



XII Congreso Geológico Chileno
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First fossil billfish (Perciformes: Xiphiidae) from central Chile.

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Introduction

The re-examination of fossil samples originally collected in 1935 by Dr. Humberto Fuenzalida (formerly Director of the National Museum of Natural History of Santiago) from the locality of Faro Carranza, Maule Region, central Chile, has revealed the first fossil billfish (Perciformes: Xiphiidae) remains in the country. The presence of xiphiid fishes in the Faro Carranza sedimentary beds, partially suggest the existence of Paleogene levels, based on the known stratigraphic range of the Xiphiidae. This inference is also supported by previous drilling works performed in the vicinity of the collection site. The exact provenance of the materials was not provided by the original collector, making it difficult to restrict the location of the Paleogene levels in the locality. *Repository*— SGO-PV: Collection of Vertebrate Paleontology, Museo Nacional de Historia Natural (National Museum of Natural History), Santiago.

Locality and geologic setting

The materials were collected at Faro Carranza (35° 35' S, 72° 37' W), located about 20 km north of Chanco and 40 km south of Constitución, in Maule Region, central Chile. The most extensive unit that crops out in the area comprises most of the coastal cliffs and the intertidal surface, and is composed of sandstones and conglomerates, with occasional lenses and concretionary nodules that yield an abundant fossil fauna and rare carbonized wood remains. The invertebrate fossils include abundant bivalves of the species *Cardium acuticostatum* D'Orbigny and the ammonoids *Gunnarites* sp., *Grossouvreites* sp. and *Diplomoceras* sp., indicating a Maastrichtian age [1]. In addition, a rich vertebrate assemblage is found at the locality, including chondrichthyan fishes of the families Odontaspidae, Squalidae, Schlerorhynchidae, Dasyatidae and Callorhynchidae, undetermined teleostean fishes, sea turtles, and marine reptiles of the families



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elasmosauridae and mosasauridae [2], [3]. This unit is considered as equivalent to the Quiriquina Formation [4] in the Bío Bío Region. A different unit crops out in the southern limit of the locality, and is composed of a succession of sandstones and conglomerates with bivalves, brachiopods, gastropods, decapods, ichnofossils and scarce lamnid sharks (in study). Despite the abundant ammonoids in northern beds of the locality, they were not recognized in these layers.

Systematic Paleontology

Order PERCIFORMES Bleeker, 1859
Suborder XIPHIOIDEI Swainson, 1839
Family XIPHIIDAE Swainson, 1839
Subfamily XIPHIORHYCHINAE Regan, 1909

Xiphiorhynchinae incertae sedis

Materials—SGO.PV.6634: Proximal and middle portions of rostrum, incomplete articulated lower jaw rami comprising dentaries and angulars.

Age—Possibly Paleogene, based on the presence of Eocene levels overlying Late Cretaceous beds in wells made in front of the fossiliferous locality, and also based on the known chronostratigraphic distribution of xiphiid fishes.

Description— The proximal portion of the rostrum comprises two robust premaxillae, each semi-circular in cross section. The distal part of the ethmoid lies between the premaxillae and bears antero-posteriorly oriented ridges over its dorsal surface. This bone is anteriorly extensive, extending between the premaxillae. This matches the condition seen in fossil and Recent xiphiids [5], [6], but differs from the arrangement in istiophorids (marlins and spearfishes), where the ethmoid lacks a pronounced anterior projection. The medial portion of the rostrum preserves the paired premaxillae. Here the cross-section of the rostrum is oval in shape, but the ventral surface of the ‘sword’ is not preserved. This specimen also includes two associated fragments of the right and left rami of the lower jaw. Each ramus is composed of a dentary and an angular. These bones meet in a long ‘v’-shaped suture. The anterior tip of each ramus is not preserved, so it is not possible to determine whether the symphysis was fused. Abundant alveoli cover almost all the occlusal and lateral surfaces of the dentary. Unlike in the extant swordfish *Xiphias*, but like the fossil xiphiids *Xiphiorhynchus* and *Xiphiorhynchoides*, the lower jaw of the Chilean billfish is elongate, probably equal in length to the ‘sword’ [6]. This seems to reflect the primitive condition for xiphiids, based on outgroup comparison with blochiids, an extinct group of Eocene stem swordfishes [7].



