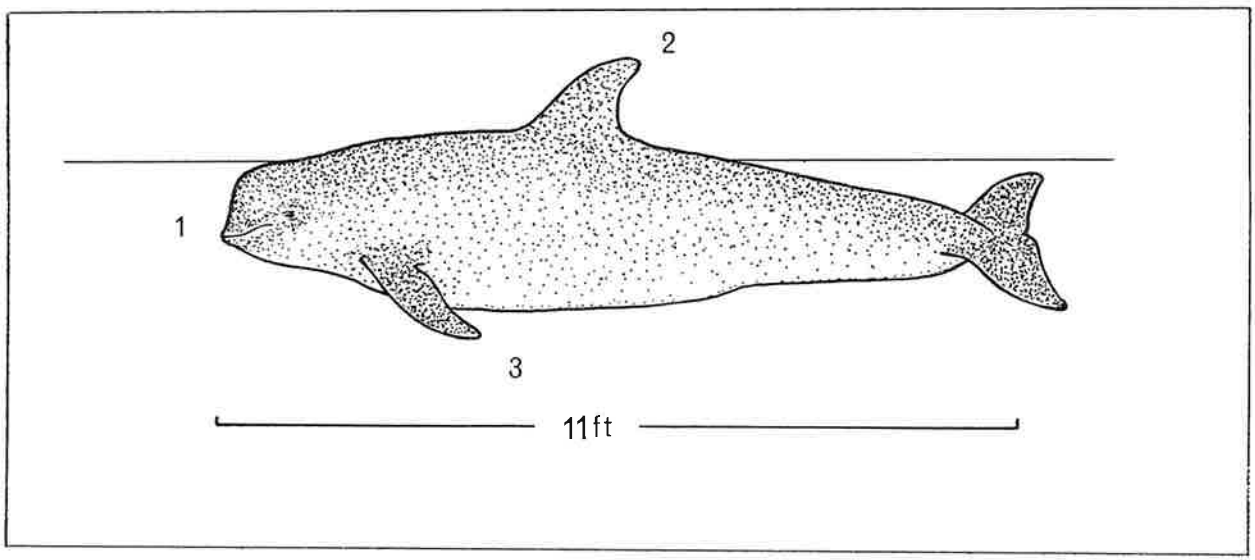
Genus **Grampus** Gray, 1846

Grampus griseus (Cuvier, 1812), Risso's Dolphin (Fig. 61)

1812. *Delphinus griseus* Cuvier, *Ann. Muséum d'Hist. nat., Paris, 19:* 14.

Comments

Superficially this species resembles the pilot whale; the forehead rises directly from the end



After Fraser in *Norman and Fraser (1937).*

Fig. 61: *Grampus griseus,* Risso's dolphin. Points of identification: 1. A bulbous head. The teeth are usually confined to the lower jaw. 2. A large dorsal fin. 3. Pointed flippers of moderate length.

of the upper jaw, but the bulge of the forehead is not as pronounced as that in the pilot whale. The flippers are long, but not as long in proportion to the total body length as those of the pilot. The dorsal fin is prominent, but slender, and is pointed more sharply than that of the pilot whale. The flippers, dorsal surface of the body, and the flukes are black or very dark grey. The flanks and ventral surface of the body and the under surfaces of the flukes and flippers are pale grey. It grows to about 11 ft long at sexual maturity.

Stranded specimens can always be separated from *Globicephala melaena* by the configuration of the teeth. The pilot whale has functional teeth in both jaws. Most specimens of *Grampus griseus* have no teeth in the upper jaw, and the teeth of the lower jaw are confined to the anterior region. The anatomy and biology of this animal were studied by Murie (1871) and Le Danois (1912). The species has a wide range, being recorded from the North Atlantic, the Mediterranean, and the Cape of Good Hope (Norman and Fraser, 1937).

Risso's Dolphin in New Zealand Waters

Risso's dolphin is said to be of solitary habit, though occasionally it forms schools of about six animals (Norman and Fraser, 1937). There is only one recorded occurrence of this species in New Zealand waters. A mandible from a specimen stranded on the Manawatu beach in September 1867 was obtained and described by Hector (1873a) and deposited in the Dominion Museum collection.

Genus **Tursiops** Gervais, 1855

Tursiops truncatus (Montagu, 1821), the Bottlenosed Dolphin or Cowfish Dolphin (Fig. 62)

1821. *Delphinus truncatus* Montagu, *Mem. Wernerian nat. Hist. Soc. 3*: 75. England.

Comments

This is a large dolphin, reaching a length of up to 14 ft at physical maturity. The head is characteristic; there are 20 to 22 pairs of teeth in each jaw. Each tooth is about $\frac{3}{8}$ in. in diameter. The beak is only a few inches long and is sharply marked off from the rest of the head (fig. 63). The line of the mouth gives *Tursiops* the appearance of having a permanent grin.

The dorsal surface varies from grey to black, and the ventral surface and the lower jaw are white. The flippers are moderately slender and pointed. The dorsal fin is set high on the back and is quite large in proportion to the body.

Tursiops truncatus is generally accepted as the dolphin species most amenable to captivity and training. The species is distributed round the

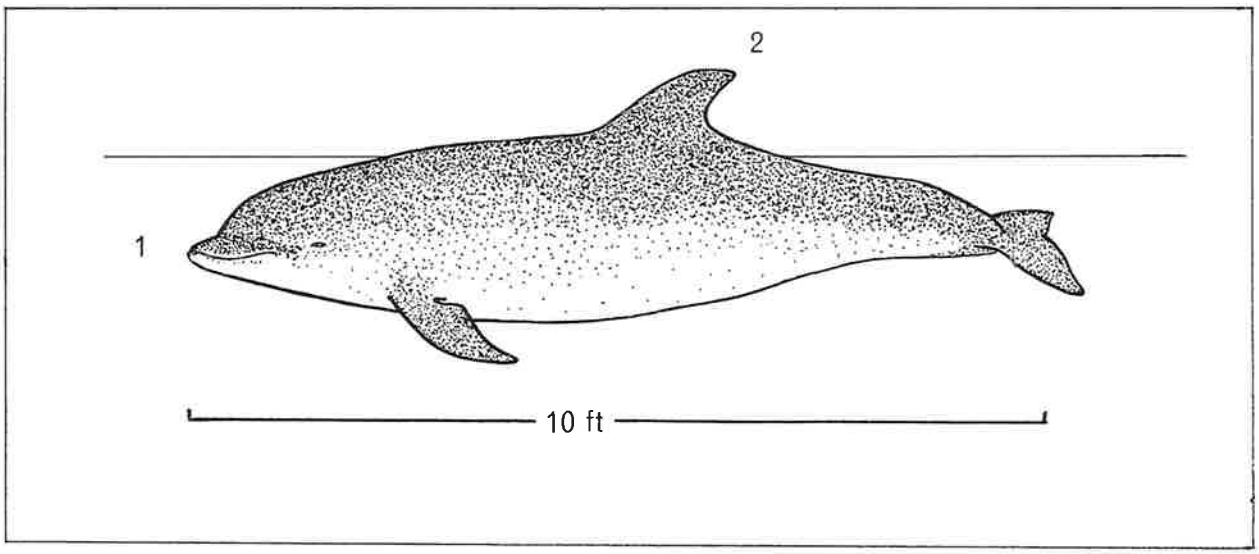


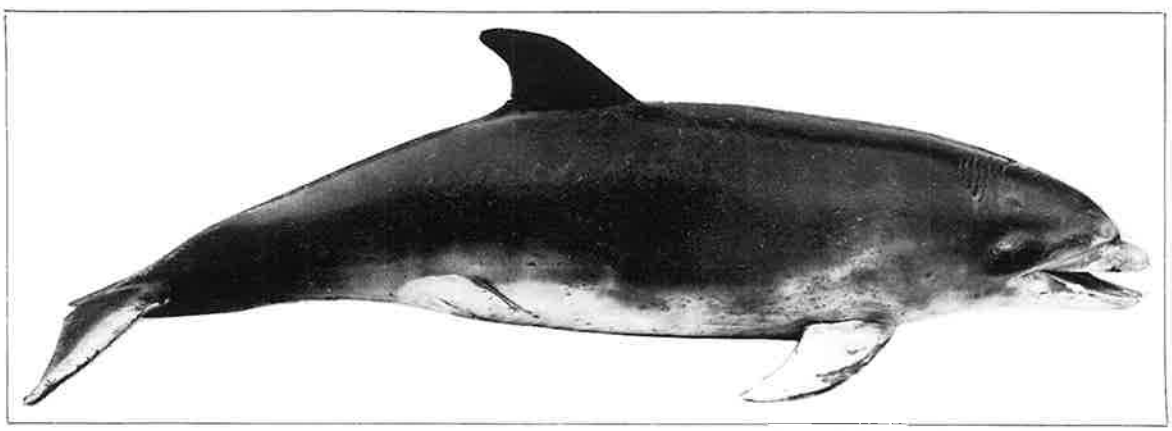
Fig. 62: *Tursiops truncatus*, the bottlenosed dolphin or cowfish dolphin. Points of identification: 1. A short beak. 2. A prominent dorsal fin. The body is dark grey above and lighter grey below.

coastal seas of Europe and down the Atlantic and Pacific coasts of the U.S.A. (Kenyon, 1952). *Tursiops* has also been recorded from the north-east coast of Australia, and several specimens are in captivity at the Tweed Head Seaquarium in Queensland. However, this species seems to be separate from that found in Europe and is known as *T. aduncus* (Scheffer and Rice, 1963), formerly *T. catalania* (Iredale and Troughton, 1934; Norman and Fraser, 1937). The *Tursiops* found round New Zealand and in Tasmanian coastal waters (Pearson, 1936) appears to be identical with the European form (Flower, 1880).

An anatomical study of this species was undertaken by Braun (1905), and the taxonomy was examined by Flower (1883) and True (1889). Studies of the behaviour of the species have been made by McBride and Hebb (1948), Hubbs (1953), Brown and Norris (1956), Caldwell and Fields (1959), Tavolga and Essapian (1957), and Lilly (1961). Hoshina and Sugiura (1956) studied skin disease in this species, and Tokita (1960) made an electro-cardiagraphical examination. The female reproductive cycle was studied by McBride and Kritzler (1951) and by Tavolga and Essapian (1957).

The Cowfish Dolphin in New Zealand Waters

The species is not rare in New Zealand coastal waters. In June 1964 the author filmed several schools of large *Tursiops* in the Acheron Passage and Bligh Sound in Fiordland, and this cetacean has been noted frequently in Foveaux Strait. The species regularly occurs in the Marlborough Sounds and Tasman Bay and is often in the



Photograph by courtesy of Dominion Museum, Wellington.

Fig. 63: A bottlenosed dolphin which was stranded at Motueka River in January 1954.

TABLE 27: New Zealand Strandings of *Tursiops truncatus*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Wanganui?	Skel. in Wa. Mus.	Oliver, 1922c
2	1	6 Jan 1873	"Dusky Bay"	Skull in Dom. Mus.	Oliver, 1922c
3	2	10 May 1875	Useless Bay, Dusky Sound	Skel. in Dom. Mus.	Hutton, 1876
4	1	1895	Lyttelton Harbour	Skull in Cant. Mus.	Oliver, 1922c
5	1	1898	Dusky Sound	Skull in Otago Mus.	Oliver, 1922c
6	1	1913	Otago Harbour	Skull and cast in Otago Mus.	Oliver, 1922c
7	1	10 May 1938	Halfmoon Bay, Stewart Island	No data	Dom. Mus. str. file
8	1	15 Jan 1954	Motueka River	No data	Dom. Mus. str. file
9	1	16 Mar 1957	Stewart Island	No data	Dom. Mus. str. file

outer bays of Wellington in late summer (Dr R. A. Falla, pers. comm.) Boat owners near Tory Channel have informed the author that they have seen several animals of the species. The former staff of the Tory Channel whaling station were familiar with the species in this locality. During 1963 and 1964 the whale chaser *Orca*

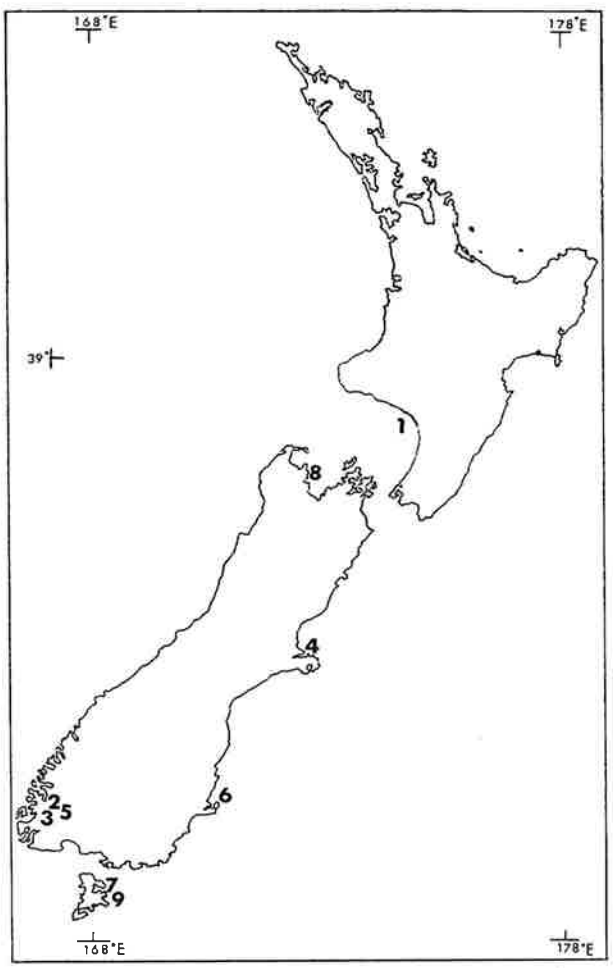


Fig. 64: The localities of known strandings of *Tursiops truncatus* on the New Zealand coast. The numbers are the record numbers in table 27.

four times reported *Tursiops* along the Kaikoura coast. The famous "Opo", of Opononi, on the north-west coast of the North Island, was a *Tursiops* (possibly *T. aduncus*, not *T. truncatus*), which indicates that the genus occurs along the west coast of both islands. Sightings on the east coast have been made at Whangarei (Mr I. D. McCallum, pers. comm.) and near Cape Kidnappers (Mr F. Robson, pers. comm.), though the occurrence of the genus on the east coast of the North Island is sporadic. The list of known strandings is given in table 27 and the localities of these are shown in fig. 64.

