Sclerorhynchid teeth (Neoselachii, Sclerorhynchidae) from the Late Cretaceous of the Quiriquina Formation, central Chile

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ABSTRACT

The rostral tooth morphology of *Ischyrhiza chilensis* (Philippi, 1887) is examined on the basis of a new material from the Maastrichtian of the Quiriquina Formation, central Chile. Oral teeth of a new sclerorhynchid, *Biropristis landbecki* gen. et sp. nov., are described from the same formation of the Algarrobo locality. These discoveries provide new and important data on the diversity and the paleobiogeography of Sclerorhynchidae, still poorly known in the Pacific realm of the southern hemisphere.

Key words: Neoselachii, Sclerorhynchidae, Ischyrhiza, Biropristis, Late Cretaceous, Chile.

RESUMEN

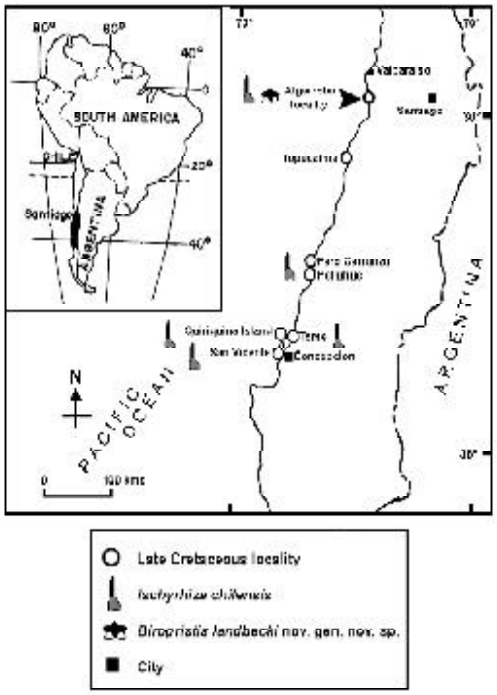
Dientes de esclerorrínquidos (Neoselachii: Sclerorhynchidae) del Cretácico tardío de la Formación Quiriquina, Chile central. La morfología de los dientes rostrales de *Ischyrhiza chilensis* (Philippi, 1887) es examinada sobre la base de nuevo material proveniente del Maastrichtiano de la Formación Quiriquina, Chile central. Se describen los dientes orales de un nuevo esclerorrínquido, *Biropristis landbecki* gen.et sp. nov., provenientes de la misma formación expuesta en la localidad de Algarrobo. Estos nuevos hallazgos entregan importante información sobre la diversidad y paleobiogeografía de los Sclerorhynchidae, aún pobremente conocidos dentro del dominio pacífico del hemisferio sur.

Palabras claves: *Neoselachii, Sclerorhynchidae, Ischyrhiza, Biropristis, Cretácico tardío, Chile.*

INTRODUCTION

The Quiriquina Formation, central Chile, South America, is known from the last century through the work of several authors (Philippi, 1887; Brüggen, 1915; Wetzel, 1930; Oliver Schneider, 1936; J. Tavera, 1988[1]), but was formally named by Biró-Bagóczky (1982) who designated its type locality in

Las Tablas, northwest bay of Quiriquina Island. Although Biró-Bagóczky (1982) proposed a Campanian-Maastrichtian age for the Quiriquina Formation, a more recent study carried out by Stinnesbeck (1986) proposed an exclusively Maastrichtian age. The marine sediments of this formation crop out along the central coast of Chile and reaches its maximum development in the vicinity of Concepción where the stratigraphically most complete lithological successions are located (text-Fig.1). The Quiriquina Formation begins with a basal conglomerate, which is followed by bioturbated and mainly glauconitic marine sandstones, horizons of calcareous sandstone with concretions and coquina beds. During the last years the first author has collected abundant remains of vertebrate fossils from the outcrops of this unit which are located between Algarrobo, northwards, and Concepción, southwards (text-Fig. 1). Most of the fossil material comes from the lower part of the Quiriquina Formation and is represented by teeth of *Centrophoroides*, *Squatina*, Orectolobiformes indet., *Carcharias* sp., *Paraorthacodus* sp., rhinobatids and dental plates of chimaeroids fishes (Suárez 2001; Stahl, 2001; Suárez *et al.* 2003). Actinopterigyan fishes are also found (*eg. Enchodus* sp. and *Belonostomus longirostris*) (Suárez, 2001; Suárez y Fritis, 2002; Brito y Suárez, 2003;) as well as fossil bones of marine reptiles belonging to the Mosasauridae and Elasmosauridae (Suárez, 2000; Suárez *et al.,* 2003). Some of the recently recognized fish taxa seem to be the same as those formerly mentioned by Philippi (1887), Wetzel (1930) and Oliver Schneider (1936). Direct comparisons with the type material has not been possible because the whereabouts of fossils described by the latter authors are unknown.



