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First confirmed record of striped dolphin, *Stenella coeruleoalba* (Meyen, 1883) from India

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Abstract

Striped dolphin, *Stenella coeruleoalba* is reported for the first time from Indian waters. Factors affecting distribution are discussed. Body measurements and weights of heart, liver, lungs and kidneys are presented and compared with the striped dolphins inhabiting Pacific coast of Japan. Heart was smaller in the present specimen. Liver and lungs were higher than the mean values and kidneys were comparable to the Pacific animals. Organ weights were compared to spinner dolphin *Stenella longirostris* from the same area.

Marine mammals are represented by 25 species of cetaceans (including this record) and a species of Sirenia from Indian seas. So far 14 species of delphinids are recorded from India. This is the first report of a striped dolphin, *Stenella coeruleoalba,* from Parangipettai (11°28'N, 79°46'E) southeast coast of India. A single male specimen was accidentally taken during off shore gill net operation for sharks. The animal was identified as *S. coeruleoalba.* Seven species of cetaceans *viz., S. longirostris, Tursiops truncatus* (Natarajan and Rajaguru, 1985), *Tursiops truncatus aduncus, Sousa chinensis, Ziphius cavirostris,* (Kumaran, 1989), *Grampus griseus* (Kumaran unpublished records) and *Neophocaena phocaenoides* (Kumaran and Subramanian, 1993) were recorded. As there is no meat value for these animals in the study area and nearby places, there is no commercial interest. All the specimens recorded at Parangipettai are due to accidental entrapment during offshore gill net operation for sharks.

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Material and methods

On 25th May 1989, a male *S. coeruleoalba* (Fig. 1) was collected during the gill net operation off Parangipettai. The animal was in fresh condition without any visible injury. The specimen was weighed,

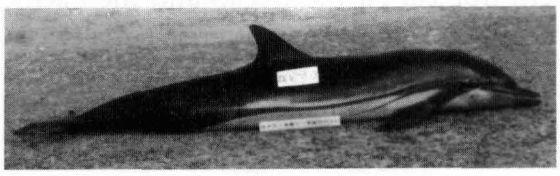

Fig. 1. *Stenella coeruleoalba*

Table 1. *External measurements (in cm - point to point) and organ weights (in g) of* S. coeruleoalba

Details	Measurements	%
Date	05/25/1989	
Sex	M	
Total Body mass (in kg)	58	100
Total length (snout tip to caudal fluke)	205	100
Length - snout to caudal peduncle	189	92.2
-snout to origin of dorsal fin	94	45.9
-tip of the upper jaw to centre of anus	127	62
- tip of the upper jaw to centre of genital	122	59.5
Base of the dorsal fin	21	10.2
Base of the right flipper	10	4.9
Base of the left flipper	11	5.4
Maximum length of caudal fluke	41.5	
Maximum width of caudal fluke	12.5	
Thickness of blubber	0.8	
Weight of heart	300	0.54
of lungs	1585	2.73
of liver	1310	2.3
of kidneys	340	0.59
Length of intestines	2200	
No. of teeth in mandible	37	
No. of teeth in maxilla	40	

measured (Table 1) and necropsy performed. Kumaran (1989) misidentified the present specimen as *Stenella longirostris*. Observations were compared to the published reports on striped dolphins from the eastern tropical Pacific Ocean and the Pacific coast of Japan. The differences between the two species of the genus *Stenella* from the same geographic region during 1989 are studied for variations.

Results and discussion

Species identification: *S. coeruleoalba* is distinguishable from other delphinids by its unique colour pattern (Fig. 1), composed of a light coloured spinal blaze, an eye-to-anus stripe subtending accessory stripe, and a flipper stripe (terminology of Perrin, 1972). The flipper stripe usually starts below the level of the eye as a thin band which quickly widens as it approaches the insertion of the flipper (Archer and Perrin, 1999). Earlier keys for species identification are restricted to the recorded list of marine mammals from Indian seas and have not considered the probable animals from the area. Further, most of the animals turn black with time after death and it is not possible for the observer to make detailed notes on the colour patterns.

Confirmation of the species identification was possible because of the availability of detailed measurements for many dolphins collected during 1989 from Parangipettai. Moreover, body measurements and organ weights from large number of spinner dolphin, another species *S. longirostris*, belonging to the same genus from Parangipettai have aided in confirming the present identification. Detailed measurements and organ weights of 18 spinner dolphins (total length 110 to 179 cm; 15 M and 3F) collected from the same area during 1989 were compared to understand the growth rate between the two species of *Stenella*. Even though most of the measurements between the two species showed slight variations they were

comparable. Among the different body measurements compared between the two species of *Stenella*, snout length and dorsal fin base had pronounced variations. Present specimen was compared to the largest collected specimen of spinner dolphin from the study area (179 cm male, weighed 44 kg) during the year 1989. The length of the snout in striped dolphin was only 4.9% of the total length compared to 8.7% (8.3 - 10.8%, n = 15) in the largest specimen of spinner dolphin. Like wise the dorsal fin base was 10.2% in striped and 13.4% (8.7-15.4%, n=15) in spinner dolphins.

Distribution: Sightings of striped dolphins have been reported in Indian Ocean (Leatherwood *et al.*, 1984) and accidental entrapment during fishing from neighboring Sri Lankan waters (Alling, 1988). Even though, Indian seas have been included in the probable distributional range of the striped dolphins (Leatherwood *et al.*, 1984., Jefferson *et al.*, 1993., Archer and Perrin, 1999), many reasons could be attributed for the lack of confirmed report. However, three main reasons are dealt at length in the following discussion: (i) the geographical distribution and habitat preference of this species; (ii) the area of active fishing operation; and (iii) lack of proper keys to identify the cetaceans inhabiting Indian seas.