Genus **Lissodelphis** Gloger, 1841

Lissodelphis peroni (Lacépède, 1804), the Southern Right Whale Dolphin (Fig. 65)

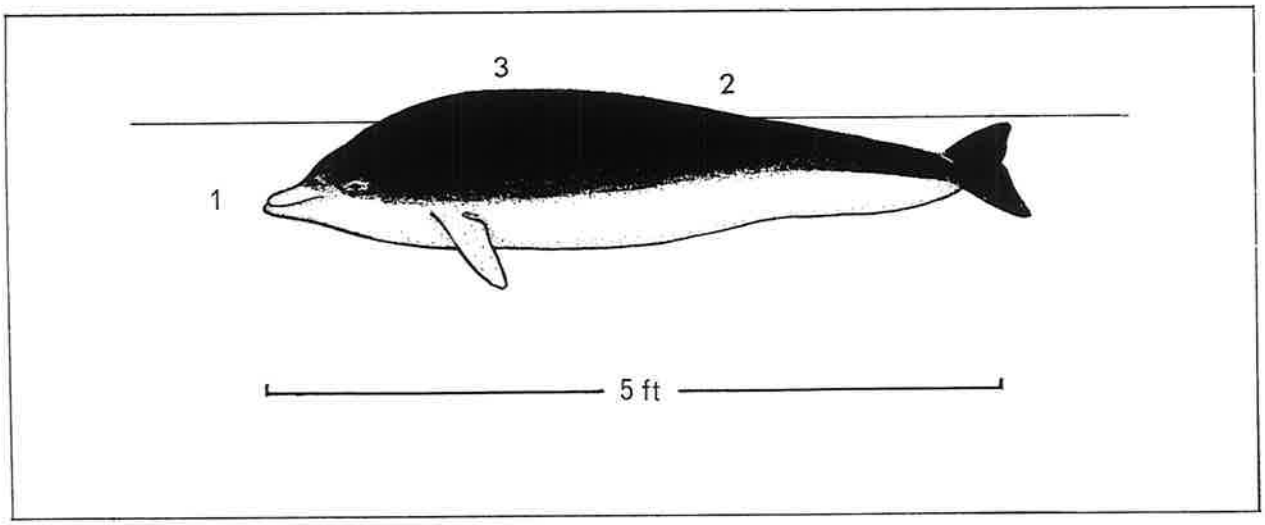
1804. *Delphinus peroni* Lacépède, Histoire Naturelle des Cétacées . . . , p. 63. Lat. 44° S, long. 141° E.

Comments

This dolphin has earned its name from its resemblance to the large right whale in not having a dorsal fin, though it is not related to the bigger whale. At physical maturity this species attains a length of about 7 to 8 ft. The dorsal surface is black, and the ventral surface, the flukes, and the flippers are glossy white. This animal cannot be confused with any other at sea or when stranded.

The Southern Right Whale Dolphin in New Zealand Waters

No recorded strandings of this animal have been found in Marine Department and Dominion Museum records. Two specimens were reported



After Fraser in *Norman and Fraser (1937)*.

Fig. 65: *Lissodelphis peroni*, the southern right whale dolphin. Points of identification: 1. A short beak. 2. No dorsal fin. 3. Dorsal surface black, ventral surface white.

by Lillie (1915), sighted during the *Terra Nova* expedition's stay in New Zealand waters in 1911 at a position lat. 47° 04′ S, long. 171° 33′ E. Until recently these two sightings were the only basis for the inclusion of the species on the New Zealand list, and the animal was considered one of our rarest dolphins.

However, on 3 October 1963 the whale chaser *Orca* sighted five of these animals and three more on 6 October of the same year at lat. 42° 36′ S, long. 173° 51′ E, and lat. 42° 27′ S, long. 173° 50′ E, respectively. On 11 January 1964 the whale chaser reported three large schools of this species, the largest (estimated as containing over 1,000 animals), moving rapidly south about 13 miles east of the Kaikoura Peninsula. Between February 1964 and the closing of whaling operations in December 1964 seven more schools were reported by the whaling company. None of these schools approached the size of those seen on 11 January, though two contained over 200 animals. The locations of the major sightings are shown in fig. 66.

An unusual dolphin was seen in Hawke Bay in February 1965 (Mr F. Robson, pers. comm.). The description indicated clearly that the animal could have been only *peroni*. The species thus occurs off the east coast of New Zealand between latitudes 39 and 47° S, that is, between Hawke Bay and Stewart Island.

Genus **Steno** Gray, 1846

Steno bredanensis (Lesson, 1828), the Rough-toothed Dolphin (Fig 67)

1828. *Delphinus bredanensis* Lesson, Histoire Naturelle . . . des Mammifères et des Oiseaux Découverts depuis 1788 . . . , Cétacés, p. 206.

Comments

This dolphin, which reaches a maximum length of about 8 ft at physical maturity, has a strong superficial resemblance to *Delphinus delphis* or *Lagenorhynchus obscurus*. There is no break between the beak and the head. On the dorsal surface the species is dark bluish grey liberally splashed with whitish marks. The ventral surface is white or pinkish and is splashed with small patches of the dorsal surface colour.

There are over 20 pairs of moderately large teeth in both the upper and lower jaws. The crowns of these teeth are roughened and from this characteristic the species has received its common name.

The Rough-toothed Dolphin in New Zealand Waters

This species was included in the New Zealand list with reservations by Hector (1873a). Oliver (1922c) retained it in his review, but expressed doubts about the validity of the record. There appear to be no records of the species in the South

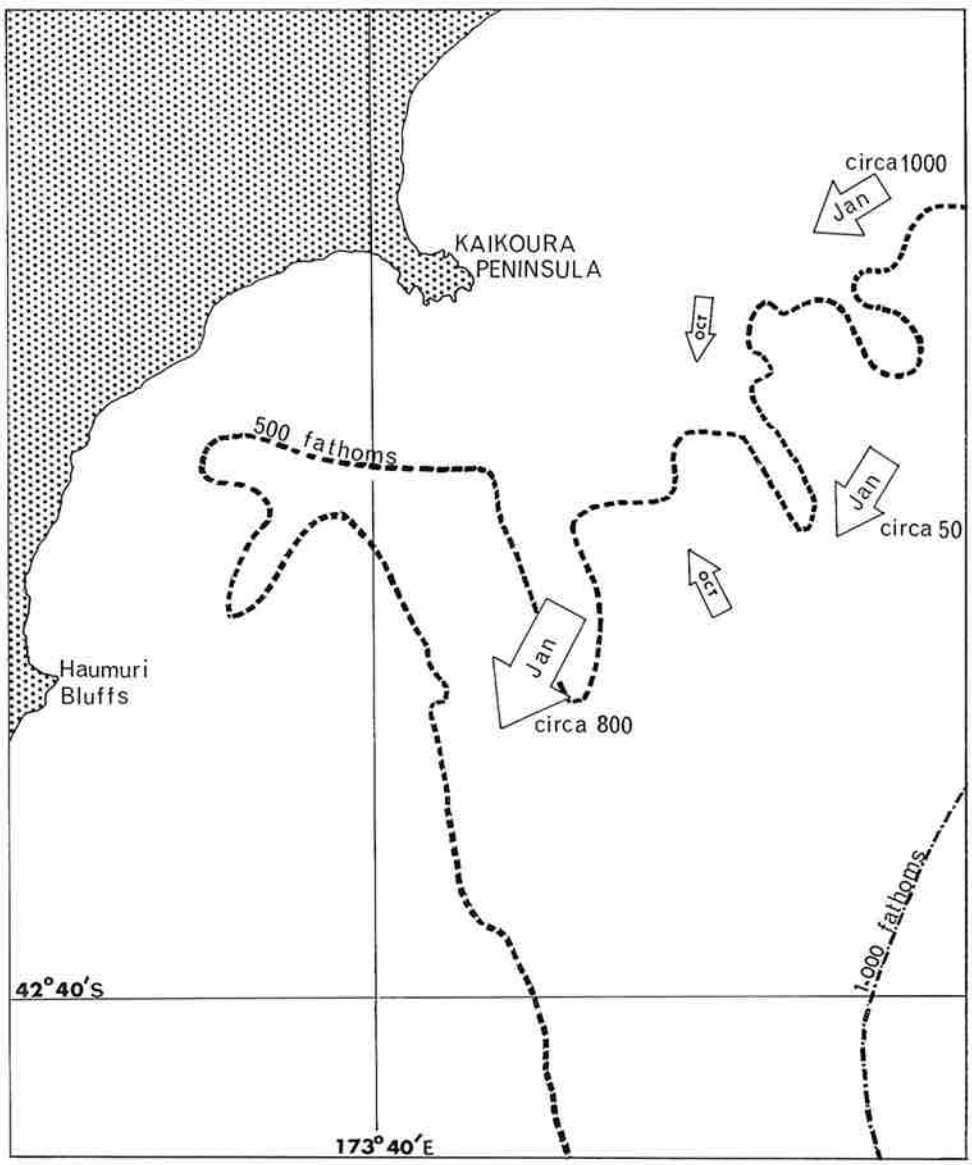


Fig. 66: Movements (indicated by arrows) of southern right whale dolphins reported by the whale chaser *Orca* in the 1963–64 season.

Pacific, though it has been stated to occur in the Indian Ocean (Norman and Fraser, 1937). Longman (1926), Iredale and Troughton (1934), and Pearson (1936) do not list this species for eastern Australia or Tasmania. The author does not regard *bredanensis* as a species occurring in the New Zealand area, though another species of *Stenella*, at present undescribed, may be present.

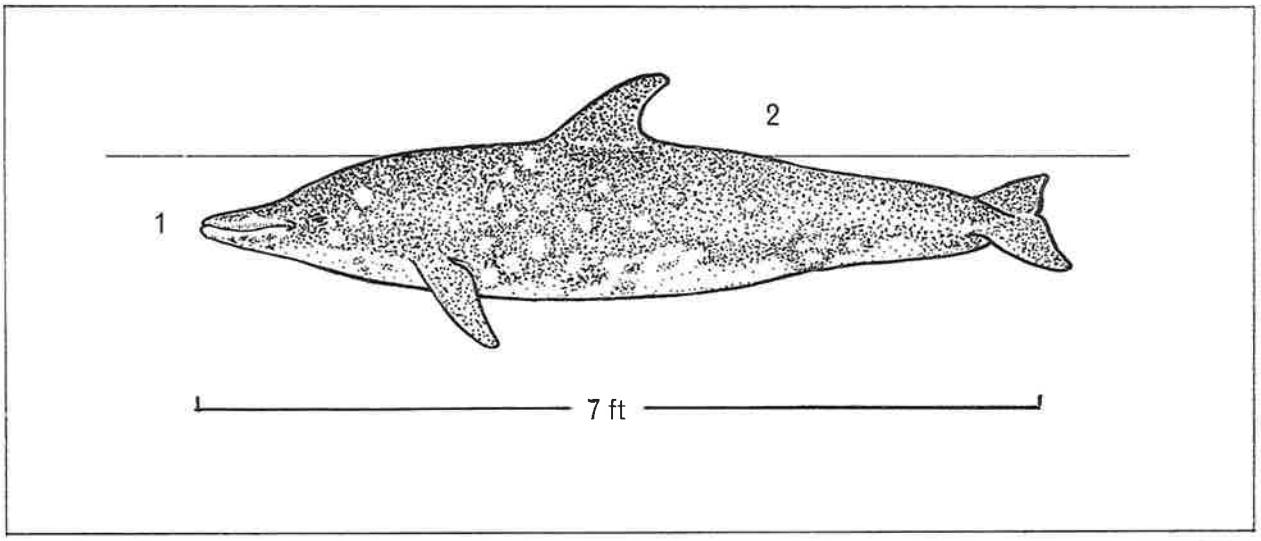
Genus **Stenella** Gray, 1866

Stenella euphrosyne (Gray, 1866), the Black-jawed Dolphin (Fig. 68)

1866. *Delphinus euphrosyne* Gray, *Proc. zool. Soc. Lond. 1866*: 214.

Comments

In shape and outline this species closely resembles *Delphinus delphis*. At physical maturity it reaches a maximum length of about 8 ft. The dorsal surface is black or very dark grey and the ventral surface is white. The tips of the jaws are black, which is the reason for the dolphin's common name. A band of dark pigment runs from near the eye to the flipper and continues posteriorly to the anal area. The genus is separated from *Delphinus* by having a grooved palate; otherwise the two genera seem to be closely related.



After Fraser in *Norman and Fraser (1937).*

Fig. 67: *Steno bredanensis*, the rough-toothed dolphin. Points of identification: 1. A long beak. 2. Dorsal surface bluish grey, splashed with whitish marks; the ventral surface is pinkish splashed with grey.

The Black-jawed Dolphin in New Zealand Waters

Oliver (1922b) stated that a skull of this animal was in the Dominion Museum collection. There appeared to be no confirmation that the specimen was of New Zealand origin. The range of this species is said to include the whole of the Atlantic and the Caribbean (Norman and Fraser, 1937). The species has also been reported from the Oregon coast in the North Pacific (Kellogg and Scheffer, 1947).

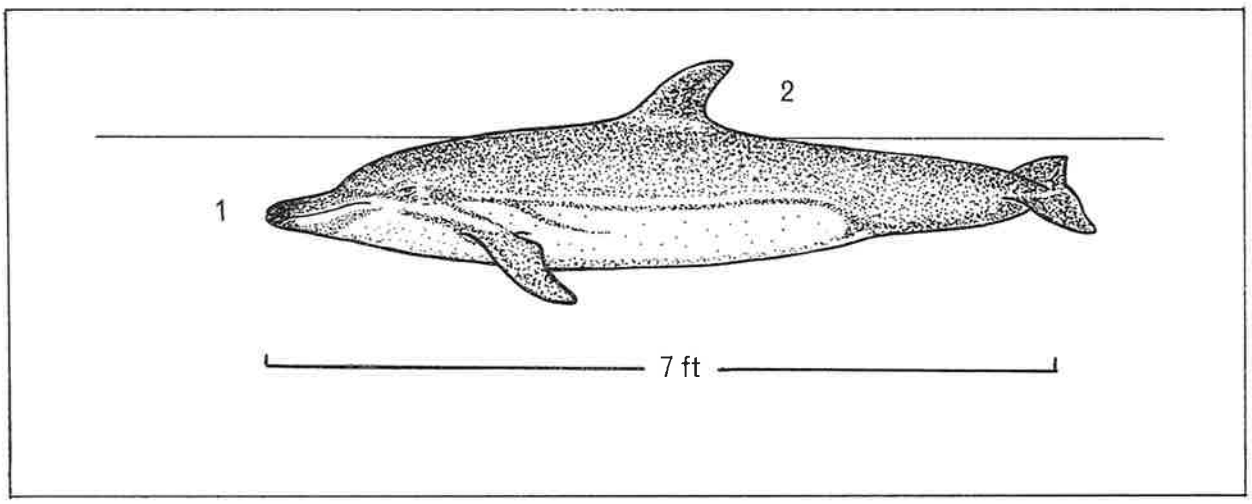
Genus **Delphinus** Linnaeus, 1758

Delphinus delphis Linnaeus, 1758, the Common Dolphin (Fig. 69)

1758. *Delphinus delphis* Linnaeus, Systema Naturae, 10th ed., vol. 1, p. 77, January. European seas.

Comments

This species, which grows to a maximum length of about 7 ft at physical maturity, is of slender build with tapered head and beak, the latter



After Fraser in *Norman and Fraser (1937).*

Fig. 68: *Stenella euphrosyne*, the black-jawed dolphin. Points of identification: 1. A long beak with a black tip. 2. Dorsal surface dark grey, ventral surface white.

