

## A new species of the catfish genus *Ituglanis* from French Guyana (Osteichthyes: Siluriformes: Trichomycteridae)

Mário de Pinna and Philippe Keith

(MDP) Museu de Zoologia da Universidade de São Paulo, Caixa Postal 42694  
Av. Nazaré 481, São Paulo-SP 04299-970 Brazil, e-mail: pinna@ib.usp.br;  
(PK) Muséum national d'histoire naturelle, Laboratoire d'ichtyologie,  
43 rue Cuvier, 75231 Paris Cedex 05, France, e-mail: keith@mnhn.fr

**Abstract.**—*Ituglanis nebulosus* is described from the Aprouague basin in French Guiana. It differs from all other species of *Ituglanis* by a color pattern composed of large, round spots irregularly distributed on body and not coalesced into longitudinal stripes. It is also diagnosable from most congeners by the round caudal fin and the reduced number of vertebrae (35 or 36). The new species shares all synapomorphies so far proposed for the genus *Ituglanis*, as well as other characteristics supporting the placement of the genus within trichomycterids.

The neotropical catfish family Trichomycteridae is known mostly for the semi-parasitic (hematophagous and lepidophagous) habits of some of its members in the subfamilies Stegophilinae and Vandelliinae, popularly called “candirus”. However, most species in the family are free-living generalized predators of aquatic invertebrates, usually inhabiting fast-flowing, clear-water streams. The majority of those are included in the subfamily Trichomycterinae, a vast non-monophyletic assemblage (de Pinna 1989) comprising over 100 described species (cf. Eigenmann 1918, Tchernavin 1944) plus many others undescribed (de Pinna 1998).

One consequence of the non-monophyly of the Trichomycterinae is that some forms included in the group are expected to be more closely related to other subfamilies than to remaining trichomycterines (de Pinna 1989, 1998). Costa & Bockmann (1993) recognized a small monophyletic group of species formerly included in *Trichomycterus*, which they removed to a separate genus, *Ituglanis*. Costa & Bockmann proposed that *Ituglanis*, rather than forming a

clade with other species of *Trichomycterus*, is instead the sister group to a large clade comprising the subfamilies Tridentinae, Stegophilinae, Vandelliinae, Sarcoglanidinae, and Glanapteryginae. That hypothesis implies that *Ituglanis*, though superficially similar to *Trichomycterus* and other members of the subfamily Trichomycterinae, is a key taxon in understanding the evolution of the pronounced morphological and behavioral specializations found in more distal trichomycterids, including the parasitic forms.

The genus *Ituglanis*, as defined by Costa & Bockmann (1993), currently comprises ten species, namely *I. amazonicus* (Steindachner), *I. eichorniarum* (Miranda Ribeiro), *I. gracilior* (Eigenmann), *I. herberti* (Miranda Ribeiro), *I. laticeps* (Kner), *I. metae* (Eigenmann), *I. parahybae* (Eigenmann), *I. parkoi* (Miranda Ribeiro), *I. passensis* Fernández & Bichuette, and *I. proops* (Miranda Ribeiro). The distribution of species assignable to the genus, several of which remain undescribed, covers much of cis-Andean South America, from the Guyanas in the north to Uruguay in the south.



In this paper, we describe a distinctive new species of *Ituglanis*, representing the first species of the genus described from French Guyana.

*Material and methods.*—Meristics and morphometrics are taken according to de Pinna (1992). Skeletal observations are mostly based on a single paratype, cleared and counterstained for bone and cartilage according to a procedure combined and modified from the methods of Taylor & Van Dyke (1985) and Song & Parenti (1995). Data on vertebral number and pleural ribs were taken from the cleared and stained paratype and from radiographs of the holotype and alcoholic paratype. Radiographs were made with a digital x-ray system at the National Museum of Natural History, Smithsonian Institution. Vertebral counts do not include those in the Weberian complex, and the compound caudal centrum (PU1+U1) is counted as one. Number of branchiostegal rays and odontodes are based on the single cleared and stained paratype.

