

RECORD OF A SPECIMEN OF SHEPHERD'S BEAKED WHALE (*TASMACETUS SHEPHERDI*) FROM THE COAST OF SANTA CRUZ, ARGENTINA, WITH NOTES ON AGE DETERMINATION

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The Ziphiidae family comprises 21 living species (Dalebout *et al.*, 2004) inhabiting oceanic waters, usually beyond the continental shelf. The majority of these species are primarily known from a small number of strandings or the occasional sightings at sea. As a result, biological and ecological information of many beaked whale species is limited and new records provide valuable data.

In September 2003 a specimen of Shepherd's beaked whale (*Tasmacetus shepherdii*) was found stranded on a beach close to Santa Cruz lighthouse (50°09'S, 68°21'W) in the vicinity of Puerto Punta Quilla, Santa Cruz Province, Argentina.

Tasmacetus shepherdii is the only beaked whale with a full set of functional teeth in both jaws, and was first described in 1937 on the basis of a partial skeleton from New Zealand (Oliver, 1937). Around 20 strandings have been registered, 12 in the coasts of New Zealand (Sorensen, 1940; Smith, 1965; Gaskin, 1968), two in the Juan Fernandez Islands (Brownell *et al.*, 1976), seven in Argentina (Mead and Payne, 1975; Goodall and Galeazzi, 1988⁴; Benegas and Serino, 2000⁵; Goodall, pers. comm.), one in Australia, and another one in the South Sandwich Islands (Mead, 2002). In addition, there are four sightings attributed to this species: one each from New Zealand (Watkins, 1976), Gough Island (Pym, 2003⁶), between Falkland (Malvinas) Islands and South Georgia (Laughlin, 1996), and the Seychelles (Mead, 2002). On the basis of the stranding and sighting locations, Shepherd's beaked whale is thought to have a circumpolar distribution in cold temperate waters of the Southern Hemisphere (Jefferson *et al.*, 1993).

The first individual found on the Argentine coast was cast ashore in Península Valdés in 1973 (Mead and Payne, 1975). Incomplete skulls have also been found in Tierra del Fuego (Goodall, 1978) and in Santa Cruz Province (Lichter and Goodall, 1988). The stranded animal found at Punta Quilla was in advanced decomposition. According to information given by the local ranger who found the specimen, the animal stranded in early 2003. However, body measurements could be recorded (Table 1) and skin samples could be taken. At the time of field dissection, all the teeth remaining in the mouth were extracted in order to prevent subsequent loss.

The specimen was determined as a male because the tusks were eroded, evidence of eruption in life (Moore, 1968). Vertebral epiphyseal fusion was complete and the pulp cavities of the teeth were filled, indicating that the animal was physically adult (Moore, 1968).

Comparisons were made with other complete specimens, one known from Argentina and two from New Zealand (Mead and Payne, 1975) (Table 1). Most of the standard external and craniometrical measurements of the Punta Quilla specimen were similar to those of the Península Valdés specimen, although the latter was a female. They were also similar to those of the males stranded in New Zealand.

The dorsal fin of the Punta Quilla specimen was deteriorated and lacked its tip. Therefore, the 'snout to dorsal fin' measurement was taken up to the insertion of the dorsal fin, which explains the differences shown among specimens. The differences found for the girth at *axilla*, flipper and fluke measurements most likely are due to tissue shrinkage caused by dehydration and decomposition.

Fifty one teeth were collected, but according to the alveoli the total number of teeth would be 91 (Table 1). All teeth showed considerable wear. Many of them were truncated at their tips, and some had grooves where opposing teeth had worn against them. The alveoli count is very similar to those of the Birdling's Flat animal (see Table 1), and lower than those recorded for the two other specimens.

Four teeth were used for age determination. The tusks were cut on a longitudinal and lingual-buccal medial plane, while a right mandibular tooth was sectioned longitudinally. Teeth were decalcified in RDO, a commercial mixture of acids, and sectioned on a freezing microtome, at a thickness of 18µm. Sections were stained with Mayer's Haematoxylin and mounted with Canadian balsam (Perrin *et al.*, 1980; Crespo *et al.*, 1994). In order to observe the Growth Layers Groups (GLGs) on the entire length of the tooth, a thin section of a left maxillary tooth was obtained, sagittally sectioned and polished with wet sandpaper. GLGs were observed with a stereomicroscope (X30) under transmitted light. Age was determined independently by three observers in order to minimize counting errors.

