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REVIEW OF THE SOUTH AMERICAN CHARACIFORM FISH GENUS *CHILODUS*, WITH DESCRIPTION OF A NEW SPECIES, *C. GRACILIS* (PISCES, CHARACIFORMES, CHILODONTIDAE)

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ABSTRACT

Examination of 291 specimens of *Chilodus*, a genus of South American fresh water fishes, yielded the presence of three species, viz.: *C. punctatus*, *C. zunevei*, and *C. gracilis*. Of the first species the lectotype is designated. The type material of *C. zunevei* is lost; new material enabled a redescription of this species. *C. gracilis* is described as a new species, although it is known as an aquarium fish since decades. The three species are illustrated; a key to them and a map showing their distribution are included.

INTRODUCTION

The present paper deals with the results of a study of the species assigned to *Chilodus* Müller & Troschel, 1844, South American characiform fishes known as "headstanders" in reference to their oblique swimming and resting position. We recognize three species, viz.: *C. punctatus* Müller & Troschel, 1844, *C. zunevei* Puyo, 1945, and *C. gracilis* n. sp. Within the large range of distribution of *C. punctatus*, considerable variability in details of the colour pattern is found. The species is well known among aquarists. One of the striking habits is its ability to quickly change its colour pattern and pigmentation intensity. It is possible that several populations we consider to be *C. punctatus* represent discrete taxa. We are, however, unable to prove this.

Chilodus zunevei has a restricted geographical range and at times has been regarded a subspecies of *C. punctatus* (e.g., Géry, 1964, 1977). We are unaware of imports of living specimens. Its colour pattern in preserved material, however, is distinctly different from *C. punctatus*, even when one considers the great variation in that character in the latter species. We treat *C. zunevei* as a separate species on the basis of its striking colour pattern, which shows little or no variability in preserved material.

Chilodus gracilis n. sp. is known both in literature and as an aquarium inhabitant since several decades. An illustration in Arnold & Ahl (1936) strongly suggests that already in 1913 *C. gracilis* was available as an aquarium fish. An often used photograph by Timmerman (e.g., in Hoedeman, 1954) shows both *Chilodus punctatus* and *C. gracilis*; the latter was considered by

aquarists to be the male of the former. It differs from both other *Chilodus* spp. in its considerably greater slenderness (fig. 6) and in its colour pattern. The colour pattern of this species varies in different behavioural and environmental conditions.

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SYSTEMATIC SECTION

Chilodus Müller & Troschel, 1844

Chilodus Müller & Troschel, 1844: 85 [original diagnosis; type species, by monotypy, *Chilodus punctatus* Müller & Troschel, 1844].

Diagnosis.- Dorsal head profile straight. Mouth superior; lips thick; the lower jaw slightly protruding when the mouth is closed. Small unicuspid brown-tipped teeth in both upper and lower lips. Pharyngeal teeth small and numerous. *Chilodus* spp. share a distinctly organized pharyngeal dentition consisting of numerous multicuspid teeth with recurved crowns. This does not occur within the remaining neotropical Characiformes but for the genus *Caenotropus* Günther, 1864, the only other genus of Chilodontidae, and in the family Anostomidae. Dorsal fin formula ii-iii + 9 (rarely 10) + (i), distal tip of first few dorsal fin rays black, remaining area of this fin hyaline

with dark spots. Anal fin ii-iii + 10-11 (rarely 9) + (i), with a convex or straight margin. Ventral fin ii + 8. Gill rakers on the lower arch 15-18 (total: 24-29). Predorsal scutes 5-6, rarely 4 or 7. Fins naked.

KEY TO THE SPECIES OF *CHILODUS*

- 1a Body depth 3.3-3.6 in standard length; a solid longitudinal stripe is always present*Chilodus gracilis*
- 1b Body depth 2.7-3.2 in standard length.....2
- 2a Body with evenly distributed conspicuous dark spots which are ventrally equally prominent as dorsally, spots also being present around the pectoral fin (fig. 4); no trace of a longitudinal stripe.....*Chilodus zunevei*
- 2b Pigmentation of body variable (figs. 1-2), dorsally more prominent than ventrally, absent around the pectoral fin; longitudinal stripe rarely absent; sometimes this stripe is faded or shows a zig-zag pattern: in such cases the spots on the body are also faded and then confined to the margin of the scales*Chilodus punctatus*

Chilodus punctatus Müller & Troschel, 1844 (figs. 1-3, 6)

Chilodus punctatus Müller & Troschel, 1844: 85-86 [original description; type locality: Guyana, "in lacu Amucu Guianae" (= Lake Amuku, upper Essequibo river system)].