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Discussion and Conclusions

The studied sample constitutes the first record of a xiphiid fish from Chile. Excepting an isolated vertebral centrum from the Eocene of Seymour Island, Antarctica [8], this specimen represents the southernmost fossil record of this family. The ovoid cross-section of the 'sword' and the elongate lower jaw are consistent with the extinct subfamily Xiphiorhynchinae, although it is possible that these features might represent xiphiid symplesiomorphies. Taxonomy of xiphiorhynchines, especially that of the genus *Xiphiorhynchus*, is complicated by the fact that nearly all constituent species are represented only by rostral fragments. More precise taxonomic identification of the Chilean xiphiorhynchine will require an explicit, synapomorphy-based scheme for fossil and living swordfishes. The known chronostratigraphic distribution of xiphiids is restricted to the Eocene-Holocene [6]. The identification of material attributable to this group implies the existence of Paleogene (probable Eocene) levels at the locality of Faro Carranza. This is also suggested by previous drillings assigned to the Eocene [9] based on stratigraphic correlations.

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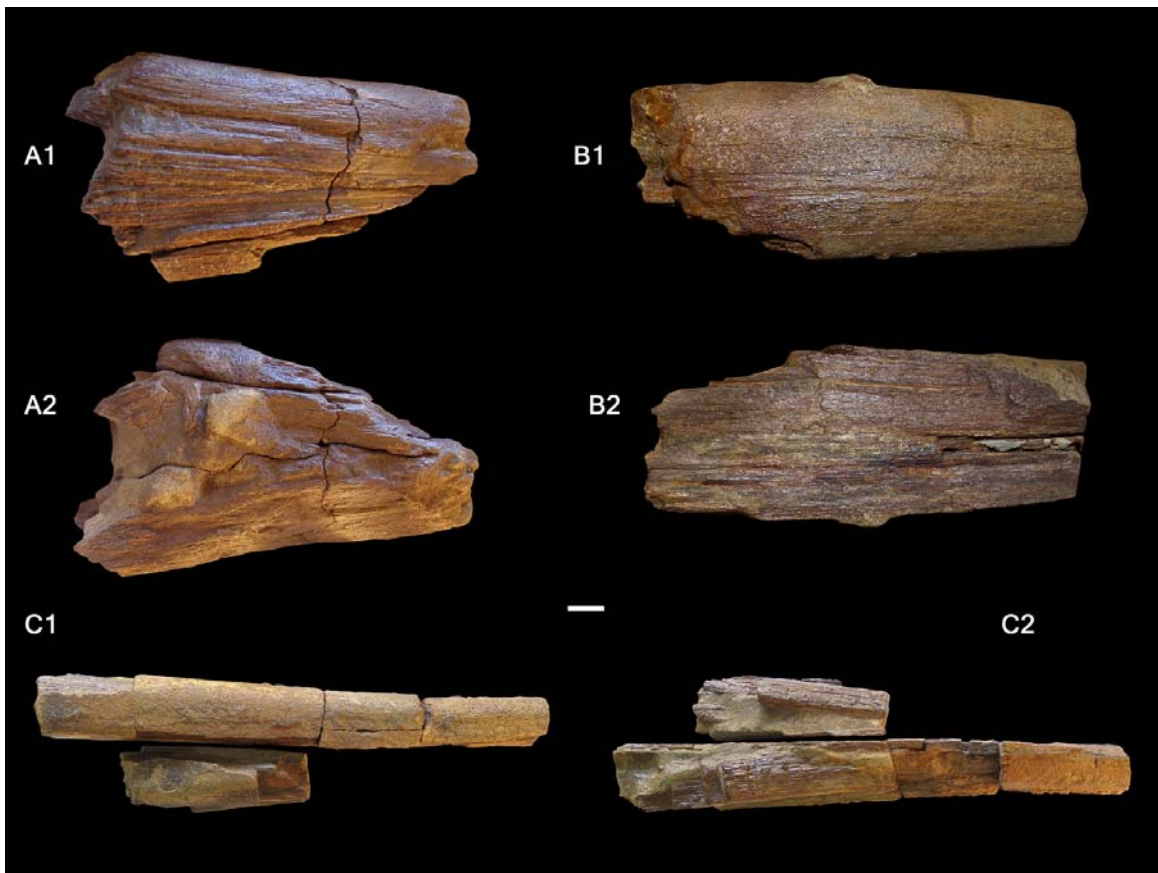


Fig. 1: SGO-PV-6634: *Xiphiorhynchinae incertae sedis*. **A1)** Proximal portion of rostrum in dorsal view. **A2)** ventral view. **B1)** Medial portion of rostrum in dorsal view. **B2)** ventral view. **C1)** Fused dentaries in dorsal view. **C2)** ventral view. Scale bar = 1 cm.