

THE SOUTH AMERICAN PLATED CATFISH GENUS
ASPIDORAS R. VON IHERING, 1907,
with descriptions of nine new species from Brazil
(Pisces, Siluriformes, Callichthyidae)

by

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ABSTRACT

The South American callichthyid catfish genus *Aspidoras* R. von Ihering, 1907, is redefined on the basis of thirteen nominal species. Morphological differences with the related genus *Corydoras* Lacépède, 1803, are discussed. Two species originally described in *Corydoras*, viz., *Corydoras raimundi* and *Corydoras pauciradiatus* are herein transferred to *Aspidoras*.

Aspidoras now consists of the following previously described nominal species: (1) *Aspidoras rochai* R. von Ihering, 1907 (type-species of the genus), known from Brazil, Est. Ceará, Fortaleza, (2) *Aspidoras raimundi* (Steindachner, 1907) from Brazil, Est. Maranhão, Rio Parnaíba system, (3) *Aspidoras lakoi* P. de Miranda Ribeiro, 1949, from Brazil, Est. Minas Gerais, Rio Paranaíba system, and (4) *Aspidoras pauciradiatus* (Weitzman & Nijssen, 1970) from Brazil, Est. Goiás, Rio Araguaia system.

Nine new species from Brazil are described herein: (1) *Aspidoras albater* from Est. Goiás, Rio Tocantinzinha, (2) *Aspidoras brunneus* from Est. Mato Grosso, Serra do Roncador, (3) *Aspidoras carvalhoi* from Est. Ceará, Guaramiranga, (4) *Aspidoras eurycephalus* from Est. Goiás, Córrego Vermelho, (5) *Aspidoras fuscoguttatus* from Est. Mato Grosso, Córrego Corguinho, (6) *Aspidoras maculosus* from Est. Bahia, Rio Itapicurú system, (7) *Aspidoras menezesi* from Est. Ceará, Rio Salgado system, (8) *Aspidoras poecilus* from Est. Mato Grosso, upper Rio Xingu, and from Est. Goiás, Rio Araguaia, and (9) *Aspidoras spilotus* from Est. Ceará, a tributary of Rio Acaráu, and from Cachoeira do Gusmão. In addition to these nominal species some material is described and figured under the provisional designation of *Aspidoras* sp. aff. *poecilus*. These specimens may represent another species, but are not formally named.

INTRODUCTION

R. von Ihering published a bilingual original diagnosis of *Aspidoras*, the English part of which reads (1907: 30): "This new genus is apparently closely related to *Corydoras*, but differing from it,

as also *Callichthys* and *Hoplosternum*, by having two pairs of nuchal plates between the occipital and the base of the dorsal; the occipital plate nearly truly hexagonal, the posterior angle not much produced. The head is rather elevated, not depressed, rounded in front and somewhat compressed laterally. The coracoid plates entirely hidden by the skin. Barbels short, not reaching the gill-openings. Type: *Aspidoras rochai* n. sp."

Gosline (1940: 10) published the following diagnosis of *Aspidoras*: "Head compressed. Lower lip reverted to form a single pair of barbels beside the rictal barbels [his fig. 3]. Rictal barbels reaching about to level of gill opening. Eye more or less superior. Suborbital naked. Fontanel small, roundish, its length equal to about half the diameter of the eye. Supraoccipital forming a broad, short triangle posteriorly. Nuchal plates barely meeting along the midline between the supraoccipital and the azygous predorsal plate. Abdomen between pectoral fins completely covered with flesh. Dorsal 1,7, its base somewhat shorter than its distance from adipose. Caudal forked. One species; north-eastern Brazil." In his key to the genera of the family Callichthyidae, Gosline (op. cit.: 5) distinguishes *Aspidoras* from both *Corydoras* and *Brochis* Cope, 1872, by the following characters: "Foremost plates of upper lateral series, i.e., nuchal plates, meeting along the midline between occipital and dorsal; abdomen between pectoral bases entirely covered with flesh; fontanel small, roundish." What Gosline called *Aspidoras rochai* (the same material identified as *A. rochai* by Ellis, 1913) actually represents a new species, here described as *Aspidoras maculosus*.

Knaack (1966: 365), while describing *Corydoras pygmaeus* as a new species, noted that: "Nach der z. Z. noch im allgemeinen benutzten Systematik der Callichthyiden von Gosline (1940) müßte diese Art der Gattung *Aspidoras* zugeordnet werden. Auf Grund vorliegender Untersuchungsergebnisse läßt sich diese Gattung nicht aufrecht erhalten, so daß die Art *pygmaeus* dem Genus *Corydoras* zugeschrieben wurde. Eine ausführliche Diskussion und Begründung über den Einzug der Gattung *Aspidoras* wird in einer späteren Arbeit erfolgen." To our knowledge, Knaack never published this intended paper.

Hoedeman (1952) — based on Gosline, 1940 — united *Aspidoras*, *Brochis*, and *Corydoras* in the subfamily Corydoradinae Hoedeman, 1952 (forming together with the Callichthyinae Gill, 1872, the family Callichthyidae Gill, 1872). He split the Corydoradinae into two tribes, the Corydoradidi with *Corydoras* and *Brochis*, and the Aspidoradidi with *Aspidoras*. We prefer to omit discussion of the higher classification (above generic level) within the family Callichthyidae until suitable comparative anatomical investigations have been accomplished.

The majority of the species we recognize within *Aspidoras* show greater similarities than differences. Four hundred specimens were available for examination. We ascribed them to thirteen nominal species. We realize that the results presented in this publication have not to be considered clear-cut solutions of the problems we were faced with. Many of the specimens at hand were collected a long time ago, and we have to await freshly collected material to describe the minor details of the colour patterns. The morphometric and meristic data represented in the bar diagrams (figs. 17 through 19) were taken from a limited number of adult specimens, for many specimens are juvenile, hence not useful for comparison with adult specimens of other species.

ABBREVIATIONS USED AND DEFINITIONS OF TERMS

CAS	California Academy of Sciences, San Francisco, Calif.
[CM]	Carnegie Museum (material now in FMNH).
DNOCS	Departamento Nacional de Obras Contra as Sêcas, Fortaleza, Ceará.
FMNH	Field Museum of Natural History, Chicago, Ill.
IRScNB	Institut Royal des Sciences Naturelles de Belgique, Brussels.

[IU]	Indiana University (material now in CAS).
MNRJ	Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro.
MZUSP	Museu de Zoologia da Universidade de São Paulo, São Paulo.
NMW	Naturhistorisches Museum, Vienna.
RMNH	Rijksmuseum van Natuurlijke Historie, Leiden.
[SU]	Stanford University (material now in CAS).
UMMZ	University of Michigan, Museum of Zoology, Ann Arbor, Mich.
USNM	National Museum of Natural History, Washington, D.C.
ZMA	Instituut voor Taxonomische Zoölogie (Zoölogisch Museum), Amsterdam.
bd	body depth, measured from the anterior edge of the azygous predorsal scute vertically to the ventral edge of the ventrolateral body scute(s) (where in <i>Corydoras</i> the coracoid is exposed); in adult females bearing ripe eggs the bulging belly is not included; expressed as a ratio of sl.
bw	body width, measured between point just anterior to the pectoral spine insertions; expressed as a ratio of sl.
ca	width of "coracoid area", measured between the ventral edges of the anteriormost ventrolateral scutes; expressed as a ratio of hl.
db	number of dorsolateral body scutes (except the small scutes at the posterior end of the caudal peduncle).
dcp	least depth of the caudal peduncle; expressed as a ratio of hl.
hl	head length, measured from the snout tip (ethmoid) to the highest point of the gill opening; expressed as a ratio of sl.
lbo	length of the bony orbit, horizontally measured; expressed as a ratio of hl.
lds	length of the dorsal fin spine, measured with the spine in vertical position from the junction of the bases of the dorsal spine and the predorsal scute to the spine tip; expressed as a ratio of sl.
lps	length of the pectoral spine, measured with the spine pressed along the body from the articulation point of the spine to its tip; expressed as a ratio of sl.
pas	number of pre-adipose scutes, is the number of middorsal scutes anterior to the adipose fin spine, which is in fact a modified middorsal scute though not included in the count.
sl	standard length, measured from the snout tip (ethmoid) to the junction of the posterior edges of the last counted scutes of the caudal peduncle; expressed in mm to the nearest tenth.
sn	snout length, measured from the snout tip (ethmoid) to the nearest anterior edge of the bony orbit; expressed as a ratio of hl.
vbs	number of ventrolateral body scutes (except the small scutes at the posterior end of the caudal peduncle).
wi	least width of the interorbital, is the least distance between the dorsal borders of the orbit of each side; expressed as a ratio of hl.

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For the loan and/or exchange of specimens we like to express our gratitude to the following colleagues: Dr. R. M. Bailey & Dr. R. R. Miller (UMMZ); Dr. M. Boeseman (RMNH); Dr. R. A. Braga (DNOCS); Dr. H. Britski (MZUSP); Dr. A. Leitão de Carvalho (MNRJ); Dr. W. N. Eschmeyer & Miss P. Sonoda (CAS); Dr. J. Géry, Saint-Cyprien, Dordogne; Dr. J. P. Gosse & Mr. E. Walschaerts (IRScNB); Dr. R. K. Johnson (FMNH); Dr. P. Kähnsbauer (NMW); and Dr. S. H. Weitzman (USNM). Mr. L. A. van der Laan (ZMA) made the photographic illustrations. Figs. 2 and 3 were drawn by Mrs. M. P. Bakry (USNM); fig. 5 by Dr. S. H. Weitzman. Dr. Weitzman also kindly read the manuscript and discussed (in lit., 6 and 25 November, 1975) the status of the genus *Aspidoras*. An agreement with our opinion that *Aspidoras* is distinct from *Corydoras* is not implied.

Aspidoras R. von Ihering, 1907

Aspidoras R. von Ihering, 1907: 30 and 31 (original diagnosis, in English and Portuguese; type-species, by original designation and monotypy, *Aspidoras rochai* R. von Ihering, 1907).

Aspidoras is easily distinguished from all other callichthyid genera (*Corydoras*, *Brochis*, *Dianema*, *Callichthys*, *Hoplosternum*) by the possession of two cranial fontanels. The anterior (frontal) fontanel — round or slightly oval in shape — always penetrates the roof of the skull, whereas the posterior (supraoccipital) fontanel is closed in adult specimens, leaving a small roundish shallow pit.

In the 400 specimens examined of thirteen species we assign to the genus *Aspidoras* a basically similar structure of the skull roof was found. The variability of this character is small. None of the other Callichthyidae show this structure and no intermediate structure was found in the 100-odd species of the related genus *Corydoras*.

Corydoras, *Brochis*, and *Dianema* possess a single, open fontanel — much larger and far more elongate than the frontal fontanel in *Aspidoras* — with a commissural bar anteriorly. *Callichthys* and *Hoplosternum* have a roundish frontal fontanel with a foramen anterior to the commissural bar and a small foramen posterior to it.

Aspidoras is most closely related to *Corydoras* Lacépède, 1803 and *Brochis* Cope, 1872. *Brochis* differs from *Corydoras* among others by having

more dorsal fin rays (10-17 in *Brochis* against 6-8 (usually 7) in *Corydoras*).

Aspidoras comprises small sized species, up to 41.8 mm standard length (*Aspidoras menezesi* n. sp.), with small eyes and short dorsal and pectoral spines. In habitus, all but one species (*Aspidoras poecilus* n. sp.) are — unlike the majority of *Corydoras* and *Brochis* species — roundish rather than triangularly depressed in their transverse head shape.

Too much emphasis has hitherto been laid upon the characteristic of the nuchal plates meeting along the midline between occipital process and dorsal fin spine, to distinguish *Aspidoras* from *Corydoras*. The position of the nuchal plates (i.e., meeting or not meeting) is an insufficient character to distinguish *Aspidoras* from *Corydoras*, as in some species of *Aspidoras* the nuchal plates are separated along the midline by the supraoccipital process (fig. 16n), like in most — not all — species of *Corydoras*.

Little is known of the evolution of the Callichthyidae and therefore it is speculative to discuss phylogenetic relationships. For example, we do not know whether the presence of a supraoccipital fontanel (pit) in *Aspidoras* represents a retained primitive character shared with unknown ancestral callichthyids or that it is a specialized character in a process of closing the skull. If the character is primitive (the presence of a frontal and parietal fontanel is considered primitive for ostariophysan fishes), then it is hardly defensible to recognize *Aspidoras* as a taxon different from *Corydoras* according to the Hennigian cladistic approach. On the other hand, none of the known callichthyid genera shares this character, so it might be considered a specialized character. We are unable at the moment to use this character for making phylogenetic inferences, but certainly it is useful to assemble the thirteen species which possess the supraoccipital pit in a separate genus.

Etymology. —

Not explained by R. von Ihering. Most probably *Aspidoras* is derived from the Latin "asper", meaning rough, harsh, uneven, and from the Greek δoπά, meaning skin, hide. There is a well-known generic name in Siluriformes, *Doras* Lacépède, 1803.

Table I. Morphometric characters in mm to the nearest tenth, and counts of the primary type-specimens of the species of *Aspidoras*.

	sl	bd	bw	lds	lps	hl	sn	lbo	wi	ca	dcp	D	P ₁	A	P ₂	C	db	vs	pas
<i>rochai</i>	39.9	10.6	10.4	—	—	10.2	5.4	1.9	4.5	4.5	5.5	1,7,i	i,5	i,6	1,9	7/7	27	24	6
<i>raimundi</i>	25.5	6.7	6.0	4.0	4.5	6.4	3.1	1.8	3.0	2.0	3.6	1,7,i	i,6	ii,5	1,9	7/7	25	23	4
<i>lakoi</i>	33.4	10.4	9.1	3.2	5.1	9.6	4.8	1.2	4.6	3.2	4.9	1,7,i	i,6	i,5	1,9	7/7	26	24	11
<i>pauciradiatus</i>	23.2	6.8	5.9	4.5	5.5	6.2	2.5	1.7	2.8	3.5	2.9	1,6,i	i,5	i,6	1,7	7/7	23	20	2
<i>albater</i>	35.6	9.0	8.9	4.4	6.5	9.9	5.5	2.0	4.0	3.9	4.8	1,7,i	i,6	ii,5	1,8	7/7	26	23	5
<i>brunneus</i>	20.9	5.4	5.3	3.0	3.6	5.8	3.1	1.5	2.4	2.2	3.0	1,7,i	i,6	ii,5	1,9	7/7	26	23	4
<i>carvalhoi</i>	25.4	7.4	6.8	3.9	4.9	6.6	3.4	1.3	3.2	3.1	3.8	1,7,i	i,5	ii,5	1,9	7/7	25	22	4
<i>eurycephalus</i>	29.5	8.2	7.5	2.9	3.3	8.0	4.3	1.5	4.2	3.0	4.5	1,7,i	i,5	ii,5	1,9	7/7	26	23	4
<i>fuscoguttatus</i>	32.0	9.2	8.5	4.7	4.9	8.6	4.5	1.4	4.0	4.0	4.7	1,7,i	i,5	i,5	1,8	7/7	27	24	3
<i>maculosus</i>	37.2	9.7	8.7	4.8	5.5	9.5	5.1	2.3	3.8	5.8	4.8	1,7,i	i,5	ii,5	1,8	7/7	26	23	3
<i>menezesi</i>	41.8	11.2	10.3	5.8	7.5	10.9	5.9	2.4	4.1	4.7	5.5	1,7,i	i,5	ii,5	1,9	7/7	26	23	6
<i>poecilus</i>	29.2	8.3	7.1	5.4	5.8	7.8	4.1	1.9	3.7	2.4	4.2	1,7,i	i,5	ii,5	1,8	7/7	25	22	6
<i>spilotus</i>	34.0	8.2	8.1	4.2	5.5	9.3	5.1	1.9	3.2	3.5	4.1	1,7,i	i,5	i,5	1,9	7/7	25	22	3

A = anal fin; C = caudal fin; D = dorsal fin; P₁ = pelvic fin; P₂ = pectoral fin.