Material examined (235 specimens, largest 78.5 mm SL, from Rio Iquíri).- Lectotype (by present designation), ZMB 23599, SL 54.0 mm, one paralectotype, ZMB 24074, SL 56.9 mm, Guyana, Lake Amuku, upper Essequibo river system, coll. R. Schomburgk, 1837/1838;- FMNH 7430 (two), BMNH 1911:10:31:492/5 (four), ZMA 110.612 (one), Guyana, Lower Potaro River, Rockstone, coll. C. H. Eigenmann, 1908:- FMNH 53445 (three), Guyana, Lower Potaro River, Crab Falls, coll. C. H. Eigenmann, 1908;- ZMA 105.822 (11), Surinam, Distr. Nickerie, creek at right bank of Nickerie River, 12 km W.S.W. of Stondansie Fall, depth 50-100 cm, width 7 m, running

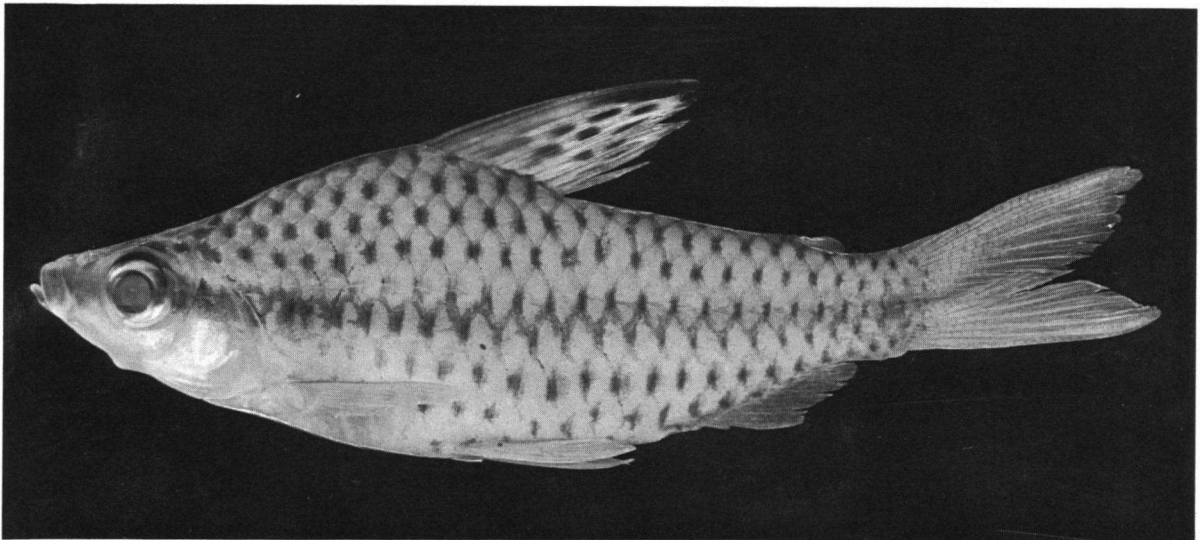
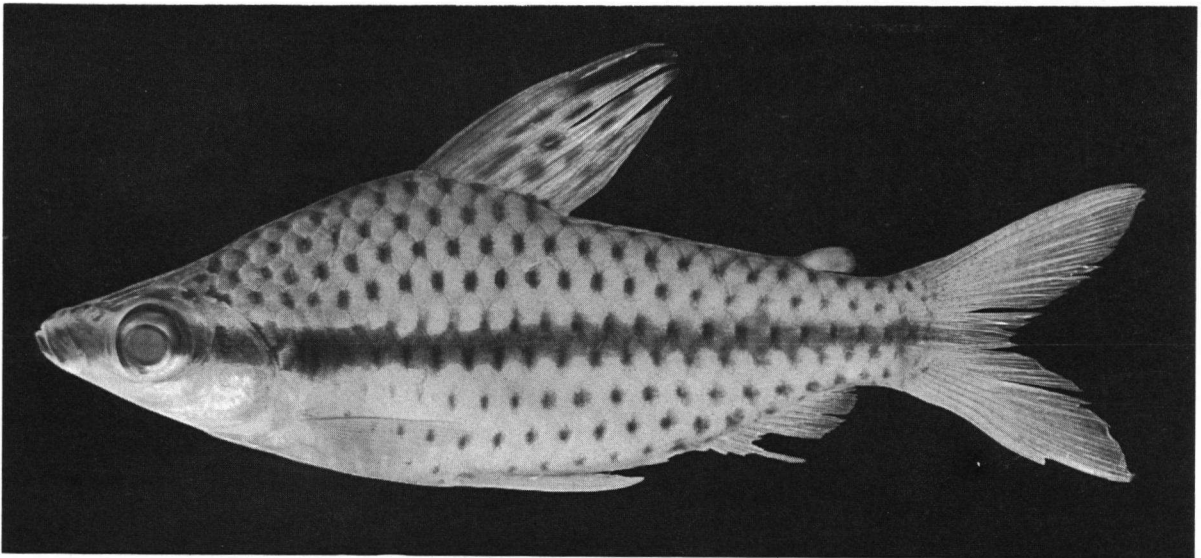