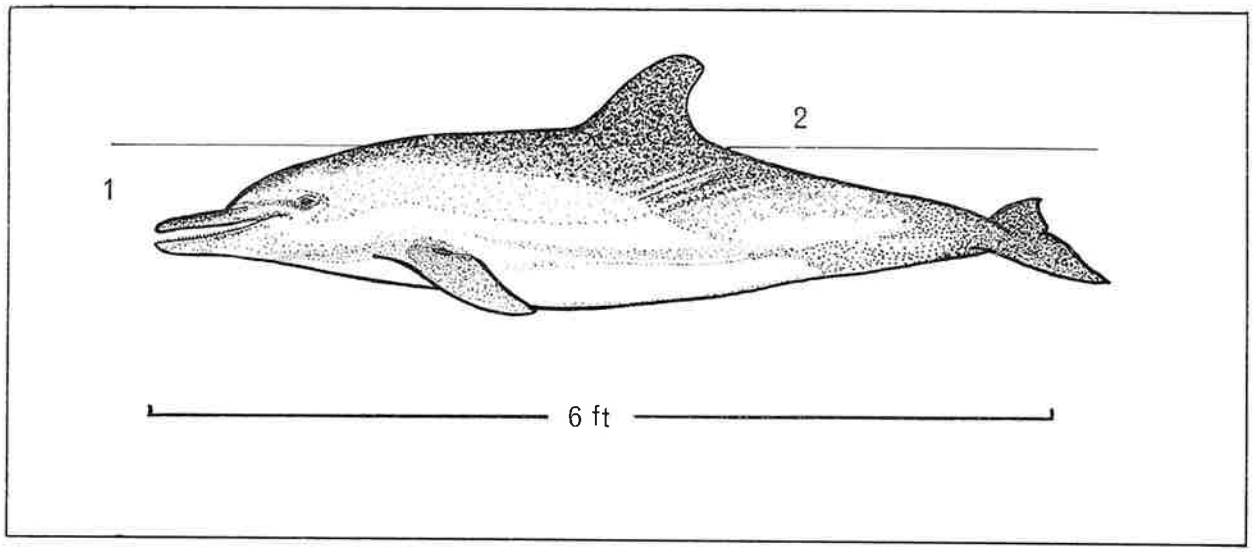


Fig. 69: *Delphinus delphis*, the common dolphin. Points of identification: 1. A long beak. 2. Dorsal surface purplish brown, ventral surface white. There is grey shading on the flanks.

marked off sharply from the rest of the head (fig. 70). The dorsal surface of a live animal is purplish brown and darker round the flukes and the dorsal fin; after death this colour darkens to blackish brown. The ventral surface is pure white, and the two colour zones are separated by a belt of grey mixed with yellow. The flippers are dark brown, and some animals have a ring of dark brown round the eye.

This animal appears to have been recorded from most parts of the world (Norman and Fraser, 1937). In some areas, for instance, the Black Sea, it is taken commercially for oil and meat.

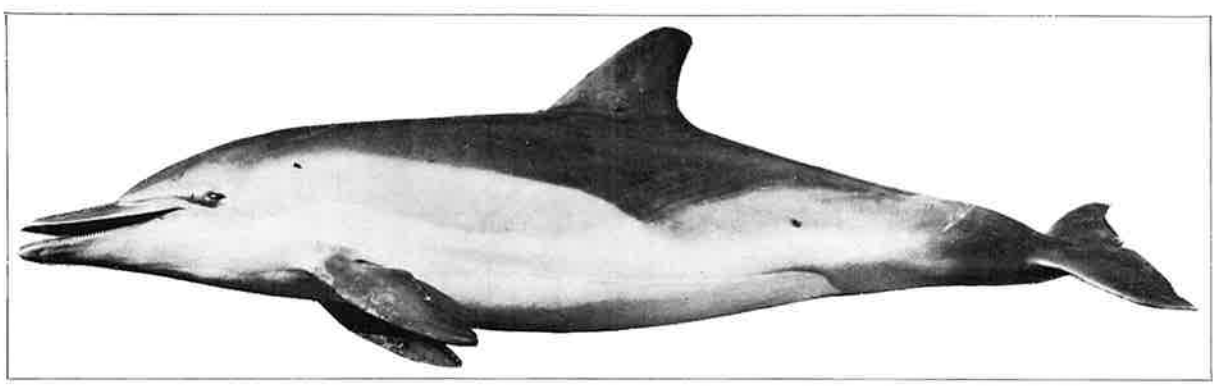
The Common Dolphin in New Zealand Waters

Delphinus delphis is the commonest dolphin round New Zealand, except near Cook Strait, Tasman Bay, and the Marlborough coast, where it is equalled in numbers by the dusky dolphin, *Lagenorhynchus obscurus*.

The number of strandings recorded for this animal is not large, but the dolphin is so familiar to coastal dwellers that it is unlikely that a stranded specimen would be reported unless it was on a public beach. Animals of this species appear to strand singly more often than in schools, which probably indicates that stranded animals were sick or dying before stranding. School strandings may be rare, because this species is more familiar with the shallow water environment than, say, the pilot whale or the false killer whale.

The common dolphin is a predator and will feed on schools of flying fish.

The recorded strandings (fig. 71) are listed in table 28, which gives a very incomplete picture of distribution when compared with the large number of accredited sightings (about 4,000)



Photograph by C. McCann, by courtesy of Dominion Museum, Wellington.

Fig. 70: A common dolphin which was stranded at Eastbourne, Wellington, in 1956.

accumulated during the Marine Department whaling survey of 1962–64. The largest concentrations sighted are shown in fig. 72. Records were kept throughout the survey by the crew of the Marine Department launch *Ocean Star* in the Hauraki Gulf. Some of the preliminary results of the analysis of these sightings are shown in fig. 73, and the localities in the gulf where this species was found to occur frequently are shown in fig. 74.

Genus **Lagenorhynchus** Gray, 1846

Lagenorhynchus cruciger (d'Orbigny, 1847), the Southern White-sided Dolphin (Fig. 75)

1847. *Delphinus cruciger* d'Orbigny, Voyage dans l'*Amérique* Méridionale . . . , vol. 4, pt. 2, p. 32. South America.

Comments

There is almost no beak in the species of *Lagenorhynchus*; the head cuts down sheer toward the tip of the snout. A number of species have been recognised, including *cruciger*, *obscurus*, *fitzroyi*, *acutus*, *australis*, *albirostris*, *obliquidens*, *wilsoni*, *superciliosus*, *electra*, *latifrons*, and *thicolea*. Iredale and Troughton (1934) have considered *obscurus*, *fitzroyi*, *cruciger*, and *latifrons* as synonyms, the name *obscurus* taking precedence. The forms are very similar in many respects, but here *obscurus* and *cruciger* are retained as separate species. *Lagenorhynchus cruciger* is blackish and white on

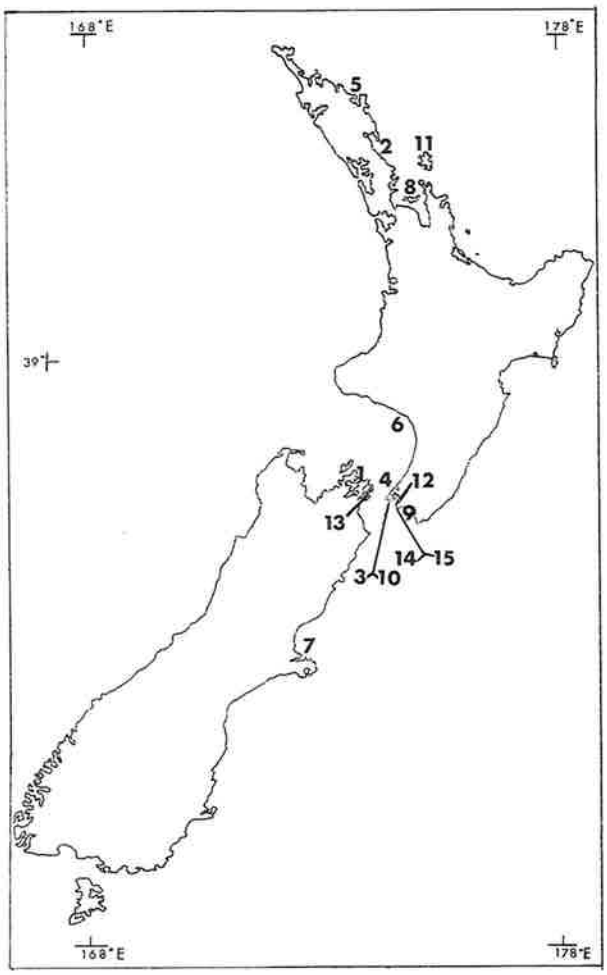


Fig. 71: The localities of known strandings of *Delphinus delphis* on the coast of New Zealand. The numbers are the record numbers in table 28.

TABLE 28: New Zealand Strandings of *Delphinus delphis*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Shag Rock, Marlborough Sounds	Skull in Dom. Mus.	Dom. Mus. str. file
2	1	Not known	Marsden Point	Skull in Dom. Mus.	Dom. Mus. str. file
3	1	Nov 1864	Lyall Bay	Skel. in Dom. Mus.	Hector, 1873a; Oliver, 1922c
4	1	30 Aug 1866	Porirua	Skull in Dom. Mus.	Hector, 1873a; Oliver, 1922c
5	1	4 Nov 1872	Bay of Islands	Skull in Dom. Mus.	Oliver, 1922c
6	1	1873	Wanganui	No data	Hector, 1873a
7	1	1896	Lyttelton Harbour	Skel. in Cant. Mus.	Oliver, 1922c
8	1	4 Jul 1920	Motutapu Island	No data	Oliver, 1922c
9	1	1 Jan 1953	Palliser Bay	No data	Dom. Mus. str. file
10	1	7 Sep 1955	Lyall Bay	No data	R. A. Falla, pers. comm.
11	7	2 Apr 1956	Great Barrier Island	No data	Dom. Mus. str. file
12	1	26 Jun 1956	Eastbourne	7 ft male	C. McCann, pers. comm.
13	1	10 Jan 1964	Whekenui, Tory Channel	6 ft male	Identified by D. E. Gaskin and M. W. Cawthorn
14	1	9 Mar 1964	Baring Head	7 ft adult	Identified by D. E. Gaskin
15	1	10 Mar 1964	Baring Head	6 ft adult	Identified by D. E. Gaskin

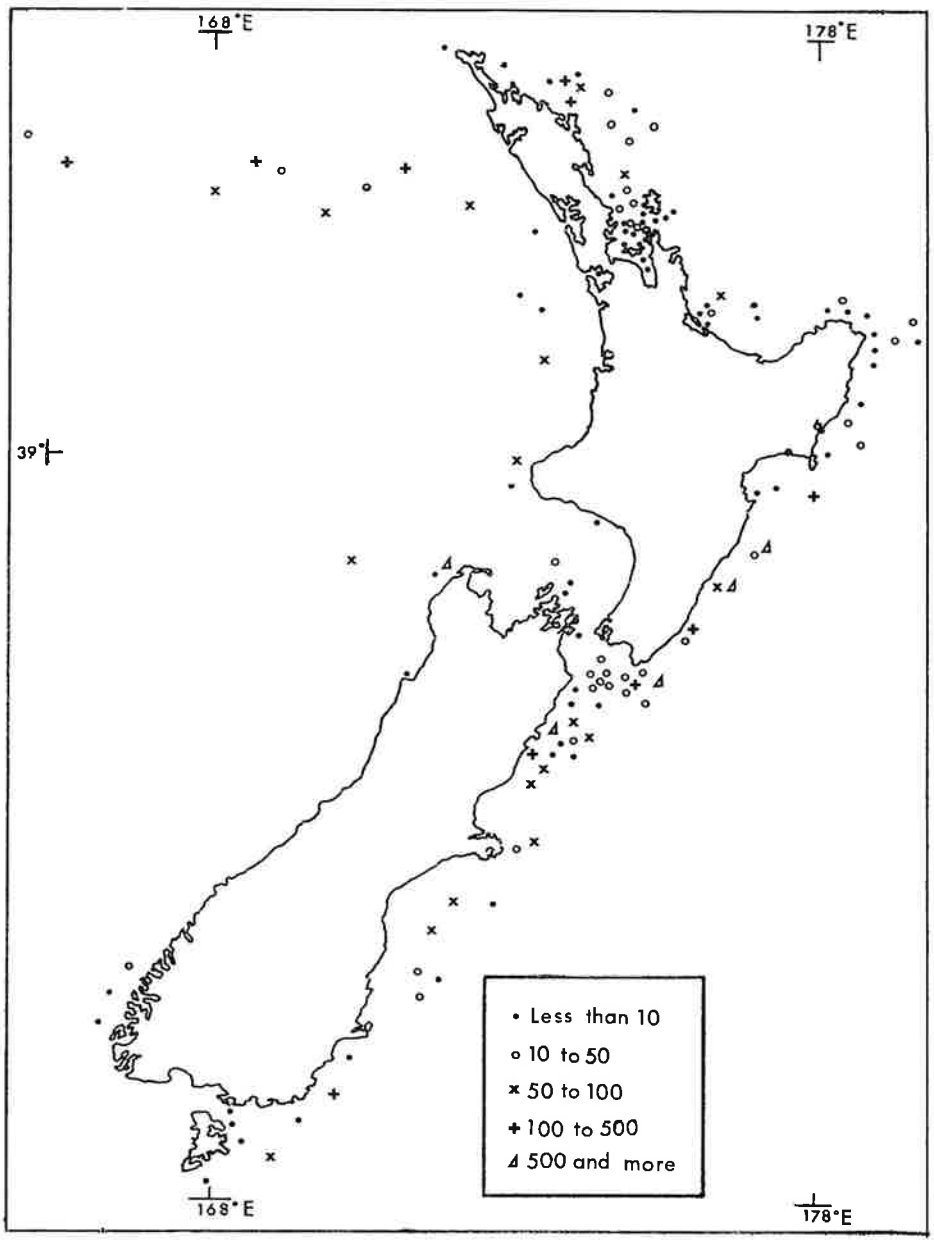


Fig. 72: Sightings of the common dolphin round New Zealand between 1962 and 1964.

the dorsal surface and white beneath. The flanks are white, except for an irregular blackish band extending from the eyes to the base of the pectoral flippers. This band is widest below the dorsal fin and in some animals meets the dark pigment of the dorsal surface. *Lagenorhynchus obscurus* is blackish on the dorsal surface.

The Southern White-sided Dolphin in New Zealand Waters

Three pairs of *Lagenorhynchus* were sighted by a whale-marking vessel off the north-east coast of the South Island during observations on 14 August 1963 on the Marine Department survey. These animals, which were moving south some miles off the mouth of the Clarence River, all had larger flippers and dorsal fins than *obscurus*, and the line of the head was less smooth than in *obscurus*. These were tentatively logged as *cruciger* (Gaskin, 1964a), though no positive identification was possible. There are no records of a *cruciger* stranding in New Zealand, so the occurrence of the animal must remain in doubt.

Lagenorhynchus obscurus (Gray, 1828), the Dusky Dolphin (Fig. 76)

1828. *Delphinus obscurus* Gray, Spicilegia Zoologica . . . , vol. 1, p. 2, 1 July. Cape of Good Hope, South Africa.

Comments

The dusky dolphin differs from the species or form *cruciger* in shape of the head, dorsal fin, and flippers. In *obscurus* the line of the head in profile drops sharply from the top of the forehead to the tip of the snout (fig. 77), and the beak is not an externally visible entity.

A grey stripe runs along the flank from the eye down to the anterior base of the flipper. There is much variation in colouring, but generally the dorsal surface and the upper parts of the flanks are bluish black, and the rest of the body is white. Along the mid-line of the flanks there is a zone of irregular grey shading. The flippers and flukes are bluish black. The species attains a maximum length of about 7 ft at physical maturity.