Striped dolphins enjoy wide range of distribution from tropical to temperate waters than their closest relatives. These dolphins are generally restricted to oceanic regions, and are seen close to shore only when deep water approaches the coast (Jefferson *et al.*, 1993). In oceanographic terms, spotted (*S. attenuata*) and spinner dolphins (*S. longirostris*) tend to occur in tropical surface waters, where extensive stable thermocline ridging and relatively small annual variation in surface temperature are typical, where as striped dolphins and common dolphins (*Delphinus delphis*) inhabit areas with seasonal changes in surface temperature and thermocline depth with seasonal upwelling (Perrin *et al.*, 1994).

In an earlier study, in the eastern tropical Pacific by Au and Perryman (1985), the distribution tendency of striped and common dolphins were observed to be complementary to that of more strictly tropical spinner and pantropical spotted dolphins. Although there is a great overlap, the striped and common dolphins tend to be more frequent in areas where spinner and spotted dolphins are less frequent. Similarly, during the sighting survey in the northern Indian Ocean Cetacean Sanctuary, the number of striped and common dolphins were observed to be less frequent, whereas spotted and spinner dolphins were predominant (Leatherwood *et al.*, 1984).

Among the accidentally entrapped dolphins reported from the Indian waters, the percentage composition of the spinner dolphins was the highest. Spinner dolphins recorded 53% and 42% from two different stations in the southwest coast of India (Mohan, 1988, Jayaprakash *et al.*, 1995) and 33% from the southeast coast of India (Kumaran, 1989 and unpublished records).

Similarly the occurrence of spinner dolphins was higher in nearby Sri Lanka. Alling (1986) observed 40% of dolphins brought for sale are spinners in Sri Lankan fish markets. Ilangakoom (1989, 1997) reported that 45% and 51% accidental catch of dolphins from northeast and southwest Sri Lanka are constituted by spinners. This illustrates the suitability of habitat for spinner dolphins, in general, than for striped dolphins in the vicinity of the study area.

In India, common dolphins were reported from the southwest and southeast coast (Krishnapillai and Kasinathan, 1987) and from Andaman waters (Sivaprakasam, 1980). In the southwest coast *viz.*, Calicut (Mohan, 1988) and Cochin (Jayaprakash *et al.*, 1995) reported 19% and 22% of common dolphins respectively. Thus the presence of common dolphins in fewer numbers supports the probable distribution of striped dolphins in Indian waters. Apart from this, both striped (8%, 14%) and common dolphins (0.05%) are reported from neighbouring Sri Lanka (Ilangakoon, 1989, 1997).

Paulpandian *et al.* (1989) reported the presence of few submarine canyons off Parangipettai, at 200m depth contours. Rough bottom topography with irregular submarine canyons results in the movement of deep waters to the surface and therefore probable distribution of striped dolphins cannot be over looked. In earlier sighting surveys from the Indian Ocean, striped dolphins have been reported from deeper water > 2000 m (Leatherwood *et al.*, 1984). Alling's (1986), sighting survey indicated that the striped dolphins in near by study area are very low (0.09/100 NM) compared to common (17.4/100 NM) and spinner dolphins (13/100 NM).

Secondly, the area of gill net operation from Parangipettai is neretic and therefore chances of encountering the striped dolphins are rare. Even after 14 years of recording this specimen, very few have been reported from off shore gill net operations. With few exceptions most of the gill nets are 500m in length. It is not improbable that there can be a mixed school of spinner and striped dolphins off Parangipettai as previously observed in the northern Indian Ocean (Alling, 1986). During monitoring of accidentally caught cetaceans at Parangipettai, between January 1989 to September 1992, there was no record of common dolphin. Reilly (1990) observed that a year-round spatial separation in mean habitat features is maintained between the species, with striped dolphins intermediate between common dolphins and spinner/spotted dolphins in their oceanographic preferences. Absence of common dolphins in the study area could be attributed to similar reasons.

Continuous expansion of marine fisheries in India has resulted in frequent bycatch of oceanic dolphins. Sighting reports of common and other oceanic dolphins should be treated with caution because lack of proper keys to identify oceanic dolphins has increased the probability of misidentification (Kumaran, 2002).

Organ weights: Information on organ weights is valuable for understanding the growth and physiological condition of the

animal. Weights of heart, lungs, liver, kidneys and length of intestines were recorded (Table 1). Based on the relationship between age and total body weight observed from the striped dolphins inhabiting Pacific coast of Japan (Miyazaki *et al.*, 1981), the age of the present specimen is inferred to be slightly over 2 years. The ratio of the heart, lungs, liver and kidneys to the total body weight is compared to understand the growth pattern between the present specimen and striped dolphins from the Pacific Ocean. It has been observed in striped dolphins from the Pacific Ocean that the growth of different organ varies during different developmental phases of its life (Miyazaki *et al.*, 1981). The weight of heart in the present specimen is slightly lower (0.52%) than the specimen of close length and weight from the Pacific waters (0.62%). Ratios of lungs (2.73%) and liver (2.23%) for the present specimen were higher compared to the mean values of lungs (1.92%), liver (1.67%) of striped dolphins from the Pacific coast of Japan. Both kidneys were weighed together for calculating their ratio to total body weight (0.59%) and was comparable to the Pacific animals. Organ weights were compared to the largest specimen of spinner dolphin (179 cm, male, 44 kg) from Parangipettai. Lungs (2.5%) of the spinner dolphin were lower, liver (2.61%), kidneys (0.79%) higher and heart (0.54%) was comparable to the present specimen. Further studies on striped dolphins from India will help to understand the observed inter-specific and intra-specific differences in organ weights.

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