

# BEAUFORTIA

INSTITUTE OF TAXONOMIC ZOOLOGY (ZOOLOGICAL MUSEUM)  
UNIVERSITY OF AMSTERDAM

Vol. 36, no. 5

October 31, 1986

## THE CICHLID GENUS *CRENICICHLA* FROM THE TOCANTINS RIVER, STATE OF PARÁ, BRAZIL, WITH DESCRIPTIONS OF FOUR NEW SPECIES (PISCES, PERCIFORMES, CICHLIDAE)

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### ABSTRACT

A large collection of fish specimens assembled by the Instituto Nacional de Pesquisas da Amazônia (INPA) in the Tocantins River, State of Pará, Brazil yielded nine species (four of which are new) of the cichlid genus *Crenicichla*; *C. astroblepa* n. sp.; *C. compressiceps* n. sp.; *C. cyclostoma* n. sp.; *C. jegui* n. sp.; *C. johanna* Heckel, 1840; *C. labrina* (Spix & Agassiz, 1829); *C. lugubris* Heckel, 1840; *C. notophthalma* Regan, 1913; and *C. reticulata* (Heckel, 1840). A tenth species, described from the Tocantins River, *C. cametana* Steindachner, 1911 is, although not found in the INPA collection, included in this paper. Eight of the species are described and illustrated. *C. labrina* is removed from synonymy, *C. strigata* Günther, 1862 is synonymized with *C. lugubris*. Lectotypes are designated for *C. cametana*, *C. labrina*, and *C. notophthalma*. The type-locality of *C. labrina* is restricted. Type material of previously described *Crenicichla* spp. recorded from the Tocantins River has been examined. A key to the species is provided. Distribution maps and comments on the habitat are included.

### INTRODUCTION

During 1980-1984 members of the Instituto Nacional de Pesquisas da Amazônia (INPA), according to a convention of Research INPA/Eletronorte about the impact of the Tucuruí dam on the ecology of the Tocantins River, State of Pará, Brazil, collected fishes. The cichlid fauna of this river was poorly known. Only one species of *Crenicichla* (viz. *Crenicichla cametana*) was described from the Tocantins River (Steindachner, 1911: 369). Recent collections were made from the confluence with the Amazonas River north of Itupiranga. Many *Crenicichla* specimens, belonging to nine species,

were encountered. They include four hitherto undescribed species, which are described in this paper. Methods of taking measurements and counts are as employed in Ploeg, 1986.

For the loan and/or gift of specimens, and for information, I like to express my gratitude to the following persons: Miss B. Brewster and Mr. G. J. Howes, British Museum (Natural History) (BMNH), London, Dr. D. J. Stewart, Field Museum of Natural History (FMNH), Chicago, Dr. M. L. Bauchot and Mr. F. d'Aubenton, Muséum National d'Histoire Naturelle (MNHN), Paris, Mr. M. Kottelat, Musée d'Histoire Naturelle de Neuchâtel (MHNN), Neuchâtel, Dr. B. Herzig and Mr.

H. Ahnelt, Naturhistorisches Museum Wien (NMW), Vienna, and especially Dr. M. Jégu, Office de Recherche Scientifique Technique Outre Mer (ORSTOM), and Dr. G. Mendes dos Santos, Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus.

I am grateful to Mr. J. Zaagman for making the drawings and Mr. L. A. van der Laan for the photographs, and to Drs. H. Nijssen and I. J. H. Isbrücker for critically reading the manuscript, all of the Zoological Museum, Amsterdam (ZMA).

### Crenicichla Heckel, 1840

*Crenicichla* Heckel, 1840: 416-417 (original diagnosis); type-species, by subsequent designation of Eigenmann & Bray, 1894: 620: *C. macrophthalmalma* Heckel, 1840.

*Batrachops* Heckel, 1840: 432 (original diagnosis); type-species by subsequent designation of Eigenmann & Bray, 1894: 620: *B. reticulatus* Heckel, 1840.

*Boggiana* Perugia, 1897: 149 (original diagnosis); type-species by monotypy: *Boggiana ocellata* Perugia, 1897.

### DIAGNOSIS

Body elongate; lower jaw somewhat longer than upper jaw; orbit in upper half of head; preoperculum serrated. Two well-developed lateral lines, in scales which are larger than adjacent scales, with 1, 2, or 3 scales extending on caudal fin; forehead without scales; cycloid scales on head, operculum, suboperculum, anterior part of back, and belly, remaining scales normally ctenoid; caudal fin with basal and interradiated scales, other fins without basal scales. Dorsal fin acute posteriorly; anal fin origin below 1st soft dorsal ray, posteriorly acute, 3 anal spines; pelvic fin acute, V.I.5; pectoral fin rounded, P.15. Teeth conical and recurved, outer teeth series fixed. Denticulated gill rakers externally on first ceratobranchial.

### Key to the species of the Tocantins River

- 1a. Scales on sides cycloid .....  
 ..... *Crenicichla johanna* Heckel, 1840

- b. Scales on sides ctenoid ..... 2  
 2a. Eyes situated dorsally; head almost as deep as wide ..... 3  
 b. Eyes situated laterally; head deeper than wide ..... 4  
 3a. Caudal peduncle twice longer than deep; light dots on body and head .....  
 ..... *Crenicichla jegui* n. sp.  
 b. Caudal peduncle only slightly longer than deep; no dots on the body and head .....  
 ..... *Crenicichla astroblepa* n. sp.  
 4a. Number of scales below lateral lines 110-130 ..... *Crenicichla lugubris* Heckel, 1840  
 b. Number of scales below the lateral lines 50-85 ..... 5  
 5a. Humeral spot absent ..... 6  
 b. Humeral spot present ..... 8  
 6a. Upper jaw length 6-10% of SL ..... 7  
 b. Upper jaw length 11-12% of SL .....  
 ... *Crenicichla cametana* Steindachner, 1911  
 7a. Six to seven gill rakers externally on first ceratobranchial; head depth 20-23% of SL .....  
 ..... *Crenicichla cyclostoma* n. sp.  
 b. Eight to ten gill rakers externally on first ceratobranchial; head depth 16-18% of SL .....  
 ..... *Crenicichla notophthalma* Regan, 1913  
 8a. Head wide (15-20% SL); interorbital wide (29-41% HL); many scales in lateral lines (34-38); body scales with dark base .....  
 ..... *Crenicichla reticulata* (Heckel, 1840)  
 b. Head width 12-15% SL, interorbital width 15-30% HL; 24-36 scales in lateral lines; body scales without dark base ..... 9  
 9a. Suborbital stripe present; maxilla reaching to below orbit .....  
 . *Crenicichla labrina* (Spix & Agassiz, 1829)  
 b. Suborbital stripe absent; maxilla not reaching to below orbit .....  
 ..... *Crenicichla compressiceps* n. spec.

### *Crenicichla astroblepa* n. sp.

(Pls. 1, 3 upper, middle; Tables I, II, III)

### MATERIAL EXAMINED

Holotype: INPA 856, 108 mm SL, Tucuruí, residual pools downstream of stowage, after

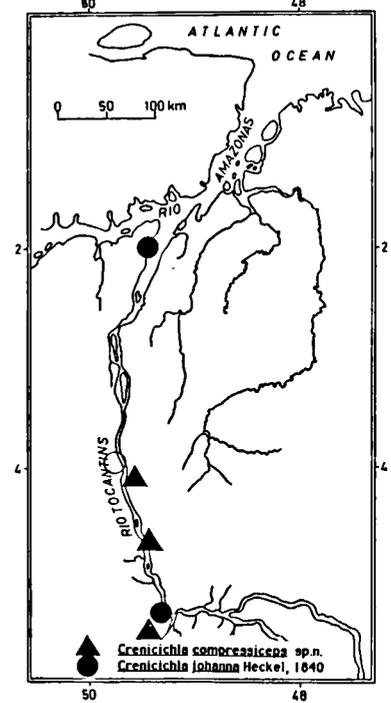
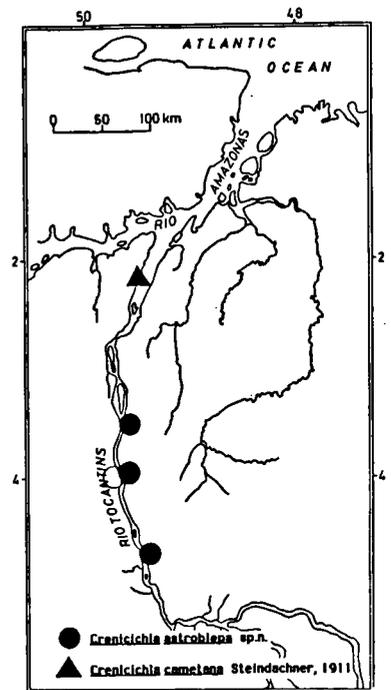
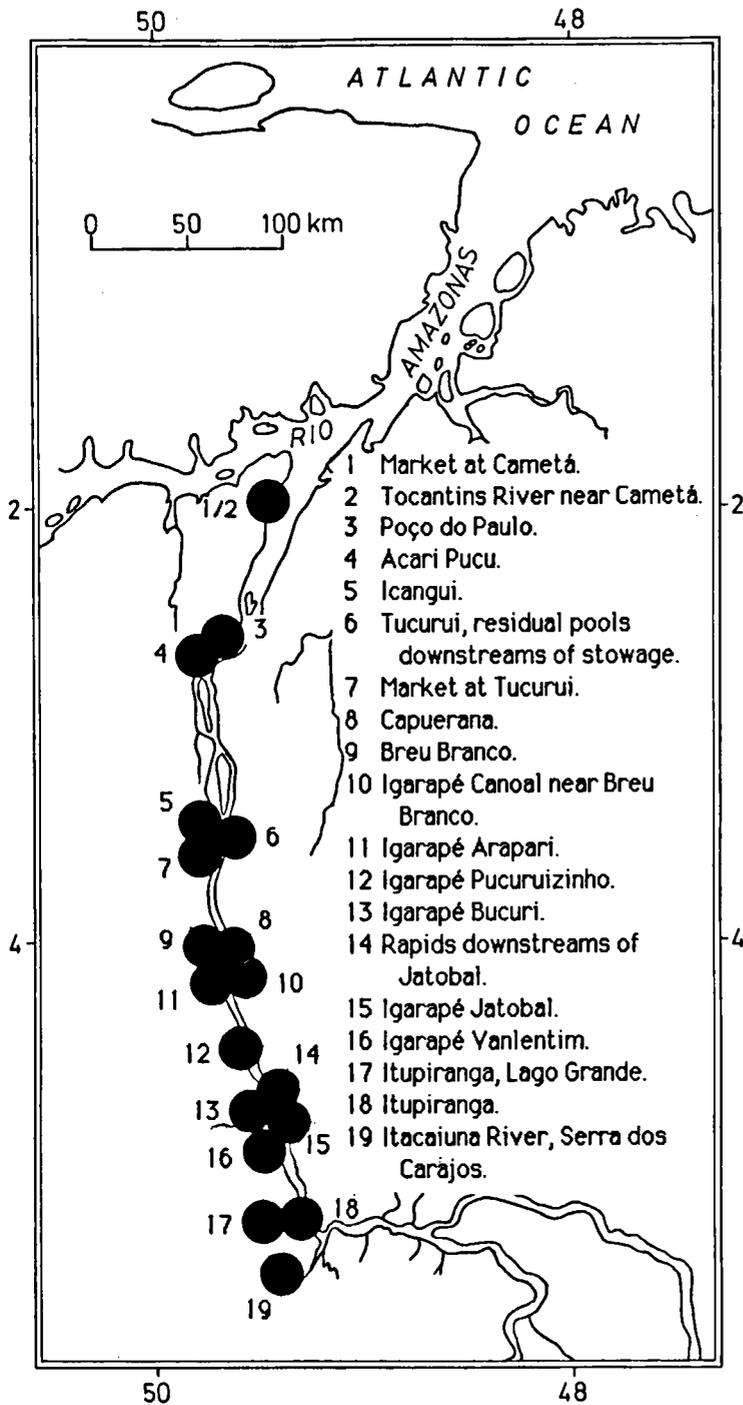


Plate 1. Distribution of four *Crenicichla* species occurring in the Tocantins River. The largest map shows all localities. Closed circles/triangles represent material identified by the author, open circles/triangles represent material identified by Dr. Jégu.

