

**ON A SPERM WHALE *PHYSETER MACROCEPHALUS* LINNAEUS STRANDED AT KRUSADAI ISLAND IN THE GULF OF MANNAR, WITH AN UP-TO-DATE LIST AND DIAGNOSTIC FEATURES OF WHALES STRANDED ALONG THE INDIAN COAST**

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**ABSTRACT**

A male sperm whale *Physeter macrocephalus* Linnaeus was beached on the southern side of Krusadai Island (Gulf of Mannar) on 30th April 1980. Since it is of a very rare instance and since only meagre information is available on sperm whales from the seas around India, a detailed description on the stranded whale is given in this paper. In addition, another instance of stranding of a sperm whale, evidently a male, at Manauli Island in 1979 is also briefly mentioned. An up-to-date list of stranding of whales of different species along the Indian Coast from 1748 and their diagnostic features to facilitate identification have also been included. A proforma for taking measurements and collecting other details on stranded whales along the Indian Coast has been suggested.

**INTRODUCTION**

THE STRANDING of whales along the Indian Coast has been reported by several authors in the past. Moses (1947) summarised the reports upto 1947. His list includes the stranding of the sperm whale *Physeter macrocephalus* and of the pygmy sperm whale *Kogia breviceps* only once in each case, and the latter was reported once more (Pillay, 1926). Since the stranding of the sperm whales along the Indian Coast appears rather rare and since adequate descriptions and other details of these whales from recent studies in India are not available, detailed observations were made by the authors on a sperm whale stranded at Krusadai Island on 30-4-1980. These observations, along with a summary of the diagnostic features developed based on personal observations of the senior author and earlier reports for the identification of whales commonly washed ashore and an up-to-date list of strandings of whales along the Indian Coast are given in this paper.

**REPORT ON STRANDING**

A sperm whale *Physeter macrocephalus* was washed ashore on 30th April, 1980 on the

southern side of Krusadai Island (Fig. 1, 2). It was first sighted drifting towards the shore at 3 p.m. The whale was found to be a male, dead and lying on its right side when stranded and it was intact. The present observations were made on 2nd May, 1980 on receipt of information. The whale measured 8.1 metres from tip of snout to tail notch. The mouth was wide open exposing the massive triangular tongue and the teeth in the lower jaw. There was no visible injury on the body of the whale. However, there were skin abrasions behind angle of jaw and eyes, base of flippers, on the ventral surface behind vent and on the lower surface of the tail fluke which were perhaps caused while drifting. Blood was oozing out through the mouth, eyes and genital opening. Except for these, the overall external condition of the whale was fresh.

**DESCRIPTION**

Various morphometric measurements of the whale were taken and are given in Table 1. The head of the whale was massive, almost square in front and rectangular in side view. The single crescentic blow-hole (Fig. 3 c) was located parallel to the body axis at the front

of the head slightly to the left of the median line. The head portion around the blow-hole and also the lower half of fore-head were raised with a depression formed below the blow-hole. The conspicuously small eye was situated a little distance behind the gape of the mouth. The underslung lower jaw was small and narrow. There were 22 teeth on the left side

small and not well demarcated from the body. There were six small humps behind the dorsal fin, their heights progressively increasing towards tail (Fig. 2 b).

There were reticulate wrinkles on the skin along the vertebral column, commencing mid-dorsally opposite the origin of flipper and exten-

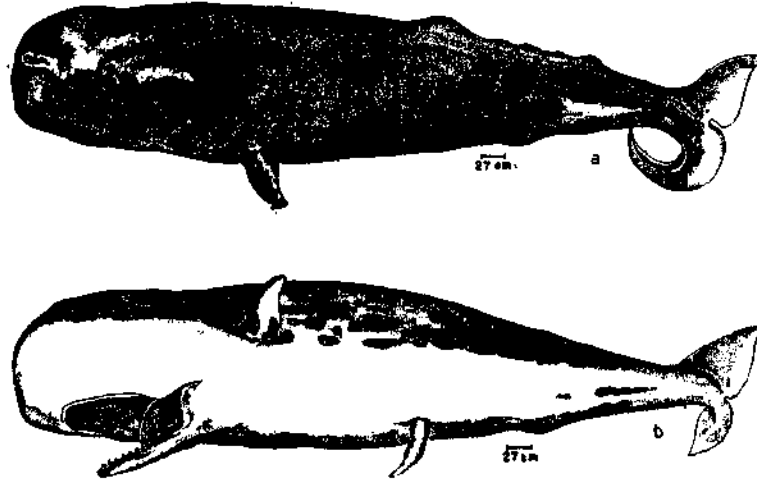


Fig. 1. The Sperm whale *Physeter macrocephalus* stranded at Krusadai Island : a. Dorso-lateral view as it was seen washed ashore and b. ventro-lateral view.

and 21 teeth on the right side of the lower jaw (Fig. 3 b). The teeth were peg-like and were not very sharp. Among the teeth, only eight on the left side and six on the right side of anterior portion of jaw were exposed and all the remaining had not cut the gums and appeared like nodules covered by skin. There were no teeth in the upper jaw. The inner surface of the lower jaw was granular and had a median groove. The palatal region was also granular with big nodules at the extreme inner end. The tongue was massive, short and wide thick and muscular. It was triangular in shape with a flat top and a pointed tip (Fig. 3 a). It did not extend to the full length of jaws. The flippers were broad with rounded tips. The dorsal fin, located on the back at about 5/8 of the length of the body from anterior end, was very

ding upto origin of dorsal fin and again commencing behind dorsal fin and extending up to front of the last hump near caudal peduncle. The wrinkles extended laterally downwards up to about 16 cm on both sides. Shallow irregular longitudinal depressions were present between dorsal margin and the level of flippers, extending posteriorly upto the last dorsal hump. About 5-6 interrupted shallow depressions were present on the chest, extending up to umbilicus. The skin was otherwise smooth all over the body and hairless.

The tail fluke (Fig. 3 e) had a median notch, each half being triangular in shape. A ridge, in continuation of the dorsal margin of the body ran on to the tail fluke upto about 23 cm in front of the tail notch.

The genital opening was situated midventrally, slightly in front of the middle of the body. The penis (Fig. 3 d) was found protruding outside almost completely. It was elongate, cylindrical, broad at the base and tapering towards tip with a well defined shallow aperture. The penis was flabby and turgid at the time of observation. The anal opening was situated a little behind the genital opening and it was slightly smaller than the latter.

fresh, the internal organs had decomposed very much. Due to this, the disposition and shape of the internal organs could not be made out.

The total weight of blubber that could be removed was about 1250 kg, which yielded about 150 litres (130 kg) of oil. The blubber was creamy white in colour and was of varying thickness at different parts of the body, as

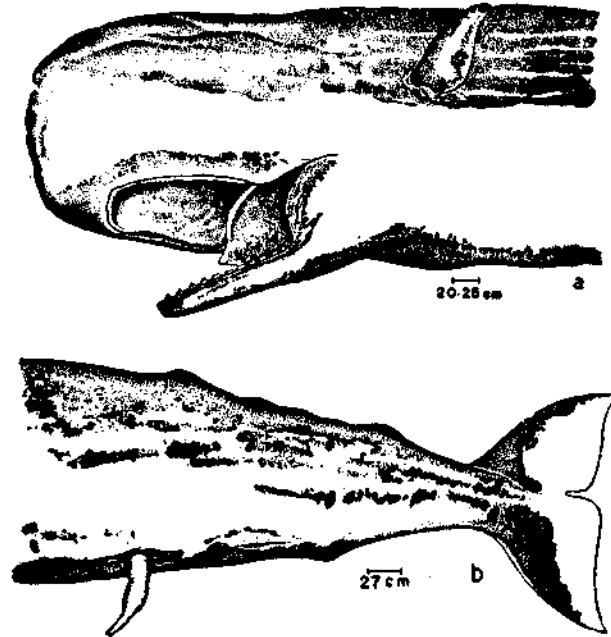


Fig. 2. *P. macrocephalus*: a. Anterior portion of the stranded sperm whale showing blow-hole, mouth, eye and flipper and b. Posterior portion showing dorsal humps, penis, anus and caudal fluke.