Text FIG. 1. Geographical maps showing the Late Cretaceous localities of the Quiriquina Formation and provenance of the sclerorhynchid teeth.

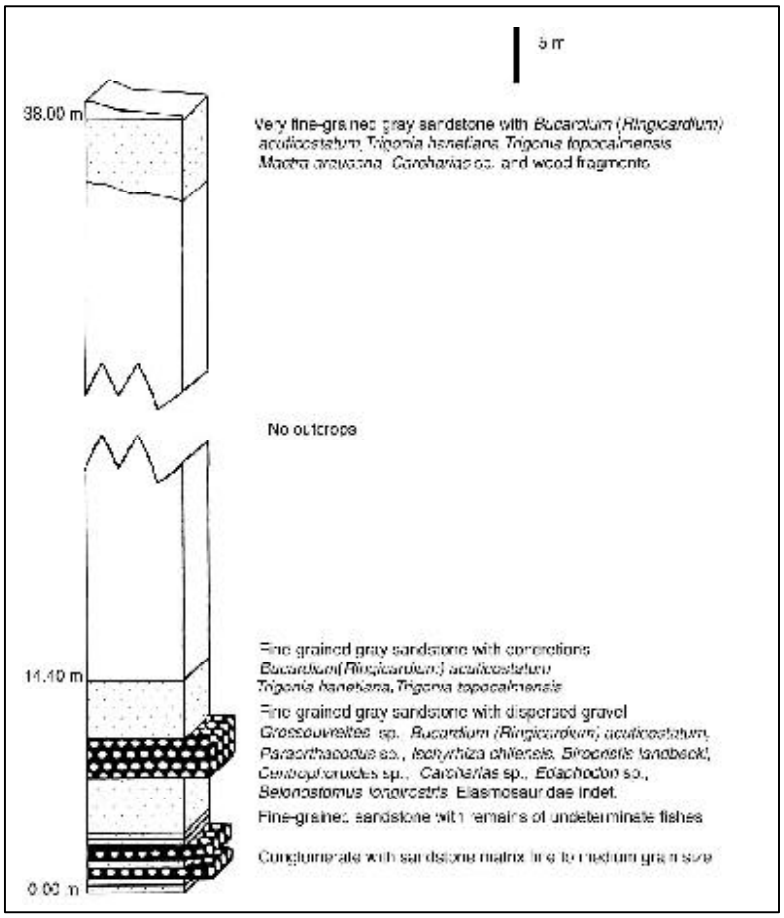
HISTORICAL REVIEW

The first fossil record of selachians in the Quiriquina Formation is by Philippi (1887) who mentioned and illustrated some teeth coming from Quiriquina Island and from Algarrobo locality. Brüggen (1915); Wetzel (1930); Oliver Schneider (1936) and J. Tavera (1988)[1] cited fossil fish teeth coming from the Quiriquina Island and other localities of the Quiriquina Formation. Recently the senior author of his article has collected new selachian teeth from four localities exposing the Quiriquina Formation (text-Fig. 1). The material includes rostral teeth of *Ischyrhiza* as well as oral teeth belonging to a new genus of sclerorhynchid, and are described and discussed below.

[1] 1988. Formación Quiriquina. Localidades para la Formación. Estratotipos y Fauna (33º21'S-37º50'S) (Inédito), *Universidad de Chile, Facultad de Ciencias Físicas y Matemática*s, *Departamento de Geología*, 212 p.

