

MISCELLANEOUS PUBLICATIONS
MUSEUM OF ZOOLOGY, UNIVERSITY OF MICHIGAN, NO. 67

A SMALL COLLECTION OF FISHES
FROM RIO GRANDE DO SUL
BRAZIL

BY
A. LOURENÇO GOMES

ANN ARBOR
UNIVERSITY OF MICHIGAN PRESS
NOVEMBER 28, 1947

**PRICE LIST OF THE MISCELLANEOUS PUBLICATIONS
OF THE MUSEUM OF ZOOLOGY, UNIVERSITY OF MICHIGAN**

Address inquiries to the Director of the Museum of Zoology, Ann Arbor, Michigan.

Bound in Paper

No. 1.	Directions for Collecting and Preserving Specimens of Dragonflies for Museum Purposes. By E. B. WILLIAMSON. (1916) Pp. 15, 3 figures	\$0.25
No. 2.	An Annotated List of the Odonata of Indiana. By E. B. WILLIAMSON. (1917) Pp. 12, 1 map	\$0.25
No. 3.	A Collecting Trip to Colombia, South America. By E. B. WILLIAMSON. (1918) Pp. 24. (<i>Out of print</i>)	
No. 4.	Contributions to the Botany of Michigan. By C. K. DODGE. (1918) Pp. 14	\$0.25
No. 5.	Contributions to the Botany of Michigan, II. By C. K. DODGE. (1918) Pp. 44, 1 map	\$0.45
No. 6.	A Synopsis of the Classification of the Freshwater Mollusca of North America, North of Mexico, and a Catalogue of the More Recently Described Species, with Notes. By BRYANT WALKER. (1918) Pp. 213, 1 plate, 223 figures	\$3.00
No. 7.	The Anculosae of the Alabama River Drainage. By CALVIN GOODRICH. (1922) Pp. 57, 3 plates	\$0.75
No. 8.	The Amphibians and Reptiles of the Sierra Nevada de Santa Marta, Colombia. By ALEXANDER G. RUTHVEN. (1922) Pp. 69, 13 plates, 2 figures, 1 map	\$1.00
No. 9.	Notes on American Species of Triacanthagyna and Gynacantha. By E. B. WILLIAMSON. (1923) Pp. 67, 7 plates	\$0.75
No. 10.	A Preliminary Survey of the Bird Life of North Dakota. By NORMAN A. WOOD. (1923) Pp. 85, 6 plates, 1 map	\$1.00
No. 11.	Notes on the Genus Erythemis, with a Description of a New Species (Odonata). By E. B. WILLIAMSON. The Phylogeny and the Distribution of the Genus Erythemis (Odonata). By CLARENCE H. KENNEDY. (1923) Pp. 21, 1 plate	\$0.50
No. 12.	The Genus Gyrotoma. By CALVIN GOODRICH. (1924) Pp. 29, 2 plates	\$0.50
No. 13.	Studies of the Fishes of the Order Cyprinodontes. By CARL L. HUBBS. (1924) Pp. 23, 4 plates	\$0.75
No. 14.	The Genus Perilestes (Odonata). By E. B. WILLIAMSON AND J. H. WILLIAMSON. (1924) Pp. 36, 1 plate	\$0.50
No. 15.	A Check-list of the Fishes of the Great Lakes and Tributary Waters, with Nomenclatorial Notes and Analytical Keys. By CARL L. HUBBS. (1926) Pp. 77, 4 plates	\$1.50
No. 16.	Studies of the Fishes of the Order Cyprinodontes. VI. By CARL L. HUBBS. (1926) Pp. 79, 4 plates	\$1.00
No. 17.	The Structure and Growth of the Scales of Fishes in Relation to the Interpretation of their Life-History, with Special Reference to the Sunfish Eupomotis gibbosus. By CHARLES W. CREASER. (1926) Pp. 80, 1 plate, 12 figures	\$1.50
No. 18.	The Terrestrial Shell-bearing Mollusca of Alabama. By BRYANT WALKER. (1928) Pp. 180, 277 figures	\$1.50
No. 19.	The Life History of the Toucan Ramphastos brevicarinatus. By JOSELYN VAN TYNE. (1929) Pp. 43, 8 plates, 1 map	\$0.75
No. 20.	Materials for a Revision of the Catostomid Fishes of Eastern North America. By CARL L. HUBBS. (1930) Pp. 47, 1 plate	\$0.75
No. 21.	A Revision of the Libelluline Genus Perithemis (Odonata). By F. RIS. (1930) Pp. 50, 9 plates	\$0.75
No. 22.	The Genus Oligoclada (Odonata). By DONALD J. BORROR. (1931) Pp. 42, 7 plates	\$0.50
No. 23.	A Revision of the Puer Group of the North American Genus, Melanoplus, with Remarks on the Taxonomic Value of the Concealed Male Genitalia in the Cyrtacanthacrinae (Orthoptera, Acrididae). By THEODORE H. HUBBELL. (1932) Pp. 64, 3 plates, 1 figure, 1 map	\$0.75

