

A Gervais' beaked whale (*Mesoplodon europaeus*) washed ashore in southeastern Brazil: extra limital record?

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Abstract

On 10 August 2001, a beaked whale was found dead on a rocky shore at São Vicente (23°58'S; 46°24'W), São Paulo state, Brazil. The damaged specimen was approximately 390 cm in length and in an advanced state of decomposition. It was identified as a *Mesoplodon europaeus* based on the following characteristics: (1) the presence of a flattened pair of teeth placed near the posterior half of the short mandible symphysis; (2) when viewed laterally in an upright position with the long axis of the rostrum horizontal, the premaxillary foramina straddle a horizontal plane, transecting the centres of the maxillary foramina; and (3) both the protuberance of the maxillary, which interrupts the antorbital notch, and the ridge that extends back from this protuberance are conspicuous. Cranial measurements are presented. This is the southernmost record of this species in the southern hemisphere, the first one to the southwest Atlantic and the first one along the Brazilian coast. Recent beaked whale records along the Brazilian coast, due to the increasing of cetological research, raises the possibility of ordinary distribution, rather than extra limital observations. Further investigations are needed to draw reliable conclusions on Gervais' beaked whales in the southern hemisphere.

Key words: Gervais' beaked whale, *Mesoplodon europaeus*, *Mesoplodon*, Ziphiidae, Brazil.

Introduction

Gervais' beaked whales (*Mesoplodon europaeus* Gervais, 1855) occur in warm temperate and

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tropical waters in the Atlantic Ocean (Mead, 1989; MacLeod, 2000; Norman & Mead, 2001). Although the holotype was found in the English Channel around 1840 (Gervais, 1855), most records come from the northwest Atlantic, mainly from the Gulf coasts of the United States and Caribbean Islands (Raven, 1937; Ulmer, 1947; Rankin, 1953; Moore, 1963; Caldwell, 1964; Varona, 1970; Debrot & Barros, 1992; Mead, 1989; Rosario-Delestre *et al.*, 1999; Norman & Mead, 2001). Recent observations close to Europe and West Africa showed that *M. europaeus* may not be as rare in the northeast Atlantic as once thought (see Reiner, 1980; Burton *et al.*, 1989; Robineau & Vely, 1993; MacLeod, 2000). In the southern hemisphere, there are only three confirmed records, all from the Ascension Island at 07°57'S (Mead, 1989; Norman & Mead 2001). These were the previous southernmost records for this species. Almost all records of the Gervais' beaked whale are strandings with few confirmed sightings (Pitman, 2002).

Materials and Methods

Specimen description

On 10 August 2001, a beaked whale was found dead on a rocky shore at São Vicente (23°58'S; 46°24'W), São Paulo state, Brazil. The carcass was in an advanced state of decomposition, suggesting the animal was dead for some time before being washed ashore. Due to damage caused by waves washing the animal against the rocky shore and the inaccessibility of the stranding location, it was not possible to take external measurements other than total body length (approximately 390 cm), or to identify the sex of the animal. Only its head was recovered and the skull (Fig. 1) was deposited at the collection of the Museu do Instituto de Pesca de Santos (CEEMAM # 127).