The colour of the body was black both dorsally and ventrally. Greyish white patches were present from about the angle of mouth to the tip of lower jaw and along the lower margin of upper jaw. The flippers, dorsal fin and caudal fluke were slack. The eyes were brown and the tongue was whitish grey.

The whale was cut on 3-5-80 for removing the blubber for extraction of oil and for removal of ambergris, if present, from the intestine. Eventhough externally the animal looked almost

follows (in cm): On top of the head 4.5; near blow-hole 3.0; below eye 10.5; below flipper 8.5; below dorsal fin 12.0; on chest 16.0; on belly 16.0; on the side of the body at midlength 12.0; on the side of the body beyond anus 20.0 and at caudal peduncle 5.0.

The square front head mostly contained flesh and when it was cut, an yellow viscous fluid (about 25 litres) which is called the sperm oil or spermececi, flowed out.

The alimentary canal had mostly disintegrated by the time the abdomen was cut open. The oral cavity was very small. The stomach was found to be a large sac and compartments could not be differentiated. It contained only the

upper and lower mandibles of squids (Fig. 6). Three types in both the upper and lower mandibles could be separated out. The three types differed in the shape of the rostrum and lateral wall.

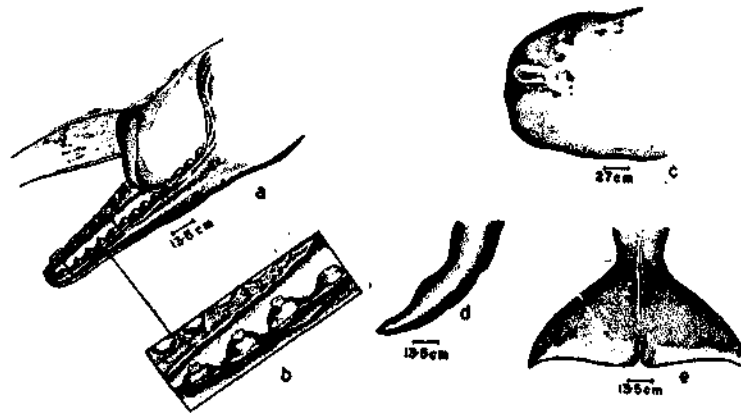


Fig. 3. *P. macrocephalus* : a. Mouth showing the exposed tongue; b. Teeth; c. Blow-hole; d. Penis and e. Tail fluke.

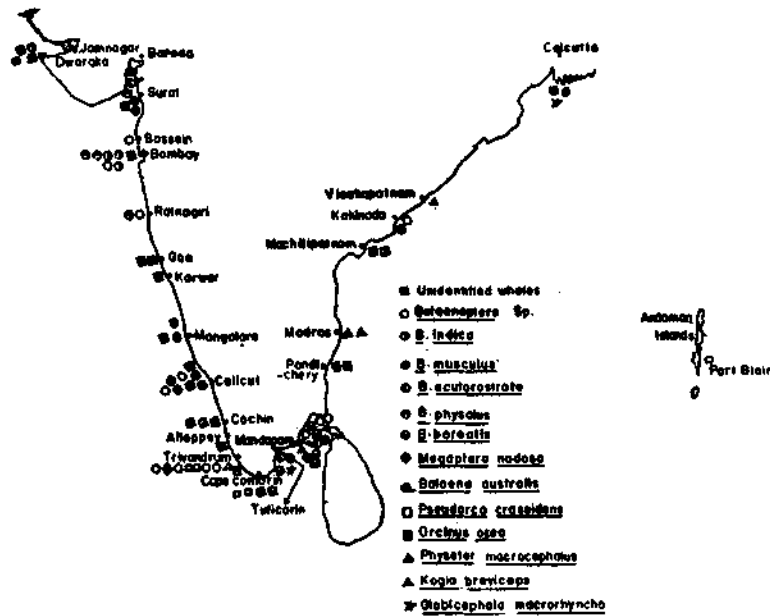


Fig. 4. The details of strandings of the different species of whales along the Indian Coast (For details, please refer Table 2).

brownish black horny beaks of cephalopods. A sample of these horny beaks was collected and examined. The sample contained both

In the upper mandibles, one type (type 1) had a long, narrow and curved rostrum some-

what resembling the trunk of an elephant and the lateral wall, was comparatively shorter than rostrum-hood length (Fig. 6). In the second

type (type 2) the rostrum was short and less curved resembling somewhat a parrot's beak and the lateral wall was about one and a half

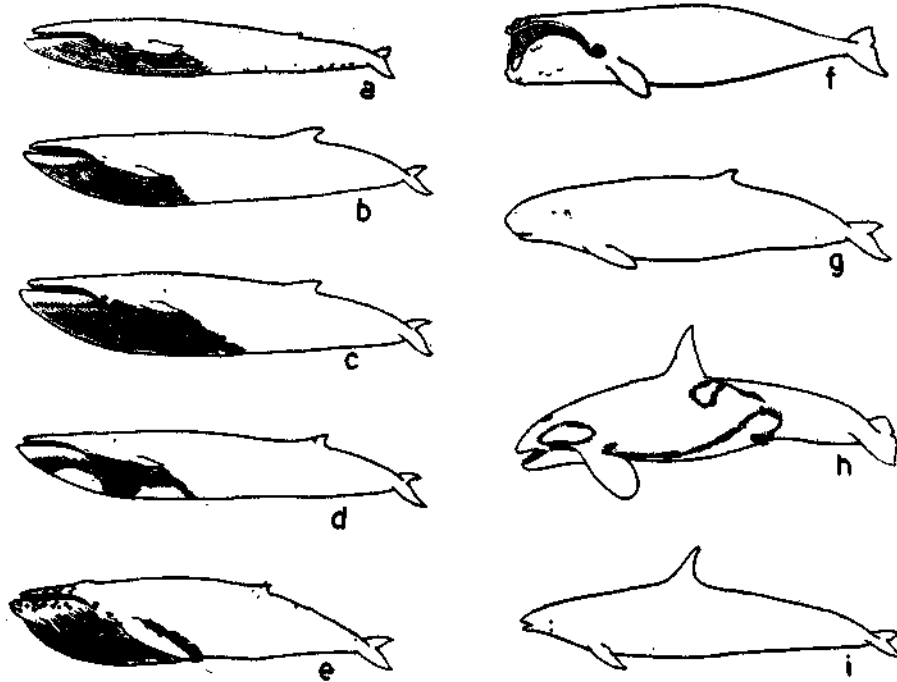


Fig. 5. Different species of whales stranded along the Indian Coast: a. Blue whale *Balaenoptera musculus*; b. Minke whale *B. acutorostrata*; c. Fin whale *B. physalus*; d. Sei whale *B. borealis*; e. Hump back whale *Megaptera nodosa*; f. Black right whale *Balaena glacialis*; g. Pygmy sperm whale *Kogia breviceps*; h. Killer whale *Orcinus orca* and i. False killer whale *Pseudorca crassidens*. (a, b, c, d, e, g and i after Pike, 1956 and h after Norman and Fraser, 1937) (Figures not to scale).