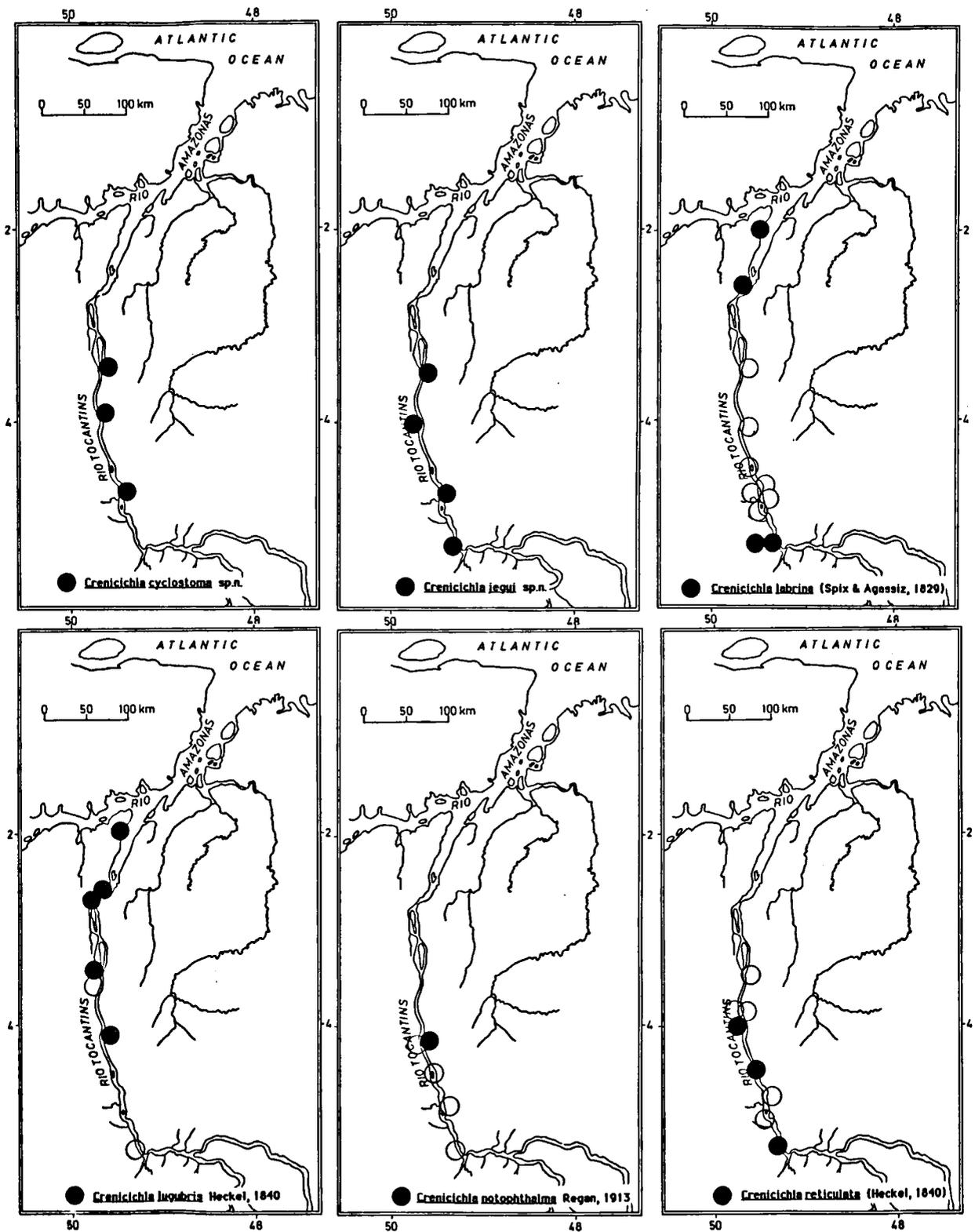


Plate 2. Distribution of six *Crenicichla* species occurring in the Tocantins River. Closed circles represent material identified by the author, open circles represent material identified by Dr. Jégu.

closing the stowage, IX/X-1982, coll. M. Jégu. Paratypes: INPA 876 (20)/874 (13), and ZMA 119.761 (18), same data as holotype; INPA 979 (3), ZMA 119.468 (2), rapids downstream of Jatobal, 8-VII-1982, coll. M. Jégu; INPA 978 (one), Capuerana, XI-1981, coll. M. Jégu.

## DESCRIPTION

Based on holotype and 20 paratypes. Head depressed; body (posterior to operculum) increasingly compressed; maximum body depth at level of about 11th dorsal spine; maximum body width at cheeks; predorsal and preventral profile straight; angle between predorsal and preventral profile 35°; snout pointed in lateral view, rounded in dorsal view; lips fleshy; eyes in dorsal position, interorbital narrow; orbit twice in head depth at orbit level; nostrils halfway postlabial skinfold and orbit; caudal peduncle slightly longer than deep.

In holotype 76 scales in a series below the lateral lines, in paratypes: 71 (2), 72 (1), 73 (3), 74 (2), 75 (1), 76 (5), 77 (2), 80 (3), and 81 (1); scales on prepelvic and pelvic area much smaller than on sides; holotype with 25/10 scales in lateral lines, in paratypes: 25/11 (2), 25/12 (7), 25/13 (1), 26/10 (1), 26/11 (5), 26/12 (2), 27/11 (1) and 27/12 (1); lateral line scales about twice as long as adjacent scales; 3 horizontal series of scales between the lateral lines; posterior lateral line continuing onto caudal fin with 3 (occasionally 2) scales; basal scales on caudal fin, 4 scale series in the middle, 1 series at the edges; interradiation scales extend to about half to 2/3 of caudal fin length.

Dorsal fin origin just above pectoral fin origin; spines increasing in length to about the 9th; length of last dorsal spine 9% of SL, in paratypes 9 (5), 10 (10), 11 (4) or 14 (1) % of SL; rays acute posteriorly, 6th from last the longest; D XXIII.11 in holotype, XX.11 (1), XXI.10 (1), XXI.12 (1), XXII.10 (5), XXII.11 (7), XXIII.10 (3), and XXIII.11 (2) in paratypes. Caudal fin rounded. Anal fin reaching to caudal fin base; rays acute posteriorly, 3rd from last the longest; A III.8 in

holotype, III.7 (1), III.8 (7), III.9 (11) and III.10 (1) in paratypes. Pelvic fin reaching to almost halfway the anus; acute, 2nd ray the longest. Pectoral fin 5/4 as long as pelvic fin; rounded.

Eight gill rakers externally on first ceratobranchial of holotype, of paratypes: 7 (2), 8 (11), and 9 (7).

## COLOUR PATTERN

Adult (mainly holotype). Body yellowish-brown; sides gradually yellowish ventrally; head dorsally dark, cheek yellowish-brown; scales on body with a dark base, forming lateral series of dots; humeral spot absent; caudal fin with a spot; dorsal fin dark with a light grey, broad distal margin, about one third of ray length, distal half of last soft rays light grey; caudal fin dark, with light grey distal margin, about 1/5 the length of rays; anal fin black, last 6 rays with a light grey margin, about half the length of the rays; pectoral fin light grey; pelvic fins dark grey at proximal half of rays, distal half light grey. Large specimens have light areas on the sides, which are irregular in distribution.

A juvenile (41 mm SL, ZMA 119.761) has the body brownish grey, gradually lighter ventrally. From operculum to caudal fin base are 9 vertical bars in dorsal half of body. Black, ocellated caudal fin spot. Fins light grey, dorsal, caudal, and anal fin with a narrow black margin.

## ETYMOLOGY

The name *astroblepa* alludes to the eyes, which are in dorsal position; *aster* (Gr.) meaning star, *blepos* (Gr.) meaning look/glance.

## REMARKS

*Crenicichla astroblepa* is distinguished from other *Crenicichla* species by the combination of the

