A new species of *Microglanis* (Siluriformes: Pseudopimelodidae) from upper rio Paraná basin, Brazil

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*Microglanis garavelloi*, new species, collected in tributaries of rio Paranapanema and rio Tietê, is the first species of the genus described from upper rio Paraná basin. The new species can be distinguished from other species of *Microglanis* on morphometric characters, color pattern, caudal-fin shape, pectoral-spine morphology and lateral line development. Characters used specifically to distinguish *M. garavelloi* from *M. cottoides* (laguna dos Patos and rio Uruguay basins) and *M. parahybae* (rio Paraíba do Sul basin) include morphometrics, color pattern and pectoral-spine serration.


**Key words:** Bumble bee catfish, Freshwater fishes, Neotropical, rio Paranapanema, rio Tietê.

**Introduction**

*Microglanis* was proposed by Eigenmann (1912) as a monotypic genus to include the species *Microglanis poecilus*. The genus is easily distinguished from other Pseudopimelodidae by its small adult size (no greater than 11 cm SL), premaxillary tooth plate with rounded lateral margin and no posterior extension, and an incomplete lateral line (Eigenmann, 1912; Gomes, 1946; Mees, 1974).

The 13 species of *Microglanis* are distributed in the Orinoco and Amazon basins, one Pacific coast drainage in Ecuador, the Maracaibo basin (rio Catatumbo), lago Valencia and Caribbean drainages in Venezuela, Atlantic coastal drainages of the Guianas and eastern and southern Brazil from the rio São Francisco to the state of Rio Grande do Sul, and Uruguay basin (Mees, 1974; Shibatta, 2003; Bertaco & Cardoso, 2005; Mori, 2005). Prior to this study, *Microglanis* had not been reported from the rio Paraná basin despite extensive collections from this region.

A recent collection in the rio Tibagi, in Paraná State, Brazil, revealed a population of a new species of *Microglanis*. Additional specimens were subsequently discovered in museums collected from the rio Tietê basin, São Paulo State, Brazil, in Promissão, Cosmópolis, and Botucatu municipalities. The specimens from the basins of Tibagi and Tietê rivers were found to represent a new species described herein as *Microglanis garavelloi*. A morphometric analysis was performed to distinguish *M. garavelloi* from *M. parahybae* and *M. cottoides*, distributed in the Paraíba do Sul and Uruguay basins respectively, because *M. parahybae* has a similar pattern of coloration and the new species was misidentified as *M. cottoides* by previous authors (e.g. Visotto et al., 1999).

**Material and Methods**

Measurements were taken point-to-point with digital caliper to 0.01 mm, following Malabarba & Mahler (1998), except for body depth, which was taken at the dorsal-fin origin. The new species, *M. parahybae* and *M. cottoides* were compared using size-free canonical variate analysis (SFCVA) in order to test hypothesized differences among the species and to identify diagnostic characters. The program SAS was used to calculate the SFCVA, according to the method developed by Reis et al. (1990). Meristic data include numbers of pectoral-fin rays, pelvic-fin rays, dorsal-fin rays, caudal-fin rays, gill rakers, vertebrae, and branchiostegal rays. Counts of bilaterally symmetrical features were made on the left side of the body. Osteological characters were examined from specimens.
cleared and stained (cs) according to the procedure of Dingerkus & Uhler (1977). Vertebral counts include only free centra, with the compound caudal centra (pleural 1 + ural 1) counted as a single element. Institutional abbreviations are as in Leviton et al. (1985), with the addition of MZUEL (Museu de Zoologia da Universidade Estadual de Londrina), LBP (Laboratório de Biologia de Peixes da Universidade Estadual Paulista – campus de Botucatu), and LIRP (Laboratório de Ictiologia de Ribeirão Preto da Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto - Universidade de São Paulo). Other abbreviations are SL, standard length and HL, head length.

Key to species of Microglanis from southern Brazil:
1. Squarish head in dorsal view (more pronounced in adults); mouth width 67-85 % HL ................................. M. eurystoma (upper rio Uruguai drainage)
   1’. Conical head in dorsal view; mouth width 50-72.4 % HL ...2
   2. Dark blotch beneath adipose fin not extending to anal fin as continuous bar ........................................ 3
   2’. Dark continuous bar on posterior flank from base of adipose fin to that of anal fin .................................. 4
3. Caudal-peduncle depth 9.8-11.4 % of SL, pectoral-girdle width 25.6-29.7 % of SL ................................. M. parahybae (rio Paraíba do Sul drainage)
3’. Caudal-peduncle depth 10.8-16.8 % of SL, pectoral-girdle width 28.2-33.9 % of SL ................................. M. garavelloi (upper Paraná drainage)
4. Dorsal and anal fins entirely dark brown ........................................ M. nigripinnis (rio Macacu and rio São João drainage)
4’. Dorsal and anal fins dark distally but with light areas near base ................................................................. 5
5. Maxillary barbel short, not reaching pectoral-fin origin, caudal fin almost entirely black with narrow vertical light band near base .......... M. malabarbai (rio Ijuí drainage)
5’. Maxillary barbel extending to pectoral-fin origin, caudal fin almost entirely black or light with large dark brown band in middle .................................................. 6
6. Body width 27-34 % of SL, head length 29-34 % of SL ...... M. cotoides (laguna dos Patos and rio Uruguay drainages)
6’. Body width 22-29 % of SL, head length 25-29 % of SL .......................................... M. cibelae (coastal drainages from northern Rio Grande do Sul and Santa Catarina states)

Microglanis garavelloi, new species
Figs. 1, 2
Holotype. MZUSP 88006 (formerly MZUEL 1730 in part), 31.72 mm SL; Brazil, Paraná, Jataizinho: ribeirão Taquari, 23º12’24”S 50º56’50”W, 20 Aug 1999, O. A. Shibatta et al.