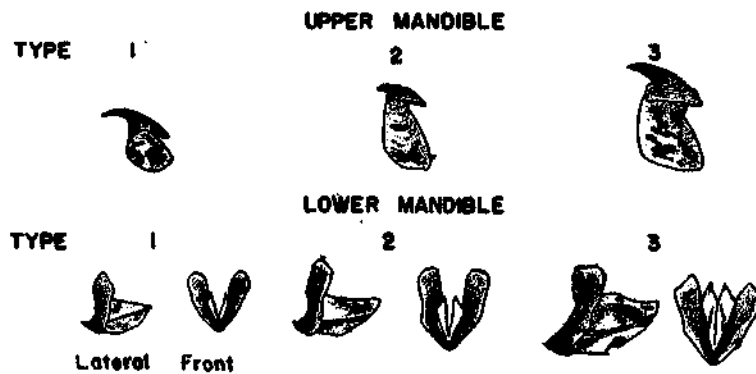


Fig. 6. Upper and lower mandibles of squids collected from gut contents of *P. macrocephalus* (Figures not to scale).

times of the rostrum-hood length (Fig. 6). In the third type (type 3) the rostrum was the medium size and moderately curved when compared to other types, somewhat resembling a crow's like a fold on the lateral wall. In one type (type 1) the ridge was very prominent and ran beak. The lateral wall was equal to or slightly lesser in height than the rostrum-hood length from the base to tip of lateral wall medially. The ridge was almost of the same thickness (Fig. 6). The third type was comparatively

tip was straight and not pointed upwards (Fig. 6). The first type was more abundant in the sample than the other two types. The intestine was very long, measuring about 100 metres. It contained greenish black paste-like substance (ambergris?) which emitted bad odour but tasted sweetish. About 2 kg of this substance could be removed. The examination of intestine revealed no parasites. The rectum was of larger diameter than the intestine and it measured about 2.5 metres in length.



Fig. 7. Mandibles of different species of cephalopods collected from inshore waters of Mandapam. Upper and lower mandibles: a and a' of cuttle fish *Sepia aculeata*; b and b' of cuttle fish *S. pharaonis*; c and c' of cuttle fish *Sepiella inermis*; d and d' of squid *Sepioteuthis arctipinnis*; e and e' of squid *Loligo duvaucili*; f and f' of squid *Symplectoteuthis oulaniensis* and g and g' of *Octopus* sp. (Figures not to scale).

more abundant in the sample than the other two types.

In the lower mandibles, all the three types had either a strong ridge or an elevation appearing throughout. The rostral tip was pointed upwards (Fig. 6). In the second type (type 2) the lateral wall had only a shallow line of depression medially from base to tip and there was an elevation appearing like a fold between the median line and lower margin of lateral wall. This fold widened posteriorly and ended laterally but not at the tip. In this type also the rostra tip was pointed upwards (Fig. 6). In the third type (type 3) also there was a weak elevation as found in the second type but the median depression was not conspicuous. The rostral

The actual weight of the whale could not be determined. However, from a formula given by Zenkovich (1937, in Berzin, 1972), namely,  $LD^2/3$  (L being total length and D, maximum height of the body), the weight of the whale was estimated to be 6.9 tonnes. (The total length of the whale was 8.1 m and maximum height was 1.6 m). Berzin (1972) has given a table for corresponding lengths and weights of sperm whales with body lengths from 11.6 m to 17.9 m. The length and weight values were plotted in a graph (Fig. 8). The graph depicted a parabolic curve and this could be further extra-polated to estimate the corresponding weights of sperm whales measuring from 6 m. From this graph the weight of the present male

sperm whale could be estimated to be about 6.7 tonnes.

DIAGNOSTIC FEATURES OF THE STRANDED WHALES ALONG THE INDIAN COAST

A scrutiny of the various reports on stranding of whales has shown that on many occasions,

the stranded whales had not been indentified fully. The main reason for this appears to be, the non-availability of a ready reference for this purpose. Therefore, it is felt that tabulation of the diagnostic features of different species of whales so far stranded from actual observations of various authors and published reports would faciliate easy identification in future instances of strandings. The diagnostic

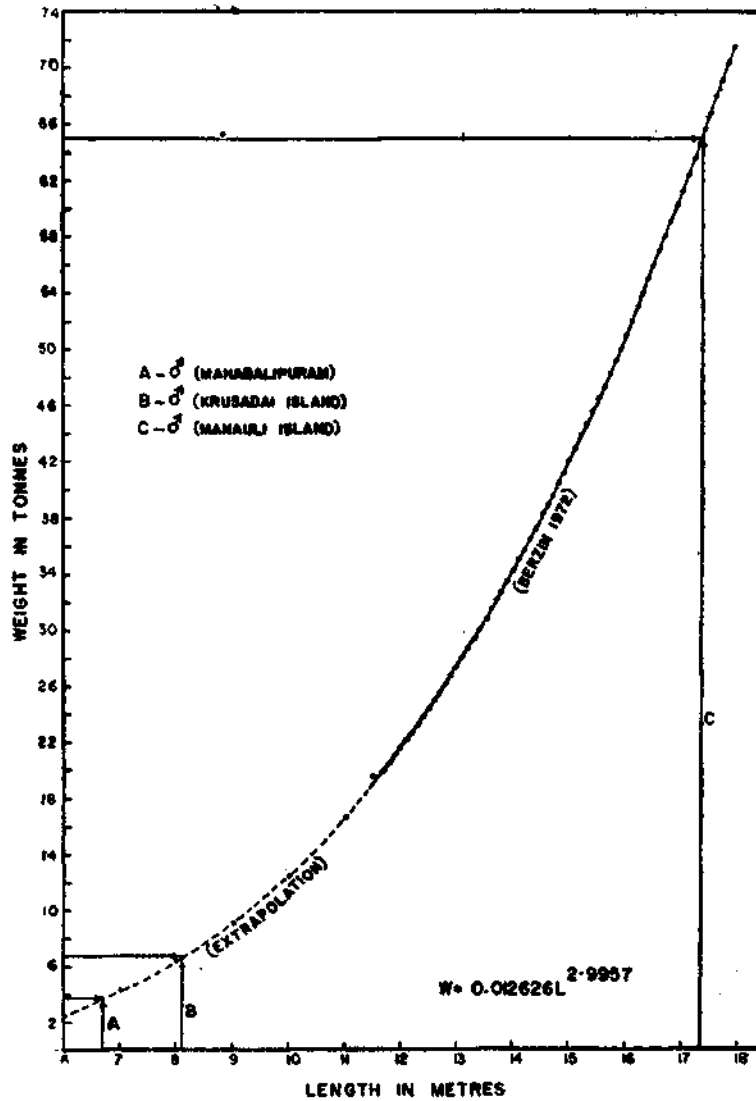


Fig. 8. Corresponding lengths and weights of sperm whale *P. macrocephalus*.

features given below are restricted to species of whales so far known to have been stranded along the Indian Coast.

ORDER: CETACEA

- A. SUB-ORDER: Mysticeti (whalebone whales)  
Baleen or whalebone in the mouth; No teeth in the adult, they may be present in the young, but are never functionally developed; lower jaw wide with jaw bones arching outwards; two blow-holes; and the skull perfectly symmetrical.

1. Family: *Balaenopteridae*

Head comparatively small; Whale bone relatively short; numerous parallel longitudinal grooves (pleats) on the throat; and a distinct dorsal fin.

- I. Stream lined body; comparatively small flippers and distinct dorsal fin ..... genus *Balaenoptera* (Rorquals)

- a) Flipper length 1/7 in for klength; 80 to 100 ventral grooves extending upto umbilicus; a small dorsal fin placed well behind towards tail; *baleen plates jet black including frayed edges*; the flippers slate blue white and whitish below; and flukes slate blue on both sides ..... *Balaenoptera musculus* (Blue whale or Sibbald's rorqual) (Fig. 5 a)
- b) Flipper length 1/8 in fork length; About 50 ventral grooves extending to half way between the flippers and the umbilicus; relatively small dorsal fin placed well forward comparatively; *baleen plates yellowish white including frayed edges*; the flippers blue grey with a prominent white patch above and white below; and flukes blue grey above and white below ..... *B. acutorostrata* (Minke whale or piked whale or lesser rorqual) (Fig. 5 b)
- c) Flipper length 1/9 in fork length; 60-90 ventral grooves extending up to umbilicus; fairly tall triangular dorsal fin with concave hind margin; *baleen plates on the right side white along the anterior third with the remaining portion dull blue grey and yellowish grey and the frayed edges*

*yellowish white*; and flippers and flukes grey above and white below ..... *B. physalus* (Fin whale or Finner whale or common rorqual) (Fig. 5 c).