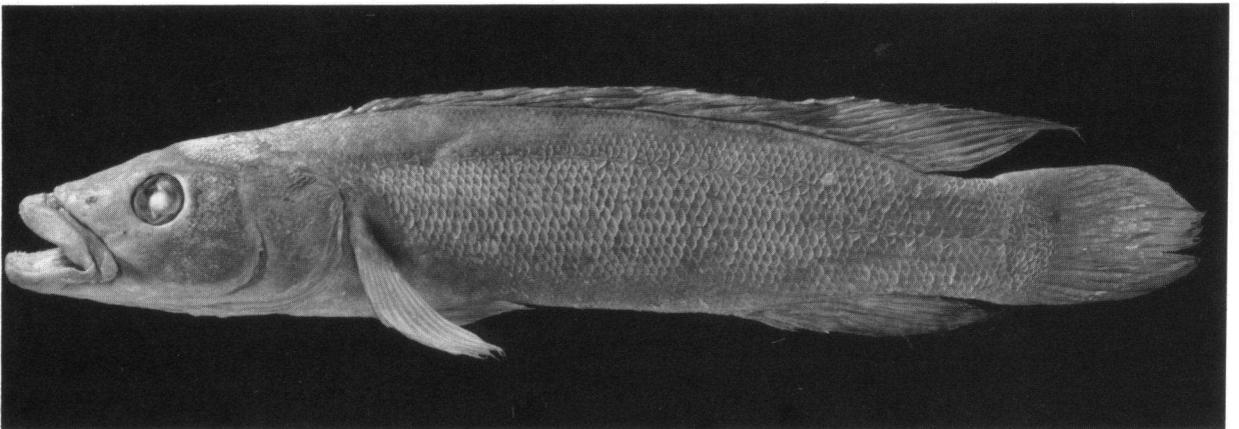
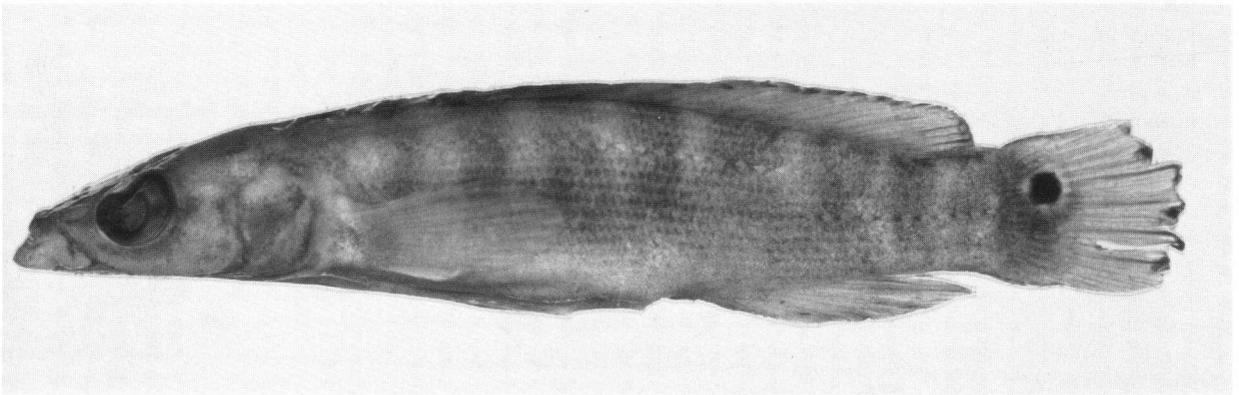
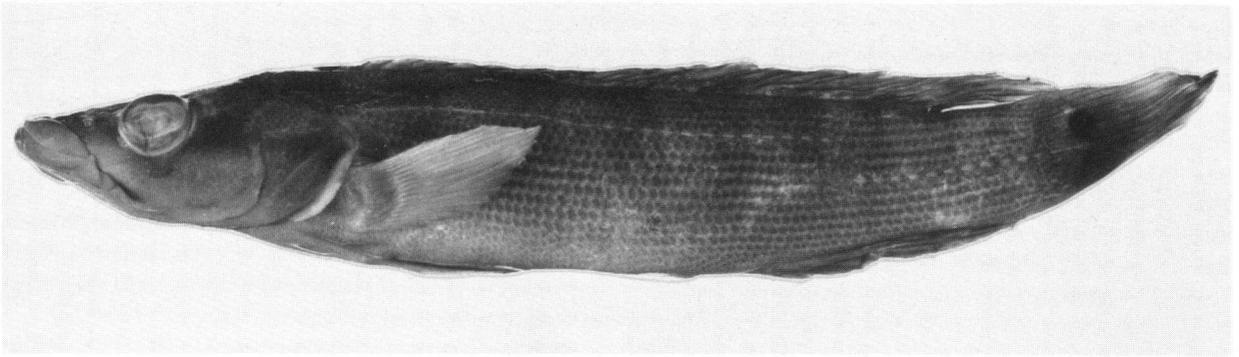


Plate 3. (Upper) *Crenicichla astroblepa*, n. sp., holotype, INPA 856, 108 mm SL, (middle) juvenile, ZMA 119.761, 41 mm SL, (lower) *Crenicichla cametana*, lectotype, NMW 32.816, 176 mm SL.

following characters: (a) eyes in extremely dorsal position, hence interorbital area narrow, (b) head almost as deep as long (c) caudal peduncle slightly longer than deep. *Crenicichla astroblepa* is reminiscent of *C. jegui* n. sp., from which it can easily be distinguished by (a) larger eyes, (b) lack of dots on the body, (c) larger scales on the flanks, (d) caudal peduncle slightly longer than deep instead of twice as long as deep.

***Crenicichla cametana* Steindachner, 1911**  
(Pls. 1, 3 lower; Tables I, II, III)

*Crenicichla cametana* Steindachner, 1911: 369-371 (original description, three syntypes); type-locality: Tocantins River near Cameté.

#### MATERIAL EXAMINED

Lectotype by present designation: NMW 32.816, 176 mm SL, from locality cited above. One paralectotype: NMW 32.815, 157 mm SL, same data as lectotype (second paralectotype not traceable in the NMW collection).

#### DESCRIPTION

Body laterally compressed; predorsal and preventral profile straight; angle between predorsal and preventral profile about 35°; snout in lateral view pointed, in dorsal view rounded; lower jaw little longer than upper jaw; orbital diameter about 3 times in head depth at orbit level; caudal peduncle slightly longer than deep; nostrils little nearer to orbit than to postlabial fold of skin.

In lectotype 76 scales in a horizontal series below the lateral lines from operculum to caudal fin base, in paralectotype 83; 23/11 scales in lateral lines in lectotype, 23/13 of paralectotype; 3 scales in a horizontal series between lateral lines; scales in preventral area much smaller than scales on body; 4 basal scale series in the middle of the caudal fin, 3 in paralectotype; interradiated scales to about 2/3 of caudal fin length. Nine gill rakers externally on 1st ceratobranchial.

Dorsal fin acute posteriorly, reaching to spot on caudal fin, in paralectotype little more posterior; spines increasing in length to about 8th, posterior to this equal in length; 6th from last dorsal ray the longest; lectotype: D XXI.11, paralectotype XXII.10. Caudal fin rounded; 19-20% of SL. Anal fin acute posteriorly; 5th from last ray the longest, reaching to caudal fin base; A III.8. Ventral fin acute, 2nd soft ray the longest, reaching to halfway the anus. Pectoral fin rounded; slightly larger than pelvic fin.

#### COLOUR PATTERN

Body uniform dark-brown. Dorsal, caudal, and anal fins grey-brown. Humeral spot, pre-, sub-, postorbital stripes, and lateral band absent. Small dark spot just dorsal to center of caudal fin base. Ventral and pectoral fins light grey. The specimens have apparently lost most pigment.

#### REMARKS

In his original description, Steindachner described the colour of *C. cametana* as dark-brown, middle third of the scales notably darker than dorsal and ventral third, causing a pattern of narrow lateral stripes ("wie bei *Batrachops ocellatus*").

Although the INPA-expedition collected many hundreds of *Crenicichla* specimens, no specimens of *C. cametana* are represented.

***Crenicichla compressiceps* n. sp.**  
(Pls. 1, 4 upper; Tables I, II, III)

#### MATERIAL EXAMINED

Holotype: INPA 855, 53 mm SL, rapids downstream of Jatobal, 8-VII-1982, coll. M. Jégu.

Paratypes: INPA 878 (21)/877 (one)/862 (3)/ZMA 119.763 (14), same data as holotype;

INPA 872 (5)/977 (6)/ZMA 119.762 (5)/119.469 (4), Igarapé Canoal, near Breu Branco, 12-XI-1981, coll. M. Jégu; MZUSP 32.772 (18), Itacaiuna River, Serra dos Carajos, Caldeirão, Cachoeira Carreira Comprido, Poço de Pedral, 14-X-1983, coll. M. Goulding.

## DESCRIPTION

Based on holotype and 16 paratypes. Head compressed; predorsal profile straight to concave; prefrontal profile convex; angle between predorsal and prefrontal profile about 30°; snout in lateral view pointed, in dorsal view rounded; mouth narrower than interorbital width; lower jaw not, or little prognathous; orbital diameter about half head depth at orbit level; nostrils slightly nearer to orbit than to postlabial skinfold; caudal peduncle some longer than deep, often about as long as deep.

In holotype 61 scales in a horizontal series below the lateral lines, in paratypes: 56 (2), 59 (2), 61 (2), 62 (4), 63 (2), 64 (2), 65 (1), 66 (1); 23/8 scales in lateral lines of holotype, paratypes: 21/8 (2), 22/7 (1), 22/8 (1), 22/9 (2), 22/10 (1), 23/7 (3), 23/8 (5), 24/7 (1); 3 scales in horizontal series between lateral lines (in 16 counted paratypes one with 4 scales); scales in prefrontal area smaller than scales on body; 2 (4), 3 (11), or 4 (2) basal scale series in the middle of the caudal fin (3 in holotype), diminishing to 1 toward the edges; interradial scales to about 1/4 of caudal fin length, often to 2/5, and to 1/2 of caudal fin in one paratype. Holotype with 7 rakers externally on 1st ceratobranchial, in 16 paratypes: 6 (1), 7 (5), 8 (7), 9 (2), damaged, and thus not countable (1); most rakers bent, 2 or 3 ventral rakers knob-shaped.

Dorsal fin acute posteriorly, reaching to about 1/3 of caudal fin; spines increasing in length from 1st to about 8th, posterior to this equal in length; 3rd or 4th from last dorsal ray the longest; holotype: D XIX.10, paratypes: XIX.11 (4), XX.9 (2), XX.10 (7), XX.11 (1), XXI.9 (1), XXI.10 (1). Caudal fin rounded;

18-24% of SL. Anal fin acute posteriorly; 3rd or 4th ray the longest and reaching to caudal fin base; holotype: A III.9, paratypes: III.9 (13), III.10 (3). Ventral fin acute, 2nd soft ray the longest, reaching to halfway the anal fin. Pectoral fin rounded; larger than pelvic fin.

## COLOUR PATTERN

Male (holotype). Ground colour of body brown, darker dorsally, gradually yellowish brown ventrally; ventral part of head, and prefrontal area pale; forehead grey; dark stripe from distal tip of lower jaw, over orbit to dorsal edge of operculum; cheek yellow; 6 yellow bars between lateral lines and dorsal fin, from 3rd dorsal spine to caudal peduncle; 1st and 2nd bar lighter and surrounding a black blotch. This blotch extends to below lateral line. Dorsal fin white with dark distal margin, rays with dark base; soft rays with 6 dark vertical bars. Caudal fin white with black dorsal margin; 7 vertical black bars; upper part of caudal fin base with black spot. Anal fin white, with black distal margin; 4 vertical black bars in posterior part. Ventral fin beige. Pectoral fin hyaline.

Females differ from males in having no black bars in dorsal, caudal and anal fins.

## ETYMOLOGY

The specific name *compressiceps* alludes to its compressed head, *compressus* (L.) means pressed together, *caput* (L.) means head.

## REMARKS

*Crenicichla compressiceps* can be distinguished from all other *Crenicichla* species by the combination of the following characters: (a) head strongly compressed, (b) mouth very small, (c) maxilla not reaching to anterior margin of orbit, (d) six yellow bars on back, between lateral lines and dorsal fin, with black blotch between anterior two bars.

The largest available specimen of *Crenicichla compressiceps* is only 60 mm SL. This indicates that it is a small species. However, no characters present in adults of other *Crenicichla* spp. such as elongated posterior dorsal and anal fin rays were present.

In some specimens the black humeral blotch extends anteriorly to first white bar; yellow bars sometimes extend to the posterior lateral line series.

***Crenicichla cyclostoma* n. sp.**  
(Pls. 2, 4 middle, lower; Tables I, II, III)

#### MATERIAL EXAMINED

Holotype: INPA 854, 96 mm SL, Tucuruí, residual pools downstream of stowage, after closing the stowage, XI-1982, coll. M. Jégu. Paratypes: INPA 880 (22)/ZMA 119.764 (15), same data as holotype; INPA 866 (2)/871 (4)/ZMA 119.766 (2), Capuerana, 10-XI-1981, coll. M. Jégu; INPA 860 (11)/ZMA 119.767 (9), rapids downstream of Jatobal, 8-VII-1982, coll. M. Jégu; INPA 976 (one), between Cameta and Jatobal, coll. INPA.