*Comparative material examined.*—*Ituglanis amazonicus*, MZUSP 30449 (1 ex c&s); *I. eichorniarum*, MZUSP 40792 (13 ex, 2 c&s), 59387 (2 ex); *I. gracilior*, FMNH 53264, x-ray of holotype, MZUSP 65415 (1 ex); *I. herberti*, MZUSP 22186 (1 ex), 2209 (1 ex); *I. parahybae*, MZUSP 79810 (2 ex, 1 c&s), MZUSP 71852 (3 ex); *I. metae*, MZUSP 26030 (2 ex); *I. parkoi*, MNRJ 3849 (holotype), MZUSP 23368 (1 ex); *I. passensis*, MZUSP 80097 (3 ex), 80098 (3 ex), 80099 (2 ex); *I. proops*, MZUSP uncat (5 ex c&s); *Ituglanis* sp. 1, MCP 10420 (1 ex c&s, from Uruguay); *Ituglanis* sp. 2 MZUSP 24128 (2 ex c&s, from the Amazon); *Ituglanis* sp. 3 MNRJ 11489 (5 ex c&s, from Tocantins basin). The unidentified species listed above (sp. 1, sp. 2, etc.) refer to undescribed species which are comparatively relevant for this paper. They will be described in separate publications. Material of *I. laticeps* was not available for examination, and data on that species were obtained from Eigenmann

(1918). Additional comparative material of other trichomycterids and other catfishes is listed in de Pinna (1992).

*Ituglanis nebulosus*, new species

Figs. 1 and 2

*Ituglanis* sp.; Le Bail, Keith & Planquette, 2000:164, 165 (brief description and color photograph)

*Holotype.*—MNHN 2001-1128, 36.6 mm SL, French Guiana, Arataye river (tributary of Approuague river), near the natural preserve "Reserve naturelle des Nouragues", (04°00'22"N, 52°36'34"W), col. P. Planquette & et al., Sep 1985.

*Paratypes.*—Two specimens, both collected with holotype. MNHN 2001-1129, 31.1 mm SL; MZUSP 69574, 35.1 mm SL (specimen cleared and stained).

*Diagnosis.*—*Ituglanis nebulosus* is distinguished from all other species of *Ituglanis* by a color pattern composed of large dark blotches (larger than twice eye diameter), which often contact each other at their borders but do not coalesce. Dark spots in all other *Ituglanis* species, when present, are either very fine and irregular or regularly spaced and round, no larger than eye, or irregular and coalescent forming roughly-defined longitudinal stripes. *Ituglanis parahybae* has the color pattern most similar to that of *I. nebulosus*, but its dark markings are mostly irregular (vs. round) and partly coalesce as two or three longitudinal series. The differences in color pattern between the two species are well demonstrated in color photographs of fresh or live specimens included in fig. 1 of Costa & Bockmann (1993) and page 165 of Le Bail et al. (2000). The round caudal fin distinguishes *I. nebulosus* from all of its congeners except *I. metae*. In all other species of *Ituglanis*, the caudal fin is either truncate or truncate with rounded dorsal and ventral corners and a gently convex posterior margin (see Discussion). The new species is further diagnosable from *I. gracilior*, geographically its closest congener, by the



Table 1.—Morphometric data for *Ituglanis nebulosus*. A—holotype, B and C—paratypes, D—mean. Measurements 2–13 expressed as % of SL, 14–27 as proportions of HL.

	A	B	C	D
1—Standard length (mm)	36.6	31.1	35.1	34.3
2—Total length	120.8	121.9	118.2	120.3
3—Body depth	16.1	14.5	15.1	15.2
4—Caudal peduncle length	18.0	17.4	18.5	18.0
5—Caudal peduncle depth	11.5	11.6	11.4	11.5
6—Predorsal length	72.4	73.0	70.4	71.9
7—Preanal length	75.4	74.6	77.2	75.7
8—Prepelvic length	62.6	62.7	63.5	62.9
9—Antevent distance	68.9	68.5	69.8	69.0
10—Dorsal-fin base length	7.7	7.4	7.7	7.6
11—Anal-fin base length	6.3	6.4	6.3	6.3
12—Pelvic-fin length	8.7	8.4	8.3	8.5
13—Head length	18.6	19.3	18.8	18.9
14—Head width	88.2	90.0	89.4	89.2
15—Head depth	51.5	45.0	39.4	45.3
16—Interorbital	26.5	30.0	27.3	27.9
17—Eye diameter	10.3	8.3	6.1	8.2
18—Snout length	36.8	38.3	39.4	38.2
19—Mouth width	50.0	48.3	40.9	48.4
20—Length of interopercular patch of odontodes	25.0	26.7	25.8	25.8
21—Length of opercular patch of odontodes	13.2	13.3	10.6	12.4
22—Posterior internarial width	19.1	20.0	18.2	19.1
23—Anterior internarial width	22.1	21.7	19.7	21.1
24—Posterior internarial diameter	5.9	5.0	6.1	5.6
25—Anterior internarial diameter	5.9	5.0	4.5	5.1
26—Pectoral-fin length	58.8	55.0	57.6	57.1
27—Length of pectoral-fin filament	29.4	31.7	37.9	33.0