KEY TO THE SPECIES OF *ASPIDORAS*

- 1a. Snout length 2.5 or more in hl; length pectoral spine less than 4.5 in sl; number of dorso- and ventrolateral body scutes 23/20; dorsal fin with a spine and 6 soft rays, last ray split to its base *Aspidoras pauciradiatus* (Weitzman & Nijssen, 1970)
- b. Snout length 2.1 or less in hl; length pectoral spine more than 4.5 in sl; number of dorso- and ventrolateral body scutes 25/22 or more; dorsal fin with a spine and 7 soft rays, last ray split to its base 2
- 2a. Dorsolateral body scutes with a longitudinal solid dark brown band *Aspidoras brunneus* n. sp.
- b. Dorsolateral body scutes without longitudinal solid dark brown band 3
- 3a. Body with about 4 distinct oblique bars *Aspidoras albater* n. sp.
- b. Body with other colour markings or without colour markings 4
- 4a. Body with distinct dark midlateral blotches 5
- b. Body without distinct dark midlateral blotches 6
- 5a. Length bony orbit 5.3 or more in hl; body width 3.8 in sl; 6 pre-adipose scutes *Aspidoras rochai* R. von Ihering, 1907
- b. Length bony orbit 5.0 or less in hl; body width 3.9 or more in sl; 3 to 4 pre-adipose scutes *Aspidoras spilotus* n. sp.
- 6a. Body without colour pattern *Aspidoras carvalhoi* n. sp.
- b. Body with a colour pattern 7
- 7a. Length bony orbit 6.5 or more in hl; 6 or (usually) more pre-adipose scutes. *Aspidoras lakoi* P. de Miranda Ribeiro, 1949
- b. Combination of length bony orbit and number of pre-adipose scutes not as in 7a 8
- 8a. Body marbled with brown and with some rows of small roundish dark brown spots (lacking in juveniles) *Aspidoras fuscoguttatus* n. sp.
- b. Body marbled with brown, without rows of small roundish dark brown spots 9
- 9a. Body with irregular oblique brown marbling; length dorsal spine 5.2 to 5.4 in sl *Aspidoras poecilus* n. sp.

- b. Body with irregular oblique brown marbling; length dorsal spine 6.3 to 8.9 in sl *Aspidoras* sp. aff. *poecilus*
- c. Body with more or less roundish spots; length dorsal spine more than 5.8 in sl 10
- 10a. Dorsal fin usually with a conspicuous, triangular dark blotch *Aspidoras raimundi* (Steindächner, 1907)
- b. Dorsal fin without a conspicuous, triangular dark blotch 11
- 11a. Length pectoral spine more than 8.0 in sl; interorbital width less than 2.0 in hl; length dorsal spine more than 9.5 in sl *Aspidoras eurycephalus* n. sp.
- b. Length pectoral spine less than 8.0 in sl; interorbital width more than 2.0 in hl; length dorsal spine less than 9.5 in sl 12
- 12a. Length dorsal spine more than 7.3 in sl; length pectoral spine more than 5.7 in sl; body depth 3.8 to 4.0 in sl; body width 4.2 to 4.4 in sl; 3 to 4 pre-adipose scutes *Aspidoras maculosus* n. sp.
- b. Length dorsal spine less than 7.3 in sl; length pectoral spine less than 5.7 in sl; body depth 3.3 to 3.8 in sl; body width 3.8 to 4.2 in sl; 5 to 6 pre-adipose scutes *Aspidoras menezesi* n. sp.

Aspidoras rochai R. von Ihering, 1907 (figs. 1, 15a-b, 16a, 17-20)

Aspidoras rochai R. von Ihering, 1907: 30-34 (original description; type-locality: "Fortaleza, capital of State of Ceará"; lectotype in Departamento de Zoologia, Secretaria da Agricultura, São Paulo, MZUSP 2195); Eigenmann, 1910: 402 (listed); A. de Miranda Ribeiro, 1911: 155-156 (description, after R. von Ihering); A. de Miranda Ribeiro, 1918: 720 (listed; apparently the syntypes; Fortaleza); Fowler, 1954: 46 (references, in part); Britski, 1969: 206 (description; designation of the lectotype).

Material examined. — One (lectotype, designated by Britski, 1969: 206), MZUSP 2195, sl 39.9 mm, Brazil, Est. Ceará, Fortaleza, 03°45' S, 38°35' W, coll. F. Dias da Rocha, I-1905; one (paralectotype), MZUSP 5300, sl 37.8 mm, same data as lectotype.

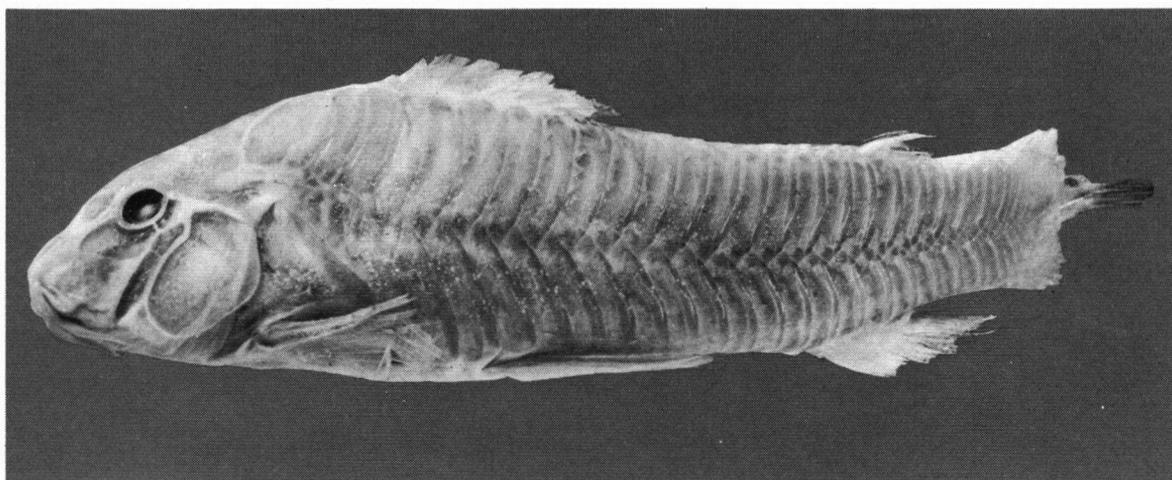


Fig. 1. *Aspidoras rochai* R. von Ihering, 1907. Lectotype.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. Both the lecto- and paralectotype are in a poor condition. The dorsal fin spine is broken in the lectotype. Dorsal fin rays are broken off near the base in both specimens, whereas the caudal fin is almost completely lost in both specimens. Also the pectoral and anal fins are badly damaged, although in the paralectotype we observe that the middle pectoral fin rays reach over the pelvic fin base to about the tip of the first (unbranched) pelvic fin ray. Only the pelvic fins are still in good shape in the lectotype.

Snout in front of nostrils naked. Two short mental barbels, two pairs of rictal barbels, longer (upper) rictal barbel reaching to or a little beyond a vertical from anterior margin of eye. Inner edge of pectoral fin spine moderately serrated (figs. 15a-b). Anterior fontanel short-oval (fig. 16a). Skin of intercoracoid area with numerous isolated minute ossifications, decreasing in number and size posteriorly.

Colour in alcohol (fig. 1). — Except for some very faint, indefinite brownish shading along the midline of the body, the colour pattern has completely disappeared from the lectotype and the paralectotype. R. von Ihering (1907: 32 and 34) described the colour in the English part of the original description as follows: "General colour of body dark-brown above, light below; several light rounded spots on operculum and flanks; above the lateral line runs, parallel to it, a light

and somewhat irregular band from the nape to the caudal, being united in front with that of the other side. Pectoral and ventral fins plain; anal with several spots which form a cross-line; dorsal dark at the base, light in the middle and as it seems, with dark subterminal markings; caudal with 4-6 (?) oblique series of little spots."

In a footnote on page 32 R. von Ihering states: "I cannot give here the full description of the dorsal and caudal fins as they are greatly damaged in both typical specimens."

Etymology. —

In honour of Mr. Francisco Dias da Rocha (R. von Ihering, 1907: 34 and 35).

***Aspidoras raimundi* (Steindachner, 1907)**
(figs. 2-3, 15c, 16b, 17-20)

Corydoras raimundi Steindachner, 1907: 84-85 (original description; type-locality: "... in dem Bächchen, welches bei Victoria in den Rio Parnahyba mündet."); lectotype in Naturhistorisches Museum, Vienna, NMW 61110; Eigenmann, 1910: 403 (listed); Regan, 1912: 215 (description, after Steindachner; in key on p. 210); Ellis, 1913: 409 (listed; in key, after Steindachner, on p. 400); Gosline, 1940: 21 (listed; in key on p. 14); Gosline, 1945: 75 (listed); Fowler, 1954: 66 (listed); Nijssen, 1970: 58 (listed; placed within *Corydoras* "barbatus-group").

Corydoras raymundi; Van der Stigchel, 1946 & 1947: 130-131 (misspelling of name; description of "type", which is listed on p. 5 as "holotype").

Material examined. — One (lectotype, by present designation), NMW 61110 (ex NMW 46794), sl 25.5 mm, Brazil, Est. Maranhão, at mouth of brook emptying into Rio Parnaíba at

Alto Parnaíba (formerly Victoria), 09°08' S, 45°56' W, coll. F. Steindachner, 26/29-VI-1903; sixty-two (paralectotypes), NMW 46792 (one), NMW 46794 and 46795 (fifty-one), ZMA 110.480 (nine, ex NMW 46794), RMNH 7962 (one, this specimen has erroneously been considered "holotype" by Van der Stigchel, 1946 & 1947: 5), sl 12.7 to 32.6 mm, same data as lectotype.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. Dorsal and pectoral spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two short mental barbels, two pairs of long rictal barbels, which may reach (as in the lectotype) well beyond base of pectoral

fin spine. Inner edge of pectoral fin spine strongly serrated (fig. 15c). Anterior fontanel elongate oval (fig. 16b) in the lectotype and most of the paralectotypes, short-oval in some other paralectotypes. Skin of intercoracoid area with several isolated minute ossifications, decreasing in number and size posteriorly.

Colour in alcohol (figs. 2-3). — Steindachner (1907: 85) describes the colour pattern as: "3 Reihen länglicher Fleckchen von grau-violetter Färbung längs der beiden oberen Höhendrittel des Rumpfes. Schwanzflosse quer gebändert. Eine fast schwärzliche, scharf abgegrenzte Binde längs der Höhenmitte der Rückenflosse, zu-

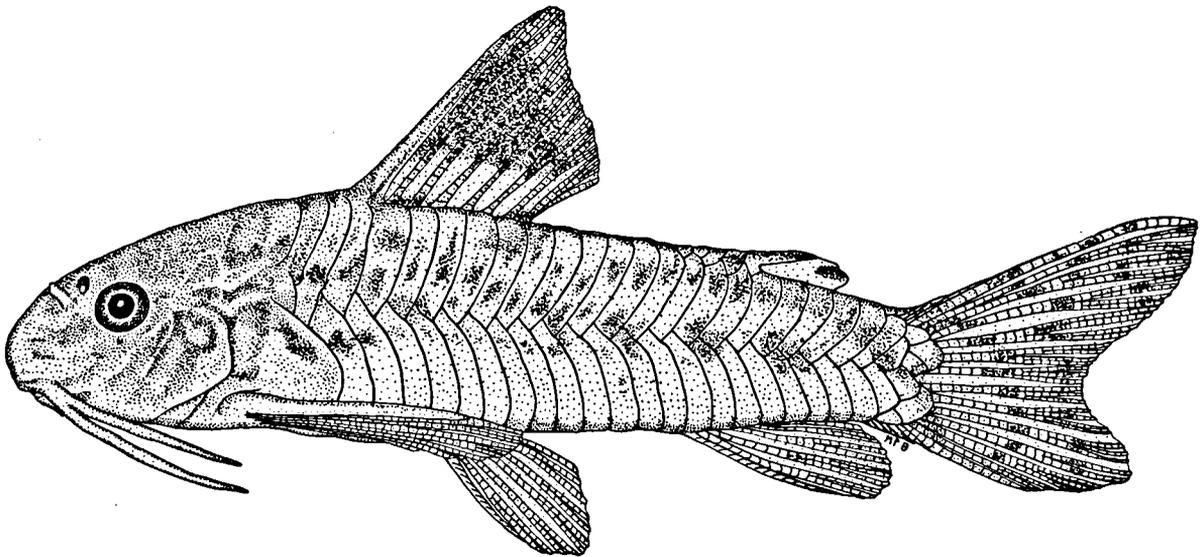


Fig. 2. *Aspidoras raimundi* (Steindachner, 1907). Lectotype, male.