Fig. 1. *Chilodus punctatus* Müller & Troschel, 1844, from Surinam, Nickerie River (ZMA 105.822; upper, SL 54.5 mm, lower, SL 55.3 mm).

water, bottom mud, coll. H. Nijssen, 5-IV-1967;- RMNH 31232 (five), Surinam, Nickerie River, Tjawassi Creek, coll. M. Boeseman, 7-II-1971;- RMNH 31233 (four), Surinam, Nickerie River, Blanche Marie Falls, coll. M. Boeseman, 11-II-1971;- IRSNB 20.879 (13), Brazil, Terr. Rondônia, Igarapé das Milagres, right bank tributary to Rio Madeira at Porto Velho, coll. J.-P. Gosse, 24-XI-1967;- IRSNB 20.880 (nine) [four photographed specimens

deposited in ZMA 116.603], Brazil, Est. Acre, Rio Iquíri, tributary to Rio Purus, km 47, along road along Rio Branco-Abuna, coll. J.-P. Gosse, 28-XI-1967;- IRSNB 20.881 (144), Brazil, Terr. Rondônia, Mamoré river system, mouth of Igarapé Palheta upstream of Guajara-Mirim, coll. J. P. Gosse, 26-XI-1967;- ANSP 102177 (one), Ecuador, Prov. Napo-Pastaza, Lake Jatuncocha (about 01°00' S, 76°26' W), coll. M. Olalla, II-1958;- ANSP 128296 (four),