#### DESCRIPTION

Based on holotype and 33 paratypes. Body laterally compressed; predorsal profile straight; preventral profile straight; angle between predorsal and preventral profile about 45°; snout in lateral and dorsal view rounded; mouth as wide as interorbital width; lower jaw not, or very little prognathous; orbit in upper half of head; orbital diameter about 2.5 in head depth at orbit level; nostrils nearer to orbit than to postlabial skinfold; caudal peduncle somewhat longer than deep.

In holotype 66 scales in a horizontal series below the lateral lines, in 26 paratypes: 59 (1), 63 (2), 64 (3), 65 (2), 66 (2), 67 (3), 68 (4), 69 (7), 71 (1), and 73 (1); 23/12 scales in lateral lines of holotype, in 28 paratypes: 23/10 (3), 24/9 (1), 24/10 (6), 24/11 (2), 24/12 (1), 24/13

(1), 25/8 (1), 25/10 (5), 25/11 (4), 25/12 (1), 26/10 (1), 27/8 (1), and 27/10 (1); lateral line scales about twice as large as adjacent scales; scales on anterior part of back ctenoid; 3 scales in horizontal series between lateral lines (in 28 paratypes 1 with 2 and 3 with 4 scales); scales in preventral area much smaller than scales on sides; 3-5 basal scale series in the middle of the caudal fin (4 in holotype), diminishing to 1 toward the edges; interradial scales extending to about 2/3 or 1/2 of caudal fin length. Holotype with 6 gillrakers externally on 1st ceratobranchial, in 22 paratypes: 6 (13), 7 (9).

Outer teeth series in both jaws with a few teeth which are much larger than in other *Crenicichla* spp. of the same size, and also much larger than inner teeth series. In the middle of the lower jaw 2 of such large teeth close to each other, separated by a small gap. All teeth fixed.

Dorsal fin acute posteriorly, in largest paratypes (probably males) reaching to end of caudal fin, occasionally to beyond caudal fin, in somewhat smaller (probably female) and in much smaller paratypes to caudal peduncle; spines increasing in length from 1st to about 8th, posterior to this equal in length; 6th from last dorsal ray the longest; holotype: D XXI.11, 28 paratypes: XX.10(1), XX.11 (8), XXI.10(1), XXI.11 (11), XXI.12 (2), XXII.10 (44), XXII.11(1), and XXII.12(1). Caudal fin rounded; 19-28% of SL. Anal fin acute posteriorly; 5th ray from last the longest, reaching to caudal fin base; holotype: A III.9, in 28 paratypes: III.8 (2), III.9 (25), and III.10(1). Ventral fin acute, second soft ray the longest, reaching to halfway the anal fin. Pectoral fin rounded; little larger than pelvic fin.

#### COLOUR PATTERN

Adult (holotype). Ground colour of body light brown, yellowish brown on belly; forehead grey brown; a darker brown blotch on the base of each scale on the side. Dorsal fin dark with light distal margin, elongate posterior part of soft rays light. Caudal fin grey; upper part of caudal fin base with black spot. Anal fin with

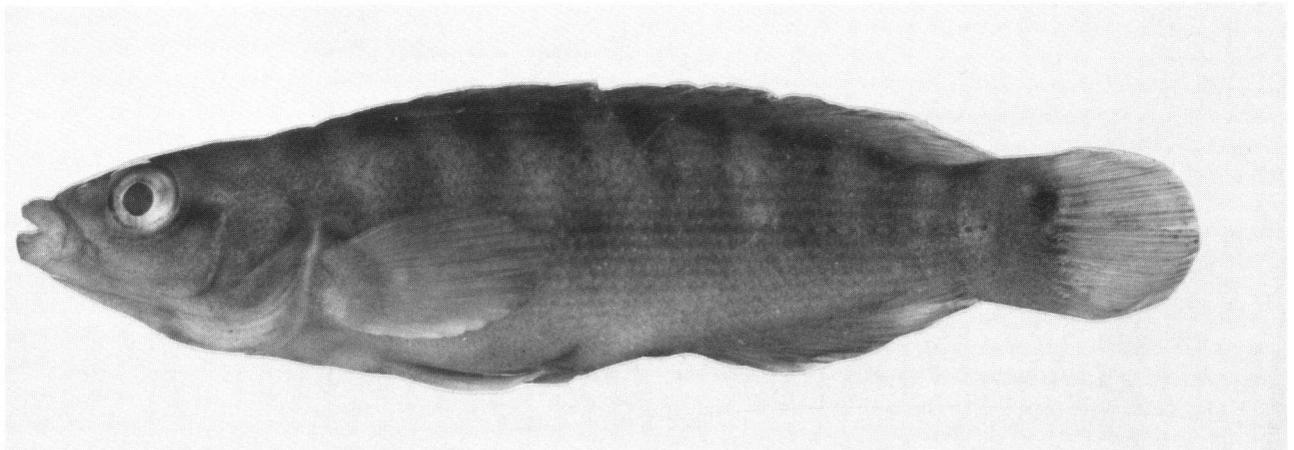
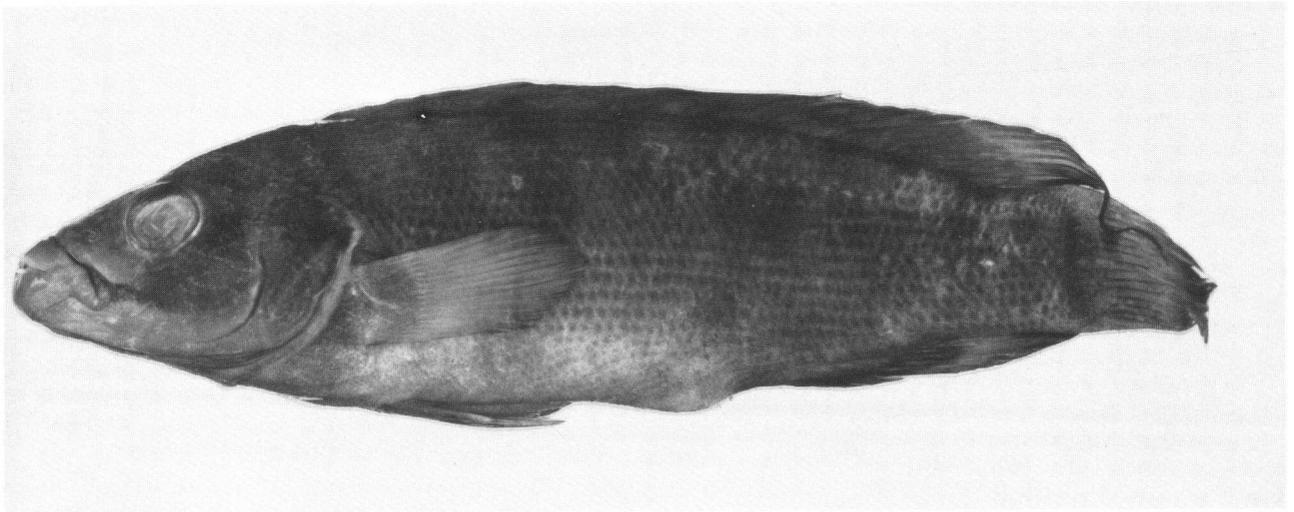
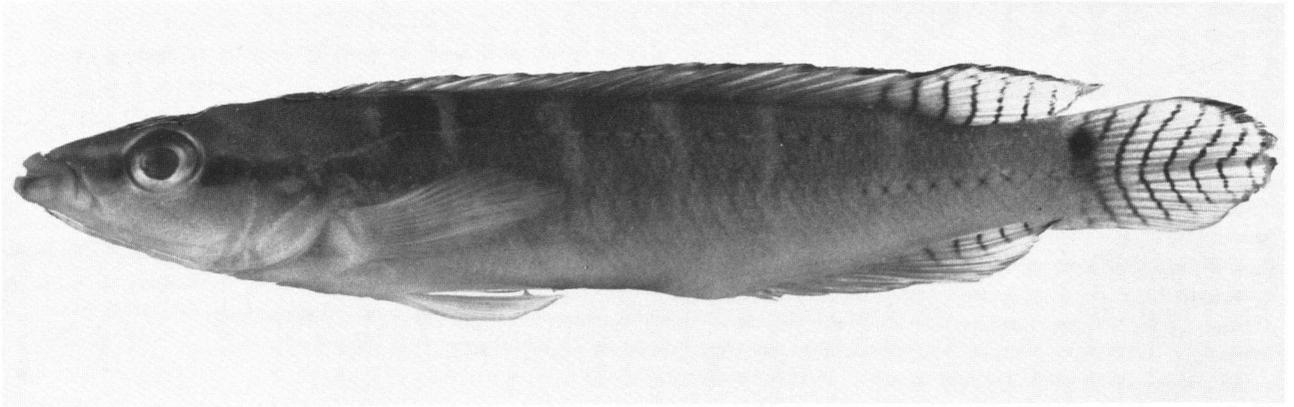


Plate 4. (Upper) *Crenicichla compressiceps*, n. sp., paratype, ZMA 119.763, 61 mm SL, male, (middle) *Crenicichla cyclostoma*, n. sp., holotype, INPA 854, 96 mm SL, (lower) juvenile, ZMA 119.764, 54 mm SL.

black base and white distal margin, larger part of last rays white along posterior margin. Ventral fin dark grey with white distal margin. Pectoral fin hyaline.

Juvenile (based on paratype of 54 mm SL from ZMA 119.764). Ground colour same as in adults. Nine somewhat darker, almost vertical bars, between the operculum and the caudal fin somewhat oblique to the middle of the body. A vague lateral band in the middle of the body from pectoral fin base to the caudal fin base. Distal half of the caudal fin white, the basal half dark. Caudal fin with a spot surrounded by a light ring.

#### ETYMOLOGY

The name *cyclostoma* alludes to its rounded mouth, *kyklos* (Gr.) means round/circular and *stoma* (Gr.) mouth.

#### REMARKS

*Crenicichla cyclostoma* is distinguished from other *Crenicichla* species by the following combination of characters: (a) head strongly compressed, (b) mouth rounded, lips very thick, (c) maxilla not reaching to anterior margin of orbit, and (d) nostrils nearer to orbit than to postlabial skinfold.

Some adults show the same colour pattern as juveniles, except for the ocellated caudal fin spot, which is obscured by the dark caudal fin base.

The locality "Between Cametá and Jatobal" is not included in the map (Pl. 2) nor in the discussion, because this indication is very vague.

***Crenicichla jegui* n. sp.**  
(Pls. 2, 5 upper; Tables I, II, III)

#### MATERIAL EXAMINED

Holotype: INPA 857, 106 mm SL, Itupiranga, VII-1980, coll. INPA.

Paratypes: ZMA 119.765 (one), same data as holotype; INPA 859 (one), rapids downstream of Jatobal, 8-VII-1982, coll. M. Jégu; ZMA 119.768 (one), Breu Branco, XI-1981, coll. M. Jégu; INPA 883 (one), Tucurui, residual pools downstream to stowage, after closing the stowage, IX-1984, coll. M. Jégu.