The genus *Lagenorhynchus* occurs throughout the Pacific, though it is doubtful if the distribution of any one species is continuous over any great distance. The genus has been discussed by Bierman and Slijper (1947 and 1948). If many of the forms described from the Southern Hemisphere are only forms of one species, it might be possible to consider the distribution of one species as circumpolar in the Southern Ocean. Wilke, Taniwaki, and Kuroda (1953) studied the biology of *Lagenorhynchus obliquidens* on the coast of Japan, and Scheffer (1950) has studied the same species on the Pacific coast of North America. Brownell (1965) describes a specimen of this species from

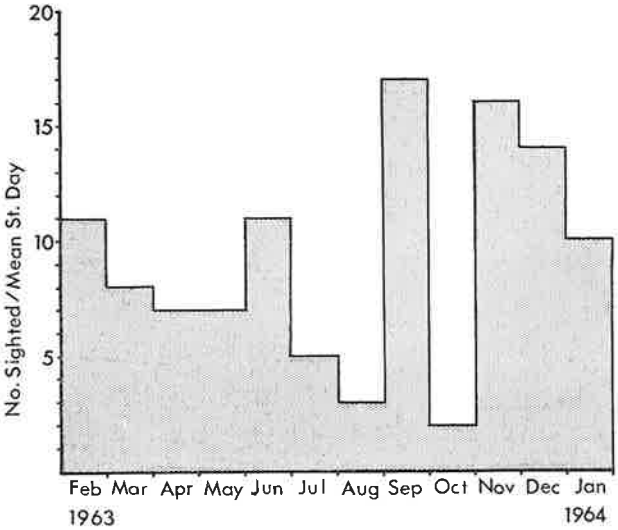


Fig. 73: Seasonal variation in the concentration of common dolphins in the Hauraki Gulf.

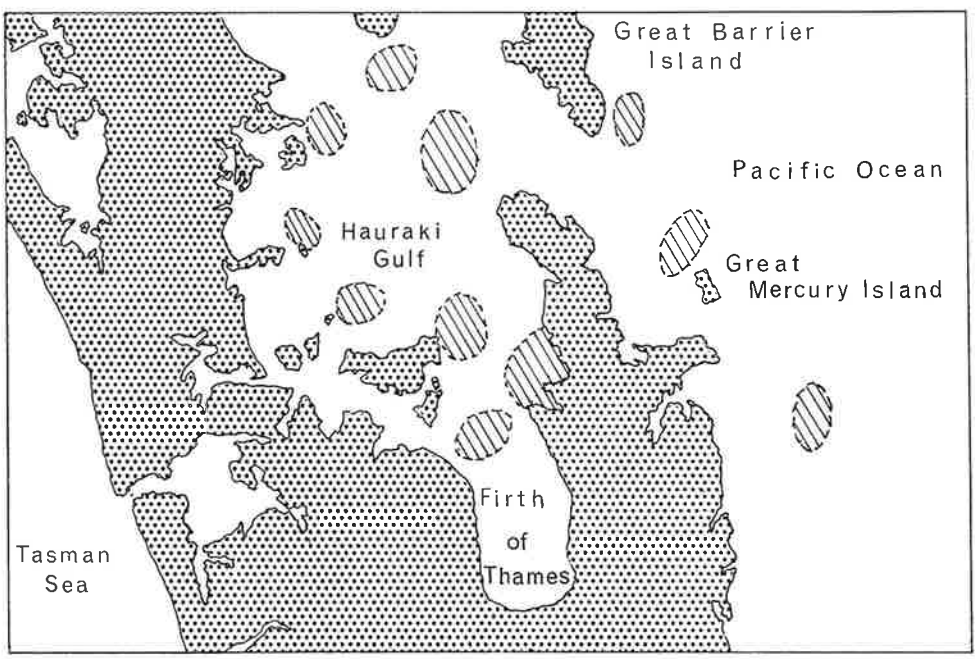
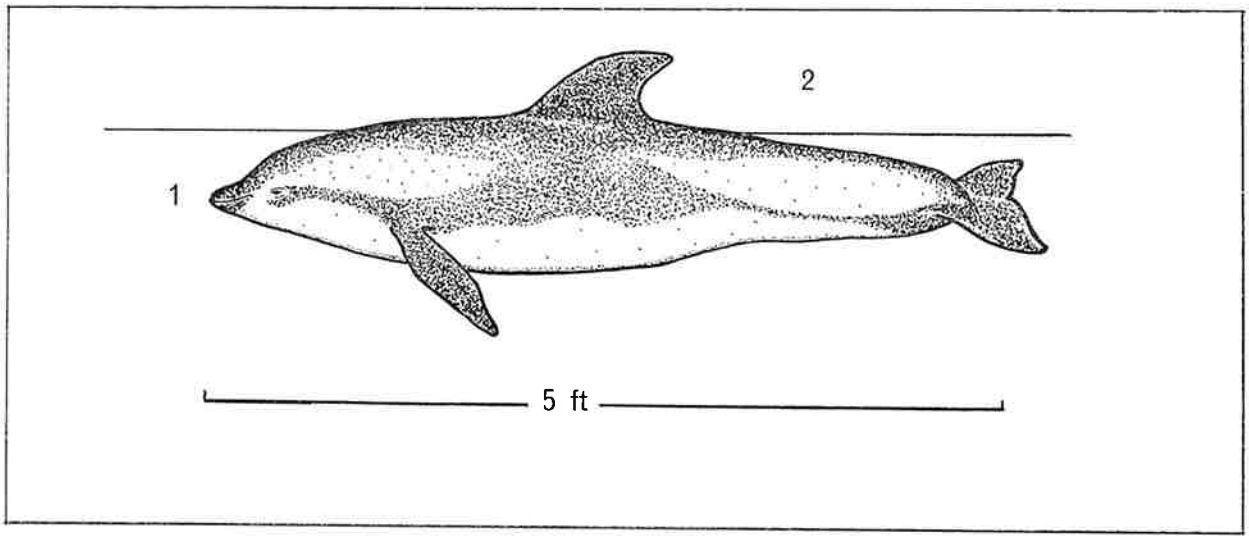


Fig. 74: Areas (hatched) where the common dolphin was consistently found in and near the Hauraki Gulf by the MV *Ocean Star* in 1963–64.



After Fraser in *Norman and Fraser (1937).*

Fig. 75: *Lagenorhynchus cruciger*, the southern white-sided dolphin. Points of identification: 1. A short beak. 2. A large dorsal fin. The dorsal surface is blackish and the ventral surface white, with grey on the flanks.

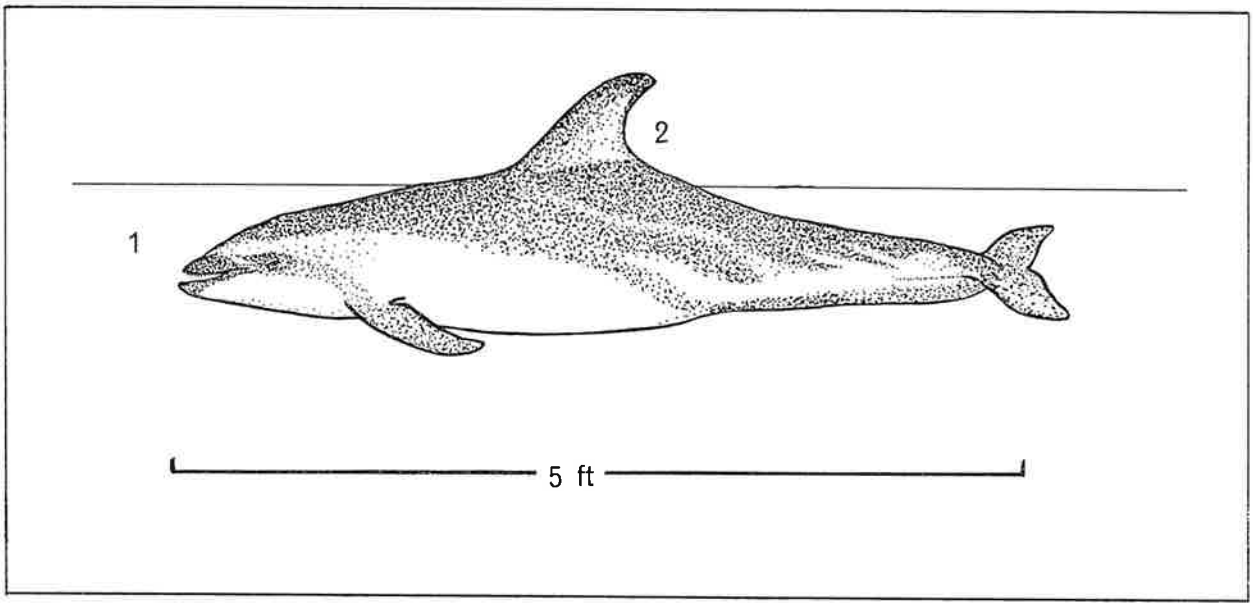
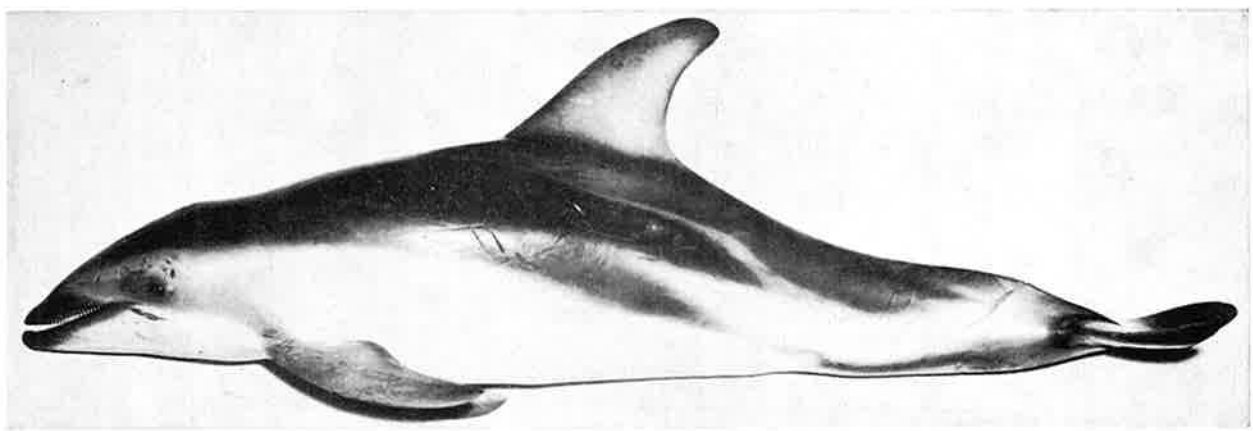


Fig. 76: *Lagenorhynchus obscurus*, the dusky dolphin. Points of identification: 1. A head sloping to the tip of the upper jaw. There is no visible beak. 2. A large dorsal fin. The body is generally bluish black above, white below, and grey on the flanks.



Photograph by F. O'Leary, by courtesy of Dominion Museum, Wellington.

Fig. 77: A dusky dolphin which was stranded at Island Bay, Wellington, in 1959.

New Zealand and discusses the taxonomy of *Lagenorhynchus*.

The Dusky Dolphin in New Zealand Waters

The range of this species round New Zealand appears to be restricted to the southern areas. The dusky dolphin is the commonest dolphin in the Cook Strait - Banks Peninsula region. In winter its range on the east coast extends north to Whitianga, but in summer it is only rarely seen north of Cape Kidnappers (Mr F. Robson, pers. comm.). The range southward is confirmed as far as Banks Peninsula by sightings during the Marine Department survey and by a stranding. Lillie (1915) reported the species as far south as lat. 58° S. Large concentrations were sighted by survey vessels off the coast between Cape Turnagain and Banks Peninsula and in Cook Strait. Other Marine Department officers have reported the species from Tasman Bay and near Kapiti Island.

Records of 18 strandings are given in table 29 and their localities are shown in fig. 78.

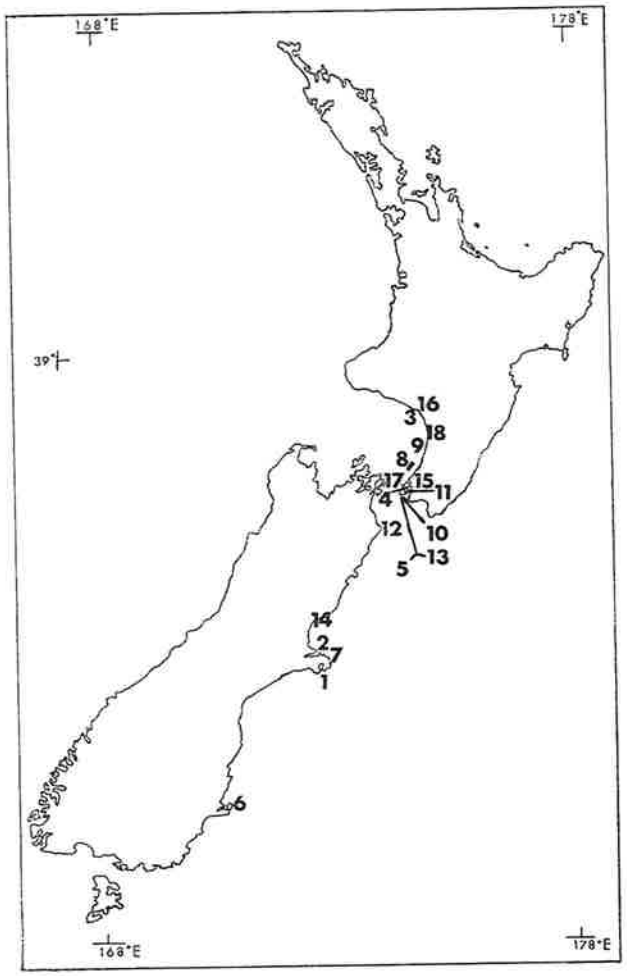


Fig. 78: The localities of known strandings of *Lagenorhynchus obscurus* on the New Zealand coast. The numbers are the record numbers in table 29.

TABLE 29: New Zealand Strandings of *Lagenorhynchus obscurus**

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Akaroa	Cast in Cant. Mus.	Oliver, 1922c
2	1	Not known	Lyttelton Harbour	Skull in Cant. Mus.	Oliver, 1922c
3	3	4 Nov 1872	Wanganui	1 skull in Dom. Mus., 2 spec. in Wa. Mus.	Hector, 1873a; Oliver, 1922c.
4	1	8 Jun 1944	Wellington Harbour	No data	Dom. Mus. str. file
5	1	14 Oct 1947	Island Bay	No data	Dom. Mus. str. file
6	1	1948	The Spit, Otago	No data	L. Gurr, pers. comm.
7	1	Mar 1948	Port Levy	Skull in Cant. Mus.	M. Darby, pers. comm.
8	1	14 Mar 1949	Kapiti Island	No data	R. A. Falla, pers. comm.
9	1	9 Jan 1953	Hokio	No data	C. McCann, pers. comm.
10	1	2 Jun 1953	Lyall Bay	No data	C. McCann, pers. comm.
11	1	21 Nov 1955	Evans Bay	Female	C. McCann, pers. comm.
12	1	1 Apr 1958	Cape Campbell	No data	C. McCann, pers. comm.
13	1	6 May 1959	Island Bay	Female	C. McCann, pers. comm.
14	1	26 Dec 1958	Woodend Beach, North Canterbury	Skull in Cant. Mus.	M. Darby, pers. comm.
15	1	12 Sep 1960	Paekakariki	Male	C. McCann, pers. comm.
16	1	16 Aug 1963	Castlecliff	6 ft, unsexed	Brownell, 1965
17	1	23 Feb 1964	Makara	Skull and some bones in Dom. Mus.	Identified by C. McCann, D. E. Gaskin, and M. W. Cawthorn
18	1	1 Nov 1965	Foxton Beach	Skel. of 5 ft 11 in. male in Mass. Univ. Zoology Dept.	Identified by D. E. Gaskin

*Several specimens of this species have been captured in Hawke Bay, in the area near Napier, for live exhibition in Marineland of New Zealand.