shorter maxillary barbel (reaching posteriorly slightly beyond posterior margin of pectoral-fin base; vs. minimally to midlength of pectoral fin exclusive of filament). The presence of only three pleural ribs distinguishes *I. nebulosus* from all congeners except *I. amazonicus* and *I. gracilior*. However, rib number is not known in all species of *Ituglanis*. The reduced number of vertebrae in *I. nebulosus*, 35 or 36, is also unusual in the genus, where vertebral counts normally range otherwise from 39 to 41 (41 in *I. gracilior*, 39 in *I. eichorniarum* and *I. parahybae*, 40–41 in *I. proops*). The only other species with 36 vertebrae is *I. passensis*, a cave species easily distinguished from all other *Ituglanis* species by the reduction of eyes and of integumentary pigmentation.

*Description.*—Morphometric data for the holotype and paratypes are provided in Table I. Cross-section of body round or slight-

ly depressed at pectoral-fin insertion, becoming increasingly compressed posterior to midlength of trunk. Caudal peduncle tapering gradually to caudal fin in dorsal view. Dorsal profile of body straight from head to origin of dorsal fin, sometimes slightly convex at posterior half of trunk. Dorsal profile of head continuous with that of dorsum (Fig. 1). Caudal peduncle evenly deep, nearly as much as remainder of body, expanded posteriorly by procurrent rays. Ventral profile of body gently convex along abdomen, then practically straight from origin of pelvic fins to origin of caudal fin. Myotomes obscured by thick integument but visible by relief on caudal peduncle and dorsal part of posterior half of trunk. Region of longitudinal skeletogenous septum visible as a shallow wide depression, probably in part due to post-mortem shrinkage. Axillary gland inconspicuous on surface of



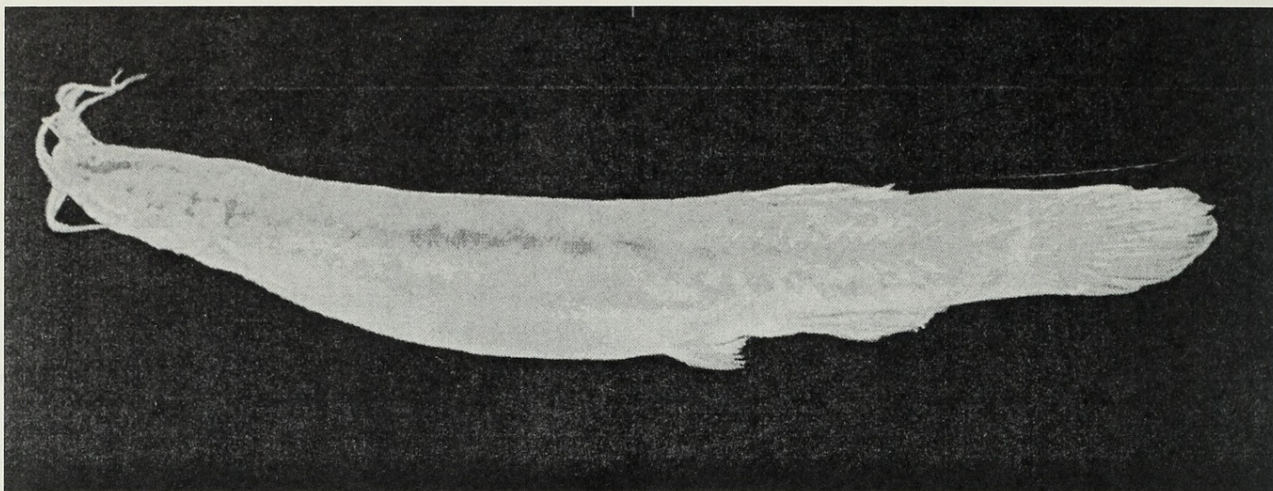


Fig. 1. *Ituglanis nebulosus*, holotype, MNHN 2001-1128, 36.7 mm SL, lateral view.

body, apparently located dorsoposteriorly to base of pectoral fin, as inferred from slightly different texture of integument. Its small slit-like pore located shortly dorsoposteriorly to first pectoral-fin ray, slightly anteroventral to first lateral-line pore.