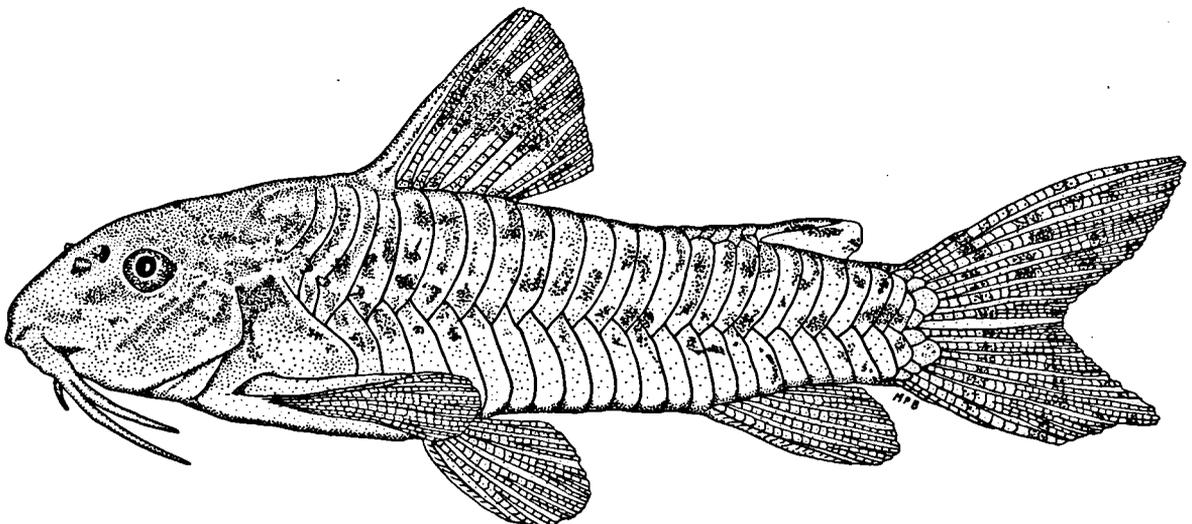


Fig. 3. *Aspidoras raimundi* (Steindachner, 1907). Paralectotype, female, NMW 46794, sl 32.6 mm.

weilen nicht ganz bis zum hinteren Flossenrande reichend."

Ground colour of body and head pale tan. Small, irregular brown spots distributed over body, operculum and cleithrum. In some specimens spots tend to be arranged into a longitudinal pattern. No mask present but melanophores dense between eyes and over supraoccipital bone, producing a dark brown colour on posterior dorsum of head. Dorsum of snout pale tan to pale brown. Belly pale tan, without dark pigment. Barbels all pale tan to brown.

Dorsal fin unpigmented along base and tip, with a prominent dark brown, more or less triangular blotch, originating at about halfway the dorsal spine. Adipose fin spine usually dark brown, and some dark brown pigment about this spine on the membrane. Caudal fin rays with minute dark brown spots, forming narrow, irregular, more or less vertical to oblique bars. Pectoral, pelvic, and anal fins without pigment.

Etymology. —

Unknown, perhaps named after a Brazilian assistant (Dr. P. Kähnsbauer, in lit.).

Nomenclatural note. —

Steindachner (loc. cit.) did not state the exact number of specimens he had at hand while originally describing this species. We are quite sure he had at least the sixty-three syntypes that

we re-examined at hand. Anyhow, there was no holotype selected for *Corydoras raimundi*, as Van der Stigchel assumed. Probably, Van der Stigchel thought that the species was described from a single specimen.

***Aspidoras lakoi* P. de Miranda Ribeiro, 1949**
(figs. 4, 15d, 16c, 17-20)

Aspidoras lakoi P. de Miranda Ribeiro, 1949: 143-145, fig. 1 (original description; type-locality: "Pequeno córrego na floresta do Grotão, Fazenda da Cachoeira, Município de Passos, Estado de Minas Gerais"; holotype in Museu Nacional, Rio de Janeiro, MNRJ 5292); P. de Miranda Ribeiro, 1959: 8 (listed; holotype and topotypes: Est. Minas Gerais, Córrego na floresta do Grotão, fazenda da Cachoeira, Passos).

Material examined. — One (holotype), MNRJ 5292, sl 33.4 mm, Brazil, Est. Minas Gerais, Rio Paraná system, a tributary of Rio Grande, pequeno córrego na floresta do Grotão, Fazenda da Cachoeira, Município de Passos, coll. C. Lako, IX-1945; twenty-three (topotypes), MNRJ 5293 (twenty-one), ZMA 113.565 (two), sl 14.9 to 39.7 mm, coll. C. Lako, 1945.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. Dorsal and pectoral fin spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two short mental barbels, two pairs of long rictal barbels, reaching the gill openings ventrally. Inner edge of pectoral spine faintly serrated (fig. 15d). Anterior fontanel elon-



Fig. 4. *Aspidoras lakoi* P. de Miranda Ribeiro, 1949. Holotype.

gate oval in some specimens, slightly rhomboidal in others (fig. 16c). Skin of intercoracoid area naked without ossifications.

Colour in alcohol (fig. 4). — P. de Miranda Ribeiro (1949: 144) describes the colour pattern as: "O colorido fundamental é isabelino, sendo que as placas, especialmente nas extremidades, mostram máculas castanhas que, vistas em conjunto, parecem formar uma tarja ao longo da linha lateral e máculas irregularmente dispostas sobre o corpo; cabeça irregularmente manchada de castanho, mais carregado para o focinho. Dorsal e adiposa escuras na base, sendo que a primeira com pintas castanhas sobre os raios; anal com uma mácula castanha na base, após o primeiro raio, tendo os demais manchados em sua metade, formando uma tarja naquela região. Os raios de caudal, com manchas castanhas, arrumadas paralelamente em seis filas."

Holotype. Ground colour yellowish. Large, irregular, alternating (originally dark?) brown blotches all over the sides of the body. Adipose spine and part of membrane dark brown. Dorsal fin with some small brown dots. Dorsum of pectoral fin brownish. Pelvic fins plain. Anal fin with rather large basal dot, followed by a tan zone, which is followed by a dark tan oblique zone. Tips of anal fin rays pigmented. Caudal fin broken off for the greater part, but, according to the rather good photograph of this specimen published in the original description, with many small brown dots, arranged into about four more or less regular vertical lines.

Topotypes. Ground colour of body and head pale tan. Caudal fins greatly damaged in all specimens. Bony parts of head pale brownish. Body marbled with light brown in a sort of checkerboard pattern in some of the specimens.

Dorsal fin unpigmented in some specimens, with some light brown spots on the soft rays in other specimens, the membrane between spine and first ray pigmented with brown in some specimens. Adipose fin sometimes with a faint small light brown dot near the base of the spine. A few spots may occur on dorsum of pectoral fin rays, but mostly this fin is evenly pigmented with light brown, and in some specimens it is unpigmented. Pelvic fins plain. Anal fin base with or without a faint brown blotch.

Etymology. —

Named in honour of Mr. Carlos Lako, who

collected the holotype and topotypes (P. de Miranda Ribeiro, 1949: 143).

Aspidoras pauciradiatus (Weitzman & Nijssen, 1970)

(figs. 5, 15e, 16d, 17-20)

"*Corydoras* U-6" Axelrod et al., 1967: F-223.00 (colour photograph).

Corydoras pauciradiatus Weitzman & Nijssen, 1970: 129-131, figs. 5, 6e (original description; type-locality: "Brazil, Rio Araguaia near Aruaña (14°58' S, 51°04' W), Est. Goiás"; holotype in United States National Museum, Washington D.C., USNM 191625).

Material examined. — One (holotype), USNM 191625, sl 23.2 mm, Brazil, Est. Goiás, Rio Araguaia near Aruaña, 14°58' S, 51°04' W, coll. H. R. Axelrod, 1960; one (paratype), USNM 204363, sl 22.6 mm, same data as holotype; two, ZMA 113.586, sl 20.1-21.4 mm, aquarium specimens, donated by F. Wolter, X-1970; one, ZMA 113.587, sl 29.4 mm, aquarium specimen, donated by R. Suhr, specimen was imported in 1963, died XII-1968.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. Two pairs of rictal barbels and one pair of mental barbels. Inner edge of pectoral spine strongly serrated (fig. 15e). Fontanel round, 0.7 mm in diameter in holotype and paratype, enclosed by frontals (fig. 16d). Skin of intercoracoid area naked.

Colour in alcohol (fig. 5). — Ground colour of body and head pale tan. No mask present but melanophores dense between eyes and over supraoccipital bone, producing a dark brown colour on posterior dorsum of head. Dorsum of snout pale brown with 7 to 8 moderate sized spots in a triangular pattern with one end of triangle at snout tip. Small brown spots (as in fig. 5) arranged over sides of body and head. Spots tend to be arranged in a linear longitudinal pattern, each row occurring on 6 to 10 scutes. Posterior end of each row converges toward junction between dorso- and ventrolateral body scutes. Thus posteriorly, dorsal rows of spots converge ventrally toward ventral rows of spots which converge dorsally. The effect vaguely resembles a series of posteriorly pointing chevrons. This can best be seen in a live colour photograph of paratype on page F-223.00 of "*Corydoras* U-6" in Axelrod et al. (1967). Belly pale tan, without dark pigment. Dorsal rictal barbels brown, ventral rictal barbels white.

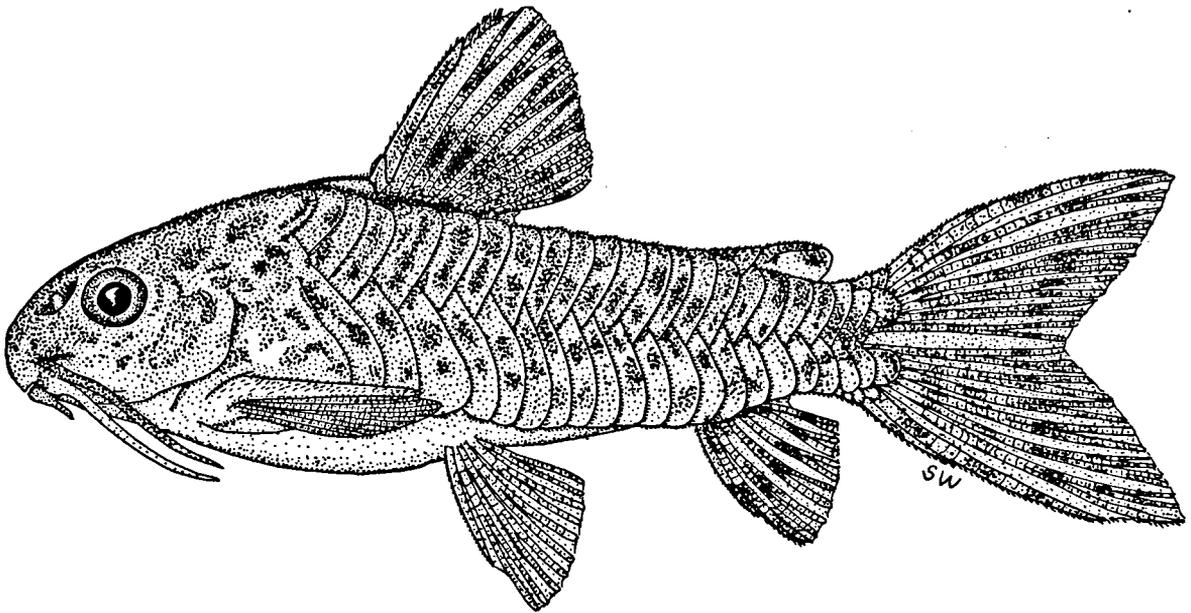


Fig. 5. *Aspidoras pauciradiatus* (Weitzman & Nijssen, 1970). Holotype.

Dorsal fin with a large basal black blotch, on rays and membrane and one or two distal narrow horizontal bands. Pigment of these bands confined to fin rays. Adipose fin with some pigment dorsally in both type-specimens; adipose spine with black pigment. Pectoral and pelvic fins without dark pigment. Anal fin with one or two rows of pigment, confined to the fin rays and forming a band. Caudal fin with about five rows of narrow black bars, third from anterior band being darkest. Distal bar almost not distinguishable. Pigment confined to fin rays.

In two of the three additional specimens (ZMA 113.586 and 113.587) the distal half of the pelvic fin rays bear some blackish pigmentation; the three specimens have dark pectoral spines.

Etymology. —

From the Latin “paucus” meaning few, and “radius” meaning ray of the sun or spoke of a wheel, hence rays of a fin. In reference to the few dorsal and pectoral fin rays (Weitzman & Nijssen, 1970: 130).

***Aspidoras albater* n. sp.**
(figs. 6, 15f, 16e, 17-20)

Material examined. — One (holotype), MZUSP 12991, sl 35.6 mm, Brazil, Est. Goiás, Rio Tocantinzinha near São João da Aliança, 14°46' S, 47°30' W, Rio Tocantins system, coll. G.

Brasil, 1-1974; eleven (paratypes), MZUSP 12992 (four), USNM 213540 (five), ZMA 113.592 (two), sl 27.5 to 33.9 mm, same data as holotype.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. Dorsal and pectoral fin spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two short mental barbels, two pairs of rictal barbels, the longest (dorsal) reaching to or little beyond a vertical from the posterior margin of eye. Inner edge of pectoral fin spine finely serrated (fig. 15f). Anterior fontanel round (fig. 16e). Skin of intercoracoid area with numerous isolated minute ossifications.

Colour in alcohol (fig. 6). — Ground colour of body and head pale tan. Four large, irregular, oblique, almost solid black or dark brown blotches on body, and some smaller, more or less isolated dots along dorsum. Dorsum of head dark brown, operculum and dorsum of snout marbled with tan and dark grey. Cleithrum even grey except for white area just superior to pectoral fin spine base.