#### DESCRIPTION

Based on holotype and paratypes. Anterior half of the body rounded in transverse section, gradually compressed posteriorly; largest specimen more compressed; maximum body depth at level of about 9th dorsal spine; maximum body width at level of operculum; predorsal and preventral profile straight; angle between predorsal and preventral profile 30°; snout pointed in lateral view, rounded in dorsal view; lips fleshy; eyes situated extremely dorsally, interorbital width narrow; orbit 1/3 of head depth at orbit level; nostrils halfway postlabial skinfold and orbit; caudal peduncle about twice as long as deep.

In holotype 87 scales in a horizontal series below the lateral lines, in paratypes: 87 (1), 92 (1), 93 (1), and 95 (1); scales on belly and prepelvic area much smaller than on sides, and cycloid; 26/13 scales in lateral lines of holotype, in paratypes: 23/16 (1), 23/14 (1), 24/12 (1), and 25/14 (1); lateral line scales about 3 times as long as adjacent scales; 3 horizontal scale series between the lateral lines; lateral line continuing onto caudal fin with 2 scales; basal scales on caudal fin, 4 scale series in the middle, 2 series at the edges; interradiation scales to about half the caudal fin.

Dorsal fin origin just above pectoral fin origin; spines increasing in length to about the 9th, posteriorly equal in length; length of the posterior dorsal spine is 10% of SL, in 3 paratypes 8% (2) or 9% (1) of SL; rays acute posteriorly, 4th from last the longest; D XXII.12 in holotype, XXII.13 (2), XXIII.11 (1), and XXIII.12 (1) in paratypes. Caudal fin rounded. Anal fin reaching to caudal fin base; rays acute posteriorly, 4th from last the longest;

A III.9 in holotype, III.9 (1), III.10 (2), and III.11 (1) in paratypes. Pelvic fin reaching to halfway the anus; acute. Pectoral fin as long as pelvic fin; rounded.

Nine gill rakers externally on 1st ceratobranchial of holotype, paratypes: 8 (1), 9 (2), and 10 (1), all knob-shaped.

## COLOUR PATTERN

Back from orbit to caudal fin base brown-grey; sides gradually more yellowish to ventrad; head, preoperculum, and operculum dark grey, with a yellow-brown area below the orbit and on dark part of preoperculum; pelvic fin yellow-brown to grey, other fins grey; bluish dots on body, which are dorsally smaller than a scale, at level of lateral line somewhat larger than a scale; bluish dots also present on head, very clear on lips, with the exception of ventral part of mouth; 2 series of light spots in dorsal fin, 1 at the base of the rays and 1 at the distal tip of the rays. Spots between each 2 rays; dots in posterior part of dorsal fin, forming light bands; a narrow dark band along margin of dorsal and caudal rays; a dark caudal fin blotch, surrounded by a light ring, in the caudal fin base, just above the lateral line scales.

## ETYMOLOGY

The specific name *jegui* is in honour of Dr. Michel Jégu, who collected the paratypes of this species, and most of the other material on which this paper is based.

## REMARKS

*Crenicichla jegui* is distinguished from all other *Crenicichla* species by the following combination of characters: (a) eyes extremely high, (b) narrow interorbital, (c) snout and lips almost black with bluish dots, (d) caudal peduncle about twice as long as deep.

*Crenicichla jegui* has a laterally more rounded

body than other *Crenicichla* species. According to Dr. Jégu the specimens were collected among rocks.

***Crenicichla johanna* Heckel, 1840**  
(Pls. 1, 5 middle; Table I, III)

*Crenicichla johanna* Heckel, 1840: 425-427 (original description, type-locality: Guaporé River).

## MATERIAL EXAMINED

ZMA 119.757 (one), market at Cametá, 31-III-1982, leg. M. Jégu; INPA 873 (one), ZMA 119.756 (one), Itupiranga, 6-VII-1980, coll. INPA.

## REMARKS

A detailed description of *Crenicichla johanna* is given in Ploeg (in press).

The Tocantins *C. johanna* differs from the French Guiana specimens in their somewhat smaller head (14-15% of SL versus 14-18% of SL for the French Guiana specimens), and in the absence of lateral bands. The colour is uniform grey-brown.

***Crenicichla labrina* (Spix & Agassiz, 1829)**  
(Pls. 2, 5 lower; Tables I, II, III)

*Cychla labrina* Spix & Agassiz, 1829: 99 (original description, type-locality: "Mari Brasiliae". restricted below).

## MATERIAL EXAMINED

Lectotype by present designation, MHNN 599, 119 mm SL, lakes in Brazil, coll. C. F. P. von Martius, before 1829.  
INPA 863 (one), ZMA 119.758 (one), Poço do Paulo, 26-VI-1982, coll. M. Jégu; INPA 869 (one), ZMA 119.759 (one), Itupiranga, 6-VII-1980, coll. INPA; ZMA 119.760 (one),

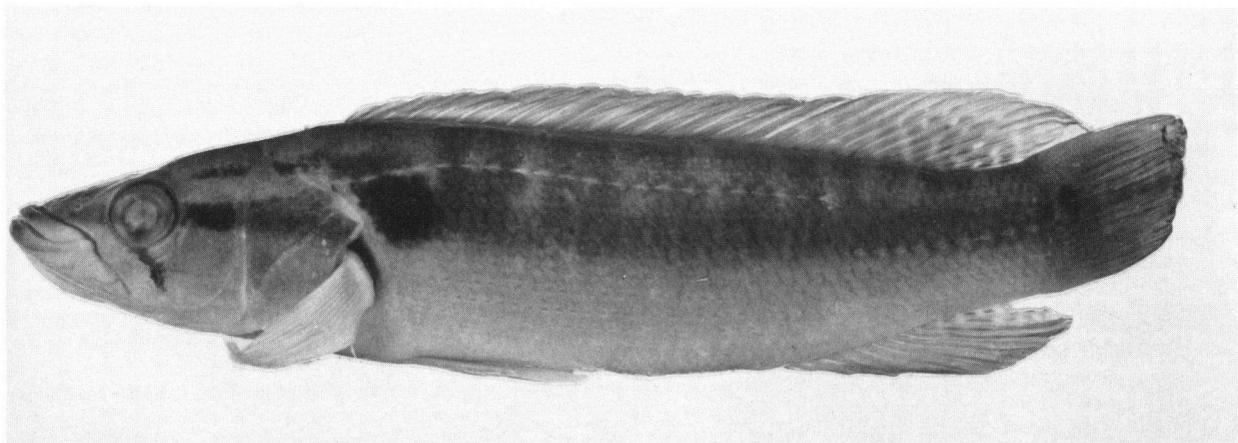
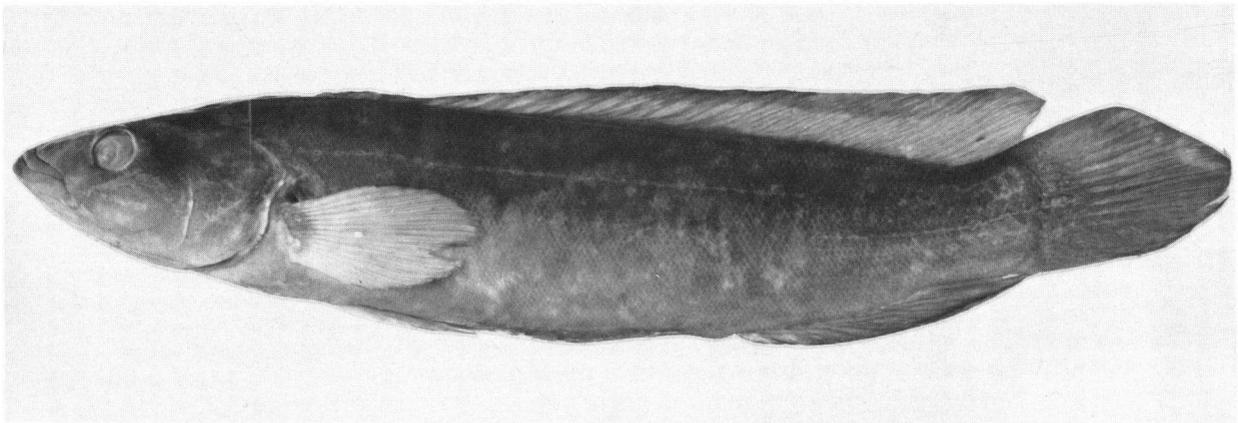


Plate 5. (Upper) *Crenicichla jegui*, n. sp., holotype, INPA 857, 106 mm SL, (middle) *Crenicichla johanna*, from market at Cametá, ZMA 119.757, 278 mm SL, (lower) *Crenicichla labrina*, from Itupiranga, ZMA 119.760, 112 mm SL.

Table I. Morphometric and meristic range for (A) *C. astroblepha* (N = 22), (B), *C. camelana* (N = 2), (C) *C. compressiceps* (N = 21), (D) *C. cyclostoma* (N = 34), (E) *C. jegui* (N = 5), (F) *C. johanna* (N = 3), (G) *C. labrina* (N = 8), (H) *C. lugubris* (N = 11), (I) *C. notophthalma* (N = 20), (J) *C. reticulata* (N = 7). \* = caudal fin damaged.

	A	B	C	D	E	F	G	H	I	J
Total length (mm)	50-195	188-209	19-73	20-126	70-241	187-343	96-193*	72-250	34-56	67-237
Total length (%SL)	118-124	119-120	118-124	119-128	117-123	120-123	118-126*	116*-121	121-131	116-126
Standard length (mm)	41-165	157-176	16-60	24-102	57-204	155-278	77-163	61-215	27-46	53-199
Head length (%SL)	28-32	32	25-33	26-31	33-37	28-32	31-32	28-33	29-35	30-31
Head depth (%SL)	15-20	18-20	17-21	20-25	11-18	19-20	19-23	16-20	16-18	18-23
Head width (%SL)	15-19	16	11-13	13-17	11-14	14-15	12-15	12-15	13-15	15-20
Depth caudal peduncle (%SL)	11-13	12	10-12	12-15	6-11	12	11-13	10-12	9-11	12-14
Length caudal peduncle (%SL)	11-13	12-13	11-14	13-16	12-16	10-12	11-13	12-15	10-12	12-14
Snout length (%SL)	8-11	11	8-10	8-11	11-13	8-9	8-10	8-11	6-9	7-8
Upper jaw length (%SL)	7-13	11-12	6-9	7-10	12-13	9	10-13	9-11	6-9	8-12
Lower jaw length (%SL)	11-16	16-17	10-13	11-13	18	12-13	14-17	12-15	11-14	13-17
Length last dorsal spine (%SL)	9-14	10-11	10-14	9-13	8-10	9	9-11	9-11	9-13	10-13
Orbital diameter (%HL)	19-30	16-18	21-33	18-28	13-18	15-19	19-26	18-23	24-32	22-31
Width interorbital (%HL)	18-34	31-34	15-23	19-31	9-18	31-35	22-30	22-33	19-33	28-41
Scales first lateral line	25-27	23	21-24	23-27	23-26	27	22-24	26-29	19-23	24-25
Scales second lateral line	10-13	11-13	7-10	8-13	12-16	13-16	7-11	13-16	7-10	10-13
Scales below lateral lines	71-80	76-83	56-66	59-73	87-95	121-144	54-64	113-126	50-64	62-71
Dorsal spines	XX-XXIII	XXI-XXII	XIX-XXI	XX-XXII	XXII-XXIII	XXI-XXII	XVII-XIX	XXII-XXIV	XIX-XX	XXI-XXIII
Dorsal soft rays	10-12	10-11	9-11	10-12	11-13	17-18	12-17	15-17	9-10	10-12
Anal soft rays	7-10	8	9-10	8-10	9-11	11-12	9-10	10-13	7-9	7-8
Gill rakers	7-9	9	6-9	6-7	8-10	8-11	9-11	11-13	8-10	8-10

Itupiranga, 5-VII-1980, coll. INPA; INPA 881 (one)/879 (one); market at Cametá, XI-1980, leg. INPA; INPA 853 (one), Itupiranga, Lago Grande, 21-XI-1981, coll. M. Jégu; INPA Toc. 1362 (one), Itupiranga, VII-1980, coll. INPA.

