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A FIRST CONFIRMED SPECIMEN RECORD IN CHILE, AND SIGHTINGS ATTRIBUTED TO THE LESSER BEAKED WHALE *MESOPLODON PERUVIANUS* REYES, MEAD AND VAN WAEREBEEK, 1991

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ABSTRACT

Three sightings totalling five small-sized beaked whales recorded off north-central Chile (ca. 29°S) in February 1998, two between Punta Zorros and Damas Island and one south of Choros Island, were attributed to *Mesoplodon peruvianus*. A *ca*. 1m neonate was observed for the first time. The occurrence of lesser beaked whales in shallow water habitat (20-70m depth) is unusual in the Family Ziphiidae. On 17 December 1997, during the IWC 3rd Blue Whale Survey off Chile, researchers (including two of the authors) assigned another beaked whale sighting at 20º26'S, 70º44'W, in deeper water (878-1245m), as a probable *M. peruvianus*. All individuals shared the following characteristics: small body size, short snout, nondescript dark colouration dorsally and a low, markedly triangular dorsal fin.
An adult beaked whale skull (specimen GPS004) was collected at Los Choros beach (29º17.04'S, 71º23.54'W) in May 1995. Diagnostic cranial characteristics, including i.a. lateral maxillary excrescences on the distal rostrum, identified it as the first confirmed record of M. *peruvianus* in Chile. The specimen and probable sighting records extend the species' known distribution range 14° latitude farther south in the Eastern Pacific. Evidence of two bullets shot through the head of GPS004 raises the issue of direct catches of small cetaceans in the area.

Key words: Beaked whale, *Mesoplodon peruvianus*, Distribution, Cranial characteristics, Direct Catch, Chile.

RESUMEN

Primeros registros documentados en Chile de la ballena picuda peruana *Mesoplodon peruvianus* Reyes, Mead y Van Waerebeek, 1991. Tres registros de avistamientos de pequeñas ballenas picudas hechos en febrero de 1998 en el norte-centro de Chile (alrededor de 29°S), dos entre Punta Zorros e Isla Damas y uno al sur de la Isla Choros, fueron atribuidos a cinco individuos de *Mesoplodon peruvianus*. Por primera vez fue observado un neonato de aproximadamente 1m. La ocurrencia de ballenas picudas peruanas en habitat de aguas someras (20 a 70m de profundidad) es inusual para la familia Ziphiidae. El 17 de diciembre de 1997, durante el tercer crucero de ballena azul de la Comisión Ballenera Internacional frente a las costas de Chile, los investigadores (entre ellos dos de los autores) registraron otro avistamiento de ballena picuda en la posición 20º 26'S, 70° 44'W, en aguas más profundas (878-1245m) como probable *M. peruvianus*. Todos compartían las siguientes características: el pequeño tamaño del cuerpo, hocico corto, oscura coloración dorsal, y una aleta dorsal baja y muy triangular.
Un cráneo adulto de una ballena picuda (espécimen GPS004) se recogió en la playa de Los Choros (29° 17.04'S, 71° 23.54'W), en mayo de 1995. Características craneales diagnósticas, incluidas las excrecencias laterales del maxilar en la parte distal del rostro, confirmaron el cráneo como el primer registro de *M. peruvianus* en Chile.
Ambos, el espécimen GPS004 y los avistamientos atribuidos amplían el límite de distribución de la especie 14° de latitud hacia el sur en el Pacífico Oriental. Evidencia de dos balas disparadas en la cabeza del espécimen GPS004 plantea la cuestión de capturas directas de cetáceos menores en la zona.

Palabras clave: Ballena picuda, *Mesoplodon peruvianus*, Distribución, Características craneales, Capturas, Chile.

INTRODUCTION

The lesser beaked whale or Peruvian beaked whale[1] *Mesoplodon peruvianu*s Reyes, Mead and Van Waerebeek, 1991, is the smallest member of the genus, with an adult body length of about 370cm. It was described mainly from freshly captured specimen, landed in Peruvian fishing ports. The species has a short and narrow snout, a nondescript brownish-grey colouration except for light lower flanks and belly, and a small, markedly triangular dorsal fin located on the posterior third of the back (Reyes *et al*., 1991). It has been seen alone or in small groups (Pitman and Lynn, 2001; this paper).

