

Redescription of *Diplomystes mesembrinus* (Siluriformes, Diplomystidae)

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Redescription of *Diplomystes mesembrinus* (Siluriformes, Diplomystidae). - New specimens of *Diplomystes mesembrinus* collected in the río Chubut, Argentina, allow a thorough description of the species, hitherto known only by four specimens. *Diplomystes mesembrinus* may be distinguished from *D. viedmensis* and *D. cuyanus* by the possession of a low number of maxillary teeth, no more than 23 in adults. This character is shared by *D. mesembrinus* and the Chilean species *D. chilensis*, *D. camposensis*, and *D. nahuelbutaensis*. The suture between basibranchials 2 and 3 differentiates *D. mesembrinus* from the three Chilean species and *D. viedmensis*. Some ontogenetic changes in *D. mesembrinus* are commented upon.

Key-words: Siluriformes - Diplomystidae - *Diplomystes mesembrinus* - Neotropical Region - Patagonia.

INTRODUCTION

Patagonia, in southern South America, is an extense region with scarce rivers. Most of the Patagonian rivers have headwaters in the Cordillera de los Andes, many of them at high altitude, and run from the West to the East, pouring into the Atlantic Ocean. In the rivers of Patagonia, fresh water fishes are scarce. Only species of the siluriform families Diplomystidae and Trichomycteridae are recorded within the ichthyofauna of the area. Six species are included into the family Diplomystidae; three of them are present in Chile and other three species in Argentina. The three East-Andean species *Diplomystes cuyanus*, *D. viedmensis* and *D. mesembrinus* respectively occur in the Colorado, Negro, and Chubut-Senguerr basins. Chubut-Senguerr basin is one of the most important Patagonian basins; it mainly occurs in the province of Chubut between 41° 30' and 46° S. From the mouth of the río Senguerr, Ringuelet (1982) described *Diplomystes mesembrinus* based on two specimens. Although several records of the "bagre pintado" appeared in a chronicle of an expedition to the río Chubut in 1865-66 (CLARAZ 1988), only material type and two very small specimens of *D. mesembrinus*, captured by one of the authors in that river (GOSZTONYI 1988), were known until five years ago, and the adults of *D. mesembrinus* were unknown.

The objective of this paper is to redescribe *D. mesembrinus* using external and osteological characters. Remarks about diagnostic characters and ontogenetic changes of the species are added.

MATERIAL AND METHODS

Specimens of *D. mesembrinus* were cleared and counterstained following TAYLOR & VAN DYKE (1985). Measurements are straight distances taken with calliper to nearest 0.1 mm, on the left side of the body whenever possible.

Cleared and stained specimens (C&S) of *Diplomystes viedmensis* Mac Donagh, 1931, *D. cuyanus* Ringuelet, 1965, *D. chilensis* Molina, 1782, *D. camposensis* Arratia, 1987, and *D. nahuelbutaensis* Arratia, 1987, have been examined.

Material is deposited in Centro Nacional Patagónico (CENPAT), Muséum d'histoire naturelle de Genève (MHNG) and Museo de La Plata (MLP).

REDESCRIPTION

Diplomystes mesembrinus Ringuelet, 1982

Figs 1-8, table 1

Diplomystes viedmensis mesembrinus Ringuelet, 1982: 350.

Diplomystes mesembrinus; AZPELICUETA 1994a: 13.