Base of dorsal fin rays with grey pigment in most specimens; dorsal fin rays with one or two horizontal rows of grey dots. Adipose fin spine grey, adipose fin membrane unpigmented. Caudal fin (damaged in all specimens) with three or a few more rather broad vertical or irregularly

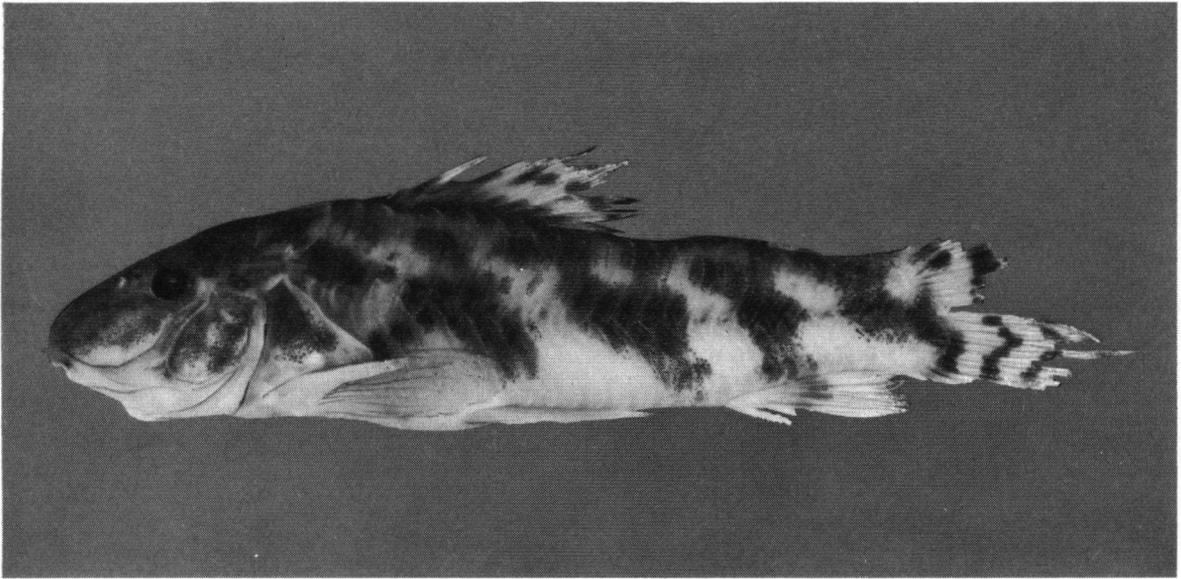


Fig. 6. *Aspidoras albater* n. sp. Holotype.

curved bars. Pectoral and pelvic fins unpigmented; anal fin with some faint pigment forming a diffuse spot variably extending to about halfway the rays.

Etymology. —

The specific name is derived from the Latin “*albus*” meaning white, and from the Latin “*ater*” meaning black, in allusion to the colour pattern.

***Aspidoras brunneus* n. sp.**
(figs. 7, 15g, 16f, 17-20)

Material examined. — One (holotype), ZMA 113.588, sl 20.9 mm, Brazil, Est. Mato Grosso, Serra do Roncador, km 125 of

the road Chavantina-Caximba, coll. E. J. Fittkau, 17-VIII-1965; five (paratypes), ZMA 109.380 (four), USNM 213569 (one), sl 19.4 to 21.3 mm, same data as holotype.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. The six specimens used for this description are apparently all juveniles. Dorsal and pectoral fin spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two short mental barbels, two pairs of long rictal barbels, reaching nearly to the gill openings ventrally. Inner edge of pectoral fin spine strongly serrated (fig. 15g). Anterior fontanel long oval to slightly rhomboidal (fig. 16f). Skin of intercoracoid area naked.

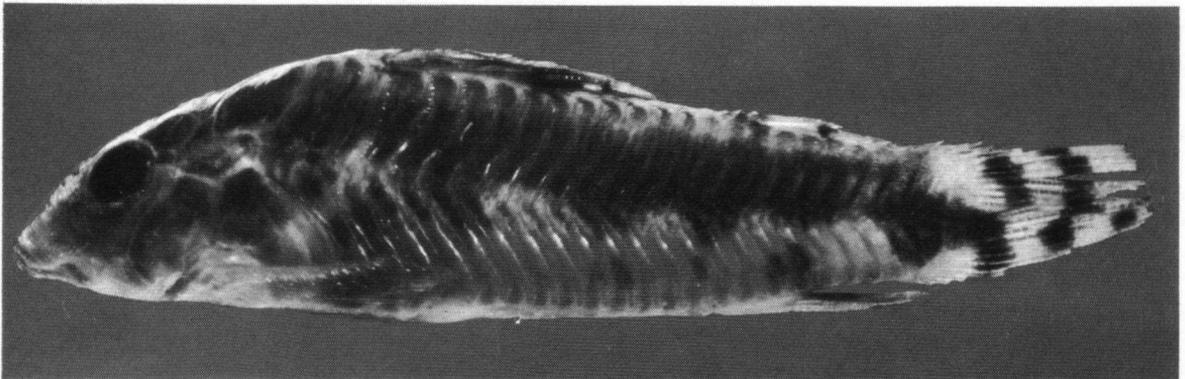


Fig. 7. *Aspidoras brunneus* n. sp. Holotype.

Colour in alcohol (fig. 7). — Ground colour of body and head pale tan. Upper half of body solid dark brown to about the midlateral line, curving downwards near caudal fin base. Ventral side of this colour area irregularly alternated with pale tan of ventral half of body. Ossified parts of head dark brown, naked part of snout with irregularly distributed dark brown chromatophores. Dorsal fin with a dark blotch at base of first three rays, followed by a pale tan, unpigmented area. Distally the dorsal fin rays may bear dark pigment; in some specimens this pigment is situated lower on the rays and is followed by an unpigmented tip. Adipose fin spine brown in most of the specimens. Caudal fin with two or three oblique dark brown lines. The caudal fin tips are damaged in all six specimens. A rather large, dark brown blotch in posterior half of anal fin. Pelvic fins unpigmented. Pectoral fins usually with some dark, irregular and faint markings.

Etymology. —

The specific name is derived from the Medieval Latin "brunneus" meaning dusky, dark, tawny, in allusion to the dark brown colour pattern.

***Aspidoras carvalhoi* n. sp.**
(figs. 8, 15h, 16g, 17-20)

Aspidoras rochai [non R. von Ihering, 1907]; P. de Miranda Ribeiro, 1959: 8 (in part; listed; Brasil, Est. Ceará, Acude Canabrava, Guaramiranga).

Material examined. — One (holotype), MNRJ 5230, sl 25.4 mm, Brazil, Est. Ceará, Açude Canabrava, Guaramiranga, coll. R. S. de Menezes, XII-1947; one (paratype), ZMA 113.589, sl 22.3 mm, same data as holotype.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. Dorsal and pectoral fin spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two comparatively long mental barbels (about twice the length of such barbels in most of the other *Aspidoras* species), two pairs of rather short rictal barbels, reaching to a vertical through the centre of the eye. Inner edge of pectoral fin spine strongly serrated (fig. 15h). Anterior fontanel elongate oval (fig. 16g). Skin of intercoracoid area with several isolated minute ossifications, decreasing in number posteriorly.

Colour in alcohol (fig. 8). — Ground colour light yellowish umber all over. This species is almost completely devoid of chromatophores; only a few dark brown isolated minute pigment spots on the lateral body scutes, concentrated along or near the posterior edge of the scutes.

Etymology. —

Named in honour of Dr. Antenor Leitão de Carvalho, Chefe do Departamento de Vertebrados of the Museu Nacional, Rio de Janeiro, who kindly sent us many specimens of various species of *Aspidoras* on loan.

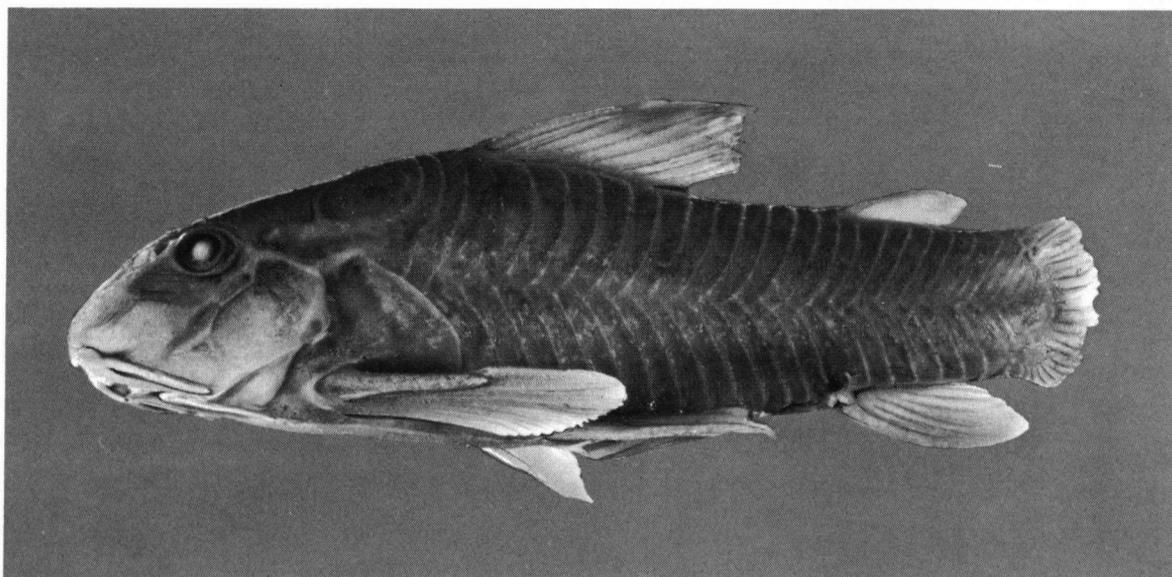


Fig. 8. *Aspidoras carvalhoi* n. sp. Holotype.

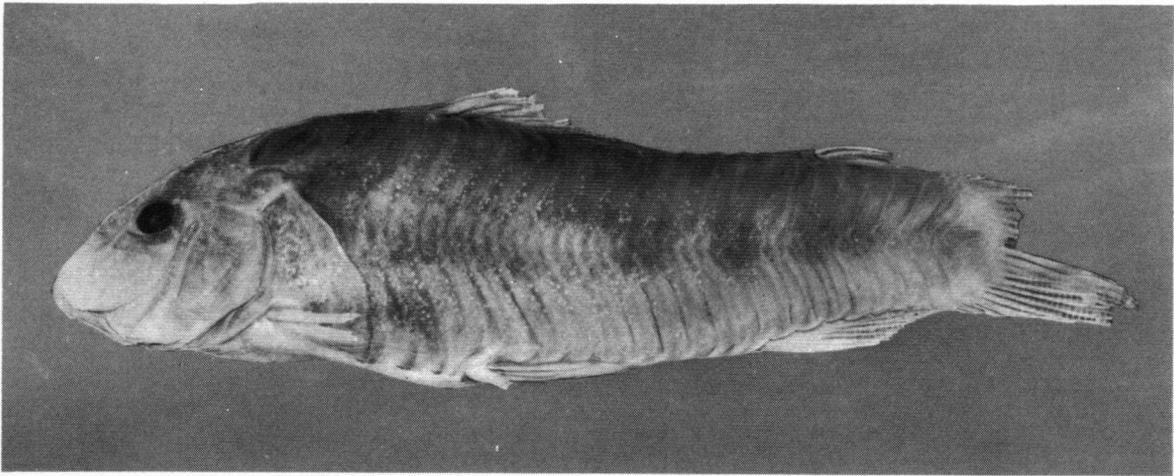


Fig. 9. *Aspidoras eurycephalus* n. sp. Holotype.

***Aspidoras eurycephalus* n. sp.**
(figs. 9, 15i, 16h, 17-20)

Material examined. — One (holotype), CAS 16010, sl 29.5 mm, Brazil, Est. Goiás, Rio Tocantins system, Corrego Vermelho into Rio das Almas, tributary of Rio Maranhão, about 15° S, 49°30' W, coll. C. Ternetz, 26-XII-1923; six (paratypes), CAS 31833 (five), ZMA 113.593 (one), sl 20.0 to 25.4 mm, same data as holotype.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. Dorsal and pectoral fin spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two short mental barbels, two pairs of long rictal barbels, somewhat shrivelled in all specimens. Inner edge of pectoral fin spine moderately serrated (fig. 15i). Anterior fontanel round to slightly oval (fig. 16h). Skin of intercoracoid area naked.

Colour in alcohol (fig. 9). — All seven specimens are badly faded, no doubt as a result of more than fifty years of preservation. There are, however, light brown markings on the body, reminiscent of those found in *Aspidoras poecilus* and *Aspidoras* sp. aff. *poecilus*. Three specimens have some remains of caudal fin rays, with an indication of a narrow vertical or little oblique line.

Etymology. —

The specific name is derived from the Greek εὐρύς meaning broad, wide, and from the Greek κεφαλή meaning head, in allusion to its wide interorbital.

***Aspidoras fuscoguttatus* n. sp.**
(figs. 10, 15k, 16i, 17-19, 21)

Material examined. — One (holotype), MZUSP 8573, sl 32.0 mm, Brazil, Est. Mato Grosso, Rio Paraná system, Córrego Corguinho, estrada da Três Lagoas (20°46' S, 51°43' W) — Conceição do Taboado, coll. H. Britski, 28-XII-1968; twenty-four (paratypes), MZUSP 11737 through 11755 (nineteen), ZMA 113.594 (five), sl 19.0 to 38.0 mm, same data as holotype.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. Dorsal and pectoral fin spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two short mental barbels, two pairs of long rictal barbels, reaching base of pectoral fin spine in some of the specimens; in other specimens the rictal barbels are slightly shorter, reaching almost to the gill openings ventrally. Inner edge of pectoral fin spine finely serrated (fig. 15k). Anterior fontanel elongate oval (fig. 16i). Skin of intercoracoid area with several isolated minute ossifications.

Colour in alcohol (fig. 10). — Ground colour of body and head pale tan. Dorsum and sides of head, opercles, and snout marbled with brown. In most specimens there is a narrow, solid brown oblique line running down forward from the eye. Dorsum and sides of body with three kinds of dark brown markings: (1) rather large, irregular blotches along the midline, (2) medium-sized, irregular and somewhat faint blotches just below the dorsum of the body and just above the



Fig. 10. *Aspidoras fuscoguttatus* n. sp. Holotype.

ventrum of the body, and (3) series of quite regular, small roundish speckles, which can be arranged into rows in some specimens. In the two smallest specimens (sl 19.0 and 22.3 mm) these speckles are absent or nearly absent. Upper third of lateral body scutes, just below dorsum of body, shaded with yellowish brown. Colour pattern highly variable in minor details.

Dorsal fin with a number of dark brown, mostly somewhat elongate dots, with a variable distribution over rays and membrane. Adipose fin usually with a small dark brown central or dorsal dot. Caudal fin with series of minute dark brown spots, forming up to three more or less regular vertically or zigzaglike arranged narrow lines. Anal fin usually with some faint spots at its base; some specimens also have a few of such spots near the distal end of the rays. Pelvic fins unpigmented. Dorsum of pectoral fins with light brownish pigmentation, or with minute, irregular dark brown spots, sometimes arranged into oblique lines.

Etymology. —

The specific name is derived from the Latin "fuscus" meaning dusky, dark, swarthy, and from the Latin "guttatus" meaning dappled, speckled, spotted, in allusion to the colour pattern.