Named after the country where it was discovered, the confirmed distribution of *M. peruvianus* is at least from Isla Espiritu Santo (24°25'N, 110°25'W) in the southwestern Gulf of California (Urbán-Ramírez and Aurioles-Gamboa, 1992; Aurioles-Gamboa and Urbán-Ramírez, 1993) south to the coast of Peru, between Playa Paraiso (11°12'S, 77°37'W) and San Juan de Marcona (15°19'S, 75°11'W) (Reyes *et al*., 1991). A specimen collected near Kaikoura (42°31'S,173°30'E), New Zealand, is the only known record for the western South Pacific (Baker and van Helden, 1999). Listed as Data Deficient by the IUCN Red List (IUCN, 2006) and included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2006), its conservation status is unknown. Off Peru, lesser beaked whales are caught with some regularity in drift gillnets set mainly for sharks and rays (Reyes *et al*., 1991).

The coasts of northern and central Chile and of Peru are heavily influenced by cool upwelling associated with the Humboldt Current system and therefore share most of their cetacean species. Considering that the southernmost known occurrence of *M. peruvianus* in Peru is only 3° north of the Chilean border (18°21'S), northern Chile was expected to be part of its range, although it had not been encountered there (Canto *et al*., 1992; Yáñez , 1997; Capella *et al*.,1999).

The first evidence for the occurrence of *M. peruvianus* in Chile was presented by the senior author at the IV International Congress of Natural Resources Management held in Termas de Puyehue, Chile, in November 1998. In May 1999, after examination of voucher material, Van Waerebeek *et al*. (1999) reported (but did not document) the first Chilean specimen to the IWC Scientific Committee meeting in Grenada. Subsequently, Aguayo (1999) stated that two new species were recorded for Chile, *D. capensis* and *M. peruvianus*, the source of which he referred to as 'Aguayo-Lobo *et al*. in press', but no published substantiation has followed[2]. The present paper describes for the first time cranial voucher material of *M. peruvianus* in Chile and five sightings attributed to the species.

MATERIAL AND METHODS

IWC Third Blue Whale Cruise off Chile

In December 1997, the International Whaling Commission organised the Third Blue Whale Cruise, off Chile, as part of its IWC/SOWER[3] survey programme (Findlay *et al*., 1998). Two of the authors (PS and KVW) participated as researchers on board the R/V Shonan Maru 2. The survey, one of the most comprehensive cetacean diversity and distribution assessments in Chile was, however, limited to deep, offshore waters. Sightings data were stored, besides in the proprietary IWC/SOWER format, in the Cetacean Research DB 4.0 database managed by CMMR Leviathan and deposited at Chile's Museo Nacional de Historia Natural (MNHN).

Boat survey of inshore waters

From late January to mid-March 1998, the TURSIOPS98/99 research programme conducted

[1]Although some authors refer to the lesser beaked whale as 'pygmy beaked whale', the former was the earliest English vernacular name (Van Waerebeek, 1991). Moreover, naming of new species is traditionally deemed the prerogative of their discoverers. [2]Sanino *et al*. (2003) first documented *D. capensis* from Chile. [3]SOWER: Southern Ocean Whale and Ecosystem Research programme, International Whaling Commission.

by CMMR Leviathan included a dedicated boat survey of cetaceans between the Chañaral and Choros coastal islands off north-central Chile,10nm of shore and the continent coastline in Chile's IV Region (Coquimbo). The Leviathan 2, a 7m sailing boat specifically constructed for cetacean research was employed as primary observation platform. Cetacean sightings were recorded following protocols similar to those used on the Shonan Maru 2. To allow comparative studies, cetacean sightings were supported by digital video (SONY DCR-VX1000) and data were entered in the same DB 4.0 database used on R/V Shonan Maru 2.