Head depressed, parabolic in dorsal view (nearly round excluding snout), slightly longer than wide. Snout differentiated from rest of head by deep concavity on each side in dorsal view (Fig. 2). Jaw muscles hypertrophied laterally, resulting in swollen cheeks. Eyes small, without free orbital rim, located dorsally on head but directed dor-

solaterally. Skin covering eyes thin and transparent. Eyes located entirely on anterior half of HL. Interorbital nearly four times eye diameter. Eye lens well-formed and visible. Anterior nostril located slightly closer to margin of snout than to anterior margin of eye, surrounded by membrane of integument forming short tube, continuous laterally or posterolaterally with nasal barbel. Anterior nares separated by space slightly smaller than interorbital. Posterior nostrils slightly smaller than eye, located slightly closer to anterior nares than to eye, partly closed by thin cup-like flap of integument along their anterior margin (no corresponding flap posteriorly). Posterior internarial width slightly smaller than anterior one.

Opercular patch of odontodes small, dorsolaterally located on head, its posterior end reaching vertical through posterior margin of base of first pectoral-fin ray or to middle of fin-base. Approximately 12 opercular odontodes underlain by small, well-differentiated oval fold of integument. Interopercular patch of odontodes located ventrolaterally on head, anteroventral to and approximately twice size of opercular patch. Opercular and interopercular odontode patches close to each other, almost juxtaposed in some specimens (Fig. 1). Approximately 17 interopercular odontodes, underlain by short flap of integument. Posterior odontodes largest.



Fig. 2. *Ituglanis nebulosus*, holotype, MNHN 2001-1128, dorsal view of head.



Mouth subterminal, its corners only slightly curved posteriorly. Upper lip almost straight, covered with large papillae. Premaxillary teeth arranged in two well-defined regular rows. Outer row teeth fine and conical, inner row teeth more robust, somewhat blunt at tip. Lower lip thin, poorly-differentiated from remainder of ventral surface of head, covered with papillae smaller than those on upper lip. Flat, thin integumentary outgrowth at corner of mouth, adjacent to posterior margin of rictal barbel base. Branchiostegal membranes thick, narrowly joined to isthmus medially and forming large free fold. Six branchiostegal rays. Branchial openings broad, unconstricted. All barbels large (Fig. 2). Maxillary barbel longest and broadest, reaching posteriorly slightly beyond posterior margin of pectoral-fin base. Rictal barbel smaller than maxillary one, extending to posterior margin of interopercular patch of odontodes or to anterior margin of pectoral-fin base. Nasal barbel approximately as long and wide as rictal one, extending posteriorly to perpendicular through posterior margin of opercular patch of odontodes, or slightly beyond.

Lateral line reduced to short tube immediately posterior to head, its terminal pore slightly posterior to vertical through posterior margin of pectoral-fin base. Single additional pore anterior to it, located close to posterior margin of opercular patch of odontodes. Pectoral fin narrow, distally convex, with  $i+5$  rays. Rays progressively shorter posteriorly. First pectoral-fin ray preceded by broad anterior margin of integument, forming anterior edge of fin. First ray longer and thicker than others, prolonged into filament representing approximately one-third the total length of ray. Length of pectoral fin (filament included) approximately equal to HL. Pelvic-fin  $i+4$ ; first unbranched ray shorter than second and third. Origin of fin well anterior to that of dorsal fin. Large pelvic splint present. Posterior margin of pelvic fin slightly convex, covering anal and urogenital openings

but not reaching origin of anal fin. Dorsal fin small, with broadly round distal margin, its origin anterior to vertical through origin of anal fin. Dorsal-fin rays  $ii+6$  plus one accessory anteriorly. Anal fin similar to caudal in size but deeper in shape, with  $ii+5$  rays plus one accessory anteriorly. Caudal fin round, approximately twice as long as deep, continuous with caudal peduncle, with  $6+6$  principal rays. Procurent caudal-fin rays difficult to discern in alcohol-preserved specimens, 12 dorsally and 10 ventrally in cleared and stained paratype.