Aspidoras maculosus n. sp.
(figs. 11, 15-l, 16k, 17-19, 21)

Aspidoras rochai [non R. von Ihering, 1907]; Ellis, 1913:

394, pl. XXVI fig. 3 (material listed from Agua Branca, Rio Zinga, and Rio Paiaia); Gosline, 1940: 10 (two of the specimens recorded by Ellis, 1913; Rio Paiaia); Gosline, 1945: 74 (listed; bacia do rio Itapicuru, Bahia, Brasil); Fowler, 1954: 46 (in part; references).

Material examined. — One (holotype), FMNH 54810 [ex CM 3457], sl 37.2 mm, Brazil, Est. Bahia, Rio Paiaia, into headwaters of Rio Itapicuru, small, rocky, rapid stream from Serra Jacobina between Bom Fim and Jacobina, about 11° S, 40°30' W, coll. J. D. Haseman, 8-XI-1907 (this specimen is figured in Ellis, 1913, pl. XXVI fig. 3); four (paratypes), FMNH 78361 [ex FMNH 54810, ex CM 3457] (two), ZMA 113.595 [ex FMNH 54810] (one), CAS [IU] 13319 [ex CM 3457] (one), sl 23.3 to 30.8 mm, same data as holotype; three (paratypes), FMNH 54808 [ex CM 3455], sl about 21.0 to about 33.4 mm, Brazil, Est. Bahia, Rio Agua Branca, coll. J. D. Haseman, 6-XI-1907; one (paratype), FMNH 54809 [ex CM 3456], sl 33.7 mm, Brazil, Est. Bahia, Rio Zinga, coll. J. D. Haseman, 7-XI-1907.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. Dorsal and pectoral fin spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two short mental barbels, two pairs of long rictal barbels, reaching to gill openings ventrally. Inner edge of pectoral fin spine serrated (as in fig. 15-l). Anterior fontanel elongate oval (fig. 16k). Skin of intercoracoid area naked.

Colour in alcohol (fig. 11; see also Ellis, 1913, pl. XXVI fig. 3). — Ground colour of body and head pale tan. Body with several isolated roundish or

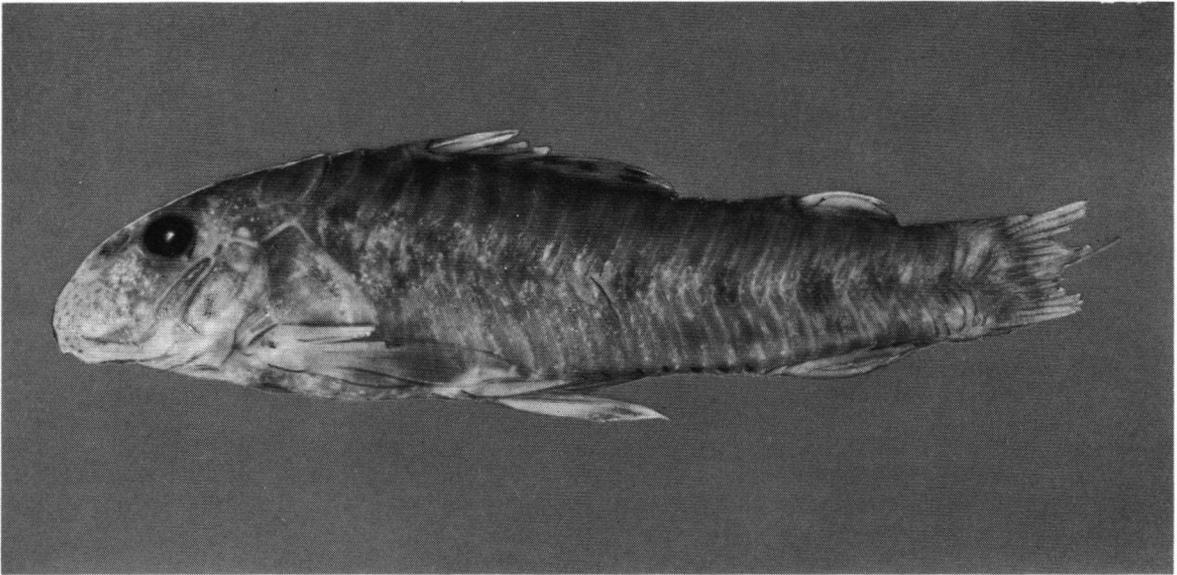


Fig. 11. *Aspidoras maculosus* n. sp. Holotype.

somewhat irregular brown spots, those on and near midline of longitudinal lateral body scutes somewhat larger than the others. In some specimens the spots tend to be arranged into irregular horizontal rows.

Dorsal fin with faint, irregular or elongate brown markings. Adipose fin membrane with or without a minute brown spot. Caudal fin with up to four narrow vertical lines of small brown spots on the rays. Anal fin presumably unpigmented (the specimens are preserved during 69 years). Pelvic fins without pigmentation. Pectoral fin sometimes with some brown pigment on the dorsum. Generally, the colour pattern of the body and head of *Aspidoras maculosus* resembles that of *A. raimundi*.

Etymology. —

The specific name is derived from the Latin “maculosus” meaning spotted, dappled, pied, in allusion to the colour pattern.

***Aspidoras menezesi* n. sp.**

(figs. 12, 15 m-n, 16-l, 17-19, 21)

Material examined. — One (holotype), UMMZ 147336, sl 41.8 mm, Brazil, Est. Ceará, Rio Granjeiro at Crato, 07°10' S, 39°25' W, tributary on left bank of Rio Salgado, coll. R. S. de Menezes, 1945; twenty-six (paratypes), UMMZ 195951 (twenty-one), ZMA 113.596 (five), sl 20.3 to 34.0 mm, same data as holotype; one (paratype), UMMZ 147340, sl 21.9 mm,

Brazil, Est. Ceará, Poco Redondo, Rio dos Cacás at Crato, Rio Salgado system, coll. R. S. de Menezes, XII-1945.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. Pectoral and presumably also dorsal fin spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two short mental barbels, two pairs of long rictal barbels, reaching to or just beyond gill openings ventrally. Inner edge of pectoral fin spine moderately serrated (figs. 15 m-n). Anterior fontanel elongate oval (fig. 16-l). Skin of intercoracoid area naked in juveniles, with a few isolated minute ossifications in adults.

Colour in alcohol (fig. 12). — Ground colour of body and head pale tan. Dorsal and caudal fins damaged in most of the specimens. Dorsum of head, snout, and opercles finely marbled with brown. Colour pattern on sides of body variable, consisting of medium-sized to rather large irregular dark brown blotches, most prominent along midlateral longitudinal body scutes, posteriorly sometimes united to form one elongate horizontal blotch. Upper half of dorsolateral body scutes with some ill-defined brown blotches, marbled, or cloudy. Lower half of ventrolateral body scutes unpigmented, except for a brown dot connected with the pigmentation on the midlateral body scutes in some specimens.

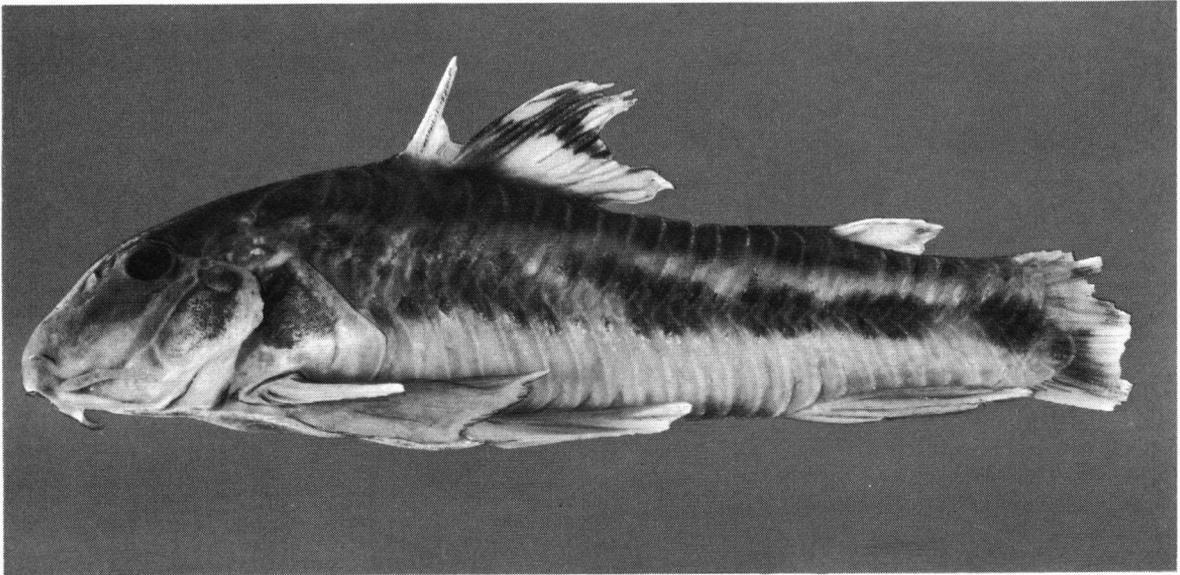


Fig. 12. *Aspidoras menezesi* n. sp. Holotype.

Head, snout, and opercles finely marbled with brown.

Dorsal fin with or without some brown spots; there are specimens with some brownish pigmentation in upper third of the fin. Adipose fin membrane unpigmented or with a faint brownish spot. Anterior part of damaged caudal fins may bear one or two vertical or oblique rows of minute dark brown spots forming narrow lines. Anal, pelvic, and pectoral fins unpigmented.

Etymology. —

This species is named in honour of Dr. Rui Simões de Menezes, who collected the holotype and paratypes.

Aspidoras poecilus n. sp.
(figs. 13, 15-o, 16m, 17-19, 21)

Corydoras cochui [non Myers & Weitzman, 1954]; Axelrod et al., 1967: F-203.00 (colour photograph; popular account).

Corydoras rochai [non R. von Ihering, 1907]; Knaack, 1970: 333, pl. CXXXI (photograph; popular account; discussion).

Material examined. — One (holotype), IRScNB 560, sl 29.2 mm, Brazil, Est. Mato Grosso, creek upstream of village Porori, left bank of Rio Xingu, upper Rio Xingu, coll. J. P. Gosse, 31-X-1964; two (paratypes), USNM 191624 (one), ZMA 113.597 (one), sl 31.7 and 35.3 mm, largest probably a male, Brazil, Est. Goiás, Rio Araguaia near Aruaña, 14°58' S, 51°04' W, coll. H. R. Axelrod, 1960.

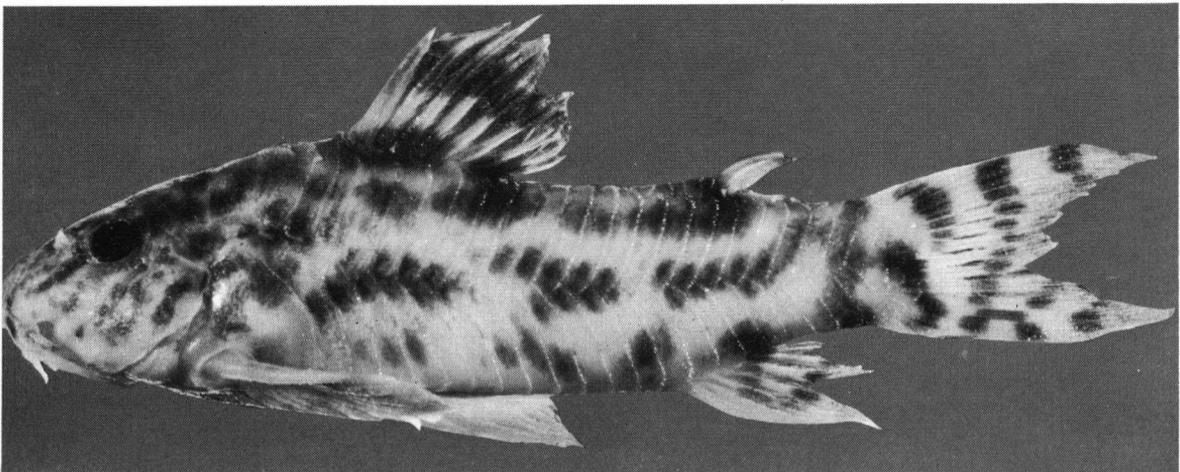


Fig. 13. *Aspidoras poecilus* n. sp. Holotype.

Description. —

Morphometric and meristic data in table I and figs. 17 through 19. Dorsal and pectoral fin spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two short mental barbels, two pairs of rictal barbels, the longest reaching to gill openings ventrally. Inner edge of pectoral fin spine moderately serrated (fig. 15-o). Anterior fontanel round (fig. 16m). Skin of intercoracoid area with numerous isolated minute ossifications.

Colour in alcohol (fig. 13). — Ground colour of body and head pale tan. Dorsum and sides of head, opercles, and snout marbled with tan and brown. Lateral sides of body with several prominent and weak blotches (see fig. 13, of left side of holotype), which are slightly different on both sides of the holotype.

Dorsal fin base with a large, oval, brown blotch from spine through fourth ray, and a smaller brown blotch on base of sixth and seventh ray. Both blotches extend somewhat over the dorsum of the body, the smaller one being connected with a dark solid blotch. Dorsal to the two basal blotches there is a rather broad, horizontal whitish stripe, extending to halfway the spine and followed by a large brown blotch. This blotch consists of a weakly pigmented part on the membrane, alternated by dense pigmentation on the rays, forming vertical lines. Above this blotch, the dorsal fin is devoid of pigment. Adipose fin spine with some scattered brown chromatophores along the base and near the middle; upper part of its membrane weakly pigmented with brown. Caudal fin rays with elongate brown spots, arranged into three or four irregular, though somewhat vertical broad bars. Anal fin with a series of minute brown spots arranged into an oblique U-shaped line. Pelvic fins unpigmented. Dorsum of pectoral fin spine and rays with scattered minute brown spots. Unossified ventral area whitish. Upper rictal barbels with some brown pigment.

Etymology. —

The specific name is derived from the Greek *ποικίλος* meaning variegated, pied, mottled, spotted, in allusion to the colour pattern.

Aspidoras* sp. aff. *poecilus
(figs. 15p, 21)

Aspidoras rochai [non R. von Ihering, 1907]; P. de Miranda Ribeiro, 1959: 8 (listed; in part; Rio Palmas, MNRJ 997).