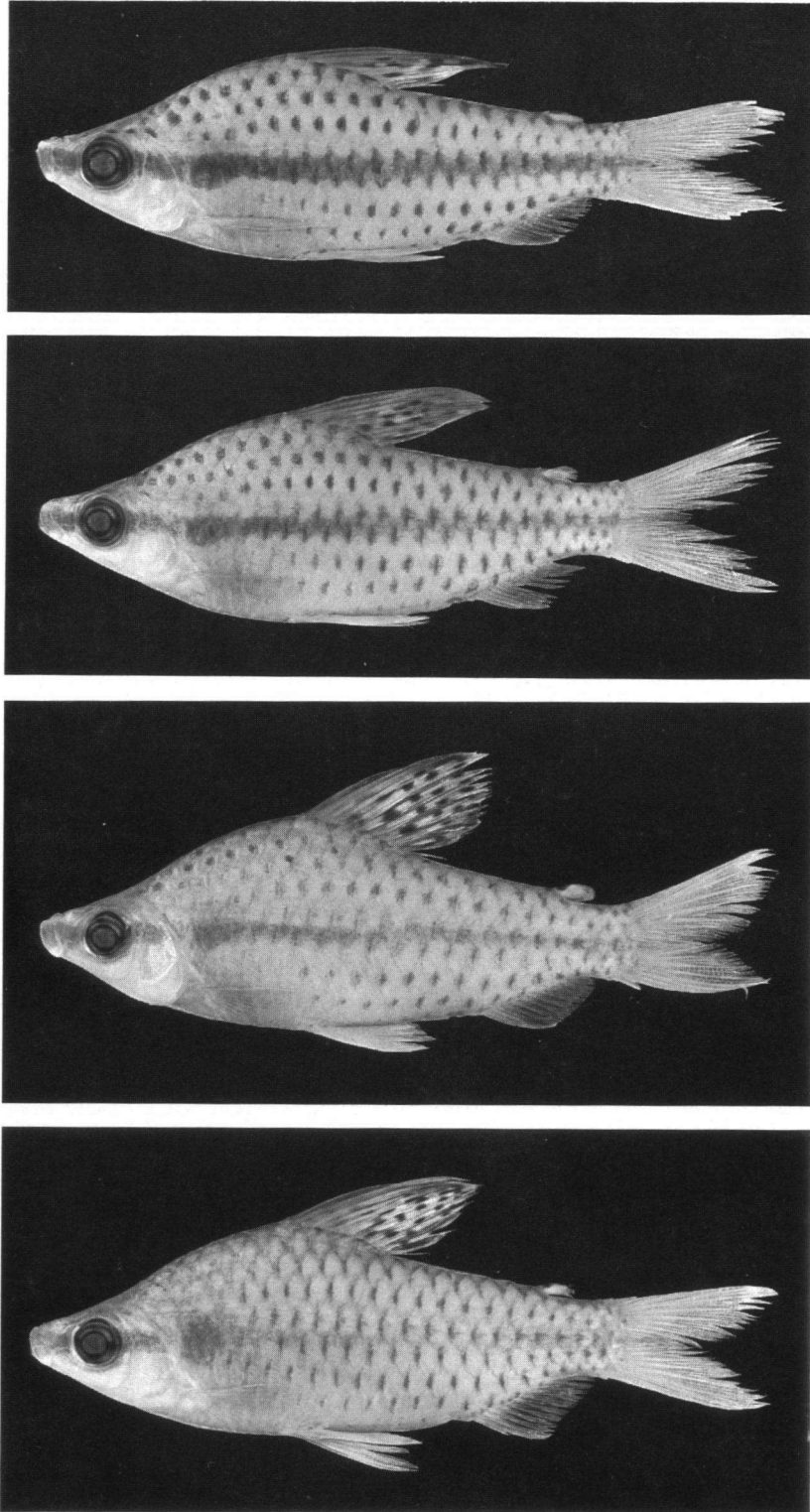


Fig. 2. *Chilodus punctatus* Müller & Troschel, 1844, from Brazil, Rio Iquiri (ZMA 116.603; upper, SL 52.8 mm, second, SL 61.8 mm, third, SL 75.3 mm, lower, 75.9 mm).

Colombia, Meta, Hacienda Humacita, small stream flowing generally south, and presumably Lake Mozambique complex, 259 ft. of stream mostly above bridge, coll. J. E. Böhlke, N. & D. Foster, 24-II-1972;- MCZ 21432 (one), Brazil, Est. Amazonas, Lake Hyuanary near mouth of Rio Negro, coll. Thayer Exp., 27/29-X-1865;- MCZ 46051 (25), Brazil, Est. Pará, Rio Apeú, Boa Vista, Municipio of Castanhal, coll. N. Menezes, VII-1965;- IRSNB 20.882 (one), Brazil, Est. Amazonas, lake near Vila Amazônia, right bank tributary to Rio Amazonas at confluence of Paran  do Ramos, downstream of Rio Parintins, coll. J.-P. Gosse, 16-XII-1967;- MCZ 2770 (five), Brazil, Est. Pará, Obidos, Thayer Exp., 26-VIII-1865.

Description.- Morphometric and meristic data of 62 specimens from several localities, SL up to 78.5 mm. Body depth 2.7-3.2 in SL; head length 3.3-3.8 in SL; snout length 3.0-3.5 in head length; orbital diameter 2.8-3.4 in head length; length dorsal fin 2.8-3.2 in SL; L1 24-29.

The lectotype (SL 54.0 mm) and paralectotype (SL 56.9 mm) are imperfectly preserved. Their actual morphometric and meristic data are as follows: body depth 3.3 and 3.2 in SL; head length 3.6 and 3.5 in SL; snout length 3.6 and 3.5 in head length; orbital diameter 2.8 and 2.9 in head length; length dorsal fin 2.9 in SL in the lectotype, broken in the paralectotype; L1 28 and 27.