MATERIAL EXAMINED. 66 specimens, provincia del Chubut, Argentina. Holotype: MLP 8452, 168.0 mm, mouth of río Senguerr. MLP uncat., 1 ex., 33.8 mm, río Chubut inferior (C&S), col. A. Gosztanyi. MLP uncat., 9 ex., 80.4-170.7 mm (1 ex., C&S), río Chubut near Los Altares (43° 51' 30" S-68° 28' W), 18-12-95. MLP uncat., 3 ex., 65.0-101.0 mm (2 ex. C&S), río Chubut near km 261 provincial road 25, 19-12-95, col. A. Gosztanyi and R. Taylor. MLP uncat., 20 ex., 63.0-135.3 mm (2 ex. C&S), río Chubut en cañadón Carbón /43° 49' 8" S- 67° 53' 8"), 18-4-97, col. A. Gosztanyi, L. Kuba, and R. Taylor. MLP uncat., 1 ex., 103.2 mm, río Chubut en Los Altares, same date and collectors. MLP uncat., 8 ex., 99.0-159.5 mm, río Chubut, near cerro Cóndor (43° 19' 1"-69° 8' 2"), 19-4-97, same collectors. CENPAT uncat., 2 ex., 137.0-187.0 mm (C&S), río Chubut near Los Altares, 9-12-1993, col. R. Taylor. CENPAT uncat., 14 ex., 82.2-215.0 mm, same locality, 18-12-95, col. A. Gosztanyi and R. Taylor. CENPAT uncat., 5 ex., 69.0-122.0 mm, km 261 of the provincial road 25, 19-12-95, same collectors. MHNG 2593.66-67, 2 ex., 127.0-134.0 mm, río Chubut, near cerro Cóndor, 19-4-97, col. A. Gosztanyi, L. Kuba, and R. Taylor.

DIAGNOSIS. *Diplomystes mesembrinus* is differentiated from *D. cuyanus* and *D. viedmensis* by the presence of few maxillary teeth, no more than 23 in adults, a character of uncertain polarity shared with the Chilean *D. chilensis*, *D. cuyanus*, and *D. nahuelbutaensis*. The suture between basilbranchials 2 and 3 distinguishes *D. mesembrinus* from the three Chilean species and *D. viedmensis*. *Diplomystes mesembrinus* has the narrowest mouth (0.26-0.32 vs. 0.34-0.42 in head length of the other species).

REDESCRIPTION. The previously known descriptions of *D. mesembrinus* were based on the holotype (RINGUELET 1982; AZPELICUETA 1994b). Completing those descriptions, only the differences found in the new material are mentioned below. Measurements are listed in table 1, as percentages of different lengths.

Dorsal fin with first spine small, second spine well developed and 7 rays branched, as in all diplomystid species. Second spine with 6-8 small serrae in half or distal one third of posterior margin, serrae worn in adults; anterior margin of second spine smooth. Adipose-fin origin placed at same level of anal-fin origin or scarcely anteriorly (Fig. 1). Adipose depth in percentage of its length 16.67-30.0.

Pectoral fin with one spine and 8-10 branched rays; pectoral-fin tip extended beyond pelvic-fin origin in juveniles (Fig. 2), not reaching such origin in adults. Pectoral spine with 18 posterior serrae in adults, highest number found in diplomystid species.

Two pectoral axillary gland pores present; posterior one usually divided into two apertures.

Pelvic-fin origin always placed in anterior half of standard length. Pelvic-fin tip extended beyond origin of anal fin in young and some juveniles, but not in adults.

Anal fin with 4-5 unbranched rays and 8-9 branched rays. Last simple ray or first branched ray longer. Dorsal and anal fins with fleshy bases.

Lower caudal lobe scarcely longer and wider than upper one. Lateral line end usually curved dorsally, sometimes straight (five specimens). Dorsal procurrent caudal rays 16-17 and ventral procurrent rays 16-18.

Dorsal head surface on supraoccipital smooth. Fleshy fold around posterior nare completely or partially covering the aperture. Mouth narrow; premaxillary tooth plate wide in relation to mouth width. Maxillary barbel reaching beyond pectoral-fin origin in small specimens, and near branchiostegal membrane in adults.

Total number of vertebrae 42-44, including the Weberian apparatus and preural centrum 1+ural centrum 1. Anterior gill rakers on first arch as follows: 6-8 in epi-branchial, 1 in cartilage, 12-14 in ceratobranchial and hypobranchial. Pseudobranch bearing 14-15 filaments in adults. Eleven or twelve pairs of ribs present; first rib reduced and fused to 5th parapophysis. A well-developed rib joined to 5th. parapophysis present in one specimen (140 mm SL).

Coloration in life: Body grey, upper area of flanks dark, lower area light; body whitish ventrally. Small black dots on flanks, more abundant dorsally. Few dots on dorsal surface of head, more concentrated on snout. Small specimens grey, without dots (Fig. 2).

