

SERRABRYCON MAGOI, A NEW GENUS AND SPECIES OF
SCALE-EATING CHARACID (PISCES: CHARACIFORMES)
FROM THE UPPER RÍO NEGRO

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Abstract.—*Serrabrycon magoi*, a previously undescribed genus and species of scale-eating tetragonopterin characid, is described from the black waters of the Río Negro system in the region of the Río Casiquiare, Venezuela. The genus and species are unique in the combination of the presence of a series of outwardly oriented teeth in the upper and lower jaws, the relatively low number of scales in a longitudinal series to the hypural joint, and in the limitation of pores for the laterosensory canal system of the body to the anteriormost scales of the lateral line.

Scale-eating (lepidophagy) has been described as a significant food habit in a variety of both freshwater and marine fishes inhabiting diverse regions of the world (see Sazima 1983 for a review). Within the freshwaters of the Neotropical realm, this specialized food habit has been described for a number of species belonging to the order Characiformes. Neotropical characiforms of the family Characidae for which lepidophagy has been previously described include *Catapryon mento* Müller and Troschel (Kner 1860:34; Gosline 1951:54, Géry 1964:460) and *Serrasalmus elongatus* Kner (Goulding 1980:162) of the subfamily Serrasalminae, *Exodon paradoxus* Müller and Troschel, *Roebioxodon guanensis* (Puyo), and the various species of the genus *Roeboides* (Breder 1927:127; Géry 1964:459-460) all presently assigned to the subfamily Characinae, and *Probolodus heterostomus* Eigenmann (Roberts 1970:384; Sazima 1977:510) and *Bryconexodon juruena* Géry (1980:1) of the subfamily Tetragonopterinae. These taxa, with the exception of *Serrasalmus elongatus*, are characterized by specialized dentition, typically consisting of everted teeth, often mammilliform in overall shape, which form very irregular series along the outer margins of the jaws. The

outwardly directed teeth function in dislodging scales from the host species, with the removed scales then being ingested directly if taken into the mouth, or gathered from the water column or substrate if knocked free (Sazima and Machado 1982). Although these dental modifications are characteristic for, and very similar in, the majority of lepidophagous Neotropical characiforms, such distinctive teeth have been implicitly hypothesized to have arisen independently in the diverse lineages of scale-eaters which are presently assigned to four different subfamilies of the Characidae (but see also comments under "Relationships").

Recent collecting activities in the upper portions of the Río Negro have revealed a previously undescribed genus and species of lepidophagous tetragonopterin characid described herein. This new form shares many of the dental modifications noted above as "typical" for lepidophagous Neotropical characiforms, but is quite distinctive in other attributes, most notably in its incompletely pored lateral line.

Materials and methods.—All measurements are given as proportion of standard length (SL) except for subunits of the head which are presented as proportions of head

length. Vertebral counts were taken from radiographs, and cleared and counter-stained specimens. This number includes the four vertebrae incorporated into the Weberian apparatus and considers the fused PU_1+U_1 as a single element. In the counts of median and pelvic fins, lower-case Roman numerals indicate unbranched fin rays, and Arabic numbers indicate branched fin rays. In the meristic values presented, the range for each measurement for the paratypes and holotype is presented first, with the value for the holotype indicated in brackets.

The following abbreviations are used for institutions: BMNH, British Museum (Natural History), London; MBUCV, Museo de Biología, Instituto de Zoología Tropical, Universidad Central de Venezuela, Caracas; MZUSP, Museu de Zoologia da Universidade de São Paulo, São Paulo; and USNM, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Serrabrycon, new genus

Diagnosis.—Tetragonopterine characid with mammilliform teeth in both jaws. Teeth of outermost tooth row of premaxilla directed anteriorly or anteroventrally rather than ventrally, forming irregular series. Second and fifth dentary teeth distinctly rotated anterodorsally. Lateral line pores present only on anterior seven or eight scales of laterosensory canal series. Scales in longitudinal series from supracleithrum to hypural joint 29 to 31.

The combination of an incompletely pored lateral line, the relatively low number of scales in a longitudinal series, and the noted modifications of the dentition in the upper and lower jaws distinguishes *Serrabrycon* in the Characiformes.