Colour in alcohol (figs. 1-2).- Ground colour yellowish brown. Dorsolateral part of body more heavily pigmented than ventrolateral part. Edge of dorsolateral scutes dark, resulting in a net-like pattern. Base of each scute with a dark brown spot, forming four regular rows on either side of the lateral line. Preventral area usually unspotted. A dark brown stripe from tip of lower lip through eye and operculum to caudal peduncle, extending on 9th and 10th branched caudal fin ray. In this stripe -at the height of the insertion of the pectoral fins- a more or less conspicuous, humeral spot is visible. Predorsal scutes with dark brown pigment, forming a predorsal stripe, diverging on the

head into two lines around the fontanel, which converge on the upper lip.

M ller & Troschel (1845, pl. 4 fig. 2) illustrated the habitus of one of the syntypes, which does not show a longitudinal stripe. They described (loc. cit.: 27), however, the colour pattern as follows [our translation]: "yellow brown, with rows of blackish spots equal to the number of scales; a blackish longitudinal band runs below the lateral line. The dorsal fin shows black blotches, its upper end having a larger black blotch in front. Anal fin blackish without blotches."

Eigenmann (1912: 273-274, pl. 35 fig. 4, pl. 84) reported several samples from the Essequibo river system and illustrated a representative specimen. The material we have examined from his 1908 collection is now too faded to describe the variability in colour pattern. Eigenmann's illustrated specimen (loc. cit., pl. 35) is quite reminiscent of a specimen we illustrate (fig. 1, upper) from the Nickerie river system in Surinam. From the same sample, another specimen (fig. 1, lower) is illustrated; both specimens display two extremes in pigmentation intensity.

A gradual range of pigmentation intensity is illustrated in fig. 2. These four specimens from the Brazilian Rio Iqu ri show several phases of pigmentation intensity we also observed in living individuals from unknown localities. Such aquarium specimens can change their pigmentation instantly, in response to the behaviour of conspecific tankmates.

Of the freshly preserved samples we examined, one is worth noting. In all 25 specimens from Brazil, Rio Ape  (MCZ 46051) the longitudinal stripe is distinctly shorter than in all other *Chilodus punctatus*. At the most it extends to a vertical below the origin of the dorsal fin. Some specimens have a humeral blotch on this stripe. On account of the possession of this reduced stripe, we tentatively identify them as *C. punctatus*; otherwise they quite resemble *C. zunevei* and they even tend to have small dark spots around the pectoral fin base. All other well pigmented *C. punctatus* lack spots in that area, whereas these are always present in *C.*



Fig. 3. Localities of examined *Chilodus* spp.

zunevei. It is possible that the Rio Apeú population represents a (sub-) specific taxon different from genuine *C. punctatus*.

***Chilodus zunevei* Puyo, 1945**
(figs. 3, 4, 6)

Chilodus Zunevei Puyo, 1945: 183-185, fig. 1 [original description; type locality: French Guiana: "...crique inconnue qui se déverse dans l'Itany (fleuve Maroni)"; habitus figure inaccurate, sketch].

Material examined (31 specimens, largest 76.7 mm SL, from Crique Pakoti).- ZMA 112.537 (thirteen), Surinam, Distr. Marowijne, Ricanau Creek, E of Moengo, coll. P. J. H. van Bree, 6-XI-1972;- ZMA 104.274 (four), same locality as ZMA 112.537, coll. H. P. Pijpers, 4-IX-1960;- ZMA 101.533 (three), same locality as ZMA 112.537, coll. H. P. Pijpers, 18-III-1962;- ZMA 104.275 (eight), Surinam, Distr. Marowijne, Marowijne River near Albina, coll. H. P. Pijpers, 12-III-1962;- MNHN 1988-818 (one), French Guiana, Oyapock River, coll. F. d'Aubenton, IX/XI-1976;- ZMA 116.601 (one), Brazil, Est. Amapá, east of Martinique Village (03°51' N, 51°53' W), coll. F. d'Aubenton, 9-XI-1976;- MNHN 1988-819 (one), French Guiana, Cri-

que Pakoti near Trois Sauts (02°15' N, 52°53' W), coll. P. Grenand, 11-IX-1976.

Description.- Morphometric and meristic data of 9 specimens from Surinam and French Guiana, SL up to 76.7 mm. Body depth 2.8-3.0 in SL; head length 3.4-3.6 in SL; snout length 3.1-3.4 in head length; orbital diameter 3.0-3.3 in head length; length dorsal fin 2.8-3.0 in SL; Ll 24-27.