Pectoral fins dark grey, pelvic fins light grey. Dark chromatophores only on dorsal surface of both paired fins. Dorsal and caudal fins with very small dots and distal margin dark; five specimens with caudal margin unpigmented. Larger specimens with dots scattered on anal fin, anal-fin base of small specimens whitish, and light grey distally. Adipose fin completely covered by very small dots.

Papillae: Filamentous papillae, scarce in juveniles and numerous in adults, cover the entire body; also, papillae are present at the base of dorsal and pectoral fins, and spines. Papillae are short in juveniles and long in adults (1.5 mm). There are rounded papillae around mouth, posterior surface of maxilla, and branchiostegal area. Many of those papillae around mouth become prismatic during growth. The dorsal area of each papilla has eight taste-buds. Scarce rounded or filamentous papillae are always found in mouth roof.

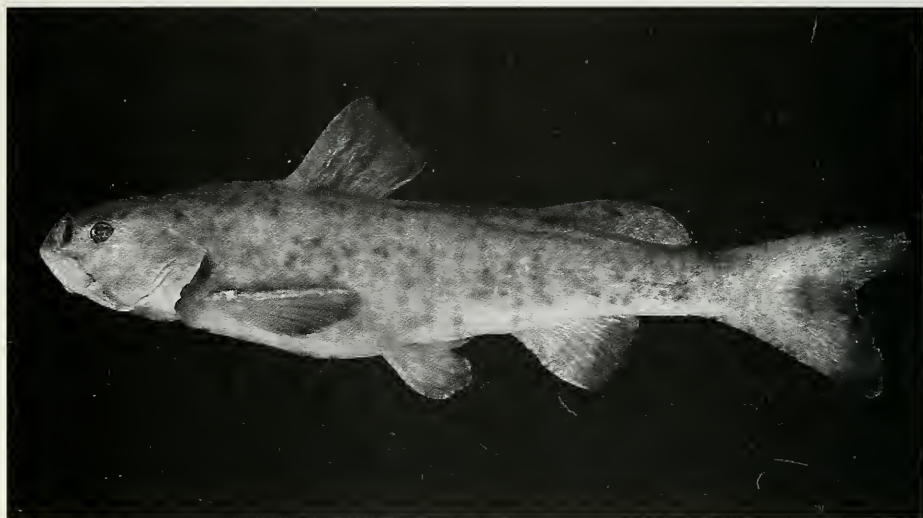


FIG. 1

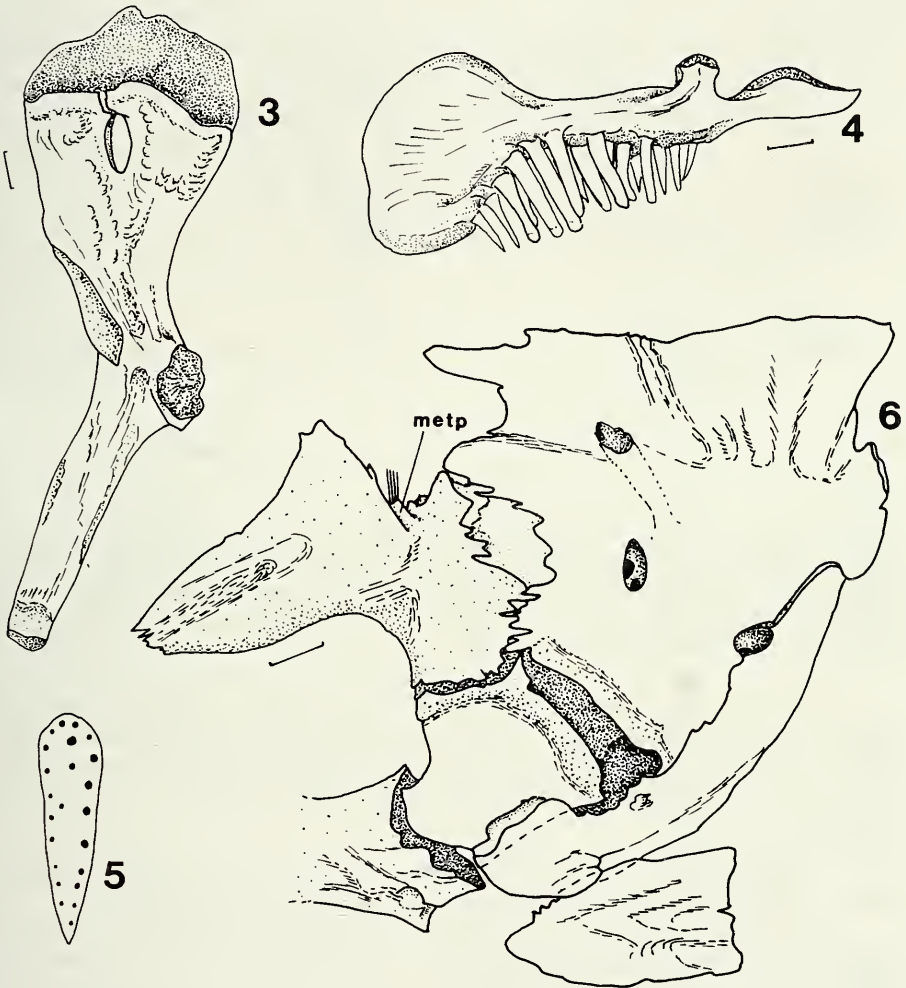
Diplomystes mesembrinus, río Chubut near cerro Cóndor, 150.5 mm SL.