(*Continued on last pages*)

ADVERTISEMENT

The publications of the Museum of Zoology, University of Michigan, consist of two series—the Occasional Papers and the Miscellaneous Publications. Both series were founded by Dr. Bryant Walker, Mr. Bradshaw H. Swales, and Dr. W. W. Newcomb.

The Occasional Papers, publication of which was begun in 1913, serve as a medium for original studies based principally upon the collections of the Museum. The papers are issued separately to libraries and specialists, and, when a sufficient number of pages have been printed to make a volume, a title page, table of contents, and index are supplied to libraries and individuals on the mailing list for the entire series.

The Miscellaneous Publications, which include papers on field and museum techniques, monographic studies, and other contributions not within the scope of the Occasional Papers, are published separately, and as it is not intended that they will be grouped into volumes each number has a title page.

MISCELLANEOUS PUBLICATIONS
MUSEUM OF ZOOLOGY, UNIVERSITY OF MICHIGAN, NO. 67

A SMALL COLLECTION OF FISHES
FROM RIO GRANDE DO SUL
BRAZIL

BY
A. LOURENÇO GOMES

ANN ARBOR
UNIVERSITY OF MICHIGAN PRESS
NOVEMBER 28, 1947

CONTENTS

INTRODUCTION	5
CHARACIDAE	5
<i>Odontostoechus</i> , New Genus	7
<i>Odontostoechus lethostigmus</i> , New Species	8
<i>Distoechus</i> , New Genus	12
<i>Distoechus stigmaturus</i> , New Species	13
<i>Characidium pterostictum</i> , New Species	18
<i>Acestrorhamphus hepsetus</i> (Cuvier)	22
GYMNOTIDAE	22
<i>Gymnotus carapo</i> Linnaeus	22
<i>Hypopomus brevirostris</i> (Steindachner)	22
PIMELODIDAE	23
<i>Heptapterus mustelinus</i> (Valenciennes)	23
<i>Microglanis cottoides</i> (Boulenger)	23
<i>Rhamdia sebae</i> (Valenciennes)	23
CALLICHTHYIDAE	23
<i>Corydoras paleatus</i> (Jenyns)	23
LORICARIIDAE	24
<i>Canthopomus</i> sp.	24
<i>Ancistrus stigmaticus</i> Eigenmann and Eigenmann	26
<i>Xenocara gymnorhyncha</i> (Kner)	27
<i>Microlepidogaster laevior</i> (Cope)	30
<i>Loricaria</i> (<i>Rhineloricaria</i>) <i>steinbachi</i> Regan	33
POECILIDAE	36
<i>Phalloceros caudimaculatus</i> (Hensel)	36
ATHERINIDAE	36
<i>Odontesthes bonariensis</i> (Valenciennes)	36
CICHLIDAE	36
<i>Crenicichla lepidota</i> Heckel	36
Literature Cited	36

ILLUSTRATIONS

PLATES

(Plates I-III follow page 39)

PLATES

- I. FIG. 1. *Odontostoechus lethostigmus*, new genus and species.
FIG. 2. *Distoechus stigmaturus*, new genus and species.
FIG. 3. *Characidium pterostictum*, new species.
- II. FIG. 1. *Xenocara gymnorhyncha*. Lateral view.
FIG. 2. The same, dorsal view.
- III. FIG. 1. *Loricaria (Rhineloricaria) steinbachi* Regan. Lateral view.
FIG. 2. The same, ventral view.

FIGURES IN THE TEXT

FIGURES

- 1. *Odontostoechus lethostigmus*, new genus and species. (a) Head, (b) Front premaxillary tooth, (c) Lateral premaxillary tooth, (d) Mandibular tooth 9
- 2. *Distoechus stigmaturus*, new genus and species. (a) Head, (b) Front premaxillary tooth, (c) Lateral premaxillary tooth, (d) Mandibular tooth 15

A SMALL COLLECTION OF FISHES FROM RIO GRANDE DO SUL, BRAZIL

INTRODUCTION

A SMALL collection of fresh-water fishes secured by Dr. H. Kleerekoper was sent to the Museum of Zoology of the University of Michigan for identification. Dr. Carl L. Hubbs placed the collection in my hands, and the present paper is the result of a study of the 18 species included. The fishes were collected in Lagôa dos Quadros and in Rio Maquiné, a small tributary to that lake, Conceição do Arroio County, Rio Grande do Sul, Brazil, during the period June to August, 1941.