Colour in alcohol (fig. 4). Our freshly preserved specimens hardly show variation in pigmentation. Contrary to *Chilodus punctatus*, there is no trace of a longitudinal stripe. The dark spots on the body in adults are well-defined, prominent, and relatively larger than in *C. punctatus*. Fontanel margined with a narrow brown line. Anal fin in adults often with grey pigment.

Small specimens have relatively (compared to adults) less prominent spots on the body. Their pigmentation is, however, already reminiscent of that of adults. The anterior margin of the dorsal fin is dark brown in juveniles. The lower half of this margin becomes inconspicuously greyish to hyaline in adults.

Discussion.- Puyo (1945: 184-185; 1949: 124) described the colour pattern of his two

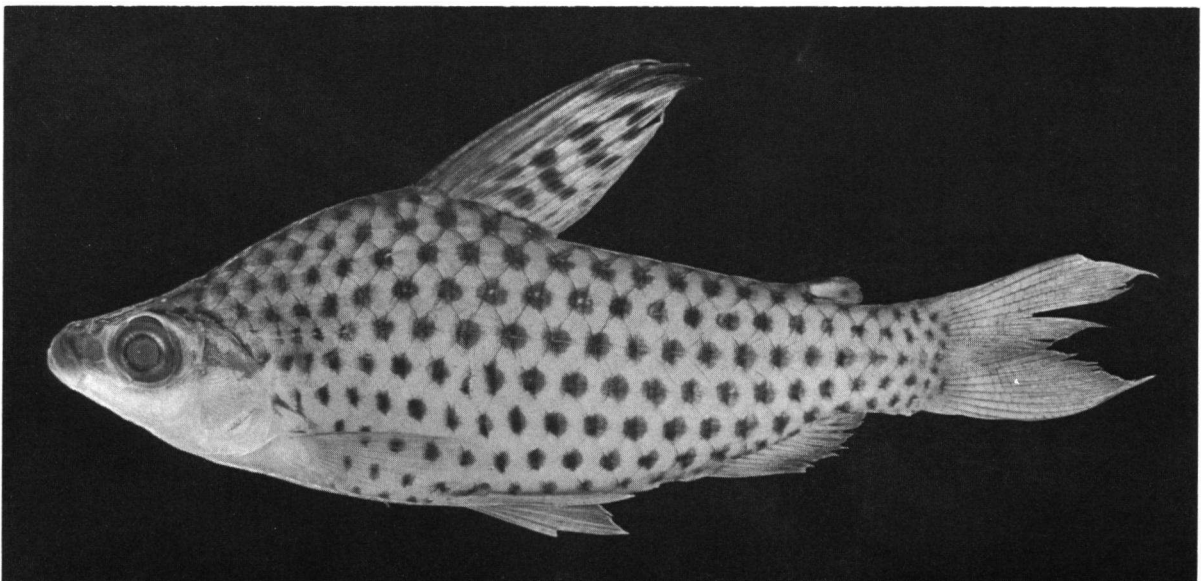


Fig. 4. *Chilodus zunevei* Puyo, 1945, from Brazil, Rio Oyapock (ZMA 116.601, SL 64.8 mm).

'syntypes' (which were never deposited in a collection) as follows (our free translation): "Body uniformly "sand-golden", anteroventral region yellowish-white; cheeks golden; upper jaw and interorbital area yellow with metallic reflections; lips whitish; scales brown-purple at the base, except for those on the belly; dorsal fin with finely scattered black-purple, in particular on the six last rays, the two first rays hyaline with dark tips; adipose with a brown spot; caudal fin hyaline-whitish, same as anal-, pectoral- and pelvic fins."

Géry (1966: 122) recorded the specimens collected by Pijpers as *Chilodus punctatus punctatus* and described the colour of freshly preserved specimens. Pending a more thorough study of the populations of *Chilodus*, we prefer to consider *C. zunevei* as a separate species, rather than as a subspecies of *C. punctatus*.

***Chilodus gracilis* n. sp.**
(figs. 3, 5-6)

Etymology.- Latin, *gracilis*, slender.

Material examined (25 specimens, largest 63.6 mm SL, a paratype from Rio Iça).-

Holotype: IRSNB 760, SL 40.1 mm, Brazil, Est. Amazonas, right bank tributary to Rio Uaupés at Trovão (about 20 km upstream of

mouth of Rio Uaupés), coll. J.-P. Gosse, 9-XII-1967.