FIG. 2

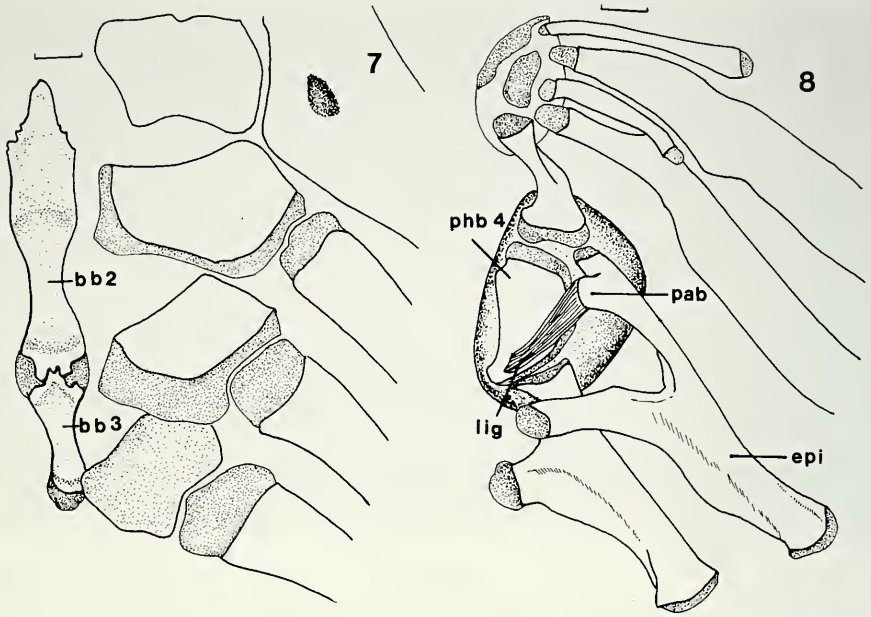
Young specimen of *Diplomystes mesembrinus*, río Chubut near cerro Cóndor, 102.2 mm SL, without dots on body.

Large pit-organs in a line, parallel to lateral line, present along the entire flanks (AZPELIQUETA 1993). Also, large pit-organs occur in lines in the dorsal surface of head and in front of dorsal fin, on body (AZPELIQUETA 1994a; ARRATIA & GAYET 1995).



FIGS 3-6

Diplomystes mesembrinus, 187 mm SL. 3: Right autopalatine, dorsal view, an incomplete fusion between the two anterior autopalatine processes; 4: Right maxilla, with conic and spatulate teeth, lateral view; 5: Right maxilla, ventral view, schematic illustration showing the arrangement of the maxillary teeth; 6: Right suspensorium, mesial view, a small metapterygoid process present. metp: metapterygoid process. Scale bar: 1 mm.