Vertebrae 35 (MNHN paratype) or 36 (holotype and MZUSP paratype). Pleural ribs three. Branchiostegal rays seven.

*Pigmentation.*—A color photograph of a freshly-collected specimen is provided in Le Bail et al. (2000:165). In preservative, whole of dorsum and sides of body covered with irregularly-distributed, roundish dark markings (Fig. 1). Most individual marks larger than twice eye diameter, often partly coalescent, with those on ventral part of sides smaller than rest and those on dorsum less conspicuous due to darker background. Thin, dendritic, white threads evident on close examination, probably representing superficial blood vessels, sometimes outlining limits between myotomes. Hypural plate outlined by large, dark, triangular spot. Dorsal part of head as dark as dorsum, but marbled tan, with spots less clearly defined. Area around eyes and nares markedly darker than rest, especially on region immediately lateral to nares (Fig. 2). Cheeks with well-defined spots smaller than those on body. Area of opercular odontodes nearly or totally white, but surrounding integument rim very darkly-pigmented, forming narrow round black edge around odontode patch (Fig. 1, 2). Interopercular patch of odontodes white, except for dark area at base. Ventral surface of head mostly white, except for faint fields of dark chromatophores on anterior part of mental region, lower jaw and lower lip. Part of cheek chromatophores also visible in ventral view. Nasal barbel and dorsal surface of maxillary



barbels covered with irregular fields of dark chromatophores along their basal three-fourths. Rictal barbel lacking dark integument pigmentation. All barbels with clearly visible reddish-tan cores (cf. nasal barbels in Fig. 2). Caudal fin, except for its hyaline distal third, covered with spots similar to those on body. Dorsal fin with elongate dark fields on its proximal half. Anal fin with sparse, dark fields along base. Pectoral fin with small, elongate dark field along bases of one or two anterior rays. Pelvic fin lacking dark pigment. Abdomen white.

*Etymology.*—From the Latin *nebulosus*, meaning cloudy, misty, in reference to the integumentary pigmentation pattern of this species.

*Ecological notes.*—All material of the new species was collected at a slow-flowing section of the river, about 3 meters wide, 20–50 cm deep, and densely shaded by tropical rain forest (gallery forest). The bottom was sandy, covered with leaf litter. Water was clear, slightly tea-stained. The exact microhabitat of the specimens could not be determined, because collecting was done with rotenone. Eight species were found together with *Ituglanis nebulosus*: *Dysichthys coracoideus*, *Helogenes marmoratus*, *Bryconops affinis*, *Hoplias aimara*, *Gasteropelecus sternicla*, *Copella carsevennensis*, *Astyanax meunieri*, and *Poptella brevispina*. Stomach contents seen by transparency in the cleared and stained paratype of *I. nebulosus* show numerous arthropod remains.

*Distribution.*—So far known only from type locality, in Approuague basin, French Guyana (Fig. 3).

*Comments on the taxonomy of Ituglanis.*—The genus *Ituglanis* seems monophyletic as presently constituted and of particular importance in being the sister-group to a large subclade of trichomycterids, including highly specialized parasitic forms (see section below). However, the limits of most of its species remain poorly-known, and there are, additionally, several yet undescribed species assignable to the genus. The