Material examined. — Sixteen, MNRJ 997, sl 15.0 to 24.6 mm, Brazil, Est. Goiás, Rio Palmas, coll. R. Pfrimer, 1957; four, CAS 16015 [ex IU], sl 28.9 to 30.3 mm, Brazil, Est. Goiás, Corrego at Peixe into Rio Tocantins, 12°02' S, 48°36' W, coll. C. Ternetz, 31-I-1924; seventeen, CAS 16013 [ex IU], sl 23.7 to 31.4 mm, Brazil, Est. Goiás, Rio Tocantins system, Vereda do Agostinho into Rio Cannabrava, coll. C. Ternetz, 14-I-1924; one, CAS 16014 [ex IU], sl 33.0 mm, Brazil, Est. Goiás, Rio Tocantins system, brook into Corrego da Porteira into Rio Cannabrava into Rio Tocantins, coll. C. Ternetz, 15-I-1924; five, CAS 16012 [ex IU], sl 26.9 to 33.2 mm, Brazil, Est. Goiás, Corrego São Domingo, coll. C. Ternetz, 2-I-1924; one, CAS 16011 [ex IU], sl 27.7 mm, Brazil, Est. Goiás, Corrego da Mula into Tocantins below mouth of Rio Maranhão, about 14° S, 48°15' W, coll. C. Ternetz, 1-I-1924; one, CAS 16009 [ex SU], sl about 24.8 mm, Brazil, Est. Goiás, Rio Tocantins system, Corrego Gomez into Ribeirão Macaco into Rio Maranhão, coll. C. Ternetz, 30-XII-1923.

Description. —

Morphometric and meristic data in table II. Dorsal and pectoral fin spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two short mental barbels, two pairs of long rictal barbels, reaching to or almost to gill openings ventrally in some specimens, and to or slightly beyond base of pectoral fin spine in other specimens. Inner edge of pectoral fin spine (1) finely serrated in MNRJ 997, (2) finely to moderately serrated in CAS 16013 (fig. 15p), (3) moderately serrated in CAS 16015 and CAS 16014, (4) moderately to strongly serrated in CAS 16012, CAS 16011, and CAS 16009. Anterior fontanel (1) roundish, elongate oval, or slightly rhomboidal in the specimens in MNRJ 997, (2) roundish or pear-shaped in CAS 16015, (3) elongate oval in CAS 16014, (4) elongate oval in most of the specimens in CAS 16013, though some have a broad oval anterior fontanel, (5) broad oval in four specimens in CAS 16012, rather elongate oval in one specimen, (6) slightly rhomboidal in CAS 16011 and CAS 16009. Skin of intercoracoid area with isolated minute ossifications, which are more numerous in adults than in juveniles; in the latter they may be even still undeveloped.

Colour in alcohol. — Most of the specimens in MNRJ 997 are badly faded, but some of them show up to four light brown solid blotches on the sides of the body. A blotch just behind the base of the last dorsal fin ray is the largest and covers the greater part of the dorso- and ventrolateral body scutes. No pigmentation is visible on any of the fins. Most caudal fin rays, however, are broken off near the base.

Table II. Morphometric characters expressed as ratios in sl (bd through hl), or as ratios in hl (sn through dcp), and some meristic data of 17 specimens of *Aspidoras* sp. aff. *poecilus*.

CAS no.	sl	bd	bw	lds	lps	hl	sn	lbo	wi	ca	dcp	D	P ₁	A	P ₂	C	dbs	vbs	pas
16015	30.3	3.5	3.7	7.2	5.8	3.8	2.0	3.6	2.2	—	1.8	—	—	—	—	—	25	23	4
16015	30.0	3.4	3.8	7.1	6.0	3.8	2.0	3.8	2.3	—	1.9	—	—	—	—	—	25	22	4
16015	29.2	3.8	4.2	7.3	5.5	3.9	2.1	3.5	2.2	—	1.8	—	—	—	—	—	25	22	4
16015	28.9	3.3	3.8	8.0	5.7	3.6	2.0	3.8	2.4	—	1.9	—	—	—	—	—	25	23	3
16013	31.4	3.7	4.3	7.5	6.2	3.8	2.1	4.1	2.4	2.4	1.8	1,7,i	i,5	ii,5	1,8	7/7	25	22	4
16013	30.7	3.7	4.2	6.3	6.5	4.0	1.9	4.2	2.1	1.9	1.8	1,7,i	i,5	ii,5	1,8	7/7	25	22	4
16013	30.3	3.7	4.2	7.6	6.3	3.9	2.0	4.1	2.2	2.2	1.8	1,7,i	i,5	ii,5	1,8	7/7	26	23	4
16013	29.7	3.6	4.0	7.1	6.0	3.7	2.0	4.8	2.4	2.1	1.8	1,7,i	i,5	ii,5	1,8	7/7	25	22	4
16013	29.4	3.7	4.3	7.2	6.1	3.9	2.0	4.2	2.2	2.5	1.8	1,7,i	i,5	ii,5	1,8	7/7	25	22	4
16013	28.4	3.7	4.2	8.9	6.9	3.8	2.0	4.2	2.1	2.3	1.8	1,7,i	i,5	ii,5	1,8	7/7	25	22	5
16013	27.6	4.0	4.6	8.6	6.0	4.3	2.0	3.8	2.1	2.6	1.7	1,7,i	i,5	ii,5	1,8	7/7	26	23	5
16013	27.3	3.7	4.4	7.6	6.2	3.9	2.0	4.1	2.1	2.1	1.8	1,7,i	i,5	ii,5	1,8	7/7	25	22	6
16014	33.0	3.6	4.0	7.7	5.8	3.8	1.9	3.9	2.4	2.1	1.8	—	—	—	—	—	25	22	4
16012	33.2	3.6	3.9	8.3	6.1	3.5	2.0	4.7	2.4	—	1.9	—	—	—	—	—	26	23	4
16012	31.3	3.5	3.8	8.0	5.9	3.4	1.9	4.7	2.4	—	1.9	—	—	—	—	—	25	23	6
16012	28.6	3.9	4.2	6.5	4.8	3.8	2.0	4.2	2.1	—	1.9	—	—	—	—	—	27	24	5
16012	27.3	3.8	4.1	7.0	5.4	3.6	2.0	3.9	2.3	—	1.8	—	—	—	—	—	27	24	4

A = anal fin; C = caudal fin; D = dorsal fin; P₁ = pelvic fin; P₂ = pectoral fin.

The specimens in CAS 16015, 16013, 16014, and 16011 all show a very similar colour pattern, after 50-odd years of preservation. The snout is somewhat marbled with light brown in some specimens. In other specimens the dorsal fin has some light brown dots; sometimes the dorsal fin is plain. The caudal fin has up to three light brown vertical or slightly oblique lines, which are somewhat heavier in the lower lobe than in the upper lobe. All specimens have a large number of irregular spots and dots on the sides of the body. Those along or near the meeting of dorso- and ventrolateral body scutes are usually somewhat larger than the remaining markings, and often tending to form a row. Again there is a great individual variability in minor details of the colour pattern. In some specimens the spots on the sides of the body are isolated, sometimes they are connected with other spots to form irregularly shaped blotches.

The specimens in CAS 16012 and 16009 are still surprisingly well-pigmented (they were collected in the same period as the other CAS specimens just mentioned). The dorsal fin rays in one of these specimens have dark brown spots arranged into three more or less horizontal rows, one along the base, the second near the distal end of the rays, and the third in between. Basically, the other specimens seem to have the same colour pattern of the dorsal fin. However, the

present bad condition of their dorsal fin is not ideal for observation. The snout is finely marbled with brown in some specimens. The sides of the body have dark brown irregular dots, fewer and larger and better defined than in the other CAS specimens here discussed. The shape of the dots is as variable as found in marble. Those along the meeting of dorso- and ventrolateral body scutes are the largest. In the caudal fin there are up to three narrow light brown vertical or slightly oblique lines.

***Aspidoras spilotus* n. sp.**
(figs. 14, 15q, 16n, 17-19, 21)

Aspidoras rochai [non R. von Ihering, 1907]; P. de Miranda Ribeiro, 1959: 8 (listed; in part; MNRJ 8688, Cachoeira do Gusmão, Município de Ipú).

Material examined. — One (holotype), ZMA 113.590, sl 34.0 mm, Brazil, Est. Ceará, Riacho dos Macacos, tributary of Rio Acaráu, coll. J. L. de Menezes, 10-XI-1969; twenty-nine (paratypes), ZMA 112.284 (twenty-one), USNM 213568 (two), CAS 31834 (one), DNOCS 18112 (five), same data as holotype; one hundred and forty-four (paratypes), MNRJ 8688 (one hundred and forty-two), ZMA 113.591 (two), sl 17.7 to 30.0 mm, Brazil, Est. Ceará, Cachoeira do Gusmão, Município de Ipú, coll. J. F. Cruz, 24-VIII-1952.

Description. — Morphometric and meristic data in table I and

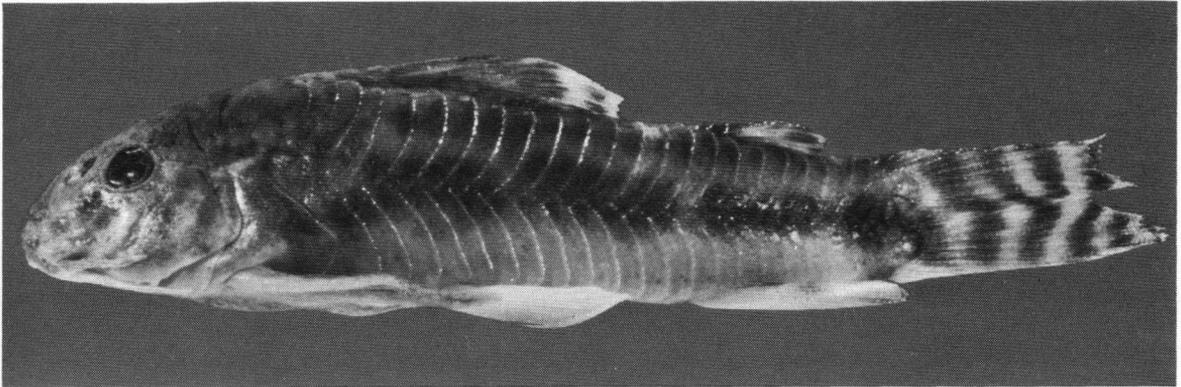


Fig. 14. *Aspidoras spilotos* n. sp. Paratype, ZMA 112.284, sl 28.9 mm.

figs. 17 through 19. Dorsal and pectoral fin spines distinctly shorter than adjacent rays. Snout in front of nostrils naked. Two short mental barbels, two pairs of long rictal barbels, reaching sometimes up to gill openings ventrally, but usually shorter. Inner edge of pectoral fin spine finely to moderately serrated (fig. 15q). Anterior fontanel pear-shaped or oval (fig. 16n). Skin of intercoracoid area naked in juveniles, with minute isolated ossifications in adults, more numerous anteriorly than posteriorly.

Colour in alcohol (fig. 14). — Ground colour of body and head pale tan. Dense, dark brown pigment on dorsum and sides of head and snout, and on opercles and cleithrum, except for a narrow pale tan curved line in the naked suborbital/preoccipital area. Snout sometimes slightly marbled; the preoccipital/interorbital area sometimes with lighter and darker brown roundish spots. Body with prominent dark brown, oval spots along the meeting of dorso- and ventrolateral body scutes. There are four more or less isolated spots in one paratype. In the other specimens the spots are united, sometimes forming a single longitudinal bar from cleithrum to base of caudal fin. Most of the specimens are intermediate between these two patterns. Dorsal to the midlateral series of spots the body may have a light horizontal area. Other specimens are pigmented with light brown in this area. The dorsum of the body is light brown with some dense spots, usually just below last dorsal fin ray and just below adipose fin spine. Ventrals of body (ventral to midlateral dots/bar) pale tan, but usually there are three dusky, ill-defined concentrations of dark brown pigment, one in front of anal fin "spine" (unbranched ray), one at or

near base of last anal fin ray, and one between base of last anal fin ray and base of caudal fin.

Dorsal fin with small, dark brown spots, sometimes in the upper half of the fin, sometimes forming one or two narrow horizontal or slightly oblique lines, irregularly arranged in other specimens, sometimes forming a small triangular blotch. The pigmentation in the dorsal fin is not restricted to the rays only, although it is much denser on the rays than on the membrane. Some pigmentation may be present at base of first and last two dorsal fin rays. In some specimens there is an additional small, ill-defined blotch at base of middle dorsal fin base. Adipose fin spine and dorsal membrane pigmented with brown. Caudal fin with up to four rather broad, dark brown oblique or vertical bars, better defined in some specimens than in others; one of the paratypes has no bars but an even, densely brown pigmented caudal fin. Anal fin sometimes plain, mostly with a faint brown dot near the base of the middle rays or in the middle of these rays. Pelvic fins without pigment. Dorsum of pectoral fins usually with numerous minute brown spots, or evenly pigmented with scattered brown. Belly whitish to yellowish.

The pattern of the paratypes in MNRJ 8688 and ZMA 113.591 is faded. The midlateral blotches are the most prominent markings, especially the centres of the blotches have remained, so that most of the specimens do not show a longitudinal bar.

Etymology. —

The specific name is derived from the Greek *σπιλότος* meaning spotted, stained, in allusion to the colour pattern.