Type species.—*Serrabrycon magoi*, n. sp.

Etymology.—*Serrabrycon* from the Latin, *serra* for saw, and *Brycon* a genus of Neotropical characiforms, in reference to the

Table 1.—Morphometrics of *Serrabrycon magoi*, new species. Standard length is in millimeters; measurements 1 to 11 are proportions of standard length; 12 to 16 are proportions of head length.

	Holo-type	Paratypes (37)	
		Range	Average
Standard length	27.5	21.3–31.8	
1. Greatest body depth	0.29	0.28–0.30	0.288
2. Snout to dorsal-fin origin	0.53	0.53–0.57	0.540
3. Snout to anal-fin origin	0.68	0.68–0.71	0.689
4. Snout to pectoral-fin origin	0.30	0.29–0.33	0.319
5. Snout to pelvic-fin origin	0.52	0.51–0.53	0.520
6. Origin of dorsal fin to hypural joint	0.48	0.45–0.50	0.480
7. Pectoral-fin length	0.20	0.19–0.22	0.207
8. Pelvic-fin length	0.17	0.17–0.20	0.185
9. Length of base of anal fin	0.23	0.21–0.24	0.223
10. Least depth of caudal peduncle	0.12	0.11–0.12	0.115
11. Head length	0.31	0.30–0.33	0.318
12. Snout length	0.24	0.23–0.27	0.248
13. Orbital diameter	0.39	0.36–0.40	0.375
14. Postorbital length	0.41	0.39–0.43	0.401
15. Length of upper jaw	0.46	0.45–0.48	0.466
16. Interorbital width	0.32	0.29–0.33	0.305

saw-like appearance of the outwardly pointing teeth in the upper and lower jaws.

Serrabrycon magoi, new species

Figs. 1, 2, 3, Table 1

Holotype.—MBUCV 14270, 27.5 mm standard length (SL). Venezuela, Territorio Federal Amazonas, Departamento Río Negro, lower portion of Caño Manu, which drains into the Río Casiquiare about 250 m upstream of Solano (approx. 02°00'N, 66°57'W); collected by R. P. Vari, C. J. Ferraris, Jr., O. Castillo, and J. Fernandez; 7 Dec 1984.

Paratypes.—Taken with the holotype; 27 specimens: USNM 270260, 11 specimens, 21.5–27.5 mm SL (3 specimens cleared and



Fig. 1. *Serrabrycon magoi*, new species, holotype, MBUCV 14270, 27.5 mm SL.

counterstained for cartilage and bone); MBUCV 14271, 10 specimens, 21.3–25.4 mm SL; MZUSP 28749, 3 specimens, 23.5–24.6 mm SL; and BMNH 1985.4.9:4–6, 3 specimens, 21.3–23.5 mm SL. Venezuela, Territorio Federal Amazonas, Departamento Río Negro, drying lagoon northeast of airport at San Carlos de Río Negro (approx. 01°55'N, 67°02'W); collected by A. Machado-Allison, R. P. Vari, C. J. Ferraris, Jr., J. Fernandez and O. Castillo; 4 Dec 1984; 10 specimens: USNM 270259, 5 specimens, 24.9–31.8 mm SL; and MBUCV 14272, 5 specimens, 24.7–26.5 mm SL.

Diagnosis.—As for the genus.

Description.—Table 1 gives morphometrics of holotype and paratypes. Body relatively slender, moderately compressed laterally. Greatest body depth at origin of rayed dorsal fin. Dorsal profile of body gently curved from tip of snout to interorbital region, nearly straight from that point to insertion of rayed dorsal fin. Body profile at base of rayed dorsal fin straight, posteroventrally sloped. Dorsal profile of body slightly convex from rear of insertion of last dorsal fin ray to caudal peduncle. Ventral profile of head distinctly convex from tip of fleshy lower jaw to below opercle; nearly straight from that point to anus other than for slight convexity at insertion of pelvic fins. Ventral surface of body transversely flattened anterior to insertion of pelvic fins. Base of anal fin straight or very slightly con-

vex. Ventral profile of caudal peduncle slightly convex.

