

# Indo-Pacific Beaked Whale

## *Indopacetus pacificus*

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### I. Characteristics and Taxonomy

The Indo-Pacific beaked whale, also known as Longman's beaked whale or tropical bottlenose whale, is an uncommon tropical ziphiid that was until very recently one of the least known extant cetaceans. Originally described as *Mesoplodon pacificus* from a beach-worn skull collected in Queensland, Australia in 1882 (Longman, 1926), the validity of the species was initially challenged by researchers who variously suggested that it was a subspecies of True's beaked whale (*Mesoplodon mirus*) or an adult female southern bottlenose whale (*Hyperoodon planifrons*). These allegations were refuted and the validity of the species confirmed by the discovery of a second skull from the coast of Somalia in 1955 (Azzaroli, 1968). After further study, Moore (1968) found it sufficiently distinct to warrant establishing a new genus *Indopacetus*. These two skulls were the only evidence that this species existed until very recently when a series of at-sea sightings of an unidentified beaked whale from the tropical Indian and Pacific oceans were compiled and more closely analyzed. Some of these sightings had previously been tentatively identified as of southern bottlenose whales (*Hyperoodon planifrons*), but color pattern differences ruled out that species and the suggestion was made that it could be the long lost *I. pacificus* (Pitman *et al.*, 1999). This identification was subsequently confirmed by genetically matching stranded animals (that had previously been identified as *H. planifrons*) with the holotype of *I. pacificus* in the Queensland Museum (Dalebout *et al.*, 2003). This has led to the identification of dozens of at-sea sightings, and *I. pacificus* has now become one of the more frequently identified beaked whales.

The Indo-Pacific beaked whale is identified in the field as a relatively large ziphiid with a prominent melon sharply set off from a fairly long beak, a prominent dorsal fin, and a subtle but distinctive color pattern (Fig. 1). The calf is dark gray with a conspicuously pale head. The light color of the melon extends only as far back as the blowhole (this is important because in the otherwise similar-looking *Hyperoodon* spp., the paleness on the melon extends 10cm or so posterior to the blowhole). Much of the face, lower jaw and throat are also pale. Immediately posterior to the blowhole the dark gray dorsal coloration extends ventrally to form a dark patch around the eye; it also extends ventrally and backward to the insertion of the flipper, forming a broad band. There is a small white "ear spot" embedded in the dark area behind the eye. Immediately posterior to the dark flipper band, and setting it off, is a large white patch formed by the white from the ventral area extending high up on the sides of the animal. This white thoracic coloration apparently darkens with age because it has only been seen on calves.

Adults are similar to calves except that the beak is longer and the color pattern changes somewhat (Fig. 2). Adult females appear brown in good light and grayer with lower light levels. Adult males are similarly colored but often appear lighter than females due, at least in part, to an accumulation of scars from tooth rake marks by other males. Although females have very few of the linear scars found on adult males, both sexes often have numerous white, oval scars that appear to be mainly healed bites from cookie cutter sharks (*Isistius* sp.; Fig. 2). As in calves, the melon of adults is often a pale tan color; this paleness is not evident on all individuals, suggesting



**Figure 1** *Indopacetus pacificus* near the Maldives Islands in the central Indian Ocean showing the pale prominent melon, distinct beak, and conspicuous blow. Photograph by R. C. Anderson.

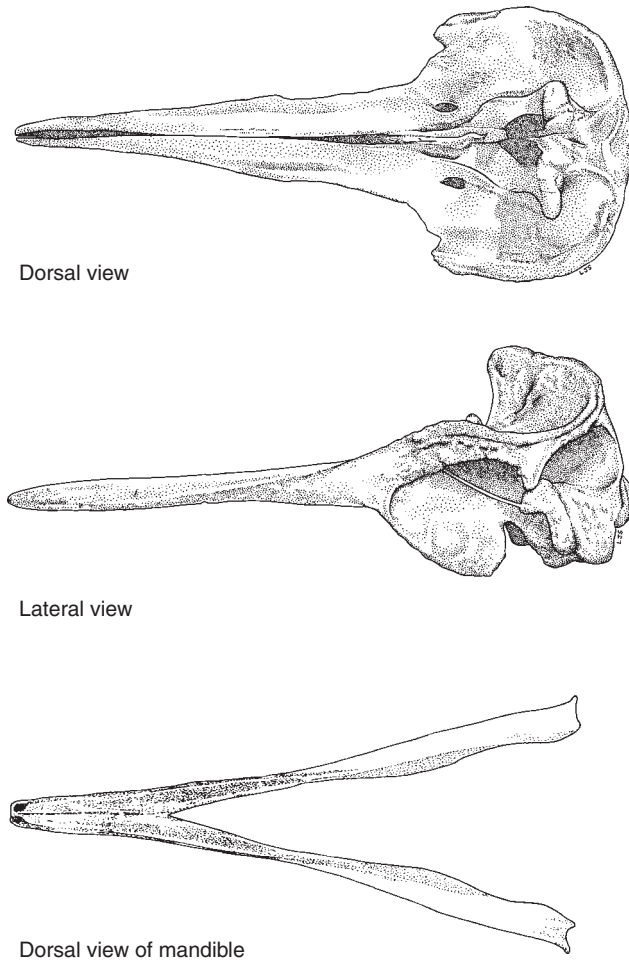


**Figure 2** An apparently emaciated 6-m female *Indopacetus pacificus* that stranded in Kagaoshima, Japan in 2002; the white spots are bite scars from cookie cutter sharks (*Isistius* sp.). Photograph by Kagoshima City Aquarium, courtesy of T. Yamada.

that it may become obscured with age. This species is large enough that it produces a clearly visible, low, bushy blow, which is usually angled slightly forward. As in all ziphiids with apical dentition, the gape in both sexes is straight throughout most of its length but turned up slightly at the posterior end. A dip behind the melon (seen in profile) is confluent with the blowhole. The dorsal fin is set approximately two-thirds of the way back on the upper body and it is relatively large, perhaps larger than in any other species of beaked whale. Similar to other ziphiids, the pectoral flippers are small and can fit into depressions that make them flush with the body. *I. pacificus* is the only beaked whale known to exhibit polydactyly.