Paratypes: IRSNB 761 (ten), ZMA 120.253 (three), SL 31.7-45.4 mm, same data as holotype; IRSNB 762 (three), ZMA 120.254 (one), SL 39.3-52.4 mm, Brazil, Est. Amazonas, left bank tributary to Rio Negro, in Arquipélago da Anavilhanas, coll. J.-P. Gosse, 18-XI-1967;- IRSNB 763 (one), SL 57.6 mm, Brazil, Est. Amazonas, Igarapé Veneno, right bank tributary to Rio Tiquié downstream of Cachoeira Pari, coll. J.-P. Gosse, 5-XII-1967;- MCZ 21434 (four), SL 47.9-61.4 mm, Brazil, Est. Amazonas, Jatuarana Village along Rio Aripuanã, coll. Thayer Exp., XII-1865;- NRM 44:3:3066 (two), SL 49.8-63.6 mm, Brazil, Est. Amazonas, Rio Iça, Pueblo Coiavá, caño, coll. T. Hongslo, 3-XI-1971.

Description.- Morphometric and meristic data of 19 specimens from Brazil, SL up to 63.6 mm. Body depth 3.3-3.6 in SL; head length 3.1-3.7 in SL; snout length 3.1-3.4 in head length; orbital diameter 3.0-3.3 in head length; length dorsal fin 3.0-3.4 in SL; L1 27-29.

Morphometric and meristic data of the holotype (SL 40.1 mm): body depth 3.5 in SL; head length 3.1 in SL; snout length 3.1 in head length; orbital diameter 3.1 in head length; length dorsal fin 3.1 in SL; L1 28.

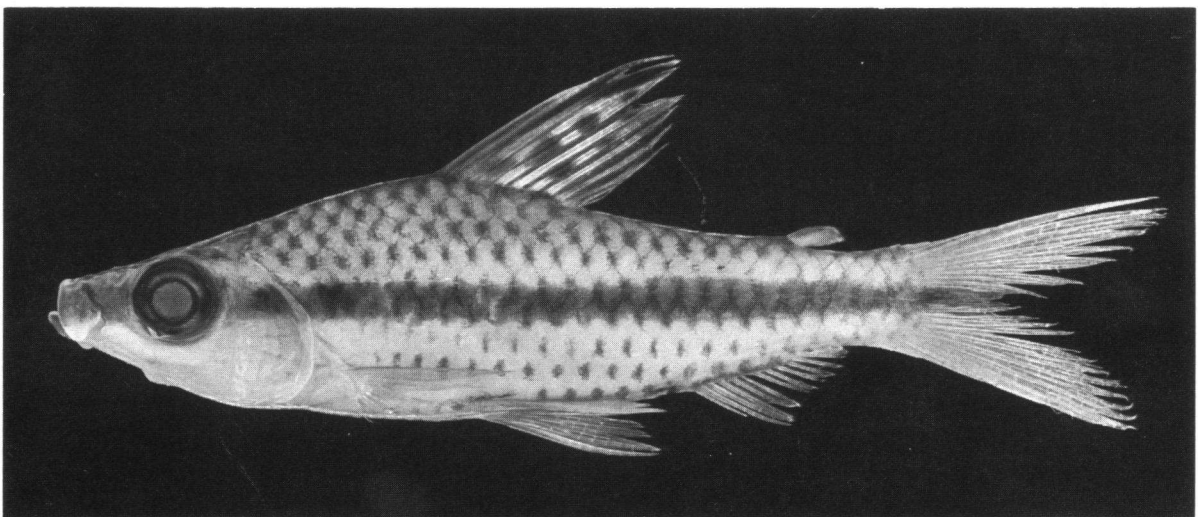


Fig. 5. *Chilodus gracilis* n. sp., holotype, SL 40.1 mm.

