BEAUFORTIA

INSTITUTE OF TAXONOMIC ZOOLOGY (ZOOLOGICAL MUSEUM)
UNIVERSITY OF AMSTERDAM

Vol. 31 no. 3 October 30, 1981

REVISION OF *LORICARIA* LINNAEUS, 1758 (PISCES, SILURIFORMES, LORICARIIDAE)

I. J. H. ISBRÜCKER

Institute of Taxonomic Zoology, University of Amsterdam, P.O. Box 20125, 1000 HC Amsterdam, The Netherlands

&

Musée de Zoologie de l'Université et de la Ville de Nancy, 34, rue Sainte-Catherine, 54000 Nancy, France

ABSTRACT

The South American genus of mailed catfishes *Loricaria* Linnaeus, 1758 is reviewed. Almost all primary type-material and additional specimens are examined. Descriptions, tabulated morphometric and meristic data, and illustrations are presented of eleven species: *Loricaria cataphracta* Linnaeus, 1758 (syn.: *Plecostomus flagellaris* Gronovius, ed. Gray, 1854, and *Loricaria carinata* de Castelnau, 1855), *L. lata* Eigenmann & Eigenmann, 1889, *L. simillima* Regan, 1904, *L. parnahybae* Steindachner, 1907 (syn.: *L. piauhiae* Fowler 1941), *L. piracicabae* Von Ihering, 1907, *L. clavipinna* Fowler, 1940, *L. nickeriensis* Isbrücker, 1979, *L. tucumanensis* Isbrücker, 1979, *L. apeltogaster* Boulenger, 1895, *L. prolixa* Isbrücker & Nijssen, 1978, and *L. lentiginosa* Isbrücker, 1979. The nomenclatural history of *L. cataphracta* is revised: contrary to the author's previous (1972) assumption, two syntypes of this species are still in existence. Definitions are presented of the tribe Loricariini, the subtribe Loricariina, the *Loricaria*- and *Pseudohemiodon*-groups, and of the *Loricaria cataphracta* species complex. In addition, the Pseudoloricariina (new subtribe), the Ricolina (new subtribe), and the Planiloricariina are defined. A key to the genera of Loricariinae with filamentous lip structures is given. A list of species originally proposed as representatives of the genus *Loricaria*, now excluded, is added together with their current identification.

INTRODUCTION

Loricaria Linnaeus, 1758, is a genus of substrate dwelling, South American primary freshwater fishes. It is the earliest described taxon in the family of armoured or mailed catfishes, the Loricariidae.

A total of 61% of all Loricariinae has at some time been assigned to *Loricaria*. However, authors of important works on this group, like Eigenmann & Eigenmann (1889, 1890, 1891), Regan (1904), Eigenmann (1910), and Gosline (1945) had adopted a subdivision of *Loricaria* into several subgenera, each of which is considered to be of generic rank by me, resulting in a considerable reduction of the number of species in *Loricaria*. Compared to the works of Eigenmann & Eigenmann, Regan, and Gosline, Bleeker's (1862, 1863) subdivision of the Loricariidae is surprisingly modern — or the recent subdivision by me (1980) is perhaps conservative — in terms of the number of recognized genera. A list of nominal species proposed originally as members of *Loricaria* sensu

lato, presently assigned to other genera of Loricariidae, is given at the end of the systematic part of this paper.

Ricola Isbrücker & Nijssen, 1978, *Paraloricaria* Isbrücker, 1979, *Brochiloricaria* Isbrücker & Nijssen, 1979, *Crossoloricaria* Isbrücker, 1979, *Pseudohemiodon* Bleeker, 1862, *Rhadinoloricaria* Isbrücker & Nijssen, 1974, and *Planiloricaria* Isbrücker, 1971, share a single external character with *Loricaria*, absent in all other genera of Loricariinae: numerous filamentous labial barbels and subbarbels. A key to these genera is included.

In previous papers (especially 1971b, 1972) I have attempted to point out some historical difficulties in correctly naming specimens belonging to the type-species of the genus, *Loricaria cataphracta*. Recently, Boeseman (1976) demonstrated some errors in these publications. With his criticism in mind I have revised my previous interpretations (see Addendum).

ABBREVIATIONS

ANSP	: Academy of Natural Sciences of Philadelphia, Philadelphia, Penn.
BMNH	: British Museum (Natural History), London.
MCZ	: Museum of Comparative Zoology, Cambridge, Mass.
MNHN	: Muséum National d'Histoire Naturelle, Paris.
MZUN	: Musée de Zoologie de l'Université et de la Ville Nancy, Nancy.
MZUSP	: Museu de Zoologia da Universidae de São Paulo, São Paulo.
NMW	: Naturhistorisches Museum, Vienna.
NRS	: Naturhistoriska Riksmuseet, Stockholm.
USNM	: National Museum of Natural History, formerly United States National Museum, Washington D.C.
ZMA	: Instituut voor Taxonomische Zoölogie (Zoölogisch Museum), Amsterdam.
ZMB	: Museum für Naturkunde der Humboldt-Universität, Berlin.
hl	: head length
sl	: standard length

METHODS

The methods of taking morphometric and meristic data were defined by Isbrücker & Nijssen (1978a: 180-182).

ACKNOWLEDGEMENTS

Many persons have contributed importantly to this study in many ways, particularly by the loan or gift of specimens, providing working space in their laboratories, extensive curatorial assistance, or by information. I am much obliged to all these individuals for their kindness: Mrs J. Abel (MNHN), Mrs Dr M. L. Bauchot (MNHN), Dr J. E. Böhlke (ANSP), Dr H. A. Britski (MZUSP), Mrs Ph. Choanier (MNHN), Mrs M. Clark-McLellan (BMNH), Dr B. Condé (MZUN), Mrs M. M. Dick (MCZ), Dr W. L. Fink (MZC), Dr P. H. Greenwood, Mr G. J. Howes (BMNH), Dr P. Kähsbauer (NMW), Mrs S. Karnella (USNM), Mrs Dr C. Karrer (formerly ZMB), Dr E. Lachner (USNM), Dr K. Liem (MCZ), Mr C. Powell (USNM), Dr W. G. Saul (ANSP), and Mr R. Schoknecht (MCZ).

Mr Howes and Mr A. Wheeler (both BMNH) criticized parts of the typescript dealing with the history of *Loricaria cataphracta*. I am very grateful for their suggestions for improvement. Mr Wheeler provided me with information on the still existing syntypes of *Loricaria cataphracta*, and gave permission to use one of his photographs (fig. 2 in this paper).

I am much indebted for the friendly and extensive interest, advice, assistance, critical comments and stimulating discussions while working (in ZMA) to Dr P. J. H. van Bree, Mrs C. Lindenaar-Sparrius, Dr H. Nijssen, and Mr L. van Tuyl; Mr L. A. van der Laan and Mr J. Zaagman (both also ZMA) prepared all but one of the illustrations in this paper. Mrs Drs F. F. J. M. Pieters (Artis Library, Amsterdam) provided me with many of the valuable publications in her care.

I deeply appreciate the stimulation given by both Dr J. Géry (St. Cyprien) and Professor Dr B. Condé (MZUN), while proposing to present this study to the University of Nancy I.

At an earlier occassion (1978) I had already dedicated the MZUN-scription containing the basis of this publication to Dr H. Nijssen, who strongly supported my study of fishes throughout many years: without his support none of my publications would have been realized.

With gratitude I acknowledge the financial support received by a grant from the K. F. Hein Foundation (Utrecht) to complete the present study.

THE TRIBE LORICARIINI

The Loricariini are characterized by having: a) the origin of the dorsal fin about opposite to the origin of the pelvic fins; b) 6 branched dorsal fin rays, the last one split to its base; c) 10 branched caudal fin rays; d) no more, and usually considerably less than 18 teeth in each premaxilla in adults (against at least 27 in the adults of the Harttiini); and e) great differentiation in dentitions and lip shapes and structures.

The characteristic dentition present in almost all Hypostominae, Ancistrinae, Hypoptopomatinae, all Harttiina and in the Farlowellini (viz., very numerous, slender, filiform teeth with a strongly curved and bilobate crown), never occurs in the Loricariini. In spite of the diversity in lip structures and shapes in the Loricariini, none is similar to those present in other Loricariid groups.

The outer (naked) surface of the upper lip is devoid of dermal ossifications.

The orbital rim, with few exceptions, is provided with a more or less conspicuous posterior notch.

The fin rays are usually dichotomously branched. Often the upper unbranched caudal fin ray extends as a fragile, extremely long filament; a similarly prolonged lower unbranched caudal fin ray is rarely encountered, in some of the Rineloricariina only.

Within the Loricariini, several different types of secondary sexual dimorphism have evolved. These include (a) excessive growth of odontodes in certain areas of the head, on dorsum of the body in front of the dorsal fin origin, and/or on dorsum of the pectoral fin, (b) change in the shape of certain minute odontodes — for example, those on the spines of the pelvic and anal fins — (c) change in the shape of the teeth, and (d) the development of a very long and broad lower lip. All these changes occur in the male of the various representatives of the Loricariini. The dimorphism indicated under (a) is restricted to the more primitive genera, that indicated under (d) is found only in the more specialized subtribes. In addition, secondary sexual dimorphism is unknown in various species and may prove not to exist at all in various instances.

The Loricariini are the sistergroup of the Harttiini. The more generalized representatives of both tribes do not appear to be very distantly related to each other, although the probably most primitive genus of the Loricariini (*Ixinandria*) is more advanced than the probably most primitive genus of the Harttiini (*Harttiella*). There appears to be more variability among the Loricariini than among the other tribes of the Loricariinae (Harttiini, Farlowellini, and Acestridiini).

The Loricariini are subdivided into 8 subtribes: the Rineloricariina, Ricolina (new), Loricariina, Planiloricariina, Reganellina, Pseudoloricariina (new), Loricariichthyina, and the Hemiodontichthyina.

Various species of Loricariini reach a larger size than most other Loricariinae, many reaching over 300 mm in sl (e.g., some Rineloricariina, Loricariina, Pseudoloricariina, and Loricariichthyina).

Anal fin with I,4 rays, last one split to its base; pectoral fin I,6; pelvic fin I,5.

Thirteen genera of Loricariini differ from the Rineloricariina (consisting of *Ixinandria, Rineloricaria, Dasyloricaria,* and *Spatuloricaria*), from the Harttiini (*Harttiella, Harttia, Cteniloricaria, Lamontichthys, Pterosturisoma, Sturisomatichthys, Sturisoma,* and *Metaloricaria*) and from the Farlowellini (*Farlowella* only) by the apparent absence of prominent odontode development in mature males: *Ricola, Paraloricaria, Loricaria, Brochiloricaria, Crossoloricaria, Pseudohemiodon, Rhadinoloricaria, Planiloricaria, Reganella, Limatulichthys, Pseudoloricaria, Loricariichthys,* and *Hemiodontichthys.* The absence of this sexual dimorphism needs confirmation in several of these 13 genera (not all species are known from both sexes, rendering the conclusion preliminary).

PSEUDOLORICARIINA new subtribe

Type-genus: *Pseudoloricaria* Bleeker, 1862

The subtribe Pseudoloricariina as here proposed is equivalent to the genus *Pseudoloricaria* sensu Isbrücker & Nijssen, 1976b. At that time, *Pseudoloricaria* was considered to contain two species, but since then (Isbrücker & Nijssen, in Isbrücker, 1979a) we established *Limatulichthys* to accommodate the second species.

Limatulichthys (a less specialized genus than

the next) and *Pseudoloricaria* probably are descendants of some *Rineloricaria/Dasyloricaria*-like lineage, which gradually lost the ability to develop masculine odontode enlargement during maturation. This dimorphism became replaced by a tendency towards improvement of the masculine lower lip enlargement. It appears that the Pseudoloricariina are intermediate between Rineloricariina and Loricariichthyina. The latter subtribe shows a much higher specialization in dentition and lip structure, restricted to a single genus, *Loricariichthys*.

As a definition of the Pseudoloricariina, our previous (1976b) diagnosis of *Pseudoloricaria* is still valid.

RICOLINA new subtribe

Type-genus: *Ricola* Isbrücker & Nijssen, 1978

Ricola consists of a single species, *R. macrops*, occurring in the Río de la Plata and higher up the Río Paraná, in Uruguay and Argentina. *Ricola macrops* may reach a standard length of 219 mm. It is characterized by three features:

a) it is strikingly similar in appearance (shape of head and body, structure of the odontodes, arrangement of scutes and development of abdominal scutelets, and colour) to species of *Loricaria*, particularly of the *Loricaria cataphracta*-group;

b) its dentition is strikingly reminiscent (shape and number, as well as relative size of the teeth) of a *Rineloricaria*, particularly of the *Rineloricaria platyura*-group;

c) it is unique among Loricariidae by the structure of its lips and barbels. These barbels are not only very numerous (like in *Loricaria* and related genera), but many of them are further subdividing into minute branches.

The upper lip is narrow; a series of about 5 barbels at either side along the posterior edge of this lip, increasing in length towards the maxillary barbel. Posterior to these series are three thick, deeply branched barbels present along the outer surface of the premaxillae. Outer side of the maxillary barbels with a series of long barbels (actually being a continuation of the series anterior to the premaxillae), each barbel being provided with numerous small barblets in a linear series. Inner side of producing part of the maxillary barbels likewise with several long barbels with small barblets.

Lower lip narrow, the anterior half consisting of a thick, semicircular cushion-like structure. This structure bears irregular, low papillae on the surface. The posterior part of the lower lip has numerous slender, simple papillae or subbarbels on its surface (like those in *Loricaria* spp.). Edge of the lower lip with numerous long barbels, each provided ventrally with shorter, slender subbarbels. A short, thick, triangular papilla between premaxilla and dentary. Three long papillae in the buccal cavity posterior to the premaxillae, one in the middle and one at either side.

Ricola has up to 15 teeth in each premaxilla and up to 14 teeth in each dentary. Those in the premaxillae are about twice as long as those in the dentary. They have a prominent inner lobe and a smaller outer lobe.

Ricola tends to have many, sometimes slightly more lateral body scutes (37-39) than the Loricariina (32-38).

Secondary sexual dimorphism: The pectoral fin spine is thicker in the male than in the female, just like in males of *Loricaria*. Tooth lobes in mature males become broader and more rounded at the tip than in females and juveniles, which have acute tips. This type of change in tooth shape also occurs in males of various other subtribes of Loricariini (e.g., Rineloricariina, Loricariina, Pseudoloricariina, Loricariichthyina, and Hemiodontichthyina).

Considering the three mentioned characters of *Ricola macrops*, it can neither satisfactorily be included within the Rineloricariina, nor within the Loricariina. I propose a new subtribe for *Ricola*, because it is hard to imagine that this genus evolved from some *Loricaria*-like ancestor which secondarily would have attained the primitive dentition, compared to the Loricariina. One could judge *Ricola* as some highly specialized derivation of the Rineloricariina stock which retained its ancestral dentition and attained its unusual lip structures plus the *Loricaria*-like appearance independently from the Loricariina. Because of the combination of characters (general appearance of *Loricaria*, dentition of *Rineloricaria*, and unique barbel structure) I think it is justified not to

unite the Rineloricariina with the Loricariina on account of *Ricola*.

PLANILORICARIINA

Planiloricaria Isbrücker, 1971

Planiloricaria is known only from the holotype of *P. cryptodon*, 214 mm in sl, originating from the Río Ucayali near Pucallpa, Peru.

Superficially, it is reminiscent of a *Pseudohemiodon* with a disk-like head shape in dorsal and ventral view, and much depressed in lateral view. It differs not only from that genus but also from all other species of the tribe Loricariini by:

— its produced dorsal fin spine, 2.4 in sl (against 3.4 or more);
— its small eyes, 13.1 in hl (against 9.6 or less);
— its long maxillary barbels, 1.0 in hl, each with about 20 subsidiary barbels (maxillary barbel is 1.1 in *Rhadinoloricaria* and more in other Loricariini);
— its 24 long, papillose barbels along the posterior edge of the lower lip, 2.6 in hl (against at least 4.5);
— its numerous lateral body scutes, 40 (against 27-39); and
— the absence of premaxillary teeth and its reduced number of mandibular teeth, 3 (against up to 18 and up to 34, respectively).

Planiloricaria has no orbital notch; no dorsal flap on the pupil; its lower lip is very narrow, 11.5 times in hl; numerous filaments and papillose extensions about the (rudimentary?) premaxillae; a smooth dorsum of head and snout, except for a feeble coalescing double ridge running anterior as well as posterior to the supraoccipital process; head and snout are devoid of prominent odontodes; a very long upper caudal filament; no produced pelvic fin spines; abdomen almost completely covered with minute scutelets.

Planiloricaria shares the absence of premaxillary teeth with *Reganella* and with *Hemiodontichthys*; with both it does not seem to have a close relationship. Secondary sexual dimorphism is not known.

LORICARIINA

With the exception of the Ricolina and the Planiloricariina, the Loricariina embrace the other genera of the Loricariinae with numerous long, fleshy filaments on the surface and/or along the outer edges of both the upper and the lower lips.

Loricariina have up to 9 premaxillary and up to 11 mandibular teeth (Ricolina have up to 15 and 14, respectively; Planiloricariina have no premaxillary teeth and 3 in each dentary). The number of lateral body scutes ranges in the Loricariina from 31 to 38; in the Ricolina there are 37-39 and in the Planiloricariina 40.

The Loricariina occur all over tropical South America. The largest member of the subfamily belongs here: *Paraloricaria vetula*, which reaches 437 mm in sl.

All members of the subfamily Loricariinae (like those of the other subfamilies of Loricariidae) have replacement teeth. Specimens of species now assigned to other genera than *Loricaria* (e.g., *Paraloricaria, Crossoloricaria*) may be found with five or less teeth in each premaxilla.

The teeth are embedded between axial, fleshy lamellae, and counting these lamellae results in a higher number of (potential) teeth. A difference in tooth shape and relative size is usually associated with differences in the structure of barbels and other soft parts of lips and in the buccal cavity. I am of the opinion that these differences are not necessarily related to feeding habits, but to the different trends in the evolution.

The subtribe Loricariina may be further divided into two genus-groups, presumably representing distinct phyletic lineages, which I here informally refer to as the *Loricaria*-group (also including *Paraloricaria* and *Brochiloricaria*), and the *Pseudohemiodon*-group (also including *Crossoloricaria* and *Rhadinoloricaria*).

The *Loricaria*-group seems to be rather close (perhaps more so than the *Pseudohemiodon*-group) to the Rineloricariina. The ancestor of the *Loricaria*-group probably was a Rineloricariina which developed a tendency towards (a) fewer teeth; (b) slightly larger lips, especially the lower lip becoming longer; (c) more numerous and more prominent papillae which turned into filaments; (d) more numerous lateral body scutes, tending to coalesce more posterior than in the Rineloricariina stock; and (e) a gradual loss of the secondary sexual dimorphism in the odontode development in the males.

The *Loricaria*- and *Pseudohemiodon*-groups

The genera of the *Loricaria*-group have larger and less premaxillary teeth, and the teeth in the dentary are likewise more robust than in the *Pseudohemiodon*-group genera. The teeth of the *Pseudohemiodon*-group are rather inconspicuous, either simple or bilobed, and more or less spoon-shaped.

The filaments on the surface and along the posterior edge of the lower lip are longer (sometimes bifid or trifid) and smooth in the *Loricaria*-group. In the *Pseudohemiodon*-group the filaments may be almost absent on the surface of the lower lip, sometimes being reduced to small, elongate papillae. The long filaments on and especially along the lower lip are not smooth, but more or less papillose; frequently these papillae are elongate.

The snout of the *Loricaria*-group genera is not produced; in the *Pseudohemiodon*-group the snout is hardly or not produced in some species and quite produced in others.

The following comparison of 166 specimens of *Paraloricaria, Loricaria,* and *Brochiloricaria* with 46 specimens of *Crossoloricaria, Pseudohemiodon,* and *Rhadinoloricaria* was made. Those of the *Loricaria*-group are given first, followed between parentheses by those of the *Pseudohemiodon*-group:

standard length up to 437 mm (246.5 mm);
postdorsal length 1.6-1.8 (1.6-2.1);
length first dorsal fin ray 3.6-6.6 (5.1-7.3);
anal spine length 4.6-7.2 (6.0-13.2);
pectoral spine length 2.2-6.6 (5.0-6.6);
pelvic spine length 3.9-7.3 (6.0-8.7);
upper caudal fin spine 1.0-7.4 (0.4-6.9);
lower caudal fin spine 4.9-8.7 (6.1-9.9);
ventrorostral length nihil (4.2-25.8);
length lower lip 3.7-9.4 (3.9-10.6);
cleithral width 1.0-1.5 (0.8-1.3);
supracleithral width 1.5-2.1 (1.3-1.9);
head width 1.0-1.5 (0.8-1.3);
head depth 1.9-3.1 (2.5-3.5);
body depth at dorsal fin origin 1.6-3.2 (2.2-3.5);
length maxillary barbel 1.5-7.4 (1.1-2.4);
length longest barbel of lower lip 5.6-26.0 (4.5-12.1);
lateral body scutes 32-38 (31-34);
coalescing lateral body scutes 17-26 (13-21);
thoracic scutes 4-13 (5-11);
premaxillary teeth up to 6 (up to 9).

KEY TO GENERA OF LORICARIINAE WITH FILAMENTOUS LIP STRUCTURES, TRIBE LORICARIINI

1a No teeth in upper jaws . . . . . (Planiloricariina) *Planiloricaria.*
1b Teeth in both upper and lower jaws . 2.
2a Upper jaws with 6 or more teeth on each side . . . . . 3.
2b Upper jaws with 5 or less teeth on each side . . . . . 4.
3a Upper jaws with up to 9 teeth on each side; maxillary (= rictal) barbels with subbarbels which are not subdivided into minute branches . . . . . (Loricariina) 5.
3b Upper jaws with up to 15 teeth on each side; maxillary barbels with subbarbels which are subdivided into minute branches . . . . . (Ricolina) *Ricola.*
4a Teeth in upper jaws long, about twice the length of teeth in lower jaws . *Loricaria.*
4b Teeth in upper jaws about 1/3 longer than those in lower jaws; teeth in lower jaws about as long as teeth in the upper jaws of *Loricaria* . . . . . *Brochiloricaria.*
5a Abdomen naked, or covered with different patterns of scutelets, not however, arranged into a single median strip . . . . . 6.
5b Abdomen naked except for a single median strip of small, roundish scutelets . . . . . *Crossoloricaria.*
6a A ventrorostral extension present . . 7.
6b No ventrorostral extension . *Paraloricaria.*
7a Sides of head and snout more or less triangular in dorsal view; cleithral width 0.8-1.1 in hl; supracleithral width 1.3-1.7 in hl; head depth 2.5-3.3 in hl; maxillary barbel 1.4-2.4 in hl; depth caudal peduncle 12.3-17.3 in hl . . . . . *Pseudohemiodon.*
7b Sides of head tapering, of snout narrow and somewhat concave in dorsal view; cleithral width 1.2 in hl; supracleithral width 1.9 in hl; head depth 3.5 in hl; maxillary barbel 1.1 in hl; depth caudal peduncle 9.7 in hl . . . . . *Rhadinoloricaria.*

THE GENUS *LORICARIA* LINNAEUS, 1758

Loricaria Linnaeus, 1758: 307-308 (type-species, by monotypy, *Loricaria cataphracta* Linnaeus, 1758).

Fusiloricaria Fowler, 1940a: 247 (subgenus of *Loricaria*; type-species, by original designation and monotypy, *Loricaria* (*Fusiloricaria*) *clavipinna* Fowler, 1940).

Loricaria consists of 11 valid species, which occur in a wide range of localities in Surinam, French Guiana, Brazil (States of Pará, Amazonas, Mato Grosso, Acre?, Roraima), Paraguay, Uruguay, Argentina, Bolivia, Peru, Ecuador, Venezuela, and Guyana. The distributions shown in figs. 14-15 include examined material only.

Loricaria is unique among Loricariidae in its dentition. There are up to 5, usually 3 or 4, teeth in each section of the premaxilla, distinctly longer (about twice) than the teeth in the dentary. In juveniles and females, these teeth have a large, oblong crown with a more or less rounded tip. Small specimens (e.g., one of 29.1 mm in sl) already have a completely developed number of teeth. The teeth are either simple, or bilobate, usually with a much smaller outer lobe. In each section of the dentary there may be up to 11 (usually less) teeth. Generally, the crowns of the mandibular teeth have a much shorter, broader, and more rounded inner lobe and a more conspicuous outer lobe than the premaxillary teeth.

The upper lip is short, its margin with numerous slender, simple, bifurcate and rarely trifurcate, barbels, subbarbels and long papillae. Cirrhi are present on its ventral surface, around the base of the teeth, in the buccal cavity, and on the surface of the maxillary barbel.

The lower lip is well-developed, usually with a more or less deep median notch. Posterior to the dentary the surface of the lip usually has a cushion bearing low papillae. Posterior to this cushion, the lip has many long, simple filaments which continue along the posterior margin.

A mostly inconspicuous posterior orbital notch is usually present.

The pelvic fin spine is almost always longer than the adjacent branched ray. The upper unbranched caudal fin ray often extends as a fragile filament as long as, or exceeding the standard length.

The abdomen may be naked, or is partially or entirely covered with small scutelets, which develop with age. There are specific differences in the speed of development of these scutelets: some species are fully covered at an earlier stage than others. In the late development of these scutelets, *Loricaria apeltogaster, L. prolixa,* and *L. lentiginosa* are reminiscent of the *Paraloricaria* spp. and of *Brochiloricaria macrodon.*

The morphometric and meristic variation within 155 specimens representing all species of *Loricaria* is summarized:

standard length 29.1-346 mm;
axial length 31.7-377 mm;
total length 35.0-515 mm;
smallest mature male 103.8 mm;
head length 3.7-5.2;
predorsal length 2.9-3.7;
postdorsal length 1.6-1.8;
postanal length 1.8-2.2;
dorsal spine length 3.4-6.5;
length first dorsal fin ray 3.6-6.6;
anal spine length 4.6-7.2;
pectoral spine length 2.2-6.6;
pelvic spine length 3.9-7.4;
length upper caudal 'spine' 1.0-7.4;
length lower caudal 'spine' 4.9-8.7;
snout length 1.7-2.1;
length lower lip 3.7-9.4;
thoracic length 1.1-1.8;
abdominal length 1.2-2.0;
maximum orbital diameter 4.2-9.2;
interorbital width 4.3-6.4;
cleithral width 1.0-1.5;
supracleithral width 1.5-2.1;
head width 1.0-1.5;
head depth 1.9-3.1;
body depth at dorsal fin origin 1.6-3.2;
body width at dorsal fin origin 1.1-3.2;
body width at anal fin origin 1.1-3.3;
depth caudal peduncle 12.0-21.1;
width caudal peduncle 3.6-9.9;
length maxillary barbel 2.0-7.4;
longest barbel along the lower lip 5.6-26.0;
lateral scutes 32-37;
coalescing lateral scutes 17-26;
thoracic scutes 4-12;
premaxillary teeth up to 5;
mandibular teeth up to 11.

Secondary sexual dimorphism. — Mature males of *Loricaria* (of the *L. cataphracta*-group, which excludes *L. apeltogaster, L. prolixa,* and *L. lentiginosa*) have hypertrophied pectoral fin spines, blunter odontodes on the pelvic and anal fin spines, and shorter, more rounded tooth lobes than females. Rarely, males have long and broad lips (e.g., a male of *L. clavipinna* in USNM 124930, from the Río Ampiyacu in Peru, 156.5 mm in sl, has the lower lip shape suggestive of those Loricariidae which protect their eggs by the enlarged lower lip: *Dasyloricaria, Limatulichthys, Pseudoloricaria, Loricariichthys,* and *Hemiodontichthys*). A. de Miranda Ribeiro (1912: 10) reported a specimen of *L. cataphracta* from S. Manoel, Tapajoz, "... com uma placa de ovos sobre a lado abdominal." Males of *Loricaria apeltogaster, L. prolixa,* and of *L. lentiginosa* are unknown; maybe it is more appropriate to say that they have not yet been recognized.

The *Loricaria cataphracta* complex

The majority of the examined specimens of *Loricaria* belong to this complex. They are characterized by an early development of the scutelets which cover the abdomen usually completely with age. The complex includes *L. cataphracta, L. lata, L. simillima, L. parnahybae, L. piracicabae, L clavipinna, L. nickeriensis,* and *L. tucumanensis.* Excluded species are *Loricaria apeltogaster, L. prolixa,* and *L. lentiginosa.* They share the poor development of abdominal scutelets, but this cannot serve as a synapomorphy. It remains to be demonstrated whether the three latter species are mono- or polyphyletic.