Head obtusely pointed in profile; mouth terminal, lower jaw longer than upper. Upper jaw extending posteriorly to vertical through anterior third of pupil. Mammilliform teeth of outer row of premaxilla extending through fleshy covering of jaw. Nostrils approximate; anterior round, posterior crescent-shaped. Eye relatively large. Fronto-parietal fontanel extensive, completely separating parietals, frontals in contact only at epiphyseal bar. Fontanel wider posteriorly, extending onto dorsomedial portion of supraoccipital. No supraorbital present.

Four branchiostegal rays, three attached to anterior ceratohyal, one to posterior ceratohyal. Anterior cartilage of basihyal subdivided longitudinally into lateral halves. Pharyngeal teeth all unicuspidate; broad triangular patch of teeth on fifth ceratobranchial; smaller groupings of teeth on fourth and fifth upper pharyngeal tooth plates, and on tooth plate associated with third infra-pharyngobranchial. Gill rakers elongate. Gill rakers on first gill arch 6 or 7+1+10 or 11.

Outer row of premaxillary teeth consisting of four mammilliform teeth, reoriented anteriorly or slightly anterodorsally (Fig. 2). Tips of teeth in very irregular line. Second tooth from midline distinctly oriented more anterodorsally than others. Teeth of inner row on premaxilla tricuspidate, somewhat anteroposteriorly flattened, not mammilli-

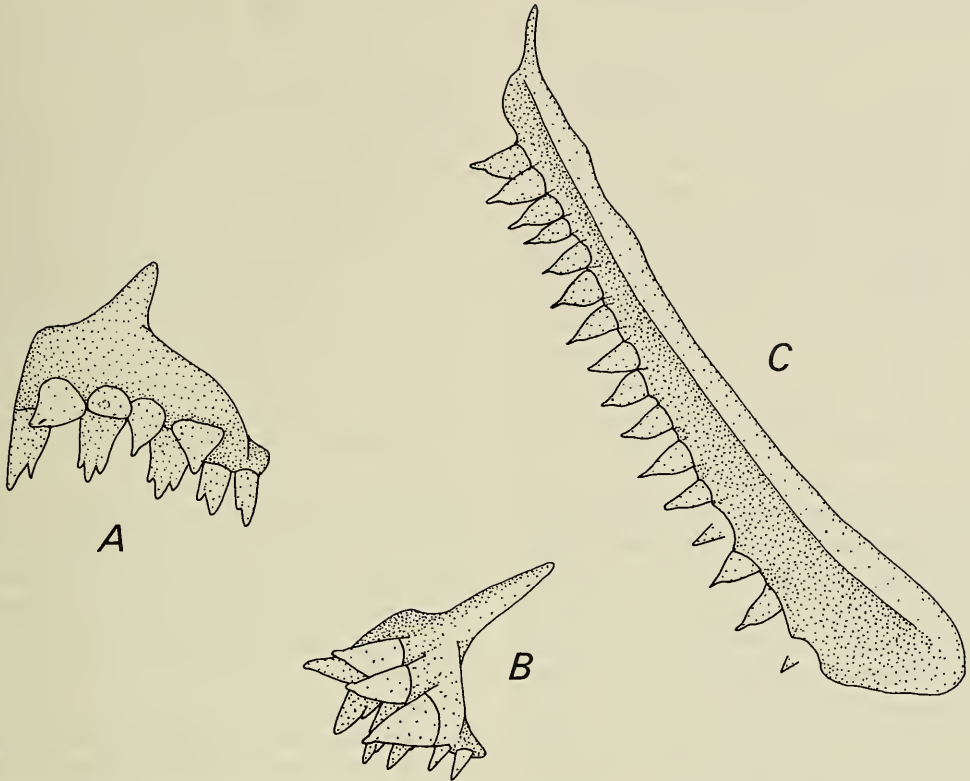


Fig. 2. *Serrabrycon magoi*: A, Left premaxilla, anterior view; B, Left premaxilla, lateral view; C, Left maxilla, lateral view, first and fourth teeth from bottom in process of replacement.

form; tips oriented ventrally or slightly anteroventrally. Five teeth in inner row. Maxilla with single series of 15 or 16 very slightly mammilliform teeth along entire anterior edge. Dorsalmost tooth in series somewhat mammilliform and laterally directed. Remaining teeth having typical tetragonopteran orientation, with tips approximately in plane of main body of maxilla; some very slightly mammilliform.