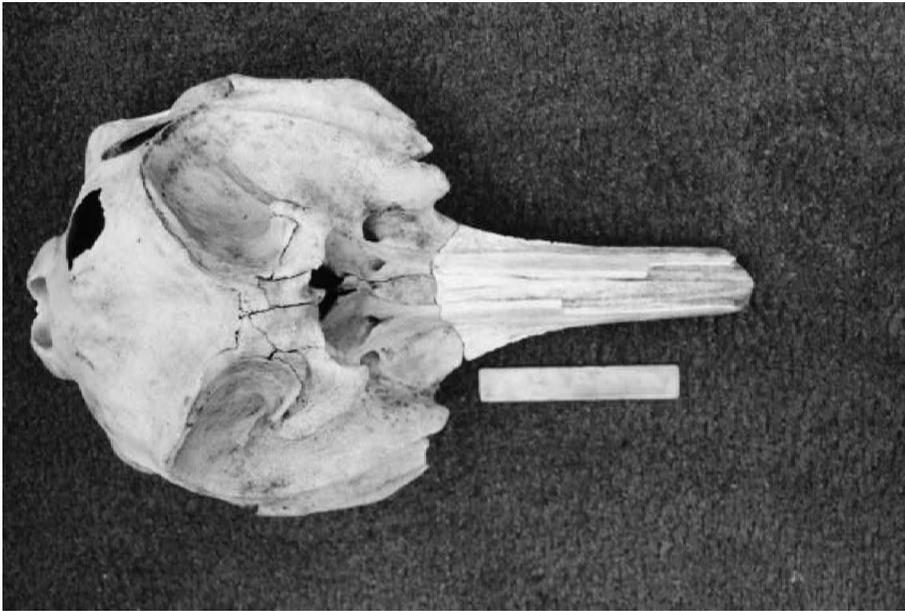


Figure 1. Skull dorsal view of the *Mesoplodon europaeus* (CEEMAM # 127) specimen which stranded in August 2001 at São Vicente, Brazil. (Scale=15 cm).



Figure 2. Skull frontal view of the *Mesoplodon europaeus* (CEEMAM # 127) specimen, showing the extreme development of the vertex. (Scale=15 cm).

The animal was identified as a *Mesoplodon* specimen based on the extreme development of the vertex (Fig. 2), which involves the postero-dorsal extensions of the maxillary, premaxillary, frontal, supra-occipital, and nasal bones (True, 1910). The

specimen was identified as a *M. europaeus* based on the following characteristics: (1) the presence of a flattened pair of teeth placed near the posterior half of the short mandible symphysis (Fig. 3) (True, 1910; Harmer, 1924; Raven, 1937; Norman &

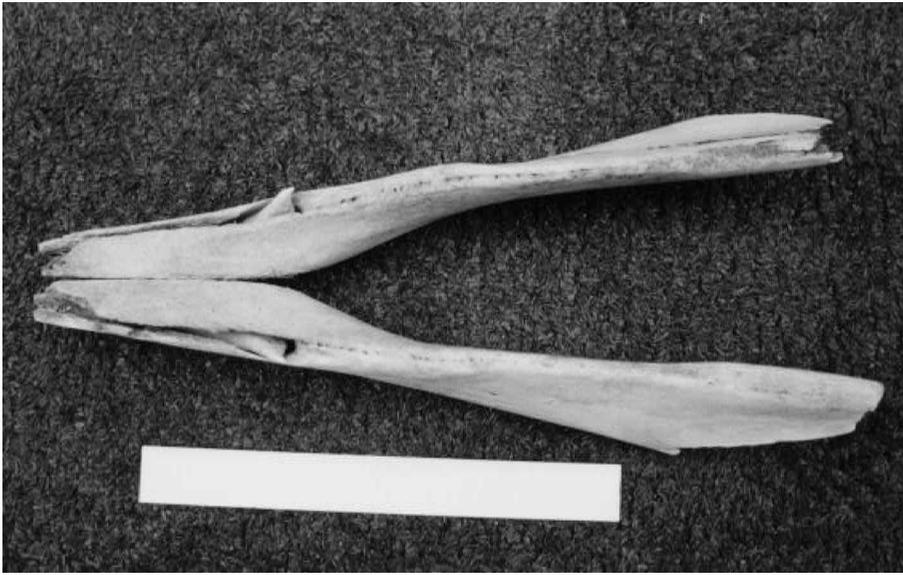


Figure 3. Dorsal view of the *Mesoplodon europaeus* (CEEMAM # 127) mandibles showing teeth position in relation to the symphysis (scale=15 cm).