- d) Flipper length 1/10-1/12 in fork length; 30-60 ventral grooves extending up to midway between the line of flippers and umbilicus; relatively larger dorsal fin placed comparatively well forward; *baleen plates black with frayed inner edges white*; and flippers and flukes dark grey both above and below ..... *B. borealis* (Sei whale or Rudalphi's rorqual) (Fig. 5 d)

- II. Thickest and bulky body; long and narrow flippers; a low hump instead of dorsal fin (Hump back whales) ..... genus *Megaptera*.

Baleen plates coarse and black; tubercles cover the snout, chin and lower jaw ..... *Megaptera nodosa* (Hump-back whale) (Fig. 5 e)

2. Family: *Balaenidae*

Head more than or nearly one fourth of the entire length of the animal; whale bone long and narrow with fine bristles; no throat grooves; no dorsal fin; well developed lower lips projecting upwards on either side and strongly arched narrowed upper jaws; flippers rounded; seven cervical vertebrae fused into a solid structure ..... genus *Balaena* (Right whales)

- a) Head is about one fourth of the body length; an irregular excrescence known as 'bonnet' on the front portion of upper jaw; body generally black and without a white patch on the anterior end of lower jaw ..... *Balaena glacialis* (*B. australis*) (Black right whale) (Fig. 5 f)

B. SUB-ORDER: Odontoceti (Toothed whales)

Teeth present in adults; sometimes burried in gums; baleen or whalebone absent; blow-hole single; and skull asymmetrical.

1. Family: *Physeteridae* (Sperm whales)

Crescent-shaped blow-hole on the left side of the head; upper jaw extends beyond lower jaw; numerous teeth, very prominent in underslung lower jaw.

- a) Massive square fronted rectangular head; a comparatively long narrow underslung lower jaw with 20-30 pairs of strong teeth,



- dorsal fin not well demarcated; and colour of the body dark bluish grey to black with greyish white patches on the lower jaw and margin of upper jaw ..... *Physeter macrocephalus* (Cachalot, Sperm or Spermecet whale) (Fig. 1)
- b) Short blunt conical snout giving the whale a superficial resemblance to shark; a small underslung lower jaw with 14-15 pairs of sharp, curved teeth terminating 4-6 inches behind the tip. Comparatively well defined dorsal fin; and colour of the body black above and greyish white below..... *Kogia breviceps* (Pygmy spermwhale) (Fig. 5 g)
2. Family: *Delphinidae*
- Whales of small to moderate size; numerous teeth present in both upper and lower jaws.
- a) Robust body; gently sloping snout which does not surpass the tip of lower jaw; paddle-like large flippers with rounded margins; more or less high triangular dorsal fin; black and white belly; and white patches one above eye and another behind base of dorsal on upper side of the body..... *Orcinus orca* (Killer whale) (Fig. 5 h)
- b) Body more slender; the flippers narrow and tapered and 1/8-1/10 in body length; the dorsal fin narrow, tapered and concave on its hind margin; body black overall; and 11 pairs of strong teeth in each jaw..... *Pseudorca crassidens* (False killer whale) (Fig. 5 i)
- c) A conspicuous bulbous head, the globular forehead slightly overhanging a short beak; the flippers long and tapering which are about 1/5 to 1/7 of the body length; the tip of dorsal fin bluntly rounded; and 7-8 pairs of teeth in each jaw ..... *Globicephala macrorhyncha* (Indian pilot whale)

TABLE 1. Measurements (in cm) of the Sperm whale *Physeter macrocephalus* stranded at Krusadai Island

Snout to tail notch	810	Width of genital opening	38
Snout to angle of mouth	195	Length of penis	83
Snout to eye (anterior margin)	200	Width of base of penis	20
Snout to blow-hole		Width at the tip of penis	2
(a) front margin	17.5	Width of anus	30
(b) centre	31	Tail notch to tip of fluke	121
(c) hind margin	44	Tail notch to anus	262
Snout to insertion of flipper	275	Tail notch to genital opening	332
Snout to origin of dorsal fin	500	Girth immediately behind the flipper	530
Snout to origin of last hump	660	Girth at the base of dorsal fin	380
Snout to origin of genital opening	440	Girth at genital opening	340
Snout to origin of anus	518	Girth at anus	270
Length of blow-hole	26.5	Girth at caudal peduncle	146
Length of flipper	84.5	Height of body behind flipper	153
Width of base of flipper	35	Height of body at the origin of dorsal fin and front end of genital opening	160
Maximum width of flipper	41	Height of body at the base of last hump	95
Width of base of dorsal fin	58	Dorsal fin origin to origin of last hump	210
Height of dorsal fin	19	Base of caudal peduncle to tail notch	74.5
Length of upper jaw	138	Interspace between end of genital opening and origin of anus	35
Length of lower jaw	126		
Tooth gum (a) length	4		
(b) width	3		
Inter space between exposed teeth	4		
Inter space between tooth humps	2.5		
Width of lower jaw (near origin)	17		
Diameter (horizontal) of eye	2.5		
Distance between angle of mouth and eye	10		

TABLE 2. Particulars of whales stranded along the Indian Coast (1748 to 1980)

Date	Place	Species	Length	Sex	Salient features (as reported)	Condition	Remarks and Reference
1748	Pondichery	—	30'	—	—	—	No details
1757	Pondichery	—	106'	—	—	—	Maximum size reported so far.
1848	Quilon	<i>Balaenotera</i> sp.	100'	—	—	—	—
1852	July	Salt Lakes near Calcutta	—	—	—	—	A shoal of many dozens stranded.
1858	Quilon	<i>Globiocephalus indicus</i> (Indian Pilot whale)*	—	—	—	—	—
1864	Masulipatam	<i>Balaenoptera</i> sp.	90'	—	—	—	—
1866	Vizagaptanam	—	—	—	—	—	No details.
1874	Mangalore	<i>Kogia breviceps</i>	—	—	—	—	—
1879	Dwarka	<i>Balaenoptera indica</i> Great Indian Fin whale*	48'	—	—	—	Bones in Madras museum.
1883	Feb.	Varala (Okhamandal)	50'	—	—	—	—
1884	Bombay	—	12'	—	—	—	—
1890	Jan.	Madras	—	—	—	—	No details except that it was killed by Enbrates.
1890	Dec.	Pamban	<i>Physeter macrocephalus</i>	24'	—	—	—
1891	Mangalore	—	—	—	—	—	No details except that it was killed by Abdur Rahman. Skeleton in Madras museum.
1901	Rajakamangalam (between Colachel and Cape Comorin)	—	60'	—	—	—	—
1901	Rajakamangalam	<i>Balaenoptera indica</i>	73'	—	—	Advanced state of decomposition	Bones with Bombay nat. Hist. Soc. Ref. Pillay, 1926.
14.2.1902	Trivandrum	<i>Pseudorca crassidens</i>	16' 10"	—	—	—	Ref. Silas and Kumara Pillai, 1960.
?	Trivandrum	<i>Pseudorca crassidens</i>	11' 10" and 10' 9 1/2"	—	1 male & 1 female	—	Ref. Pillay, 1926.
11-4-1906	Bassein	<i>Balaenoptera</i> sp.	63'	—	—	—	Ref. Millard, 1906.
1907	Rajakamangalam	<i>Pseudorca crassidens</i>	—	—	—	—	Skeleton in Trivandrum Museum. Ref. Pillay 1926.
?	Thengapatnam	<i>Pseudorca crassidens</i>	—	—	—	—	Ref. Pillay, 1926.
1911	Viviadrug near Ratnagiri	<i>Balaenoptera indica</i>	70'	—	—	—	Ref. Kinnear, 1914.
1912 August	Ratnagiri	<i>Balaenoptera</i> sp.	61'	—	—	—	Ref. Kinnear, 1917.

\* For common names of other species, please refer text.

TABLE 2 (Contd.)