#### RESTRICTION OF TYPE-LOCALITY

The type-locality "Mari Brasiliae" refers to lakes and/or large rivers. The lectotype represents a species of *Crenicichla*, which genus dwells in fresh water only. Most subsequent authors assigned *C. labrina* to *C. saxatilis* (e.g., Pellegrin, 1904: 374; Regan, 1905: 159; Eigenmann, 1912: 514; Fowler, 1954: 307). However, *C. saxatilis* occurs in Surinam and French Guiana, thus outside the area where Martius collected. Martius made collections throughout an enormous distance along the Amazon River system (Papavero, 1971: map 7). In this area more than one *Crenicichla* species occurs fitting the original description of *C. labrina*. The species of which eight specimens are recorded herein are identified with *C. labrina*, mainly to conserve this name, rather than the alternative to describe it as a new species. During his expedition Martius visited Cametá along the Tocantins River. The faded colour pattern of the lectotype of *C. labrina* does no longer provide diagnostic evidence for the identification of the new material.

Because a number of species fits the original description of *C. labrina* and the original type-locality is vague, the species is redescribed. Simultaneously the type-locality is herewith restricted to Tocantins River, north of Itupiranga.

#### DESCRIPTION

Based primarily on a 112 mm SL male from Itupiranga (ZMA 119.760). Body rectangular; laterally compressed; head not flattened; snout in this specimen pointed; lips broad; nostrils situated little nearer to orbit than to postlabial

skinfold; maxilla well reaching to below orbit; caudal peduncle almost as long as deep; predorsal profile straight, preventral profile straight to convex; angle between predorsal and preventral contours about 45°; orbit about half head depth at orbit level.

Scales on anterior part of back ctenoid; from operculum to caudal fin base 56 scales in a series below the lateral lines, in other specimens: 54(1), 55 (3), 59(1), 62(1), and 64(1); lateral line scales larger than adjacent scales; 2 scales in a vertical row between the lateral lines; 22 in anterior, 9 in posterior lateral line, in other specimens: 22/8(1), 22/9(1), 22/11(1), 23/7(1), 23/10(1), 23/11(1), and 24/10(1); 2 lateral line scales extend on caudal fin; 3-4 basal scale series; interradiation scales extend to 2/3 of caudal fin length. Ten gill rakers, in other specimens: 9 (5) and 10 (2); dorsal 4 or 5 rakers bent, the remaining ones knob-shaped.

Dorsal fin origin just beyond posterior edge of operculum; spines increasing in length to 6th, posteriorly equal in length; soft part of dorsal fin acute posteriorly, reaching to beyond caudal fin spot; 7th ray from posterior the longest; D XVIII.14, in other specimens: XVII.17(1), XVIII.12(1), XVIII.13(1), XVIII.14(1), XIX.12(1), and XIX.14 (2). Anal fin acute posteriorly, reaching to caudal fin base; 5th ray from posterior the longest; A III.9, in other specimens: III.9 (4) and III.10 (3). Ventral fin reaching to halfway the anal fin; 1st (branched) ray the longest; acute distally. Pectoral fin as long as ventral fin; rounded. Caudal fin rounded.

#### COLOUR PATTERN

Brownish; dorsally darker, ventrally lighter; dorsal part of head greyish; ventral part of head, preventral area, and belly yellowish; just posterior to operculum a dark inconspicuous humeral spot covering 5 scales in a horizontal series; vague lateral band from humeral spot to caudal fin base; dark caudal fin spot without a light ring; dark suborbital, preorbital, and

postorbital stripe; 2nd dark stripe from orbit to dorsalmost part of humeral spot (just above lateral line); about 8 very vague, dark vertical bars above lateral band; white dots, smaller than a scale, occur in an irregular pattern on darker part of the sides, more numerous posteriorly than just behind operculum. White dots in posterior part of dorsal and anal fin. Pectoral and ventral fins hyaline, other fins grey.

## REMARKS

The colour pattern is variable. The largest specimen (INPA 881, 163 mm SL) shows inconspicuous white dots in the center of the scales on the flanks, arranged into longitudinal white series forming lines. In some specimens the humeral spot is more or less round, in others it shows two notches, like in *C. saxatilis* from French Guiana. Also the ground colour of the body is variable, some specimens are brown-yellow, others cream-white.

*Crenicichla labrina* is reminiscent of *C. saxatilis*. The average head is somewhat shorter in *C. labrina* (31.8% SL versus 33.2% SL). The average snout of *C. labrina* is somewhat shorter (8.8% SL versus 10.2% SL). The average posterior lateral line of *C. labrina* has less scales (9.4 versus 10.5). The shape of the humeral spot is variable in *C. labrina*. In *C. saxatilis* it is constant and distinct with a dorso-anterior notch. White stripes as present in INPA 881 are absent in *C. saxatilis*. Dots on flanks in *C. saxatilis*, and black spots in the dorsal fin of female *C. saxatilis*, are not found in *C. labrina*.

The original two syntypes of *C. labrina* were deposited in Munich, later on one of these syntypes was deposited in Neuchâtel. The Munich (larger) syntype was destroyed during World War II. According to Kottelat (1984: 150) the syntype MHNN 599 is 120 mm SL, 145 mm TL. The two syntypes were said to be 4.5 and 7 "inch".

The lectotype falls within the variability of characters of the Tocantins specimens, except for the relative snout length, which is longer

(12% of SL, range 8-10). This may be due to the weakness of the lectotype.

## *Crenicichla lugubris* Heckel, 1840

(Fig. 2, 6; Tables I, III)

*Crenicichla lugubris* Heckel, 1840: 422-424 (original description, type-locality: Negro River).

*Crenicichla johanna* var. *strigata* Günther, 1862: 306 (original description, type locality: Capin (= Capim) River, Cupai (= Cupari) River).

## MATERIAL EXAMINED

Syntype of *C. lugubris* NMW 61.148, Negro River.

Two syntypes of *C. johanna* var. *strigata* BMNH 1848-11-8: 79-80, rivers "Cupai" and "Capin".

INPA 865 (2), ZMA 119.748 (one), Poço de Paulo, 26-VI-1980, coll. INPA; ZMA 119.747 (one), Icangui, 29-XI-1980, coll. INPA; INPA 882 (3), ZMA 119.749 (2), Igarapé Canoal, downstream of Cachoeira, 12-XI-1981, coll. M. Jégu; ZMA 119.750 (one), market at Cametá, 31-III-1980, leg. INPA; ZMA 119.751 (one), Acari Pucu, 28-III-1982, coll. M. Jégu.

## REMARKS

A detailed description of *C. lugubris* will be given in a future paper on the Surinam cichlids.

The Tocantins specimens differ in colour from Surinam specimens as follows: Adults: dark brown dots arranged in lines on the head and anterior part of back. Vague dark humeral spot, below lateral line. Humeral spot not round (see fig. 9). Dark spot in caudal fin base. Dorsal and anal fin with dark distal margin, rest of these fins, and caudal fin grey. Ventral fin and pectoral fin hyaline.

Juveniles (including syntypes of *C. strigata*) show different colour patterns (fig. 9). Ontogenetic changes are: (a) longitudinal

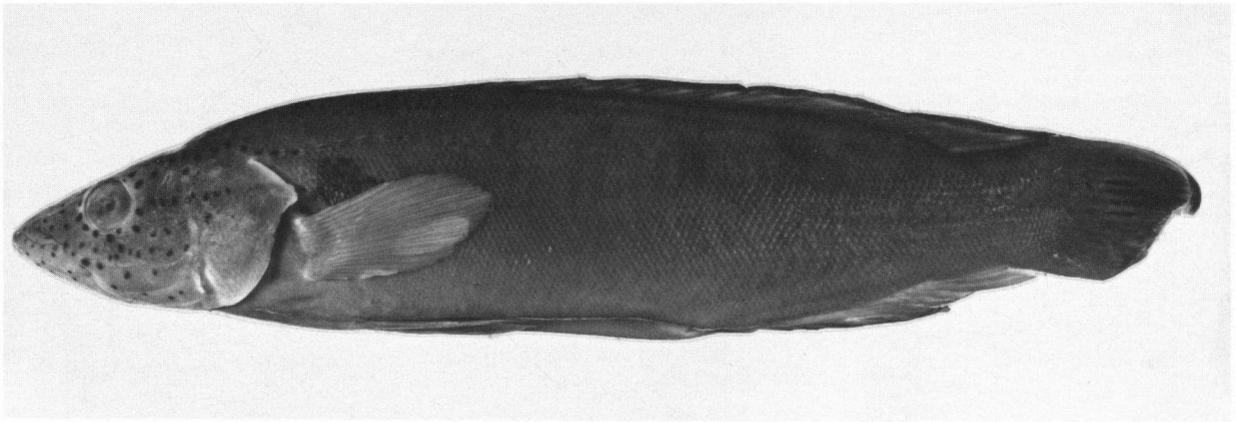
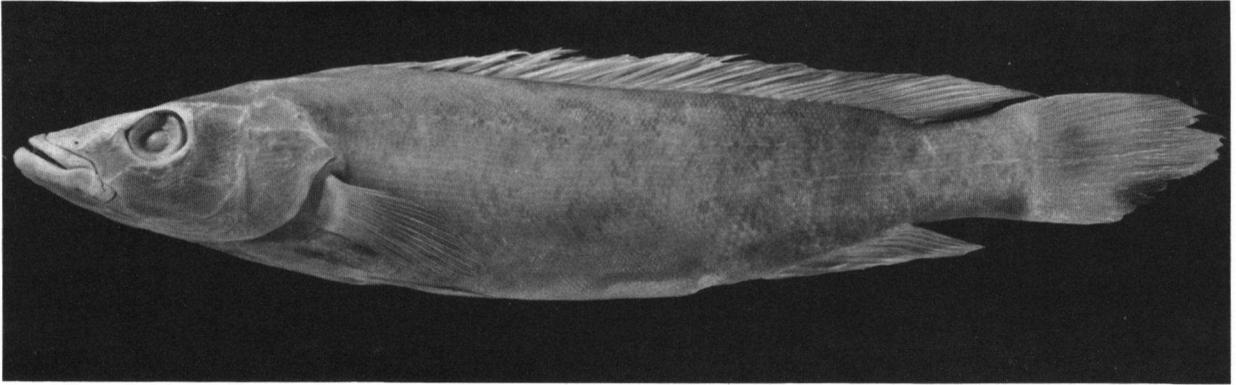


Plate 6. (Upper) *Crenicichla lugubris*, adult, holotype, NMW 61.148, 231 mm SL, (middle) adult from Icangui, ZMA 119.747, 208 mm SL, (lower) juvenile, syntype of *C. johanna* var. *strigata*, BMNH 1848-11-8: 79, 150 mm SL.