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⁴ Goodall, R. N. P. and Galeazzi, A. R. (1988) *Strandings on the coasts of the Province of Santa Cruz, Argentina. A preliminary look*. Page 34 in Abstracts, III Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur, 25-30 July, Montevideo, Uruguay.

⁵ Benegas, L. G. and Serino, F. (2000) Sobre el varamiento de un ejemplar de delfín picudo de Shepherd, *Tasmacetus shepherdii*, en la costa de Río Grande, Tierra del Fuego. Page 13 in Abstracts, IX Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur. 28 October - 02 November, Buenos Aires, Argentina.

⁶ Pym, A. (2003) A sighting of Shepherd's Beaked Whales *Tasmacetus shepherdii* at sea off Gough Island, South Atlantic (Cetacea: Ziphiidae) <http://hometown.aol.co.uk/tonypym/ShepherdsBeakedWhale.html>

Table 1. Selected dimensions (in cm) of four specimens of *Tasmacetus shepherdi*. Numbers in the first column indicate measurements given by Norris (1961).

Characters	SPECIMENS			
	Punta Quilla (Argentina)	Península Valdés (Argentina)	Stewart Island (New Zealand)	Birdling's Flat (New Zealand)
Sex	Male	Female	Male	Male
1 Total length	660	660	700	637
2 Snout to eye	94L / 101.5R	103	-	100
3 Snout to apex of melon	37	36	-	-
4 Length of gape	63L / 58R	58	61	62
Eye to blowhole (right)	39	51	-	-
9 Snout to blowhole	112	107	-	115
10 Snout to flipper	156	160	183	150
11 Snout to dorsal fin	433 ¹	478	456	-
12 Snout to umbilicus	-	297	-	-
13 Snout to genital aperture	-	-	-	377
14 Snout to anus	446	-	-	-
15 Projection of lower jaw	3	1.3	2.5	3
Length of throat grooves	42	36	38	-
21 Girth at axilla	260 ²	320	-	320
29 Flipper length anterior insertion to tip	53R	69	-	-
30 Flipper length axilla to tip	35R	43	46	-
31 Flipper width	13.5R	16	-	21
34 Fluke width	106	152	152	135
35 Fluke depth	29.5	44	-	50
Length of skull	121	123	123	130
Length of mandible	111	106	-	-
<i>Alveoli count (teeth collected)</i>				
Upper right	20 (16)	17	18	21
Upper left	19 (15)	17	18	21
Lower right	26 (9)	23	18	27
Lower left	26 (11)	22	18	27
Total	91 (51)	79	72	96

(L) left; (R) right; ¹ Taken up to the anterior insertion of the dorsal fin. ² Taken on the right side, and doubled (130cm x 2).

The tusk is a bilaterally compressed cone in shape, and the fundamental structure consists of enamel, dentine and cementum (Figure 1). Beneath the thin enamel layer, there is a uniform layer of dentine and a large pulp cavity filled with osteodentine leaving a narrow central root canal. The prenatal dentine is consistently more uniform textured and less opaque than the postnatal dentine. The neonatal line is well defined, consisting of a thin translucent layer. Deposition of cementum occurs over much of the

tooth surface and is thickest in the basal half of the tooth. A white internal layer, uniformly structured and thicker than the dark yellowish external layer, was shown in the cementum. This could be a particular pattern of deposition in the cementum of the Punta Quilla specimen. Dentine growth layer groups are not well defined because of the preparation technique used, but a series of regular GLGs can be seen in the cementum, and they are a better alternative method to determine the age.