Date	Place	Species	Length	Sex	Salient features (as reported)	Condition	Remarks and reference
11-12-1914	Dhabool, South of Bombay	<i>Balaenoptera indica</i>	41'	Male	Ventral grooves extended behind flippers; body slate grey, flippers dark and inside mouth dirty yellowish white.	Dead and decomposed	Ref. Prater, 1914.
1919	Tithor (Mahasagar, Baroda)	—	71'	—	—	—	No details
1923	Madai (Malabar)	<i>Balaenoptera</i> sp.	—	—	—	—	No details
January 1924	Pudiangadi (Calicut)	—	—	—	—	—	No details
1924	Gullamedu	—	—	—	—	—	No details
October 1924	light house, Divi, Kistna Dt. Karwar	—	48'	—	—	—	No details
December 1925	Trivandrum	<i>Kogia breviceps</i>	10'	Female (gravid)	—	—	Ref. Pillay, 1926.
February 1925	West Hill, Calicut	<i>Balaenoptera</i> sp.	38'	—	—	—	No details
July 1926	Baliapatam, Cannanore	—	48'	—	—	—	Skeleton at St. Aloysius College, Mangalore
1927	Chala, Tellicherry	—	22'	—	—	—	No details
1927 Nov.	Near Cherai, Cochin	—	94'	—	—	—	No details
1928 ?	Gogha (Kathiawar)	—	30'	—	—	—	No details
1931	Shika (Jamnagar)	—	73'	—	—	—	No details
1934	Parur, Travancore	—	—	—	—	—	No details
1934 Jan. - Feb.	Jambudwip, Bengal	<i>Balaenoptera musculus</i>	64'?	—	Baleen plates black	Dead and putrified	Ref. Jones, 1953.
Feb. 7-5-1934	Colaba, Bombay	<i>Balaenoptera indica</i>	52'	—	—	Highly decomposed	Ref. Mecann, 1934.
1935	Anjuna, Goa	<i>Balaenoptera</i> sp.	—	—	—	—	No details
1935	Vadanapalli (Malabar)	—	50'	—	—	—	No details
March 1973	Near Dhnushkodi	—	—	—	—	—	No details
1937	Pullam, Travancore	<i>Balaenoptera</i> sp.	45'	—	—	—	Skeleton in Trivandrum Museum
Feb. 1939	Between Suratkal and Mulki	—	80'	—	—	—	Skeleton in K. High School, Mangalore

TABLE 2 (Contd.)

Date	Place	Species	Length	Sex	Salient features (as reported)	Condition	Remarks and References
1939 March	Mulvel (Okhamandal)	<i>Balaenoptera indica</i>	79'	—	Ventral grooves on throat and belly; colour dark grey with tail, flippers and underside lighter.	—	Ref. Moses, 1940.
1939 March	Anjuna, Goa	—	50'	—	—	—	No details
1939 Oct.	Near Cape Comarin	—	50'	—	—	—	No details
1941 ?	Broach	—	—	—	—	—	No details
1942 Feb.	Anjengo near Quilon	—	—	—	—	—	No details
1942 Jan.	Vadgam near Sabarmathi	—	67'	—	—	—	Prakrith, 1942.
1943 March	Aramda (Okhamandal)	<i>Orca gladiator</i> ( <i>Orcinus orca</i> )	23' 8"	—	—	—	Ref. Moses, 1947.
23-1-1943	Kathuwar Anjengo near Quilon	<i>Megaptera nodosa</i>	49' 4"	—	—	Alive and got entangled in a seine	First record Ref. Mathew, 1947.
1944 Nov.	Gajanaara, Baroda	<i>Balaena australis</i>	71' 2"	—	—	—	Ref. Moses, 1947.
1945 Nov.	Moboro, Carmona, Goa	—	56'	—	—	—	No details
28-1-1947	Naduvattam, Calicut	<i>Balaenoptera</i> sp.	45'	—	42 ventral grooves	Dead and decomposed	Ref. Jacob and Devidas Menon, 1947.
1947 March	Chinnaganjam, Guntur Dt.	—	72'	—	—	—	No details
1947 May	Ernakulam	<i>Balaenoptera</i> sp.	20'	—	Bluish black above pale white below	Alive and returned to sea	Ref. Pillay, 1949.
1949 April	Thaikadapuram, Kerala	<i>Balaenoptera</i> sp.	—	—	—	—	Ref. Chacko and Mathew, 1954-55
14-5-1951	Umargam, Bombay	<i>Balaenoptera indica</i>	74'	—	—	Dead and putrified	Ref. Chari, 1951.
1951 September	Gangoli	<i>Balaenoptera</i> sp.	—	—	—	—	Ref. Chacko and Mathew, 1954-55.

TABLE 2 (Contd).

Date	Place	Species	Length	Sex	Salient features (as reported)	Condition	Remarks and references
10-2-1954	Badgara	<i>Balaenoptera</i> sp.	62'	—	Flipper length 10'	Dead and putrified	-do-
19-7-1959	Chollangi Bay (near Etumoga Village, Kakinada)	<i>Balaenoptera</i> sp.	261 1/2"	—	A pair of blow-holes, baleen plates with edges of light colour, and ventral grooves extend upto the front of umbilicus.	Caught alive and lived upto five hours	Eight tonnes. Ref. Rao, 1961.
27-11-1960	Pozhikara (Between Cape Comorin and Colachal)	<i>Pseudorca crassidens</i>	1. 2.79 m 2. 3.75 m	Male Female	Flipper 1/8 to 1/10 in body length	Caught alive, male lived for three days and female lived one day	Ref. Silas and Kumara Pillay, 1960.
27-11-1960	Ovari between Cape Comorin and Tiruchendur, Tamilnadu	—	—	—	—	—	-do-
-do-	Alleppey, Kerala	—	—	—	—	—	-do-
27-12-1960	Ganeshghan village, Bhavasagar Dt. Gujarat	<i>Balaenoptera musculus</i>	78'	Female	Flipper 8'	Dead	100 tonnes approx. Ref. Kewlaramani, 1969.
26-5-1961	Punnakayal, South of Tuticorin	<i>Balaenoptera acutorostrata</i>	30'	—	—	Hit on a fishing boat and escaped	Ref. Silas, 1964.
19-7-1962	Karangadu near Devipattinam (Palk Bay)	<i>Balaenoptera</i> sp.	70'	—	—	Dead and decomposed	Information from P. S. B. R. James, C. M. F. R. I.
1962 July	Palk Bay Coast from Karangadu up to north of Point Calimere	—	—	—	—	—	Six other whales washed ashore; P.S.B.R. James, C.M.F.R.I.

TABLE 2 (Contd.)

Date	Place	Species	Length	Sex	Salient features (as reported)	Condition	Remarks and reference
23-2-1963	Gavier Village, near Surat, Gujarat	<i>Balaenoptera musculus</i>	20.28 m	—	Flipper 1/7 of the body length	Dead and decomposed	Ref. Dannel, 1963,
21-4-1964	Muloor Village, South Kanara	<i>Balaenoptera musculus</i>	15.76 m	—	The ratio of flipper length to body length 1:8:7; baleen plates black	Dead and in advanced state of decomposition	Ref. Nagabhushanam and Dhulkhed, 1964,
4-8-1965	Arnala (Bombay)	<i>Balaenoptera physalus</i>	14.1 m	—	68 ventral grooves extending upto umbilical region; the flipper length 1/9 of the body length.	—	Ref. Grubh and Pereira, 1965.
9-10-1965	Off Nepean Sea Road, Bombay Coast.	<i>Balaenoptera ahyalus</i>	15.10 m	—	Flipper length 1/9 of the body length; total number of ventral grooves 70 extending upto anal region; colour of body and flippers grey above and white below.	Dead and decomposed	Ref. Kharbari <i>et al.</i> , 1968.
5-2-1966	Mandapam (Palk Bay)	<i>Balaenoptera musculus</i>	13.65 m	—	Ratio of flipper length to body length 1:7.5; 70 ventral grooves extending upto umbilicus; colour dark grey above and lighter below.	Dead and putrified	Information from P.S.B.R. James, C.M.F.R.I.
7-2-1966	Muthukuda village, Mimisal, Tamilnadu	<i>Balaenoptera</i> sp.	45'	—	Flipper 1.5 m.	—	Report in Dailies; visited by P.S.B.R. James, C.M.F.R.I. Few bones and flippers found.
25-5-1966	Kannan Parambu, Calicut.	<i>Balaenoptera musculus</i>	13.51 m	—	Ratio of flipper length to total length 1:8.6	Dead and putrified	Ref. Venkataraman and Girijavallaban 1966.