Two new genera and species of Cheirodontinae are described under the names *Odontostoechus lethostigmus* and *Distoechus stigmaturus*, and a new species of Nannostomatinae under the name *Characidium pterostictum*. *Microlepidogaster laevior* (Cope, 1894) is resurrected from the synonymy of *M. nigricauda* (Boulenger, 1891). *Loricaria steinbachi* Regan, 1906, is reported to occur in Brazil for the first time.

The methods of taking measurements and counts are those described by Hubbs and Lagler (1941: 12-20), unless otherwise specified. In the enumeration of fin rays the unbranched soft rays are represented by lower case Roman numerals (Hubbs, 1944: 76); the spines of catfishes are represented by small capitals.

I am indebted to Dr. Carl L. Hubbs for the generous loan of many papers from his personal library, to Dr. Reeve M. Bailey for orientation in all phases of preparation of this paper, and to Dr. George S. Myers who kindly examined the types of the new cheirodontines. Miss Grace Eager, staff artist of the Museum of Zoology, University of Michigan, prepared the drawings in Figures 1 and 2.

The present study was completed at the Museum of Zoology, University of Michigan, under an inservice training grant awarded by the director of the Fish and Wildlife Service, United States Department of Interior, under the program of the United States government for cultural and scientific co-operation with other American republics.

CHARACIDAE

The 2 new genera of cheirodontine fishes with multicuspid teeth and complete lateral line are described below. The following key compares these and other allied genera.

ANALYSIS OF THE GENERA OF CHEIRODONTINAE WITH MULTICUSPID.

TEETH AND COMPLETE LATERAL LINE¹

- A.—Cheirodontinae: gill membranes free from each other and from the isthmus; parietal and frontal fontanelles present; ventral surface slightly compressed, neither serrated nor excessively decurved; nostrils close together, with a single flap; teeth in a single series in each jaw (a weak secondary row in *Distoechus*); dorsal with 11 or fewer rays; caudal forked, usually with accessory rays. Teeth multicuspid, in part at least with 5 or more points or lobes, expanded distally; lateral line complete; predorsal area scaled; caudal naked; dorsal closer to tip of snout than to base of caudal rays.
- 1a.—Third circumorbital in contact with preopercle below; tooth-bearing part of maxillary usually shorter than the toothless part 2
- 2a.—Teeth in upper and lower jaw dissimilar; premaxillary teeth but little expanded distally, pointed, the median point a little the largest; mandibular teeth much expanded distally, with a small basal notch on each side and 3 median wide points of about the same size 3
- 3a.—Maxillary with teeth *Holoshesthes* Eigenmann, 1903
- 3b.—Maxillary without teeth *Cheirodontops* Schultz, 1944
- 2b.—Teeth in upper and lower jaw similar 4
- 4a.—Mouth small, the lips normal; gape oblique; maxillary with 2 to 7 teeth; lower ramus of first branchial arch with a single series of gill rakers 5
- 5a.—Scales at base of caudal rays normal *Odontostilbe* Cope, 1870
- 5b.—Lower lobe of caudal fin with enlarged scales which cover a dermal bag *Saccoderma* Schultz, 1944
- 4b.—Mouth rather large, low, the lips very shallow, especially on the upper jaw; gape strictly horizontal; maxillary with two teeth; lower ramus of first branchial arch with 2 series of gill rakers 4
- *Othonocheirodus* Myers, 1927
- 1b.—Third circumorbital separated from preopercle by a naked area, which is very narrow below, in *Odontostoechus*; tooth-bearing part of maxillary longer than the toothless part 6
- 6a.—Adipose fin wanting; jaws lipless; gape strictly horizontal; maxillary with 6 or 7 teeth, premaxillary with 4, and mandible with 8, on each side 6
- *Monotocheirodon* Eigenmann and Pearson (in Pearson, 1924)
- 6b.—Adipose fin present; lips shallow; gape not quite horizontal; maxillary with 4 to 6 teeth, premaxillary with 5 to 7, and mandible with 8 to 11, on each side 7