MATERIAL AND LOCALITIES

Most sclerorhynchid remains consist only of isolated rostral teeth. Rostral teeth of the genus *Ischyrhiza* are abundant (57 available specimens) but only fifteen are complete (SGO-PV 805-820). The rest of rostral teeth is represented by broken crowns and peduncles. Material of *Ischyrhiza* was recovered by surface collecting from five localities of the Quiriquina Formation. The best sample of teeth was obtained from Algarrobo locality (30° 31'S) and incomplete teeth of *Ischyrhiza* were also collected from Faro Carranza (35° 36'S), Pelluhue (35°43'S); Tomé (36° 37'S) and Las Tablas (36°36'S) (text-Fig. 1). Just two oral teeth were recovered from the Algarrobo locality and have the numbers SGO-PV-800 and SGO-PV-801. The stratigraphic horizon of the fossil material in the Algarrobo locality is indicated in text figure 2. All the material described and figured in this work is deposited in the Sección Paleontología of the Museo Nacional de Historia Natural, Santiago, Chile, under numbers SGO-PV-800, SGO-PV-801, SGO-PV-807, SGO-PV-809 and SGO-PV-810.



Text FIG. 2. Stratigraphical column of the Quiriquina Formation exposed in the Algarrobo locality with horizons of vertebrate fossils (modified from Tavera, 1980).

SYSTEMATIC DESCRIPTIONS

Superorder Batomorphii
Order Rajiformes
Family Sclerorhynchidae Cappetta, 1974
Genus *Ischyrhiza* Leidy, 1856

Type species: *Ischyrhiza antiqua Leidy*, 1856a. Cretaceous. Neuse River, North Carolina, U.S.A.

***Ischyrhiza chilensis* (Philippi, 1887)**
(Plate 1, Figs. 1-9)

1887. *Plesiosaurus chilensis* Philippi, p. 5, Lam. 55, Fig. 8. 1930. *Ischyrhiza chilensis* (Philippi). Wetzel, p. 95-96.
1936. *Ischyrhiza chilensis* Philippi. Oliver Schneider, p. 821-824.
1988. *Ischyrhiza* sp. Philippi. Tavera, 1988[1], p. 180, Lam. 27, Fig.174.

Figured material: three rostral teeth; SGO-PV 807, SGO-PV 809, SGO-PV-810. Algarrobo locality, Quiriquina Formation, central Chile (text-Fig. 1).

Description: Sclerorhynchidae with rostral teeth of large size (up to 3.2 cm). The cusp is thin and quite sharp, dorso-ventrally compressed, with a generally translucent tip of white enameloid. The crown-peduncle limit is defined by a neck or quite pronounced bulge forming a saddle-like contour, as a downward-bending bow in upper (or lower) view, bending upward in anterior and posterior views. The posterior margin of the cusp is smoothly convex with a cutting edge developed along the upper two thirds of its length. The anterior cutting edge is developed along the upper half of the crown and abruptly disappears, giving the cusp an anterior outline markedly sigmoidal shape in dorsal (or ventral) view (Pl. 1, Fig. 1). The peduncle is slightly shorter than the cusp. The maximum width is noted at the level of the basal face. The upper and lower faces are rather flat and their proximal halves show an alternance of deep furrows separated by irregular laminae. The basal face (Pl. 1, Fig. 3) presents a quite wide and deep medial furrow continuing on the anterior and posterior faces. In general, the posterior groove is more developed than the anterior, reaching a higher position on the peduncle. Some large teeth can have a thicker peduncle. Some proximal teeth, of smaller size, are strongly arched dorsoventrally (Pl. 1, Figs. 8, 9). They have a very well developed peduncle of square cross section in basal view (Pl. 1, Fig. 8) and with a truncated pyramidal form in upper (or lower) view (Pl. 1, Fig. 7). In some small teeth, the cusp is more erect and the peduncle has a more elliptical shape in basal view (Pl. 1, Fig. 5), with a clear posterior basal process in upper view (Pl. 1, Fig. 4).