TABLE 2 (Contd.)

Date	Place	Species	Length	Sex	Salient features (as reported)	Condition	Remarks and References
2-4-1969	Tuticorin (Gulf of Mannar)	<i>Balaenoptera musculus</i>	11.26 m	Female (juvenile)	61 furrows ventrally reaching up to naval; flipper 1/8 in total length; colour blackish blue dorsally and flesh coloured ventrally; baleen plates black posteriorly but yellowish anteriorly.	Alive, shot at and killed before bringing to shore	Five tonnes. Ref. Bensam <i>et al.</i> , 1972.
13-8-1971	Off Magdalla near Surat	<i>Balaenoptera physalus</i>	14.05 m	—	68 ventral grooves; flipper 1/89 in total length; body flipper and fluke grey above and white below; baleen plates for about one third of distance from tip of snout were white and remainder were dull blue grey streaked with pale ash grey and yellowish grey; fringes yellowish white.	Dead	wt. 18.5 tonnes Ref. kharbari, 1973.
1971 Dec.	Pullamadam near Mandapam (Palk Bay)	<i>Balaenoptera borealis</i>	15.53 m	—	58 ventral grooves; the ratio of flipper to fork length 1:11.4; body bluish black above and creamy below; flipper completely dark.	Dead and extensive injuries on the ventral side between anus and umbilicus	Ref. Venkataraman <i>et al.</i> , 1973.
23-6-1972	Karwar	<i>Physeter catodon</i>	8.37 m	Female	16 erupted and 10 unerupted teeth on either side of lower jaw; in upper jaw 7 rudimentary teeth.	Dead; bleeding profusely from a wound at the base of lower jaw; a small chunk of flesh cut out on the back immediately behind dorsal fin.	wt. 13.14 tonnes Ref. Antony Raja and Vasudev Pai, 1973.

TABLE 2 (Contd.)

Date	Place	Species	Length	Sex	Salient features (as reported)	Condition	Remarks and References
14-1-1973	Between Kulasekarpattinam and Manapad near Tuticorin (Gulf of Mannar)	<i>Globiocephala macrorhyncha</i>	220-575 cm	—	Flipper 1/7 of the total length; head greatly swollen in front and fore head bulged out; teeth 7-8 in both jaws and confined to anterior half of the jaw; colour uniform black lighter on the ventral side.	147 stranded and lived for a few days	Ref. Alagarwami <i>et al.</i> , 1973.
28-7-1976	Port Blair	<i>Pseudorca crassidens</i>	—	—	—	—	Unpublished-personal communication; D. B. James, C.M.F.R.I.
4-10-1977	Pamban (Palk Bay)	<i>Balaenoptera musculus</i>	10-12 m	Female	Body bluish black dorsally and creamy white ventrally; flipper bluish on both sides and baleen plates black with whitish edges.	Entangled in gill net alive and died on reaching the shore	Information from R. Soundararajan and M. Badrudeen, C.M.F.R.I.
10-10-1979	Chinna monai Village (near Mallipattanam)	<i>Balaenoptera</i> sp.	—	—	About 50 ventral grooves	Dead and putrified; only few bones and blubber of throat portion remained.	Information from G. Mohanraj, C.M.F.R.I.
1979	Manauli Island (Gulf of Mannar)	<i>Physeter macrocephalus</i>	80'	Male	22 teeth sockets on each side of lower jaw; lower jaw bone length (one side) 3.7 m.	Dead	wt. 65 tonnes (approx.) Reported that some quantity of ambergris was recovered from intestine. Skull and other bones examined. P.S.B.R. James and R. Soundararajan, C.M.F.R.I.



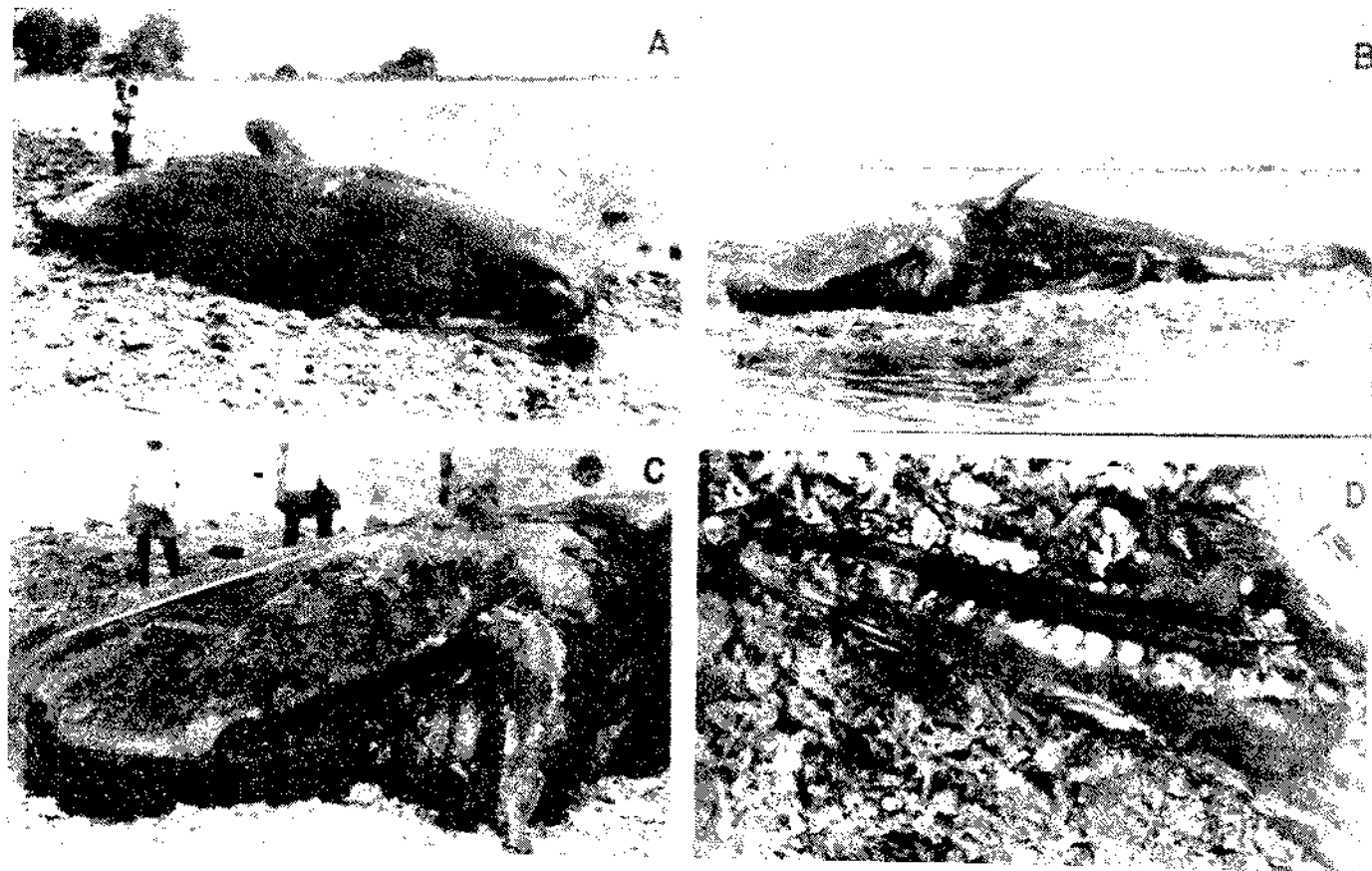


PLATE I. The Sperm whale *Physeter macrocephalus* Linnaeus : A. Dorso-lateral view showing the asymmetrically located blow hole, the flipper and wrinkles on the skin behind the flipper, B. Ventro-lateral view showing the extruded penis, C. Antero-lateral view of the head showing the under-slung lower jaw and the massive triangular tongue and D. Lateral view of lower jaw showing the teeth on either side, few of them cutting through the gums.