Most species of the *L. cataphracta* complex are incompletely known. It is possible that additional studies will demonstrate that species like *L. cataphracta* and the closely related *L. simillima* are indeed polymorphic with phenotypically different populations. It is also possible that more taxa become distinguishable within such species. Likely, the *Loricaria cataphracta* complex is a very specialized, recent monophyletic lineage which is still rapidly evolving.

Many species of this complex show few distinctive characters when all populations combined are considered. Easily distinguishable sympatric species pairs exist (e.g., *L. cataphracta* with *L. simillima,* and *L. cataphracta* with *L. parnahybae).*

Sufficiently large and complete samples (including freshly preserved juveniles and adults of either sex), which would enable recognition of specific variation, are not available. Study of such material is needed before a key to the species can be prepared. Extensive data are assembled into tables, containing all morphometric and meristic information. These data together with the descriptions and illustrations are the best means towards identification that can be offered.

Loricaria cataphracta Linnaeus, 1758
(figs. 1-2, 14; tables Ia-c, II-III)

Loricaria dura Linnaeus, 1754: 79-80, pl. 29 (description; pre-1758, invalid), — Bleeker, 1862: 3 (ex-Linnaeus, 1754; invalid nomen novum for *Loricaria cataphracta*), — Bleeker, 1863: 80 (listed as type-species of *Loricaria*; *L. cataphracta* included as a junior synonym), — Bleeker, 1864: 18-20 (description; 6 specimens; Surinama, Mejico), — Boeseman, 1972: 311-312 (discussion; 4 syntypes; type-locality: Surinam), — Isbrücker, 1972: 164-166, 178 (discussion; a junior synonym of *L. cataphracta*), — Boeseman, 1976: 160 (type-status of Bleeker's specimens denied).

Plecostomus no. 69 Gronovius, 1754: 26-27 (description; no locality), — Gronovius, 1756: 16 (diagnosis).

Loricaria cataphracta Linnaeus, 1758: 307 & 308 (original diagnosis; in part; type-locality: in America meridionali; 2 syntypes — 2 species — in NRS; neotype in ZMA), — Linnaeus, 1766: 508, and Linnaeus, ed. Gmelin, 1789: 1363 (same as Linnaeus, 1758). — Bloch, 1794: 76-79, pl. 375 figs. 3-4 (description; discussion; comparison), — Cuvier, 1816: 211 (synonymy), — Cloquet, 1823: 208 (discussion), — Bory de Saint-Vincent, 1826: 504-505 (discussion), — Hancock, 1828: 247 (comparison), —

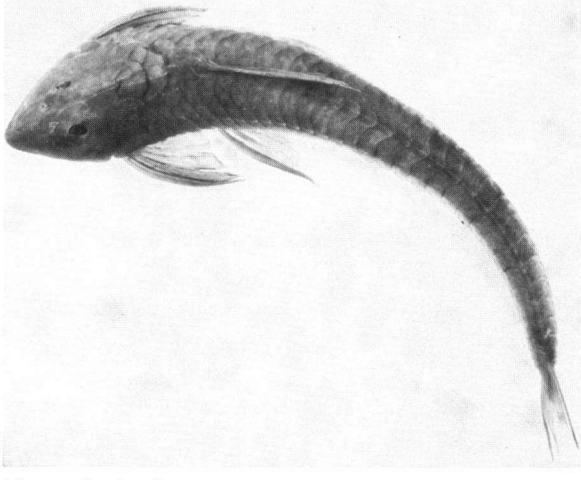

Fig. 1. *Loricaria cataphracta* Linnaeus, 1758. Dorsal view of neotype.

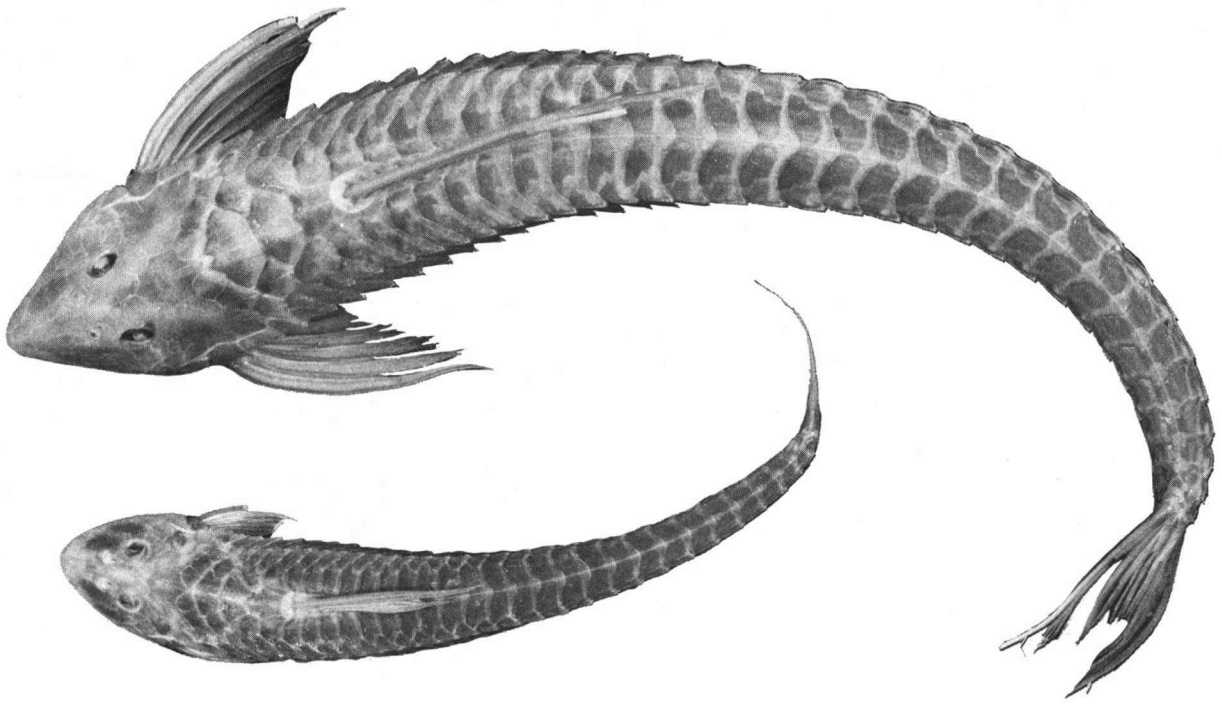

Fig. 2. *Loricaria cataphracta* Linnaeus, 1758. Dorsal view of lectotype (top), and of the paralectotype (bottom), the latter probably representing *Loricariichthys maculatus* (Bloch, 1794).

Cuvier, 1829: 301, and 1836: 545 (same as in 1816), — Guichenot, *in* Guérin (ed.), 1836: 494 (discussion), — Valenciennes, *in* Cuvier & Valenciennes, 1840: 459-466 (Paris ed.),: 339-344 (Strasbourg ed.) (description; Surinam, Cayenne; discussion), — Robert H. Schomburgk, 1841: 136-137 (discussion), — Cuvier, 1842: 253 (synonymy; genus misspelled as *Loricario*), — Richard Schomburgk, 1847: 370 (British Guiana, Rupununi; ecology), — Müller & Troschel, *in* Schomburgk (ed.), 1848: 831 (Rupununi, an den Sandbänken), —Bleeker, 1858: 331 (listed), — Günther, 1864: 255 (description; Surinam and northern Brazil), — Klinckowström, 1892: 104 (listed; Surinam, in rivers and swamps), — Regan, 1904: 291 (description; 9 specimens; R. Amazon, Guiana; note on p. 270; in distributional table on p. 196; in key on p. 274; in subgenus *Loricaria*), — Eigenmann & Bean, 1907: 665 (in part; 9 specimens from Amazon River; listed), — Eigenmann, 1910: 415 (in part?; listed; Amazons, Guiana, Paraguay; in subgenus *Loricaria*), — Eigenmann, 1912a: 243-244 (description; 3 specimens; British Guiana, creek in Mora Passage, mud-flats Demerara, Crab Falls; also recorded on pp. 17, 24, 66, 77), — Starks, 1913: 36 (listed; 3 specimens; Pará), — Fowler, 1915: 241 (description; 1 specimen; Surinam), — Bhatti, 1938: 29-30, pl. 5 fig. 67, pl. 6 figs. 68-70 (integument and dermal skeleton, in part based upon BMNH 1923.8.11: 31-40, 240 mm), — Schultz, 1944: 329 (listed; in key on p. 323; table 23; Amazon), — Gosline, 1945: 106 (in part?; listed; Amazonas, Guiana, Paraguai), — Van der Stigchel, 1946 & 1947: 170-172 (in part?; description; 14 specimens; Surinam, Surinam-Brazil?, South America), — Puyo, 1949: 107 (in part?; description; Guyane française, Tonate, région de Kourou, rivière du tour de l'Ile, Kaw et l'Approuage; vernacular names: goret fouet, siscioua), — Holm, 1957: 45 (statement of missing type-material), — Wheeler, 1958: 214-215, pl. 28 fig. 1 (redescription of Gronovius' specimen of *Plecostomus* no. 69; doubtful identification; discussion), — Lowe (McConnell), 1964: 141 (listed; in small sandy pools of Rupununi River, Guiana), — Boeseman, 1968: 5 (identification of *Plecostomus* no. 69 Gronovius), — Boeseman, 1971: 15 (notes), — Isbrücker, 1971a: 275, 281 (listed; comparison), — Isbrücker, 1971b: 10, 15-16 (history), — Isbrücker, 1972: 163-170, 172-175, 186-187, figs. 1-6, 12c-h, table 1 (history; designation of neotype; discussion; type-locality restricted: Surinam, Marowijne River near Galibi; Marowijne River near Mopikondre, Suriname River system), — Isbrücker, 1973: 172, 173, 181 (discussion), — Boeseman, 1976: 156-160, fig. 2, pl. 1, table 1 (in part?; discussion; Surinam, Marowijne-, Suriname-, Nickerie-, and Corantijn River basins; Guyane, Stoupan, Mahure River basin; in subgenus *Loricaria*), — Boeseman, *in* Bruijning, Voorhoeve & Gordijn (eds.), 1977: 44 (popular account; illustration of a ♂; Surinam; vernacular name: basjafisi), — Isbrücker & Nijssen, 1978a: 184-185 (comparison), — Isbrücker, 1979a: 86-87, 98, 102, 110 (listed; comparisons; indication of the lectotype), — Isbrücker, 1979b: 111, figs. 1-2 (popular account), — Isbrücker, 1980: 115, 116-117 (listed; notes on type-material).

Plecostomus corpore aculeato; ore cirrato: dorso monopterygio Artedi, *in* Seba, 1759: 88, *not* pl. 29 fig. 14 (description; non-binominal, invalid; the figure likely is of a *Loricariichthys maculatus* (Bloch, 1794)).

Plecostomus no. 392 Gronovius, 1763: 127 (diagnosis; same as *Plecostomus* no. 69 Gronovius, 1754).

Draad-Staart [obsolete Dutch vernacular name] Houttuyn, 1765: 125-126 (description; discussion).

[*Plecostomus s. Loricaria*] *Loricaria* Meuschen, *in* Gronovius, 1781, in index following p. 380 (based upon *Plecostomus* no. 392 Gronovius, 1763; invalidated *in* Hemming (ed.), 1954b), — Whitley, 1929: 305 (listed; reference to index by Meuschen).

Loricaria Cirrhosa Bloch & Schneider, 1801: xxxii & 125, pl. 34 (nomen novum for *L. cataphracta).*

Loricaria cirrhora; Cuvier, 1829: 301, 1836: 545, Cuvier & Valenciennes, 1842: 253 (listed as a junior synonym of *L. cataphracta*; misspelling).

Loricaria setifera Lacepède, 1803: 140 & 141 (description; nomen novum for *L. cataphracta* of several authors, including Linnaeus, 1758; likely not based upon actual specimens).

Loricaria setigera; Cuvier, 1816: 211 (a junior synonym of *L. cataphracta*; misspelling), — Cuvier, 1829: 301, 1836: 545, Cuvier & Valenciennes, 1842: 253 (same as Cuvier, 1816), — Valenciennes, in Cuvier & Valenciennes, 1842, pl. 100 figs. 2-2a (description; disposal of illustrated specimen unknown).

Loricaria Dentata Shaw, 1804: 37 (description; nomen novum for *L. cataphracta*; Indian seas).

Plecostomus flagellaris Gronovius, ed. Gray, 1854: 158 (original diagnosis, based upon *Plecostomus* no. 69 Gronovius, 1754; no locality).

Loricaria flagellaris; Isbrücker, 1972: 163-170, 175-177, 186-187, figs. 7, 12a-b, table 1 (history; discussion; redescription of the holotype; comparison).

Loricaria carinata de Castelnau, 1855: 46, pl. 23 fig. 3 (original description; holotype; type-locality: De la rivière des Amazones), — Kner, 1858: 349 (discussion), — Regan, 1904: 292 (in part; description; 8 specimens, including the holotype — see also under *L. lata* and *L. simillima* — in distributional table on p. 196, in key on p. 274; in subgenus *Loricaria*), — Bertin & Estève, 1950: 74 (listed; holotype; as *L. cataphracta*), — Isbrücker, 1972: 170-171, 178-179, 187, figs. 8, 12i-j, table 1 (discussion; description and illustration of the holotype).

The following records need confirmation:

Loricaria cataphracta; Kner, 1854a: 77-79, pl. 1 figs. 2a-c (description; Cujaba and Guaporé; also mentioned on pp. 68, 70, 74-75, 76, 77, 79-80, 80-81; *"heterodon"* a better name than *cataphracta*), — Peters, 1877: 471 (listed; Venezuela, Calabozo; vernacular name: agujeta), — Eigenmann & Eigenmann, 1889: 36 (listed; in subgenus *Loricaria*; Vigia, Sao Conçallo, Cameta, Manaos, Para, Rio Negro, Coary, Villa Bella, Gurupa, Rio Preto, Tajapuru, Porto do Moz, Teffé, Marañon Ucayale, Obidos), — Eigenmann & Eigenmann, 1890: 382-384 (description; 48 specimens; same localities as listed in 1889; in key on p. 364, in subgenus *Loricaria*), — Eigenmann & Eigenmann, 1891: 39 (listed; in subgenus *Loricaria*; Rio Preto, Amazons, Guiana; by typographical error, the synonymy was placed under *L. nudiventris*), — Pellegrin, 1899a: 158 (listed; Venezuela, Apuré), — Pellegrin, 1899b: 406 (Manaos), — Eigenmann, McAtee & Ward, 1907: 150 (listed; Paraguay basin), — A. de Miranda Ribeiro, 1911: 122, pl. 33 fig. 3 (description; in key on p. 116a; references on p. 427; Rio Amazonas e Paraguay, Goyaz, Matto Grosso, Cuyabá, Guaporé, Vigia, S. Gonçalo, Cametá, Manáos, Pará, Coary, Villa Bella, Gurupá, Rio Preto, Tajapuru, Porto do Móz, Teffé e Obidos; Surinam; Perú e Republicas do Sul; misspellings in synonymy: *L. cotaphracta, Lorioaria cataphracta,* and *Liricaria cirrhosa*), — A. de Miranda Ribeiro, 1912: 10 (23 specimens; Manáos, Porto Esperidão-Jaurú, Caceres, Paraguay, M. Grosso, S. Manoel (Tapajoz), — Bertoni, 1914: 8 (Paraguay), — A. de Miranda Ribeiro, 1918: 719 (listed; Matto-Grosso, Comm. Rondon; Rio Juruá, Amazonas), — A. de Miranda Ribeiro, 1920: 9 (listed; probably from Aripuanan or Jamari), — La Monte, 1935: 7 (listed; Rio Jurua), — Pearson, 1937: 112 (in distributional table), — Bertoni, 1939: 53 (listed; Asunción, Paraguay), — Fowler, 1940a: 286 (listed; Ucayali River?; genus name misspelled as *Loracaria*), —Eigenmann & Allen, 1942: 208-210 (description; Rio Huallagas, Yurimaguas, Rio Itaya, Iquitos, Gosulimacocha, Rio Paranapura), — Devincenzi, 1943: 2 (in key to the *Loricaria* spp. of rio de la Plata), — Fowler, 1945: 105 (listed; Perú, Yurimaguas, Río Itaya, Iquitos, Gosulimacocha, Río Paranapura, Brasil, Guayanas), — Fernández Yépez, 1946: 6 (listed; Río Guárico, Río Apure; vernacular name: aguja), — Gosline, 1947: 84, 85, 86, 88, 90, 91 (notes on dissecting material in Mus. Rio de Janeiro), — Fowler, 1954: 92-93 (references; Amazônia, Peru, Paraguay, Guianas, Venezuela; vernacular name: pilote), — P. de Miranda Ribeiro, 1964: 3 (listed; 2 specimens, Rio Araguaya), — Mago Leccia, 1967: 257 (listed; Venezuela; vernacular name: paleta), — Tovar Serpa, 1967: 221 (listed; also listed on p. 222), — Ovchynnyk, 1968: 258 (in part?; Rio Anzu, at Puerto Napo, tributary of Rio Napo, Prov. Napo-Pastaza; Rio Bogota, tributary of Rio Tulubi, tributary of Rio Santiago, Prov. Esmeraldas), — Mago Leccia, 1970: 85 (listed; Venezuela; vernacular names: paleta, tabla).

Specimens examined:

Surinam

ZMA 109.616 (neotype, ♀?), District Marowijne, mouth of Marowijne River near Galibi, 05°45'N, 54°00'W, fresh water (due to the rainy season while collecting), coll. H. Nijssen (Brokopondo Research 1966/1967) & W. Vervoort, 1/2-VI-1966; — ZMA 110.722 (topotype), ZMA 106.230 (8 topotypes), same data as neotype; — ZMA 106.231 (topotype), District Marowijne, Marowijne River near Mopikondre (= Maria's Hoop), 30 km S. of Albina, 05°30'N, 54°15'W, seine in sandy bay, coll. H. Nijssen, 17-VI-1966.

ZMA 106.232 (1), District Brokopondo, Suriname

River system, creek at right bank of Sara Creek, 31 km S. of village Dam, running water, sand-bottom, depth 40 cm, coll. H. Nijssen, 12-X-1966; — ZMA 106.233 (7), sl 89.2-106.9 mm, District Brokopondo, Suriname River system, Sara Creek, 27 km S. of village Dam, running water, depth 150 cm, loam, sand, coll. H. Nijssen, 14-X-1966; — ZMA 106.234 (8), District Brokopondo, Suriname River system, Marowijne Creek (= Gran Creek), 63 km S. of Afobaka's artificial dam, running water, sand, depth 150 cm, coll. H. Nijssen, 20-X-1966.

BMNH 1866.8.14:125 (1), BMNH 1866.8.14: 129 (1), BMNH 1866.8.14:130 (1), BMNH 1866. 8.14:156 (1), BMNH missing register number (1), sl 148-307 mm, Surinam, purch. of Damon; — BMNH 1860.11.10:14 (1, ♂), sl 265.5 mm, and BMNH 1870.3.10:9 (1, ♀?), sl 273.5 mm, Surinam, purch. of Kappler.

French Guiana

BMNH 1926.3.2.:765-782 (21), Prov. Guyane, Fleuve Oyapock at St. Georges, 03°55'N, 51°47'W, coll. C. Ternetz; — MNHN 1900.159-163 (5), sl 95-115.5 mm, Fleuve Oyapock at St. Georges, coll. F. Geay; — MNHN A.9557 (2), Prov. Guyane, Cayenne, 04°55'N, 52°18'W, coll. Frère, before 1840.

Guyana

BMNH 1974.5.22:524-528 (5), sl 103.5-131 mm, Rupununi River, in sandy creek, coll. R. H. Lowe (McConnell); — BMNH 1977.10.4:1 (1), ZMA 115.132 (1), Anarika near Rockstone, Essequibo River, coll. G. J. Howes, 31-I-1976; — BMNH 1876.10.4:2-3 (2), sl 133-135.3 mm, Demerara, purch. of Cutter.

Brazil

BMNH 1923.8.11:31-40 (19), ZMA 115.133 (2), sl 230-276 mm, Est. Pará, Ilha de Marajo, coll. W. Ehrhardt; — BMNH 1895.3.29:40 (1), Est. Pará, Belém (formerly Pará), 01°27'W, presented by Göldi.

MNHN A.9562 (holotype of *Loricaria carinata*), Rio Amazonas, coll. F. de Castelnau; — USNM 52574 (8), Est. Pará/Amazonas, Rio Amazonas, Belém (= Pará) to Manaus, coll. J. B. Steere, 1901.

South America

ZMB 3160 (1), described by Bloch, 1794 and — erroneously — designated as the lectotype of *L. cirrhosa* Bloch & Schneider by Isbrücker, 1972; — BMNH 1853.11.12: 195-196 (2 parts of the holotype of *Plecostomus flagellaris*); — MZUN unregistered (1).

Description:

Morphometric and meristic data are presented in tables and are not repeated here.

Marowijne River specimens (table IIa-d)

Anus surrounded by a relatively large naked, roundish-oval area, reaching the naked ventral base of pelvic fins by a narrow connection of skin. Anterior to base of last pelvic fin ray, the abdomen is usually completely covered with small polygonal scutelets (occasionally lacking in small, isolated areas about the pectoral fin base), usually decreasing in size anteriorly. Two specimens in ZMA 106.230 (sl 267 and 250 mm) differ in having relatively large scutelets between base of pectoral fins. The scutelets reach just posterior to the inner side of gill opening, leaving a naked, V-shaped or roundish median notch. Together with the posterior thoracic scute, the larger scutes anterior to naked anal area form an inflexible plate. The smaller scutelets between the prominent thoracic scutes allow lateral as well as dorsal and ventral movement of this part of the body. The small scutelets in front of this complex again form an inflexible area. There is individual variation in the pattern of abdominal scutelets.

Ventral side of head naked, except for a series of narrow, mostly square-like marginal scutes extending from dorsolateral and dorsofrontal sides of the head. Posteroventral, mostly second, scute may extend beyond margin of head.

Minute odontodes (= dermal denticles, or integumentary teeth) on all dermal ossifications, including fin spines and rays. These odontodes are more prominent in the following areas: (1) on supraoccipital process, in two longitudinal rows, which may run from almost parallel to slightly diverging posteriorly, (2) on the three subsequent middorsal (predorsal) scutes, in two longitudinal rows on the first and second scute, and in a single

Table I. Measurements in mm and counts of (a) *Loricaria cataphracta*, neotype, (b) *Plecostomus flagellaris*, holotype, (c) *Loricaria carinata*, holotype, (d) *Loricaria lata*, lectotype, (e) *Loricaria simillima*, lectotype, (f) *Loricaria parnahybae*, lectotype, (g) *Loricaria piauhiae*, holotype, (h) *Loricaria piracicabae*, holotype, (i) *Loricaria clavipinna*, holotype, (j) *Loricaria nickeriensis*, holotype, (k) *Loricaria tucumanensis*, holotype, (m) *Loricaria apeltogaster*, lectotype, (n) *Loricaria prolixa*, holotype, (o) *Loricaria lentiginosa*, holotype.

specimen	a	b	c	d	e	f	g	h	i	j	k	m	n	o
mature male	—	—	+	+	+	—	—	+?	+	+	+	—	—	—
standard length	292.0	181.9	228.0	267.0	162.5	103.2	131.0	168.0	142.0	118.6	122.3	177.0	295.0	292.5
axial length	314.4	196.0	—	—	174.1	111.1	139.5	—	153.0	—	132.6	191.0	322.0	321.0
total length	—	363.9	—	—	—	172.0	—	—	—	—	—	>236.0	495.0	442.5
head length	62.3	35.9	48.4	59.4	33.4	21.7	26.6	39.4	31.5	24.1	29.5	35.7	62.9	63.7
predorsal length	89.9	53.1	66.6	86.4	49.5	30.5	38.3	54.8	43.2	34.9	41.4	52.2	90.5	92.0
postdorsal length	174.4	111.0	141.5	154.6	98.2	62.5	82.0	96.7	86.2	74.0	68.1	109.2	176.0	173.4
postanal length	148.9	101.5	122.8	128.1	84.4	55.1	70.6	76.4	74.7	65.4	57.7	90.0	143.6	142.4
dorsal spine length	—	45.8	—	—	—	21.7	26.4	—	33.1	25.3	27.5	45.9	50.0	55.8
first dorsal ray	67.4	44.0	—	51.5	34.8	20.7	24.1	—	32.4	24.5	26.0	39.1	48.4	53.1
anal spine length	54.6	27.1	—	44.1	27.9	16.8	20.5	—	24.9	22.2	23.4	32.7	52.2	50.9
pectoral spine length	51.7	32.3	>36.4	55.0	32.7	17.4	21.9	—	28.2	21.0	24.4	52.8	81.9	72.2
pelvic spine length	55.4	28.5	42.2	47.3	27.2	17.3	21.5	26.1	25.9	19.6	20.9	35.3	70.2	64.9
upper caudal spine	—	>182.0	—	—	—	68.8	—	—	—	—	—	>59.0	206.0	150.0
lower caudal spine	43.2	33.6	—	—	22.9	15.6	—	—	—	—	—	36.0	53.2	46.4
snout length	33.5	18.9	26.7	33.8	17.7	11.3	14.5	21.8	17.2	12.0	16.1	18.5	36.0	36.4
lower lip	15.0	—	—	11.3	4.0	4.4	3.7	6.2	—	6.5	5.7	3.9	13.2	16.7
thoracic length	45.3	—	34.4	46.6	26.7	16.1	19.0	28.7	24.3	18.1	22.1	32.4	51.3	45.9
abdominal length	38.0	24.4	30.4	44.1	21.8	13.1	17.2	27.1	18.4	15.3	17.5	28.0	50.4	47.5
max. orbital diameter	10.3	7.3	8.9	9.7	6.1	4.7	5.1	5.9	6.6	5.4	4.4	5.8	7.6	8.3
interorbital width	14.3	6.6	10.3	11.4	6.3	3.6	4.9	6.6	5.6	4.1	6.4	6.6	11.1	11.9
cleithral width	49.6	33.9	40.9	50.6	26.2	15.8	20.3	32.9	25.4	16.2	23.1	31.6	63.1	63.5
supra-cleithral width	37.0	24.3	28.8	36.7	19.9	11.0	14.6	23.5	17.3	11.7	16.9	21.2	42.2	43.4
head width	46.4	32.3	40.9	49.0	26.2	15.8	19.3	31.4	23.4	15.9	22.0	30.5	59.0	59.7
head depth	31.1	—	20.5	24.4	13.2	8.7	11.0	12.6	12.1	8.7	11.2	13.6	22.5	25.5
body depth at dorsal	34.0	—	23.1	27.2	15.2	8.7	11.5	12.4	13.0	8.7	11.4	16.9	24.1	28.2
body width at dorsal	41.0	33.4	33.4	48.5	20.9	11.6	16.9	23.8	18.0	13.0	17.6	25.3	53.2	53.2
body width at anal	35.8	23.1	26.1	41.0	19.0	10.2	13.6	19.2	14.8	11.7	14.1	24.3	52.7	51.5
depth caudal peduncle	5.2	—	3.1	4.3	2.1	1.3	1.5	2.3	1.8	1.3	1.4	2.7	4.7	4.9
width caudal peduncle	10.9	6.5	8.1	11.4	5.6	2.9	4.2	6.2	4.5	3.4	4.0	7.7	14.1	12.2
rictal barbel	22.2	—	—	23.9	14.0	8.8	9.7	—	11.8	11.4	9.0	12.6	28.5	—
lower lip barbels	6.8	—	—	—	—	1.7	—	—	—	3.3	—	2.0	4.9	11.3
lateral scutes	35/35	35/35	35/35	34/34	35/35	34/33	34/34	36/37	35/35	34/34	32/32	35/35	36/35	35/35
coalescing scutes	17/18	19?/18	20/19	21/22	20/21	19/19	18/18	25/23	18/17	17/19	19/19	18/19	22/21	22/21
thoracic scutes	10/10	9/9	10/8	9/8	10/10	7/8	7/8	9/8	8/9	10/7	8/8	11/10	9/9	8/7
teeth upper jaws	3/2	4/4	3/3	3/2	4/3	3/4	3/3	3/4	3/4	2/4	4/3	2/2	2/3	3/3
teeth lower jaws	8/5	4/3	6/5	5/6	7/7	6/6	7/9	2/4	10/11	6/7	6/7	7/7	8/5	5/6

row on the third scute, (3) in two longitudinal rows along coalescing and parallel lateral body scutes, including some larger odontodes on cleithrum, (4) medianly on the first three to five scutes between predorsal and dorsolateral body scutes, (5) on dorsoanterior part of orbital rim, (6) along ventral snout margin, including lateroposterior part of preoperculum.