¹ This key is in part modified from Eigenmann (1915: 14–17). In addition to the new species the following forms were studied: *Holoshesthes heterodon* Eigenmann, Carnegie Museum (= C.M.) No. 6867a; *H. pequirá* (Steindachner), C.M. No. 6857; *Odontostilbe paraguayensis* Eigenmann and Kennedy, C.M. No. 6853 and University of Michigan Museum of Zoology (= U.M.M.Z.) Nos. 66364 and 66444; *O. microcephala* Eigenmann, C.M. No. 6855; *Monotocheirodon pearsoni* Eigenmann, U.M.M.Z. Nos. 66484 (paratypes) and 66485; *Cheirodon piaba* Lütken, U.M.M.Z. Nos. 66376 and 66393; *C. insignis* Steindachner, U.M.M.Z. No. 14662; and *Othonocheirodus eigenmanni* Myers, California Academy of Sciences No. 17946. I am indebted to M. Graham Netting and Dr. Wilbert M. Chapman for the loan of specimens in the Carnegie Museum and in the California Academy of Sciences.

- 7a.—Premaxillary teeth in a single row; teeth in both jaws with 5 to 7 points (usually 5), premaxillary occasionally with some 3-pointed teeth, and last tooth of maxillary and of mandible sometimes tricuspid; lower ramus of first branchial arch with 2 series of gill rakers; dorsal rays, i, 8; anal rays, ii, 15 to 18 ODONTOSTOECHUS, new genus
- 7b.—Each side of premaxillary with 1 to 3 small teeth which form a weak secondary row in front of the main row; teeth in upper jaw with 6 to 9 points, those of maxillary mostly with 7 or 8, and of premaxillary with 7 to 9; teeth in lower jaw with 5 to 9 points, most frequently 7; last tooth of each jaw with 3 or more points; lower ramus of first branchial arch with a single series of gill rakers; dorsal rays, i, 9; anal rays, iii, 20 to 22 DISTOECHUS, new genus

Odontostoechus, new genus

Orthotype—*Odontostoechus lethostigmus*, new species.

Teeth in a single series in each jaw, all of essentially the same shape, expanded distally, multicuspoid, with 5 to 7 points (usually 5); median point scarcely the longest. Three-pointed teeth rarely present on premaxillary; the last maxillary and the last mandibular tooth sometimes tricuspid. Each premaxillary with 6 or 7 subequal teeth. Maxillary with 4 or 5 teeth, decreasing in size posteriorly. Lower jaw with 8 to 10 teeth on each side, decreasing in size posteriorly. Mouth rather large, terminal, low, the gape horizontal, the lips shallow. Maxillary relatively long, articulating with premaxillary below middle of nostrils, its tooth-bearing part more or less horizontal, longer than the toothless part which is slightly oblique downward and backward, the extremity free. Circumorbitals separated from preopercle below by a very narrow naked area; posteriorly by a wider naked area which is widest in back of the small, fourth circumorbital. Lower ramus of first branchial arch with 2 series of gill rakers. Lateral line complete, its branches on head well developed. Adipose fin present. Predorsal area scaled. Caudal naked, with 4 irregular series of scales at its base; caudal lobes equal. Dorsal closer to tip of snout than to base of caudal rays. Anal emarginate, with ii, 15 to 18 rays. Dorsal rays, i, 8. Pectoral rays, i, 11 to 13. Pelvic rays, i, 7. Humeral spot present; lateral dark stripe expanded posteriorly to form a less intense dark spot at base of caudal fin.

This genus seems to be related to *Distoechus*, *Othonocheirodon*, and *Monotocheirodon*. It differs from the other genera of cheirodontine fishes as indicated in the accompanying key. *Odontostoechus* presents an interesting feature in common with *Monotocheirodon* and *Othonocheirodon*, namely the presence of 2 rows of gill rakers on the lower ramus of the branchial arches; it differs from those genera in having an adipose fin, the third circumorbital not in contact with preopercle below, and in other characters. *Holoshesthes*, *Odontostilbe*, *Distoechus*, and *Cheirodon* have only 1 series of gill rakers. In the structure of the mouth *Odontostoechus* is simi-

lar to *Monotocheirodon*, *Othonocheirodus*, and *Distoechus*, especially to the first, which also has the mouth very low. The dentition, however, is more like that of *Monotocheirodon* and *Othonocheirodus* than that of *Distoechus*.

The name *Odontostoechus* (ὀδόντς, ὀδόντος, "tooth," and στροίχος, "row") refers to the single series of teeth, an arrangement which is usual in the Cheirodontinae but is in contrast to the condition in *Distoechus*.