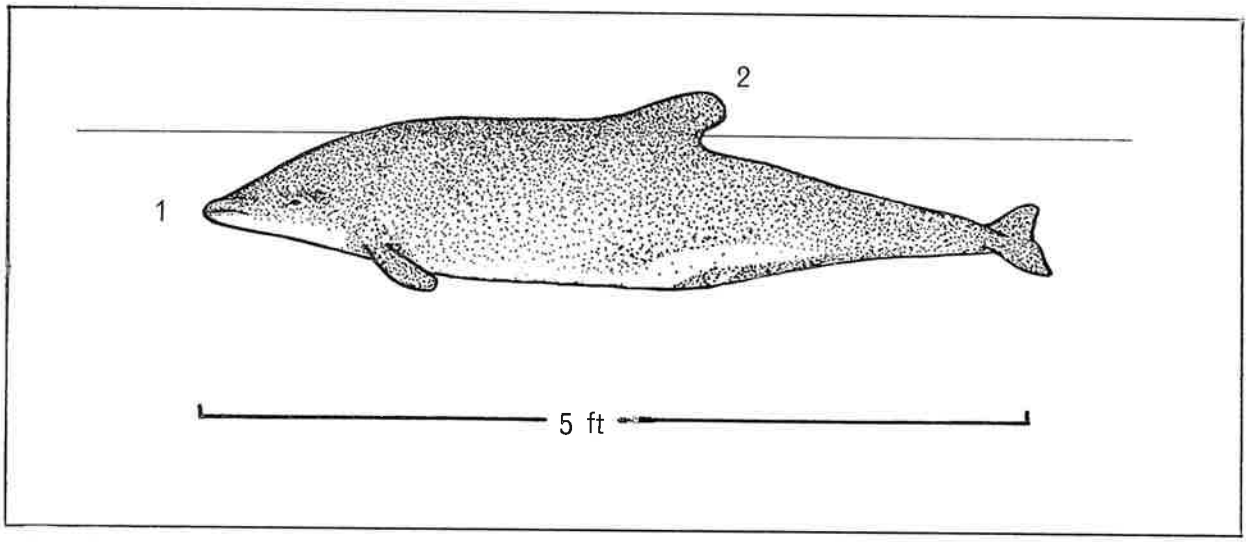


Fig. 79: *Cephalorhynchus hectori*, Hector's dolphin. Points of identification: 1. A short beak. 2. A rounded dorsal fin. The body is grey and lighter beneath.

Genus **Cephalorhynchus** Gray, 1846

Cephalorhynchus hectori (van Beneden, 1881), Hector's Dolphin (Fig. 79)

1881. *Electra hectori* van Beneden, *Bull. Acad. R. Belg. 3*: 887.

Comments

The dorsal surface of this small dolphin is very dark grey, and the ventral surface is white. This white area extends to the lower jaw. Oliver (1946) described an unusual colour variety of this animal. The beak merges into the head with little perceptible break or indentation. The dorsal fin is characteristic, being blunt and rounded. The flippers are also rounded at the tip, not pointed as in *Lagenorhynchus* and *Delphinus*. At physical maturity Hector's dolphin reaches a maximum length of about 6 ft.

Hector's Dolphin in New Zealand Waters

This animal does not appear to have been recorded outside New Zealand coastal waters. There are, however, several other closely related species, and the distribution of the genus appears to be more or less circumpolar in the Southern Hemisphere (Norman and Fraser, 1937).

Though sporadic reports of this species have been received by the author from most parts of New Zealand, the animal appears to be common only in certain areas. It is an inshore species,

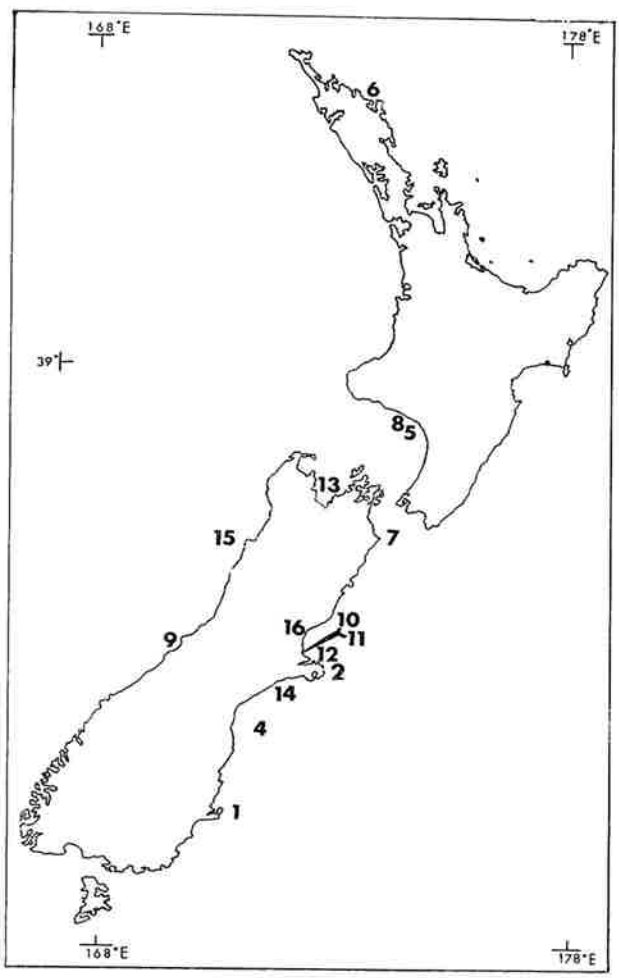


Fig. 80: The localities of known strandings of *Cephalorhynchus hectori* on the New Zealand coast. The numbers are the record numbers in table 30.

TABLE 30: New Zealand Strandings of *Cephalorhynchus hectori*

Record No.	No. of Animals	Date	Locality	Details	Reference
1	1	Not known	Otago?	Skel. in Otago Mus.	Oliver, 1922c
2	1	Not known	Banks Peninsula	Skel. in Cant. Mus.	Oliver, 1922c
3	1	Not known	"North coast"	Skel. in Paris Mus.	Oliver, 1922c
4	1	Not known	Canterbury	Skull in U.S. Nat. Mus.	Oliver, 1922c
5	1	Not known	Wanganui?	Skel. in Wa. Mus.	Oliver, 1922c
6	1	About 1870	Bay of Islands	Skull in Dom. Mus.	Oliver, 1922c
7	2	About 1871	Cape Campbell	"Two shot from large school"	Hector, 1873a; Oliver, 1922c
8	1	May 1921	Castlecliff	Stuffed skin in Wa. Mus.	Oliver, 1922c
9	1	1945	Okarito	Caudal vert. in Cant. Mus.	M. Darby, pers. comm.
10	1	Mar 1948	South New Brighton	Skull in Cant. Mus.	M. Darby, pers. comm.
11	1	Jan 1949	South New Brighton	Skull in Cant. Mus.	M. Darby, pers. comm.
12	1	Mar 1953	Sumner	Skel. in Cant. Mus.	M. Darby, pers. comm.
13	1	14 Aug 1953	Nelson	Adult	C. McCann, pers. comm.
14	1	13 Mar 1956	Ashburton River	Skull in Cant. Mus.	M. Darby, pers. comm.
15	1	13 Dec 1956	Westport	Adult	C. McCann and R. A. Falla, pers. comm.
16	1	Aug 1961	Woodend Beach, North Canterbury	Skull and vert. in Cant. Mus.	M. Darby, pers. comm.

often penetrating some distance into estuaries, and it appears even when the sea has been churned by bad weather and is a dirty brown from washed-out silt. Most other cetaceans are generally regarded as preferring to avoid muddy water.

The animal is common from Banks Peninsula to the northern extremity of the South Island and as far south on the west coast as Hokitika. The author saw some Hector's dolphins outside the Grey River bar in June 1963 and outside the reef at the entrance to Kaikoura harbour later that month. The species is nearly always found close to the cement works at Cape Foulwind, near Westport (Dr R. A. Falla, pers. comm.). Oliver (1922c) recorded a stranding from the Bay of Islands. The species also ranges north on the west coast of the North Island, becoming scarcer north of Cape Egmont. The New Zealand records are listed in table 30, and the locations of the strandings are shown in fig. 80.

SOURCES OF DATA

The archives of the Dominion Museum, Wellington, particularly files started by the late Dr W. R. B. Oliver, have provided many of the data.

Files, early records of Cetacea, and records of whaling activity held by the Marine Department have been available.

Some of the results of field work between 1962 and 1964 have already been reviewed (Gaskin, 1964c), and a paper on *Delphinus delphis* has been published (Gaskin, 1966a). Six papers describe results of the sperm whale studies (Gaskin, 1963, 1964a, 1964b, and 1967b; Gaskin and Cawthorn 1967a and 1967b).

Reports from the former Tory Channel whaling company about whales and dolphins throughout the sperm whaling period from 1962 to 1964 and sighting records supplied by observers have provided many useful data.

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REFERENCES

ABBOTT, C. G. 1930: California record of a sharp-headed finner whale. *J. Mammal. 11*: 240–1.

ALLEN, G. M. 1941: Pygmy sperm whale in the Atlantic. *Publs Field Mus. nat. Hist., zool. ser., 27*: 17–36.

ANDREWS, R. C. 1908a: Notes upon the external and internal anatomy of *Balaena glacialis* Bonn. *Bull. Am. Mus. nat. Hist. 24*: 171–82.

——— 1908b: Description of a new species of *Mesoplodon* from Canterbury Province, New Zealand. *Bull. Am. Mus. nat. Hist. 24*: 203–15.

——— 1909: Observations on the habits of the finback and humpback whales of the eastern North Pacific. *Bull. Am. Mus. nat. Hist. 26*: 213–26.

——— 1916: Monographs of the Pacific Cetacea. II—The sei whale (*Balaenoptera borealis* Lesson). *Mem. Am. Mus. nat. Hist. (n.s.) 1*: 289–388.

ARCHEY, G. 1926: The blue whale (*Balaenoptera musculus*). Two new records from New Zealand. *N.Z. Jl Sci. Technol. 8*: 189.

BAILEY, A. M.; SORENSEN, J. H. 1962: Subantarctic Campbell Island. *Proc. Denver Mus. nat. Hist. 10*: 1–305.

BEALE, T. 1839: "The Natural History of the Sperm Whale." 2nd ed. John van Voorst, London. 393 pp.

BEDDARD, F. E. 1900: "A Book of Whales." John Murray, London. 320 pp.

BENHAM, W. B. 1901: On the anatomy of *Cogia breviceps*. *Proc. zool. Soc. Lond. 1901 (2)*: 107–34.

——— 1902a: Notes on the osteology of the short-nosed sperm-whale. *Proc. zool. Soc. Lond. 1902 (1)*: 54–62.

——— 1902b: An account of the external anatomy of a baby rorqual (*Balaenoptera rostrata*). *Trans. Proc. N.Z. Inst. 34*: 151–5.

——— 1902c: Notes on *Cogia breviceps*, the lesser sperm whale. *Trans. Proc. N.Z. Inst. 34*: 155–68.

BEST, P. B. 1960: Further information on Bryde's whale (*Balaenoptera edeni* Anderson) from Saldanha Bay, South Africa. *Norsk Hvalfangsttid. 49*: 201–15.

BIERMAN, W. H.; SLIJPER, E. J. 1947: Remarks upon the species of the genus *Lagenorhynchus*, I. *Proc. K. ned. Akad. Wet. 50*: 1353–64.

——— 1948: Remarks upon the species of the genus *Lagenorhynchus*, II. *Proc. K. ned. Akad. Wet. 51*: 127–33.

BOSCHMA, H. 1938: On the teeth and some other particulars of the sperm whale (*Physeter macrocephalus* L.). *Temminckia 3*: 151–278.

——— 1950: Maxillary teeth in specimens of *Hyperoodon rostratus* (Muller) and *M. grayi* von Haast stranded on the Dutch coasts. *Proc. K. ned. Akad. Wet. 53*: 775–86.

——— 1951: Rows of small teeth in ziphioid whales. *Zoöl. Meded., Leiden, 31*: 139–48.

BRAUN, M. 1905: Anatomisches und biologisches über den tümmler. *Schr. phys. - ökon. Ges. Königsb. 46*: 136–41.

BRINKMANN, A. 1948: Studies on female fin and blue whales. Report on investigations carried out in the Antarctic during the season 1939–1940. *Hvalrad. Skr. 31*. 38 pp.

BROWN, D. H. 1960: Behavior of a captive Pacific pilot whale. *J. Mammal. 41*: 342–9.

BROWN, D. H.; NORRIS, K. S. 1956: Observations of captive and wild cetaceans. *J. Mammal. 37*: 311–26.

BROWN, S. G. 1954: Dispersal in blue and fin whales. "*Discovery*" *Rep. 26*: 355–84.

——— 1957: Whale marks recovered during the Antarctic whaling season 1956–57. *Norsk Hvalfangsttid. 46*: 555–9.

BROWNELL, R. L. 1965: A record of the dusky dolphin, *Lagenorhynchus obscurus*, from New Zealand. *Norsk Hvalfangsttid. 54*: 169–71.

BULLIS, H. R.; MOORE, J. C. 1956: Two occurrences of false killer whales, and a summary of American records. *Am. Mus. Novit. 1756*. 5 pp.

BURMEISTER, H. 1867: Preliminary description of a new species of finner whale (*Balaenoptera bonaerensis*). *Proc. zool. Soc. Lond. 1867*: 707–13.

CALDWELL, D. K.; FIELDS, H. M. 1959: Surf riding by Atlantic bottle-nosed dolphins. *J. Mammal. 40*: 454–5.

CARTE, A.; MACALISTER, A. 1868: On the anatomy of *Balaenoptera rostrata*. *Phil. Trans. R. Soc. 158*: 201–61.

CHITTLEBOROUGH, R. G. 1953: Aerial observations on the humpback whale, *Megaptera nodosa* (Bonnaterre), with notes on other species. *Aust. J. mar. Freshwat. Res. 4*: 219–26.

——— 1954: Studies on the ovaries of the humpback whale, *Megaptera nodosa* (Bonnaterre), on the Western Australian coast. *Aust. J. mar. Freshwat. Res. 5*: 35–63.

——— 1956: Southern right whale in Australian waters. *J. Mammal. 37*: 456–7.

——— 1958a: The breeding cycle of the female humpback whale, *Megaptera nodosa* (Bonnaterre). *Aust. J. mar. Freshwat. Res. 9*: 1–18.

——— 1958b: An analysis of recent catches of humpback whales from the stocks in groups IV and V. *Norsk Hvalfangsttid. 47*: 109–37.

——— 1959a: Australian marking of humpback whales. *Norsk Hvalfangsttid. 48*: 47–55.

——— 1959b: *Balaenoptera brydei* Olsen on the west coast of Australia. *Norsk Hvalfangsttid. 48*: 62–6.