Discussion: Wetzel (1930) proposed the name *Ischyrhiza chilensis* for teeth of his own collection, which certainly correspond to the teeth figured in the present study. When Philippi (1887) described and figured the rostral teeth from Quiriquina, he misinterpreted them as teeth of *Plesiosaurus chilensis* (Gay, 1848), while he thought were associated with the skeletal remains of this taxon. Wetzel (1930) recognised the true nature of these teeth by comparing them with those of *I. mira* (Leidy, 1856 b) from the northern hemisphere. He did not provide any adequate descriptions to separate these species, and neither did he figure the material. On the other hand, Oliver Schneider (1936) commented on the species *I. chilensis*, but he did not consider its formal diagnosis. J. Tavera (1988)[1] described and figured a tooth from Faro Carranza and assigned it just as *Ischyrhiza* sp.

The present paper clarifies the previously unsatisfactory status of the Chilean *Ischyrhiza* species and widens its occurrence to four new localities of the Quiriquina Formation. The authors consider that the specific name *chilensis* proposed by Philippi (1887), is to be retained for the rostral teeth, even if they were first identified as teeth of a plesiosaur by Philippi. The rostral teeth of *I. chilensis* seem to be abundant in all studied localities from the Quiriquina Formation, but no single oral tooth that could be allocated to this species has been found yet.

Twelve *Ischyrhiza* nominal species are known in the Late Cretaceous, from the Turonian to the Maastrichtian and are found in North America, Europe, Middle East and Africa:

Ischyrhiza antiqua Leidy, 1856a: Cretaceous, Neuse River,

North Carolina, U.S.A.
Ischyrhiza avonicola Estes, 1964: Maastrichtian (Lance Formation), Eastern Wyoming, U.S.A.
Ischyrhiza basinensis Case,1987: Upper Campanian, east of Worland, Washakie County, Wyoming, U.S.A.
Ischyrhiza chilensis (Philippi, 1887): Maastrichtian, Quiriquina Island, Chile.
Ischyrhiza georgiensis Case, Schwimmer, Borodin and Leggett, 2001: Lower/Middle Santonian (Eutaw Formation). Entrance of Fort Benning, Chattahoochee County, Georgie, U.S.A.
Ischyrhiza germaniae (Weiler, *in* Albers and Weiler 1964): Lower Campanian, Aix-La-Chapelle, Germany.
Ischyrhiza hartenbergeri Cappetta, 1975: Maastrichtian (El Molino Formation), Toro-Toro, northeast of Potosí, Bolivia.
Ischyrhiza mira Leidy, 1856b: Upper Cretaceous (Cretaceous Greensand), Burlington County (no more precision), New Jersey, U.S.A.
Ischyrhiza mira/schneideri Slaughter and Steiner, 1968: Eagle Ford Formation. Turonian (Bells Member), Marsh Lane Locality, Dallas County, Texas, U.S.A.
Ischyrhiza monasterica Case and Cappetta, 1997: Late Maastrichtian (Navarroan, Kemp Clay Formation), South Sulphur River, near Commerce, Hunt County, Texas, U.S.A.
Ischyrhiza nigeriensis (Tabaste, 1963): Maastrichtian, Mont Igdaman, Niger.
Ischyrhiza viaudi Cappetta, 1981: Lower Santonian, Les Bardys, Notre-Dame-de-Riez, Vendée, western France.

Seven of these (*I. avonicola*, *I. basinensis*, *I. georgiensis*, *I. germaniae*, *I. hartenbergeri*, *I. monasterica*, and *I. viaudi*) correspond to forms of small size, of which a single species, *I. hartenbergeri*, is known in South America (Maastrichtian of Bolivia).

The five remaining representatives of this genus (*I. antiqua, I. chilensis*, *I. mira, I . mira/schneideri*, *I. nigeriensis*) are large sized species. The occurrence of *Ischyrhiza chilensis* in the Quiriquina Formation widens the southward distribution of this group during the Late Cretaceous and constitutes the second record of a large sized sclerorhynchids in South America, the first one being *Pucapristisbranisi* Schaeffer, 1963, from the Maastrichtian of Bolivia.

It is probable that *Ischyrhiza antiqua*, the age of which was not precisely indicated, is a synonym of *I. mira*.

Other species, formerly assigned to the genus *Ischyrhiza*, belong in fact to other taxa:

The species *Ischyrhiza*? *radiata* Clark, 1895 (Eocene, Clifton Beach, Maryland, U.S.A.) was based on a hypural plate and vertebrae of an actinopterygian fish (figured in Clark, 1896); so, it does not belong to a sclerorhynchid.