Non-Type specimens. Brazil, São Paulo: MZUSP 47798, 5 (1 cs), 27.0-39.7 mm SL, rio Araquã, rio Tieté tributary, Botucatu. LBP 492, 6, 25.0-32.4 mm SL, rio Capivara (ponte de Botucatu), Botucatu. MZUEL 3725, 34.0 mm SL, rio Pirapitingui, Cosmópolis. MZUEL 3726, 3, 35.8-41.8 mm SL, rio Pirapitingui, rio Jaguari tributary, Cosmópolis.

Diagnosis. Microglanis garavelloi is distinguished by having paired fins and anal fin mottled or with thin faint bands (vs. heavy dark bands in M. ater, M. pellopterygius, and M. nigripinnis); trunk with dark-brown saddles (vs. mottled in M. variegatus); caudal fin emarginate (vs. rounded in M. zonatus); tip of pectoral spine as distinct bony point (vs. tip of pectoral spine soft, not as distinct bony point, but implanted between two teeth, one straight, pointing outwards from anterior margin and the other curved, pointing backwards from posterior margin in M. secundus (sensu Mees, 1974)); continuous portion of lateral line not reaching vertical through adipose-fin origin (vs. reaching vertical through adipose-fin origin in M. iheringi); caudal peduncle with faint to dark blotch irregularly shaped (vs. triangular in M. poecilus); caudal-peduncle depth 10.8-17.0 % of SL (vs. 8.8-10.3 % of SL in M. eurystoma); trunk short relative to head (vs. long in M. cibela); caudal fin lightly mottled with narrow vertical black band across central portions of fin rays and dark blotch beneath adipose fin not extending to anal fin as continuous bar (vs. caudal fin almost completely black with narrow vertical white band across central portions of fin rays and dark continuous bar on posterior flank from base of adipose fin to that of anal fin in M. malabarbai); caudal-peduncle depth 10.8-16.8 % of SL and pectoral-girdle width 28.2-33.9 % of SL (vs. caudal-peduncle depth 9.8-11.4 % of SL and pectoral-girdle width 25.6-29.7 % of SL in M. parahybae).

Description. Morphometric data are presented in Table 1. Head and anterior body depressed, body becoming laterally
A new species of Microglanis from upper rio Paraná


Color in alcohol. Ground color light brown alternating with slightly darker brown saddles on head and trunk. Darker area mottled with small light patches covering area on head from tip of snout to occipital region and extending ventrally onto interopercle and opercle. Large dark brown saddle located dorsally from nuchal region to posterior base of dorsal fin, center of saddle interrupted by small light brown patch over spinelet; saddle n-shaped in lateral view. Dark coloration on head and first dark saddle on body separated by lighter yoke-like marking along nuchal region. Second dark brown saddle extends from slightly posterior of dorsal fin to middle of adipose fin, center of saddle interrupted by large light brown oval patch over anterior third of adipose fin; dark saddle broadly v-shaped in lateral view. Irregular light brown vermiculations on sides along trunk. Dark brown band at base of caudal fin. Conspicuous dark brown band in middle of caudal fin. Dorsal fin with dark brown band across middle and another dark band along base. All fins and belly mottled with small dark brown spots.

Table 1. Morphometric data of Microglanis garavelloi from Upper rio Paraná basin. Standard length (SL) in mm, body proportions as ratios of SL or head length (HL). SD = standard deviation.

<table>
<thead>
<tr>
<th></th>
<th>Holotype</th>
<th>Paratypes</th>
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<tr>
<td></td>
<td>Mean ± SD</td>
<td>Low-high</td>
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<tr>
<td>Standard length (mm)</td>
<td>31.72</td>
<td>20.8-41.8</td>
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<tr>
<td>Percents of HL</td>
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<td>27.4±4.8</td>
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<tr>
<td>Eye diameter</td>
<td>9.6</td>
<td>9.2-16.2</td>
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<tr>
<td>Interorbital width</td>
<td>51.8</td>
<td>42.5-55.7</td>
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<tr>
<td>Head depth</td>
<td>41.6</td>
<td>36.8-54.9</td>
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<td>Snout length</td>
<td>39.4</td>
<td>37.4-45.2</td>
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<tr>
<td>Mouth width</td>
<td>60.7</td>
<td>56.2-72.4</td>
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<tr>
<td>Percents of SL</td>
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<td>29.2</td>
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<td>Pelvic-anal fin distance</td>
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<td>Maxillary-barbel length</td>
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<td>Anal-fin base length</td>
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<td>Body depth at adipose-fin origin</td>
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<tr>
<td>Adipose-fin base length</td>
<td>24.4</td>
<td>14.3-27.4</td>
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Karyotype. A diploid number (2n) of 54 chromosomes, with 22 metacentric, 20 submetacentric and 12 subtelocentric chromosomes was reported for M. garavelloi (Vissotto et al., 1999), but identified therein as M. cottoides.