Orbital rim oval in shape, with a small dorsoposterior notch, preceded dorsoanteriorly by some prominent odontodes.

Pectoral pore present in skin just ventral to the anterior part of first lateral body scute. Simple pores of the sensory canal system on dorsum of head, as short curved or as long straight canals, usually between fusions of the dermal ossifications. Bifurcate pores are present between odontode rows along coalescing scutes, just ventral to the dorsal row. Between odontode rows along parallel lateral body scutes the pores are mostly simple.

Upper lip narrow, the anterior margin to base of the maxillary (= rictal) barbels with numerous simple, bifurcate, rarely trifurcate or quadrifurcate, long and thick subbarbels. A large number of similar barbels, usually simple and shorter, on the surface posterior to this margin at either side of the origin of premaxillae, reaching base and ventral surface of maxillary barbel. Along inner side of maxillary barbels, a narrow area

Table II. Morphometric and meristic characters of *Loricaria cataphracta*: (a) neotype, Surinam, Marowijne River system, (b) 1 male, topotype, ZMA 110.722, (c) 8 topotypes, ZMA 106.230, (d) 1 topotype, ZMA 106.231, (e) 9 specimens, Surinam, Suriname River system, ZMA 106.232 and 106.234, (f-j) 4, 1, 1, 7, and 8 specimens, respectively, arranged according to size, French Guiana, Fleuve Oyapock, BMNH 1926.3.2:765-782. Measurements expressed at ratios of standard- or head length.

specimen(s)	a	b	c	d	e	f	g	h	i	j
mature male	—	+	1?	—	—	3	—	—	—	—
standard length	292.0	271.0	250.0-280.0	182.5	62.9-122.3	261.5-273.0	189.0	132.7	101.1-123.7	65.6- 94.0
axial length	314.4	291.8	268.4-301.5	194.3	up to 121.4	282.3-295.0	204.0	—	108.6-132.4	70.9-101.5
total length	—	—	—	—	up to 209.3	up to 447.0	—	—	up to 174.7	88.8-118.3
head length	4.7	4.7	4.7-5.2	5.0	4.7-5.0	4.5-5.0	5.0	5.1	4.8-5.0	4.6-4.8
predorsal length	3.2	3.3	3.4-3.6	3.4	3.4-3.5	3.1-3.3	3.5	3.6	3.4-3.5	3.3-3.6
postdorsal length	1.7	1.7	1.6-1.7	1.6	1.6-1.7	1.6-1.7	1.7	1.6	—	—
postanal length	2.0	2.0	1.8-2.0	1.9	1.8-1.9	1.9-2.0	1.8	1.8	—	—
dorsal spine length	—	—	4.0-<4.7	5.5	4.4-5.0	3.4-3.8	3.9	4.4	4.4-4.8	4.5-5.1
first dorsal ray	4.3	4.2	4.2-5.1	5.7	4.7-5.2	3.6-3.9	4.2	4.5	4.7-5.1	4.7-5.5
anal spine length	5.3	5.3	5.3-6.2	—	5.7-6.2	4.8-5.1	5.4	5.6	5.7-6.1	5.8-6.8
pectoral spine length	5.6	5.3	5.2-6.1	6.6	5.5-6.3	4.8-5.2	5.4	5.8	—	—
pelvic spine length	5.3	5.6	5.5-6.3	6.1	5.5-6.2	4.8-5.4	5.8	5.6	5.9-6.4	5.7-6.9
upper caudal spine	—	—	up to <3.3	—	up to 1.0	up to 1.4	—	—	up to <1.4	up to 2.8
lower caudal spine	6.8	6.3	6.5-7.2	7.3	6.8-7.7	5.8-6.0	6.4	—	7.3-7.6	7.0-7.5
snout length	1.9	1.9	1.9	1.9	1.9-2.1	1.8-1.9	2.0	1.9	—	—
lower lip	4.2	4.4	4.0-5.3	4.9	3.8-4.7	4.6-5.0	5.1	4.9	5.0-5.7	4.8-6.0
thoracic length	1.4	1.3	1.2-1.3	1.3	1.2-1.5	1.2-1.3	1.3	1.3	1.3-1.4	1.3-1.5
abdominal length	1.6	1.6	1.5-1.7	1.4	1.5-1.8	1.5-1.7	1.6	1.7	—	—
max. orbital diameter	6.0	5.9	5.3-5.8	4.9	4.4-4.9	5.4-6.0	5.4	5.6	4.6-5.0	4.4-4.8
interorbital width	4.4	4.9	4.3-4.8	5.2	5.3-6.4	4.8-5.3	5.3	5.2	5.1-5.6	5.1-5.7
cleithral width	1.3	1.3	1.3	1.4	1.4-1.5	1.3	1.3	1.4	—	—
supra-cleithral width	1.7	1.8	1.7-1.8	1.8	1.9-2.1	1.7-1.8	1.8	1.8	—	—
head width	1.3	1.4	1.3-1.4	1.4	1.4-1.5	1.3-1.4	1.4	1.4	—	—
head depth	2.0	2.4	2.1-2.3	2.4	2.5-2.8	2.1-2.3	2.3	2.4	2.4-2.7	2.5-2.7
body depth at dorsal	1.8	2.2	1.9-2.1	2.0	2.3-2.8	1.8-1.9	1.9	2.2	2.2-2.5	2.5-2.7
body width at dorsal	1.5	1.7	1.4-1.7	1.6	1.8-2.3	1.4-1.5	1.5	1.7	1.8-2.0	2.0-2.1
body width at anal	1.7	1.9	1.7-1.9	1.8	2.0-2.5	1.7-1.8	1.9	2.1	2.1-2.4	2.2-2.8
depth caudal peduncle	12.0	14.6	12.3-15.4	14.6	16.9-19.3	13.8-15.8	17.3	15.4	15.0-19.2	16.6-20.6
width caudal peduncle	5.7	5.7	4.9-5.6	6.4	6.2-7.5	5.6-6.3	6.1	7.3	—	—
rictal barbel	2.8	2.4	2.3-2.5	2.5	2.3-3.3	2.0-2.3	—	2.8	—	—
lower lip barbels	9.2	11.6	8.5-10.3	12.2	10.5-13.9	10.5-14.6	12.3	13.7	8.7-14.0	9.8-15.3
lateral scutes	35/35	35/35	35/35-36	35/35	33-34/33-34	34-35/34-35	35/35	36/36	35-36/35-36	35/34-35
coalescing scutes	17/18	19/19	17-18/17-19	19/19	18-19/18-20	17-19/18-19	17/18	19/19	18-20/18-20	18-19/18-19
thoracic scutes	10/10	10/10	8-12/ 6-10	10/9	7-10/ 7-9	7-9 / 7-10	10/11	9/9	—	—
teeth upper jaws	3/2	3/2	2-4 / 2-4	2/3	2-4 / 2-4	1-4 / 3-5	3/4	5/5	4/ 4-5	3-5 / 4-5
teeth lower jaws	8/5	7/9	6-7 / 6-7	9/10	6-9 / 5-8	6-8 / 5-9	8/7	8/7	5-7 / 7-8	6-8 / 7-8

devoid of such subbarbels. Surface of the entire connected lower lip with numerous slender papillae. Edge of lower lip with a median notch, and with about 20-24 long papillae, or subbarbels.

Surface of premaxillae with 4-6 axial fleshy lamellae, allowing replacement teeth to elevate in position. Just posterior to origin of functional teeth, these lamellae are provided with one or two thick, acute papillae, as long as or shorter than premaxillary teeth. Between both premaxillae the surface is papillose, bearing two prominent papillae in median position, followed posteriorly by two papillae in transverse position, as well as one large papilla at either side of the latter.

Teeth in premaxillae about twice as long as (or longer than) those in the dentary. Teeth in both jaws usually with a small to minute outer lobe and a conspicuous inner lobe. Inner lobe of premaxillary teeth usually oblong with or without a rounded tip, or slightly conical. Inner lobe of teeth in the dentary with an oval or roundish tip, which rarely is slightly conical.

Tip of supraoccipital process blunt or acute. Eye dorsally covered with a narrow pigmented flap of skin. Iris with a small, mostly acute or somewhat roundish dorsal flap.

Colour in alcohol. — Ground colour of all ossified parts light yellowish tan, ground colour of naked parts whitish. Pigment almost absent, except for diffuse greyish chromatophores. Such chroma-

tophores may be more abundant on dorsum of the paired fins, especially on the membrane.

Only one of the ten topotypes (ZMA 110.722, a male) has a faint pattern in the caudal fin, consisting of alternate brownish grey blotches on lower caudal fin spine, and brown pigment on distal ends of rays in the lower caudal fin lobe. This specimen displays secondary sexual dimorphism in having the pectoral fin spine quite thick, especially at about two thirds of its length. The tips of the teeth are not rounded more than in females.

In the specimen in ZMA 106.231 the abdominal scutelets are absent in a V-shaped area commencing halfway base of pectoral fin, reaching to about halfway last (inner) pectoral fin ray.

Comparative notes:

Surinam, Suriname River system. — The specimen in ZMA 106.232 (sl 87.2 mm; table IIe) has a light pale, yellowish colour all over, without markings. Abdominal scutes incompletely developed. Orbital notch very small.

The seven juveniles in ZMA 106.233 (sl 89.2-106.9 mm) have a greyish tan ground colour of dorsum of head and body. Base of first and second dorsal fin ray with faint brownish pigmentation, continuing transversely on the scutes. A faint, rather broad, brownish transverse stripe may be present just posterior to base of last dorsal fin ray. In some of the specimens a similar stripe midway between base of last dorsal fin ray and caudal fin base. Faint brownish spots on dorsal fin. Upper caudal fin spine spotted with brown. Posterior half of lower caudal fin lobe may bear brown pigment, like the three triangular scutes on caudal fin base.

The eight juveniles in ZMA 106.234 (sl 62.9-122.3 mm; table IIe) are like the preceding, but dorsum of body posterior to base of last dorsal fin ray has five to seven faint transverse stripes of varying width. A stripe near first and second dorsal fin ray may continue anteriorly oblique on the dorsum of body, to about the dorsal row of odontodes along the lateral body scutes. The larger specimens have the abdominal scutes fairly completely developed.

The dimensions in table II (showing differences in maximum orbital diameter, interorbital width, cleithral width, supra-cleithral width, head depth, body depth and width at dorsal, body width at anal, and depth and width of caudal peduncle) likely are due to allometry. The Suriname River population tends to have less lateral body scutes and more coalescing scutes. There are no larger specimens from this river system available for comparison, nor smaller ones from the Marowijne River system.

French Guiana, Fleuve Oyapock (table IIf-j). — Of the four largest specimens (261.5-273 mm sl), two have a shallow notch in the medio-anterior series of abdominal scutelets. In a specimen of 269 mm sl it is shallowly V-shaped, in the specimen of 261.5 mm rounded. There is a median convexity between the nostrils and orbital edges, bearing prominent odontodes, especially in smaller specimens.

In a male of 269 mm sl, the crowns of premaxillary teeth are about thrice as short and distinctly broader than, e.g., in the male in ZMA 110.722 from the Marowijne River (this specimen, sl 271 mm, has a thicker pectoral fin spine) and in the two other males from the Oyapock (261.3 and 273 mm in sl). The teeth in the dentary are also shorter and have broader tips than in the mentioned other three males. Especially on inner dorsum of pectoral fin spine, the odontodes are more conspicuous than in the large female (sl 263 mm) in this sample. The odontodes on pelvic and anal fin spine are slightly blunter. The four adults (table IIf) differ from the topotypes of comparable size in several morphometric characters: all fins except caudal are longer, and usually the interorbital area is narrower.

The development of abdominal scutelets may be advanced at a sl of 116.5 mm, although a specimen of 123.7 mm in sl has the posterior half of the abdomen reasonably covered only. At a sl of about 130 mm the abdomen is almost completely covered. The specimen of 65.6 mm in sl has four small scutelets, about anterior to base of pelvic fin spines, where the scutelets develop first and continue anteriorly.

Juveniles are otherwise completely developed. They possess a faint colour pattern, consisting of three to five transverse bars on dorsum of body

Table III. Morphometric and meristic characters of *Loricaria cataphracta*: (a-b) 2 specimens, French Guiana, Cayenne, MNHN A.9557, (c) 1 specimen, Guyana, Rupununi River, BMNH 1974.5.22:524-528, (d-e) 2 specimens, Guyana, Essequibo River, BMNH 1977.10.4:1, ZMA 115.132, (f-i) 4 specimens, Brazil, Ilha de Marajo, BMNH 1923.8.11:31-40, ZMA 115.133, (j) 1 specimen, Brazil, Belém, BMNH 1895.3.29:40, (k) holotype of *Loricaria carinata*, (m) 8 specimens, Brazil, Belém to Manaus, USNM 52574, (n) 1 specimen, South America, Bloch's collection, ZMB 3160, (o) holotype of *Plecostomus flagellaris*, (p) 1 specimen, South America, MZUN unregistered. Measurements expressed as ratios of standard- or head length.

specimen(s)	a	b	c	d	e	f	g	h	i	j	k	m	n	o	p
mature male	—	—	—	—	—	—	—	+	+	+	+	2	+?	—	—
standard length	199.3	198.0	131.0	166.8	143.0	260.0	258.0	254.5	230.0	178.0	228.0	142.0-188.5	278.0	181.9	141.1
axial length	—	—	—	—	154.5	282.4	277.9	—	245.8	—	—	152.7-204.9	—	196.0	152.0
total length	—	—	—	—	212.0	515.0	>328.2	—	>282.8	296.0	—	—	—	363.9	—
head length	4.8	4.9	4.6	5.2	4.8	4.4	4.7	4.5	4.7	4.5	4.7	4.4-4.9	5.1	5.1	4.7
predorsal length	3.4	3.4	3.4	3.7	3.6	3.0	3.3	3.1	3.3	3.3	3.4	3.2-3.4	3.5	3.4	3.2
postdorsal length	1.6	1.6	1.7	1.6	1.6	1.8	1.7	1.7	1.7	1.7	1.6	1.6-1.7	1.6	1.6	1.7
postanal length	1.9	1.9	1.9	1.8	1.9	2.1	1.9	2.0	2.0	2.0	1.9	1.8-2.0	1.9	1.8	2.0
dorsal spine length	—	—	4.7	4.4	4.4	3.8	3.7	4.0	4.3	4.0	—	3.9-4.6	—	4.0	—
first dorsal ray	4.2	4.2	4.9	4.6	4.5	3.9	3.9	4.3	4.5	4.3	—	3.9-4.7	4.4	4.1	4.4
anal spine length	5.3	—	6.0	6.2	5.8	5.0	5.2	—	5.4	—	—	4.9-5.5	5.0	6.7	5.5
pectoral spine length	5.4	—	5.4	5.4	5.1	4.7	5.6	5.1	5.2	5.3	<6.3	5.1-5.6	5.2	5.6	—
pelvic spine length	<6.3	—	5.9	5.9	5.3	4.9	5.1	5.3	5.2	—	5.4	4.7-5.7	5.1	6.4	5.3
upper caudal spine	—	—	—	—	2.0	1.0	<3.7	—	4.4	<1.5	—	up to 1.3	—	1.0	—
lower caudal spine	—	—	7.4	8.1	6.8	6.0	—	—	6.7	<7.2	—	5.8-7.1	—	5.4	7.0
snout length	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.8	1.9-2.0	1.8	1.9	2.0
lower lip	—	—	4.9	5.7	5.5	4.6	4.4	4.6	4.7	—	—	4.7-5.1	5.1	—	4.7
thoracic length	1.3	1.3	1.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.2-1.5	1.2	—	1.3
abdominal length	1.5	1.5	1.6	1.5	1.6	1.6	1.6	1.6	1.5	1.7	1.6	1.6-1.8	1.5	1.5	1.6
max. orbital diameter	5.4	5.4	5.1	5.3	5.2	5.4	5.1	5.7	5.7	4.9	5.4	4.3-5.0	5.7	4.9	4.5
interorbital width	5.0	5.0	5.7	5.5	5.6	4.9	4.9	5.2	4.7	5.1	4.7	4.8-5.5	4.7	5.4	5.3
cleithral width	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.3-1.4	1.2	1.1	1.4
supra-cleithral width	1.8	1.8	2.0	1.8	1.9	1.7	1.7	1.8	1.7	1.8	1.7	1.8-1.9	1.6	1.5	1.8
head width	1.4	1.4	1.4	1.3	1.4	1.3	1.3	1.3	1.3	1.3	1.2	1.3-1.5	1.3	1.1	1.4
head depth	2.3	2.4	2.9	2.8	2.9	1.9	1.9	2.1	2.2	2.4	2.4	2.2-2.6	2.2	—	2.4
body depth at dorsal	2.0	2.0	2.6	2.5	2.4	1.7	1.6	1.9	1.9	2.3	2.1	2.1-2.4	1.8	—	2.1
body width at dorsal	1.6	1.7	1.8	1.7	1.8	1.4	1.3	1.6	1.5	1.5	1.5	1.6-1.8	1.5	1.1	1.6
body width at anal	1.8	2.0	2.1	2.0	2.1	1.6	1.7	1.8	1.7	1.9	1.9	1.8-2.1	1.6	1.6	2.1
depth caudal peduncle	15.3	16.2	17.9	17.9	19.8	15.3	15.3	15.7	15.3	17.9	15.6	15.6-19.2	12.7	—	18.8
width caudal peduncle	6.7	6.4	5.0	6.9	6.6	6.1	5.8	5.9	5.6	5.9	6.0	5.9-6.9	4.7	5.5	7.7
rictal barbel	—	—	—	2.5	2.5	2.6	2.4	2.4	2.2	—	—	2.3-2.6	—	—	2.3
lower lip barbels	—	—	11.0	10.4	10.2	10.5	18.4	23.6	13.6	—	—	9.8-10.1	7.8	—	7.7
lateral scutes	35/35	35/35	35/35	36/36	35/35	34/34	35/35	35/35	35/36	34/34	35/35	34-35/33-35	36/35	35/35	34/34
coalescing scutes	18/18	18/19	21/20	21/20	20/20	19/19	18/19	18/18	19/19	18/18	20/19	17-20/17-20	18/17	19?/18	19/19
thoracic scutes	8/8	8/9	11/9	9/8	7/8	8/8	9/9	9/10	8/10	9/8	10/8	8-10/7-10	8/9	9/9	8/9
teeth upper jaws	4/4	—	2/3	3/2	3/4	4/5	3/2	4/4	2/4	5/5	3/3	3-4/3-4	1/3	4/4	3/3
teeth lower jaws	6/3	—	6/8	7/7	8/8	7/7	7/7	8/8	7/8	8/—	6/5	5-10/6-9	8/7	4/3	7/6

posterior to base of last dorsal fin ray; transversely arranged pigmentation may occur about base of dorsal fin spine. Dorsal fin, and dorsum of paired fins with even or irregular brown spots, tending to form a transverse marking in the paired fins short from the end of the rays. The anal fin may bear vague markings. The caudal fin has dark brown pigment on and surrounding caudal scutelets. Dark pigment is prominent on distal half of caudal fin rays, especially on the lower lobe, often forming a sickle-shape, running along the outer caudal fin. The tips of upper caudal fin rays are not pigmented. This colour pattern gradually fades with growth. However, the female of 263 mm sl has still remnants of the juvenile colour pattern in dorsal, pectoral, pelvic and caudal fins.

Very small specimens have almost no posterior orbital notch; adults have a shallow, inconspicuous notch.

French Guiana, Cayenne. — The two specimens in MNHN A.9557 (table IIIa-b) were collected before 1840 (mentioned by Valenciennes, 1840). The prominent odontodes are white, likely due to change during the period of preservation. Orbital notch small.

Guyana, Rupununi River. — Table IIIc. Ground colour light brownish. Head and body anterior to base of last dorsal fin ray tend to be slightly darker, even brown. Posterior to base of

last dorsal fin ray, the dorsum of caudal peduncle has three to five transverse brown stripes (absent in one of the specimens). Dorsal fin with many small, indefinite dark brown patches. Dorsum of pectoral and pelvic fins either plain, or light brown. One of the specimens has many small, light spots in more or less oblique series in these fins. Caudal fin with darker pigment on basal triangular scutes and with indefinite patches on rays and membrane. Tip of most of the caudal fin rays dark brown, forming a roundish, marginal stripe. Abdominal scutes almost completely developed in most specimens (sl 103.5-131 mm). Odontodes on dorsum of head more prominent, arranged into weakly waving longitudinal lines. Especially the larger specimens with a small posterior orbital notch.

Guyana, Essequibo River. — Table IIId-e. Greyish rather than brownish pigmentation. Especially the smaller of the two specimens at hand has the lower half of dorsal fin rays with even grey pigment, followed by a scarcely pigmented oblique area. This area followed by uneven grey pigmentation. Dorsum of pectoral and pelvic fins dark. Tip of most caudal fin rays broken off in the larger specimen, nearly black in the smaller specimen, causing an almost vertical, rather broad bar.

Brazil, Ilha de Marajo. — Table IIIf-i. Posterior margin of caudal fin with a broad, dark brown band, except for tips of the three upper branched rays in upper lobe. In some specimens this band is narrower, in others almost the entire caudal fin is pigmented. Paired fins and dorsal fin may be evenly pigmented with brown; most of the specimens are light yellowish. Brownish pigment may be present on dorsum of body and head, forming faintly marbled areas. The posterior orbital notch is more prominent than in the specimens from the Marowijne River.

Eight out of 21 specimens are males (sl 230-257 mm; sl of the females 255-276 mm). Seven of them have the crowns of the teeth shorter and broader than in the females, like the male from Fleuve Oyapock described above. The contrast between both sexes is in the shape of mandibular teeth, not always in the shape of the teeth in the premaxillae. However, the dentition of the premaxillae is often damaged in the presumed females in this series. There are morphometric and meristic differences with the topotypes in the four measured specimens.

Brazil, Belém. — The male in BMNH 1895. 3.29:40 (sl 178 mm; table IIIj) has short, spoon-shaped tooth crowns; the pectoral fin spine is hardly broader than in a female.

Brazil, Rio Amazonas. — The holotype of *L. carinata* (table IIIk) is a male, with the pectoral fin spine broader than in a female. The teeth are more elongate and more oval than in the preceding specimen. It has a broader head than usual (1.2 against 1.3-1.5 in other specimens).

The eight specimens in USNM 52574 (another specimen of this sample is a *L. simillima*), from Rio Amazonas, "Belém to Manaus", have a faded colour pattern, although the fins are usually pigmented with even brown (except for upper caudal fin spine, and tip of upper caudal fin lobe). Their morphometric and meristic data are given in table IIIm.

The so-called lectotype of *L. cirrhosa* Bloch & Schneider (1801) (table IIIn) was described as *L. cataphracta* by Bloch (1794). The smaller specimen, previously designated as the paralectotype of *L. cirrhosa* by me (1972), is now assigned to *L. simillima.*

The holotype of *Plecostomus flagellaris*, contrary to my previous opinion, is a *L. cataphracta* (table IIIo). The morphometric differences are due to the way of preservation: like a herbarium specimen.

The specimen in MZUN (table IIIp) is brownish (artificial, not pigmented).

Discussion:

More sampling of *L. cataphracta* from its area of distribution is needed, to provide specimens with comparable standard lengths. Differences in morphometric dimensions, in colour pattern, and in number of lateral versus coalescing scutes cannot be evaluated. *L. cataphracta* was examined only from Guianean and Amazonian specimens. It has more prominent odontodes than in some closely related species, like *L. lata* and *L. simillima*, but I found it impossible to exactly express this difference.

Loricaria lata Eigenmann & Eigenmann, 1889
(figs. 3, 14; tables Id, IVa-c)

Loricaria lata Eigenmann & Eigenmann, 1889: 36-37 (original description; 11 syntypes; type-locality: Goyaz; in subgenus *Loricaria*), — Eigenmann & Eigenmann, 1890: 384-385 (description; syntypes; in key on p. 365; in subgenus *Loricaria*), — Eigenmann & Eigenmann, 1891: 39 (listed; in subgenus *Loricaria*; Goyaz), — Isbrücker, 1972: 171, 179-183, 187, figs. 9-10, 12k-m, table 1 (discussion; description; designation of the lectotype; 5 paralectotypes; Goyaz; comparison; 3 other paralectotypes separated as "*Loricaria*" sp. inc. sed.), — Isbrücker, 1973: 172, 173, 174 (discussion; footnote; type-locality: Brazil, Est. Goiás, Rio Araguaia drainage, upper course of Rio Vermelho at Goiás, 15°57'S, 50°07'W), — Isbrücker & Nijssen, 1978: 194-195 (lectotype and 5 paralectotypes; comparison), — Isbrücker, 1979a: 87 (listed), — Isbrücker, 1980: 118 (listed).

Loricaria carinata (non de Castelnau, 1855); Regan, 1904: 292 (in part; description, partly based upon a syntype of *L. lata*, considered as a junior synonym of *L. carinata*; in distributional table on p. 196; in key on p. 274; in subgenus *Loricaria*).

Most authors subsequent to Regan (1904) considered *L. lata* a junior synonym of *L. carinata*.

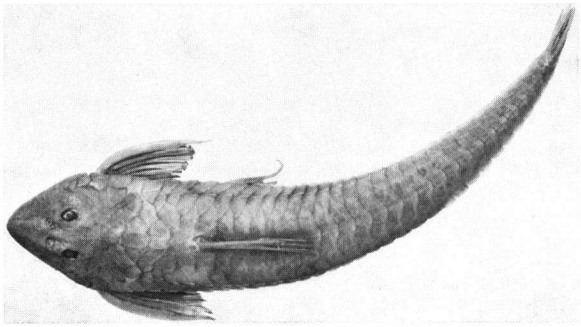

Fig. 3. *Loricaria lata* Eigenmann & Eigenmann, 1889. Dorsal view of the lectotype.

Specimens examined:

Brazil

MCZ 46721 (lectotype), Est. Goiás, Rio Araguaia drainage, upper course of Rio Vermelho at Goiás, 15°57'S, 50°07'W, coll. Senhor Honorio, about 1865, — MCZ 8123 (4 paralectotypes), BMNH 1889.11.14:65 (1 paralectotype), same data as lectotype.

Note. — Three additional paralectotypes are tentatively identified as *Spatuloricaria evansii* (Boulenger, 1892); 2 remaining paralectotypes were not encountered.

Description:

Loricaria lata is in most respects similar to *L. cataphracta*, from which it slightly differs in some morphometric and meristic tendencies (compare table IVa-c with table IIa-c). Moreover, the odontodes in general and particularly those forming the postoccipital ridges, are weaker (a character shared with *L. simillima*). The abdominal scutes between the oblong thoracic scutes are generally larger than in *L. cataphracta*. However, this character is not quite stable in the latter species.

Pectoral pore present. There is a shallow, more or less triangular posterior orbital notch.

Colour in alcohol. — Except for the smallest paralectotype, the lectotype and larger paralectotypes are devoid of pigmentation (or faded). Eigenmann & Eigenmann (1889: 37, 1890: 385) described: "Coloration uniform in adult (?), all the fins dusky; ...; all the fins more or less spotted; upper lip and barbel dotted." At present, the dorsum of the maxillary barbels, and principal barbels of the upper lip are light brown. The smaller paralectotype has the dorsal fin and dorsum of pectoral and pelvic fins brownish, just like dorsum of head and body. The interorbital area, posterior to supraoccipital process to first lateral body scute, and posterior to pelvic fin base, are lighter brown.

Discussion:

Several comparable populations of *L. cataphracta* show more, and more clear morphometric differences with each other than with *L. lata*. In fact, the recognizability of *L. simillima, L. parnahybae,* and *L. clavipinna* as distinct though closely related species with *L. cataphracta,* indicates that *L. lata* can be considered as a distinct species as well. However, fresh topotypes are needed for a better comparison with *L. cataphracta*.

Loricaria simillima Regan, 1904
(figs. 4, 14; tables Ie, IVd-m, V)

Loricaria cataphracta (non Linnaeus, 1758); Bloch, 1794: 76-79 (in part; ZMB 22223), — Eigenmann & Bean, 1907: 665 (in part; listed; 1 out of 9 specimens from the Amazon River), — Isbrücker, 1972: 172-175 (in part; ZMB 22223).

Loricaria Cirrhosa; Bloch & Schneider, 1801: xxxii and 125 (in part; ZMB 22223).