Lower lip very fleshy, forming distinct pad. Teeth on dentary becoming progressively smaller posteriorly (Fig. 3). First four or five dentary teeth tricuspidate; lateral cusps relatively small. Remaining dentary teeth slightly mammilliform or conical. Second tricuspidate tooth distinctly rotated laterally relative to primary axis of first and

third teeth. Fourth dentary tooth more laterally oriented than third, fifth more than fourth; sixth through eighth teeth progressively less laterally aligned. Remaining dentary teeth vertically oriented.

Scales cycloid. Scales in longitudinal series between supracleithrum and hypural joint 29 to 32 [32]. Two or three series of scales extend beyond hypural joint onto base of caudal fin. Pores communicating with laterosensory canal system of lateral line developed only on anteriormost seven or eight scales of longitudinal series. Scales in transverse series from origin of rayed dorsal fin to ventral midline 12 or 13 [13].

Rayed dorsal fin obtusely pointed, first and second branched rays longest, last unbranched ray slightly shorter. Dorsal-fin rays

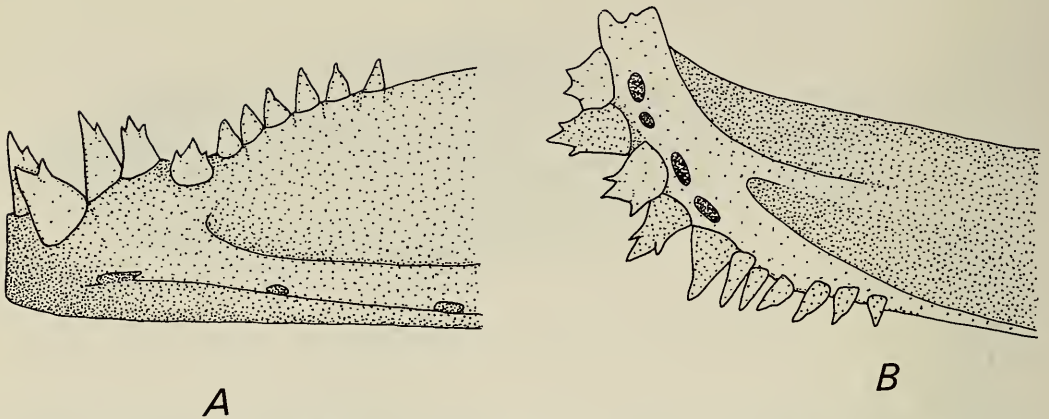


Fig. 3. *Serrabrycon magoi*, left dentary, anterior portion: A, Lateral view; B, Dorsal view.

ii,8 or ii,9 [ii,8]. Adipose dorsal fin relatively well developed, length about one-half diameter of orbit; unscaled. Anal-fin rays iii,15 or iv,15 or 16 [iv,15]; first two unbranched rays very short; last unbranched ray and first and second branched rays longest, subequal. Margin of anal fin falcate; posteriormost ten branched rays about one-third to one-half length of longest rays. Pectoral fin pointed, reaching to or slightly beyond origin of pelvic fin. Pectoral fin rays 12 to 14 [13]. Pelvic fin reaching to origin of anal fin. Pelvic fin rays i,6,i [i,6,i].

Vertebrae: 31 (6), 32 (18), 33 (1).

Coloration in alcohol.—Overall ground coloration of specimens fixed in formalin and preserved in alcohol light tan. Head with dense field of small chromatophores on upper lip, snout, and dorsal portion of head. Line of dark pigmentation along margin of lower lip. Lateral surface of head with scattered chromatophores, largest on opercle.

Body with diffuse field of chromatophores on lateral surface. Field more dense anteriorly, particularly in region of pored portion of lateral line. Chromatophore field extending to caudal peduncle, with discrete straight dorsal margin; field gradually thinning out ventrally in region between pectoral and anal fin origins; reaching to ventral margin of body along base of anal fin and

ventral surface of caudal peduncle. Scales dorsal of lateral chromatophore field with margins distinctly outlined by relatively wide series of small chromatophores. Overall body pigmentation darkest along dorsal midline.