——— 1959c: Determination of age in the humpback whale, *Megaptera nodosa* (Bonnaterre). *Aust. J. mar. Freshwat. Res. 10*: 125–43.

——— 1962: Australian catches of humpback whales, 1961. *Rep. Div. Fish. Oceanogr. C.S.I.R.O. Aust. 34*. 13 pp.

——— 1963: Australian catches of humpback whales, 1962. *Rep. Div. Fish. Oceanogr. C.S.I.R.O. Aust. 35*. 5 pp.

——— 1965: Dynamics of two populations of the humpback whale, *Megaptera novaeangliae* (Borowski). *Aust. J. mar. Freshwat. Res. 16*: 33–128.

CHUZHAKINA, E. S. 1955: On the breeding cycle of the sperm whale. *Trudy Inst. Okeanol. 18*: 95–9.

CLARKE, M. R. 1962: The identification of cephalopod "beaks" and the relationship between beak size and total body weight. *Bull. Br. Mus. nat. Hist., Zool., 8*: 421–80.

CLARKE, ROBERT 1955: A giant squid swallowed by a sperm whale. *Norsk Hvalfangsttid. 44*: 353–7.

——— 1956: Sperm whales of the Azores. "*Discovery*" *Rep. 28*: 237–98.

——— 1962: Whale observation and whale marking off the coast of Chile in 1958 and from Ecuador towards and beyond the Galapagos Islands in 1959. *Norsk Hvalfangsttid. 51*: 265–87.

COMRIE, L. C.; ADAM, A. B. 1938: The female reproductive system and corpora lutea of the false killer whale, *Pseudorca crassidens* Owen. *Trans. R. Soc. Edinb. 59*: 521–32.

COWAN, I. M. 1939: The sharp-headed finner whale of the eastern Pacific. *J. Mammal. 20*: 215–25.

CUSHING, J. E.; FUJINO, K.; CALAPRICE, N. 1963: The Ju blood typing system of the sperm whale and specific soluble substances. *Scient. Rep. Whales Res. Inst., Tokyo, 17*: 67–77.

DAVIES, J. L. 1960: The southern form of the pilot whale. *J. Mammal. 41*: 29–34.

DAVIES, J. L.; GUILER, E. R. 1957: A note on the pygmy right whale, *Caperea marginata* Gray. *Proc. zool. Soc. Lond. 129*: 579–89.

DAWBIN, W. H. 1954: Maori whaling. *Norsk Hvalfangsttid. 43*: 269–81.

——— 1956a: The migrations of humpback whales which pass the New Zealand coast. *Trans. R. Soc. N.Z. 84*: 147–96.

——— 1956b: Whale marking in South Pacific waters. *Norsk Hvalfangsttid. 45*: 485–508.

——— 1959a: New Zealand and South Pacific whale marking and recoveries to the end of 1958. *Norsk Hvalfangsttid. 48*: 213–38.

——— 1959b: Evidence on growth-rates obtained from two marked humpback whales. *Nature, Lond., 183*: 1749–50.

——— 1960: An analysis of the New Zealand catches of humpback whales from 1947 to 1958. *Norsk Hvalfangsttid. 49*: 61–75.

——— 1964: Movements of humpback whales marked in the South West Pacific Ocean 1952 to 1962. *Norsk Hvalfangsttid. 53*: 68–78.

——— 1966: The seasonal migratory cycle of humpback whales. *In* K. S. Norris (Ed.), "Whales, Dolphins, and Porpoises", pp. 145–69. University of California Press, Los Angeles.

DELL, R. K. 1960: The New Zealand occurrences of the pygmy sperm whale, *Kogia breviceps. Rec. Dom. Mus., Wellington, 3*: 229–34.

DEMPSEY, E. W.; WISLOCKI, G. B. 1941: The structure of the ovary of the humpback whale (*Megaptera nodosa*). *Anat. Rec. 80*: 243–57.

DUNSTAN, D. J. 1957: Caudal presentation at birth of a humpback whale, *Megaptera nodosa* (Bonnaterre). *Norsk Hvalfangsttid. 46*: 553–5.

EDMONDSON, C. H. 1948: Records of *Kogia breviceps* from the Hawaiian Islands. *J. Mammal. 29*: 76–7.

ENDERS, R. K. 1942: Notes on a stranded pigmy sperm whale (*Kogia breviceps*). *Notul. Nat. 111*. 6 pp.

FLOWER, W. H. 1872: On the recent ziphioid whales, with a description of the skeleton of *Berardius arnouxi. Trans. zool. Soc. Lond. 8*: 203–34.

——— 1879: A further contribution to the knowledge of the existing ziphioid whales. Genus *Mesoplodon. Trans. zool. Soc. Lond. 10*: 415–37.

——— 1880: On the external characters of two species of British dolphins (*Delphinus delphis* Linn. and *Delphinus tursio* Fabr.). *Trans. zool. Soc. Lond. 11*: 1–5.

——— 1882: On the cranium of a new species of *Hyperoodon* from the Australian seas. *Proc. zool. Soc. Lond. 1882*: 392–6.

——— 1883: On the characters and divisions of the family Delphinidae. *Proc. zool. Soc. Lond. 1883*: 466–513.

FORBES, H. O. 1893: Observations on the development of the rostrum in the cetacean genus *Mesoplodon*, with remarks on some of the species. *Proc. zool. Soc. Lond. 1893*: 216–36.

FRASER, F. C. 1936: Vestigial teeth in specimens of Cuvier's whale (*Ziphius cavirostris*) stranded on the Scottish coast. *Scott. Nat. 1936*: 153–7.

——— 1945: On a specimen of the southern bottlenosed whale, *Hyperoodon planifrons*. "*Discovery*" *Rep. 23*: 21–36.

——— 1950: Notes on a skull of Hector's beaked whale *Mesoplodon hectori* (Gray), from the Falkland Islands. *Proc. Linn. Soc. Lond. 162*: 50–2.

——— 1966: Comments on the Delphinoidea. *In* K. S. Norris (Ed.), "Whales, Dolphins, and Porpoises", pp. 7–30. University of California Press, Los Angeles.

FRASER, F. C.; PURVES, P. E. 1960: Hearing in cetaceans. *Bull. Br. Mus. nat. Hist., Zool., 7*. 140 pp.

FRY, D. H. 1935: Sharp-headed finner whale taken at Los Angeles harbour. *J. Mammal. 16*: 205–7.

FUJINO, K. 1953: On the serological constitution of the sei-, fin-, blue-, and humpback-whales (I). *Scient. Rep. Whales Res. Inst., Tokyo, 8*: 103–25.

——— 1954a: On the serological constitution of the sperm- and Baird's beaked-whales. (I) Blood groups of the sperm- and Baird's beaked-whales. *Scient. Rep. Whales Res. Inst., Tokyo, 9*: 105–20.

——— 1954b: On the body proportions of the fin whales (*Balaenoptera physalus* (L.)) caught in the northern Pacific Ocean (I) (preliminary report). *Scient. Rep. Whales Res. Inst., Tokyo, 9*: 121–63.

——— 1964: Fin whale subpopulations in the Antarctic whaling areas II, III, and IV. *Scient. Rep. Whales Res. Inst., Tokyo, 18*: 1–27.

GAMBELL, R. 1964: A pygmy blue whale at Durban. *Norsk Hvalfangsttid. 53*: 66–8.

GASKIN, D. E. 1963: Whale marking cruises in New Zealand waters made between February and August 1963. *Norsk Hvalfangsttid. 52*: 307–21.

——— 1964a: Whale marking cruises in New Zealand waters made between August and December 1963. *Norsk Hvalfangsttid. 53*: 29–41.

——— 1964b: Recent observations in New Zealand waters on some aspects of behaviour of the sperm whale (*Physeter macrocephalus*). *Tuatara 12*: 106–14.

——— 1964c: Return of the southern right whale (*Eubalaena australis* Desm.) to New Zealand waters, 1963. *Tuatara 12*: 115–8.

——— 1965: New Zealand whaling and whale research 1962–4. *N.Z. Sci. Rev. 23*: 19–22.

——— 1966a: Dolphins at the Napier Marineland. A preliminary review. *N.Z. Sci. Rev. 24*: 21–4.

——— 1966b: New records of the pigmy sperm whale *Kogia breviceps* Blainville 1838, from New Zealand, and a probable record from New Guinea. *Norsk Hvalfangsttid. 55*: 35–7.

——— 1967a: The whaling potential of the New Zealand subregion. *Fish. tech. Rep. N.Z. mar. Dep. 16*. 30 pp.

——— 1967b: Luminescence in a squid *Moroteuthis* sp. (probably *ingens* Smith), and a possible feeding mechanism in the sperm whale *Physeter catodon* L. *Tuatara 15*: 86–8.

GASKIN, D. E.; CAWTHORN, M. W. 1967a: Squid mandibles from the stomachs of sperm whales (*Physeter catodon* L.) captured in the Cook Strait region of New Zealand. *N.Z. Jl mar. Freshwat. Res. 1*: 59–70.

——— 1967b: Diet and feeding habits of the sperm whale (*Physeter catodon* L.) in the Cook Strait region of New Zealand. *N.Z. Jl mar. Freshwat. Res. 1*: 156–79.

GILMORE, R. M. 1959: On the mass strandings of sperm whales. *Pacif. Nat. 1(10)*: 9–16.

GLAUERT, L. 1947: The genus *Mesoplodon* in Western Australian seas. *Aust. Zool. 11*: 73–5.

GRAY, J. E. 1846: Mammalia: On the Cetaceous Animals. *In* J. Richardson and J. E. Gray (Eds.), "The Zoology of the Voyage of HMS *Erebus* and *Terror*, under Command of Captain Sir James Clark Ross, R.N., F.R.S., during Years 1839 to 1843". Vol. 1, pp. 13–53. Janson, London.

——— 1871a: Notes on the skull of *Balaena marginata*, described in *Transactions of the New Zealand Institute*, Vol. ii, p. 26, as the type of a new genus *Neobalaena. Trans. Proc. N.Z. Inst. 3*: 123–4.

——— 1871b: Notes on the *Berardius* of New Zealand. *Ann. Mag. nat. Hist., ser. 4, 8*: 115–7.

——— 1874a: List of seals, whales, and dolphins of New Zealand. *Trans. Proc. N.Z. Inst. 6*: 87–9.

——— 1874b: On the skeleton of the New Zealand pike whale, *Balaenoptera huttoni* (*Physalus antarcticus* Hutton). *Ann. Mag. nat. Hist., ser. 4, 13*: 448–52.

GUILER, E. R. 1961: A pregnant female pygmy right whale. *Aust. J. Sci. 24*: 297–8.

GUNTER, G.; HUBBS, C. L.; BEAL, M. A. 1955: Records of *Kogia breviceps* from Texas, with remarks on movements and distribution. *J. Mammal. 36*: 263–70.

GUNTHER, E. R. 1949: The habits of fin whales. "*Discovery*" *Rep. 25*: 113–42.

HAAST, J. von 1870: Preliminary notice of a ziphid whale, probably *Berardius arnuxii*, stranded on the 16th of December 1868, on the sea beach, near New Brighton, Canterbury. *Trans. Proc. N.Z. Inst. 2*: 190–2.

——— 1874: On the occurrence of a new species of *Euphysetes* (*E. pottsii*), a remarkably small catodont whale, on the coast of New Zealand. *Trans. Proc. N.Z. Inst. 6*: 97–102.

——— 1876: Further notes on *Oulodon*, a new genus of ziphioid whales from the New Zealand seas. *Proc. zool. Soc. Lond. 1876*: 457–8.

——— 1877a: Notes on the skeleton of *Epiodon novae zealandiae*. *Trans. Proc. N.Z. Inst. 9*: 430–42.

——— 1877b: Notes on *Mesoplodon floweri*. *Trans. Proc. N.Z. Inst. 9*: 442–50.

——— 1877c: On *Oulodon:* a new genus of ziphioid whales. *Trans. Proc. N.Z. Inst. 9*: 450–7.

——— 1880: Notes on *Ziphius* (*Epiodon*) *novae-zealandiae* von Haast—goose-beaked whale. *Trans. Proc. N.Z. Inst. 12*: 241–6.

——— 1881: Notes on *Balaenoptera rostrata* Fabricius (*B. huttoni* Gray). *Trans. Proc. N.Z. Inst. 13*: 169–75.

——— 1883: Notes on a skeleton of *Balaenoptera australis* Desmoulins, the great southern rorqual or "sulphur-bottom" of whalers. *Proc. zool. Soc. Lond. 1883*: 592–4.

HALE, H. M. 1932a: Beaked whales—*Hyperoodon planifrons* and *Mesoplodon layardii*—from South Australia. *Rec. S. Aust. Mus. 4*: 291–311.

——— 1932b: The pigmy right whale (*Neobalaena marginata*) in South Australian waters. *Rec. S. Aust. Mus. 4*: 314–9.

——— 1939: Rare whales in South Australia. *S. Aust. Nat. 19 (4)*: 5–8.

——— 1947: The pigmy sperm whale (*Kogia breviceps* Blainville) on South Australian coasts. *Rec. S. Aust. Mus. 8*: 531–46.

——— 1962a: The pigmy sperm whale (*Kogia breviceps*) on South Australian coasts, part III. *Rec. S. Aust. Mus. 14*: 197–229.

——— 1962b: Occurrence of the whale *Berardius arnuxi* in southern Australia. *Rec. S. Aust. Mus. 14*: 231–43.

HANDLEY, C. O. 1966: A synopsis of the genus *Kogia* (pygmy sperm whales). *In* K. S. Norris (Ed.), "Whales, Dolphins, and Porpoises", pp. 62–9. University of California Press, Los Angeles.

HARMER, S. F. 1924: On *Mesoplodon* and other beaked whales. *Proc. zool. Soc. Lond. 1924*: 541–87.

——— 1931: The false killer dolphin. *Nature, Lond., 127*: 60.

HARRISON, R. J. 1949: Observations on the female reproductive organs of the ca'aing whale, *Globiocephala melaena* Traill. *J. Anat. 83*: 238–53.

HARRISON, T.; JAMUH, G. 1958: Pigmy sperm whale (*Kogia breviceps*) in Borneo. *Nature, Lond., 182*: 543.

HECTOR, J. 1873a: On the whales and dolphins of the New Zealand seas. *Trans. Proc. N.Z. Inst. 5*: 154–70.

——— 1873b: Notes on the whales and dolphins of the New Zealand seas. *Ann. Mag. nat. Hist., ser. 4, 11*: 104–12.

——— 1874: Notice of a variation in the dentition of *Mesoplodon hectori* Gray. *Trans. Proc. N.Z. Inst. 6*: 86–7.

——— 1875: Notes on New Zealand whales. *Trans. Proc. N.Z. Inst. 7*: 251–65.

——— 1877: Notes on New Zealand Cetacea. *Trans. Proc. N.Z. Inst. 9*: 477–84.

——— 1878: Notes on the whales of the New Zealand seas. *Trans. Proc. N.Z. Inst. 10*: 331–43.

——— 1881: Notes on New Zealand Cetacea, recent and fossil. *Trans. Proc. N.Z. Inst. 13*: 434–6.

HIRASAKA, K. 1937: On the pigmy sperm-whale, *Kogia breviceps* (Blainville). *Mem. Fac. Sci. Agric. Taihoku Imp. Univ. 14*: 117–42.

HOBBS, J. R. 1885: Stranding of a pygmy sperm whale. *Bull. U.S. Fish Commn 5*: 450.