Mead, 2001); (2) when viewed laterally in an upright position with the long axis of the rostrum horizontal, the premaxillary foramina straddle a horizontal plane transecting the centres of the maxillary formamina (Norman & Mead, 2001); and (3) both the protuberance of the maxillary which interrupts the antorbital notch and the ridge that extends back from this protuberance are conspicuous (Raven, 1937). In addition to those characteristics, the basirostral groove described by Flower (1878) to be common in other *Mesoplodon* species than in *M. europaeus* was absent. The analysed skull resemble the Andrew's beaked whale (*M. bowdoini*) skull. However, the gap between the nasals is too large, the right nasal crest is not big enough and the maxillary foramina are different.

The skull is incompletely ossified and some bones are not completely fused indicating that this specimen was probably a subadult. Raven (1937) described that the relative age of a *M. europaeus* specimen could be judged by the extent of the co-ossification of the presphenoid and vomer, which in adults occupies the entire mesorostral canal. In the studied specimen, the mesorostral canal is formed by the vomer below and bounded on either side above by the medial borders of the premaxillaries, and it does not completely fill the canal, indicating a probable juvenile specimen (as shown in Fig. 3, Raven, 1937). However, it presents fully ossified pulp cavities of both teeth (Fig. 4),

showing evidences of being mature. In addition, it was not possible to reach the specimen gender based only on the analysis of the mesorostral canal, as Varona (1985) described that females and juveniles share similar skull characteristics which are different from the ones observed in adult males. Based on the characteristics described above, we concluded that this specimen was probably a subadult female.

Results

Due to damage sustained either pre- or post-mortem, the tip of the rostrum and some of the cranial bones of the São Vicente specimen, it was not possible to take all the cranial measurements. Those which could be taken are shown in Table 1. Measurements were taken with calipers to the nearest millimeter following Moore (1963) and Ross (1984). The condylobasal length (CBL) without the broken tip of rostrum measured 538 mm. Based on the relative proportions between the CBL and the skull largest width (around 0.47 as presented by Raven, 1937, after analysing three *M. europaeus* skulls), the estimated CBL of the São Vicente specimen was 685 mm. The width of the base of the rostrum relative to the zygomatic width (0.41) was low when compared to other *M. europaeus* specimens (0.55–0.64, n=9) by Reyes *et al.* (1995). The relative length of the upper surface of the right nasale in the vertex (28.9 mm) was 0.87 times the



Figure 4. Shape of both collected teeth of the *Mesoplodon europaeus* (CEEMAM # 127). Pulp cavities were fully ossified (scale=15 cm).

least distance between the premaxillary foramina (33.0 mm). This index was less than 2.0 in all *Mesoplodon* species, except for *M. traversii* (Reyes *et al.*, 1995; van Helden *et al.*, 2002).

Discussion

The reported record is the southernmost for the Gervais' beaked whale in the south Atlantic and the first known from the southwest Atlantic, as well as for the Brazilian coast. A total of 43 cetacean species were reported in Brazil (IBAMA, 2001; Pinedo *et al.*, 2002), including seven other ziphiid species: the southern bottlenose whale ($n=2$), *Hyperoodon planifrons* (Gianuca & Castello, 1976; Simões-Lopes & Ximenez, 1993), the Blainville's beaked whale ($n=3$), *Mesoplodon densirostris* (Castello & Pinedo, 1980; Simões-Lopes & Ximenez, 1993; Secchi & Zarzur 1999), the Gray's beaked whale ($n=4$), *M. grayi* (Soto & Vega 1997; Pinedo *et al.*, 2001), the Hector's beaked whale ($n=1$), *M. hectori* (Zerbini & Secchi, 2001), the strap-toothed beaked whale ($n=1$), *M. layardii* (Pinedo *et al.*, 2002), the Arnoux's beaked whale ($n=1$), *Berardius arnuxii* (Siciliano & Santos, *in press*), and the Cuvier's beaked whale ($n=13$), *Ziphius cavirostris* (see review by Pinedo *et al.*, 2001). All records are from stranded individuals. This Gervais' beaked whale record confirms the predicted occurrence of this species in the southwest

Atlantic (see Pinedo *et al.*, 1992; Hetzel & Lodi, 1993).