Beach surveys for cetacean strandings

Fishermen and other locals of the coastal communities of Los Corrales, San Agustín and Chañaral de Aceituno were interviewed about cetacean strandings and bycatch in the 'Los Choros' general area. Beach searches for unreported cetacean strandings were carried out from January till March 1998 along the coastline of the marine reserve between the latitudes 28.97ºS and 29.34ºS, using a motorbike (Honda XR250RF).

RESULTS

Sightings of small-sized beaked whales

During the 1997/98 IWC blue whale cruise, a small beaked whale with a nondescript dark colouration was sighted close to the vessel on 17 December 1997, south of Iquique, and was attributed to *M. peruvianus* (details in Table 1). In February 1998, three other sightings recorded near the coastal location of Punta de Choros during the TURSIOPS98/99 project were also identified as this species (see details in Table 1). The small-sized beaked whales were observed in very shallow water (20-70 m) and at close distance in calm weather. Unfortunately video footage recorded was compromised by strong glare. The beaked whales were dark dorsally and light on the ventral side, with a sharp pigmentation gradient between dark and light parts. The low dorsal fin located on the posterior third of the body was shaped like an almost perfect isosceles triangle.

TABLE 1. Records of small-sized beaked whales sighted in northern Chilean waters, attributed to the lesser beaked whale *Mesoplodon peruvianus*. (SST= sea surface temperature; N= group size).

Position	Platform	Date	N	Notes
20º25.08'S, 70º44.62'W	*Shonan Maru 2*	17 Dec 97	1	7:11h; a mesoplodont surfaced close to the vessel; swimming direction: 120º; depth on chart: 878-1245m. It was impossible to determine whether the animal responded to the ship. Probable *M. peruvianus* because of very small size, triangular dorsal fin, nondescript dark colouration of upper body.
29º13.42'S, 71º29.92'W	*Leviathan 2*	14 Feb 98	1	13:19h; sighted between Damas Island and Punta Zorros at 10m distance and 15º port from the boat; depth (sounder): 21m; course 270º; swimming direction: 90º; SST: 19.2ºC. Beaufort: 0.
29º13.42'S, 71º29.93'W	*Leviathan 2*	14 Feb 98	3	13:21h; at 15m ahead; depth (sounder) 20m; course 270º; swim direction: 90º; SST: 19.2ºC; Beaufort: 0. One individual passed under the sailing boat facing up. One calf with an estimated body length of about 1m.
29º17.55'S, 71º32.73'W	*Leviathan 2*	15 Feb 98	1	11:36h; south of Choros Island; distance 20m and 30º starboard of the boat; depth (sounder): 70m; SST: 18.5ºC.

First authenticated record of *M. peruvianus* in Chile

Interviews with local inhabitants revealed the existence of skeletal material of several cetaceans, some of which was donated to the CMMR collection. Among the specimens from 'Los Choros' beach, south of Punta de Choros (29º17.04'S, 71º23.54'W) (Fig. 1), was a small beaked whale skull, without mandibles or other body parts (Fig. 2), but with some fresh soft tissue attached when collected in May 1995. Identified as *M. peruvianus* from its cranial characteristics (see below), the skull was donated to CMMR in March 1998 and assigned specimen code GPS004. Between its finding and archiving it was left to dry, without further handling, on the roof of the collector's house.

FIGURE 1. Map of South America. Arrow shows the 'Punta de Choros' headland where *M. peruvianus* specimen GPS004 was collected.

Cranial characteristics of specimen GPS004

Skull GPS004 is somewhat incomplete: both nasal bones, the proximal parts of the right premaxillary bone, the synvertex and the right pterygoid bone are missing or damaged (See Fig.2). The cranium is fully mature as evidenced by advanced fusion between premaxillaries and maxillaries and the vomer which completely fills the mesorostral canal with dense bone. Specimen GPS004 is recognized as an adult *M. peruvianus* from comparison with the adult/subadult *M. peruvianus* reference sample in Reyes *et al*. (1991). The following diagnostic cranial morphological characteristics were ascertained.