Adult length measurements are available from only three animals: (1) a pregnant female that stranded in the Maldives in January 2000 was 6m long (curvilinear measurement) and (2) a physically mature female that stranded in Kagoshima, Japan in July 2002 was 6.5-m long, which may be a maximum for this species, and (3) a 5–65-m female (and her 4.20-m calf) stranded in Taiwan in 2005. A neonate that stranded in South Africa was 2.9 m long.

The skull of the adult (pregnant) female that stranded in the Maldives measured 123cm. This species has a single pair of teeth set



**Figure 3** Skull of *Indopacetus pacificus*. Courtesy of the Food and Agriculture Organization of the United Nations; from Jefferson et al. (1993), *Marine Mammals of the World*, FAO, Rome.

near the tip of the lower jaw, which presumably erupt only in adult males (as they do in most species of ziphiids), but no adult male is known to have been examined. A 5.73-m immature male that stranded in the philippines in 2004 had teeth that were just starting to erupt. The teeth are conical in shape and oval in cross section, set in relatively shallow alveoli (sockets), and likely project slightly forward in adult males. In addition to these tooth characteristics, the skull of *I. pacificus* (Fig. 3) is distinguishable from those of *Mesoplodon* and the other living genera of beaked whales by the following features (1) frontal bones occupy an area of the vertex equal to or greater than that of the nasal bones; (2) premaxillary crest with extremely short posterior processes; (3) a deep horizontal groove in the maxillary bone just above the orbit; and (4) about mid-length in the beak, there is a swelling of the lateral margins so that the beak does not grow narrower throughout its entire length (Moore, 1968).

Historically, the validity of the genus *Indopacetus* as distinct from *Mesoplodon* has not been universally accepted. A recent molecular genetics analysis found support for species level differences in *I. pacificus*, but the available samples were too degraded to resolve validity of the genus (Dalebout et al., 2003). The same study, however, was able to verify the morphological characters that Moore (1968) used to diagnose the genus and also identified two other possible diagnostic characters: rib count and number of fused cervical

vertebrae. The more recent study concluded that the genus should be retained pending further evidence to the contrary.

## II. Distribution and Abundance

The Indo-Pacific beaked whale appears to be uncommon or rare throughout much of its range. Before 2003, there were no confirmed live sightings in the wild, and for over 75 years its distribution was inferred from only two skulls collected in east Australia and Somalia, respectively. Since then however, there have been at least 8 new stranding records (including two previously misidentified as *Hyperoodon planifrons*), and at least 65 at-sea sightings. Based on this, *I. pacificus* is now known to inhabit tropical waters throughout the Indo-Pacific, from the west coast of Mexico to the east coast of Africa and the Gulf of Aden (Fig. 4). It is rare in the eastern Pacific but appears to be more common in the western Pacific and is also at least fairly common in the western tropical Indian Ocean, suggesting an affinity for western ocean basins. The only population estimates to date were based on systematic surveys in Hawaiian (EEZ) waters (1007 animals) and the eastern tropical Pacific (291 animals; Barlow et al., 2006).

## III. Ecology

Practically nothing is known about the ecology of *I. pacificus*. Beaked whales are in general mainly squid-eaters and *I. pacificus* appears to be no exception. Stomach contents are known from only two specimens. A stranded animal from Davao, Philippines had only squid beaks in its stomach. Another stranded specimen, from Kagoshima, Japan, contained squid beaks, plastic bits, and nematodes in its stomach; there were no fish remains. Of a total of 69 squid beaks identified, 83% were *Taonius pavo*; other species present included *Moroteuthis loennbergi*, *Onychoteuthis borealijaponica*, *Chiroteuthis imperator*, and *Histioteuthis corona inermis*.

Most sightings have been in deep water (>2000m), where the sea surface temperatures were  $\geq 26^{\circ}\text{C}$ . Although a fair number of sightings have been recorded along continental slope areas (200–2000m), this may reflect a bias for surveys to be more nearshore. It has usually been observed in monospecific groups, but among the 65 sightings recorded to date it has also been associated with short-finned pilot whales (*Globicephala macrorhynchus*; five times), pilot whales and common bottlenose dolphins (*Tursiops truncatus*; two times), and only bottlenose dolphins (one time). Photographs of both stranded and live specimens often show numerous white oval scars, which are probably the healed wounds of cookiecutter shark bites (*Isistius* spp.): the Kagoshima stranding had hundreds of scars giving it a spotted appearance (Fig. 2).

## IV. Behavior and Physiology

Group size tends to be larger than in other beaked whale species except perhaps *Berardius* spp. Evidence to date also suggests there may be regional differences in group size. In the Pacific, mean group size was 18.5 individuals (range 1–100). In the western vs the eastern Pacific, it was 29.2 and 8.6, respectively (Pitman et al., 1999). In the western Indian Ocean, group size averaged 7.2 individuals (range 1–40; Anderson et al., 2006). *I. pacificus* tends to travel in close groups, often with adult males, adult females, and calves present. When traveling fast at the surface, animals bring their head and beak high out of the water, or sometimes porpoise low like large dolphins. Diving and surfacing is largely synchronous within the group. Dive times recorded to date have ranged from 11 to 33 min; one animal was suspected of diving for at least 45 min, and it is probable that maximum dive times may be considerably longer.