Table IV. Morphometric and meristic characters of *Loricaria lata*: (a) lectotype, Brazil, Goiás, (b) 4 paralectotypes, MCZ 8123, (c) 1 paralectotype, BMNH 1889.11.14:64; of *Loricaria simillima*: (d) lectotype, Ecuador, Canelos, (e) 2 paralectotypes, (f) 1 topotype, BMNH 1880.12.8:80, (g) 1 specimen, Peru, Río Ucayali, BMNH 1913.7.30:35, (h) 1 specimen, Peru, Aquas Amarillas, BMNH 1969.7.15:22-23, (i) 1 specimen, Peru, Quebrada Ayamiria, BMNH 1969.7.15:22-23, (j) 1 specimen, Peru, Río Ucayali system, BMNH 1969.7.15:22-23, (k) 1 specimen, Venezuela, Río Guarapiche, USNM 163176, (m) 1 specimen, Brazil, Bôa Vista, NMW 46167. Measurements expressed as ratios of standard- or head length.

specimen(s)	a	b	c	d	e	e	f	g	h	i	j	k	m
mature male	+	2	—	+	+	+	—	—	—	—	—	—	—
standard length	267.0	198.2-257.2	165.0	162.5	159.0	152.0	64.5	177.0	182.0	166.0	63.7	144.0	100.0
axial length	—	—	—	174.1	170.9	163.0	—	190.4	198.4	180.3	—	155.9	108.0
total length	—	—	—	—	—	—	—	—	—	—	—	—	—
head length	4.5	4.5-4.8	4.8	4.9	4.9	4.8	4.8	4.4	4.7	4.8	4.3	4.6	4.6
predorsal length	3.1	3.2-3.3	3.3	3.3	3.4	3.4	3.4	3.1	3.3	3.3	3.2	3.4	3.4
postdorsal length	1.7	1.7-1.8	1.7	1.7	1.7	1.7	—	1.7	1.7	1.7	1.7	1.7	1.6
postanal length	2.1	2.0-2.1	2.0	1.9	1.9	2.0	—	2.0	2.0	2.0	2.0	2.0	1.9
dorsal spine length	—	up to<5.3	5.1	—	<5.0	—	—	4.2	3.6	4.1	—	4.1	4.5
first dorsal ray	5.2	up to<5.3	5.3	4.7	4.6	4.5	—	4.4	3.9	4.4	4.7	4.5	4.9
anal spine length	6.1	up to 5.7	5.9	5.8	—	5.8	—	5.5	5.6	6.3	6.6	5.8	5.9
pectoral spine length	4.9	5.0-<5.2	5.0	5.0	5.0	4.9	—	5.1	4.8	5.4	5.5	5.3	5.2
pelvic spine length	5.6	5.6-5.9	6.2	6.0	5.7	5.6	—	4.9	5.1	5.9	6.2	5.6	5.6
upper caudal spine	—	—	—	—	—	—	—	—	—	<4.0	—	—	—
lower caudal spine	—	—	—	7.1	—	—	—	—	6.5	7.2	—	—	6.7
snout length	1.8	1.8-1.9	1.9	1.9	1.9	1.9	—	1.9	1.9	1.9	2.2	2.0	1.9
lower lip	5.3	4.3-6.2	7.3	8.4	6.5	5.0	—	6.7	4.9	5.6	5.5	9.4	6.3
thoracic length	1.3	1.2-1.3	1.3	1.3	1.2	1.2	—	1.3	1.2	1.1	1.4	1.3	1.3
abdominal length	1.4	1.3-1.4	1.3	1.5	1.6	1.5	—	1.7	1.5	1.5	1.7	1.6	1.7
max. orbital diameter	6.1	5.7-6.5	5.0	5.5	5.3	5.2	4.8	5.4	5.1	5.3	4.2	5.4	4.9
interorbital width	5.2	5.0-5.4	5.3	5.3	5.5	5.4	5.4	5.2	5.2	5.1	4.9	5.4	5.1
cleithral width	1.2	1.1-1.2	1.2	1.3	1.3	1.3	—	1.2	1.2	1.2	1.4	1.3	1.3
supra-cleithral width	1.6	1.6-1.7	1.7	1.7	1.8	1.8	—	1.6	1.7	1.7	1.9	1.8	2.0
head width	1.2	1.2-1.3	1.2	1.3	1.4	1.3	—	1.3	1.3	1.2	1.4	1.4	1.3
head depth	2.4	2.6-2.7	2.9	2.5	2.5	2.4	—	2.5	2.5	2.5	2.7	2.4	2.6
body depth at dorsal	2.2	2.2-2.4	2.5	2.2	2.2	2.1	—	2.2	2.1	2.2	2.6	2.2	2.4
body width at dorsal	1.2	1.3-1.4	1.4	1.6	1.6	1.5	—	1.6	1.4	1.4	2.0	1.6	1.9
body width at anal	1.5	1.4-1.5	1.7	1.8	1.8	1.7	—	2.0	1.7	1.6	2.3	2.0	2.2
depth caudal peduncle	13.8	13.8-15.2	16.0	15.9	15.5	15.0	—	14.9	15.0	15.1	14.8	14.8	16.8
width caudal peduncle	5.2	5.6-5.7	5.6	6.0	6.0	6.1	—	6.4	4.9	5.5	7.8	6.4	7.8
rictal barbel	2.5	2.4-2.7	2.3	2.4	—	—	—	2.9	2.8	3.2	3.1	3.4	2.6
lower lip barbels	—	—	—	—	—	—	—	11.5	10.5	11.6	16.4	—	10.0
lateral scutes	34/34	34-35/34-35	34/34	35/35	35/35	35/35	37/35	35/35	35/34	36/36	36/36	37/37	35/35
coalescing scutes	21/20	20-21/21-22	22/21	20/21	20/19	20/20	21/20	19/19	21/21	22/23	22/22	21/20	21/20
thoracic scutes	9/8	7-9/8-9	8/9	10/10	10/9	10/9	—	7/8	8/9	9/8	9/8	9/10	8/10
teeth upper jaws	3/2	2-4/3-4	3/4	4/3	4/3	4/4	—	4/2	3/4	3/4	3/4	3/3	4/3
teeth lower jaws	5/6	7-9/7	7/2	7/7	7/6	7/7	—	7/5	10/7	5/8	8/8	7/8	8/8

Loricaria filamentosa (non Steindachner, 1878); Boulenger, 1887: 277 (listed; Ecuador, Canelos), — Boulenger, 1898: 425 (listed; Rio Jurua).

Loricaria lata (non Eigenmann & Eigenmann, 1889); Boulenger, 1896: 33 (listed; Paraguay).

Loricaria carinata (non de Castelnau, 1855); Regan, 1904: 292 (in part; description, 8 specimens, including the holotype of *L. carinata* and 1 syntype of *L. lata*, composite; R. Jurua, R. Paraguay, Matto Grosso; in distributional table on p. 196; in key on p. 274; in subgenus *Loricaria*), — Eigenmann, 1910: 425 (listed; in subgenus *Loricaria*; Rio Jurua, Rio Paraguay, Matto Grosso; the Goyaz record concerns *L. lata*), — Regan, 1913: 282 (listed; River Ucayali, Peru), — Gosline, 1945: 106 (listed; in subgenus *Loricaria*; rio Juruá, rio Paraguay, Mato Grosso; his Goiaz record concerns *L. lata*; Amazonas).

Loricaria simillima Regan, 1904: 292, pl. 17 figs. 2, 2a-b (original description; 3 syntypes; type-locality: Canelos, E. Ecuador; in distributional table on p. 196; in key on p. 274; in subgenus *Loricaria*), — Eigenmann & Allen, 1942: 207-208 (listed; Canelos), — Gosline, 1945: 106 (listed; in subgenus *Loricaria*; Canelos, Ecuador), — Fowler, 1954: 99-100, fig. 702 (references; figures after Green, in Regan, 1904; Alto Amazonas, Ecuador), — Ovchynyk, 1968: 258 (listed; Canelos on Rio Bobonaza, tributary of Rio Pastaza, Prov. Napo-Pastaza, Ecuador), — Isbrücker, 1979a: 87, 98, 102, 110 (listed; comparison; designation of the lectotype), — Isbrücker, 1980: 119 (listed).

Loricaria similima; Eigenmann, 1910: 415 (listed; in subgenus *Loricaria*; Canelos, East Ecuador; spelling).

The following records need verification:

Loricaria cataphracta (non Linnaeus, 1758?); Cope, 1874: 135 (listed; Marañon), — Cope, 1878: 681 (listed; Peru, Marañon), — Steindachner, 1882: 80 (listed; leste do Ecuador, Canelos), — Ovchynnyk, 1968: 248 (in part?; Canelos on Rio Bobonaza, after Steindachner, 1882).

Loricaria carinata (non *L. cataphracta* Linnaeus, 1758?); Eigenmann, McAtee & Ward, 1907: 120, pl. 37 figs. 1-2 (listed; 6 specimens; Puerto Max, Corumba, brook at Villa Rica; listed on p. 150), — Bertoni, 1914: 8 (not seen; Paraguay), — Fowler, 1915: 241 (discussion; 1 specimen; Rio Maranon; brief description), — Pearson, 1924: 24 (listed; 16 specimens; Lake Rogoagua, Rio Beni Basin, Bolivia; on : 55, vertical distribution in Rio Beni Basin, between 500 and 1500 ft.), — La Monte, 1935: 7 (listed; Rio Purus), — Pearson, 1937b: 112 (in distributional table), — Bertoni, 1939: 53 (listed; Paraguay), — Fowler, 1940a: 246-247, figs. 42-43 (description; Ucayali River Basin, Contamana, Peru; *L. cataphracta* of Cope, 1879 — same as 1874? — in synonymy; discussion; in subgenus *Loricaria*), — Fowler, 1940b: 58 (listed; 2 specimens, Bolivia, Rio Pilcomayo, tributary of the Paraguay, at Villa Montes, Dept. of Tarija; also listed on p. 67, notes; Todos Santos, Rio Chapare, Bolivia, Dept. of Cochabamba, alt. 1000 ft., 5 specimens), — Eigenmann & Allen, 1942: 208 (listed; reference to Fowler's 1940a record; Contamana, Peru, on the Ucayali), — Fowler, 1942: 86 (listed; Perú, Río Marañon, Contamaná), — Fowler, 1945: 105 (same as Fowler, 1942), — Pozzi, 1945: 263 (not seen), — Fowler, 1954: 91-92, fig. 692 (references; figd. specimen from Contamana; Amazônia, Peru, Paraguai), — Ringuelet & Arámburu, 1962: 53 (not seen), — Alonso de Arámburu, Arámburu & Ringuelet, 1962: 234 (not seen), — Tovar Serpa, 1967: 210 (listed; 22 specimens; Uchpa-Caño "caño", Acuario "Peces Amazónicos", Iquitos; listed after Fowler, 1945 on p. 221, also listed on pp. 222, 223, and 252, pl. 8; description; vernacular names: shitari, vieja de cola; biology, commercial value), — Ringuelet, Arámburu & Alonso de Arámburu, 1967: 400-401 (in subgenus *Loricaria*; description; in key on p. 399; Río Paraguay, Pilcomayo, Bermejo; cuenca del Salí y río Paraná medio; además: Amazonia, Perú y Paraguay; vernacular names: vieja, vieja de agua; 148 specimens from various localities listed).

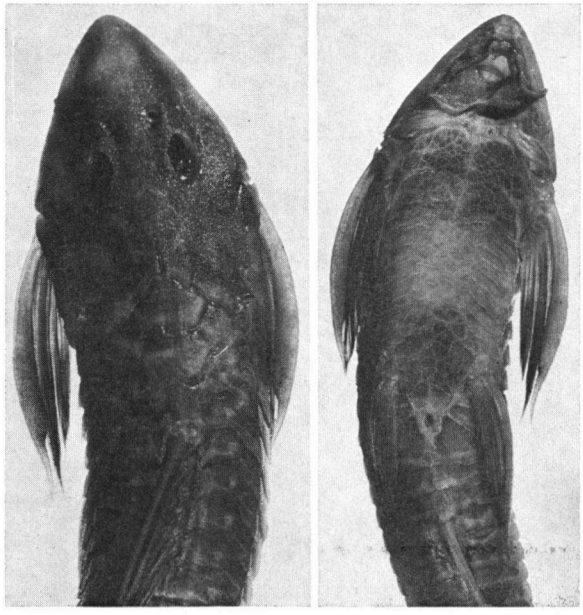

Fig. 4. *Loricaria simillima* Regan, 1904. Dorsal and ventral view of anterior part of lectotype.

Specimens examined:

Ecuador

BMNH 1880.12.8:77 (lectotype), Prov. Pastaza, Río Amazonas system, upper Río Pastaza drainage, Río Bobonaza at Canelos, 01°39'S, 77°46'W, coll. C. Buckley, — BMNH 1880.12.8:78-79 (2 paralectotypes), same data as lectotype, — BMNH 1880.12.8: 80 (1), in same jar as and same data as lectotype.

Peru

BMNH 1913.7.30:35 (1), Río Ucayali, purch. Rosenberg, — BMNH 1969.7.15:22-23 (3), Prov. Huanuco, larger specimen from Aquas Amarillas, a tributary of Río Pachitea, Río Ucayali system, Rio Amazonas drainage, middle specimen from Quebrada Ayamiria, smaller specimen without locality data, coll. Cambridge Veterinary Peru Expedition 1968.

Venezuela

USNM 163176 (1), Prov. Monagas, Caicara, 09°52'N, 63°38'W, Río Guarapiche, coll. F. D. Smith, V-1952.

Brazil

NMW 46167 (1), Est. Roraíma, Rio Branco near Bôa Vista, 02°51'N, 60°43'W, coll. J. D. Haseman, 1912/1913, — MZUSP 14101/14103 (3), Est. Amazonas, localities in Rio Solimões, near Manaus, 03°06'S, 60°00'W, — USNM 217424 (1, ex USNM 52574, in part), Est. Pará/Amazonas, Rio Amazonas, Pará (now Belém) to Manaus, coll. J. B. Steere, 1901, — BMNH 1897.12.1:73-74 (2), Est. Amazonas (or Est. Acre?), Rio Juruá, coll. J. Bach, — USNM 94631 (1), Est. Amazonas, vicinity of mouth of Rio Embira (also spelled Envira on maps), 07°30'S, 70°15'W,

Foz do Embira, or Envira, 07°29'S, 70°14'W, a tributary of the Rio Tarauacá, which in turn is a tributary of the Rio Juruá, Rio Amazonas drainage, coll. B. A. Krukoff, 1934, — BMNH 1902.2.10:24-25 (2), sl 87-156.5 mm, Est. Mato Grosso, Rio Coxipo, either Coxipó da Ponto, 15°35'S, 56°01'W or Coxipó do Ouro, 15°25'S, 56°00'W, Rio Cuiabá system, coll. F. Silvestri, Genova Museum.

Paraguay

BMNH 1934.8.20:326-346 (53), ZMA 115.519 (2), sl 136.8-250 mm, Río Paraguay near Asuncion, 25°15'S, 57°40'W, coll. Schouten, — USNM 1648 (4), sl 145-279 mm, Paraguay, coll. J. J. Page, — BMNH 1895.5.17:109-112 (4), sl 139-243 mm, Río Paraguay, coll. C. Ternetz, — USNM 181438 (1), Río Tebicuary near Asuncion Bay, coll. C. J. D. Brown, 20-XII-1956.

Argentina

BMNH 1902.7.29:84-85 (2), sl 69.3-111.9 mm, Prov. Tucumán, Río Sali near [San Miguel de —] Tucumán, 26°47'S, 65°15'W, purch. of Rosenberg, — ZMA 115.068 (2), aquarium specimens, gift from BMNH, 1976.

South America

ZMB 22223 (1), coll. M. E. Bloch, end of 18th century (= *L. cataphracta*; Bloch, 1794, in part; erroneously designated as a paralectotype of *L. cirrhosa* Bloch & Schneider, 1801, by Isbrücker, 1972).

Description:

Loricaria simillima is in many respects similar to *L. cataphracta* and *L. lata*. Morphometric and meristic data are presented in tables IVd-m and V.

The lectotype and paralectotypes (table IVd-e) have a small series of minute scutelets anterior to branchiostegal membrane, reaching ventrolateral margin of head. In the lectotype these scutelets form a triangle.

The abdomen is completely covered with relatively small scutelets, with a V-shaped median notch anteriorly. A small posterior orbital notch is present.

The colour pattern was described by Regan (1904: 292) as: "Olivaceous; fins, except the anal, with dark spots or blotches or uniform blackish." The colour pattern is now faded. The dorsal fin spine may have up to eight brown spots. On the pectoral fin spine there are five to eight transverse brown spots.

The odontodes on especially dorsum of head (dorsal margin of orbital) and in the predorsal region are weaker than in *L. cataphracta*; in this character *L. simillima* reminds of *L. lata*.

In most morphometric and meristic characters the lectotype and paralectotypes of *L. simillima* agree with *L. lata*: compare table IVd-e with IVa-c. The standard length, abdominal length, cleithral width, body width at dorsal, and width of caudal peduncle are different in both species.

Comparative notes:

Peru, Río Ucayali. — The specimen in BMNH 1913.7.30:35 (table IVg) has larger abdominal scutelets; it lacks the patch of scutelets anterior to the branchiostegal membrane. Its colour pattern is well-preserved: ground colour light tan. Dorsum of head heavily pigmented with even dark brown, lighter in and beyond interorbital area. Along base of dorsal fin and four subsequent dorsal scutes and a half is a dark brown area extending posteriorly as a transverse line, anteriorly from base of dorsal fin spine as an oblique line forward, reaching to ventral row of odontodes along coalescing body scutes. Indefinite concentrations of dark brown pigment continues on the ventrolateral coalescing body scutes, reaching base of pectoral fin spine anteriorly. Dorsum of caudal peduncle with three dark brown transverse stripes. Dorsal fin, and dorsum of pectoral and pelvic fins with dark, solid brown. Anal fin spine and first ray with irregular dark brown pigment. Caudal fin including basal triangular scutes, excluding upper spine and distal ends of upper two rays, pigmented with dark brown. There are small unpigmented spots on rays and membrane, which tend to form two vertical lines. Dorsum of upper lip, including barbels and the maxillary barbels, dark brown. Lower lip and unossified parts of ventral side whitish.

Table V. Morphometric and meristic characters of *Loricaria simillima*: (a-c) 3 specimens, Brazil, Rio Solimões, MZUSP 14101/14103, (d) 1 specimen, Brazil, Belém to Manaus, USNM 217424, (e-f) 2 specimens, Brazil, Rio Juruá, BMNH 1897.12.1:73-74, (g) 1 specimen, Brazil, Rio Embira, USNM 94631, (h) 1 specimen, Brazil, Coxipó, BMNH 1902.2.10:24-25; (i) 11 specimens, selected characters, Paraguay, BMNH 1934.8.20:326-346, (j) 8 specimens, Paraguay and Río Paraguay, USNM 1648 and BMNH 1895.5.17:109-112, 4 specimens in each sample, (k) 1 specimen, Paraguay, Río Tebicuary, USNM 181438, (m) 1 specimen, Argentina, Río Sali, BMNH 1902.7.29:84-85, (n-o) 2 specimens, Argentina, aquarium import, ZMA 105.068, (p) 1 specimen, South America, Bloch's collection, ZMB 22223. Measurements expressed as ratios of standard- or head length.

specimen(s)	a	b	c	d	e	f	g	h	i	j	k	m	n	o	p
mature male	+	+	—	—	—	+	+	—	1	—	—	—	+	+	—
standard length	176.0	154.5	145.7	180.5	203.0	199.5	160.0	156.5	145.3-250.0	139.0-279.0	144.5	111.9	267.0	229.0	143.3
axial length	190.3	167.4	158.0	—	220.2	213.8	170.8	168.5	—	—	—	—	—	—	—
total length	—	>187.8	>188.7	—	—	—	—	—	—	up to 305.0	—	—	—	—	—
head length	4.7	4.3	4.7	4.6	4.8	4.6	4.9	5.0	4.7-5.0	4.8-5.0	4.6	4.8	4.5	4.5	4.9
predorsal length	3.4	3.2	3.5	3.2	3.3	3.3	3.4	3.6	3.4-3.6	3.4-3.6	3.3	3.4	3.2	3.2	3.5
postdorsal length	1.6	1.7	1.6	1.7	1.7	1.7	1.7	1.6	—	1.6-1.7	1.7	1.6	1.7	1.7	1.6
postanal length	1.9	2.0	1.9	2.0	1.9	2.0	1.9	1.9	—	1.8-2.1	1.9	1.9	2.0	2.0	1.8
dorsal spine length	4.6	—	4.4	—	—	4.6	—	4.8	3.9-4.3	4.3-5.1	—	5.3	5.4	3.8	—
first dorsal ray	4.8	—	5.0	4.5	5.0	4.7	4.0	5.0	—	4.8-5.1	—	5.5	5.2	—	4.8
anal spine length	5.4	4.6	5.6	5.5	5.5	5.5	5.5	6.0	—	5.5-6.2	5.7	6.4	5.6	—	—
pectoral spine length	5.2	5.0	5.7	5.5	—	4.8	5.1	5.5	—	5.2-5.4	5.5	5.9	5.0	4.9	5.7
pelvic spine length	5.2	4.5	6.0	5.1	5.1	5.0	5.5	6.2	—	5.1-6.0	5.3	6.4	—	4.9	5.7
upper caudal spine	—	4.6	<3.4	—	—	—	—	—	—	up to < 3.9	—	—	—	—	—
lower caudal spine	6.8	6.6	6.9	—	6.0	6.8	—	—	—	—	—	7.8	—	—	—
snout length	1.8	1.9	1.9	1.8	1.9	1.9	1.9	1.9	—	1.9	2.0	1.9	1.8	1.9	2.0
lower lip	5.5	6.2	6.8	5.0	6.1	5.6	5.8	5.4	—	6.2-6.6	6.2	4.5	5.3	4.7	—
thoracic length	1.4	1.4	1.4	1.4	1.3	1.3	1.2	1.2	—	1.1-1.3	1.3	1.4	1.4	1.4	1.3
abdominal length	1.5	1.7	1.6	1.7	1.5	1.6	1.6	1.5	1.5-1.7	1.4-1.7	1.7	1.5	1.6	1.6	1.7
max. orbital diameter	6.3	5.6	5.0	5.7	5.6	5.4	5.1	5.1	5.3-6.0	4.7-5.7	5.0	4.6	5.8	5.3	4.5
interorbital width	5.3	5.2	5.4	5.3	5.3	5.4	5.0	6.2	4.7-5.4	4.6-5.4	5.8	4.9	4.8	4.9	5.4
cleithral width	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2-1.3	1.2-1.3	1.2	1.2	1.3	1.2	1.4
supra-cleithral width	1.7	1.7	1.8	1.8	1.7	1.7	1.8	1.7	—	1.7-1.8	1.7	1.8	1.8	1.8	1.9
head width	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.2	—	1.2-1.3	1.2	1.2	1.3	1.2	1.5
head depth	2.5	2.7	2.7	2.3	2.3	2.4	2.3	2.6	2.1-2.5	2.3-2.6	2.4	2.3	2.4	2.4	2.7
body depth at dorsal	2.2	2.4	2.3	1.9	1.9	2.0	2.0	2.3	1.9-2.2	2.0-2.5	2.3	2.3	2.2	2.1	2.4
body width at dorsal	1.6	1.7	1.6	1.4	1.3	1.4	1.5	1.5	1.4-1.6	1.3-1.7	1.7	1.6	1.5	1.4	1.8
body width at anal	1.8	2.0	1.9	1.9	1.7	1.7	1.8	1.7	1.6-1.9	1.6-2.0	1.9	1.8	1.8	1.8	2.1
depth caudal peduncle	15.1	17.0	14.7	16.5	16.9	15.5	15.7	17.4	—	15.1-17.3	18.4	19.3	14.6	15.5	17.1
width caudal peduncle	6.5	5.7	6.7	6.1	5.2	6.2	5.9	6.5	—	6.0-6.7	6.6	7.0	5.8	6.1	6.6
rictal barbel	2.4	2.5	2.3	2.4	3.4	3.0	—	2.3	—	3.1	2.9	2.5	3.4	2.8	—
lower lip barbels	10.8	11.9	7.0	11.6	17.3	13.6	10.7	11.2	—	16.6	8.7	8.0	26.0	18.2	—
lateral scutes	35/35	35/35	36/36	35/35	35/35	36/36	35/35	33/33	—	33-35/33-35	35/35	32/32	34/34	35/35	36/35
coalescing scutes	19/19	19/19	21/21	18/18	20/19	19/19	19/19	18/19	19-21/19-20	19-20/18-20	20/20	17/17	18/18	21/21	21/20
thoracic scutes	12/10	8/10	8/9	11/11	10/9	9/9	9/11	6/7	—	6-9/6-10	10/7	6/8	8/7	9/10	8/10
teeth upper jaws	3/3	3/3	4/4	4/3	—	3/3	3/3	2/4	—	2-4/2-3	1/1	4/3	4/3	3/3	2/4
teeth lower jaws	7/9	7/6	9/8	7/7	—	9/8	8/8	9/8	—	6-9/6-8	6/7	7/7	8/6	6/7	6/5

The three specimens in BMNH 1969.7.15:22-23 (table IVh-j) originate also from tributaries of the Río Ucayali. The specimen of 182 mm in sl has a greyish tan ground colour. Dorsum of head, supraoccipital process and post-temporal plate with large, irregular dark brown blotches. From base of first to third dorsal fin ray runs an oblique line forward, being narrower ventrally and reaching ventral row of odontodes along coalescing body scutes. A broad, transverse, irregular brown band on first to fourth dorsal scute posterior to base of last dorsal fin ray, reaching dorsal row of coalescing body scutes. Irregular dark brown blotches between this band and the anterior oblique line. Four transverse stripes on dorsum of caudal peduncle, the second stripe broad, covering almost two dorsal scutes.

Dorsal fin spine with nine dark brown, alternate blotches. Dorsal fin with irregular large, dark brown blotches, forming three longitudinal markings in upper two-thirds of the fin. Base of dorsal fin solid dark brown. Dorsum of pectoral and pelvic fins with numerous dark brown, irregular blotches, like the caudal fin including triangular scutes.

Large abdominal scutelets, especially between

the pectoral fin base. No scutelets anterior to branchiostegal membrane.

The specimen of 166 mm in sl is similar to the one just described, but has less pigment on dorsum of head and body. The oblique line descending from base of first to third dorsal fin ray is narrower, the blotch posterior to dorsal fin less conspicuous. Three to four narrow, vertical, irregular blotches between rows of odontodes along coalescing body scutes ventral to base of dorsal fin. Dorsal fin membrane between spine and third ray with irregular dark brown pigment from base to tip; the remaining membrane and rays with dark brown and small whitish spots.

The abdominal scutelets between pectoral fin base are much smaller than in the preceding specimen.

The juvenile in this sample, 63.7 mm in sl, is almost entirely blackish brown. Only the distal ends of fourth to last dorsal fin ray, most of the ventral side of the body, and tips of pelvic fin rays are whitish. Dorsum of pectoral fins, barbels (including maxillary barbels) of upper lip, and almost the entire caudal fin are blackish brown. Dorsum of pelvic fins with large, anal fin with small blackish brown markings.

Venezuela, Río Guarapiche. One specimen, USNM 163176 (table IVk). It has a colour pattern reminiscent of the Río Ucayali specimen in BMNH 1913.7.30:35, although the pigment is much lighter. There is a large, roundish blotch anterior to eyes, reaching tip of snout, leaving an ill-pigmented, median, almost rectangular area anterior to nostrils. Supra-occipital and predorsal area faintly pigmented.

Odontodes on dorsum of head more prominent than in the other specimens. Minute abdominal scutelets between thoracic scutes through between base of pectoral fins. A small patch of minute scutelets anterior to branchiostegal membrane.

Brazil, Bôa Vista. — One specimen, NMW 46167 (table IVm) has the abdominal scutelets incompletely developed. No scutelets anterior to branchiostegal membrane. Its colour pattern reminds of that in the preceding specimen, except for an ill-pigmented roundish-triangular area on middorsum of snout. Five faint, transverse stripes posterior to fourth dorsal scute beyond base of last dorsal fin ray. Caudal fin largely dark brown, except for upper spine, tip of upper lobe, anterior half of upper ray, and anterior half of lower ray and spine.

Brazil, Rio Solimões. — The three examined specimens also show differences in colour pattern. The specimen in table Va, sl 176 mm (MZUSP 14101) is reminiscent of the larger specimen in BMNH 1969.7.15:22-23 from Río Ucayali. Dorsal fin and dorsum of paired fins, and distal ends of caudal fin rays with several small, irregular dark brown and greyish brown blotches. Base of caudal fin on and around triangular scutes faint greyish brown. Caudal fin otherwise light grey.