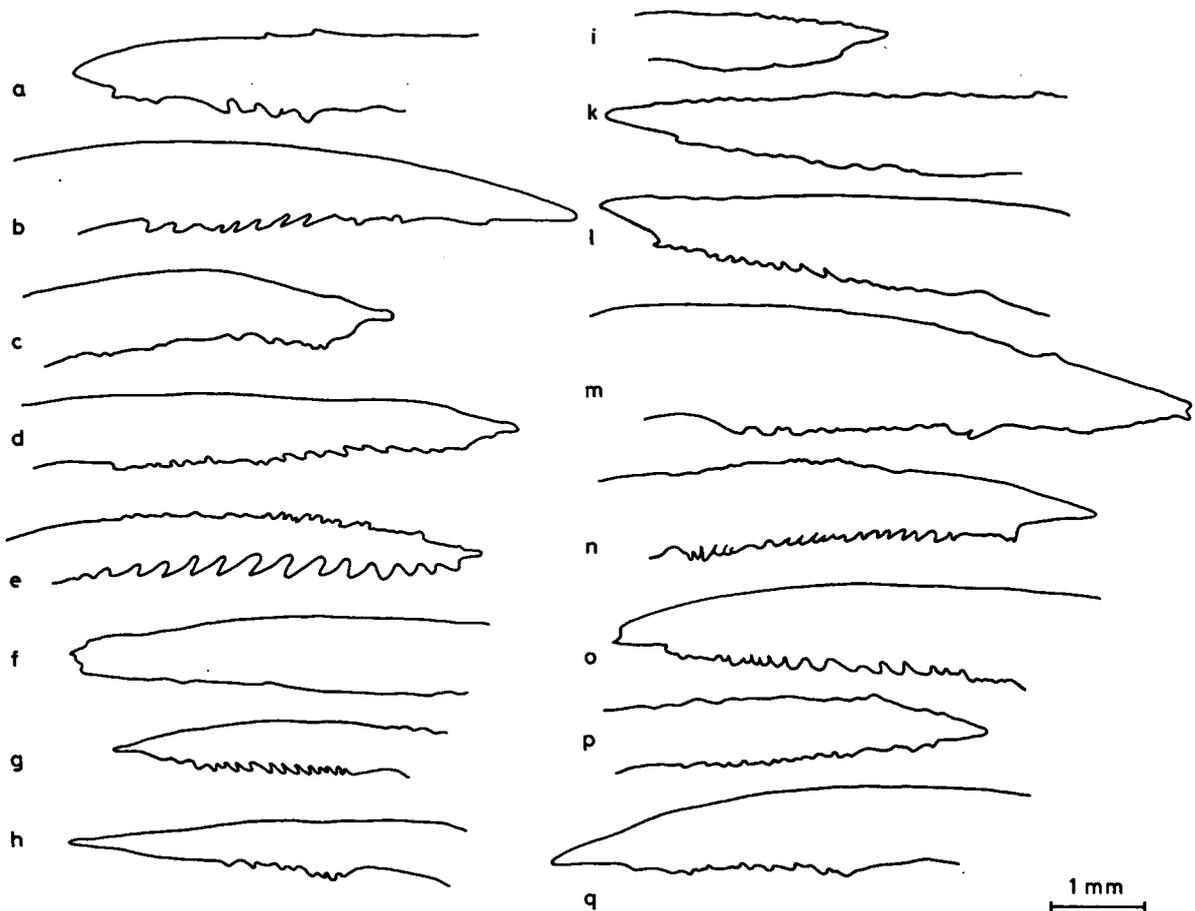


Fig. 15. Profiles of pectoral spines of a) *Aspidoras rochai*, lectotype, right spine, b) *A. rochai*, paralectotype, left spine, c) *A. raimundi*, lectotype, left spine, d) *A. lakoi*, holotype, left spine, e) *A. pauciradiatus*, paratype, left spine, f) *A. albater*, holotype, right spine, g) *A. brunneus*, holotype, right spine, h) *A. carvalhoi*, holotype, right spine, i) *A. eurycephalus*, holotype, left spine, k) *A. fuscoguttatus*, holotype, right spine, l) *A. maculosus*, holotype, right spine, m) *A. menezesi*, holotype, left spine, n) *A. menezesi*, paratype, ZMA 113.596, sl 30.7 mm, left spine, o) *A. poecilus*, holotype, right spine, p) *A. sp. aff. poecilus*, CAS 16013, sl 30.3 mm, left spine, and q) *A. spilolus*, holotype, right spine.

DISCUSSION

As shown in figs. 20 and 21, the genus *Aspidoras* has a rather restricted distribution, from the upper course of the Rio Xingu in the West to the upper course of the Rio Itapicurú in the East, and from the Rio Acaráu system in the North to the upper course of the Rio Paraná in the South.

The absence of *Aspidoras* in the rest of the continent, particularly its absence in the main Rio Amazonas basin, is of zoogeographical interest. *Aspidoras* apparently never occupied this area, which consisted of immense lakes in middle Miocene time, and which in late Miocene or

earliest Pliocene time was transformed into the Rio Amazonas, flowing to the Atlantic Ocean by the intensive uplift of the Andean Cordillera in Pliocene time (Damuth & Kumar, 1975: 874). *Corydoras* occupied this area and might be considered more advanced than *Aspidoras*.

Aspidoras rochai, *A. raimundi*, *A. lakoi*, *A. pauciradiatus*, *A. albater*, *A. brunneus*, *A. carvalhoi*, *A. eurycephalus*, *A. fuscoguttatus*, *A. maculosus*, *A. menezesi*, two forms of *Aspidoras sp. aff. poecilus*, and *A. spilolus* were each collected in such restricted areas that endemism may be suspected for most of the species. In fact, only *A. poecilus* has been found in two widely scattered places. As

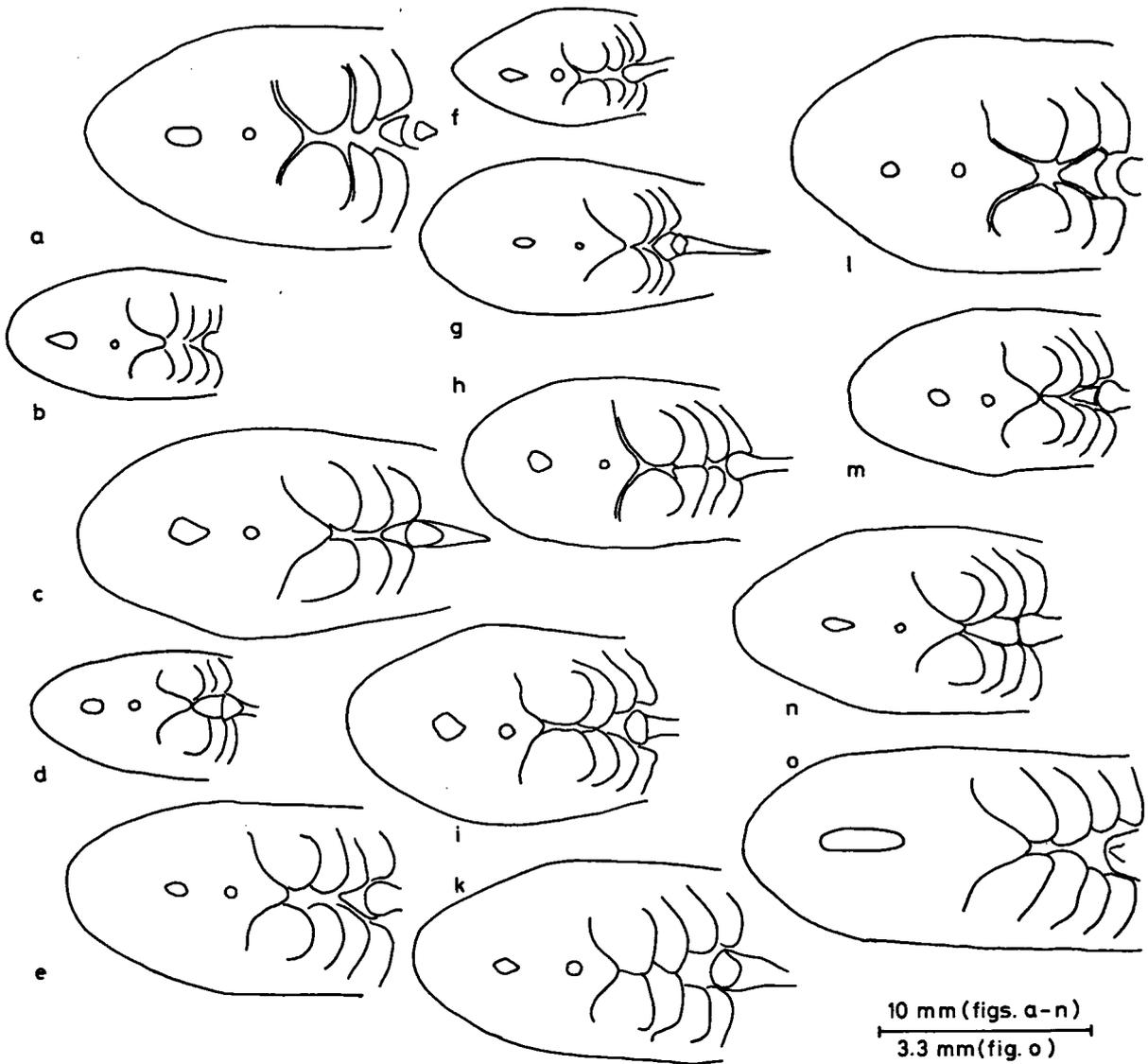


Fig. 16. Anteriodorsal view, showing fontanels and nuchal plates in a) *Aspidoras rochai*, lectotype, b) *A. raimundi*, lectotype, c) *A. lakoi*, holotype, d) *A. pauciradiatus*, ZMA 113.586, sl 20.1 mm, e) *A. albater*, holotype, f) *A. brunneus*, holotype, g) *A. carvalhoi*, holotype, n) *A. eurycephalus*, holotype, i) *A. fuscoguttatus*, holotype, k) *A. maculosus*, holotype, l) *A. menezesi*, holotype, m) *A. poecilus*, holotype, n) *A. spilotus*, holotype, and o) *Corydoras pygmaeus*, holotype.

far as we know, no *Aspidoras* specimens are mixed up with members of the genus *Corydoras* in museum collections, as we have been able to examine the majority of the representatives of the latter genus.

Aspidoras rochai (type-species of the genus) is known only from two badly preserved specimens originating from Fortaleza. There is no exact indication from which locality they were collected; there are several rivers with an undefined

course in the immediate neighbourhood of Fortaleza. Three other species were collected from rivers about Fortaleza: *A. carvalhoi*, *A. menezesi*, and *A. spilotus*. The latter species, of which 169 specimens are available, seems to be closely related to *A. rochai*. Especially the colour patterns of *A. rochai* and *A. spilotus* are quite similar, despite the fact that the colour pattern of *A. rochai* is known only from R. von Ihering's original description. The two specimens of *A.*

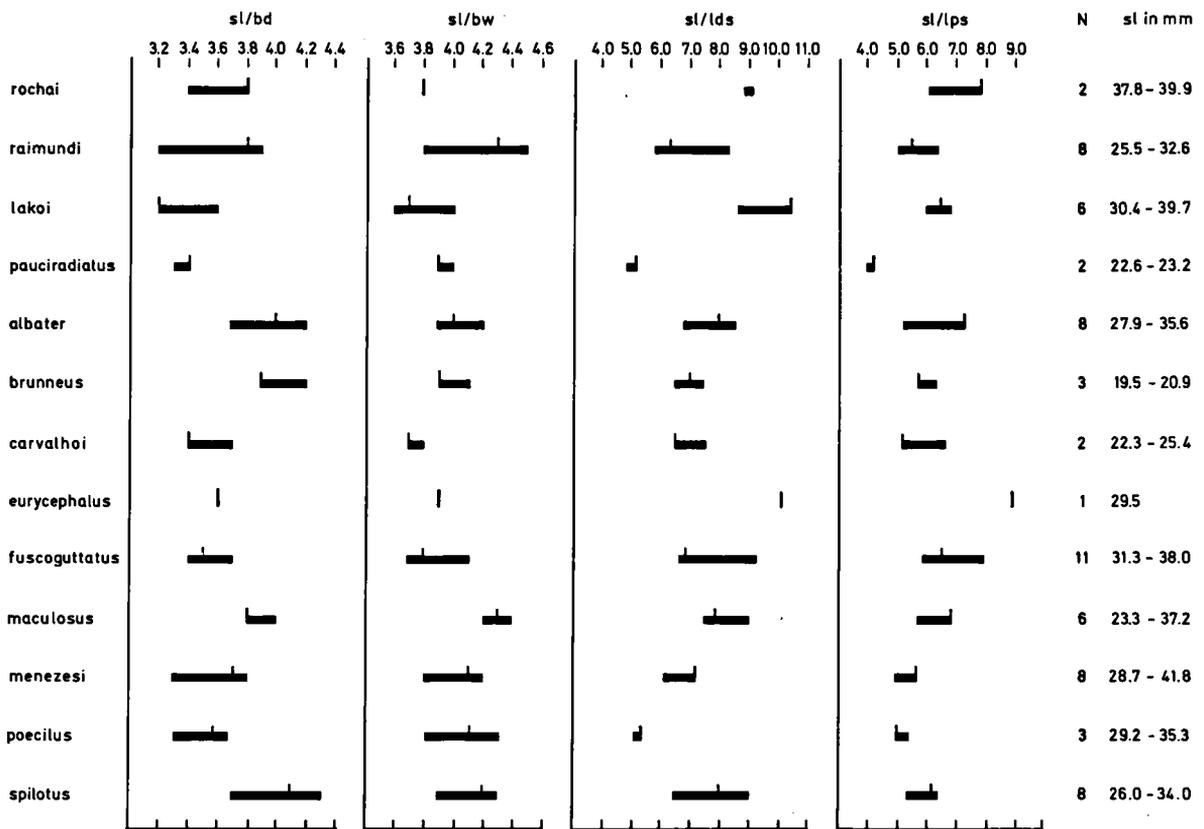


Fig. 17. Variation in ratios of body depth (bd), body width (bw), dorsal fin spine length (lds), and pectoral fin spine length (lps) in standard length (sl) in the species of *Aspidoras*. Verticals indicate primary type-specimens.

rochai are now almost completely depigmented, the fins are damaged, and even R. von Ihering already was unable to make an accurate description of the colour pattern. The two specimens of *A. rochai* measure 39.9 and 37.8 mm in sl, whereas the largest specimen of *A. spilotus* has a sl of 34.0 mm, which may account for some difference in proportions. However, *A. rochai* and *A. spilotus* differ in the following characters: length bony orbit 5.3 to 5.4 in *A. rochai* against 3.7 to 5.0 in *A. spilotus*; body width 3.8 in *A. rochai* against 3.9 to 4.3 in *A. spilotus*; 6 pre-adipose scutes in *A. rochai* against 3 to 4 in *A. spilotus*. Moreover, *A. rochai* tends to have a greater body depth (3.4 to 3.8 against 3.7 to 4.3 in *A. spilotus*), shorter dorsal fin spines (9.0 against 6.4 to 9.0 in *A. spilotus*), and shorter pectoral fin spines (6.2 to 7.8 against 5.4 to 6.3 in *A. spilotus*). Both specimens of *A. rochai* have a habitus distinctly different from the 169 specimens of *A. spilotus*, the former species being more robust. The two other species occurring

near the type locality of *A. rochai*, *A. carvalhoi* and *A. menezesi* show such distinctly different characters that they cannot be confused with *A. rochai*.