Caudal fin with well developed field of dark pigmentation at base of caudal fin rays. Pigmentation patch extending anteriorly on middle rays to slightly posterior of hypural joint; smaller chromatophores extending posteriorly from main portion of pigmentation patch to tips of those rays. Series of very small chromatophores outlining other caudal-fin rays. Dorsal-fin rays outlined by series of small chromatophores; fin dusky distally. Distal portion of anteriormost branched anal fin-rays dusky. Rays of pectoral and pelvic fins outlined by small chromatophores. Adipose dorsal fin covered with scattered small chromatophores.

Relationships.—Weitzman and Fink (1983) have recently summarized the difficulties and uncertainties associated with the present classificatory scheme applied to New World characiforms. *Serrabrycon* exemplifies many of the problems inherent in the present taxonomy of the group. Under the traditional classification the genus could be assigned to the *Hemigrammus-Pristella* grouping of tetragonopterines that is characterized, in part, by an incompletely pored

lateral line. However, no member of that assemblage has the distinctive dental modifications characteristic of *Serrabrycon*. As noted by Fink and Weitzman (1974) and again by Weitzman and Fink (1983) an incompletely pored lateral line is a questionably valid character for delimiting hypothesized monophyletic lineages within characids. The relationships of *Serrabrycon* could also be hypothesized to lie with genera such as *Exodon*, *Roebioxodon*, and *Roeboides* that authors have placed in the characid subfamily Characinae. An alternative alignment of *Serrabrycon* could be with *Probolodus* and *Bryconexodon* which have been assigned to the Tetragonopterinae. Although all of the genera just listed have completely pored laterosensory canal systems on the body, they are also characterized by mammilliform dentition similar to that of *Serrabrycon*. Furthermore the defining characters of the two subfamilies have not been based on derived characters supporting a hypothesis of their monophyly, and the present partitioning of the genera between the Characinae and Tetragonopterinae is open to reinterpretation (Menezes in Sazima 1983:88). Thus *Serrabrycon* together with *Exodon*, *Roebioxodon*, *Roeboides*, *Probolodus* and *Bryconexodon* may constitute a monophyletic group delimited, at least in part, by the presence of everted mammilliform dentition. On the other hand the assemblage may be polyphyletic with the mammilliform dentition homoplasiously present in two or more lineages.

Further research is necessary to resolve the above questions and to arrive at a hypothesis of the relationships between the contained species. Pending such a study and in light of the various uncertainties noted above, in particular the lack of a readily apparent sister group to the new species, a new genus of the Tetragonopterinae is proposed to contain the undescribed form.

Etymology.—*magoi*, in honor of Dr. Francisco Mago-Leccia of the Instituto de Zoología Tropical of the Universidad Cen-

tral de Venezuela who has contributed significantly to our knowledge of the Venezuelan fish fauna.

Food habits.—*Serrabrycon magoi* has a very muscular stomach that is large relative to the remainder of the intestinal tract. Stomach content analysis of three individuals showed that the stomachs were completely and exclusively filled with series of scales of different sizes.

Ecology.—The holotype and 27 paratypes were collected in the lower portion of Caño Manu, a very slow-flowing black water tributary of the Río Casiquiare. The stream was well-shaded by rain-forest canopy, and had few small emergent plants and no floating vegetation. The remaining ten paratypes were collected in the shallow black waters of a small sluggish stream running through the center of a drying lagoon. That locality was characterized by large amounts of submerged logs and detritus. The site had numerous large emergent plants, but was distant from the rain-forest canopy and poorly shaded.

Resumen.—*Serrabrycon magoi*, un género y una especie no descritos anteriormente que comprende pequeños peces comedores de escamas pertenecientes a la subfamilia Tetragonopterinae, Characidae; son descritos a partir de muestras provenientes de aguas negras del sistema del Río Negro de la región del Río Casiquiare, Venezuela.

El género y especie son únicos en la combinación de los siguientes caracteres: la presencia de una serie de dientes en las mandíbulas superior e inferior orientados exteriormente; el número relativamente bajo de escamas en la serie longitudinal hasta la unión hipural y en la limitación de poros del sistema del canal laterosensorial a las escamas anteriores de la línea lateral.

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