The species *I. texana* Cappetta and Case, 1975 [Turonian-Coniacian boundary (contact Eagle Ford Shale-Austin Chalk), Kiest Boulevard, Dallas, Texas, U.S.A.] has been recently reevaluated and is now assigned to the genus *Kiestus* (Cappetta and Case, 1999).

The species *iwakiensis* [*Inoceramus amakusensis* Zone; Lower Santonian (Upper Arakawa Series). Iwaki City, Fukushima Prefecture, Japan] was assigned to *Ischyrhiza* by Uyeno and Hasegawa, 1986. In fact, this species belong to the genus *Onchosaurus* and is probably a junior synonym of *O. pharao* Dames, 1887.

Ischyrhiza palaeformis (Meyer, 1974) [Santonien (Tombigbee Sand Member, Eutaw Group), Vinton's Bluff, Clay County, Mississippi] and *Ischyrhiza ritchiei* (Meyer, 1974) [Turonian (Eagle Ford Group, Bells Mbr.), Dallas County, Texas, U.S.A.] were first assigned to the genus *Ptychotrygon*. Since the Meyer's work was never published, these names are *nomina nuda*.

Comparisons: the rostral teeth of *I. chilensis* (Philippi) can only compare with few other species of the genus having large sized rostral teeth. In *I. nigeriensis* (Tabaste), the teeth are much flatter at the level of the cusp and peduncle. The cusp is more developed antero-posteriorly without a basal bulge and anterior and posterior cutting edges reaching the base of the cusp. The peduncle is practically as well developed antero-posteriorly at its base than just below the cusp. The base is rectangular and the upper and lower sides bear grooves separated by strong but regular laminae. In *I. mira* Leidy the teeth are much longer (about twice the size); the anterior and posterior cutting edges reach the base of the cusp; there is no basal bulge. The grooves and laminae at the base of the peduncle are more marked on the small teeth and become more superficial on the large specimens. The base is rectangular, with anterior and posterior hollows, the latter being deeper. In *I. chilensis*, the rostral teeth are thicker than those of *I. mira*; the cutting edges of the cusp stop before the base and there is a well-marked basal bulge. The base of the peduncle is wide dorso-ventrally, much more than in *I. mira* or *I. nigeriensis*; the grooves and laminae are only slightly marked. The basal face of the peduncle is not

hollowed except at the level of the anterior and posterior notches, which are rather narrow. In some teeth, the lower half part of the posterior face of the peduncle is concave, indicating a probably narrow contact between teeth on the rostrum. By this feature, the rostral teeth of *I. chilensis* resembles the teeth of the genus *Markgrafia* Weiler, 1935, from the late Cenomanian of Egypt; yet, in the latter, the base of the cusp is strongly folded and the base of the peduncle is much more developed dorso-ventrally, with a well marked posterior hollow.

Genus *Biropristis* gen. nov.

Type species: *Biropristis landbecki* gen. et sp. nov.
Derivatio nominus: after Dr. Lajos Biró-Bagózcky for his important contribution to the study of the geology and the paleontology of the Quiriquina Formation.
Diagnosis: Sclerorhynchid only known by its oral teeth. Teeth wider than long, rather thick, with a medially cuspidate crown less broad than the root in occlusal view. The occlusal face of the crown has a rhomboidal outline with rounded lateral corners. Labial face showing an ornamentation consisting of numerous short, salient and irregular wrinkles radiating from the cusp. Lingual face low and smooth, with a moderately salient uvula. Root rather thick. Root lobes with wide and flat basal faces separated by a broad labio-lingual furrow.