FIGS 7-8

Diplomystes mesembrinus, 215 mm SL, right branchial elements, dorsal view; 7: Suture between basibranchial 2 and 3; 8: Process in the anterior branch of the uncinat epibranchial 3 with the ligament attached. bb 2: basibranchial 2; bb 3: basibranchial 3; epi: uncinat epibranchial 3; lig: ligament; pab: process in the anterior branch of the third epibranchial; phb: pharyngobranchial 4. Scale bar: 1 mm.

Osteology: The sphenotic of small specimens is short and wide whereas the sphenotic of large specimens has a very long anterior process. The wide frontal of early ontogenetic stages becomes narrow posteriorly in adults and extremely narrow in very large specimens. One crest for muscle attachment crosses along dorsal surface of the extrascapula.

The number of maxillary teeth does not exceed 23 in adults; teeth are arranged in three somewhat unordered rows anteriorly and two rows posteriorly (Figs 4, 5).

Tooth plates develop under autopalatine on both sides in 18 specimens (N = 40); only on one side in seven specimens, and they are absent in the rest. Tooth plates have irregular number of teeth and different size; also, more than one tooth plates may occur under autopalatine, on each side. All specimens have two vomerine tooth plates. The autopalatine of small specimens and juveniles has two anterior processes that fuse during ontogeny, although they are not completely fused in some large specimens (Fig. 3). Ectopterygoid and entopterygoid always occur under the autopalatine posterior process which is long in adults. The metapterygoid process only develops in one specimen (Fig. 6). A large crest for insertion of levator arcus palatini is present on the hyomandibula.

Posterior margin of basibranchial 2 and anterior one of basibranchial 3 suture during ontogeny (Fig. 7); the beginning of this trend is observed at 130 mm SL. A small process directed posteriorly, for attachment of a short and strong ligament that firmly joins the bone to pharyngobranchial 4, grows in the anterior branch of the uncinat third epibranchial (Fig. 8).

In the Weberian apparatus, the reabsorption of the horizontal process of the intercalarium occurs in early stages of ontogeny. One supraneural develops between the supraoccipital and the neural arch of the complex vertebrae, not reaching the supraoccipital in large specimens. The dorsal margin of the claustrum does not contact the supraneural in the largest specimen (215 mm SL).

There are three proximal radials in the pectoral fin. The number of pectoral distal radials is reduced from five to two during ontogeny. The pelvic bone has three anterior processes and one pelvic radial in all specimens; the youngest specimen examined has the medial process yet cartilaginous (AZPELICUETA 1994b, fig. 14c).

TABLE 1

Measurements of 35 specimens of *Diplomystes mesembrinus* in percentage of indicated lengths. SL = 33.8-215.0 mm.

	\bar{x}	min	max
<i>Percentage of standard length</i>			
Predorsal-fin length	37.8	35.1	39.2
Preadipose fin-length	64.2	57.8	68.2
Preventral-fin length	48.6	44.5	51.0
Preanal-fin length	66.7	59.9	69.0
Dorsal-fin base	13.7	12.3	16.4
Adipose-fin base	25.9	21.4	31.9
Anal-fin base	14.0	11.0	17.3
Pelvic-fin length	16.6	13.6	20.0
Pectoral-spine length	18.4	15.2	21.5
Dorsal-spine length	18.0	11.8	21.7
Greatest body depth	20.0	14.4	23.3
Greatest head depth	15.7	13.0	20.0
Head length	26.6	24.2	29.0
Head width	18.4	16.2	22.2
Mouth width	7.7	6.0	7.7
Interorbital length	8.1	6.8	8.1
Preorbital length	11.2	8.3	13.1
<i>Percentage of head length</i>			
Head width	69.1	61.6	86.7
Mouth width	20.0	22.6	35.9
Greatest head depth	59.2	50.0	74.5
Interorbital length	30.5	25.7	35.8
Preorbital length	42.1	33.3	49.2
Orbital length	16.4	11.3	29.8
Maxillary length	23.9	17.7	28.4
Premaxillary length	22.7	15.6	27.3
<i>Percentage of mouth width</i>			
Premaxillary tooth plate	82.7	65.8	99.9

BIOLOGY

Little is known about the biology of the family (ARRATIA 1983; AZPELICUETA 1994a). Examination of a few specimens shows that five stomach contents include adult Hymenoptera, large amount of terrestrial Coleoptera, and numerous specimens of the gasteropod *Chilina* sp.