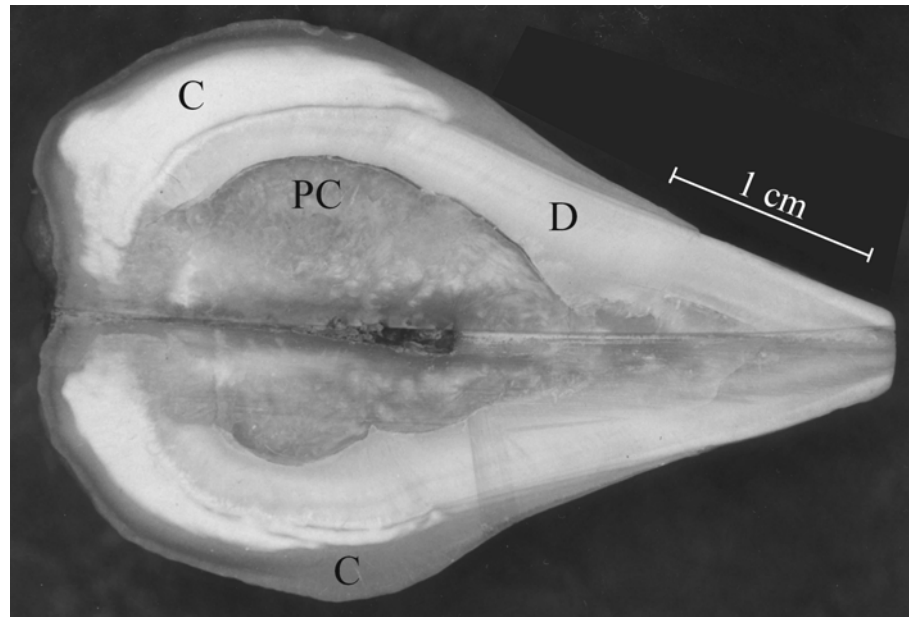


Figure 1. Longitudinal section of the right tusk of *Tasmacetus shepherdi*. (C) cementum; (PC) pulp cavity filled with osteodentine; (D) dentine.

The reading of the cementum layers in the right mandibular tooth was 23 GLGs (Figure 2). Readings in the tusks were more difficult because the layers are more dispersed and it was not possible to delimit each GLG. If we assume a depositional rate of one growth layer group per year in this species, the specimen of Punta Quilla was 23 years old. At present there are no data relating to periodicity of GLG in this species. As a minimum requirement, teeth of several individuals of various ages should be examined, before establishing a standard of age reading for certain species. Therefore, it will be necessary to examine additional samples of Shepherd's beaked whales to describe appropriately their deposition pattern.

Age is fundamental to interpreting and understanding many aspects of the biology of marine mammals (Perrin and Myrick, 1980). Studies of age estimation in ziphiids are available for *Berardius bairdii*, *Mesoplodon* spp., *Ziphius cavirostris* and *Hyperoodon* spp. (Perrin *et al.*, 1980; Mead, 1984). From these, research in age determination related to biological features has only been developed for *B. bairdii* (Kasuya, 1977) and *H. ampullatus* (Christensen, 1973). To the best of our knowledge there are no published studies on age estimation for *Tasmacetus shepherdi*. Therefore, this note is a clear contribution to the biological knowledge of this rarely recorded species.

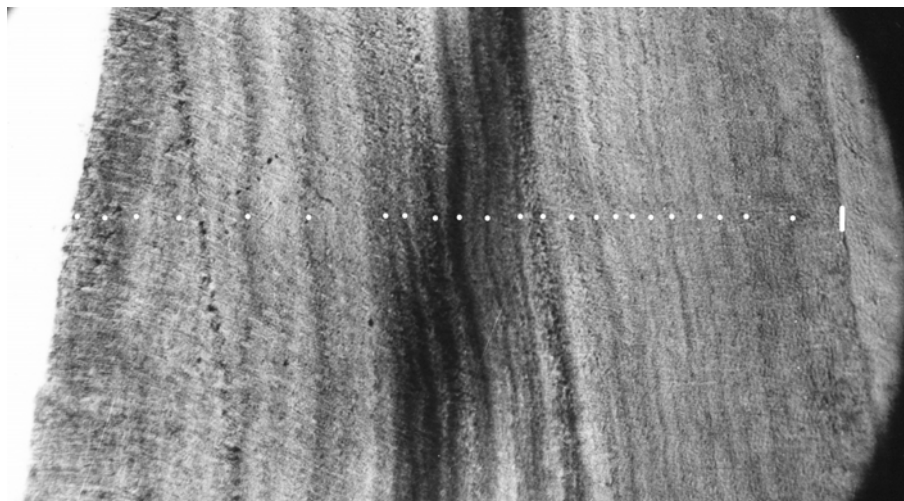


Figure 2. Decalcified and stained sections of the right mandibular tooth of *Tasmacetus shepherdi*. 100X magnification of the lateral part of the tooth. The line on the right indicates dentine-cementum boundary. Circles indicate the GLGs.

The specimen described here is the seventh record for this species in Argentina and the third complete skeleton from the South Atlantic coast. The skeleton will be held as voucher for future reference in the Monte León National Park, Santa Cruz Province, Argentina (collection number pending).

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