The next specimen (table Vb, sl 154.5 mm, MZUSP 14102) is almost plain grey, with a faint grey colour pattern like the preceding specimen.

The smaller specimen in this series (table Vc, sl 145.7 mm, MZUSP 14103) has a light grey ground colour. Faint, small, darker grey blotches on laterodorsal margin of snout. A faint line runs obliquely forward from base of first and second dorsal fin ray. Four quite broad, more conspicuous transverse grey stripes on dorsum of body posterior to dorsal fin. Pigment on fins same as in the other two specimens.

Brazil, Rio Amazonas. — The single specimen in USNM 217424 was found together with 8 specimens of *L. cataphracta*. Although now faded, its colour pattern is the same as that of the Río Ucayali specimen in BMNH 1913.7.30:35. It agrees with the type-specimens, except for the lack of small scutelets anterior to the branchiostegal membrane. There are several differences with the alledgedly sympatric specimens of *L. cataphracta* (compare tables Vd with IIIm), e.g., in snout length, maximum orbital diameter, cleithral width, and body depth and width at dorsal. The odontodes are weak.

Brazil, Rio Juruá. — The two specimens in BMNH 1897.12.1:73-74 (table Ve-f) have no scutelets anterior to branchiostegal membrane. The pigmentation of the body is faded. Especially the dorsal fin and dorsum of pectoral and pelvic fins still show brownish pigment. Caudal fin scarcely pigmented, except for a concentration of pigment in the posterior quarter, forming a vertical stripe

along outer margin, the tip of the upper lobe being unpigmented.

Brazil, Rio Embira. — The specimen in USNM 94631 (table Vg) has no pigment on body and head, and faint brownish pigment on the fins. It is a nuptial male with hypertrophied pectoral fin spine, reminiscent of those in the holotype of *L. clavipinna*. The teeth have short, round, spoon-shaped crowns.

Brazil, Coxipó. — Two specimens, BMNH 1902.2.10:24-25 (table Vh). Ground colour pale tan. Dorsum of body posterior to base of last dorsal fin ray with four to five broad, faint brown transverse stripes. Brownish markings at either side of base of first and second dorsal fin ray, and several spots on dorsum of body and head, especially in the smaller specimen. Dorsal, caudal, and dorsum of pectoral and pelvic fins with small brown spots, which are conspicuous on the pectoral fin spine.

Paraguay. — These specimens (table Vi-j) are similar to each other in colour pattern. The specimens in column i differ from those in column j in the relative length of the dorsal fin spine. Ground colour greyish brown. Caudal fin damaged in most specimens. Dorsal fin and dorsum of paired fins usually with brownish pigment, forming small spots on pectoral fin rays and extending over the fin in most specimens. One out of the 11 specimens in table Vi has several small spots on the pelvic fins. Anal fin hardly spotted.

The specimen from Río Tebicuary (USNM 181438, sl 144.5 mm, table Vk) has more prominent odontodes than usual. Ground colour light brown, with faint concentrations of pigment on dorsum of body posterior to base of dorsal fin spine. Caudal fin largely broken off. Dorsal fin, and dorsum of the pectoral and pelvic fins with ill-defined, faint brown blotches. The identification of this specimen is uncertain.

Argentina. — The specimens from Río Sali in BMNH 1902.7.29:84-85 (table Vm) have a similar colour pattern as the specimens in BMNH 1902.2.10:24-25 (Coxipó).

The two specimens in ZMA 115.068 (table Vn-o) are provisionally identified. Ground colour grey, the fins almost even grey. The larger specimen has strong odontodes. In the interorbital area, posterior to the nostrils, strong odontodes are arranged into a slender, acute oval series, almost reaching to tip of the supraoccipital process. On the supraoccipital process is a single median row of prominent odontodes in a trident-shaped series, extending from the oval series just mentioned.

South America. — The specimen in ZMB 22223 (table Vp) is identified as *L. simillima* on account of its morphometric and meristic characters, and because of its weakly developed odontodes on dorsum of head. Its colour pattern is entirely faded. It appears to be the oldest known preserved specimen of this species, and the lack of locality data is unfortunate.

Loricaria parnahybae Steindachner, 1907
(figs. 5-7, 15; tables If-g, VIa-d)

Loricaria parnahybae Steindachner, 1907b: 153-154 (pp. 2-3 of reprint) (original description; numerous syntypes; type-locality: dem Rio Parnahyba an der Mündung eines Baches bei dem Städtchen Victoria; comparison with *L. cataphracta*), — Eigenmann, 1910: 415 (listed; in subgenus *Loricaria*; Rio Parnahyba), — A. de Miranda Ribeiro, 1911: 140 (translation of Steindachner's description; in key on p. 116a; reference on p. 430), — Gosline, 1945: 106 (listed; in subgenus *Loricaria;* rio Parnaíba), — Fowler, 1954: 98 (references; Rio Parnaíba), — Isbrücker, 1979a: 87, 110 (listed; synonymy; designation of the lectotype), — Isbrücker, 1980: 118 (listed).

Loricaria piauhiae Fowler, 1941: 163-164, figs. 72-74 (original description; holotype; type-locality: Rio Parnahyba, Therezina, Piauhy; comparison), — Gosline, 1945: 107 (listed; in subgenus *Loricaria*; rio Parnaíba, Teresina, Piauí), — Fowler, 1954: 98-99, fig. 700 (references; figures from Fowler, 1941; Rio Parnaíba).

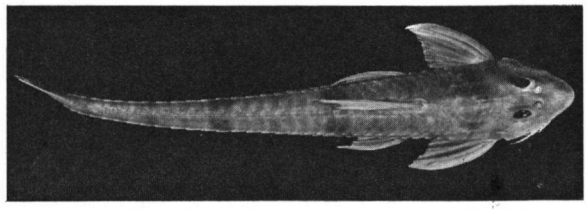

Fig. 5. *Loricaria parnahybae* Steindachner, 1907. Dorsal view of a male from French Guiana, Fleuve Oyapock, sl 159.5 mm, BMNH 1926.3.2.763-764.

Specimens examined:

Brazil

NMW 44854 (lectotype), Est. Maranhão, Alto Parnaíba (formerly Victoria), 09°08'S, 45°56'W,

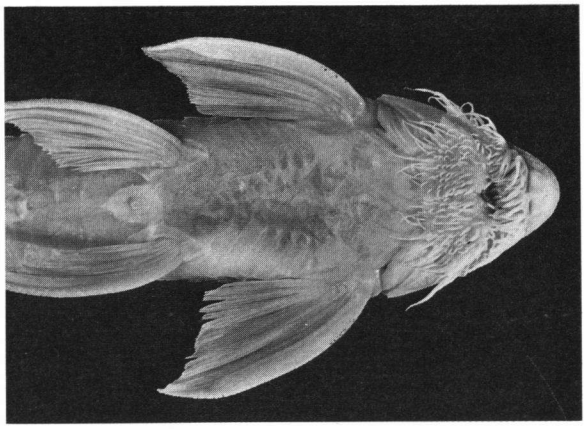

Fig. 6. *Loricaria parnahybae* Steindachner, 1907. Ventral view of anterior part of the same specimen as in fig. 5.

at Rio Parnaíba, coll. F. Steindachner, — NMW 74917 (several paralectotypes, ex NMW 44854), not measured, — NMW 44823 (1 paralectotype), ZMA 115.184 (1 paralectotype, ex NMW 45098), all with same data as lectotype, — ANSP 69452 (holotype of *L. piauhiae*), Est. Piauí/Maranhão, Rio Parnaíba at Teresina, 05°09'S, 42°46'W, coll. R. Von Ihering.

French Guiana

BMNH 1926.3.2.763-764 (2), Prov. Guyane, Fleuve Oyapock at St. Georges, 03°55'N, 51°47'W, coll. C. Ternetz.

Description:

Loricaria parnahybae, like the preceding spp., is similar to *L. cataphracta*. Six specimens were examined: the morphometric and meristic data of these are given in table VIa-d.

The lectotype and two paralectotypes have a weak indication of a posterior orbital notch. Abdominal scutelets poorly developed: a few small, isolated scutelets on the abdomen posteriorly, anterior to the anal opening. Odontodes not conspicuous.

Ground colour yellowish tan. No markings on dorsum of head; the lectotype and two paralectotypes at hand have faint pigment forming narrow, transverse stripes on dorsum of body posterior to dorsal fin. Dorsal, caudal, and pectoral fin rays with a series of minute, dark brown, widespread spots. Naked ventral side whitish; ossified ventral side light yellowish tan. The type-specimens at hand are reminiscent of the small specimens of *L. cataphracta* from the Suriname River system. Steindachner (1907b: 154) described the colour pattern as: "Oberseite des Körpers semmelfarben, verschwommen dunkler gescheckt. Zuweilen Spuren dunkler Querbinden am Rumpfe. Dunkle Fleckchen auf der D., P. und C."

The holotype of *L. piauhiae* (table VIc) is larger than the largest paralectotype of *L. parnahybae* (sl 131 and 109 mm, respectively). This specimen has also hardly a posterior orbital notch. It has some more abdominal scutelets, posteriorly they touch each other. Anteriorly some small, isolated scutelets do not extend beyond halfway the thoracic scutes. The holotype of *L. piauhiae* shows traces of a colour pattern only, which remnants agree with the type-specimens of the species. It has a dark brown ground colour, caused likely by an artificial influence (maybe it was preserved during some time in a jar topped with cork).

One of the males from French Guiana, Fleuve Oyopock at St. Georges (table VId) has thicker pectoral fin spines than the other. These specimens were collected together with the BMNH specimens of *L. cataphracta*. They have a minute posterior orbital notch. Generally, the odontodes are weak, especially on dorsum of head. More numerous

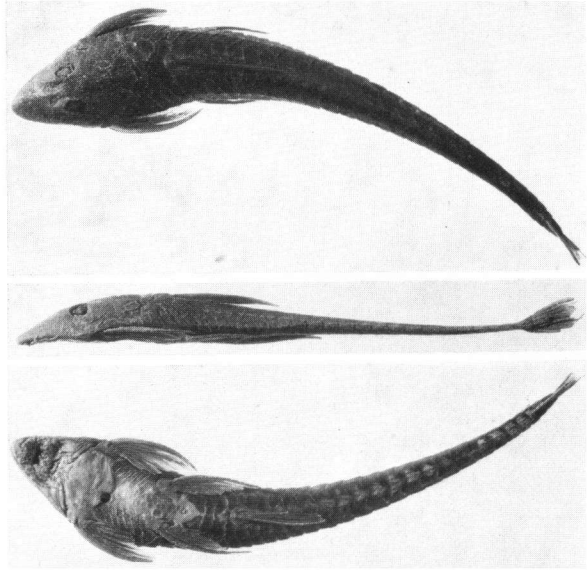

Fig. 7. *Loricaria parnahybae* Steindachner, 1907. Dorsal, lateral, and ventral view of the holotype of *Loricaria piauhiae* Fowler, 1941.

Table VI. Morphometric and meristic characters of *Loricaria parnahybae*: (a) lectotype, Brazil, Alto Parnaíba, (b) 2 paralectotypes, ZMA 115.184, NMW 44823, (c) holotype of *Loricaria piauhiae*, Brazil, Teresina, (d) 2 specimens, French Guiana, Fleuve Oyapock, BMNH 1926.3.2.:763-764; of *Loricaria piracicabae*: (e) holotype, Brazil, Rio Piracicaba, (f-g) 2 specimens, Brazil, Rio Corumbataí, MZUSP 12127 and 12125; of *Loricaria clavipinna*: (h) holotype, Peru, Contamana, (i) 1 specimen, Río Ampiyacu, USNM 124930, (j) 1 specimen, Brazil, Santarém, NMW 46165, (k) 1 specimen, Brazil, Belém, USNM 217425. Measurements expressed as ratios of standard- or head length.

specimen	a	b	b	c	d	d	e	f	g	h	i	j	k
mature male	—	—	—	—	+	+	+?	—	—	+	+	—	—
standard length	103.2	109.0	77.7	131.0	159.5	159.5	168.0	149.0	82.2	142.0	156.5	135.5	180.0
axial length	111.1	116.0	83.7	139.5	170.6	169.9	—	163.5	90.0	153.0	166.2	145.9	194.5
total length	172.0	—	—	—	—	259.0	—	—	167.2	—	—	212.0	238.8
head length	4.8	4.8	4.5	4.9	4.6	4.8	4.3	4.1	4.0	4.5	4.7	4.7	4.8
predorsal length	3.4	3.5	3.3	3.4	3.3	3.3	3.1	3.0	2.9	3.3	3.3	3.2	3.3
postdorsal length	1.7	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.8	1.6	1.7	1.7	1.7
postanal length	1.9	1.8	1.9	1.9	1.9	1.9	2.2	2.2	2.2	1.9	1.9	2.0	2.0
dorsal spine length	4.8	4.8	4.8	5.0	4.7	5.0	—	—	5.4	4.3	4.0	4.2	4.3
first dorsal ray	5.0	5.1	5.1	5.4	4.8	5.2	—	5.8	5.7	4.4	4.3	4.3	4.4
anal spine length	6.1	6.3	6.3	6.4	5.7	6.0	—	7.0	6.6	5.7	5.8	5.5	5.6
pectoral spine length	5.9	6.3	5.8	6.0	5.4	5.8	—	5.9	5.6	5.0	5.1	5.3	5.0
pelvic spine length	6.0	5.9	6.0	6.1	5.6	6.3	6.4	<7.4	6.4	5.5	5.2	4.8	5.5
upper caudal spine	1.5	—	4.5	—	—	1.6	—	—	1.0	—	—	1.7	3.1
lower caudal spine	6.6	6.4	6.4	—	7.5	7.7	—	7.8	7.0	—	6.2	6.6	6.9
snout length	1.9	2.0	2.0	1.8	1.9	1.9	1.8	1.7	1.9	1.8	1.8	2.0	2.0
lower lip	4.9	4.2	4.8	7.2	4.6	5.4	6.4	3.9	4.7	—	4.7	6.4	5.9
thoracic length	1.3	1.4	1.6	1.4	1.4	1.3	1.4	1.4	1.5	1.3	1.3	1.2	1.2
abdominal length	1.7	1.7	1.8	1.5	1.6	1.6	1.5	1.4	1.4	1.7	1.7	1.5	1.5
max. orbital diameter	4.6	4.8	4.4	5.2	5.0	5.3	6.7	6.4	5.5	4.8	5.5	4.8	5.2
interorbital width	6.0	5.6	5.6	5.4	5.6	5.8	6.0	5.9	6.0	5.6	5.5	5.9	5.5
cleithral width	1.4	1.4	1.5	1.3	1.4	1.4	1.2	1.1	1.2	1.2	1.3	1.3	1.3
supra-cleithral width	2.0	1.9	2.1	1.8	1.8	1.8	1.7	1.6	1.8	1.8	1.9	1.7	1.7
head width	1.4	1.4	1.5	1.4	1.4	1.4	1.3	1.2	1.3	1.3	1.4	1.4	1.3
head depth	2.5	2.7	2.6	2.4	2.6	2.4	3.1	2.8	3.0	2.6	2.6	2.4	2.1
body depth at dorsal	2.5	2.7	2.6	2.3	2.3	2.1	3.2	2.6	2.9	2.4	2.4	2.1	1.9
body width at dorsal	1.9	1.8	2.2	1.6	1.8	1.7	1.7	1.6	1.9	1.8	1.8	1.6	1.5
body width at anal	2.1	2.3	2.5	2.0	2.0	2.0	2.1	1.9	2.3	2.1	2.0	1.8	1.9
depth caudal peduncle	16.7	17.6	19.3	17.7	18.1	19.5	17.1	16.5	20.4	17.5	17.5	18.1	16.4
width caudal peduncle	7.5	7.2	8.3	6.3	6.9	6.6	6.4	6.1	6.8	7.0	6.6	4.8	6.3
rictal barbel	2.5	—	2.1	2.7	2.1	2.2	—	7.4	2.8	2.7	2.3	2.3	2.2
lower lip barbels	12.8	10.4	10.2	—	7.3	7.2	—	25.9	—	—	12.3	7.1	9.4
lateral scutes	34/33	34/34	34/34	34/34	35/35	35/35	36/37	37/36	35/35	35/35	36/36	36/35	34/35
coalescing scutes	19/19	19/18	19/18	18/18	21/21	20/20	25/23	26/24	24/24	18/17	20/20	20/19	19/20
thoracic scutes	7/8	7/8	6/5	7/8	6/7	9/9	9/8	8/9	9/9	8/9	11/10	9/10	9/10
teeth upper jaws	3/4	—	2/3	3/3	4/3	4/3	3/4	2/3	3,3	3/4	3/1	3/3	3/1
teeth lower jaws	6/6	8/7	6/6	7/9	8/6	6/6	2/4	5/4	6/7	10/11	7/8	7/8	7/8

abdominal scutelets than in the preceding specimens, although much fewer and smaller than in sympatric specimens of *L. cataphracta* of about the same size. Anteriorly, there are small areas without abdominal scutelets.

Ground colour light yellowish tan. Dorsum of head without markings, dorsum of body posterior to dorsal fin with up to four faint, narrow, transverse brown stripes.

Tips of dorsal and of most caudal (except for the upper) fin rays with faint brown pigment. Pectoral, pelvic and anal fins plain yellowish tan.

These two specimens, compared with sympatric *L. cataphracta* (table IIIg-h) differ in various morphometric characters: head length, predorsal length, postanal length, dorsal spine length, first dorsal ray length, anal spine length, pelvic spine length, lower caudal spine length, maximum orbital diameter, interorbital width, depth caudal peduncle, maxillary barbel and lower lip barbels. Moreover, these specimens of *L. parnahybae* tend to have more numerous coalescing body scutes than sympatric *L. cataphracta*.

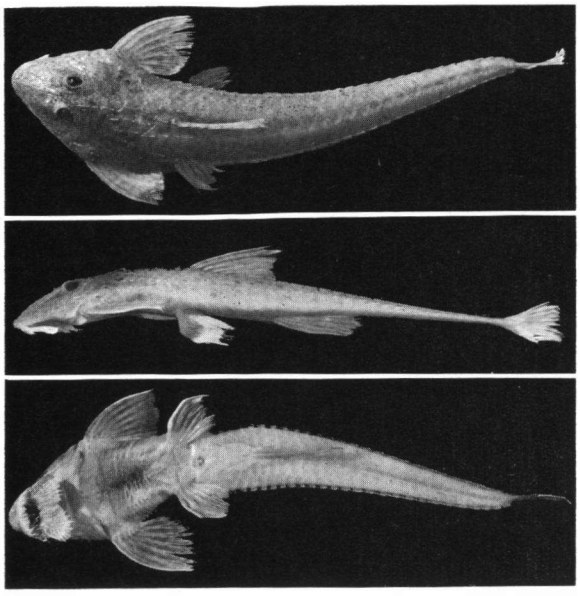

Fig. 8. *Loricaria piracicabae* Von Ihering, 1907. Dorsal, lateral, and ventral view of a specimen from Brazil, Rio Corumbataí, sl 149 mm, MZUSP 12127.

Loricaria piracicabae Von Ihering, 1907
(figs. 8, 14; tables Ih, VIe-g)

Loricaria piracicabae Von Ihering, 1907: 28 & 30, and 29 & 31 (bilingual original description, in English and Portuguese, respectively; apparently the single holotype; type-locality: Piracicaba, Piracicaba-River, State of S. Paulo, and Piracicaba, Rio Piracicaba, Estado de S. Paulo; comparison), — Eigenmann, 1910: 415 (listed; in subgenus *Loricaria*; Piracicaba), — A. de Miranda Ribeiro, 1911: 140-141 (description, translated from "Eigenm[ann] & Rudolph", thus attributed to Eigenmann & Von Ihering; in key on p. 116a; reference on p. 430), — Gosline, 1945: 106 (listed; in subgenus *Loricaria*; Piracicaba), — Fowler, 1954: 99 (references; Rio Piracicaba). — Britski, 1969: 208 (notes on holotype; rio Piracicaba, Piracicaba, Estado de São Paulo), — Isbrücker & Nijssen, 1978: 193 (name only), — Isbrücker, 1979a: 87, 110 (listed; note), — Isbrücker, 1979b: 111, fig. 3 (popular account; 3 specimens; Brésil, Etat de Sâo Paulo, Corumbatai le long du Corumbatai), — Isbrücker, 1980: 118 (listed).

Specimens examined:

Brazil

MZUSP 2182 (holotype), Est. São Paulo, Rio Piracicaba at Piracicaba, 22°45'S, 47°40'W, coll. Von Ihering, — MZUSP 12125 (1), MZUSP 12127 (1), Est. São Paulo, Corumbataí on Rio Corumbataí, an affluent of the right bank of Rio Piracicaba, coll. H. A. Britski, IV-1963.

Description:

Morphometric and meristic data are given in tables, and are not repeated here.

Holotype (table VIe). Anus surrounded by a relatively large, more or less triangular naked area, reaching naked ventral base of pelvic fins by a narrow connection of skin. Anterior to this naked area, the abdomen is covered with small polygonal scutelets, gradually decreasing in size anteriorly, reaching to the gill openings, leaving a shallow, median roundish notch.

Ventral side of head naked, except for a series of narrow, mostly square-like marginal scutes extending from dorsolateral and dorsofrontal sides of head and snout. Last posteroventral scute extends toward axis of head.

Odontodes weak, slightly more prominent in a double ridge on supraoccipital process, along coalescing and parallel lateral body scutes, and on mediodorsal scutes anterior to base of dorsal fin spine. Many of these prominent odontodes are now lost, leaving small, shallow pits.

Orbital rim round, without notch.

Pectoral pore and pores of sensory canal system like those in *L. cataphracta*.

Upper lip narrow, lower lip broad. Lips and other soft structures of mouth are in poor condition.

Base of premaxillary teeth twice as long as mandibular teeth. Teeth in the premaxillae and dentaries simple, with a short, roundish, more or less spoon-shaped crown. This likely indicates the specimen as a male.

Tip of supraoccipital process blunt. Eye with a narrow, pigmented dorsal flap of skin. Iris with a small roundish dorsal flap.

Fin spine (except for those of the pelvic fin) largely broken off. The remains of the pectoral fin spines do not indicate that these are thicker than in a female, as is the case with males of other species.

Pectoral fin posteriorly rounded, not acute like in *L. cataphracta* and most species related to it.

Shape of body and head reminiscent of *Brochiloricaria macrodon*.

Colour in alcohol. — All pigment has disappeared in the holotype. Von Ihering (1907: 30) described it as: "Straw color, the fins faintly spotted."

The holotype is in a poor state of preservation. A ring of lateral scutes is broken around the body beyond the 25th/24th coalescing scute. The specimen has small holes in various parts of the abdominal, ventral, lateral, and dorsal scutes.

The illustrated specimen was freshly preserved (MZUSP 12127, sl 149 mm, table VIf) from Rio Corumbataí, which is near the type-locality. The abdominal scutelets are incompletely developed, with small naked areas adjacent to the thoracic scutes.

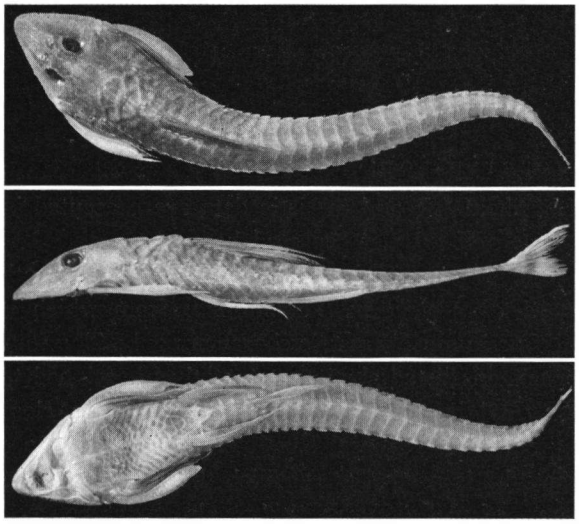

Fig. 9. *Loricaria clavipinna* Fowler, 1940. Dorsal, lateral, and ventral view of holotype.

Odontodes are more conspicuous than in the holotype: there is a single series at the tip of the supraoccipital process, and one on predorsal scute; three paired ridges on scutes between supraoccipital process and predorsal scute. At either side of this last series is a ridge of odontodes running from the post-temporal plate to the third dorsal body scute along dorsal fin base, dorsal to dorsal row of odontodes along the coalescing body scutes. Prominent odontodes are present on dorsoanterior part of the orbital rim.

Upper lip narrow, with numerous short, simple barbels with a broad base, along its edge. Ventral surface of upper lip with relatively few, simple barbels. At either side of the premaxilla are three prominent barbels. In the buccal cavity, posterior to the premaxillae is a long median barbel, and a shorter barbel to the right (the missing left barbel likely is an individual aberration). At the origin of the maxillary barbel is a series of about five barbels, the inner one the longest, gradually decreasing in length. Short, thick papillae, shorter than the premaxillary teeth are present posterior to the origin of the premaxillary teeth.

Lower lip broad, with a shallow median notch. Ventral surface of lower lip with numerous isolated, long acute papillae, the one just beyond the symphysis of the mandibulae about twice as long as the others. Edge of lower lip with a series of short, simple papillae. Maxillary barbels not well-developed.

The relative size of the premaxillary and dentary teeth is similar to that in the holotype. The premaxillary teeth are unusual in shape for a *Loricaria*: the tips are simple, long and acute, resembling an odontode. Likewise, the mandibular teeth are simple, with a short acute, or slightly rounded tip.

Tip of supraoccipital process acute.

Pectoral, pelvic, and anal fins rounded posteriorly.

Colour in alcohol. — Ground colour pale yellowish tan. Minute vague, brownish spots on dorsum of head; larger (and fewer) spots on dorsum of body.

Small, faint brownish spots on dorsum of pectoral fin and on spine and rays of dorsal and caudal fins. Pelvic and anal fins without spots.

The juvenile in MZUSP 12125 (sl 82.2 mm, table VIg) also was freshly preserved from Rio Corumbataí; it has the abdominal scutelets hardly developed. Its odontodes are more prominent (a juvenile character) than in the two preceding specimens. In the buccal cavity, posterior to the premaxillae are three long barbels, the longest one in the middle and one at either side. There is a prominent, long barbel at either side of the outer teeth in the premaxillae. The maxillary barbels are well-developed and bear anteriorly and posteriorly several small subbarbels.

The teeth resemble those of the preceding specimen, although the tips of the mandibular teeth are generally blunter.

A long upper caudal filament is present in this specimen.

Discussion:

Von Ihering (1907: 14 & 15) stated that the species indicated by an asterisk in his descriptions (as is the case with *L. piracicabae*) were examined by Prof. Ch. H. Eigenmann. I gather from the original description that there was only the holotype at hand, which has (now) a total length of 180 mm (not 190 mm, as recorded), and the caudal fin damaged.

A hand-written label sent with the holotype indicates that in 1918 A. de Miranda Ribeiro identified it as *L. macrodon*. *L. piracicabae* is one of the most distinct species of the *L. cataphracta* complex, and only superficially reminiscent of *Brochiloricaria macrodon*.

Loricaria clavipinna Fowler, 1940
(figs. 9-10, 15; tables Ii, VIh-k)

Loricaria clavipinna Fowler, 1940a: 247-249, figs. 44-47 (original description; holotype; type-species of subgenus *Fusiloricaria* Fowler, 1940a; type-locality: Ucayali River basin, Contamana, Peru), — Eigenmann & Allen, 1942: 210 (reference; listed; note, after Fowler; Contamana, Peru), — Fowler, 1942: 86 (listed; reference; Perú, Contamaná), — Fowler, 1945: 106 (listed; Perú, Contamaná), — Gosline, 1945: 107 (listed; in subgenus *Fusiloricaria*; Contamana, Peru), — Tovar Serpa, 1967: 221 (listed; after Fowler, 1945), — Isbrücker, 1972: 171 (in subgenus *Fusiloricaria*; sexual dimorphism in shape of pectoral fin spine), — Isbrücker, 1979a: 87, 90 (listed; note on holotype), — Isbrücker, 1979b: 111 (record of a male, USNM 124930), — Isbrücker, 1980: 115, 117 (listed).