TABLE 2 (Contd.)

12-4-1980	Mahabali- puram (Madras)	<i>Physeter macrocephalus</i>	6.7 m	Male	—	—	wt. 3.8 tonnes (approx.) Unpublished- personal communi- cation; D. B. James and Manivasagam, C.M.F.R.I.
30-4-1980	Krusadai Island (Gulf of Mannar)	<i>Physeter macrocephalus</i>	8.1 m	Male	Massive square head with underslung narrow lower jaw; 21 to 22 teeth on each side of lower jaw, no teeth in upper jaw; crescentic blow-hole on the left side of head; dorsal fin not well demarcated 6 small humps behind dorsal fin and colour black both dorsally and ventrally with greyish white patches on the lower jaw and along the margins of upper jaw.	Dead and internally decom- posed	wt. 6.9 tonnes (approx.) Squid mandibles found in stomach. About 2 kg. of ambergreis? from intestine and about 150 litres of oil from blubber recovered by State Government.

TABLE 3. Data to be collected on whales captured/stranded

Date:	Locality:	Number of whales	Other measurements
Sex :	Total weight:	Caught or stranded:	Length of blow-hole:
	Baleen whale	Toothed whale	Diameter of eye:
A. Baleen plates		A. Teeth	Length of upper jaw:
a) Size:		a) size:	Length of lower jaw:
b) colour:		b) Number and arrangement	Length of base of dorsal fin:
		Right Left	Height of dorsal fin:
		Upper jaw:	Length of flipper:
		Lower jaw:	Width of flipper:
B. Ventral grooves:		B. Position of blow-hole:	Girth of body
Number:			a) at insertion of flipper:
Termination point:			b) at genital opening:
			c) at origin of caudal flukes:
			d) Maximum (indicate position):
Measurements in cm in a straight line, parallel to long axis			Other details
Snout to tail notch:			Shape of head:
Snout to blow-hole:			Shape of blow hole:
Snout to gape:			Shape of dorsal fin:
Snout to eye:			Shape of flipper:
Snout to insertion of flipper:			Shape of caudal fluke:
Snout to umbilicus:			Any other special features:
Snout to genital opening:			Colour:
Snout to anus:			Condition:
Snout to origin of dorsal fin:			Species identified as:
Tail notch to tip of fluke:			Remarks:
			Parasites:
			Other products:
			Gut contents:

## REMARKS

Moses (1947) listed the stranding of whales from the year 1748 to 1947 and subsequently many other instances have been reported by different authors. All these records have been summarised in the present report (Table 2 and Fig. 4). This list may not be exhaustive and complete since some strandings would have occurred but not published. However, attempts were made to scan through all available literature and include as many details as possible of other instances various authors referred to in their papers. From the available records, it is evident that most of the strandings along the Indian Coast are of baleen whales (Rorquals) whereas those of toothed whales were very few. From Fig. 4, it is evident that the strandings of whales are somewhat concentrated in the Palk Bay and Gulf of Mannar regions, off Trivandrum, Calicut, Bombay and Surat. The stranding of the larger sperm whale *P. macrocephalus* along the Indian Coast has been recorded only twice, once in the year 1890 at Madras (Moses, 1947) and later in 1972 at Karwar (Antony Raja and Vasudev Pai, 1973). Weber (1923) considered *P. macrocephalus* as a synonym to *P. catodon*. However, according to Berzin (1972), *P. catodon* is a synonym of *P. macrocephalus*. He pointed out after tracing the history of description of the sperm whale that '*macrocephalus* is the true name because it has never been used for any other animal but the sperm whale; this can not be said of *catodon*; according to Linnaeus, the identity of this species is extremely vaguely determined'. Further, Berzin (1972) recognises two sub-species of sperm whale; the northern *Physeter macrocephalus macrocephalus* Linnaeus (1785) and the southern *Physeter macrocephalus australis* Wall (1785). The two sub-species are separated with distinct differences in the dimensions of caudal part of the body. The stranding of the pygmy sperm whale *Kogia breviceps* was recorded in 1866 at Waltair and in 1925 at Trivandrum. After these, till recently there

was no report of any stranding of the sperm whales.

Apart from the present report of stranding of the sperm whale *P. macrocephalus* at Krusadai Island, there had been two more instances of strandings of the same species recently. One instance was in 1979, probably in the month of July, at Manauli Island (Gulf of Mannar). It was reported to be a huge whale measuring around 80 feet. The present authors had opportunity to examine only the skull and some other bones of this whale only in May, 1980, for information on its stranding was not immediately available. The condylobasal length of the skull was 4.45 m and lower jaw measured 3.70 metres in a straight line. There were no traces of teeth or teeth sockets in the upper jaw but the lower jaw had 22 sockets (teeth were removed) on each side. Eventhough the whale was reported to be 80' it could have been well below 60' only as the maximum size of the sperm whale (male) has been reported not to exceed this length. A male measured by Omura *et al.* (Berzin, 1972) had length of 14 metres and the condylobasal length of the skull was 3.59 m. From this, the size of the whale having 4.45 m condylobasal length could be estimated as 17.35 m (57'). The weight of this whale is estimated to be about 65 tonnes using the table given by Berzin (1972) and the length-weight graph (Fig. 8). From the size of the whale and the jaws, it could be inferred that it would have been a male since only males are known to attain such long sizes. The second recent instance of stranding of a sperm whale (6.7 metres, male) was on 12-4-1980 at Mahabalipuram, Madras Coast (D.B. James, personal communication). The weight of this specimen was found to be 3.8 tonnes from Fig. 8. Rorquals and Sperm whale are known to be frequently stranded along the Sri Lanka Coast (Deraniyagala, 1948).

Various explanations have been put forth for Sperm whale stranding (some times en

mass). Gilmore (1959) assumes that three factors may be responsible for strandings (i) a close social cohesion and organization under leaders, (ii) a sensitive nervous system which permits panic in a violent "blind" response to sudden strange stimuli and (iii) non-adaptation in shallow water. Stranding is assumed to result mainly from the first and third factor.

Fraser (Berzin, 1972) attributes the phenomenon to the shifting of food items driven to the shore under strong winds and the pursuing whales also entering the danger zone of shallow regions. Van Heel (1962) experimentally confirmed that almost all the strandings of whales occur in coasts with a very gentle slope or on muddy shores, in which cases the direction finding echo either comes from all sides or is absent, giving some times false indication of open water in the direction of shore. He points out that wind and waves may also contribute to disorientation as turbulent water interferes with obtaining a clear echo. A whale relying on its echo-location apparatus might continue shoreward and get stranded.

The steeper the coastal slope the closer to the shore the Sperm whale comes and in spite of possessing perfect orientation in water, like other toothed whales gets stranded periodically on the shore in single or in groups. Since the Sperm whaling is not carried out in all regions of the habitat, but the whales might strand anywhere at any time, such cases enable to define accurately the boundaries of distribution in general and in different seasons and also to assess the age and sex dependent features of distribution, etc. (Berzin, 1972).

The sperm whale is a migratory species with females and young males distributed in the tropical and subtropical waters of each hemisphere between the approximate limits of 40° N and 40° S. Adult males are known to move into higher latitudes in summer (FAO, 1978). The sperm whales occur in Indian Ocean thro-

ughout the year but the abundance and distribution vary according to seasons, and hydrological conditions. In the Arabian Sea and Bay of Bengal 0.56 and 0.37 specimen are encountered per 1000 miles respectively. It is of interest to note that one Sperm whale tagged southwest of Bay of Bengal was recovered in the same region two and a half years later (Berzin, 1972). The species is polygamous and one bull commands a harem of 20-30 females. Males grow much larger in size than the females and 'the females never attain a length greatly in excess of a half that of the full grown male' (Norman and Fraser, 1937). The size of the Sperm whale at birth is about 13 feet (Budker, 1958). It attains a length of 8 m at the age of 3 years and after this the growth rates of two sexes begin to differ noticeably (Berzin, 1972). The present Sperm whale measured 8.1 m. The male matures at an average size of 9.5 m (Berzin, 1972) and presumably the present male sperm whale is adolescent, yet to attain maturity. The penis had been found protruding out and a photograph of a stranded male Sperm whale published by Hardy (1959) also shows a similar condition. The penis of the Sperm whale, like other whales, lies in a deep fold and protrudes only on erection or shortly after death (Berzin, 1972).