HOLM, J. L.; JONSGÅRD, A. 1959: Occurrence of the sperm whale in the Antarctic and the possible influence of the moon. *Norsk Hvalfangsttid. 48*: 161–82.

HOSHINA, T.; SUGIURA, Y. 1956: On a skin disease and a nematode parasite of a dolphin, *Tursiops truncatus* (Montagu, 1821). *Scient. Rep. Whales Res. Inst., Tokyo, 11*: 133–8.

HOUCK, W. J. 1958: Cuvier's beaked whale from northern California. *J. Mammal. 39*: 308–9.

HUBBS, C. L. 1946: First records of two beaked whales, *Mesoplodon bowdoini* and *Ziphius cavirostris*, from the Pacific coast of the United States. *J. Mammal. 27*: 242–55.

——— 1951a: Probable record of the beaked whale, *Ziphius cavirostris*, in Baja California. *J. Mammal. 32*: 365–6.

——— 1951b: Eastern Pacific records and general distribution of the pygmy sperm whale. *J. Mammal. 32*: 403–10.

——— 1953: Dolphin protecting dead young. *J. Mammal. 34*: 498.

HUTTON, F. W. 1875: Description of some plates of baleen in the Otago Museum. *Trans. Proc. N.Z. Inst. 7*: 266.

——— 1876: Description of the "cow-fish", or "bottlenosed dolphin" (*Tursio metis*) of the sounds, on the west coast of Otago. *Trans. Proc. N.Z. Inst. 8*: 180–1.

——— 1877: Notes on the New Zealand Delphinidae. *Trans. Proc. N.Z. Inst. 9*: 349–50.

ICHIHARA, T. 1963: Identification of the pigmy blue whale in the Antarctic. *Norsk Hvalfangsttid. 52*: 128–30.

IREDALE, T.; TROUGHTON, E. le G. 1933: The correct generic names for the grampus or killer whale, and the so-called grampus or Risso's dolphin. *Rec. Aust. Mus. 19*: 28–36.

——— 1934: A check-list of the mammals recorded from Australia. *Mem. Aust. Mus. 6*. 122 pp.

JELLISON, W. M. 1953: A beaked whale, *Mesoplodon* sp., from the Pribilofs. *J. Mammal. 34*: 249–51.

JOHNSTON, T. H.; MAWSON, P. M. 1939: Internal parasites of the pigmy sperm whale. *Rec. S. Aust. Mus. 6*: 263–74.

JONSGÅRD, A. 1951: Studies on the little piked or minke whale (*Balaenoptera acutorostrata* Lacépède). *Norsk Hvalfangsttid. 40*: 209–32.

——— 1952: On the growth of the fin whale (*Balaenoptera physalus*) in different waters. *Norsk Hvalfangsttid. 41*: 57–65.

JONSGÅRD, A.; OYNES, P. 1952: Om bottlenosen (*Hyperoodon rostratus*) og spekkhoggeren (*Orcinus orca*). *Fauna, Oslo, 1*. 18 pp.

JUNGE, G. C. A. 1950: On a specimen of the rare fin whale, *Balaenoptera edeni* Anderson, stranded on Puli Sugi near Singapore. *Zool. Verh., Leiden, 9*. 26 pp.

KASUYA, T.; ICHIHARA, T. 1965: Some information on minke whales from the Antarctic. *Scient. Rep. Whales Res. Inst., Tokyo, 19*: 37–43.

KELLOGG, R.; SCHEFFER, V. B. 1947: Occurrence of *Stenella euphrosyne* off the coast of Oregon. *Murrelet 28*: 9.

KENYON, K. W. 1952: A bottlenose dolphin from the California coast. *J. Mammal. 33*: 385–8.

——— 1961: Cuvier beaked whales stranded in the Aleutian Islands. *J. Mammal. 42*: 71–6.

KIMURA, S. 1957: The twinning in southern fin whales. *Scient. Rep. Whales Res. Inst., Tokyo, 12*: 103–25.

KIMURA, S.; NEMOTO, T. 1956: Note on a minke whale kept alive in aquarium. *Scient. Rep. Whales Res. Inst., Tokyo, 11*: 181–9.

KNOX, F. J. 1871: Observations on the Ziphidae, a family of the Cetacea. *Trans. Proc. N.Z. Inst. 3*: 125–8.

KOJIMA, T. 1951: On the brain of the sperm whale (*Physeter catodon* L.). *Scient. Rep. Whales Res. Inst., Tokyo, 6*: 49–72.

KREFFT, G. 1870: Notes on the skeleton of a rare whale probably identical with *Dioplodon sechellensis*. *Proc. zool. Soc. Lond. 1870*: 426–7.

KRITZLER, H. 1949: The pilot whale at Marineland. *Nat. Hist., N.Y., 58*: 302–8, 331–2.

——— 1952: Observations on the pilot whale in captivity. *J. Mammal. 33*: 321–34.

LAWS, R. M. 1959a: On the breeding season of Southern Hemisphere fin whales, *Balaenoptera physalus* (Linn.). *Norsk Hvalfangsttid. 48*: 329.

——— 1959b: The foetal growth rates of whales, with special reference to the fin whale, *Balaenoptera physalus* (Linn.). "*Discovery*" *Rep. 29*: 281–308.

LE DANOIS, E. 1912: Description d'un embryon de *Grampus griseus* Gray. *Archs Zool. exp. gén., ser. 5, 8*: 399–419.

LILLIE, D. G. 1915: Cetacea. *Br. Antarct. Terra Nova Exped. 1910, Zool., 1*: 85–124.

LILLY, J. C. 1961: "Man and Dolphin." Doubleday, New York. 312 pp.

LONGMAN, H. A. 1926: New records of Cetacea, with a list of Queensland species. *Mem. Qd Mus. 8*: 266–78.

LYDEKKER, R. 1922: "Guide to the Whales, Porpoises, and Dolphins (Order Cetacea) Exhibited in the Department of Zoology, British Museum (Natural History), Cromwell Road, London S.W. 7." 2nd ed., revised by Sir Sidney Harmer. Trustees of the British Museum, London. 48 pp.

MCBRIDE, A. F.; HEBB, D. O. 1948: Behavior of the captive bottle-nose dolphin, *Tursiops truncatus*. *J. comp. physiol. Psychol. 41*: 111–23.

MCBRIDE, A. F.; KRITZLER, C. 1951: Observations on pregnancy, parturition, and post-natal behavior in the bottlenose dolphin. *J. Mammal. 32*: 251–66.

MCCANN, C. 1961: The occurrence of the southern bottlenosed whale, *Hyperoodon planifrons* Flower, in New Zealand waters. *Rec. Dom. Mus., Wellington, 4*: 21–7.

——— 1962a: Key to the family Ziphiidae, beaked whales. *Tuatara 10*: 13–8.

——— 1962b: The taxonomic status of the beaked whale, *Mesoplodon hectori* (Gray)—Cetacea. *Rec. Dom. Mus., Wellington, 4*: 83–94.

——— 1962c: The taxonomic status of the beaked whale, *Mesoplodon pacificus* Longman—Cetacea. *Rec. Dom. Mus., Wellington, 4*: 95–100.

——— 1964a: The female reproductive organs of Layard's beaked whale, *Mesoplodon layardi* (Gray). *Rec. Dom. Mus., Wellington, 4*: 311–6.

——— 1964b: A coincidental distributional pattern of some of the larger marine animals. *Tuatara 12*: 119–24.

MCCANN, C.; TALBOT, F. H. 1963: The occurrence of True's beaked whale (*Mesoplodon mirus* True) in South African waters, with a key to South African species of the genus. *Proc. Linn. Soc. Lond. 175*: 137–44.

MACKINTOSH, N. A. 1942: The southern stocks of whalebone whales. "*Discovery*" *Rep. 22*: 197–300.

MACKINTOSH, N. A.; BROWN, S. G. 1956: Preliminary estimates of the southern populations of the larger baleen whales. *Norsk Hvalfangsttid. 45*: 469–80.

MACKINTOSH, N. A.; WHEELER, J. F. G. 1929: Southern blue and fin whales. "*Discovery*" *Rep. 1*: 257–540.

MATSUURA, Y. 1936: On the lesser rorqual found in the adjacent waters of Japan. *Bull. Jap. Soc. scient. Fish. 4*: 325–30.

MATTHEWS, L. H. 1937: The humpback whale, *Megaptera nodosa*. "*Discovery*" *Rep. 17*: 7–92.

——— 1938a: The sperm whale, *Physeter catodon*. "*Discovery*" *Rep. 17*: 93–168.

——— 1938b: Notes on the southern right whale, *Eubalaena australis*. "*Discovery*" *Rep. 17*: 169–81.

——— 1938c: The sei whale, *Balaenoptera borealis*. "*Discovery*" *Rep. 17*: 183–290.

MILLER, G. S. 1920: American records of whales of the genus *Pseudorca*. *Proc. U.S. natn. Mus. 57 (2311)*: 205–7.

MOORE, J. C. 1953: Distribution of marine mammals to Florida waters. *Am. Midl. Nat. 49*: 117–58.

——— 1963: Recognizing certain species of beaked whales of the Pacific Ocean. *Am. Midl. Nat. 70*: 396–428.

——— 1966: Diagnoses and distributions of beaked whales of the genus *Mesoplodon* known from North American waters. *In* K. S. Norris (Ed.), "Whales, Dolphins, and Porpoises", pp. 32–61. University of California Press, Los Angeles.

MOORE, J. C.; PALMER, R. S. 1955: More piked whales from southern North Atlantic. *J. Mammal. 36*: 429–33.

MOORE, J. C.; WOOD, F. G. 1957: Differences between the beaked whales *Mesoplodon mirus* and *Mesoplodon gervaisi*. *Am. Mus. Novit. 1831*. 25 pp.

MURIE, J. 1871: On Risso's grampus, *G. rissoanus* (Desm.). *J. Anat. Physiol., Lond., 5*: 118.

NEMOTO, T. 1962: A secondary sexual character of fin whales. *Scient. Rep. Whales Res. Inst., Tokyo, 16*: 29–34.

NEMOTO, T.; NASU, K. 1963: Stones and other aliens in the stomachs of sperm whales in the Bering Sea. *Scient. Rep. Whales Res. Inst., Tokyo, 17*: 83–91.

NISHIMOTO, S.; TOZAWA, M.; KAWAKAMI, T. 1952: Food of sei whales (*Balaenoptera borealis*) caught in the Bonin Island waters. *Scient. Rep. Whales Res. Inst., Tokyo, 7*: 79–85.

NISHIWAKI, M. 1950: Determination of the age of Antarctic blue and fin whales by the colour changes in crystalline lens. *Scient. Rep. Whales Res. Inst., Tokyo, 4*: 115–61.

——— 1955: On the sexual maturity of the Antarctic male sperm whale (*Physeter catodon* L.). *Scient. Rep. Whales Res. Inst., Tokyo, 10*: 143–9.

——— 1959: Humpback whales in Ryukyuan waters. *Scient. Rep. Whales Res. Inst., Tokyo, 14*: 49–87.

——— 1960: Ryukyuan humpback whaling in 1960. *Scient. Rep. Whales Res. Inst., Tokyo, 15*: 1–15.

——— 1962a: *Mesoplodon bowdoini* stranded at Akita Beach, Sea of Japan. *Scient. Rep. Whales Res. Inst., Tokyo, 16*: 61–77.

——— 1962b: Observation on two mandibles of *Mesoplodon*. *Scient. Rep. Whales Res. Inst., Tokyo, 16*: 79–82.

——— 1963: Taxonomical consideration on genera of Delphinidae. *Scient. Rep. Whales Res. Inst., Tokyo, 17*: 93–103.

——— 1964: Revision of the article "Taxonomical consideration on genera of Delphinidae" in No. 17. *Scient. Rep. Whales Res. Inst., Tokyo, 18*: 171–2.

NISHIWAKI, M.; HANDA, C. 1958: Killer whales caught in the coastal waters off Japan for the recent 10 years. *Scient. Rep. Whales Res. Inst., Tokyo, 13*: 85–96.

NISHIWAKI, M.; HAYASHI, K. 1950: Biological survey of fin and blue whales taken in the Antarctic season 1947–48 by the Japanese fleet. *Scient. Rep. Whales Res. Inst., Tokyo, 3*: 132–90.

NISHIWAKI, M.; HIBIYA, T. 1951: On the sexual maturity of the sperm whale (*Physeter catodon*) found in the adjacent waters of Japan (I). *Scient. Rep. Whales Res. Inst., Tokyo, 6*: 153–65.

——— 1952: On the sexual maturity of the sperm whale (*Physeter catodon*) found in the adjacent waters of Japan (II). *Scient. Rep. Whales Res. Inst., Tokyo, 7*: 121–4.

NISHIWAKI, M.; HIBIYA, T.; KIMURA, S. 1954: On the sexual maturity of the sei whale of the Bonin waters. *Scient. Rep. Whales Res. Inst., Tokyo, 9*: 165–77.

——— 1956: On the sexual maturity of the sperm whale (*Physeter catodon*) found in the North Pacific. *Scient. Rep. Whales Res. Inst., Tokyo, 11*: 39–46.

NISHIWAKI, M.; HIBIYA, T.; OHSUMI, S. 1958: Age study of sperm whale based on reading of tooth laminations. *Scient. Rep. Whales Res. Inst., Tokyo, 13*: 135–53.

NISHIWAKI, M.; ICHIHARA, T.; OHSUMI, S. 1958: Age studies of fin whale based on ear plug. *Scient. Rep. Whales Res. Inst., Tokyo, 13*: 155–69.

NISHIWAKI, M.; KAMIYA, T. 1958: A beaked whale *Mesoplodon* stranded at Oiso Beach, Japan. *Scient. Rep. Whales Res. Inst., Tokyo, 13*: 53–83.

——— 1959: *Mesoplodon stejnegeri* from the coast of Japan. *Scient. Rep. Whales Res. Inst., Tokyo, 14*: 35–48.

NISHIWAKI, M.; OYE, T. 1951: Biological investigation on blue whales (*Balaenoptera musculus*) and fin whales (*Balaenoptera physalus*) caught by the Japanese Antarctic whaling fleets. *Scient. Rep. Whales Res. Inst., Tokyo, 5*: 91–167.

NISHIWAKI, M.; YAGI, T. 1954: On the age-determination method of the toothed whale by the study of the tooth. *Proc. Japan Acad. 30*: 399.

NORMAN, J. R.; FRASER, F. C. 1937: "Giant Fishes, Whales and Dolphins." Putnam, London. 361 pp.

NORRIS, K. S.; PRESCOTT, J. H. 1961: Observations on Pacific cetaceans of Californian and Mexican waters. *Univ. Calif. Publs Zool. 63*: 291–402.

OGAWA, T.; KAMIYA, T. 1957: A case of the cachalot with protruded rudimentary hind limbs. *Scient. Rep. Whales Res. Inst., Tokyo, 12*: 197–208.

OHSUMI, S. 1960: Relative growth of the fin whale, *Balaenoptera physalus* (Linn.). *Scient. Rep. Whales Res. Inst., Tokyo, 15*: 17–84.

——— 1964: Comparison of maturity and accumulation rate of corpora albicantia between the left and right ovaries in Cetacea. *Scient. Rep. Whales Res. Inst., Tokyo, 18*: 123–48.