The present record is the fifth *Mesoplodon* species observed in Brazil. The four other species were reported in southern Brazil from 27°S to 34°S. At the latitude where the São Vicente specimen was found (~23°S), the large continental shelf is about 200 km wide. This area is influenced by the warm waters of the Brazil's Current (Emilsson, 1961; Stramma, 1989), which has the same characteristics of the Gulf Stream (Stommel, 1960; Signorini, 1976) where *M. europaeus* is known to occur. The Brazil's current flows southward along the northeast coast of South America, where the continental shelf is relatively narrower (25 to 125 km). As noted before, Gervais' beaked whales could have a cross equatorial distribution along warm and temperate deeper waters (Mead, 1989; MacLeod, 2000). If this is the case, strandings would be expected to occur along the Brazilian northeast coast. However, prior to the mid 1990s, there were few cetacean studies in this region and only a few research groups are developing surveys for stranded animals. Dedicated cetacean sighting surveys are rare along the entire Brazilian coast. Records of stranded individuals are important for understanding the distribution of poorly known cetacean species, such as beaked whales (Mead, 1989). However, care must be taken when drawing conclusions from a small number of records, particularly from regions where little is

Table 1. Cranial measurements taken from the *Mesoplodon europaeus* specimen (CEEMAM # 127) collected in São Vicente, São Paulo – Brazil, in August 2001. Bilateral measurements were taken from the left side, except for measurements 18, 19, 37 and 38, which were taken for both sides.

Cranial Measurement Description	mm
1. Length of temporal fossa	90.1
2. Length of orbit	78.8
3. Length of right nasal on vertex of skull	54.2
4. Length of nasal suture	48.8
5. Breadth of skull across postorbital process of frontals	325.0
6. Breadth of skull across zygomatic processes of squamosals	321.0
7. Breadth of skull across centres of orbits	309.1
8. Least breadth of skull across posterior margins of temporal fossae	208.7
9. Greatest span of occipital condyles	103.4
10. Greatest width of an occipital condyle	46.5
11. Greatest length of an occipital condyle	37.2
12. Breadth of skull across exoccipitals	265.8
14. Breadth of nasals on vertex	48.3
15. Least distance between premaxillary crests	49.1
16. Greatest extension of right premaxillary posterior of right nasal on vertex of skull	28.9
17. Greatest span of premaxillary crests	158.1
18. Least width of premaxillae where they narrow opposite superior nares	31.4 L/39.7 R
19. Greatest width of premaxillae anterior to place of measurement # 18	44.5 L/67.9 R
20. Width of rostrum in apices of antorbital notches	193.3
21. Width of rostrum in apices of prominential notches	132.1
22. Greatest transverse width of superior nares	52.3
23. Greatest inside width of inferior nares on the pterygoids	78.6
24. Height of skull	232.9
25. Greatest width of temporal fossa	63.2
26. Least distance between maxillary foramina	78.1
27. Least distance between premaxillary foramina	33.0
28. Distance from posterior margin of left maxillary foramen to most anterior extension of left maxillary prominence	75.3
30. Length of tympanic bulla, left	45.2
33. Outside height of mandible at mid-length of alveolus	46.9
34. Inside height of mandible at mid-length of alveolus	50.0
35. Right/left tooth height	51.8/51.2
36. Right/left tooth length	56.0/57.0

known about cetacean species distribution, such as the southwest Atlantic. Sick whales could stray far beyond their normal range and carcasses could travel unknown distances before reaching the shore. As a result, the distribution of strandings could reflect the local ocean currents, rather than the real species distribution (e.g., MacLeod, 2000). Gervais's beaked whales and other ziphiid species could occur in deeper waters along the Brazilian coast as indicated by strandings. However, little information is available on ziphiid biology and distribution for most of the south Atlantic. Therefore, the São Vicente specimen record is important in raising the possibility that this species could have a similar tropical to warm temperate distribution in the south Atlantic as it has in the north Atlantic. However, more specimens will be required to confirm whether the present specimen corresponds to an extra limital record.

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