(i) Very short condylobasal length (CBL) for an adult mesoplodont: 569mm (cf. 478-621mm, n=5).
(ii) Markedly narrow skull: zygomatic width/CBL = 0.452 (cf. 0.420-0.460, n=5).
(iii) Length of vomer visible on the palate is 120mm *(*cf. 90-171mm, n=6).
(iv) Presence of a pair of lateral maxillary excrescences (length, 45mm at right, 49mm left) in subapical position. This strongly suggests the specimen is a male (Aurioles-Gamboa and Urbán-Ramírez, 1993).
(v) Absence of basirostral grooves, maxillary ridges and prominential notches.

Some dried skin and connective tissue covered the rostrum but no traumatic injury was evident. However, after removal of tissues, it could be seen that the rostral bones are completely fractured through the maxillary excrescences, 22° from the transverse plane (Fig.3). The internal fracture *facies* is oblique, with the dorsal fracture line positioned posteriorly to the ventral fracture line. A smaller, accessory compression fracture is visible at the right excrescence. Fracture topology strongly suggests that it was caused by a severe upward blow on the rostrum coming from below left. Timing of the fracture may be situated at least a few weeks before death, considering the degree of primary bone remodelation contiguous to the fracture lines. Several vascular canals visible at the fracture zone show signs of osseous remodeling and stenosis (up to complete occlusion). More primary bone and more

FIGURE 2. Dorsal, ventral and left lateral view of a slightly damaged skull of *M. peruvianus* (GPS004) found at 29°16'S,71°25'W in north-central Chile. Note the transverse fracture of the rostrum at the height of the maxillary excrescences. Scale shown is 150mm.

orderly trabeculae are visible dorsally than ventrally. It is hypothesized that upward pressure on the rostrum during feeding, or a potential buccal infection, may explain less efficient osseous remodelation and healing at the buccal side. Overall, primary bone formation was insufficient to hold the fractured rostrum tip attached after the skull was prepared for archiving.

However, the rostral fracture may not have been the (direct) cause of death. Unrelated bone damage shows that two bullets traversed the anterior skull and likely killed the animal. The trace of one bullet, 10.9mm in diameter and some 6° inclined from the vertical plane, pierced the left maxillary bone, palatine and vomer. The second bullet trace, of the same diameter, but inclined *circa* 16° from the vertical, resulted from a more oblique shot through the nares. It shattered proximal parts of the right maxillary and most of the right pterygoid hamula. The fact that both bullets passed through the head, while leaving smoothly contoured circular tracings, suggest that a high-powered weapon and ammunition were used, and/or the weapon was fired at short range.

TABLE 2. Selected cranial measurements of *M. peruvianus* specimen GPS004.

Measurement	**mm**
Condylobasal length	569
Rostrum length, from the tip of rostrum to an imaginary line across hindmost limits of antorbital notches	340
Length of the maxillary excrescences (left/right)	45/49
Distance from the tip of rostrum to the anterior margin of the maxillary excrescences	64
Distance, in ventral view, from the tip of rostrum to the posterior margin of the vomer	232
Length of vomer visible on the palate	120
Distance, from the tip of rostrum to the anterior margin of the left external naris	387

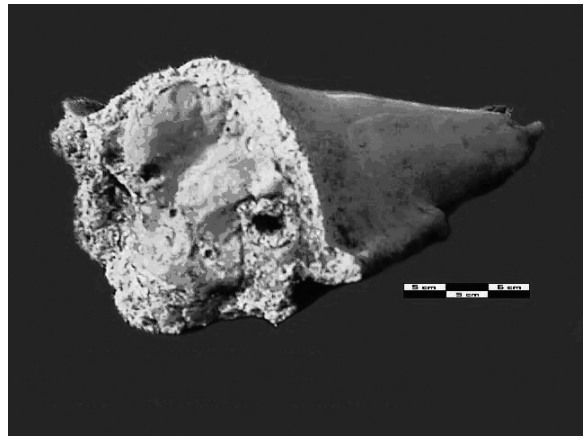

FIGURE 3. Posterior view of the transversal fracture facies of the rostrum of *M. peruvianus* specimen GPS004. Scale shown is 3cm.