Odontostoechus lethostigmus, new species

(Fig. 1; Pl. I, Fig. 1)

The holotype, U.M.M.Z. No. 143272, 47.0 mm. in standard length, was collected in a backwater of Rio Maquiné, a tributary to Lagôa dos Quadros, Conceição do Arroio County, Rio Grande do Sul, Brazil, during June, 1941, by H. Kleerekoper (field number 334). Thirteen paratypes, U.M.M.Z. No. 143271 (12) and Stanford University No. 40188 (1), 22.9 to 34.3 mm. in standard length, were taken with the holotype.

DESCRIPTION OF HOLOTYPE.—For proportional measurements see Table I.

Body compressed, the maximum depth at origin of dorsal fin, 3.3 in standard length; dorsal and ventral profiles about equally arched. Standard length, 1.3 in total length. Head small, 3.9 in standard length, deeper than wide, the dorsal profile decurved anteriorly. Head depth, 1.3 in head length; head width, 1.8 in head length, 1.4 in head depth; postorbital length, 2.6 in head length. Eye large, 2.8 in head length, its length a little greater than its depth; bony interorbital width, 3.8 in head length, 1.3 in eye length. Nostrils contiguous, slightly closer to eye than to tip of snout, the single flap directed forward and covering anterior nostril; posterior nostril somewhat larger than anterior one. Snout short, decurved, blunt, 3.9 in head length, 1.3 in eye length. A crescent-shaped naked area between eye and nostrils. Height of cheek, 6.0 in head length. First circumorbital small, elongate, separated from maxillary below by a narrow groove, and in contact above with the naked area between eye and nostrils; second circumorbital about as long as the first but deeper posteriorly, in contact with the orbital rim above; third circumorbital a large plate which covers most of the cheek but which is not in contact with preopercle, being separated by a naked area, the vertical extent of which is wider than the very narrow horizontal part; greatest width of third circumorbital, 4.8 in head length, 1.7 in eye length; fourth circumorbital very small, separated from preopercle by a wider naked area than are the third and the fifth; fifth circumorbital larger than fourth. Fontanel on top of head elongate, from level of anterior margin of eye to base of occipital process, narrow anteriorly, the parietal and frontal parts subequal. Occipital process small, triangular, bordered by 2 scales on each side and by 1 at its tip.

Lateral-line canals on head well developed. Anterior part of lateral line on body almost vertical, parallel to posterior edge of opercle; at upper corner

TABLE I
PROPORTIONAL MEASUREMENTS AND CERTAIN COUNTS IN *Odontostoechus lethostigmus*

The proportions are expressed as thousandths of the standard length or of the head length. In the enumeration of teeth the count of the right side precedes that of the left.