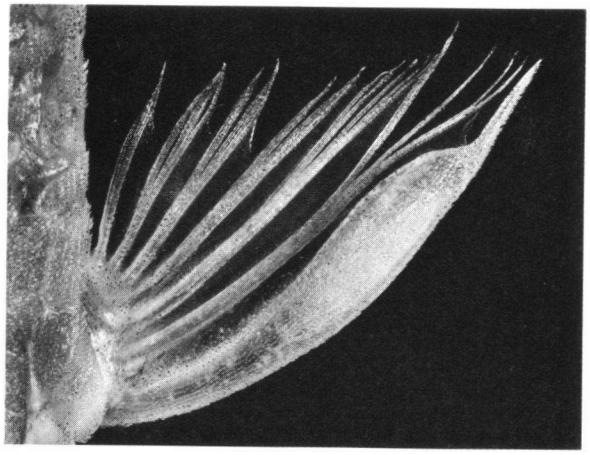

Fig. 10. *Loricaria clavipinna* Fowler, 1940. Detail of left pectoral fin spine of holotype, showing secondary sexually dimorphism of the males.

Specimens examined:

ANSP 68665 (holotype), Peru, Prov. Loreto, Río Amazonas system, Río Ucayali at Contamaná, 07°19'S, 75°04'W, coll. W. C. Morrow and party, VII/VIII-1937, — USNM 124930 (1), Río Ampiyacu, coll. W. G. Scherer, 7-IX-1936.

Brazil

NMW 46165 (1), Est. Pará, mouth of Rio Tapajós into Rio Amazonas at Santarém, 02°26'S, 54°41'W, — USNM 217425 (1), Est. Pará, Rio Amazonas, mud bank north of quay in Belém on shore of Canal do Meio of Rio Pará, 01°26'1"S, 48°29'9"W, 24-I-1969, received from B. J. Zahuranec.

Description:

Morphometric and meristic data are presented in tables and are not repeated here.

Loricaria clavipinna is closely related to both *L. cataphracta* and *L. simillima*, from which it differs in morphometric characters only. The four specimens listed above are tentatively assigned to *L. clavipinna* on account of their fairly close agreement in these characters, although more material is needed to establish the significance of some of the differences that also exist between them.

The holotype (table VIh) is a nuptial male with very thick pectoral fin spines. The teeth are typically of a male: bilobate, with a small acute outer lobe and an oblong rounded inner lobe.

The odontodes are in size intermediate between those of *L. cataphracta* and *L. simillima*. There is a small and shallow posterior orbital notch. The abdomen is completely covered with small scutelets, anteriorly with a rather deep, acute V-shaped median notch.

The holotype possesses the highest number of mandibular teeth found in a *Loricaria*. Its lips and soft structures of the mouth are in poor state of preservation.

The colour pattern was described by Fowler (1940a: 247 and p. 249) as: "Color in alcohol brown above, little darker on top of head medially and 4 dark brown transverse bands on body above, first at last half of dorsal and other 3 behind

dorsal; first and second of dark bands broadest and last narrowest. Under surface of body uniformly whitish. Eye dark gray brown. Dorsal brown, little paler basally. Caudal with long filament dotted irregularly with black, fin pale to whitish or buff, with broad basal and broad marginal blackish transverse band. Anal white. Broad pectoral spine brown, fin dark brown, with broad pale terminal border. Ventral whitish, medially dotted with blackish brown." At present, the holotype is faded, without traces of transverse bands.

The specimen from Río Ampiyacu (USNM 124930, sl 156.5 mm, table VIi) is also a nuptial male with thick pectoral fin spines. The tips of its teeth are shorter and rounder than in the holotype. It has a small, shallow median notch in the anterior abdominal scutelets. Like the type-specimens of *L. simillima*, this specimen has a patch of granular scutelets anterior to branchiostegal membrane. Its lower lip is broader and longer than usual for *Loricaria* spp.: the ventral surface is provided with numerous low papillae between the filaments (a breeding condition?).

Ground colour pale yellowish tan, without pigment on dorsum of head and body. Dorsal, and dorsum of pectoral and pelvic fins faintly pigmented with even brown, tending to form minute faint spots in dorsal fin, especially in the spine. Caudal fin with a colour pattern as described for the holotype by Fowler, with a vertical, poorly pigmented bar posterior to distal ends of triangular caudal scutes. Tip of upper caudal fin lobe without pigment.

The specimen from Santarém (NMW 46165, sl 135.5 mm, table VIj) is likely a female. The teeth have a relatively large, acute outer lobe, and a still larger oblong inner lobe. The anterior median notch in the abdominal scutelets is reminiscent of the holotype. No scutelets anterior to branchiostegal membrane.

This specimen has a rather dark, greyish tan ground colour. Two faint, transverse bands on dorsum of caudal peduncle.

Distal ends of dorsal fin rays dark brown, this fin otherwise with greyish brown pigment, its spine with faint dark brown spots. Dorsum of pectoral and pelvic fins with even greyish brown pigment. Blackish brown pigment forms a conspicuous, broad vertical band along outer caudal fin margin, ventral to the upper ray in upper lobe.

The specimen from Belém (USNM 217425, sl 180 mm, table VIk) is probably also a female, with long, oblong inner tips of teeth. A shallow, rounded median notch in the anterior abdominal scutelets. A light brown ground colour, including dorsal fin and dorsum of paired fins. The caudal fin has brown pigment, gradually becoming darker towards the distal ends of the rays.

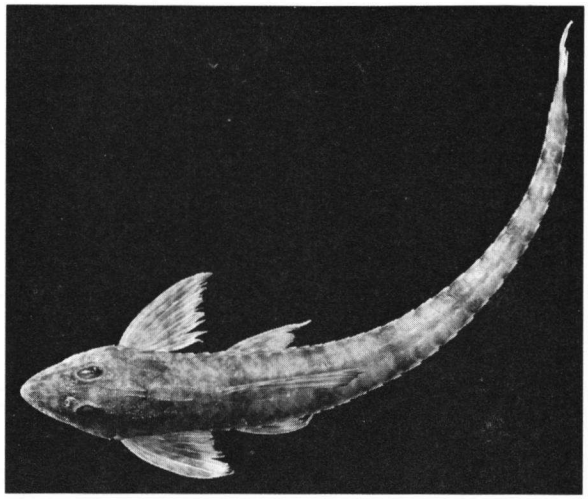

Fig. 11. *Loricaria nickeriensis* Isbrücker, 1979. Dorsal view of holotype.

Loricaria nickeriensis Isbrücker, 1979
(figs. 11, 15; tables Ij, VIIa-c)

? *Loricaria* (*Loricaria*) *cataphracta* (non Linnaeus, 1758); Boeseman, 1976: 156-158, fig. 2 (in part?; Tjawassi Creek, right tributary of Nickerie River below Lombok Falls, Surinam).

Loricaria nickeriensis Isbrücker, 1979a: 86-87 (listed), pp. 97-98, figs. 11-13, 23, tables Ib & IIb (original description; holotype, 19 paratypes; type-locality: Surinam, district Nickerie, rapide dans la rivière Fallawatra, 5 km SSW des chutes Stondansie, largeur 60 cm, fond de sable, pierres), — Isbrücker, 1980: 118 (listed).

Specimens examined:

Surinam

ZMA 106.212 (holotype), District Nickerie, rapid in Fallawatra River, 5 km SSW of Stondansie Falls, width 60 cm, sand bottom, stones, coll. H. Nijssen, 6-IV-1967, — ZMA 106.237 (8 paratypes), same data as holotype, — ZMA 106.235

Table VII. Morphometric and meristic characters of *Loricaria nickeriensis*: (a) holotype, Surinam, Fallawatra River, (b) 1 paratype, ZMA 106.237, (c) 7 paratypes, ZMA 106.237, selected characters; of *Loricaria tucumanensis*: (d) holotype, Argentina, Tucumán, (e) 1 paratype; of *Loricaria* sp. *α*: (f) 3 specimens, Brazil, Suyazinha, at BMNH. Measurements expressed as ratios of standard- or head length.

specimen	a	b	c	c	c	c	c	c	c	d	e	f	f	f
mature male	+	—	+	+	+	+	—	—	+	+	—	—	—	—
standard length	118.6	112.7	119.5	112.5	112.1	108.0	105.7	105.1	103.8	122.3	113.2	47.8	47.0	29.1
axial length	—	120.6	—	—	—	116.0	—	112.9	111.4	132.6	121.9	51.5	51.2	31.7
total length	—	—	—	—	—	143.2	—	132.1	147.8	—	—	65.2	55.4	35.1
head length	4.9	5.1	4.8	5.0	5.0	5.0	5.1	5.1	4.9	4.2	4.4	4.2	4.1	3.7
predorsal length	3.4	3.5	—	—	—	—	—	—	—	3.0	3.1	3.2	3.1	2.9
postdorsal length	1.6	1.6	—	—	—	—	—	—	—	1.8	1.7	1.7	1.7	1.8
postanal length	1.8	1.8	—	—	—	—	—	—	—	2.1	2.1	1.9	2.0	2.0
dorsal spine length	4.7	4.8	4.7	4.8	5.0	4.8	4.7	5.0	4.9	4.5	—	5.4	—	4.9
first dorsal ray	4.8	5.0	4.9	4.8	5.1	4.9	4.9	5.0	5.1	4.7	5.2	5.5	5.7	5.3
anal spine length	5.3	6.0	—	—	—	—	—	—	—	5.2	5.8	7.2	7.0	6.9
pectoral spine length	5.6	6.0	5.4	5.5	6.0	5.6	5.8	6.1	5.7	5.0	5.4	6.1	5.9	5.7
pelvic spine length	6.1	6.4	5.9	6.3	6.1	6.3	5.7	6.5	6.2	5.9	6.1	7.1	6.5	6.3
upper caudal spine	—	—	—	—	—	3.1	—	3.9	2.4	—	—	2.7	5.6	4.9
lower caudal spine	—	7.7	—	7.3	—	7.4	—	7.3	—	—	—	8.7	8.1	8.1
snout length	2.0	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.1	1.8	1.9	2.1	2.1	2.1
lower lip	3.7	4.7	—	—	—	—	—	—	—	5.2	4.6	4.3	4.5	4.9
thoracic length	1.3	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.5	1.7	1.8
abdominal length	1.6	1.4	1.7	1.5	1.5	1.6	1.5	1.5	1.5	1.7	1.6	2.0	1.8	2.0
max. orbital diameter	4.5	4.5	4.6	4.7	4.4	4.4	4.3	4.4	4.3	6.7	5.9	4.6	4.6	4.6
interorbital width	5.9	5.8	6.0	6.1	5.8	5.9	5.8	5.9	6.1	4.6	4.7	5.2	5.3	4.9
cleithral width	1.5	1.5	1.5	1.5	1.4	1.5	1.4	1.5	1.5	1.3	1.3	1.3	1.4	1.5
supra-cleithral width	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0	1.8	1.7	2.1	2.0	1.9
head width	1.5	1.5	—	—	—	—	—	—	—	1.3	1.4	1.3	1.4	1.5
head depth	2.8	2.9	2.8	2.6	2.6	2.6	2.6	2.8	2.8	2.6	2.7	2.3	2.5	2.6
body depth at dorsal	2.8	2.6	2.6	2.4	2.4	2.5	2.6	2.5	2.6	2.6	2.7	2.8	2.8	2.9
body width at dorsal	1.9	1.7	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.7	1.7	2.3	2.3	3.2
body width at anal	2.1	2.0	—	—	—	—	—	—	—	2.1	2.0	2.7	2.8	3.3
depth caudal peduncle	18.5	18.7	—	—	—	—	—	—	—	21.1	18.6	16.4	19.3	19.8
width caudal peduncle	7.1	6.9	—	—	—	—	—	—	—	7.4	7.7	8.8	8.9	9.9
rictal barbel	2.1	2.6	—	—	—	—	—	—	—	3.3	—	—	—	—
lower lip barbels	7.3	11.7	—	—	—	—	—	—	—	—	—	—	—	—
lateral scutes	34/34	33/33	34/35	34/34	34/34	34/34	34/34	34/34	33/33	32/32	32/32	33/33	33/33	33/33
coalescing scutes	17/19	18/18	18/19	19/18	18/19	19/19	18/19	18/19	19/18	19/19	19/19	20/19	19/20	19/19
thoracic scutes	10/7	8/8	—	—	—	—	—	—	—	8/8	7/7	7/7	6/8	4/5
teeth upper jaws	2/4	2/3	—	—	—	—	—	—	—	4/3	4/3	3/3	3/3	†
teeth lower jaws	6/7	6/8	—	—	—	—	—	—	—	6/7	7/7	6/6	6?/6?	†

†) dentition seems complete

(3 paratypes), sl 48.8-111.1 mm, District Nickerie, creek at right bank of Nickerie River, 12 km WSW of Stondansie Falls, width 5 m, depth 50-100 cm, running water, sandbottom, coll. H. Nijssen, 5-IV-1967, — ZMA 106.236 (8 paratypes), sl 97.1-116.8 mm, District Nickerie, Stondansie Falls in Nickerie River, width 80 cm, sandbottom, stones, coll. H. Nijssen, 5-IV-1967.

Description:

Morphometric and meristic data are given in tables and are not repeated here.

Loricaria nickeriensis belongs to the *L. cataphracta* complex and is characterized, among others, by its small adult size. The smallest nuptial ♂ is in ZMA 106.236: sl 97.1 mm. Three other mature ♂♂ in this series have a sl between 106.9 and 115.7 mm; the 4 remaining specimens are probably ♀♀, with a sl between 102.7 and 116.8 mm. The 3 specimens in ZMA 106.235 consist of a ♀, 111.1 mm in sl, and two juveniles, the smallest being 48.8 mm in sl. The holotype and 8 paratypes from the type-locality are listed in table VIIa-c; the smallest mature ♂ in this series is 103.8 mm in sl.

In most characters, including general shape of body and head, *L. nickeriensis* is reminiscent of the *L. cataphracta* population from the Suriname River system, and of *L. parnahybae*.

The ♂♂ can be recognized easily by a thickening of the pectoral fin spine, near the distal tip (which is acute), unlike the club-like spine shape in males of most other species described above. Tips of the teeth in premaxilla and dentary are shorter and especially blunter in ♂♂ than in ♀♀.

The thoracic scutes tend to be longer than usual in *Loricaria*, the abdominal area is therefore narrower. Scutelets completely or partly cover the abdomen. Generally, they are poorly developed, although fewer and relatively large scutelets may be present.

Odontodes relatively well-developed, although less prominent than in *L. cataphracta*. A small posterior orbital notch is present, like in *L. cataphracta* of the same size.

Colour in alcohol. — Ground colour pale yellowish tan. The pigmentation is variable and irregular. Dorsum of head and body with many ill-defined, sometimes rather large, dark brown spots and blotches. Dark brown pigment usually forms about five transverse bands posterior to base of dorsal fin, and an additional band runs obliquely forward from base of first and second dorsal fin ray.

Dorsal fin, and dorsum of pectoral and pelvic fins with numerous small, conspicuous dark brown spots, often surrounded by lighter brown pigment. Tips of dorsal fin rays may be darker than the rest of the fin. Distal third of pectoral and pelvic fins poorly pigmented in the holotype.

Caudal fin base usually with dark brown pigment. Lower lobe of caudal fin with irregular dark brown pigment in the larger paratype in ZMA 106.235, with small, isolated dark brown spots in most of the other specimens. Anal fin plain or with faint, widespread brown pigment.

Barbels (including the maxillary barbels) of upper lip with dark brown pigment in most of the specimens.

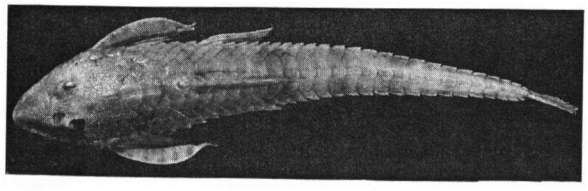

Fig. 12. *Loricaria tucumanensis* Isbrücker, 1979. Dorsal view of holotype.

Loricaria tucumanensis Isbrücker, 1979
(figs. 12, 15; tables Ik, VIId-e)

Loricaria tucumanensis Isbrücker, 1979a: 86, 87 (listed), pp. 98 & 102, figs. 14, 23, tables Ic & IIc (original description; holotype, 1 paratype; type-locality: Argentine, Prov. Tucuman, (San Miguel de —) Tucuman, 26°47'S, 65°15'W), — Isbrücker, 1980: 119 (listed).

Specimens examined:

Argentina

USNM 88669 (holotype), Prov. Tucumán, [San Miguel de —] Tucumán, 26°47'S, 65°15'W [Río Sali?], coll. Mr & Mrs R. C. Shannon, catalogued in USNM on II-1928, — USNM 217426 (1 paratype, ♀?), same data as holotype.

Description:

Morphometric and meristic data are given in tables and are not repeated here.

Loricaria tucumanensis belongs to the *L. cataphracta* complex. It appears to be closely related to *L. simillima* (a widely distributed, though problematical species), of which two specimens from the Río Sali in Argentina were examined. Both species may prove to occur sympatrically in this river.

L. tucumanensis is compared with a specimen of *L. simillima* from the Río Sali (BMNH 1902.7.29:84-85, table Vm), 111.9 mm in sl. They differ in ratios of head length, predorsal —, postdorsal —, and postanal length, dorsal spine length, length first dorsal ray, anal spine length, pectoral spine length, pelvic spine length, thoracic length, abdominal length, maximum orbital diameter, interorbital width, cleithral width, head width, head depth, body depth at dorsal, body width at dorsal and anal, width caudal peduncle, and length of the maxillary barbel (in *L. tucumanensis* measurable in the holotype only), and in number of coalescing body scutes.

The odontodes in the dorsal area anterior to origin of the dorsal fin spine (except for a few larger odontodes along dorsal part of the orbital rim) are hardly more conspicuous than the odontodes posterior to the dorsal fin spine; they are more prominent than in *L. simillima*. The snout is more acute in lateral view than in other species of *Loricaria*. A small posterior orbital notch is

present. Small scutelets completely cover the abdomen; they are smaller and more numerous than in *L. simillima* from the Río Sali.

Colour in alcohol. — Ground colour yellowish tan. Up to five faint, transverse brownish stripes on dorsum of body posterior to base of the last dorsal fin ray. Dorsal fin with faint brown spots. Dorsum of the pectoral fin spine with up to six brown blotches, some of which forming a narrow transverse line on the hypertrophied spine in the holotype.

Discussion:

Additional material of *L. tucumanensis* and of *L. simillima* from the Río Sali is needed; this will yield the necessary detail about the ranges of variation of the various characters of both species. Several of the characters now found as distinctions will overlap in more sufficient material. *L. simillima* is considered as a variable species in many respects. The relationship of various samples of *L. simillima* are not always clear, on account of the usually limited number of specimens available from each locality. *L. simillima* is closely related to *L. cataphracta* (with which it was occassionally found to be sympatric) and to *L. lata*. The status of all the samples need further investigation based on more elaborate material. There is no doubt, however, that *L. tucumanensis* is a distinct species.

Loricaria sp. *α*
(figs. 13, 15; table VIIf)

Specimens examined:

Brazil

At BMNH, unregistered (3), Est. Mato Grosso, Suyazinha stream, tributary to the Suya Missu, Rio Xingu drainage, dipnetting, coll. R. H. Lowe (McConnell), 10/11-V-1968, — at BMNH, unregistered (3), sl 37.9-76.6 mm, Est. Mato Grosso, Sangadina stream, Rio Xingu drainage, coll. R. H. Lowe (McConnell), 25-III-1968.

Description:

These 6 juveniles (data of 3 specimens from Suyazinha stream in table VIIf) represent a single

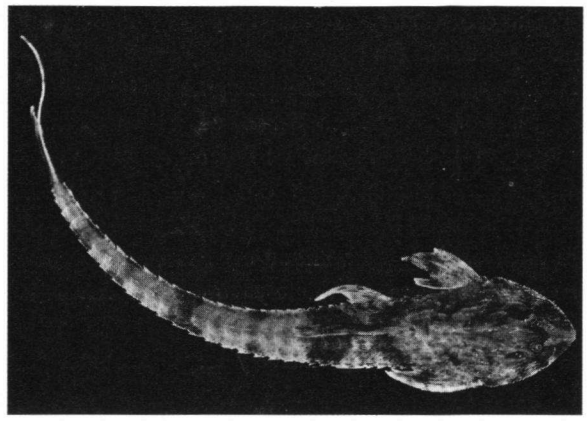

Fig. 13. *Loricaria* sp. *α*. Dorsal view of a juvenile from Brazil, Sangadina Stream, sl 44.8 mm, showing the characteristic colour pattern.

species. The colour pattern is reminiscent of some *L. simillima*: an oblique line runs forward from base of first and second dorsal fin ray; a rather broad, dark brown, transverse stripe posterior to base of dorsal fin; three to four narrower transverse stripes on posterior dorsum of caudal peduncle. Several other species of Loricariinae (e.g., *Rineloricaria* spp., *Sturisoma* spp.) have a similar colour pattern. Dorsum of head usually with small, irregular dots and spots; in one specimen, sl 44.8 mm, the dots are larger and darker; it has a median, V-shaped bright area on dorsum of snout. Dorsal fin with a dark basal blotch reaching the oblique line on body, and with a few small dark spots on the rays. A rather broad vertical band near margin of dorsal fin. Dorsum of pectoral and pelvic fins with small brown spots, which tend to form an oblique line near the distal ends of pectoral fin rays. In the specimens from Suyazinha the caudal fin has a large, dark brown, irregular blotch, reaching base, not reaching most of the margin of the fin, except about halfway the lower caudal spine. In the other specimens the caudal fin has a large, dark brown basal blotch and a large dark brown terminal blotch, with a narrow unpigmented vertical line in the middle; tip of upper caudal lobe unpigmented.

Even the smallest specimen shows all characteristics of *Loricaria* (e.g., it has lips and dentition well-developed), except that the usual small outer lobe of the teeth is relatively large, and that the odontodes are very prominent, compared to

Fig. 14. Distributions of *Loricaria* spp. T indicates the respective type-localities.

larger specimens of *Loricaria*. Only the thoracic scutes and abdominal scutelets are not developed in the smallest specimen.

Loricaria sp. β
(fig. 15; table VIIIa)

Specimens examined:

Ecuador

USNM 163916 (2), Río Pucayacu, Río Bobonaza, 02°03'S, 76°59'W, coll. R. Olalla, VIII-1949.

Description:

This unidentifiable species belongs to the *L. cataphracta* complex. The available specimens (table VIIIa) are juveniles with incompletely developed, numerous rounded abdominal scutelets. Dorsum of head and body anterior to tip of depressed last dorsal fin ray with irregular, dark brown pigment; dorsum of body posterior to depressed last dorsal fin ray with lighter brown pigment. Dorsal fin rays and membrane dark brown, except for tips of third to sixth ray. Dorsum of pectoral and pelvic fins with rather large, dark brown spots which tend to form narrow, oblique lines, margined by faint brown pigment. Caudal fin with dark brown pigment, weak (or absent) on and along upper and lower spine and near the distal ends.

Loricaria apeltogaster Boulenger, 1895
(figs. 14, 16; tables Im, VIIIb-d)

Loricaria apeltogaster Boulenger, 1895: 528 (in part; original description; 4 syntypes; type-locality: Paraguay; comparison), — Boulenger, 1896: 33, pl. 7 figs. 2, 2a-b (in part; description of the syntypes; comparison), — Regan, 1904: 292-293 (in part; description of the syntypes; Paraguay; in distributional table on p. 196; in key on p. 274, in subgenus *Loricaria*), — Eigenmann, McAtee & Ward, 1907: 120 (listed; 1 specimen — not-re-examined —, Corumba; note on lips; listed on p. 150), — Eigenmann, 1910: 415 (listed; in subgenus *Loricaria*; Paraguay), — A. de Miranda Ribeiro,

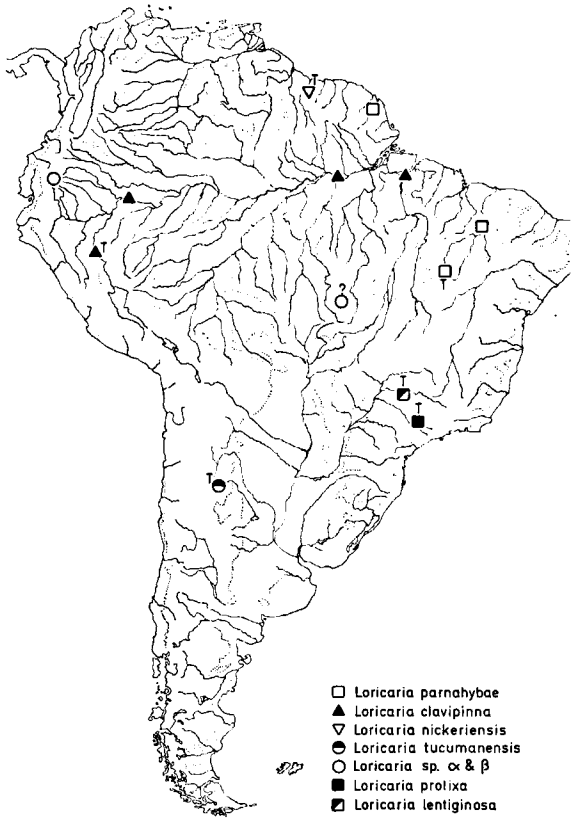

Fig. 15. Distributions of *Loricaria* spp. T indicates the respective type-localities.

1911: 136-137, fig. 72 (description, translated from Boulenger; illustration after Green, in Boulenger, 1896; in key on p. 116a; references on p. 430; specific name spelled as *L. apeltogster*), — Bertoni, 1914: 8 (not seen; Paraguay), — Pearson, 1937b: 112 (in distributional table), — Bertoni, 1939: 53 (listed; Paraguay), — Delsman, 1941: 80 (comparison with *L. apeltogaster* var. *amazonum* n. var. [= *Pseudohemiodon amazonus*]; specific name spelled as *L. peltogaster*), — Gosline, 1945: 106 (listed; in subgenus *Loricaria*; Paraguai), — Van der Stigchel, 1946 & 1947: 175-176 (decription; 1 specimen; Parana River, Rosario de Santa Fé; discussion). — L. Travassos & H. Travassos, in L. Travassos et al., 1957: 17 (listed; Urucum, Mato Grosso — not re-examined), — Isbrücker, 1973: 172 (cited after Tortonese, 1963: 311), — Isbrücker, 1979a: 87, 103, 110, figs. 20-21, 22a (listed; comparison; notes; designation of the lectotype), — Isbrücker, 1980: 115 (listed).

Loricaria apeltogaster apeltogaster; Fowler, 1954: 91, fig. 691 (references; figure from Green, in Boulenger, 1896; Paraguay).

Specimens examined:

Paraguay

BMNH 1895.5.17:105 (lectotype), [Río?] Paraguay, coll. C. Ternetz, — BMNH 1895.5.17:106-107 (2 paralectotypes), same data as lectotype.

Argentina

ZMA 100.064 (1), Prov. Santa Fé, Río Paraná at Rosario, 33°00'S, 60°40'W, coll. Noordraven.

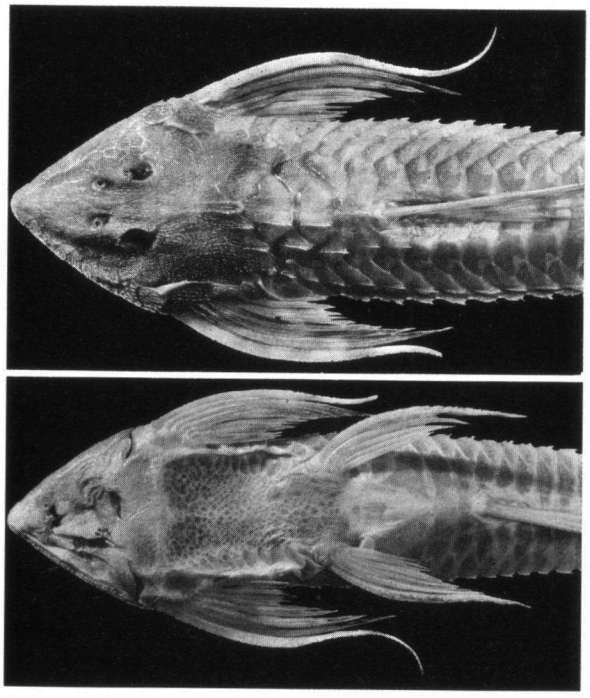

Fig. 16. *Loricaria apeltogaster* Boulenger, 1895. Dorsal and ventral view of anterior part of lectotype.

Description:

Morphometric and meristic data are given in tables and are not repeated here.

The figures by Green (in Boulenger, 1896, pl. 7) are so accurate that it was possible to recognize the illustrated individual; it was designated the lectotype.

In general appearance, *Loricaria apeltogaster* is reminiscent of *Paraloricaria agastor* Isbrücker, 1979 (based upon one of the paralectotypes of *L. apeltogaster*) rather than of the *L. cataphracta* complex. It has a small posterior orbital notch. The odontodes, especially on the head, are more conspicuous than usual for the *L. cataphracta* complex.