Males have testes with broad lobes, similar in anterior and posterior regions. As in other species of diplomystids, the females only have one gonad. At the beginning of the warm season (December), the females were not ripe.

Large specimens have been collected in a slow, deep run on the southern side of a wide turn in a meandering section of Chubut river. The medium-sized specimens were collected in shallow waters, usually with faster current. According to the observations of GOZSTONYI (1988) the small specimens were caught in a fast flowing narrow section of the river.

DISCUSSION

The family Diplomystidae is the only group of living catfishes retaining a dentate maxilla with long medial process and laminar lateral expansion. Maxillary teeth are placed along most of the oral surface of the bone and are arranged in somewhat unordered rows. A low number of maxillary teeth, not exceeding 23 in adults, have been considered by ARRATIA (1987) as a diagnostic character for the species living in the Western slope of the Andes. Nonetheless, the same number is present in adults of *D. mesembrinus* (Figs 4, 5). This number of maxillary teeth distinguishes *D. mesembrinus* from *D. viedmensis* and *D. cuyanus* which have a high number of teeth. At 215 mm SL, specimens of *D. cuyanus* and *D. viedmensis* have about 40 teeth. Such number changes during ontogeny and about 60 maxillary teeth, placed in five rows anteriorly, occur in the largest *D. viedmensis* (324 mm SL; AZPELICUETA 1994b, fig. 16f). The teeth of *D. mesembrinus* are arranged in three unordered rows anteriorly and two rows posteriorly. *Diplomystes camposensis*, *D. nahuelbutaensis*, and *D. chilensis* have two rows anteriorly and one row posteriorly (ARRATIA 1992), an arrangement that differentiates them from *D. mesembrinus*.

The autopalatine of diplomystid species has two anterior processes in early stages of ontogeny. *D. nahuelbutaensis* and *D. camposensis* retain those processes in large specimens (ARRATIA 1987) whereas both processes fuse during grow in *D. viedmensis*, *D. cuyanus*, *D. chilensis*, and *D. mesembrinus*; nonetheless, some large specimens of *D. mesembrinus* have an incomplete fusion (Fig. 3).

A metapterygoid process is found in large specimens of *D. cuyanus* and in different ontogenetic stages of *D. viedmensis* (AZPELICUETA 1994b); such process bears a small ligament attached to parasphenoid. This process only occurs in one specimen of *D. mesembrinus* (Fig. 6).

The presence of a suture between basilbranchial 2 and 3 differentiates *D. mesembrinus* from all diplomystid species, but *D. cuyanus*. The small process developed in the anterior branch of the uncinat third epibranchial is a character shared by *D. mesembrinus* and *D. cuyanus*.

FINK & FINK (1981, 1996) listed the absence of third supraneural as a Characiphysan character. Usually, one supraneural appears in the Weberian apparatus of all *Diplomystes*, although some specimens of *D. chilensis* and *D. cuyanus* have one ossified element posterior to the first ossification (ARRATIA 1987, fig. 9b; AZPELICUETA 1994b). ARRATIA (1992) mentioned one supraneural with two centers of ossification. In two juveniles of *D. cuyanus*, the suture between both elements is clearly distinguished but none of the adult specimens examined have two elements. The examination of larval and postlarval specimens of *D. chilensis* or *D. cuyanus* will confirm the origin of the second ossification which may represent other supraneural. The very small *D. viedmensis*, *D. nahuelbutaensis* and *D. mesembrinus* examined have only one supraneural (30, 26, and 33 mm of SL respectively).

During ontogeny, the cranium of the diplomystid species becomes narrow, specially at the epiphyseal bar level. The shape of some skull bones as sphenotic, frontal, and supraoccipital strikingly changes in large specimens of *D. mesembrinus*, as in the remaining species of *Diplomystes*. The presence of one crest for muscle attachment on the extraescapula of *D. mesembrinus* distinguishes this species from adult *D. viedmensis*.

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