Table II. Morphometric (in mm, in % SL of % HL) and meristic data for (A) Holotype of *C. astroblepa*, (B) Lectotype of *C. cametana*, (C) Holotype of *C. compressiceps*, (D) Holotype of *C. cyclostoma*, (E) Holotype of *C. jegui*, (G) Lectotype of *C. labrina*.

	A	B	C	D	E	G	A'	B'	C'	D'	E'	G'
Total length	127	209	64	117	127	145	118	119	121	122	120	122
Standard length	108	176	53	96	106	119	100	100	100	100	100	100
Head length	33	57	16	28	36	38	31	32	30	29	34	32
Head depth	18	33	10	24	12	26	17	20	19	25	11	22
Head width	19	28	6.4	16	12	14	18	16	12	17	11	12
Depth caudal peduncle	12	21	5.6	12	6.2	15	11	12	11	13	6	13
Length caudal peduncle	14	22	6.6	12	15	15	13	12	13	13	14	13
Snout length	10	20	4.9	9.1	13	14	9	11	9	9	12	12
Upper jaw length	11	21	4.3	9.0	14	15	10	12	8	9	13	13
Lower jaw length	15	29	—	13	19	19	14	16	—	13	18	16
Length last dorsal spine	9.3	18	6.7	11	11	12	9	11	13	11	10	10
Orbital diameter	7.6	9.3	4.1	6.5	6.0	7.6	23	16	26	23	17	20
Width interorbital	8.0	19	2.8	7.9	3.4	—	24	34	18	28	9	—
Scales first lateral line	26	23	24	23	26	21						
Scales second lateral line	10	11	8	10	13	11						
Scales below lateral lines	76	76	61	66	87	58						
Dorsal spines	XXIII	XXI	XIX	XXI	XXII	XIX						
Dorsal soft rays	11	11	10	11	12	12						
Anal soft rays	8	8	9	9	9	9						
Gill rakers	8	9	7	—	9	—						

stripes become relatively shorter, (b) fewer longitudinal stripes, (c) fewer dots on head and anterior part of the body, (d) a dark spot just posterior to operculum.

During growth the "*C. strigata*" form gradually turns into typical *C. lugubris*. Capron de Caprona (pers. comm.) raised juvenile "*C. strigata*". A photograph of the adults, shows the colour pattern of *C. lugubris*. Eigenmann (1912: 519) was the first to assign *strigata* to *Crenicichla lugubris*.

***Crenicichla notophthalma* Regan, 1913**  
(Fig. 2, 7 first, second; Tab. I, III)

*Crenicichla notophthalma* Regan, 1913: 502-503 (original description, type-locality: Amazon at Manaos).

#### MATERIAL EXAMINED

Lectotype by present designation: BM(NH) 1913.4.15: 4, 50 mm SL, probably female,

Brazil: Manaos, Amazonas River, coll. A. Rachow.

Paralectotype: BM(NH) 1913.4.15: 5, 63 mm SL, probably female, Brazil: Mañaos, Amazonas River, coll. A. Rachow. INPA 861 (8), 864 (3), ZMA 119.752 (7), 119.753 (2), Igarapé Canoal, downstream of Breu Branco, 12-XI-1981, coll. M. Jégu.

#### DESCRIPTION

Based on 20 specimens available from Tocantins River. Body laterally compressed; maximum body depth and width at level of about 5th dorsal spine; predorsal and preventral profile somewhat convex; angle between predorsal and preventral profile 35°; snout pointed in lateral view, rounded in dorsal view; lips fleshy; orbit 1.4 in head depth at orbit level; maxilla not reaching to below orbit; nostrils little nearer to postlabial skinfold than to orbit; caudal peduncle about as long as deep.

Number of scales in a longitudinal series

below the lateral lines of 13 specimens: 50 (1), 54 (2), 56 (1), 57 (2), 58 (1), 59 (2), 60 (2), 63 (1), and 64 (1); number of scales in lateral lines of 15 specimens: 19/8 (1), 19/9 (1), 20/8 (3), 20/9 (1), 20/10 (1), 21/7 (2), 21/8 (1), 21/9 (1), 21/10 (3), and 23/9 (1); 3 horizontal scale series between the lateral lines; posterior lateral line continuing onto caudal fin with 2 scales; maximum of 3 basal scale series in the caudal fin; interradial scales to about 1/4 of the caudal fin length.

Dorsal fin origin just above pectoral fin origin; spines increasing in length to about the 5th, posteriorly equal in length; length of the posterior dorsal spine 9% (1), 11% (8), 12% (6), or 13% (1) of SL; rays acute posteriorly, 4th or 5th from last the longest, reaching to caudal fin spot; in 16 specimens: D XIX.9(1), XIX.10 (5), and XX.10 (10). Middle caudal fin rays longer than adjacent rays. Anal fin acute posteriorly, reaching to caudal fin base; 4th ray from last the longest; in 16 specimens: A III.7 (2), III.8 (11), and III.9 (3). Pelvic fin reaching to halfway the anus; acute. Pectoral fin as long as pelvic fin; rounded.

In 12 specimens: 8 (2), 9 (5), or 10 (5) gill rakers externally on 1st ceratobranchial.

## COLOUR PATTERN

Colour of body in 3 equal zones: (a) a light yellow-brown ventral part, (b) a dark brown lateral band from distal tip of snout to caudal fin spot, fading to end of caudal fin, (c) a brown dorsal zone, above lateral band; in the latter zone 9 vague vertical bars, in the anterior half of the body not reaching the lateral band, about 4-6 scales wide. No humeral spot, no suborbital stripe. Dorsal fin hyaline, in many specimens (probably females) with 1-3 large black spots in the middle, occasionally with an additional number of small black spots in the fin lappets. Frequently the spots are fused. Sometimes a dark distal margin. Caudal fin with darker middle rays in which occasionally a few (up to 3) white spots; caudal fin spot small, with a light ring, dorsal part of fin white with dark distal

margin, and dark centre of dorsal half; ventral half of caudal fin grey. Anal fin hyaline, sometimes with a dark distal margin. Pectoral and ventral fins hyaline.

## REMARKS

These specimens are reminiscent of *C. wallacei* Regan, 1905 and *C. nana* Regan, 1913. The Tocantins specimens have fewer soft dorsal rays (9-10) than were recorded for *C. wallacei* by Regan (1905: 163): 11 and 13. The length of the last dorsal spine of *C. wallacei* is given by Regan as half the head length, which would make 15.6% of SL in average computed for Tocantins specimens. The length of the last dorsal spine, however, is 11.4% of SL. The caudal fin of the Tocantins specimens lacks the obscure cross-bars as described for *C. wallacei*. According to the original description of *C. nana* (Regan, 1913: 502), it has XX-XXI/11 dorsal rays, 5 or 6 anterior teeth series in both jaws. The Tocantins specimens have a maximum of XX.10 dorsal rays, and 4 teeth series in both jaws.

The Tocantins specimens agree with *C. notophthalma* Regan (1913: 502-503): 3-4 teeth series, XX.10 dorsal rays, last dorsal spine less than 2/5 in head (= 12.5%), and (usually) spots in dorsal fin.

The lectotype and paralectotype differ from the Tocantins specimens in some morphometric characters, e.g., a narrower caudal peduncle (8.2 and 9.0% of SL versus 10-12% in Tocantins specimens). This may be due to the softness of the types. In some *Crenicichla* species (viz., *C. saxatilis* and *C. albopunctata*), females often have black spots in the dorsal fin. This is probably also the case with *C. notophthalma*. Apart from that, the specimens agree in all characters. Therefore, I assume the specimens with the spots in the dorsal fin to be females, and the ones without spots to be males.

***Crenicichla reticulata*** (Heckel, 1840)  
(Pls. 2, 7 third, fourth; Table I, III)

*Batrachops reticulatus* Heckel, 1840: 433-436

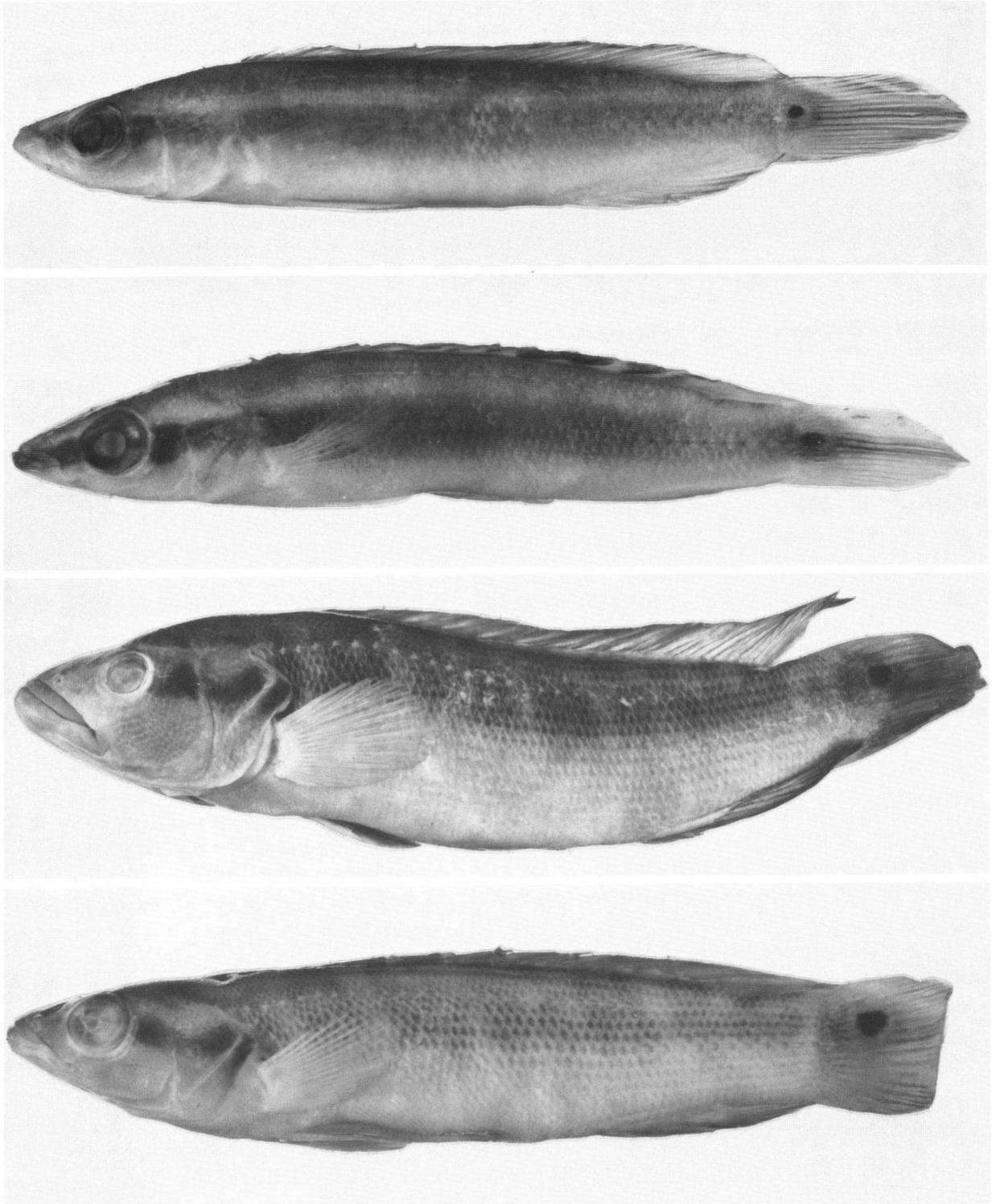


Plate 7. (First) *Crenicichla notophthalma*, from Igarapé Canoal, downstream of Breu Branco, male (?), ZMA 119.753, 45 mm SL, (second) female (?), ZMA 119.753, 44 mm SL, (third) *Crenicichla reticulata* from Itupiranga, adult, ZMA 119.755, 199 mm SL, (fourth) juvenile, INPA 867, 88 mm SL.