	Holo- type	Paratypes											Mean		
		34.3	33.0	30.2	30.0	30.0	29.1	28.9	28.0	27.7	27.0	26.6		25.4	22.9
Standard length (mm.)	47.0	285	290	278	286	293	281	283	282	288	292	296	291	301	30.0
Proportions of standard length															
Head length	255	285	290	278	286	293	281	283	282	288	292	296	291	301	285
Body depth	297	291	300	298	270	270	274	276	267	288	288	270	275	266	280
Predorsal distance	538	539	545	546	533	526	522	553	528	537	522	533	531	532	534
Distance from tip of snout to pectoral insertion	234	244	242	258	253	256	261	266	250	259	266	263	271	266	256
Distance from tip of snout to pelvic insertion	485	475	484	496	483	493	498	484	476	490	474	484	496	480	485
Distance from tip of snout to anal origin	659	644	654	655	643	660	652	653	610	638	633	642	669	646	647
Distance from tip of snout to adipose origin	851	848	863	860	856	840	862	858	853	855	825	860	866	834	852
Caudal peduncle depth	166	116	121	102	100	100	100	100	103	108	111	112	106	100	106
Caudal peduncle length	172	183	181	158	143	160	171	176	175	180	181	187	188	183	174
Highest dorsal ray (second branched ray)	223	247	254	235	240	240	257	249	257	252	255	240	240	245	245
Length of dorsal base	148	145	145	132	133	133	137	134	139	140	140	142	125	126	137
Distance from dorsal to adipose (excluding fin bases)	217	204	236	231	213	216	216	214	235	220	207	231	232	218	219
Highest anal ray (third branched ray)	178	204	209	201	203	206	206	206	214	202	222	225	220	213	203
Length of anal base	212	255	224	238	230	230	240	231	250	220	222	225	220	213	229
Longest pectoral ray	200	233	230	228	206	226	219	224	232	231	225	233	220	223	223
Longest pelvic ray	151	174	169	168	166	173	168	169	175	155	155	157	157	160	160
Proportions of head length															
Head width	541	510	510	471	465	465	487	487	506	500	493	493	486	463	491
Head depth	775	734	729	764	744	750	756	756	759	787	746	759	756	710	751
Eye length	350	357	354	348	360	352	365	365	379	375	354	341	364	362	359
Snout length	266	244	250	235	244	238	243	243	240	237	237	240	240	244	244
Bony interorbital width	258	244	250	235	232	227	243	243	240	250	242	240	240	242	242
Postorbital length	383	397	416	370	360	352	367	367	367	375	367	367	391	405	377
Greatest width of third circumorbital*	208	204	208	202	209	204	204	204	209	204	209	209	204	205	205
Height of cheek	166	142	166	134	139	136	136	136	136	136	136	136	136	147	147
Maxillary length†	250	224	224	224	220	215	215	215	215	215	215	215	215	226	226
Upper jaw length	425	387	385	348	348	340	365	365	367	375	367	367	391	362	370
Counts															
Number of teeth on premaxillary	7-7	7-7	7-6	7-7	7-7	7-6	7-7	7-7	7-7	7-7	6-7	7-7	7-7	7-7	7
Number of teeth on maxillary	5-5	5-5	5-4	4-4	4-4	4-4	5-5	4-5	4-4	5-5	5-5	4-5	4-4	4-5	4-5
Number of teeth on mandible	10-10	10-9	9-9	10-10	9-9	8-8	9-10	9-10	9-10	9-9	9-9	9-8	10-10	9-9	9
Scales on lateral line (to base of caudal)	36	37	35	35	35	35	35	36	35	35	36	36	35	35	35-36
Scales from lateral line to dorsal origin	5.5	5.5	5.5	5.5	4.5	5.5	5	5	4.5	5.5	5.5	5.5	5.5	5	5
Scales from lateral line to pelvic insertion	4	3.5	3.5	3.5	3	4	3.5	3.5	3	3.5	3.5	4	4	3	3.5
Anal rays (principal rays)	16	16	16	17	17	15	17	15	18	16	17	17	15	17	15
Pectoral rays (principal rays)	13	12	12	13	13	12	11	12	11	12	12	11	13	12	12

* The greatest width of third circumorbital was measured from the interior edge of orbital rim.
† The maxillary length was measured from the lowest part of the maxillary-premaxillary symphysis to the posterior extremity of the bone.

of gill opening it continues forward as the lateral canal.² Supratemporal canal crossing top of head at base of occipital process, with a median pore at end of a short backward projection. Operculomandibular canal originating in lateral canal closer to supratemporal canal than to orbital canals, with 3 pores in the vertical extent, 1 at the angle, and 7 in the horizontal part. Lateral canal with 1 pore near origin of operculomandibular canal,