Biropristis landbecki sp. nov.
(Plate 2, Figs. 1-6)

Type material: two oral teeth. Maastrichtian. Algarrobo locality, central Chile, South America (text-Fig. 1).
Holotype: SGO-PV-800, Plate 2, Figs. 1-3
Paratype: SGO-PV-801, Plate 2, Figs. 4-6
Derivation of name: after Luis Landbeck who collected the first fossils in Algarrobo locality.
Diagnosis: same as for genus.
Description: the teeth are broader than long, with a low and slightly cuspidate crown less transversally expanded than the root. The crown shows very different faces. In occlusal view, the crown present a rhomboidal out line. The labial margin of the labial face is medially angular, with almost straight marginal segments. The marginal angles are wide and rounded. The cusp, in a lingual position, is clear but low. In profile view, the labial face is not very abrupt and concave. It bears an ornamentation consisting of numerous small, irregular, and few salient wrinkles roughly radiating from the cusp. In profile view, this face projects a horizontal and well developed visor. The lingual face is much less developed, with a rather narrow median uvula. In profile view, it is practically vertical. The root is wide and high, with lobes having a flat basilar face; these lobes are separated by a deep groove. In profile view, its labial face is very concave. There is a pair of well developed margino-lingual foramina. The specimen SGO-PV-801 (Pl. 2, Figs. 4-6) is smaller but shows the same general pattern. The labial face is flatter in profile view, with a stronger ornamentation and longer wrinkles. The lingual face shows a concave profile. In both teeth, the groove widens in its labial part.
Discussion: the two oral teeth described above show morphological features that relates them to the Sclerorhynchidae without any doubt. By the rhomboidal shape of the occlusal face of the crown and very peculiar ornamentation of the labial face, these teeth can be separated from all other oral teeth of sclerorhynchids. Only the teeth of a species attributed to the genus *Ptychotrygon*, *P. winni* Case and Cappetta, 1997, show a similar ornamentation. The following differences can be noted: in *P. winni*, the wrinkles of the labial face are longer, less numerous and often uniting to form more or less tranverse ridges. Moreover, the teeth of *P. winni* show a clear articular hollow above the lingual uvula, and also a transverse ridge on the lingual face of the crown. In comparison with other sclerorhynchids the general morphology of the oral teeth of *Biropristis landbecki* sp. nov. is more similar with those of the genus *Sclerorhynchus* Woodward, 1889. Nevertheless, the characteristic rhomboidal out line of the occlusal face of *Biropristis* distinguishes it from all the *Sclerorhynchus* species which have an occlusal face with triangular out line.

Sclerorhynchid genera

Nineteen sclerorhynchid genera have been described, most of them based on rostral teeth.

Ankistrorhynchus Casier, 1964 [type-species: *Ankistrorhynchus lonzeensis* Casier, 1964; Lower Santonian, Lonzée, Namur Province, Belgium].

Bahariprístis Werner, 1989 [type-species: *Bahariprístis bastetiae* Werner, 1989; Upper Cenomanian, Gebel District, Bahariya Oasis, Egypt].

Borodinopristis Case, 1987 [type-species: *Borodinopristis schwimmeri* Case, 1987; Campanian (Upper Blufftown Formation), north bank of Hannahatchee Creek, Stewart County, Georgia, U.S.A.].

Celtipristis Kriwet, 1999 [type- species: *Celtipristis herreroi* Kriwet, 1999; Lower Barremian, Alcaine, Teruel Province, Spain].

Ctenopristis Arambourg, 1940 [type-species: *Ctenopristis nougareti* Arambourg, 1940; Maastrichtian, Koudiat Abdou and Ksibet-El-Draben, Ouled Abdoun Basin, Morocco].

Dalpiazia Checchia-Rispoli, 1933 [type-species: *Dalpiazia stromeri* Checchia-Rispoli, 1933; Maastrichtian, Tripolitaine, Libya].

Ganopristis Arambourg, 1935 [type-species: *Ganopristis leptodon* Arambourg, 1935; Maastrichtian, Ouled Abdoun Basin, Morocco].

Ischyrhiza Leidy, 1856a [type-species: *Ischyrhizamira* Leidy, 1856b; Late Cretaceous (Cretaceous Greensand), Burlington County (no more precision), New Jersey, U.S.A.].

Kiestus Cappetta and Case, 1999 [type-species: *Ischyrhiza texana* Cappetta and Case, 1975; Turonian-Coniacian boundary (contact Eagle Ford Shale-Austin Chalk), Kiest, Dallas County, Texas, U.S.A.].

Libanopristis Cappetta, 1980 [type-species: *Sclerorhynchus hiram* Hay, 1903; Cenomanian, Hadjula, Lebanon].