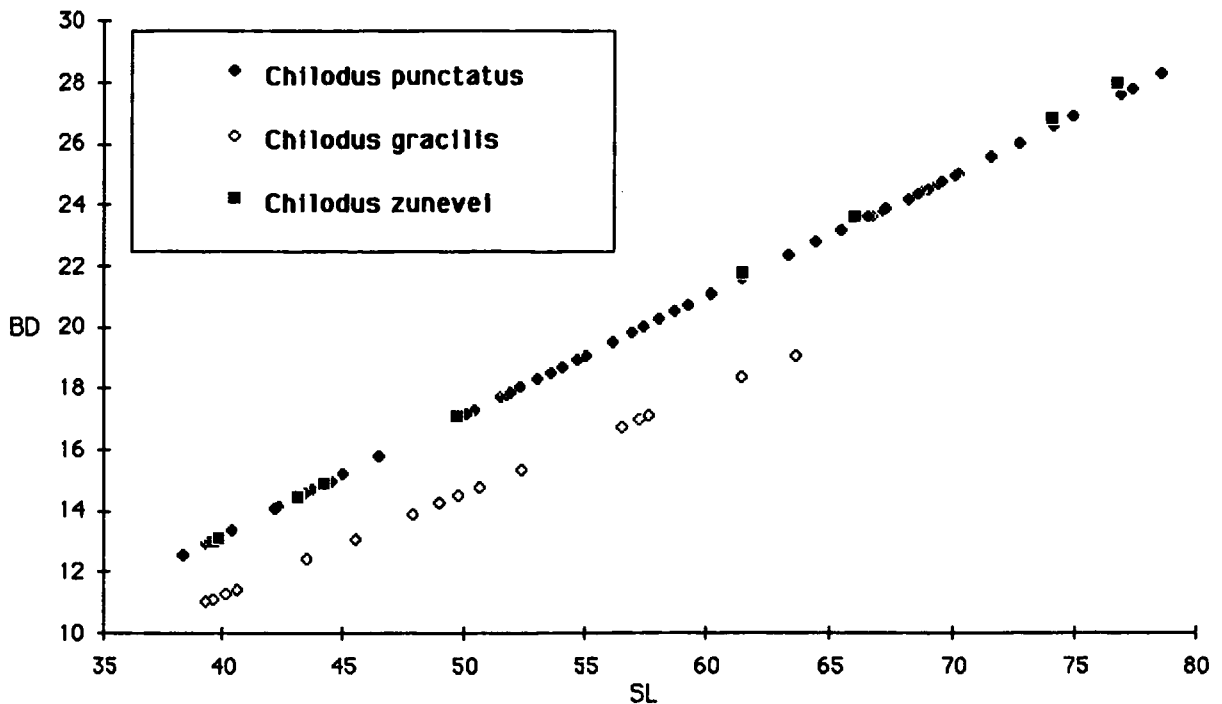


Fig. 6. Differences in correlation of body depth (BD in mm) with standard length (SL in mm) of *Chilodus gracilis* versus *C. punctatus* plus *C. zunevei* as obtained using the Microsoft Chart (Apple Macintosh) computer program. Coefficient of correlation for *C. gracilis* = 0.97, for *C. punctatus* = 0.98, and for *C. zunevei* = 0.99.

Colour in alcohol (fig. 5).- Ground colour light tan. A prominent, broad, dark brown longitudinal stripe from tip of snout through eye and operculum to caudal fin, where it narrows on the middle rays, ending as an acute triangle. In one specimen the longitudinal stripe is less prominent, showing a zig-zag pattern. A small dark brown spot or blotch on the scales above and below the longitudinal stripe, except for those scale rows immediately bordering that stripe. Anterior rays of dorsal fin dark brown in the lower half, blackish in the upper. Anterior two-thirds of dorsal fin with irregular dark brown markings. Adipose-, caudal- and anal fin with brownish pigment. Pectoral- and pelvic fins hyaline. A narrow dark brown line surrounds the fontanel.

The paratypes from Arquipélago da Anavilhanas show lighter coloured anterior dorsal fin rays than the topotypes, and have a prominent black, oval blotch on the distal tip of the anterior dorsal rays.

The paratypes from Rio Iça and Rio Tiquié hardly show pigment on the anterior dorsal fin ray whereas the remainder of the fin shows more numerous brown blotches than the specimens described above. The longitudinal stripe hardly extends beyond the base of caudal fin in the specimen from Rio Tiquié.

The three paratypes from Jatuarana (collected in 1865) are not well preserved, although their colour pattern is still visible.

Discussion.- Often confused with *Chilodus punctatus* in current aquarium literature during at least the last 30-odd years (e.g., Hoedeman, 1954); the illustration of *Chilodus punctatus sensu* Arnold & Ahl (1936), dated 1913 fits very well *C. gracilis*. Schultz (1961) described and illustrated but did not name a "new *Chilodus* sp.", which is *C. gracilis* (see also Schultz' photograph in Géry, 1964 and 1977).

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