OHSUMI, S.; KASUYA, T.; NISHIWAKI, M. 1963: Accumulation rate of dentinal growth layers in the maxillary tooth of the sperm whale. *Scient. Rep. Whales Res. Inst., Tokyo, 17*: 15–35.

OHSUMI, S.; NISHIWAKI, M.; HIBIYA, T. 1958: Growth of fin whale in the Northern Pacific. *Scient. Rep. Whales Res. Inst., Tokyo, 13*: 97–133.

OKUTANI, T.; NEMOTO, T. 1964: Squids as the food of sperm whales in the Bering Sea and Alaskan Gulf. *Scient. Rep. Whales Res. Inst., Tokyo, 18*: 111–22.

OLIVER, W. R. B. 1922a: The Paremata whale. *N.Z. Jl Sci. Technol. 5*: 125–6.

——— 1922b: The whales and dolphins of New Zealand. *N.Z. Jl Sci. Technol. 5*: 129–41.

——— 1922c: A review of the Cetacea of the New Zealand seas. *Proc. zool. Soc. Lond. 1922*: 557–85.

——— 1924a: Strap-toothed whale at Kaitawa Point, entrance to Porirua Harbour. *N.Z. Jl Sci. Technol. 7*: 187–8.

——— 1924b: Stranded blackfish at Marsden Point. *N.Z. Jl Sci. Technol. 7*: 188–9.

——— 1937: *Tasmacetus shepherdi*: A new genus and species of beaked whale from New Zealand. *Proc. zool. Soc. Lond. 107, ser. B,*: 371–81.

——— 1946: A pied variety of the coastal porpoise. *Dom. Mus. Rec. Zool. 1(1)*: 1–4.

OLSEN, O. 1913: On the external characters and biology of Bryde's whale (*Balaenoptera brydei*), a new rorqual from the coast of South Africa. *Proc. zool. Soc. Lond. 1913*: 1073–90.

OMMANNEY, F. D. 1933: Whaling in the Dominion of New Zealand. "*Discovery*" *Rep. 7*: 239–52.

OMURA, H. 1950: Diatom infection on blue and fin whales in the Antarctic whaling area V (the Ross Sea area). *Scient. Rep. Whales Res. Inst., Tokyo, 4*: 14–26.

——— 1953: Biological study on humpback whales in the Antarctic whaling areas IV and V. *Scient. Rep. Whales Res. Inst., Tokyo, 8*: 81–102.

——— 1957: Osteological study of the little piked whale from the coast of Japan. *Scient. Rep. Whales Res. Inst., Tokyo, 12*: 1–21.

——— 1958a: North Pacific right whale. *Scient. Rep. Whales Res. Inst., Tokyo, 13*: 1–52.

——— 1958b: Note on embryo of Baird's beaked whale. *Scient. Rep. Whales Res. Inst., Tokyo, 13*: 213–4.

———1959: Bryde's whales from the coast of Japan. *Scient. Rep. Whales Res. Inst., Tokyo, 14*: 1–33.

——— 1962a: Bryde's whale occurs on the coast of Brazil. *Scient. Rep. Whales Res. Inst., Tokyo, 16*: 1–5.

——— 1962b: Further information on Bryde's whale from the coast of Japan. *Scient. Rep. Whales Res. Inst., Tokyo, 16*: 7–18.

OMURA, H.; FUJINO, K. 1954: Sei whales in the adjacent waters of Japan. II. Further studies on the external characters. *Scient. Rep. Whales Res. Inst., Tokyo, 9*: 89–103.

OMURA, H.; FUJINO, K.; KIMURA, S. 1955: Beaked whale *Berardius bairdi* of Japan, with notes on *Ziphius cavirostris*. *Scient. Rep. Whales Res. Inst., Tokyo, 10*: 89–132.

OMURA, H.; NEMOTO, T. 1955: Sei whales in the adjacent waters of Japan. III. Relation between movement and water temperature of the sea. *Scient. Rep. Whales Res. Inst., Tokyo, 10*: 79–87.

OMURA, H.; NISHIWAKI, M.; ICHIHARA, T.; KASUYA, T. 1962: Osteological note of a sperm whale. *Scient. Rep. Whales Res. Inst., Tokyo, 16*: 35–45.

OMURA, H.; SAKIURA, H. 1956: Studies on the little piked whale from the coast of Japan. *Scient. Rep. Whales Res. Inst., Tokyo, 11*: 1–37.

ORR, R. T. 1948: A second record for Cuvier's whale from the Pacific coast of the United States. *J. Mammal. 29*: 420.

OTTESTAD, P. 1956: On the size of the stock of Antarctic fin whales relative to the size of the catch. *Norsk Hvalfangsttid. 45*: 298–308.

OWEN, R. 1866: On some Indian Cetacea collected by Walter Elliot. *Trans. zool. Soc. Lond. 6*: 17–47.

PARKER, T. J. 1885: Notes on the skeleton and baleen of a fin whale (*Balaenoptera musculus?*) recently acquired by the Otago University Museum. *Trans. Proc. N.Z. Inst. 17*: 3–13.

PEARSON, J. 1936: The whales and dolphins of Tasmania. Part I. External characters and habits. *Pap. Proc. R. Soc. Tasm. 1935*: 163–92.

PEDERSEN, T.; RUUD, J. T. 1946: A bibliography of whales and whaling. *Hvalrâd. Skr. 30*. 32 pp.

PIKE, G. C. 1953a: Preliminary report on the growth of finback whales from the coast of British Columbia. *Norsk Hvalfangsttid. 42*: 11–5.

——— 1953b: Two records of *Berardius bairdi* from the coast of British Columbia. *J. Mammal. 34*: 98–104.

PURVES, P. E.; MOUNTFORD, M. D. 1959: Ear plug laminations in relation to the age composition of a population of fin whales (*Balaenoptera physalus*). *Bull. Br. Mus. nat. Hist., Zool., 5*: 125–61.

RATCLIFFE, H. L. 1942: Autopsy of a male pigmy sperm whale (*Kogia breviceps*). *Notul. Nat. 112*. 4 pp.

RICE, D. W. 1963a: The whale marking cruise of the *Sioux City* off California and Baja California. *Norsk Hvalfangsttid. 52*: 153–60.

——— 1963b: Progress report on biological studies of the larger Cetacea in the waters off California. *Norsk Hvalfangsttid. 52*: 181–7.

ROBINS, J. P. 1960: Age studies on the female humpback whale, *Megaptera nodosa* (Bonnaterre), in east Australian waters. *Aust. J. mar. Freshwat. Res. 11*: 1–13.

ROEST, A. I.; STORM, R. M.; DUMAS, P. C. 1953: Cuvier's beaked whale (*Ziphius cavirostris*) from Oregon. *J. Mammal. 34*: 251–2.

RUUD, J. T. 1945: Further studies on the structure of the baleen plates and their application to age determination. *Hvalrâd. Skr. 29*. 69 pp.

——— 1952: Catches of Bryde-whale off French Equatorial Africa. *Norsk Hvalfangsttid. 41*: 662–3.

RUUD, J. T.; JONSGÅRD, A.; OTTESTAD, P. 1950: Age-studies on blue whales. *Hvalrâd. Skr. 33*. 72 pp.

SCHEFFER, V. B. 1949: Notes on three beaked whales from the Aleutian Islands. *Pacif. Sci. 3*: 353.

——— 1950: The striped dolphin *Lagenorhynchus obliquidens* Gill, 1865, on the coast of North America. *Am. Midl. Nat. 44*: 750–8.

——— 1953: Measurements and stomach contents of eleven delphinids from the North-east Pacific. *Murrelet 34*: 27–30.

SCHEFFER, V. B.; RICE, D. W. 1963: A list of the marine mammals of the world. *Spec. scient. Rep. U.S. Fish Wildl. Serv. 431.* 12 pp.

SCHEFFER, V. B.; SLIPP, J. W. 1948: The whales and dolphins of Washington State, with a key to the cetaceans of the west coast of North America. *Am. Midl. Nat. 39*: 257–337.

SCHULTE, H. von W.; SMITH, M. de F. 1918: The external characters, skeletal muscles, and peripheral nerves of *Kogia breviceps* (Blainville). *Bull. Am. Mus. nat. Hist. 38*: 7–72.

SCLATER, W. L. 1901: "The Mammals of South Africa. II." Porter, London. 241 pp.

SCOTT, E. O. G. 1942: Records of Tasmanian Cetacea: No. II. A large school of the Pacific pilot whale, *Globicephalus melas* (Traill, 1809), stranded at Stanley, north western Tasmania in October, 1935. *Rec. Queen Vict. Mus. 1(2)*: 5–34.

SCOTT, H. H.; LORD, C. E. 1920a: Studies of Tasmanian Cetacea. Part I. *Pap. Proc. R. Soc. Tasm. 1919*: 1–17.

——— 1920b: Studies of Tasmanian Cetacea. Part II. *Pap. Proc. R. Soc. Tasm. 1919*: 23–32.

——— 1921: Studies of Tasmanian Cetacea. Part IV. *Pap. Proc. R. Soc. Tasm. 1920*: 1–10.

SCOTT, J. H.; PARKER, T. J. 1889: On a specimen of *Ziphius* recently obtained near Dunedin. *Trans. zool. Soc. Lond. 12*: 241–8.

SERENE, R. 1934: Sur un échouage de *Kogia breviceps* Gray à proximité de l'Institut Océanographique de Nhatrang (Annam). *Bull. Mus. Hist. nat., Paris, ser. 2, 6*: 398–9.

SERGEANT, D. E. 1962a: The biology of the pilot or pothead whale *Globicephala melaena* (Traill) in Newfoundland waters. *Bull. Fish. Res. Bd Can. 132.* 84 pp.

——— 1962b: On the external characters of the blackfish or pilot whales (genus *Globicephala*). *J. Mammal. 43*: 395–413.

SERGEANT, D. E.; FISHER, H. D. 1957: The smaller Cetacea of eastern Canadian waters. *J. Fish. Res. Bd Can. 14*: 83–115.

SINCLAIR, J. 1962: An early dolphin embryo (*Stenella coeruleoalbus*) in serial sections. *Scient. Rep. Whales Res. Inst., Tokyo, 16*: 83–7.

SLEPTSOV, M. M. 1940: Determination of age in *Delphinus delphis* L. *Byull. mosk. Obshch. Ispyt. Prir. 49*: 43–51.

SLIJPER, E. J. 1939: *Pseudorca crassidens* (Owen). *Zoöl. Meded., Leiden, 21*: 241–366.

——— 1962: "Whales." Hutchinson, London. 475 pp.

SLIPP, J. W.; WILKE, F. 1953: The beaked whale *Berardius* on the Washington coast. *J. Mammal. 34*: 105–13.

SORENSEN, J. H. 1940: *Tasmacetus shepherdi*. History and description of specimens cast ashore on Mason's Bay, Stewart Island, in February, 1933. *Trans. R. Soc. N.Z. 70*: 200–4.

STARRETT, A.; STARRETT, P. 1955: Observations on young blackfish, *Globicephala*. *J. Mammal. 36*: 424–9.

STUMP, C. W.; ROBINS, J. P.; GARDE, M. L. 1960: The development of the embryo and membranes of the humpback whale, *Megaptera nodosa* (Bonnaterre). *Aust. J. mar. Freshwat. Res. 11*: 365–86.

SYMONS, H. W. 1955: Do Bryde whales migrate to the Antarctic? *Norsk Hvalfangsttid. 44*: 64–7.

SYMONS, H. W.; WESTON, R. D. 1958: Studies on the humpback whale (*Megaptera nodosa*) in the Bellingshausen Sea. *Norsk Hvalfangsttid. 47*: 53–9.

TAVOLGA, M. C.; ESSAPIAN, F. S. 1957: The behavior of the bottle-nosed dolphin (*Tursiops truncatus*): mating, pregnancy, parturition and mother-infant behavior. *Zoologica, N.Y., 42*: 11–31.

TAYLOR, R. J. F. 1957: An unusual record of three species of whale being restricted to pools in Antarctic sea ice. *Proc. zool. Soc. Lond. 129*: 325–32.

TOKITA, K. 1960: Electrocardiographical studies on bottle-nosed dolphin (*Tursiops truncatus*). *Scient. Rep. Whales Res. Inst., Tokyo, 15*: 159–65.

TOMPKINS, I. R. 1934: A pigmy sperm whale from the Savannah River entrance. *J. Mammal. 15*: 250–1.

TOWNSEND, C. H. 1935: The distribution of certain whales as shown by logbook records of American whaleships. *Zoologica, N.Y., 19*: 1–50.

TRUE, F. W. 1885: Notice of the capture of a male pigmy sperm whale at Kitty Hawk, North Carolina. *Bull. U.S. Fish Commn 5*: 132–3.

——— 1889: Contributions to the natural history of the cetaceans: a review of the family Delphinidae. *Bull. U.S. natn. Mus. 36.* 191 pp.

——— 1910: An account of the beaked whales of the family Ziphiidae in the collection of the United States National Museum, with remarks on some specimens in other museums. *Bull. U.S. natn. Mus. 73.* 89 pp.

TURNER, W. M. 1872: On the occurrence of *Ziphius cavirostris* in the Shetland seas, and a comparison of its skull with that of Sowerby's whale (*Mesoplodon sowerbyi*). *Proc. R. Soc. Edinb. 7*: 760.

——— 1891: The lesser rorqual (*Balaenoptera rostrata*) in the Scottish seas, with observations on its anatomy. *Proc. R. Soc. Edinb. 19*: 36–75.

ULMER, F. A. 1941: *Kogia breviceps* in South Carolina and New Jersey. *J. Mammal. 22*: 450–1.

WAITE, E. R. 1912: "Guide to the Whales and Dolphins of New Zealand". Canterbury College, Christchurch. 21 pp.

——— 1913: A supposed occurrence of the bottle-nosed whale (*Hyperoodon*) in New Zealand. *Rec. Canterbury Mus. 2*: 23–6.

WALL, W. S. 1851: "History and Description of the Skeleton of a New Sperm Whale Lately Set up in the Australian Museum: Together with Some Account of a New Genus of Sperm Whales Called *Euphysetes*." Piddington, Sydney. 66 pp.

WARNEKE, R. M. 1963: A record of the beaked whale (*Mesoplodon layardii*) in Victorian waters. *Victoria Nat. 80(3)*: 68–72.

WEBER, M. 1923: Die cetaceen der Siboga-Expedition. *Siboga Exped. 58.* 38 pp.

WHEELER, J. F. G. 1930: The age of fin whales at physical maturity. "*Discovery*" *Rep. 2*: 403–34.

WILKE, F.; TANIWAKI, T.; KURODA, N. 1953: *Phocoenoides* and *Lagenorhynchus* in Japan, with notes on hunting. *J. Mammal. 34*: 488–97.

WILLIAMSON, G. R. 1961: Two kinds of minke whale in the Antarctic. *Norsk Hvalfangsttid. 50*: 133–41.

WOOD JONES, F. 1925: Part III (Conclusion) Containing the Monodelphia. *In* "The Mammals of South Australia," pp. 271–449. Government Printer, Adelaide.

YAMADA, M. 1954: Some remarks on the pygmy sperm whale, *Kogia*. *Scient. Rep. Whales Res. Inst., Tokyo, 9*: 37–58.

ZENKOVICH, B. A. 1962: Sea mammals as observed by the round-the-world expedition of the Academy of Sciences of the USSR in 1957–58. *Norsk Hvalfangsttid. 51*: 198–210.

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