Marckgrafia Weiler, 1935 [type-species: *Marckgrafia libyca* Weiler, 1935; Lower Cenomanian, Bahariya Oasis, Egypt].

Micropristis Cappetta, 1980 [type-species: *Sclerorhynchus solomonis* Hay, 1903; Cenomanian, Hadjula, Lebanon].

Onchopristis Stromer, 1917 [type-species: *Gigantichthys numidus* Haug, 1905; Late Albian or Lower Cenomanian (Continental intercalaire), Djoua Ohanet, East of Timassanine, Argelia].

Onchosaurus Gervais, 1852 [type-species: *Onchosaurus radicalis* Gervais, 1852; Senonian, Meudon, near Paris, France].

Plicatopristis Cappetta, 1991 a [type-species: *Plicatopristis strougoi* Cappetta, 1991; Lower Maastrichtian, Mine A, Bed 1, near Wadi Teban, Hamrawein area, Egypt].

Pucapristis Schaeffer, 1963 [type-species: *Pucapristis branisi* Schaeffer, 1963; Maastrichtian (El Molino Formation, Puca Group), Toro-Toro, northeast of Potosí, Bolivia].

Renpetia Werner, 1989 [type-species: *Renpetia labiicarinata* Werner, 1989; Late Cenomanian, Gebel District Bahariya Oasis, Egypt].

Schizorhiza Weiler, 1930 [type-species: *Schizorhiza stromeri* Weiler, 1930; Lower Maastrichtian, Wadi Hammame; Gebel El Qurn, near Mahamid; Gebel Hefhuf; Otwani, near d'Edfu, Nile valley, Egypt].

Sclerorhynchus Woodward, 1889 [type-species: *Sclerorhynchus atavus* Woodward, 1889; Late Santonian, Sahel Alma, Lebanon].

The genera *Ankistrorhynchus*, *Marckgrafia* and *Onchosaurus* are to date only known by their rostral teeth.

Werner (1989) has associated oral teeth with the rostral teeth of *Marckgrafia* on the base of material collected in the Late Cenomanian of Bahariya, Egypt. Yet, as this author has mixed the faunas of two different horizons and has misinterpreted the dentition of several sclerorhynchid taxa, this association needs to be confirmed. Three genera are only known by their oral teeth: *Kiestus*, *Celtipristis*, and *Renpetia. Celtipristis* has small sized teeth that are completely smooth and little cuspidate, differing therefore from *Biropristis* gen. nov.; *Kiestus* and *Renpetia* have strongly cuspidate teeth with a labial ornamentation very different from *Biropristis*, only a medial vertical crest in *Kiestus* labial radiating folds in *Renpetia*.

The 13 remaining genera are known by both rostral and oral teeth, and even some by more or less complete skeletons (*Libanopristis*, *Micropristis* and *Sclerorhynchus*). All show oral teeth that differ strongly from those of *Biropristis*, mainly by the shape of the outline of the occlusal face of the crown and the ornamentation of the labial face of the crown, consisting generally i2n radiating folds, some of them being even practically smooth (*Libanopristis* and *Micropristis*).

CONCLUSIONS

This study has allowed to confirm the status of the teeth previously described by Wetzel (1930) under the name of *Ischyrhiza chilensis* (Philippi). New investigations on Quiriquina Island and in other localities between Concepción and Valparaiso allowed to collect many rostral teeth of *Ischyrhiza chilensis*, and therefore to provide a more accurate description of this poorly known species. It also demonstrates the wide distribution of the genus *Ischyrhiza* during the Maastrichtian.

It is highly probable that the teeth noted by Wetzel (1930, p. 94) as *Scymnus* from Quiriquina correpond in fact to rostral teeth of *Schizorhiza* (see Weiler, 1930, p. 23).

Besides, a new type of sclerorhynchid oral tooth was discovered, representing a new genus and species, *Biropristis landbecki* gen. et sp. nov. Unfortunately, the rostral dentition is for the moment unknown. This new genus increases the diversity of the family during the Maastrichtian.