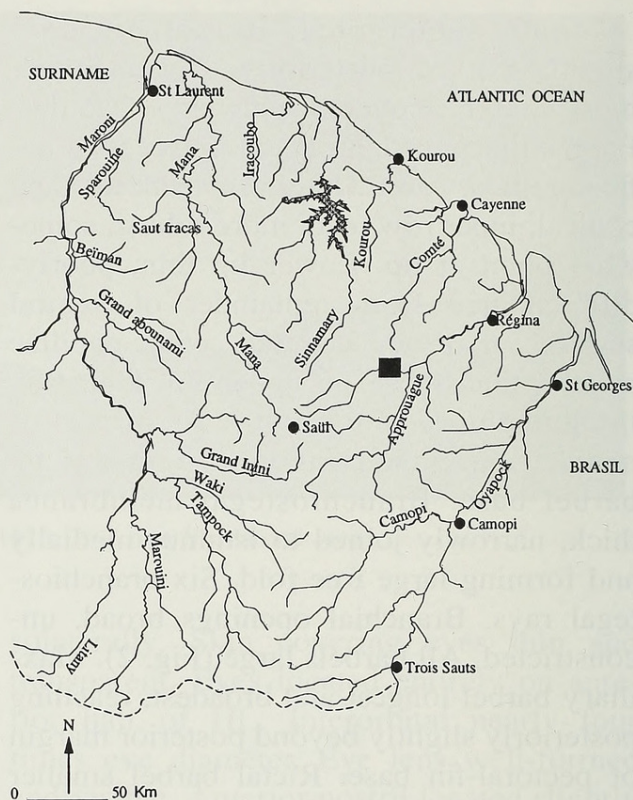


Fig. 3. Type locality (square mark) of *Ituglanis nebulosus* in French Guiana.

systematics of the genus, therefore, is clearly in need of detailed revisionary studies.

In the course of this study, some comparative data were encountered that may be useful in elucidating the taxonomy of *Ituglanis*. The shape of the caudal fin was found to be of systematic value. In most species of *Ituglanis*, as in most of *Trichomycterus*, the caudal fin is vertically truncate with round corners, with the posterior margin gently convex or straight. The shape of the fin seems to vary little intraspecifically, even in the largest samples examined (over 100 specimens of *I. proops*). In a few species, the caudal fin is round, as in the new species herein described. Miranda Ribeiro (1908) and Eigenmann (1918) reported the caudal fin as round in *I. proops*, but this seems to be mistaken, since it is truncate in all specimens examined of the species. Illustrations in Miranda Ribeiro (1908, 1912) clearly show a specimen preserved with a collapsed caudal fin, which partly obscures its truncate shape. Although the description in Eigenmann (1918) repeats the informa-



tion on the round caudal fin, the illustration in his pl. 51 fig. 2 more accurately represents the actual truncate condition. The caudal fin has also been erroneously reported as round in *I. eichorniarum* by Eigenmann (1918), even though the original description (Miranda Ribeiro 1912) reports it as truncate, a shape confirmed in specimens examined. The shape of the caudal fin indicates that the form described by Dahl (1960) as *Pygidium metae guayaberensis* (actually an *Ituglanis*), with a truncate fin, probably represents a separate species, and should be referred to as *I. guayaberensis*. The fin in *I. metae* is round.

The species geographically closest to *I. nebulosus* is *I. gracilior*, from the lower Potaro River in Guyana. The two species are evidently distinct, as demonstrated by the characters already discussed and listed in the diagnosis and by a few other, less obvious, traits which could not be confirmed in the holotype of *I. gracilior*, such as the more numerous procurrent caudal-fin rays (15/12). However, diagnosis of *I. gracilior* is problematic. It seems like the original description in Eigenmann (1912), based on a single, very small specimen, may in part be misleading. The only statement about pigmentation pattern is "all upper parts obscurely spotted". The subsequent illustration in Eigenmann (1918) shows a uniform coloration. We suspect that *I. gracilior* is actually strongly spotted, and corresponds to the form illustrated in Le Bail et al. (2000) as *I. amazonicus*. The very long barbels reported in the holotype of *I. gracilior* are seen in some specimens from French Guyana here identified as that species, although that character is subject to some degree of intraspecific variation and the condition illustrated by Eigenmann is one extreme.

The superficial similarity in color patterns in *I. nebulosus* and *I. parahybae* is not reflected in other morphological characters. The two species differ markedly in the number of vertebrae (cf. Diagnosis above), ribs (3 in *I. nebulosus* and 6 in *I. parahy-*

*bae*), and branchiostegal rays (7 vs. 8). *Ituglanis parahybae* also has the fewest pectoral- and pelvic-fin rays in the genus (5 and 4, respectively, with a vestigial fifth pelvic-fin ray sometimes present). The reduction in pelvic fin-ray number may be part of a trend to reduce the pelvic fins, since some specimens of that species have been reported to lack those fins entirely (Costa & Bockmann, 1993). *Ituglanis nebulosus* has 6 pectoral- and 5 pelvic-fin rays, values that are plesiomorphic for *Ituglanis*. The vertebral count (35 or 36) in *I. nebulosus* is one of the lowest among *Ituglanis*. The only other species with a similar value is *I. passensis*, reported to have 36 vertebrae by Fernández & Bichuette (2002: 276). So far as known, all other *Ituglanis* have at least 39 vertebrae. Samples examined of multiple cleared and stained specimens of *I. proops* and *Ituglanis* sp. 3 show that vertebral number is subject to only minor variation ( $\pm 2$  vertebra), and that the value observed for *I. nebulosus* is therefore taxonomically significant, despite being based on only three specimens. Costa & Bockmann (1993:44) reported 34–38 total vertebrae in the generic diagnosis of *Ituglanis*, but their method of counting vertebrae was not specified and comparisons are therefore difficult. *Ituglanis gracilior* is the species described from nearest to the type locality of *I. nebulosus* and it has 41 (value for holotype) to 43 vertebrae.