Aspidoras raimundi from the upper Rio Paranaíba is known from 63 specimens, all collected from the type-locality. It was described in the same year as *A. rochai*, not as an *Aspidoras* but as a *Corydoras*. Until now, *A. raimundi* was never figured in literature. *A. raimundi* seems most closely related to *A. menezesi*. Several morphometric and meristic characters are alike. *A. raimundi* is a smaller species (sl up to 32.6 mm against up to 41.8 mm in *A. menezesi*). *A. menezesi* never shows a dark, prominent blotch in the dorsal fin, and tends to have a somewhat longer snout (1.8 to 2.0 against 1.9 to 2.1 in *A. raimundi*), and a narrower interorbital (2.2 to 2.7 against 2.0 to 2.3 in *A. raimundi*). Although we regard *A. raimundi* and *A. menezesi* distinct at specific level (based on the material available), they might

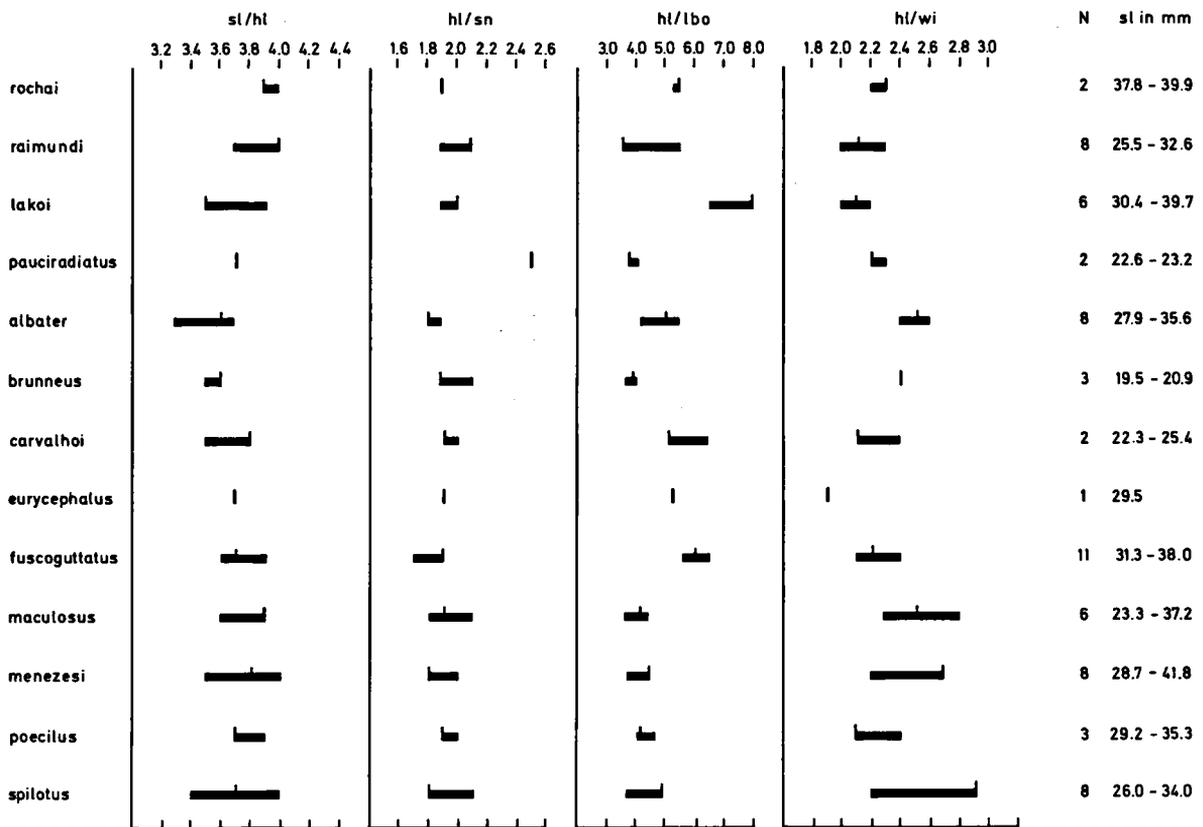


Fig. 18. Variation in ratios of head length (hl) in standard length (sl), and snout length (sn), length bony orbit (lbo), and interorbital width (wi) in head length in the species of *Aspidoras*. Verticals indicate primary type-specimens.

prove to be conspecific when specimens from more localities in the area become available.

Aspidoras lakoi, the second species described in *Aspidoras*, was based on the single holotype. Fortunately, a series of 23 topotypes, collected in the same year as the holotype, was available for examination. *A. lakoi* is known from the Rio Paraná system, from a tributary of the Rio Grande. In the same river system *A. fuscoguttatus* occurs. Apart from differences in colour pattern, *A. fuscoguttatus* differs from *A. lakoi* in the following characters: a longer dorsal fin spine (6.7 to 8.7 against 8.7 to 10.4 in *A. lakoi*); a longer snout (1.7 to 1.9 against 1.9 to 2.0 in *A. lakoi*); and less pre-adipose scutes (3 to 5 against 6 to 13 in *A. lakoi*). Moreover, *A. fuscoguttatus* tends to have a larger bony orbit (5.7 to 6.6 against 6.5 to 8.0 in *A. lakoi*), and a narrower interorbital (2.1 to 2.4 against 2.0 to 2.2 in *A. lakoi*).

Aspidoras pauciradiatus (originally described in the genus *Corydoras*) is easily distinguished from

all other species of the genus *Aspidoras* by its low number of dorso- and ventrolateral body scutes (23/20 against 25/22 or more in the other species), its low number of dorsal fin rays (6 against 7 in the other species), its extremely short snout (2.5 against 2.1 or less in the other species), and by its colour pattern. *A. pauciradiatus* has a more strongly serrated pectoral fin spine than its congeners.

Of the species we describe as new, three are easily recognizable by their colour pattern, viz.: *A. albater* with broad oblique solid brown bars, *A. brunneus* with the upper half of the body solid dark brown, and *A. carvalhoi* with hardly any pigmentation.

Besides *Aspidoras albater*, two other species occur in tributaries of the upper Rio Tocantins: *Aspidoras* sp. aff. *poecilus*, and *A. eurycephalus*. In the upper course of the Rio Araguaia two species were found together near Aruaña: *A. poecilus* (two paratypes) and *A. pauciradiatus* (holotype

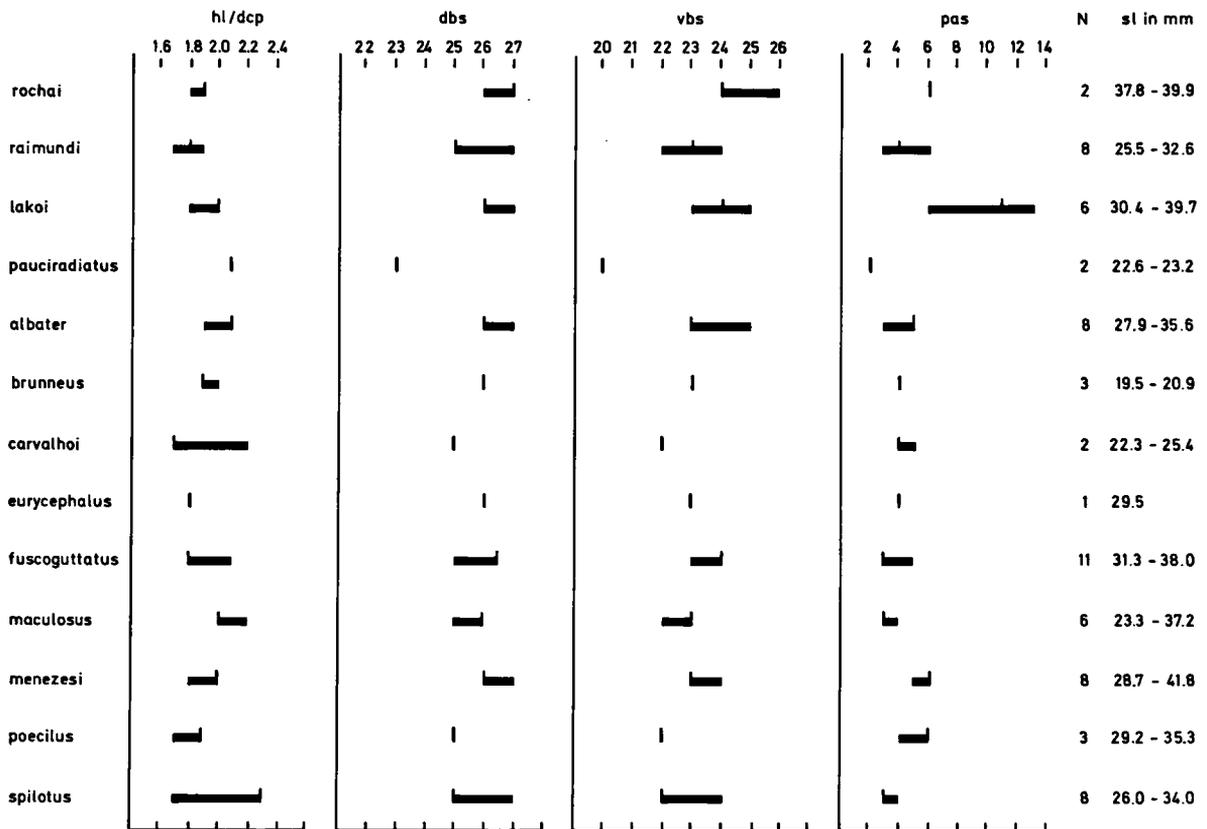


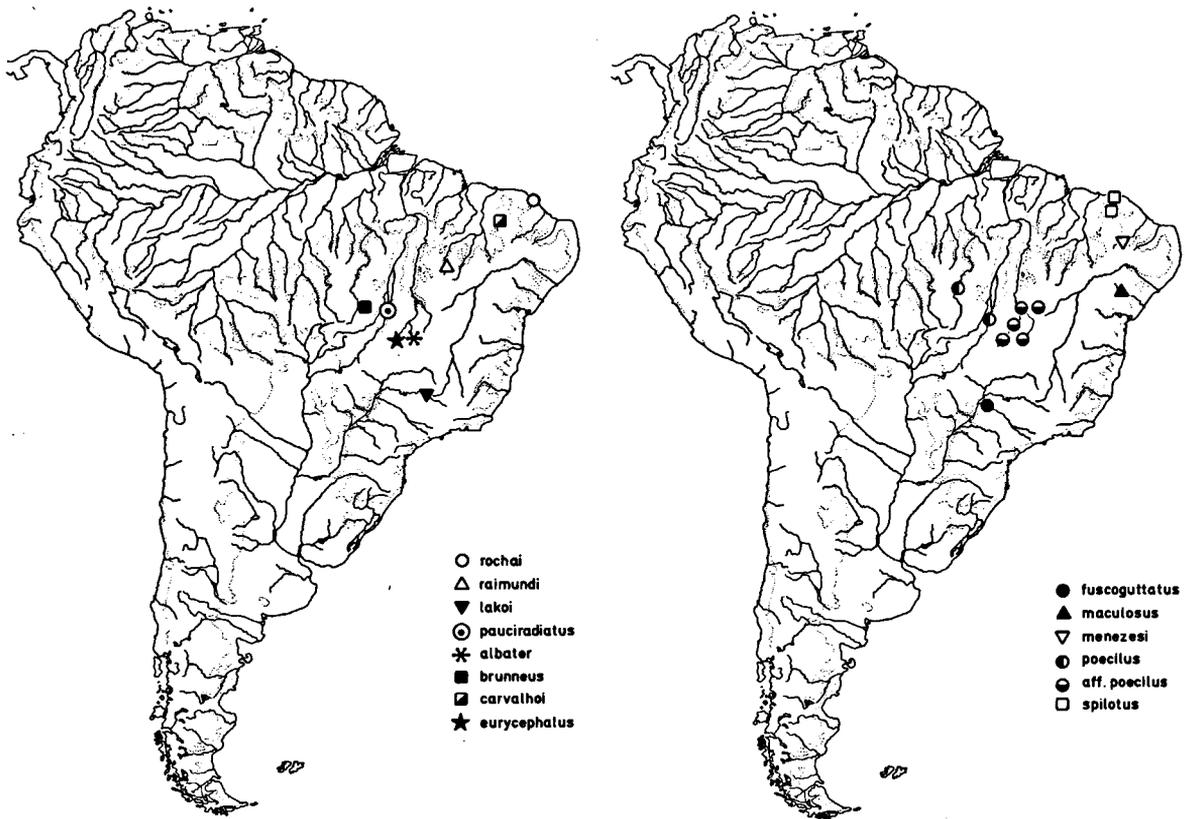
Fig. 19. Variation in ratios of depth caudal peduncle (dcp) in head length (hl) and variation in number of dorsolateral body scutes (dbs), ventrolateral body scutes (vbs), and pre-adipose scutes (pas) in the species of *Aspidoras*. Verticals indicate primary type-specimens.

and paratype). The specimens here considered as *Aspidoras* sp. aff. *poecilus* are all badly preserved specimens from tributaries of the upper Rio Tocantins, which resemble *A. poecilus* in many details. However, there are two forms: one with the blotches on the body more conspicuous and larger than in *A. poecilus*, the other form with comparatively smaller and less conspicuous markings than in *A. poecilus*. Both forms differ from each other and from *A. poecilus* in relative length of dorsal and pectoral fin spines. Further differences are found, but these may be due to the imperfect condition of the material.

Aspidoras eurycephalus, also from the upper Rio Tocantins, was collected almost simultaneously with the greater part of the specimens of *Aspidoras* sp. aff. *poecilus*. Although they are also badly preserved specimens, their broad inter-orbital not only differs from *A. poecilus* and *Aspidoras* sp. aff. *poecilus*, but also from all other

species of the genus *Aspidoras*.

Aspidoras maculosus is known from three nearby situated tributaries to the upper Rio Itapicurú. It resembles *A. menezesi* most, but it has smaller and better defined roundish dots rather than the irregularly shaped dots in *A. menezesi*. Moreover, *A. maculosus* differs from *A. menezesi* in the following characters: shorter dorsal fin spines (7.5 to 9.0 against 6.2 to 7.2 in *A. menezesi*), shorter pectoral fin spines (5.8 to 6.8 against 4.9 to 5.6 in *A. menezesi*). Furthermore, *A. maculosus* has 3 to 4 pre-adipose scutes against 5 to 6 in *A. menezesi*; it also tends to have less body scutes (dbs/vbs 25-26/22-23 in *A. maculosus* against 26-27/23-24 in *A. menezesi*). Finally, *A. maculosus* tends to have a less deep body (3.8 to 4.0 against 3.3 to 3.8 in *A. menezesi*), a more slender body (4.2 to 4.4 against 3.8 to 4.2 in *A. menezesi*), and a less deep caudal peduncle (2.0 to 2.2 against 1.8 to 2.0 in *A. menezesi*).

Figs. 20-21. Occurrence of *Aspidoras* species.

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