(original description; type-locality: Negro River).

#### MATERIAL EXAMINED

Syntype NMW 35.783, 220 mm SL, Negro River.

INPA 870, ZMA 119.754 (4), Igarapé Pucuruizinho, 26-XI-1981, coll. M. Jégu; INPA 867 (one), Itupiranga, VII-1980, coll. INPA; INPA 868 (one), Igarapé Arapari, 13-VII-1982, coll. M. Jégu; ZMA 119.755 (one), Itupiranga, 6-VII-1980, coll. INPA.

#### DESCRIPTION

Based on 8 specimens examined. Slightly laterally compressed; predorsal profile concave; preventral profile somewhat convex; angle between predorsal and preventral profile about 50°; snout in lateral view pointed, in dorsal view rounded; mouth much wider than interorbital; lower jaw prognathous; orbit in upper half of head; orbital diameter about 1/3 of head depth at orbit level of largest specimen (199 mm SL, ZMA 119.755), half of head in smaller specimen (88 mm SL, INPA 867); nostrils much nearer to distal tip of postlabial skinfold than to orbit; caudal peduncle as long as deep.

Syntype has 75 scales in a series below the lateral lines from operculum to caudal fin base, other specimens: 62 (1), 64 (2), 66 (1), 69 (1), 70 (1), and 71 (1); 27/12 scales in lateral lines of syntype, in other specimens: 24/10 (1), 24/13 (1), 25/10 (3), 25/11 (1), and 25/12 (1); lateral line scales about twice as large than adjacent scales; scales on anterior part of back ctenoid; 3 scales in horizontal series between lateral lines; scales in preventral area much smaller than scales on body; 3-4 basal scale series in the middle of the caudal fin (3 in syntype), diminishing to 1 towards the edges; interradiation scales to about 2/3 of caudal fin length, in smaller specimens to 1/2 of caudal fin. Syntype with 10 rakers externally on 1st ceratobranchial, in other specimens: 8 (3), 9 (3), and 10 (1). All teeth fixed.

Dorsal fin acute posteriorly, reaching to caudal fin spot; spines increasing in length to about 6th, posterior to this being equal in length; 6th from last dorsal ray the longest; syntype: D XXIV.11, in other specimens: XXI.12 (2), XXII.11 (1), XXIII.10 (3), and XXIII.11 (2). Caudal fin rounded; 16 (damaged)-26% of SL. Anal fin acute posteriorly; 4th ray the longest and reaching to caudal fin spot; syntype: A III.8, in other specimens: III.8 (3), III.9 (3), and III.10 (1). Ventral fin acute, 2nd soft ray the longest, reaching to halfway the anal pore. Pectoral fin rounded; slightly larger than ventral fin.

#### COLOUR PATTERN

(Based on syntype). Ground colour of body light brown, yellowish brown on belly; forehead grey-brown; a dark brown blotch on the base of each scale on the side. Dark lateral band starting as dark blotches just posterior to orbit, on operculum, and just behind operculum, then running to caudal fin spot. Lateral band on body interrupted by 6 vague, light, almost vertical bars. Bars running from back, a little beyond the middle of the sides. Dorsal fin grey. Caudal fin grey. Upper part of caudal fin base with black spot. Anal fin grey with dark edge. Ventral fin light. Pectoral fin hyaline.

#### REMARKS

The specimens from the Tocantins River differ in some characters from the syntype (e.g., fewer scales in L1, and below the lateral lines, fewer dorsal spines). The type locality is Negro River, at great distance of the Tocantins River, which may explain the differences.

#### DESCRIPTION OF SOME LOCALITIES (Pls. 1, 2)

1. *Market at Cametá*. The Tocantins River at Cametá is influenced greatly by fresh water tides (tidal range of up to 5-6 m). The

Table III. Occurrence of the ten *Crenicichla* species in two types of waters: type-1: running fast to moderately fast, bottom of rocks and sand, and type-2: stagnant or slowly running, bottom of sand, dead leaves, or mud. For each type of water the total numbers of records is shown.

	Type-1 stations	Σ type-1	Type-2 stations	Σ type-2
<i>C. astroblepa</i>	6, 8, 9, 14	4	—	—
<i>C. cyclostoma</i>	6, 8, 14	3	—	—
<i>C. jegui</i>	6, 9, 14	3	—	—1
<i>C. compressiceps</i>	14	1	—	—
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<i>C. reticulata</i>	8, 9, 14	3	11, 16, 18	3
<i>C. notophthalma</i>	14	1	11, 18	2
<i>C. johanna</i>	9	1	1, 18	2
<i>C. labrina</i>	6, 14	2	1, 3, 15, 16, 17, 18	6
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<i>C. cametana*</i>	—	—	1,	1
<i>C. lugubris</i>	—	—	1, 2, 4, 5, 18	5

\* Steindachner's type locality "Cametá" considered to be station 1

periodically in- and outflowing stream is used for fisheries. Many *Crenicichla* specimens were collected between barriers of bamboo along the bank, during March and April. Date: 31-III-1982.

2. *Tocantins River near Cametá.*

3. *Poço do Paulo.* Tributary creek to the Tocantins River, which in periods of low water is cut off from the main river by a sandbank. Stagnant, depth 2-3 m, no vegetation, sandy bottom. Collection dates: 24/26-VI-1980.

4. *Acari Pucu.* Fish collected with nets only. These were situated where the Tocantins River widens abruptly. Tidal influences of fresh water. The catches were made either in the flooded forests, or at the edge of the area that falls dry during low tide. Both zones muddy. Collection date: 28-III-1982.

5. *Icanguí.* Fish collected in a large and deep (2-4 m) creek, tributary of the Tocantins River. Slowly running water, sandy bottom, many shrubs with flooded trunks. Collection date: 29-XI-1981.

6. *Tucuruí,* residual pools downstream of stowage, after closing the stowage. When the stowage of Tucuruí was closed, the course of the river became cut off, and the bed of the river appeared. This resulted in a zone of pools

with rocks (former rapids) and sand. Collections were made with poison in the residual pools during two months. Usually these pools were small, not exceeding 15 m<sup>2</sup> at a depth of 0.5 m. Collection dates: IX/X-1984.

7. *Market at Tucuruí.* Date: XI-1981.

8. *Capuerana.* Surf-zone with pebbles and sand. Collections were made in a quiet area between the rapids, about 2 m deep, bottom with sand and rocks. Collection date: 10-XI-1981.

9. *Breu Branco.* Collection made with nets, in a quiet area between rocks along the bank, at depths of 1 to 3 m. Many small shrubs, occasionally sand or gravel. Collection dates: 13-V-1980, XI-1980, 13-XI-1981.

10. *Igarapé Canoal.* Small tributary of the Tocantins River, 1 km from confluence with the latter, 1-10 m wide, 0.8-5 m deep. One part of this area is a quiet creek, another part is bordered by trees and branches ("cachoeiras" shrubs) which accumulated to a barrier, resulting in a stagnant pool. Collection dates 12-XI-1981, 22-XI-1981, 11-VII-1982.

11. *Igarapé Arapari.* Small tributary creek of the Tocantins River. Collections made with nets and poison, at confluence with the Tocantins River (width 20 m, depth 2 m). High river bank, water running very slowly; sometimes

the stream reverses so that water flows in from the main river. Collection date: 13-VII-1982.

12. *Igarapé Pucuruizinho*. Collection date: 26-XI-1981.

13. *Igarapé Bucuri*. Collection date: 26-XI-1981.

14. *Rapids downstream of Jatobal*. A small tributary creek at the lower part of the rapids at Jatobal, width 1-6 m, depth 0.1-0.8 m. Very fast running water. Bottom with rocks, pebbles. Small "cachoeiras" shrubs. Collection date: 8-VII-1982.

15. *Igarapé Jatobal*. Collected with poison at level of road Maraba-Tucurui, upstream of flooded area. Water running slowly, width 2 m, depth 1 m. Bottom sandy, covered with decaying leaves. Trees along the bank provide large shadowed areas. Collection date: 3-VII-1982.

16. *Igarapé Valentim*. Collected with poison at level of road Maraba-Tucurui, upstream of flooded area. A zone with fast-running water, dead trees and remains of a bridge in the forest, downstream of which the bottom is sandy, upstream muddy. Width 2-5 m, depth 0.5-1.5 m. Collection date: 24-XI-1981.

17. *Itupiranga, Lago Grande*. Large lake, length 5 km, width 500 m, depth 2-3 m, separated from the Tocantins River. Collected with nets. Collection date: 21-XI-1981.

18. *Itupiranga*. Collected among large plants, in a small tributary creek of the Tocantins River, separated from the main river by trees. Almost stagnant, depth more than 5 m. Collected with nets: in pools separated from the main river, with a flat bottom and a depth of 0.5-2 m, or along the riverbank in quiet areas. Collection dates: 5/6/7/11-VII-1980, VII-1980, 5-VIII-1980, 29-VI-1982.

19. *Itacaiuna River*, Serra dos Carajos, Caldeirão, Cachoeira Carreira Comprido, Poço de Pedral. Collection date: 14-X-1983.

## DISCUSSION

The localities where the specimens were collected can roughly be divided into two water types. Type-1: running fast to moderately fast,

bottom of rocks and sand (numbers 6, 8, 9, 14), and type-2: stagnant or slowly running, bottom of sand, dead leaves, or mud (numbers 1, 3, 4, 5, 11, 15, 16, 17, 18). About stations 7, 12, 13, and 19 there is not enough information, station 10 shows habitats of both types, which is not indicated on the labels accompanying the *Crenicichla* specimens. For each water type the records of *Crenicichla* species are summarized (see table III).

Although the number of localities is low, some preliminary conclusions can be drawn. The species described in this paper as new, are restricted to type-1 waters. This is not so surprising since these kinds of waters are difficult to reach, while type-2 waters can rather easily be sampled. *C. lugubris* seems to be a species which occurs in quiet waters only.

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Received: July 31, 1986.