*Ituglanis proops*, from the Rio Ribeira basin, and *I. eichorniarum*, from the Paraguay basin, are similar in external aspect and pigmentation. However, there are additional differences that indicate that they are not conspecific. The most conspicuous differences are found in the interopercular patch of odontodes. *Ituglanis proops* has the largest interopercular patch of odontodes in the genus. Most of that enlargement occurs dorsolaterally, so that the dorsoposterior margin of the interopercular patch closely approaches the ventral margin of the opercular one. The integumentary folds of the opercular and interopercular



patches contact each other in preserved specimens. In all other species of *Ituglanis*, the two patches are clearly separated by a broad band of normal head integument. The condition in *I. proops* seems to be autapomorphic, and clearly diagnoses it from all other species of *Ituglanis*, including *I. eichorniarum*.

*Ituglanis herberti* may be a synonym of *I. eichorniarum*. The two come from the Paraguay basin. The original description of *I. herberti* by P. de Miranda Ribeiro (1940) considered the species as "evidently allied to *Trichomycterus proops*" [= *I. proops*], but fails to mention *I. eichorniarum*, from the same basin as *I. herberti*. The original description reports the color pattern of *I. herberti* as a series of vertical stripes along the sides of the trunk. This characteristic is unique in *Ituglanis* and, if confirmed, would provide evidence of specific distinctiveness. However, the original description also notes that the vertical striped pattern was not evident in the live fish. It seems likely that the dark vertical stripes were artifactual, resulting from folds of integument following preservation and shrinkage. This is common in large trichomycterids with thick integument, where deep ridges of the folds forming after preservation may be mistaken for darkly-pigmented stripes. We have seen this effect clearly in one specimen referable to *I. herberti* (MZUSP 2209), which is an old specimen where dark pigment is entirely faded. No additional taxonomically relevant data were found to justify separation of *I. herberti* and *I. eichorniarum*.

**Phylogenetic relationships.**—The placement of the new species in *Ituglanis* is unproblematical. The three synapomorphies for the genus provided in Costa & Bockmann (1993) are present in *I. nebulosus*. The first is the vestigial condition of the posterior fontanel, reduced to a small round orifice on the posterior half of the supraoccipital (Fig. 4). The second is a deep notch on the mesial margin of the palatine. The condition in *I. nebulosus* is not as extreme as that illustrated for *I. parahybae* by

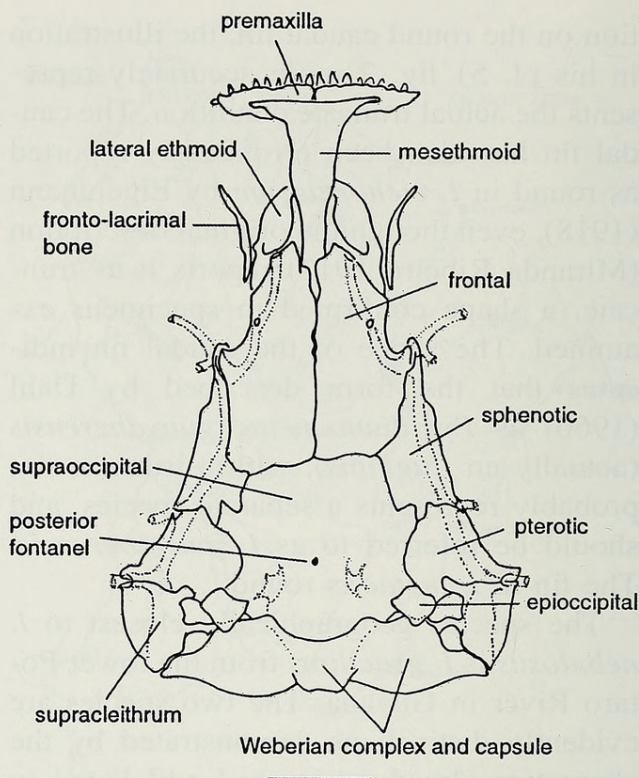


Fig. 4. *Ituglanis nebulosus*, paratype, MZUSP 69574, dorsal view of neurocranium. Scale bar = 1 mm.