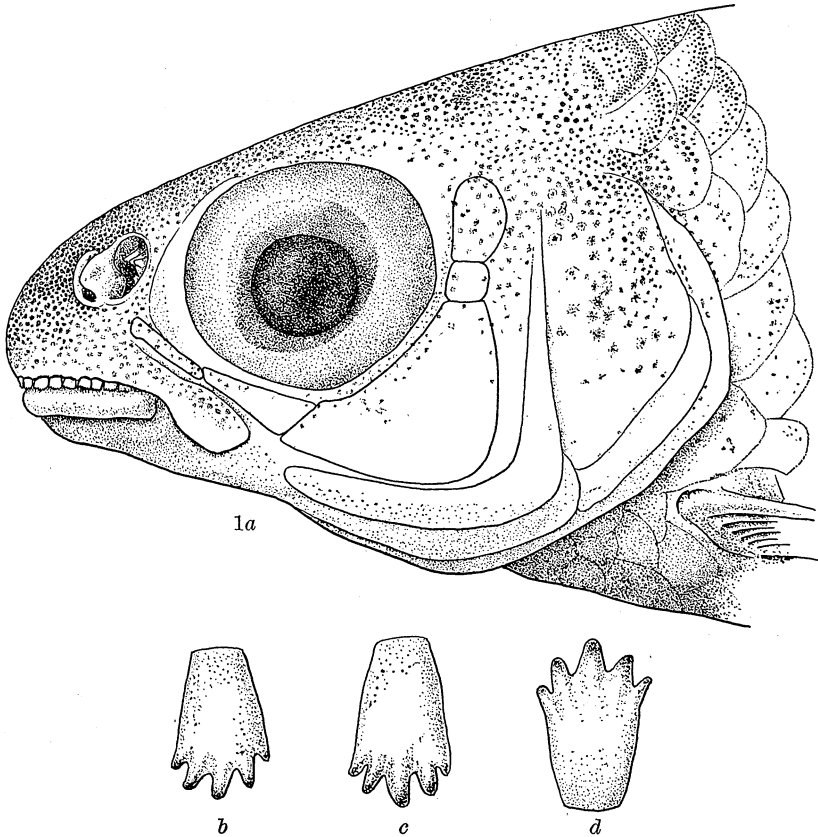


FIG. 1. *Odontostoechus lethostigmus*, new genus and species. Holotype U.M.M.Z. No. 143272, 47.0 mm. in standard length: (a) Head, (b) Front premaxillary tooth, (c) Lateral premaxillary tooth, (d) Mandibular tooth. Drawings by Grace Eager.

dividing behind the orbital rim to form the supraorbital and infraorbital canals. Infraorbital canal with 7 pores, terminating below nostrils; a projection terminated in a pore, and passing between the third and fourth circumorbital bones, extends toward the operculomandibular canal. Supraorbital canal farther from orbital rim, with 5 pores, giving off an oblique projection toward supratemporal canal, with a pore near its posterior ex-

² Terminology of canals on head after Hubbs and Cannon (1935: 9-10). The coronal pore of darters is not present in those specimens of Cheirodontinae examined.

tremity. No projection from supraorbital canal mediad along frontoparietal suture.

Mouth rather large, terminal, low, the gape horizontal; lips not completely covering teeth, especially on upper jaw; upper jaw, 2.5 in head length, slightly the longer, so that when the mouth is shut, its teeth completely sheath those of lower jaw. Maxillary relatively long, 4.0 in head length, 1.7 in upper jaw length, articulating with premaxillary below middle of nostrils; tooth-bearing part more or less horizontal, like the premaxillary, somewhat longer than the toothless part, which is slightly oblique, inclined downward and backward, the extremity free. Teeth with 5 to 7 points (usually 5), slightly expanded distally, about twice as high as wide; median point scarcely the longest. Premaxillary with 7 subequal teeth on each side, more or less regularly staggered, so that alternate teeth are slightly anterior or posterior to those on either side. Maxillary with 5 teeth (2 missing on left side), the last 3 decreasing in size; posterior tooth situated in the narrowest part of the bone, just at point where it bends downward and backward. Lower teeth somewhat broader than upper teeth, 10 on each side, the last 4 decreasing in size. Gill rakers flexible, in 2 series on each branchial arch. External gill rakers on first arch, 7 + 1 + 10, longer and more slender than internal ones, which are broadbased; internal gill rakers, 9 + 12.

Scales regularly imbricated, more or less firmly implanted. Base of caudal rays with 4 irregular rows of scales, the last transverse series formed by 2 or 4 scales, 1 specially enlarged, almost fully covering base of caudal lobe. Interspace between pelvic fins with 3 large, imbricate scales, 1 particularly long; a modified scale in axil of pelvic fin. Anal fin with a sheath of 8 scales covering the base of the 8 anteriormost principal rays. Midline of lower surface with 17 scales before insertion of pelvic, and 8 between last anal ray and base of lower caudal ray. Lateral line complete, decurved anteriorly, with 36 scales on body and 4 pored scales on base of caudal fin. Scales between lateral line and dorsal origin, 5.5, and from lateral line to pelvic insertion, 4.

Origin of dorsal fin above first fifth of pelvic fin, its distance from tip of snout, 1.8 in standard length; last dorsal ray above last fifth of pelvic; highest dorsal ray, 4.5 in standard length; length of dorsal base, 6.7 in standard length, 1.4 in distance from dorsal to adipose; distance from dorsal to adipose (excluding fin bases), 4.6 in standard length. Pectoral low, anterior, the distance from its insertion to tip of snout, 4.3 in standard length, its tip failing to reach origin of pelvic by two-thirds length of eye; longest pectoral ray, 5.0 in standard length. Pelvic fin reaching midway between anus and origin of anal fin; distance from tip of snout to insertion of pelvic, 2.1 in standard length; longest pelvic ray, 6.6 in standard length. Origin of adipose above base of last anal ray, its distance from tip of snout, 1.2 in standard

length. Anal emarginate, the distance from its origin to tip of snout, 1.5 in standard length; highest anal ray, 5.6 in standard length; length of anal base, 4.7 in standard length. Caudal forked, the lobes equal and pointed, with several nonprojecting accessory rays. Caudal peduncle length, 5.8 in standard length; caudal peduncle depth, 9.4 in standard length, 1.6 in caudal peduncle length. Dorsal rays, i, 8; anal rays, ii, 16; pectoral rays, i, 13; pelvic rays, i, 7.