CONCLUSIONS

Skull GPS004 is the first confirmed record of *M. peruvianus* in Chile. It extends the southernmost known distribution in the Eastern Pacific to 29°S, or 14° of latitude (1,550km) farther south than the most austral, published record in Peru. The Chilean and New Zealand (at 42º31'S) specimens, the sightings near Choros, and the species' common occurrence in Peru's cool coastal waters (Reyes *et al*., 1991; Van Waerebeek, unpublished data) question the hypothesis by Urbán-Ramírez and Aurioles - Gamboa (1992) who proposed the Eastern Tropical Pacific (ETP) as the core distribution area of *M. peruvianus*, believing that the records on the Peruvian coast are 'close to the limit of their southern range (15°S)'. Moreover, measured sea surface temperatures of 18.5°-19.2°C are notably below the normal SST range in the ETP of 22°-28°C (Fiedler *et al*., 1992).

Three sightings (5 individuals) in waters 20-70m deep suggest at least occasional nearshore presence of lesser beaked whales in a neritic habitat, an unusual ecological trait for ziphiids, considered to be almost exclusively oceanic. It is unclear whether the sighting of a neonate in February, suggesting calving in summer, may be the key to this inshore occurrence. A neritic distribution would also explain why lesser beaked whales are so often captured by Peru's artisanal fishermen (Reyes *et al*., 1991). Sightings attributed to *M. peruvianus* consisted of small groups of 1-3 individuals (n=5), consistent with typical ziphiid behaviour.

The fractured rostrum of specimen GPS004, considering the presence of bone remodelation,

may be only indirectly related to its death. A plausible hypothesis is that the beaked whale was either harpooned, net-entangled or stranded and was killed by shooting. Considering the diameter of the bullet holes and their clean path, the firearm used may have been equivalent to the high-powered 9mm semi-automatic handguns which are wide-spread in Chile. The use of firearms to capture or kill cetaceans has before been reported in Chile (Cárdenas *et al*., 1986; Van Waerebeek *et al*., 1999; Sanino y Yáñez 2001 b) but the present case is the first circumstantial evidence.

The cetaceans that inhabit waters surrounding the coastal islands off north-central Chile are facing threats that include direct catches (Sanino and Yáñez, 2001a, 2001b), bycatch (Van Waerebeek *et al*., 1999) and unregulated whalewatching operations (Sanino and Yáñez, 2000). The area is regularly visited by semi-industrial fishing vessels equipped with an extended bowsprit from where swordfish are taken with hand-held harpoons. Fishermen are known to apply the same method to hunt small cetaceans (Sanino and Yáñez, 2001a, 2001b). Long-liners are accused of making use of firearms and dynamite against sperm whales (*Physeter macrocephalus*) which compete for Patagonian toothfish (*Dissostichus eleginoides*) by removing hooked fishes (based on interviews conducted by PS with captains of local fishing vessels). The authors express concerns about the management of cetaceans and other marine biological resources around Los Choros even though the region includes to two Marine Reserves.

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REFERENCES

AGUAYO, A.
1999 Los cetáceos y sus perspectivas de conservación. Estudios Oceanológicos (Chile) 18:18-35.

AURIOLES-GAMBOA, D. and URBAN-RAMIREZ, J.
1993 Sexual dimorphism in the skull of the pygmy beaked whale (*Mesoplodon peruvianus*). Revista de Investigación Científica (No. Esp. SOMMEMA 1), UABCS 1: 39-52.

BAKER, A. N. and VAN HELDEN, A. L.
1999 New records of beaked whales, genus *Mesoplodon*, from New Zealand (Cetacea: Ziphiidae). Journal of the Royal Society of New Zealand 29(3):235-244.

CANTO, J., RUIZ, P. y YÁÑEZ, J.
1992 Registro de nuevas especies de cetáceos para la costa de Chile y antecedentes del grupo. Boletín del Museo Nacional Historia Natural, Chile 43:105-115.

CAPELLA, J., VILINA, Y. y GIBBONS, J.
1999 Observación de Cetáceos en Isla Chañaral y Nuevos Registros para el Área de la Reserva Nacional Nacional Pingüino de Humboldt, Norte de Chile. Estudios Oceanológicos (Chile) 18: 57-64.