The Sperm whales are known to feed almost exclusively on cephalopods (Norman and Fraser, 1937; Sanderson, 1955). A Sperm whale 13.14 m long can consume at least 2-3 tonnes of squids in the course of a day (Berzin, 1972). Generally, most parts of these cephalopods are digested except for the honey beaks (mandibles) and these usually remain in the alimentary canal undigested. The mandibles of the cephalopods are useful in the identification of cephalopods to some extent. The mandibles found in the stomach of the present Sperm whale were compared with those of locally available species of cuttle fishes, squids and octopus. In the inshore waters of Palk Bay and Gulf of Mannar in the vicinity of

Mandapam, the following cuttle fishes, namely *Sepia aculeata*, *S. pharaonis* and *Sepiella inermis* and squids, namely, *Sepioteuthis arctipinnis* and *Loligo duvaucili* are most common. The mandibles removed from these species were examined. All the mandibles differed greatly in shape from those found in the whale stomach. In all the mandibles of inshore species the ridge on the lateral wall was absent (Fig. 7) whereas in the mandibles collected from the stomach of the Sperm whale, the ridge was present. Hence it is evident that the Sperm whale did not feed, on the inshore species of cephalopods. It is also possible that the whale was dead before it drifted into coastal waters. The lower mandible examined from a species, namely, *Symplectoteuthis oualaniensis* which is an oceanic squid, had a weak 'fold' on the lateral wall (Fig. 7), but this is also differed greatly in shape from those mandibles found in the stomach of the Sperm whale. The mandibles did not belong to *Octopus* also since the lower mandibles of *Octopus* spp. do not have a jaw angle and ridge on the lateral wall whereas the three types of mandibles from the stomach of the Sperm whale had jaw angles and either ridge or fold on the lateral wall. So it is concluded that the three types of mandibles belong to the oceanic species of squids only.

Approximately 40 species of cephalopoda (only 30 have been determined to genus or species) have been recorded from stomachs of Sperm whales in all regions of the world ocean. The Sperm whales feed only in deep waters and hence the surface dwelling cephalopods are virtually absent in their stomachs. The cephalopods are represented mainly by deep sea species of squids of various sizes from small, 5-10 cm long to very large 10-12 m or longer. The following species of oceanic squids have been recorded from the stomachs of the Sperm whale (*P. macrocephalus*) namely, *Lepidoteuthis grimaldii*, *Cuciotheuthis unguiculatus*, *Octopodoteuthis longiptera*, *Onychoteuthis banksii*, *Moroteuthis robusta*, *M. ingens*, *Tetronycho-*

*teuthis dussumieri*, *Gonatus magister*, *G. fabricii*, *G. antarcticus*, *Gonatopsis borealis*, *Architeuthis* spp., *Meleagroteuthis separata*, *Histioteuthis bonellii*, *Stigmatoteuthis dolfeini*, *Dosidicus gigas*, *Illex illecebrosus*, *Stethenoteuthis bartrami*, *Mastigoteuthis* sp., *Chiroteuthis veranyi*, *Crystalloteuthis behringiana*, *Galiteuthis armata*, *Taenius pavo*, *Oregoniateuthis lovigera*, *Ancistrocheirus lesueuri*, *Taningia danae*, *Todarodes sagittatus* (Clark, 1966; Berzin, 1972). Only the following species of above list, namely, *T. pavo*, *H. bonellii*, *T. danae*, *Architeuthis* spp., *D. gigas*, *T. sagittatus*, *O. banksii*, *M. robusta*, *T. dussumieri*, *M. separata*, and *S. bartrami* have been recorded from Indian Ocean (Silas, 1968; Berzin, 1972). However, more than 30 species of oceanic squids have been recorded in Indian Ocean and the three types of mandibles collected from gut contents of the present specimen could be attributed to belong to any of them. Based on the present material, precise identification was not possible except that these mandibles belong to oceanic species of squids only. There are very few data on feeding of Sperm whale in the Indian Ocean. The stomachs of Sperm whales are known to contain fishes, crustaceans and many other organisms also (Clark, 1966; Berzin, 1972) but in the present whale only cephalopod mandibles were found.

The Sperm whales are much valued for the ambergris, a substance produced in their intestine and retained mainly in the colon and rectum. (Berzin, 1972). It has the property to absorb, intensify and stabilise for years the volatile and delicate fragrances. It is very difficult to identify the ambergris with any certainty. It is a waxy or paste-like substance, colour ranging from grey to blackish, smelling offensively when fresh from animal's body but soon getting pleasant earthy odour and is lighter than water (Norman and Fraser, 1937). The ambergris is found in one or even 3-4 Sperm whales out of hundred (Berzin, 1972). It was generally supposed that the irritation, on the intestinal wall, caused by undigested

horny beaks of squids, on which the Sperm whale feeds exclusively, was responsible for the formation of ambergris. Sometimes these beaks had been found embedded in the ambergris (Norman and Fraser, 1937; Budker, 1958; Hardy, 1959). A special bacterium, namely, *Spirillum physeteri* which lives in the stomach of Sperm whale produces the ambergris (Sanderson, 1955). In the present Sperm whale, the horny beaks were found only in stomach and not in the intestine where a small quantity of ambergris (?) was found. As a rule, ambergris occurs in small pieces and usually only one piece in an animal. Some times several pieces and larger ones also have been found. A piece of ambergris weighing 491 kg which belonged to a Dutch company was the largest ever found in the world (Berzin, 1972). The quality of commercial ambergris is determined mainly by colour and odour. While golden and white ambergris have highest value, black ambergris is least valued. Light and dark grey ambergris is widely used in cosmetic industry, especially in manufacturing fine perfumes.

Another important valuable material from Sperm whale is the spermaceti which is a light kind of wax. It is found in large quantity in the sponge-like spermaceti organ occupying more than half of the head. The spermaceti is just fluid in the living animal but takes the appearance of oily material when cooled. This substance is used in making candles and also for various other industrial uses. It is still the best oil for fine scientific, military and other instruments (Sanderson, 1955). Solid spermaceti is used as carriers in manufacturing many medical and cosmetic products and for production of lithographic ink. It is very good for treatment of burns (Berzin, 1972).

Though the oil from the blubber of Sperm whale is unsuitable for human consumption and is considered to be inferior to that of Baleen whales, still it is commercially used as technical

oils. The teeth and other bones of whales have been used for handicrafts and especially by seamen to make carvings called 'scrimshaw' work (Daugherty, 1965). The meat is inedible because it contains adipocere, but it is rich in proteins and so it is used as feed meal. The liver is very rich in vitamin A and also contains B vitamins. The tendons of the head are used for manufacturing glue. The stock after fat extractions is used for preparation of gelatin.

Available information on the whales occurring in Indian waters is very meagre. Whatever information is available it is only from stranded whales. In most instances, the strandings have been reported unduly late, rendering the collection of information on the identity and various other aspects difficult. Even the stranded whales have not been properly utilised to gather detailed information on them. If only precise information had been collected on many of the stranded whales it would have greatly helped to understand the various aspects of distribution and migratory nature of many species of whales in the seas around India. In many earlier reports except for a few, only fragmentary information is available and therefore even the identity of species seems to be doubtful. Therefore, it is emphasised here that it is necessary to record all the whale strandings occurring along the Indian Coast with basic data on size, sex, weight and as many salient features as possible. To facilitate this, a standard proforma (Table 3) has been developed for recording future observations on stranded whales along the Indian Coast.

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