Costa & Bockmann (1993, fig. 6), but is still clearly present. The third synapomorphy *I. nebulosus* shares with its congeners is an anteriorly-directed anterior portion of the sphenotic (Fig. 4).

Elucidation of the relationships of *I. nebulosus* within *Ituglanis* requires a phylogenetic analysis, preferably associated with a species-level revision, and is beyond the scope of this paper. However, characters found in the course of this study support preliminary inferences about relationships.

Among the species of *Ituglanis* available for skeletal examination, *Ituglanis* sp. 2 has the fewest pleural ribs, with only 2 pairs. The next lowest value, 3 pairs, is seen in *I. nebulosus*, *I. amazonicus* and *I. gracilior*. Remaining species for which data are available, *I. eichorniarum*, *I. parahybae*, *I. proops*, *I. passensis*, *Ituglanis* sp. 1 and *Ituglanis* sp. 3 have between 5 and 7 pairs. Reduction in rib number is considered derived because basal trichomycterids have nine or more ribs. A reduction in rib number (seven or fewer) has been considered synapomorph-



ic for *Ituglanis* plus a large subset of Trichomycteridae (see below). A more extreme reduction (three or fewer) is a state synapomorphic for a subset of the genus, including *I. nebulosus*, *I. amazonicus*, *I. gracilior* and *Ituglanis* sp. 2. Such rib reduction is homoplastically seen, in similar or more extreme degrees, also in the highly especilized subfamilies which constitute the sister group to *Ituglanis* (see below).

A smaller clade including only *I. nebulosus*, *I. amazonicus*, and *Ituglanis* sp. 2. further shares a peculiar widening of the mesethmoid shaft. In those species, the width of the mesethmoid shaft equals or surpasses the length of one of the mesethmoid cornua. This condition is markedly distinct from that in other species of *Ituglanis* and remaining species of the subfamily Trichomycterinae, where the mesethmoid shaft is narrow, its width being markedly smaller than the length of each mesethmoid cornua.

Another subgroup of *Ituglanis*, including *I. eichorniarum*, *I. parahybae*, *I. proops*, *Ituglanis* sp. 1 and *Ituglanis* sp. 3, share a peculiar lateral, or posterolateral, process on the anterior third of the antorbital (fronto-lacrimar tendon bone of some authors). In *I. proops*, some specimens have the process on one side only. The presence of this process is a derived condition, because the antorbital is a simple rod in all other relevant trichomycterine taxa.

The characters discussed indicate that *Ituglanis* seems to comprise two main monophyletic groups. One includes northern South American species from the Amazon and the Guyanas. The other includes southern forms from the Paraná/Paraguai, Ribeira de Iguape, Paraíba do Sul and Southeastern drainages in Brazil and Uruguay, plus *I. eichorniarum* and *Ituglanis* sp. 3, which also occur in Southern Amazonian tributaries. This idea is just a first approximation to an understanding of *Ituglanis* phylogeny. Further study, on the basis of additional characters and broader taxonomic sampling, is necessary to formulate a de-

tailed hypothesis on the relationships among species of the genus.

Costa & Bockmann (1993) hypothesized *Ituglanis* as the sister group to a large clade including the subfamilies Tridentinae, Stegophilinae, Vandelliinae, Sarcoglanidinae and Glanapteryginae. This group shares a synapomorphic reduction in the number of pleural ribs (2 to 6 pairs). *Ituglanis nebulosus*, with 3 pleural ribs, conforms to the condition of this character in the clade. The same happens with a more inclusive group, including the multi-subfamilial clade and *Ituglanis*, plus the genus *Scleronema*. This clade relies on two characters: a reduction in size of the interopercular patch of odontodes and the fine, elongated lateral arms of the urohyal. Again, both derived conditions are present in *I. nebulosus*. Thus, the discovery of the new species does not bring in any new character state conflicting with current understanding of the relationships of *Ituglanis* within Trichomycteridae.

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