CÁRDENAS, J.C., OPORTO, J. y STUTZIN, M.
1986. Problemas de manejo que afectan a las poblaciones de cetáceos menores en Chile. Proposiciones para una política de conservación y manejo. Segundo encuentro científico sobre el medio ambiente, Talca, 4-8

agosto 1986: 29-37.

CITES

2006 Convention on Internacional Trade in Endangered Species of Wild Fauna and Flora. Official web site. Appendices I, II, III. <http://www.cites.org/eng/app/appendices.shtml> [26-06-2006].

FIEDLER, P.C., CHAVEZ, F.P., BEHRINGER, D.W. and REILLY, S.B.

1992 Physical and biological effects of Los Niños in the eastern tropical Pacific, 1986-1989. Deep-Sea Research 39(2): 199-219.

FINDLAY, K., PITMAN, R., TSURUI, T., SAKAI, K., ENSOR, P., IWAKAMI, H., LJUNGBLAD, D., SHIMADA, H., THIELE, D., VAN WAEREBEEK, K., HUCKE, R. and SANINO, P.

1998 1997/1998 IWC-Southern Ocean Whale and Ecosystem Research (IWC-SOWER) Blue Whale Cruise, Chile. Final Report of the third IWC Blue Whale Cruise of the International Whaling Commission SOWER program. 39 p. [not published].

IUCN

2006 IUCN Red list of threatened species. The IUCN species survival commission. IUCN. The World Conservation Union. Gland. <http://www.redlist.org/> [26-06-2006].

PITMAN, R.L. and LYNN, M.S.

2001 Biological observations of an unidentified mesoplodont whale in the eastern tropical Pacific and probable identity *Mesoplodon peruvianus*. Marine Mammal Science 17:648-657.

REYES, J. C., MEAD, J. G. and VAN WAEREBEEK, K.

1991 A new species of beaked whale *Mesoplodon peruvianus* sp. n. (Cetacea: Ziphiidae) fromPeru. Marine Mammal Science 7:1-24.

SANINO, G.P. y YÁÑEZ, J. L.

2000 Efectos del turismo de observación de cetáceos en Punta de Choros, IV Región, Chile. Revista Gestión Ambiental (Chile) 6: 41-53.

SANINO, G.P. y YÁÑEZ, J. L.

2001a Nueva técnica de video identificación y estimación de tamaño poblacional en cetáceos, aplicada en delfines nariz de botella, *Tursiops truncatus*, de Isla Choros, IV Región de Chile. Boletín del Museo Nacional de Historia Natural ,Chile 50: 37-63.

SANINO, G.P. and YÁÑEZ, J. L.

2001b Study of a *Globicephala melas* individual stranded in the III Region and review of the genus for Chile. Boletín del Museo Nacional de Historia Natural, Chile, 50: 21-36.

SANINO, G.P., VAN WAEREBEEK, K. and YÁÑEZ, J.L.

2003 Review of the distribution of the genus *Delphinus* and documented records of *Delphinus capensis*, in Chile. Boletín del Museo Nacional de Historia Natural, Chile 52: 797-102.

URBÁN-RAMÍREZ, J. and AURIOLES-GAMBOA, D.

1992 First record of the pygmy beaked whale *Mesoplodon peruvianus* in the North Pacific. Marine Mammal Science 8(4): 420-425.

VAN WAEREBEEK, K.

1991 New whale surfaces in Peru. Sonar 5: 10.

VAN WAEREBEEK, K., VAN BRESSEM, M.F., ALFARO-SHIGUETO, J., SANINO, G.P., MONTES, D. and ONTON, K.

1999 A preliminary analysis of recent captures of small cetaceans in Peru and Chile. Paper SC/51/SM17 presented to IWC Scientific Committee, Grenada, May 1999. [unpublished].

YÁÑEZ, J.

1997 Reunión de Trabajo de especialistas en mamíferos acuáticos para categorización de especies según estado de conservación. Noticiario Mensual del Museo Nacional de Historia Natural, Chile 330: 8-16.

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