Compared to other *Loricaria* spp., the teeth have a relatively shorter inner lobe and a longer outer lobe, reminiscent of the teeth of *Loricaria* sp. *α*.

L. apeltogaster has poorly developed abdominal scutelets. The specimen in ZMA 100.064 has slightly larger abdominal scutelets (reaching each other) than the lectotype (a smaller specimen), in which they are isolated from each other.

Comparison:

Aside from morphometric and meristic differences, *L. apeltogaster* is distinguished from *P. agastor* by the following characters. In *P. agastor* the odontodes on especially dorsum of head and along margin of snout, are more prominent (*L. apeltogaster* has already more prominent odontodes in these areas than the *L. cataphracta* complex). In *P. agastor* the fins are shorter. It has no abdominal scutelets, and more numerous premaxillary teeth, which are as short as the dentary teeth. The teeth have a more prominent, acute outer lobe (reminiscent of the condition in many *Rineloricaria* spp.).

L. apeltogaster has richly spotted dorsal —, caudal —, and pelvic fins (and fewer spots in the anal fin), and a barred pectoral fin. In *P. agastor* the membrane of the dorsal fin and of the greater part of the caudal —, pectoral —, and pelvic fins is dark brown. Pelvic fin spine with four dark brown spots; anal fin with three small, ill-defined spots. Upper caudal fin spine spotted. Anterior

half of upper and lower caudal fin ray poorly pigmented.

A conspicuous brown stripe on dorsum of body anterior to the eyes, also covering anterior half of interorbital area, anteriorly covering the nostrils. This stripe runs obliquely forward laterally, reaching margin of head.

A narrower brown stripe from tip of supra-occipital process runs obliquely forward on operculum and cleithrum.

Two broad, faint brown areas on dorsum of body, the first commencing at base of dorsal fin posteriorly, covering about four middorsal scutes and reaching ventral row of odontodes on coalescing body scutes; the second extends from the first to fourth parallel lateral body scute.

Maxillary barbel dark brown (pale yellowish white in *L. apeltogaster*).

Loricaria prolixa Isbrücker & Nijssen, 1978 (figs. 15, 17; tables In, VIIIe-g)

Loricaria macrodon (non Kner, 1854); A. de Miranda Ribeiro, 1918b: 718-719 (listed; discussion; vernacular name: cascudo-espada; *L. macrochir* "Rud. & Eigenm." listed in synonymy; E. de S. Paulo, Piracicaba, Rio Mogy-Guaçú, de Pirassununga), — A. de Miranda Ribeiro, 1920: 9 (listed; Lagoa de Cáceres, Corumbá, Mato Grosso; doubtful record), — Schubart, 1964: 13 (listed; bacia do Mogi Guaçu; vernacular name: cascudo viola; doubtful record).

Loricaria macrochir Von Ihering, cited as "Rud. & Eigenm." *in* A. de Miranda Ribeiro, 1918b: 718-719 (nomen nudum).

Table VIII. Morphometric and meristic characters of *Loricaria* sp. *β*: 2 specimens, Ecuador, Río Pucayacu, USNM 163916; of *Loricaria apeltogaster*: (b) lectotype, Paraguay, (c) 2 paralectotypes, Paraguay, (d) 1 specimen, Argentina, Río Paraná, ZMA 100.064; of *Loricaria prolixa*: (e) holotype, Brazil, Rio Piracicaba, (f) 6 paratypes, Brazil, Rio Piracicaba and Rio Corumbataí, (g) 1 paratype, Brazil, Rio Paraná at Guaíra, MZUSP 13394. Measurements expressed as ratios of standard- or head length.

specimen(s)	a	a	b	c	c	d	e	f	g
mature male	—	—	—	—	—	—	—	—	—
standard length	87.5	86.1	177.0	191.5	186.0	258.0	295.0	230.5-346.0	344.0
axial length	—	—	191.0	207.8	201.6	—	322.0	252.6-377.0	373.4
total length	—	—	>236.0	329.1	—	—	495.0	270.1->403.0	453.0
head length	4.9	4.8	5.0	4.9	4.9	4.7	4.7	4.3-4.8	4.4
predorsal length	3.4	3.5	3.4	3.4	3.5	3.2	3.3	3.1-3.3	3.1
postdorsal length	1.7	1.6	1.6	1.7	1.6	1.7	1.7	1.7	1.7
postanal length	1.9	1.8	2.0	1.9	1.9	2.0	2.1	2.0-2.1	2.1
dorsal spine length	4.2	—	3.9	—	4.0	—	5.9	5.9-6.0	6.5
first dorsal ray	4.6	4.6	4.5	4.7	4.4	4.1	6.1	6.1-6.6	5.9
anal spine length	5.9	6.1	5.4	5.5	5.6	5.5	5.7	5.5-6.1	6.2
pectoral spine length	5.3	5.4	3.4	3.5	3.2	<2.2	3.6	3.5-4.1	4.0
pelvic spine length	6.1	5.9	5.0	5.3	5.0	4.2	4.2	3.9-4.6	5.6
upper caudal spine	—	—	<3.0	1.4	<7.4	—	1.4	up to<2.9	3.0
lower caudal spine	—	—	4.9	5.3	4.9	—	5.5	5.3-8.4	—
snout length	2.0	2.1	1.9	1.9	1.9	1.9	1.7	1.7-1.8	1.7
lower lip	4.1	4.3	9.2	4.8	5.7	6.3	4.8	3.9-5.1	4.9
thoracic length	1.2	1.3	1.1	1.3	1.3	1.2	1.2	1.2-1.4	1.3
abdominal length	1.6	1.6	1.3	1.4	1.4	1.3	1.2	1.2-1.4	1.3
max. orbital diameter	4.2	4.5	6.2	6.9	6.4	8.6	8.3	6.9-9.2	7.9
interorbital width	5.5	5.4	5.4	5.5	5.5	4.8	5.6	5.1-5.8	5.3
cleithral width	1.3	1.3	1.1	1.2	1.1	1.1	1.0	1.0-1.1	1.0
supra-cleithral width	1.8	1.9	1.7	1.7	1.7	1.6	1.5	1.5-1.6	1.5
head width	1.3	1.3	1.2	1.2	1.2	1.2	1.1	1.0-1.1	1.0
head depth	2.6	2.7	2.6	2.6	2.4	2.2	2.8	2.4-2.9	2.7
body depth at dorsal	2.5	2.5	2.1	2.2	2.2	1.6	2.6	2.3-2.7	2.8
body width at dorsal	1.8	1.9	1.4	1.4	1.5	1.2	1.2	1.1-1.3	1.2
body width at anal	2.0	2.2	1.5	1.5	1.6	1.4	1.2	1.1-1.4	1.4
depth caudal peduncle	15.0	16.2	13.2	14.6	14.5	12.7	13.4	13.1-15.8	14.2
width caudal peduncle	6.4	7.4	4.6	5.6	5.8	4.6	4.5	3.6-5.9	5.9
rictal barbel	—	—	2.8	2.6	—	2.8	2.2	2.3-2.8	2.1
lower lip barbels	—	—	17.9	6.7	—	—	12.8	8.3-11.7	6.1
lateral scutes	35/35	35/35	35/35	35/34	35/35	35/35	36/35	35-37/35-36	34/36
coalescing scutes	19/19	19/19	18/19	19/18	19/19	19/18	22/21	21-23/20-23	19/20
thoracic scutes	9/9	10/10	11/10	8/6	7/9	9/11	9/9	7-9/6-9	10/9
teeth upper jaws	3/3	3/3	2/2	2/2	3/2	2/3	2/3	2-4/2-3	3/3
teeth lower jaws	8/8	7/8	7/7	6/4	5/6	7/5	8/5	3-9/5-7	6/7

Loricaria prolixa Isbrücker & Nijssen, 1978a: 188-195, figs. 4a, 5, tables I & III (original description; holotype, 7 paratypes; type-locality: Brazil, Est. São Paulo, Rio Piracicaba, through River Tieté, Rio Paraná system, Piracicaba, 22°45'S, 47°40'W; also paratypes from Est. São Paulo, Corumbataí on Rio Corumbataí, and Est. Paraná, Rio Paraná at Guaíra), — Isbrücker, 1979a: 110 (note), — Isbrücker, 1980: 119 (listed).
Loricaria prolixa prolixa; Isbrücker, 1979a: 87 (listed).

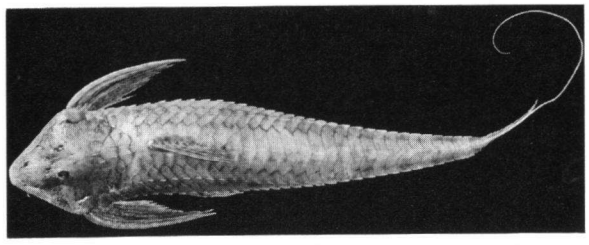

Fig. 17. *Loricaria prolixa* Isbrücker & Nijssen, 1978. Dorsal view of holotype.

Specimens examined:

Brazil

NMW 45091 (holotype), Est. São Paulo, Rio Piracicaba, through River Tieté, upper Rio Paraná basin [Piracicaba, 22°45'S, 47°40'W], coll. R. Von Ihering, — NMW 45088 (1 paratype), NMW 45089 (1 paratype), ZMA 113.537 (1 paratype, ex NMW 45090), same data as holotype, — BMNH 1905.6.9: 6 (1 paratype), likely also collected in Rio Piracicaba, coll. R. Von Ihering, — MZUSP 333 (1 paratype), Piracicaba, coll. E. Garbe, before 1919, — MZUSP 13186 (1 paratype), Corumbataí on Rio Corumbataí, an affluent of the right bank of Rio Piracicaba, coll. H. A. Britski & A. E. C. Gomes, 2-XI-1963, — MZUSP 13394 (1 paratype), Est. Paraná, Rio Paraná at Guaíra, 24°05'S, 54°15'W, coll. CETESB, VII/VIII-1977 (in my 1980 paper this specimen was inadvertently omitted).

Discussion:

This species was recently described and illustrated. Its morphometric and meristic data are given in tables, and for ready identification, an illustration is added.

In the original description we compared *L. prolixa* with *L. macrodon*; the latter was recently (Isbrücker & Nijssen, in Isbrücker, 1979a) assigned to *Brochiloricaria*.

Loricaria lentiginosa Isbrücker, 1979
(figs. 15, 18; tables Io, IXa-c)

Loricaria prolixa; Isbrücker & Nijssen, 1978a: 189, 194 (in part; non-paratypes).
Loricaria prolixa lentiginosa Isbrücker, 1979a: 86-87 (listed), p. 97, figs. 9-10, 23, back cover, tables Ia & IIa (original description; holotype, 3 paratypes; type-locality: Brésil, Est. Sao Paulo, haut bassin du Rio Parana, Represa de Volta Grande, Rio Grande).
Loricaria lentiginosa; Isbrücker, 1980: 118 (listed).

Specimens examined:

Brazil

MZUSP 13188 (holotype), Est. São Paulo, upper Rio Paraná basin, Represa de Volta Grande, Rio Grande, coll. H. A. Britski, 6/7-XI-1975, — ZMA

Table IX. Morphometric and meristic characters of *Loricaria lentiginosa*: (a) holotype, Brazil, Rio Grande, (b) 2 paratypes, topotypes, (c) 1 paratype, Brazil, Rio Mogi Guaçu. Measurements expressed as ratios of standard- or head length.

specimen	a	b	b	c
mature male	—	—	—	—
standard length	292.5	279.0	255.5	266.5
axial length	321.0	306.0	280.1	287.6
total length	442.5	333.2	355.5	—
head length	4.6	4.2	4.6	4.6
predorsal length	3.2	3.0	3.1	3.2
postdorsal length	1.7	1.7	1.7	1.7
postanal length	2.1	2.1	2.0	2.0
dorsal spine length	5.2	<6.0	5.1	6.1
first dorsal ray	5.5	5.7	5.3	6.4
anal spine length	5.7	6.0	5.8	5.9
pectoral spine length	4.1	4.0	4.2	4.1
pelvic spine length	4.5	4.7	4.4	4.5
upper caudal spine	2.0	5.3	2.6	—
lower caudal spine	6.3	6.9	5.9	6.7
snout length	1.8	1.8	1.7	1.7
lower lip	3.8	4.0	3.7	4.0
thoracic length	1.4	1.3	1.3	1.4
abdominal length	1.3	1.4	1.4	1.3
max. orbital diameter	7.7	7.0	7.0	7.6
interorbital width	5.4	5.4	5.2	5.0†
cleithral width	1.0	1.1	1.0	1.0
supra-cleithral width	1.5	1.6	1.6	1.5
head width	1.1	1.1	1.1	1.1
head depth	2.5	2.5	2.4	2.7
body depth at dorsal	2.3	2.4	2.3	2.5
body width at dorsal	1.2	1.3	1.3	1.2
body width at anal	1.2	1.3	1.3	1.3
depth caudal peduncle	13.0	14.0	13.6	14.6
width caudal peduncle	5.2	5.0	5.8	5.7
rictal barbel	—	2.4	2.3	2.1
lower lip barbels	5.6	9.4	8.0	—
lateral scutes	35/35	34/34	36/36	35/35
coalescing scutes	22/21	21/21	20/20	21/20
thoracic scutes	8/7	9/9	7/7	8/9
teeth upper jaws	3/3	3/3	2/3	3/3
teeth lower jaws	5/6	5/5	5/7	6/7

† one side of orbital rim damaged

115.183 (1 paratype, ex MZUSP 13189), MZUSP 13190 (1 paratype), same data as holotype, — MZUSP 13187 (1 paratype), upper Rio Paraná basin, Rio Mogi Guaçu, Emas, coll. U. Burheimer, VII-1973.

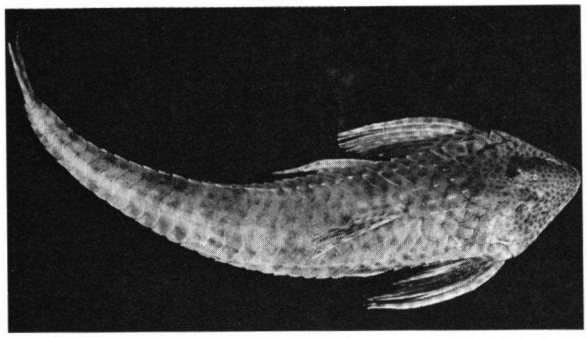

Fig. 18. *Loricaria lentiginosa* Isbrücker, 1979. Dorsal view of a paratype, sl. 266.5 mm, MZUSP 13187.

Discussion:

Like the preceding, *L. lentiginosa* was recently described; its morphometric and meristic data, and an illustration are given only.

L. lentiginosa is closely related to (if not a subspecies or a form of) *L. prolixa*, which hails from the same river system. It differs considerably in colour pattern: on dorsum of head (including the ventrally ossified margin of snout) are numerous small, well-defined dark greyish brown spots, lacking in *L. prolixa*. Dorsum of body with ill-defined, large dark blotches, spots and irregular markings.

L. lentiginosa has minute abdominal scutelets, which tend to be more numerous than in *L. prolixa*. In other respects, both are very similar to each other: the references reflect quite well the multiple choice status of the former.

LIST OF NOMINAL TAXA OF *LORICARIA* AND THEIR CURRENT IDENTIFICATION

NOMINAL TAXA:	CURRENT IDENTIFICATION:
L. accipenser Shaw, 1804	*Loricariichthys maculatus*
L. acuta Valenciennes, 1840	*Loricariichthys acutus*
L. altipinnis Breder, 1925	*Rineloricaria altipinnis*
L. amazonica de Castelnau, 1855	*Loricariichthys maculatus*
L. anus Valenciennes, 1840	*Loricariichthys anus*
L. apeltogaster amazonum Delsman, 1941	*Pseudohemiodon amazonus*
L. aurea Steindachner, 1900	*Sturisoma aureum*
L. barbata Kner, 1854a	*Sturisoma barbatum*
L. beni Pearson, 1924	*Rineloricaria beni*
L. bransfordi Gill, 1876	*Rineloricaria uracantha*
L. brevirostris Eigenmann & Eigenmann, 1889	*Sturisoma brevirostre*
L. brunnea Hancock, 1828	*Loricariichthys brunneus*
L. cacerensis A. de Miranda Ribeiro, 1912	*Rineloricaria cacerensis*
L. cadeae Hensel, 1868	*Rineloricaria cadeae*
L. capetensis Meek & Hildebrand, 1913	*Dasyloricaria capetensis*
L. caquetae Fowler, 1943a	*Spatuloricaria caquetae*
L. cashibo Eigenmann & Allen, 1942	*Loricariichthys cashibo*
L. castanea de Castelnau, 1855	*Loricariichthys castaneus*
L. catamarcensis Berg, 1895	*Rineloricaria catamarcensis*
L. cirrhosa Perugia, 1897	*Spatuloricaria evansii*
L. commersonoides Devincenzi, 1943	*Paraloricaria commersonoides*
L. cubataonis Steindachner, 1907a	*Rineloricaria cubataonis*
L. curvispina Dahl, 1941	*Spatuloricaria curvispina*
L. devincenzii Soriano Señorans, 1950	*Pseudohemiodon devincenzii*
L. eigenmanni Pellegrin, 1908	*Rineloricaria eigenmanni*

L. evansii Boulenger, 1892	*Spatuloricaria evansii*
L. fallax Steindachner, 1915	*Rineloricaria fallax*
L. felipponei Fowler, 1943b	*Rineloricaria felipponei*
L. filamentosa Steindachner, 1878a	*Dasyloricaria filamentosa*
L. filamentosa latiura Eigenmann & Vance, in Eigenmann, 1912b	*Dasyloricaria latiura*
L. filamentosa seminuda Eigenmann & Vance, in Eigenmann, 1912b	*Dasyloricaria seminuda*
L. fimbriata Eigenmann & Vance, in Eigenmann, 1912b	*Spatuloricaria fimbriata*
L. flava Shaw, 1804	*Hypostomus plecostomus*
L. frenata Boulenger, 1902	*Sturisoma frenatum*
L. griseus Eigenmann, 1909	*Limatulichthys punctatus*
L. gymnogaster Eigenmann & Vance, in Eigenmann, 1912b	*Spatuloricaria gymnogaster*
L. gymnogaster lagoichthys Schultz, 1944	*Spatuloricaria lagoichthys*
L. henselii Steindachner, 1907a	*Rineloricaria henselii*
L. hoehnei A. de Miranda Ribeiro, 1912	*Rineloricaria hoehnei*
L. jaraguensis Steindachner, 1909	*Rineloricaria jaraguensis*
L. jaraguensis Steindachner, 1910	*Rineloricaria jaraguensis*
L. jubata Boulenger, 1902	*Rineloricaria jubata*
L. kneri de Filippi, in Tortonese, 1940	*Sturisoma kneri*
L. konopickyi Steindachner, 1879a	*Rineloricaria konopickyi*
L. kronei A. de Miranda Ribeiro, 1911	*Rineloricaria kronei*
L. labialis Boulenger, 1895	*Loricariichthys labialis*
L. laeviuscula Valenciennes, 1840	*Pseudoloricaria laeviuscula*
L. lamina Günther, 1868	*Pseudohemiodon lamina*
L. lanceolata Günther, 1868	*Rineloricaria lanceolata*
L. laticeps Regan, 1904	*Pseudohemiodon laticeps*
L. latirostris Boulenger, 1900	*Rineloricaria latirostris*
L. lima Kner, 1854a	*Rineloricaria lima*
L. lima microlepidota Steindachner, 1907b	*Rineloricaria microlepidota*
L. macrodon Kner, 1854a	*Brochiloricaria macrodon*
L. macromystax Günther, 1869	*Rhadinoloricaria macromystax*
L. macrops Regan, 1904	*Ricola macrops*
L. maculata Bloch, 1794	*Loricariichthys maculatus*
L. magdalenae Steindachner, 1878b	*Rineloricaria magdalenae*
L. microdon Eigenmann, 1909	*Loricariichthys microdon*
L. microlepidogaster Regan, 1904	*Rineloricaria microlepidogaster*
L. nigricauda Regan, 1904	*Rineloricaria nigricauda*
L. nudirostris Kner, 1854a	*Loricariichthys nudirostris*
L. nudiventris Valenciennes, 1840	*Spatuloricaria nudiventris*
L. panamensis Eigenmann & Eigenmann, 1889	*Sturisoma panamense*
L. parahemiodon Günther, 1864	*Loricariichthys maculatus*
L. pareiacantha Fowler, 1943b	*Rineloricaria pareiacantha*
L. parva Boulenger, 1895	*Rineloricaria parva*
L. paulina Boulenger, 1900	*Rineloricaria latirostris*
L. phoxocephala Eigenmann & Eigenmann, 1889	*Rineloricaria phoxocephala*

L. platystoma Günther, 1868	*Cteniloricaria platystoma*
L. platyura Müller & Troschel, 1848	*Rineloricaria platyura*
L. puganensis Pearson, 1937a	*Spatuloricaria puganensis*
L. punctata Regan, 1904	*Limatulichthys punctatus*
L. rostrata Von Spix, 1829	*Sturisoma rostratum*
L. rostrata Van der Hoeven, 1852	*Rineloricaria caracasensis*
L. scolopacina de Filippi, 1853	*Farlowella scolopacina*
L. sneiderni Fowler, 1944	*Rineloricaria sneiderni*
L. spixii Steindachner, 1881	*Loricariichthys spixii*
L. steinbachi Regan, 1906	*Ixinandria steinbachi*
L. steindachneri Regan, 1904	*Rineloricaria steindachneri*
L. stewarti Eigenmann, 1909	*Rineloricaria stewarti*
L. strigilata Hensel, 1868	*Rineloricaria strigilata*
L. stübelii Steindachner, 1883	*Loricariichthys stuebelii*
L. submarginatus Eigenmann, 1909	*Rineloricaria platyura*
L. teffeana Steindachner, 1879a	*Rineloricaria teffeana*
L. thrissoceps Fowler, 1943b	*Rineloricaria thrissoceps*
L. tuyrensis Meek & Hildebrand, 1913	*Dasyloricaria tuyrensis*
L. uracantha Kner & Steindachner, 1863	*Rineloricaria uracantha*
L. uracantha rupestre Schultz, 1944	*Rineloricaria rupestris*
L. valenciennesii Vaillant, 1880	*Rineloricaria teffeana*
L. variegata Steindachner, 1879b	*Crossoloricaria variegata*
L. variegata venezuelae Schultz, 1944	*Crossoloricaria venezuelae*
L. vetula Valenciennes, 1840	*Paraloricaria vetula*

Taxa originally published in synonymy:

L. hemiodon Eigenmann & Eigenmann, 1889 (lapsus)	*Loricariichthys maculatus*
L. histrix Vandelli, in Cuvier & Valenciennes, 1840	*Pseudacanthicus histrix*
L. liturata Natterer, in Kner, 1854b	*Pterygoplichthys lituratus*
L. melanoptera Natterer, in Kner, 1854b	*Cochliodon cochliodon*
L. punctata Natterer, in Kner, 1854b	*Pterygoplichthys punctatus*

ADDENDUM

The history of *Loricaria cataphracta*

Four years prior to the establishment of zoological nomenclature, two works were issued containing the first descriptions of species of Loricariinae. It is unknown to me which of these works were published first.

Linnaeus (1754: 79-80, pl. 29) described in Latin and Swedish *Loricaria dura*, adding a fairly detailed illustration of the lateral side, and of the ventral side of head and anterior abdominal area (reproduction in Isbrücker, 1972, fig. 1). The Latin description reads: "LORICARIA. dura. LORICARIA. Habitat in INDIA. *Corpus* pedale, angustum, planiusculum, loricatum osseis segmentis. Segmenta haec (ad latus numerata 32) loco squamarum cingunt totum corpus, ossea, supra & subtus convexa. Latera magis angulata sunt. *Cauda* anceps margine bifido scaberrimo.

Caput modice declive, scabrum, aequale. *Os* absque maxillis, fere ut in Sturione, contractile, ex villis cirrhosis minimis; in superiore lobo aculeis 7 s. 8 minimis. *Membrana branchiostega* radiis 4. *Pinna dorsalis* radiis 8, alta, scabra, radio primo indiviso altiore. *Pectorales* radiis 7: primo

indiviso scabro. *Ventrales* radiis 6: primo majore indiviso, scabro. *Ani* radiis 6: primo integro, scabro. *Caudae* radiis 12, bifurca; radius supremus definit in setam longitudine totius corporis. *Segmenta* corporis, ut in Syngnatho undique cingentia, licet non aequalia, sed apice repanda undique sequenti incumbentia."

Linnaeus mentioned 32 lateral body scutes, whereas the illustration shows at least 18, at most 21 coalescing scutes (counted in my way: in the drawing this detail is indistinct), plus 15 or 16 parallel lateral body scutes, plus the (last) mediolateral caudal base scutelet, thus a total of 18+16+1 or 21+15+1 (= 35 or 37). None of the details allows species identification, but its generic identity is evident. For several reasons it is regrettable that this work has no standing in zoological nomenclature; had it been published subsequent to 1757, it would be acceptable, like most works published in the 'valid' period.

In June 1977, during a visit to the British Museum (Natural History), I learned from Mr Wheeler that the description by Linnaeus was based upon at least two specimens, still present in the Stockholm Museum, both in good condition. Mr Wheeler provided me with his observations and generously lent me the negative of his photograph (fig. 2). The larger specimen, sl 275 mm, total length 320 mm, is the one figured in Linnaeus (1754), agreeing in size and in the presence of much branched barbels. The smaller specimen is 158 mm in sl, 190 mm in total length. It has different teeth, and unbranched labial barbels. It is reminiscent of *Loricariichthys maculatus* (Bloch, 1794).

The second work was by Gronovius, published also in 1754, including extensive descriptions of two species which are representatives of two subtribes.

Gronovius (1754: 25-26, pl. 2 figs. 1-2) first described and accurately illustrated a nuptial male of *Loricariichthys maculatus*. It is the 68th species described in this work, the serial number appearing before the Latin species diagnosis: "68. PLECOSTOMUS dorso monopterygio, ore cirrato, edentulo, ossiculo superiori caudae bifurcae setiformi brevi." Gronovius here referred to "*Arted. mss. ad Sebam*", including the diagnosis of a species mentioned in that work, which was published five years later (1759), reading: "Plecostomus corpore aculeato, ore cirrato, dorso monopterygio."

Gronovius (1754: 26-27) described the next species, which was diagnosed: "69. PLECOSTOMUS dorso monopterygio, ore cirrato, dentato, ossiculo superiori caudae bifurcae longitudine corporis." Other characters distinguishing this species from sp. no. 68 are mentioned in the description. Fortunately, his specimen of sp. no. 69 still exists (BMNH 1853.11.12:195-196). Contrary to my previous conclusions, it is now referred to *Loricaria cataphracta*, which agrees with Boeseman's (1976) conclusion.

Gronovius's generic epithet Plecostomus (subsequently accepted frequently as a valid generic name by numerous authors), was invalidated by *Hypostomus* Lacepède, 1803, before *Plecostomus* became available in accordance with the Rules (cf. Boeseman, 1968: 4-6), neglecting Swainson's (1838, 1839) interpretation which was overlooked since (cf. Isbrücker, 1980: 125).

Gronovius (1756) published an expanded edition of his 1754 work. He referred to sp. no. 68 and 69, next to another Plecostomus, sp. no. 167 (Gronovius, 1756: 15 and 16, respectively). Diagnoses of the previously described species were literally repeated.

In 1756 also the ninth edition of Linnaeus's Systema Naturae appeared. This edition was prepared by Gronovius, who included (p. 51) references to his (1754) three spp. of Plecostomus, viz., species no. 67 through 69. Their diagnoses were added with slight alterations such as some abbreviations and deletion of a word.

In the tenth edition of the Systema Naturae, Linnaeus (1758) established *Loricaria*, a monotypic genus. The diagnosis is short and poorly descriptive (1758: 307): "*Caput* laeve, depressum. *Os* edentulum, retractile. *Membr. branch.* radiis VI. *Corpus* cataphractum." The second sentence, which I translate as "retractile toothless mouth" is not clear to me. The first (validly described) species was named *Loricaria cataphracta*.

Although Linnaeus's diagnosis of *L. cataphracta* is short, it contains confusing details. It consists of two parts, the second being indicated by a β. In my opinion, this demonstrates that

Linnaeus included different varieties within *L. cataphracta*: I think it was his way to distinguish between primary and secondary material (not necessarily specimens) of a species. This would imply that forms indicated by a β (and by other letters from the Greek alphabet which he used sometimes in this edition) are not eligible for type-designation.