The discovery of new sclerorhynchids on the Pacific coast of South America, in the southern hemisphere, is important in palaeobiogeographic respects. Indeed, very few discoveries have been recorded from this area until now (Cappetta, 1987; Kriwet and Kussius, 2001). Apart from Quiriquina Formation, the only one known record of sclerorhynchids from the Pacific margin of South America comes from the Late Cretaceous of Perú (Mourier *et al*., 1988; Arratia and Cione 1996). It seems probable that the low number of sclerorhynchid discoveries in the Pacific coast, of both South and North America, results from insufficient field work rather than from a real scarcity of the group.

In addition to previous observations on the Late Cretaceous marine vertebrate faunas from the Quiriquina Formation (Suárez, 2000, 2001), the new information provided by this work allows to confirm that the Pacific seaway pattern of distribution of sclerorhynchids is quite similar to that observed in other Late Cretaceous fish taxa, such as holocephalians and actinopterygians (Brito and Suárez, 2003).

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PLATES 1-2

PLATE 1

***Ischyrhiza chilensis* (Philippi, 1887) Maastrichtian, Algarrobo.**

(bar scale = 1 cm)

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Figures

1-3. SGO-PV-807 rostral tooth.

1 Lateral view

2 Basal view

3 Proximal view

4-6.SGO-PV- 809 rostral tooth.

4 Lateral view

5 Basal view

6 Proximal view.

7-9. SGO-PV-810 proximal rostral tooth.

7 Lateral view

8 Basal view

9 Proximal view.

PLATE 1

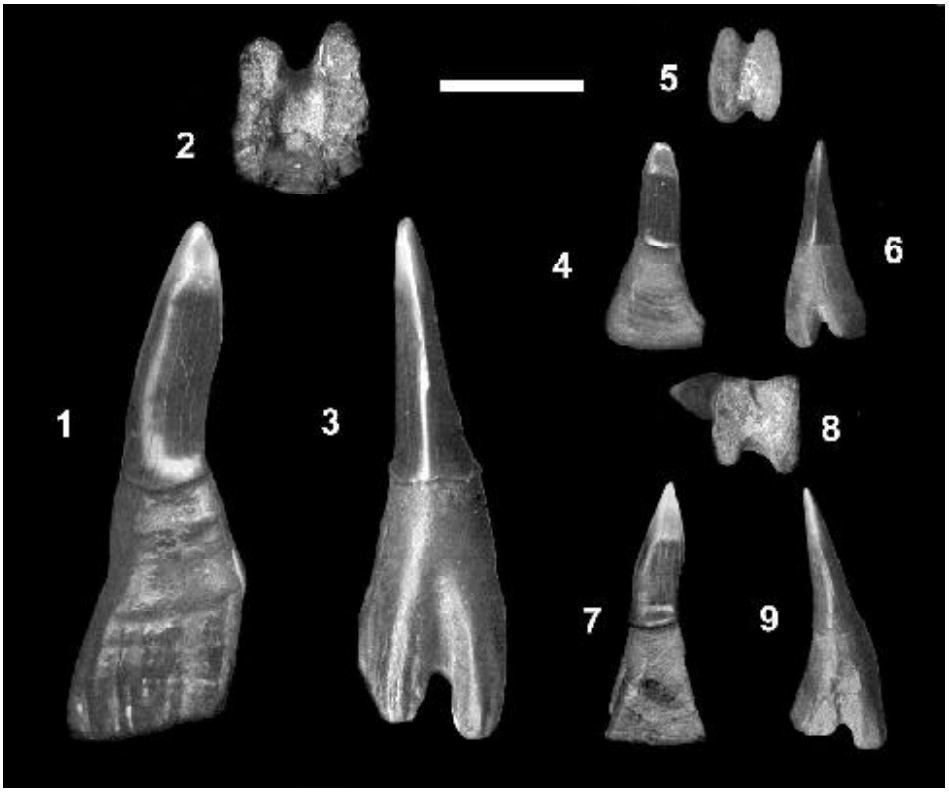

PLATE 2

***Biropristis landbecki* gen. et sp. nov. Maastrichtian, Algarrobo.**

(bar scale = 1 mm)

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Figures

1-3. Holotype, SGO-PV-800 lateral tooth.

1 Occlusal view.

2 Lingual view.

3 Basal view.

4-6. Paratype, SGO-PV-801.

4 Occlusal view..

5 Labial view.

6 Profile view.

PLATE 2