Ecological notes. In ribeirão Taquari, M. garavelloi was found in the marginal vegetation. Water velocity at that site was 0.05 m/s, mean depth of water 0.65 m, stream width 3.71m, water transparency 0.19m, dissolved oxygen 7.15 mg/L, pH 7.5, temperature 23.2°C, conductivity 211.8 mS/cm and alkalinity 110.63 mg/L.
Despite repeated collecting efforts in the rio Paraná basin in recent years, few specimens of *M. garavelloi* have been found, indicating that this might be a rare species (total = 65 individuals, mean = 3.8 per collection event).

**Distribution.** This species is known only from Brazil in the rio Paranapanema and rio Tietê basins (Fig. 4). In rio Paranapanema basin, *M. garavelloi* was collected in ribeirão Taquari, in Paraná State, and ribeirão Pau D’alho, tributary of rio Capivara, in São Paulo State. In the rio Tietê basin, it was collected in rio Pirapitingui, and Barreiro stream.

**Etymology.** The specific name, *garavelloi*, is homage to the Brazilian ichthyologist Julio Cesar Garavello.

**Results and Discussion.** *Microglanis garavelloi* can be discriminated from *M. parahybae* and *M. cottoides* in the first canonical variate axis that explains 64.7% of the variance (Fig. 5 and Table 2). *Microglanis garavelloi* has a caudal-peduncle depth, pectoral-girdle width, interorbital width, head depth, and pelvic-fin length greater than that found in *M. parahybae* and *M. cottoides* (higher positive values of CVI, \(p = 0.0001\)). *Microglanis cottoides* and *M. parahybae* also have a pelvic-fin to anal-fin distance and eye diameter greater than *M. garavelloi* (higher negative values of CVI, \(p = 0.0001\)). In the analysis *M. cottoides* could be discriminated from the two other species by the second canonical axis, based on larger adipose-fin base length, eye diameter and pelvic-fin to anal-fin distance (higher positive value of CVII, \(p = 0.0013\)). It is noteworthy that there is some geographic correlation between morphometric variation and river system within species *M. garavelloi* and *M. parahybae*.

The results of our analysis corroborate the work of Malabarba & Mahler (1998) who considered the species *M. cottoides* and *M. parahybae* to be valid. Previously, Gomes (1946) applied the name *M. cottoides* to all populations of *Microglanis* of southern Brazil whereas Mees (1974) considered *M. cottoides* to be a junior synonym of *M. parahybae*. We note that the pectoral spine illustrated by Mees (1974, Fig. 40a) for *M. parahybae* is more similar to spines in specimens identified here as *M. cottoides* (Fig. 3). However, we agree with Mees (1974), that the form of the spine changes with ontogenetic development, exhibiting a gradual increase of the number of serrations with an increase in spine length. To minimize such changes, we compared specimens with pectoral spines similar in length. As shown in figure 3 the pectoral-spine serrations in *M. garavelloi* are more robust and less numerous than in *M. parahybae* and *M. cottoides* for similarly sized specimens.

The species of *Microglanis* in southern Brazil exhibit subtle differences in color pattern that can be useful for identification mainly because intra-populational polymorphism was not observed. The color pattern of *M. garavelloi* is very similar to that of *M. parahybae* (both present vermiculations, and a dark saddle in the adipose fin area that does not extend to the anal fin). These two species are best differentiated on the
basis of caudal-peduncle depth (10.8-16.8% of SL in *M. garavelloi* vs. 9.8-11.4% in *M. parahybae*) and pectoral-girdle width (28.2-33.9% of SL in *M. garavelloi* vs. 25.6-29.7% in *M. parahybae*).

The identification of a new species endemic to the upper rio Paraná basin agrees with the hypothesis of Vari (1992), who considered this region to be an area of endemism. Other recently described species apparently endemic to the basin, such as *Neoplecostomus paranensis* Britski, 1997, reinforce this hypothesis.

All of these species are characterized by their small size (less than 20 cm SL) and their occurrence in small streams. Nevertheless, it is possible that the apparently restricted distribution of *M. garavelloi* in the rio Tietê and rio Paranapanema basins may be the result of a lack of collecting efforts in small-river habitats of the upper rio Paraná basin. The occurrence of *M. garavelloi* at different sites in the upper rio Paraná suggests that the distribution of the genus in the Paraguay-Paraná basin may be broader than is presently known and tied to patchily distributed habitats. The utilization of more encompassing collecting techniques in a greater variety of habitats often reveals the presence of new species (Castro & Casatti, 1997). Castro & Menezes (1997) proposed that new species would be found with an increase of collections in upper rio Paraná basin.


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