The first part of the Linnaean diagnosis (1758: 307) refers to his description (1754) of *L. dura*, including the fin ray counts: D. 1/8. P. 1/7. V. 1/6. A. 1/6 C. 12. This should be read as: dorsal fin with 8 rays, the first unbranched, the others branched (the last dorsal fin ray of *Loricaria* spp. is split to its base and was counted as two by Linnaeus), and so on, except for the caudal fin, in which the outer (unbranched) rays were not so indicated. The fin formulae agree with those of *Loricaria* and of several related genera.

Linnaeus added a reference to Gronovius's (1754) sp. no. 68 (= *Loricariichthys maculatus*) in the first part of the diagnosis, stating: "Plecostomus dorso monopterygio, ossiculo superiori caudae bifurcae setiformi", again followed by a fin formula which differs from that of *L. dura* in "A. 6" (instead of A. 1/6). The diagnosis of Gronovius's sp. no. 68 was not literally copied: the words "ore cirrato, edentulo" and "brevi" were deleted by Linnaeus. Evidently two species were involved in this part of the diagnosis, one of these rather than the variety under β being eligible for the restriction of *L. cataphracta*.

The second part (under β, p. 308) refers only to Gronovius's (1754) sp. no. 69. Linnaeus cited in some respects erroneously part of Gronovius's diagnosis: "Plecostomus ore edentulo, ossiculo superiori caudae bifurcae longitudine corporis." To the entire diagnosis the obviously general information: "Habitat in America meridionali. Lobus superior caudae filo longissimo terminatur." was added.

Linnaeus (1759: 101) again referred to *Loricaria* (not stating the trivial name of the single included species), as: "1. LORICARIA. *Mus. Ad. Frid. 1. t. 29. f. 1.* Plecostomus *Gron. Mus. 1. n. 68. t. 2. f. 1, 2. β,* Plecostomus *Gron. Mus. 1. n. 69. Lobus superior caudae filo longissimo terminantur.*" To this work I refer only to indicate the consistent use of the β.

Seba (1759 — not 1758 as usually assumed, cf. Holthuis, 1969) published a poor illustration (pl. 29 fig. 14) of a *Loricariichthys maculatus*-like fish, diagnosed (p. 88, in Latin and in Dutch) as: "Plecostomus corpore aculeato; ore cirrato; dorso monopterygio." In the accompanying description (reputedly by Artedi — who died in 1738 — cf. Gronovius, 1754: 25), the mentioned characters exclude a *Loricariichthys* species, instead indicating a member of *Loricaria* in its present restricted sense, whereas the characters shown in the drawing exclude *Loricaria*. Boeseman (1976: 164-165; also 1972: 308) thought the holotype of *Parahemiodon typus* Bleeker, 1862 could be the same specimen as the one figured in Seba. Artedi, in Seba, like the previously cited authors, correctly mentioned the number of fin rays, although they were presented in a different way than is usual nowadays. Seba's collection likely included a *Loricaria* and a *Loricariichthys*, possibly the same two species as in the collections of Gronovius and of Linnaeus, respectively.

Gronovius (1763: 127) again referred to sp. no. 68 of 1754, changing the serial number into 391. His diagnosis is the same as in 1754, and he added a reference to "*Seb. Thes.* vol. 3, p. 88, n. 14, tab. 29. fig. 14", again citing the diagnosis in Seba. Gronovius also referred to sp. no. 69, which was renumbered 392, including references to Linnaeus's *L. dura* (1754), and to *L. cataphracta* (1758). The present diagnosis of sp. no. 392 contained an error: "dentato" of 1754 was changed into "edentulo" for the same species.

Houttuyn (1765: 122-126) interpreted and discussed (in Dutch) Linnaeus's Systema Naturae, and works by other naturalists. He recognized both species of Gronovius, but cited only Linnaeus's 1758 diagnosis of the two forms of *L. cataphracta*, in a footnote to p. 123, without scientific names. Gronovius's illustration of sp. no. 68 was copied by Houttuyn (pl. 64 fig. 4).

Meuschen (1778, after Gronovius's death) published an auction catalogue of the Gronovius collection. Meuschen, like Gronovius, put serial numbers before each item and frequently copied Gronovius's species diagnosis. In many entries Meuschen provided apparently valid binominal

nomenclature, as in the case of the mailed catfishes, which were indicated as follows (1778: 39): "381 PLECOSTOMVS cataphracta, *Gewapende Harnasman* [vernacular Dutch, meaning armed mailed catfish, in a free translation], ...", followed by Gronovius's (1754) diagnosis of sp. no. 68, and references to Gronovius 1763, 1754, and to Linnaeus, 1758 and 1766, respectively. No. 382 in Meuschen was indicated as "PLECOSTOMVS cataphracta, Gewapende Harnasman. praecedentis varietas."; presumably he meant that this concerned a variety of the preceding. The next, no. 383, was also called "PLECOSTOMVS cataphracta, ...", but certainly another species was meant, as was indicated by a question mark behind the name. In 1954 Meuschen's work was placed on the Official Index of Rejected and Invalid Works in Zoological Nomenclature (cf. Hemming, ed., 1954a).

Meuschen (1781) also prepared an index to Gronovius's "Zoophylacii gronoviani" which was published in parts between 1763 and 1781. The index is alphabetical; page numbers were given for generic names only. However, Meuschen introduced trivial names, referred to by their serial numbers in Gronovius. Thus, one finds the genus "PLECOSTOMUS s. LORICARIA... p. 127" and the species: "Cataphracta...n. 391", and "Loricaria...n. 392". One could read this as the following combinations of names:

sp. no. 391 = a) *Plecostomus cataphracta* (Linnaeus, 1758), or
b) *Loricaria cataphracta* Linnaeus, 1758, and

sp. no. 392 = a) *Plecostomus loricaria* Meuschen, 1781, or
a) *Loricaria loricaria* Meuschen, 1781.

If accepted, this would mean that Meuschen was the first revisor of *L. cataphracta*, providing a new name for the second included species. However, both publications by Meuschen (1778 and 1781) remained unnoticed for long in ichthyology. The only modern author who accepted the proposed names (formed by Gronovius?) was Whitley (1929). In view of the effect it would have had on established nomenclature of many species, Meuschen's index (1781), fortunately, was placed also on the Official Index of Rejected and Invalid Works in Zoological Nomenclature (cf. Hemming, ed., 1954b).

Linnaeus, in his 12th (1766: 508) and 13th (ed. Gmelin. 1789: 1363) editions of the Systema Naturae almost literally copied his 1758 diagnosis of *L. cataphracta*, adding characters which distinguished it from the second recognized species: *Loricaria plecostomus* (Linnaeus, 1758), originally described in the Sturgeon genus *Acipenser* and presently known correctly as *Hypostomus plecostomus*.

Bonnaterre (1788) also copied Gronovius's illustration of sp. no. 68, which was identified (1788: 157-158) as *L. cataphracta*. As pointed out by Boeseman (1976: 163) Isbrücker (1972: 172) erroneously referred to Bonnaterre's *L. cataphracta* under that species, missing Bonnaterre's indications that he largely copied the description of sp. no. 68 (= *Loricariichthys maculatus*). Bonnaterre's remark: "...le rayon supérieur de la nageoire de la queue prolongé en filament" probably misled me while accepting his identification.

Bloch (1794: 76-79) validly restricted *L. cataphracta*, describing the second species as *Loricaria maculata* (now *Loricariichthys maculatus*) (1794: 73-75). Bloch (loc. cit.: 76), among others, included Gronovius's sp. no. 69, Seba's and Bonnaterre's descriptions and illustrations in his references (and referred to Statius Müller, whose work I have not seen). In addition to an excellent comparative description (*L. cataphracta* versus *L. maculata*, pp. 76-78), Bloch remarked: "Ob dieser Unterschied vom Geschlechte herrühre, oder ob es wirklich zwey verschiedene Arten sind, kann nur derjenige entscheiden, welcher Gelegenheit hat, diese Fisch an Ort und Stelle zu untersuchen", and on p. 79: "Linné führt im Natursystem..., die, in seinem *Museo*, mit der langen Borste am Schwanze, befindliche Abbildung, zu seinem Panzerfische an, und macht gleich darauf aus dem nehmlichen Fische des *Gronov* eine Nebenart...".

Bloch (ed. Schneider, 1801: 125; see also p. xxxii) published the diagnosis of a "*Loricaria Cataphracta*", but this concerns a species not even included in Linnaeus's original diagnosis. *L. cataphracta* as restricted (Bloch, 1794), received a new name ("*Loricaria Cirrhosa*") in 1801, whereas

Bloch's *L. maculata* (1794) was named *L. Cirrhosa* var. *Maculata.* Previously (1972: 169) I erroneously stated: "...the diagnosis of *Loricaria cirrhosa* by Bloch & Schneider (1801) must be regarded as the description of a new species...". *L. cirrhosa* is an available but invalid substitute name for *L. cataphracta* as restricted by Bloch (1794). The type-specimen of *L. cirrhosa* is also that of *L. cataphracta* (restricted). The lectotype designation (from 2 specimens available to Bloch in 1794) for *L. cirrhosa* by Isbrücker (1972: 173) was erroneous.

Lacepède (1803: 140 and 141-143) published also a nomen novum, *L. setifera,* available but invalid, to substitute *L. cataphracta.* The primary type-specimen of *L. setifera* is the same as that of *L. cataphracta* (restricted).

Shaw (1804: 37) proposed "*Loricaria Dentata*", an additional nomen novum for *L. cataphracta,* available but invalid. Among his references Shaw listed *L. cataphracta* sensu Bloch, 1794; other references are to Linnaeus, 1758 and to Gronovius, 1763.

Cuvier (1816: 210-211) included two subgenera in *Loricaria*: "Les Hypostomes" and "*Loricaria*". He (1816: 211) listed the species of his subgenus *Loricaria* in a footnote, as follows: "*Loricaria cataphracta,* L. *Cirrhosa,* Schn. et *Setigera,* Lacép., Bl. 375, 3-4, — *Lor. maculata,* Bl. 375, 1, 2". Previously, I gathered that Cuvier listed 4 species, but it is clear that he intended to list only two valid species, the first of which having two junior synonyms. To present workers it is sometimes hard to evaluate older authors, but contemporary authors (e.g., Cloquet, 1823: 208; Bory de Saint-Vincent, 1826: 504-505; Guichenot, 1836: 494, pl. 310 fig. 2) better understood Cuvier's way of indicating synonyms.

Cuvier (1829: 301) presented a revised list of "Les Loricaires proprement dites (Loricaria. Lacép.)". He (inadvertently) omitted *L. maculata,* and presented the following in addition to his earlier enumeration: "*Loric. rostrata,* Sp., III; — *Rinelepis aspera,* id., II; — *Acanthicus hystrix,* id., I." The same references were given by Cuvier in a later edition (1836: 545).

Cuvier (1842: 253) again listed the species of *Loricaria,* as in 1829 and 1836. In the Atlas of this work — prepared by Valenciennes — a nice, almost entirely accurate illustration of a *Loricaria* was included (pl. 100), with the caption: "Genre LORICAIRE. *Loricaria. Fig. 2.* LA LORICAIRE SÉTIGÈRE. *Loricaria setigera.* Nob. Montrant le corps couvert de plaques ou de boucliers osseux et carénés. L'espèce est remarquable par le long filet qu'elle porte à la caudale. — Des eaux douces de l'Amérique. *Fig. 2. a.* La tête, vue par dessous, pour montrer les lèvres larges et frangées qui entourent la bouche. (D'après nature)." I previously interpreted this as the proposal of a new species, because of Valenciennes's use of the expression "Nob." Now I am convinced that Valenciennes used Cuvier's variant spelling of the name proposed by Lacepède, which Cuvier considered a junior synonym of *L. cataphracta.* Possibly, the French vernacular name and the name proposed by Lacepède got mixed up. I referred to this work (1972: 170) by Cuvier & Valenciennes as published in 1836, but recently Cowan (1976) demonstrated that the part in which the cited information appeared, was issued in 1842: two years subsequent to the publication of Valenciennes, in Cuvier & Valenciennes's 15th volume of Histoire naturelle des poissons. In this latter work, Valenciennes treated, among others, *Loricaria* in a different and better way. No references to the earlier works of Cuvier and Valenciennes as here discussed were given.

Gray (1854) edited a "Catalogue of fish collected and described by Laurence Theodore Gronow, now in the British Museum", in which the Gronovian name *Plecostomus flagellaris* was published. This is the first available name (subsequent to Meuschen, 1781) based on the specimen of the 69th species described by Gronovius, 1754, which thus became the holotype.

Bleeker (1858: 331) listed all species of *Loricaria,* including *L. cataphracta.* Bleeker (1862a: 3, same as Bleeker, 1863: 80, and, more extensively, 1864: 18-20) adopted *Loricaria dura* as the valid name, of which he considered *L. cataphracta* as a junior synonym. Bleeker's use of the name *L. dura* must in fact be interpreted as the first (post-Linnaean) introduction of a substitute name, the type-specimen of which is the same as that of *L. cataphracta.*

Due to the influence of important works like that of Bloch (1794), Valenciennes, in Cuvier & Valenciennes (1840), Kner (1854a), Bleeker (1864), and Günther (1864), the outline identity of *L. cataphracta* and its nomenclatural ghost, *Loricariichthys maculatus*, became established. It is unnecessary to continue this discussion with subsequent publications. The subject was discussed by me in 1971b and in 1972. In the latter paper I thought it was necessary to designate a neotype for *L. cataphracta*, being convinced that Linnaeus' (1754) specimen(s) of "*L. dura*" was (were) lost. In view of questions about the identity of numerous specimens previously identified as *L. cataphracta* and the resulting validity or synonymy of related or identical species, it seemed (and still remains) important to have *L. cataphracta* based on a primary type-specimen. Fortunately, we now know that two syntypes of *L. cataphracta* exist. On the basis of examination of a photograph (fig. 2) I can designate the larger one as the lectotype. No species can be based upon two primary type-specimens (lectotype and neotype): the resulting problems (if any) have to be referred to the International Commission on Zoological Nomenclature. I hope that the original specimen of Linnaeus will eventually stand as the primary type for *L. cataphracta*; however, it still awaits re-examination.

Isbrücker (1972: 175, 177, 186-187, figs. 7, 12a-b, table 1) examined the holotype of *Plecostomus flagellaris* and tentatively accepted it (as *L. flagellaris)* as slightly distinct from *L. cataphracta.* Now I agree with Boeseman (1976: 159) that *P. flagellaris* falls within the range of variation of *L. cataphracta.* For reasons stated above, I disagree with Boeseman that the holotype of *P. flagellaris* is a syntype of *L. cataphracta.*

Boeseman (1976: 158 and 159) seemed content to accept the identification by several authors of various specimens as *L. cataphracta.* If all these identifications would be correct, *L. cataphracta* is a common species in northern South America. The identity of several recorded "*L. cataphracta*" however, still needs verification.

REFERENCES

Additions to references in Isbrücker, 1972 & 1980.

Alonso de Arámburu, A. S., R. H. Arámburu & R. A. Ringuelet, 1962. Peces paranaenses nuevos para la fauna Argentina. Physis, **23** (65): 223-239, 4 pls. (not seen; reference after Ringuelet et al., 1967: 561).

Bertin, L. & R. Estève, 1950. Catalogue des types de poissons du Muséum national d'Histoire Naturelle. 5e Partie. Ostariophysaires (Siluriformes). Bull. Mus. Hist. nat. Paris,: 1-85.

Bertoni, A. de Winkelried, 1914. Fauna paraguaya. Catálogos sistemáticos de los vertebrados del Paraguay. Peces, batracios, reptiles, aves y mamíferos conocidos hasta 1913. Asuncion, 86 pp. Peces,: 5-15 (not seen; reference after Fowler, 1954: 356, and after Ringuelet et al., 1967: 562).

——, 1939. Sumario. Catálogos sistemáticos de los vertebrados del Paraguay. Rev. Soc. Cient. Paraguay, **4** (4): 1-60 (Peces, : 50-58).

Bhatti, H. K., 1938. The integument and dermal skeleton of Siluroidea. Trans. zool. Soc. London, **24** (1) 1: 1-102, 11 pls.

Bory de Saint-Vincent, [J. B. G. M.], 1826. In: Dictionnaire classique d'histoire naturelle, **9**: [iii], 1-598 (Rey & Gravier, and Baudouin Frères, Paris).

Bruijning, C. F. A., J. Voorhoeve & W. Gordijn, (eds.), 1977. Encyclopedie van Suriname, : 1-716 (Argus Elsevier, Amsterdam, Brussels).

Cloquet, H., 1823. In: Dictionnaire des sciences naturelles, dans lequel on traite méthodiquement des différens êtres de la nature, considérés soit en eux-mêmes, d'après l'état actuel de nos connoissances, soit relativement a l'utilité qu'en peuvent retirer la médecine, l'agriculture, le commerce et les arts. Suivi d'une biographie des plus célèbres naturalistes, **27**: [iv], 1-551 (F. G. Levrault, Strasbourg et Paris and Le Normant, Paris).

Cowan, C. F., 1976. On the Disciples' edition of Cuvier's Règne Animal. J. Soc. Biblphy nat. Hist., **8** (1): 32-64.

Cuvier, [G. L. C. F. D.], 1816. Le règne animal distribué d'après son organisation pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée. Tome II, contenant les reptiles, les poissons, les mollusques et les annélides, **2**: v-xviii, 1-532 (Déterville, Paris) (for the correct dating, cf. Roux, 1976).

——, 1829. Le règne animal distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée. Nouvelle édition, revue et augmentée, **2**: i-xv, 1-406 (Déterville & Crochard, Paris).

——, 1836. Le règne animal distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée. Troisième Edition, **1**: 1-624, 14 pls. (Louis Hauman & Co., Brussels).

——, 1842. Le règne animal distribué d'après son organisation, pour servir de base à l'histoire naturelles des animaux, et d'introduction à l'anatomie comparée. Edition accompagnée de planches gravées, representant les types de tous les genres, les caractères distinctifs des divers groupes et les modifications de structure sur lesquelles repose cette classification; par une réunion de disciples de Cuvier, MM. Audouin, Blanchard, Deshayes, Alcide D'Orbigny, Doyère, Dugès,

Duvernoy, Laurillard, Milne Edwards, Roulin et Valenciennes, **3**: 1-392 (Fortin, Masson & Co., Paris) (Published in small issues from 1836-1849; for the correct publication dates of the Poissons sections, cf. Cowan, 1976).

EIGENMANN, C. H. & B. A. BEAN, 1907. An account of Amazon river fishes collected by J. B. Steere; with a note on *Pimelodus clarias*. Proc. U. S. nation. Mus., **31** (1503): 659-668.

EIGENMANN, C. H., W. L. MCATEE & D. P. WARD, 1907. On further collections of fishes from Paraguay. Ann. Carnegie Mus., **4** (1): 110-157, pls. 31-45.

FERNÁNDEZ YÉPEZ, A., 1946. Ictiologia. Corronchos, Panaques y Agujas de Venezuela. Publ. Establ. Venez. Cienc. nat. Caracas, **1** (2): 1-8.

FOWLER, H. W., 1942. Los peces del Peru. Catálogo sistemático de los peces que habitan en aguas peruanas. Bol. Mus. Hist. nat. "Javier Prado", Lima, Univ. San Marcos, **6** (20): 71-91.

——, 1945. Los peces del Peru. Catálogo sistemático de los peces que habitan en aguas peruanas. Mus. Hist. nat. "Javier Prado", Lima, Univ. San Marcos, : 1-298.

GOSLINE, W. A., 1942. Notes on South American catfishes (Nematognathi). Copeia, **1942** (1): 39-41.

G[UICHENOT], A., 1836. In: Guérin, F.-E. (ed.), Dictionnaire pittoresque d'histoire naturelle et des phénomènes de la nature, contenant l'histoire des animaux, des végétaux, des minéraux, des météores, des principaux phénomènes physiques et des curiosités naturelles, avec des détails sur l'emploi des productions des trois règnes dans les usages de la vie, les arts et métiers et les manufactures, **4**: [iv], 1-640, Planches, : 1-12, 401 pls. (Au Bureau de souscription, Rue Saint-Germain-des Prés, n° 4, Paris).

HOLTHUIS, L. B., 1969. Albertus Seba's "Locupletissimi rerum naturalium thesauri..." (1734-1765) and the "Planches de Seba" (1827-1831). Zool. Meded. Leiden, **43** (19): 239-252, 3 pls.

HOUTTUYN, F., 1765. Natuurlyke historie of uitvoerige beschryving der dieren, planten en mineraalen, volgens het samenstel van den heer Linnaeus. Met naauwkeurige afbeeldingen. Vervolg der visschen, **1** (8): [x], 1-525, [lxvii], 1-30, pls. 63-70 (F. Houttuyn, Amsterdam).

ISBRÜCKER, I. J. H., 1979b. Les poissons de la famille des Loricariidés ou Poissons-Chats cuirassés. Rev. fr. Aquariol. — Herpétol., **6** (4): 109-124.

——, 1980. Classification and catalogue of the mailed Loricariidae (Pisces, Siluriformes). Versl. Techn. Geg., Inst. Taxon. Zoöl. (Zoöl. Mus.), Univ. Amsterdam, **22**: 1-181.

KLINCKOWSTRÖM, A., 1892. Föreningens sammankomster under arbetsåret 1891-1892. VIII. Sammanträdet den 30 Maj. Herr A. Klinckowström berichtete über seine zoologischen Untersuchungen während eines Aufenthaltes in Suriname und legte einen Theil der gemachten zoologischen Sammlungen dem Vereine vor. Biol. Fören. Förhandl. Stockholm, **4** (8): 101-104.

LINNAEUS, C., 1756. Systema naturae sistens regna tria naturae in classes et ordines genera et species redacta, tabulisque aeneis illustrata. Accedunt vocabula Gallica. Editio multo auctior & emendatior, : [viii], 1-227, [xviii] & 2 pages advertisment, 8 pls. (T. Haak, Lugduni Batavorum).

——, 1759. Animalium specierum in classes, ordines, genera, species. Methodica dispositio, additis characteribus, differentiis atque synonymis, accommodata as Systema Naturae & in formam enchyridii redacta, secundum decimam Holmensem editionem, : [iv], 1-253, [3] (T. Haak, Lugduni Batavorum).

——, 1789. In: J. F. Gmelin (ed.), Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Tomus I. Editio decima tertia, aucta, reformata, (3): 1033-1516 (G. E. Beer, Lipsiae).

LOWE (MCCONNELL), R. H., 1964. The fishes of the Rupununi savanna district of British Guiana, South America. Part 1. Ecological groupings of fish species and effects of the seasonal cycle on the fish. J. Linn. Soc. (Zool.), **45** (304): 103-144.

MAGO-LECCIA, F., 1967. Notas preliminares sobre los peces de los llanos de Venezuela. Bol. Soc. Venez. Cienc. nat., **27** (112): 237-263, 1 map, 12 figs.

MEUSCHEN, F. C., 1778. Museum Gronovianum. Sive index rerum naturalium tam mammalium amphibiorvm piscivm insectorum conchyliorvm zoophytorvm plantarvm et mineralivm exqvisitissimorvm quam arte factarvm nonnvllarum. Inter qvae eminet herbarivs siccvs plantarvm a tovrnefortio claitonio Linnaeo aliisqve botanicis collectarvm. Qvae omnia mvlta cvra et magis svmptibus sibi comparavit vir amplissimvs & celeberrimvs Lavr. Theod. Gronovivs J. V. D. Civitatis Lugduno Batavae senator et scabinvs societatis regiae Londinensis Basilaeensis et Hollandiae qvae Harlemi est aliorvmgve socivs &c. &c. Quae publice subhasta dictrahentur in aedibus Defuncti Ad diem Mercurii 7. Octobris & seqq. 1778. Diebus 1. & 2. Octobris Museum patebit. Lugdvni Batavorvm. Apud. Th. Haak & Socios, nec non J. Meerbvrg, Bibliopolas. 1778. Vbi Catalogi distribuuntur pro 6. Stuferis, : i-vi, 1-231 (232)-1 unnumbered page (recto advertisements, verso blank).

MIRANDA RIBEIRO, P. DE — see Ribeiro, P. de Miranda.

ØRVIG, T., 1967. Phylogeny of tooth tissues: evolution of some calcified tissues in early vertebrates. In A. E. W. Miles (ed.), Structural and chemical organization of teeth, 1: 45-110 (Academic Press, New York & London).

——, 1977. A survey of odontodes ('dermal teeth') from developmental, structural, functional, and phyletic points of view, : 53-75, 3 pls., in: Mahala Andrews, S., R. S. Miles & A. D. Walker (eds.), Problems in vertebrate evolution. — Linnean Symp. Ser., 4 (Academic Press, London, publ. for the Linnean Soc. London).

PEARSON, N. E., 1937b. The fishes of the Beni-Mamoré and Paraguay basins, and a discussion of the origin of the Paraguayan fauna. Proc. California Acad. Sci., (4), **23** (8): 99-114.

POZZI, A., 1945. Sistemática y distribución de los peces de agua dulce de la República Argentina. Gaea, VII: 239-292 (not seen; reference after Ringuelet et al., 1967: 584).

RIBEIRO, P. DE MIRANDA, 1964. Apontamentos ictiológicos — II. Bol. Mus. nac. Rio de Janeiro, Zool., n.s., **246**: 1-4.

RINGUELET, R. A. & R. H. ARÁMBURU, 1962. Peces argentinos de agua dulce. Claves de reconocimiento y caracterización de familias y subfamilias, con glosario explicativo. Agro, **3** (7): 1-98, 9 pls. (not seen; reference after Ringuelet et al., 1967: 578).

ROUX, C., 1976. On the dating of the first edition of Cuvier's Règne Animal. J. Soc. Biblphy nat. Hist., **8** (1): 31.

SCHOMBURGK, R., 1847. Reisen in Britisch-Guiana in den Jahren 1840-1844. Im Auftrag Sr. Majestät des Königs von Preusen ausgeführt von Richard Schomburgk. Nebst einer Fauna und Flora Guiana's nach Vorlagen von Johannes Müller, Ehrenberg, Erichson, Klotzsch, Troschel, Cabanis und andern. Mit Abbildungen und einer Karte von Britisch-Guiana aufgenommen von Sir Robert Schomburgk, 1: v-viii, i-x, 1-469, 8 pls. (J. J. Weber, Leipzig).

STEINDACHNER, F., 1879b. [Das w. M. Herr Director Dr. Franz Steindachner überreicht eine Reihe ichthyologischer Abhandlungen über die Fauna des Orinoco bei Ciudad Bolivar, des Mamoni-Flusses bei Chepo im Isthmus von Panama und einiger Flüsse Peru's unter dem Titel: „Beiträge zur Kenntniss der Süsswasserfische Südamerikas."]. Anz. Akad. Wiss. Wien, mathem.-naturwiss. Cl., **16** (5): 149-152.

——, 1907a. Über einige Fischarten aus dem Flusse Cubataõ im Staate Santa Catharina bei Theresopolis (Brasilien). Sber. Akad. Wiss. Wien, mathem.-naturwiss. Kl., **116** (1): 475-492, 2 pls.

——, 1907b. [Dr. Steindachner berichtet ferner über zwei neue Arten von Süsswasserfischen aus dem Stromgebiet des Parnahyba, welche von ihm während der zoologischen Expedition der kaiserl. Akademie nach Brasilien aufgefunden waren sowie über eine Abart von Loricaria lima, Kn. aus dem Jurua, ...etc.]. Anz. Akad. Wiss. Wien, mathem.-naturwiss. Kl., **44** (10): 152-155 (reprint pp. 1-4).

TOVAR SERPA, A., 1967. Peces del oriente peruano. Algunas especies de Loricariidae con referencia especial de la „carachama" *Pteyrgoplichthys multiradiatus* (Hancock), ecología y utilidad. Biota, Lima, **6** (50): 201-255.

TRAVASSOS, L. & H. TRAVASSOS, 1957. In: Travassos, L., H. Travassos, A. R. Rego-Barros, D. de O. Albuquerque, S. J. Oliveira, A. Lemos de Castro & H. Souza Lopes: Excursão científica realizada nas zonas da Estrada de Ferro Noroeste do Brasil e Brasil-Bolívia em janeiro e fevereiro de 1955. Publ. Avulsas Mus. nac., : 5-19.

VALENCIENNES, A., 1842. Les poissons: avec un Atlas. In G. [L. C. D. F.] Cuvier, 1842 (which see), 4, 120 pls. (Fortin, Masson & Co., Paris) (Published in small issues from 1836-1849; for the correct publication dates of the Poissons sections, cf. Cowan, 1976).

Received: February 26, 1981

Institute of Taxonomic Zoology (Zoological Museum), University of Amsterdam