General coloration of body yellowish olive, darker toward the back. Upper part of head dark, with a faint white cross line at occiput; snout grayish; lower part of head light yellowish; cheek and operculum light, with minute brown points concentrated in the upper part of opercle and fifth circumorbital to form an indistinct blotch. Peritoneum dark, easily seen through the translucent body wall. Body sprinkled with minute brown points, most numerous above lateral line, concentrated at scale margins so that they are outlined with dark; a brown line at base of dorsal fin, and a thin mid-dorsal streak. Humeral spot conspicuous, about equal to pupil, above fourth, fifth, and part of sixth scale of lateral line. Dark lateral stripe conspicuous, indistinct anteriorly, darkest on caudal peduncle, expanded into a deeper but much lighter spot just before base of caudal. Fins immaculate, light, the dorsal, adipose, anal, and caudal faintly dusky; middle caudal rays dusky. Base of anal fin with a series of short, faint, light brown lines, which are parallel to and alternate with the rays.

VARIATION.—Proportional measurements of the holotype and 13 paratypes are given in Table I. The paratypes agree with the description of the holotype, with the exception of the variations noted below.

Supratemporal canal sometimes interrupted, each part terminating in a pore at edge of or over fontanel; median pore often in the canal itself and not at end of a backward projection; canal complete but without pore in 1 specimen. Operculomandibular canal interrupted just below lateral canal in several specimens, with 1 pore at either side of the interruption; in 1 specimen the interruption is long, equal to two-thirds its vertical extent. Operculomandibular canal with 2 or 3 pores in its vertical extent, and 5 to 7 in the horizontal portion. Infraorbital canal with 5 to 7 pores, its projection toward operculomandibular canal sometimes very short, or so long that it bridges over, but does not connect with, that canal. Supraorbital canal with 2 to 4 orbital pores, its projection toward supratemporal canal sometimes short.

Teeth mostly 3-pointed in 1 specimen. Last tooth, on both jaws, sometimes tricuspid. For variation in tooth counts see Table I.

Scales in sheath at base of anal fin, 7 or 8. Midline of lower surface with 16 or 17 scales before pelvic insertion. Lateral line, 35 to 37+4. Scales between lateral line and dorsal origin, 4.5 to 5.5, and from lateral line to pelvic insertion, 3 to 4 (see Table I).

Tip of depressed pectoral occasionally reaching pelvic insertion, and tip of pelvic sometimes reaching anal origin. Anal rays, ii, 15 to 18; pectoral rays, i, 11 to 13 (see Table I). The dorsal count is i, 8, and the pelvic, i, 7, in all specimens.

In small specimens, the coloration is paler, the characteristic features as described for the holotype somewhat fainter.

The name *lethostigmus* (from *λήθη*, "forgetfulness," and *στιγμα*, "spot") refers to the large but faintly colored spot at the base of caudal fin; this character contrasts sharply with the intense black spot of *Distoechus stigmaturus*, which was taken in the same collection.

Distoechus, new genus

Orthotype—*Distoechus stigmaturus*, new species.

Premaxillary with 1 to 3 teeth on each side, alternating with the first 3 teeth of the main row to form a secondary row in front; each tooth with 3 to 5 points. Main row on premaxillary with 5 or 6 subequal teeth on each side, with 7 to 9 points, much expanded distally, especially those near midline, almost as high as wide; points subequal, more rounded than those of maxillary and mandibular teeth. Maxillary with 4 to 6 teeth, each with 6 to 9 points (usually 7 or 8), expanded distally, about twice as high as wide, and decreasing gradually in size posteriorly; median point scarcely the largest; last tooth sometimes with as few as 3 points. Lower jaw with a single series of 8 to 11 teeth on each side, with 5 to 9 points (most frequently 7), similar in shape to the maxillary teeth, decreasing in size posteriorly; last or last 2 teeth usually minute, sometimes with only 3 or 4 points. Mouth rather large, terminal, the gape horizontal, the lips shallow. Maxillary relatively long, articulating with premaxillary below middle of nostrils, inclined downward and backward, the extremity free, its tooth-bearing part longer than the toothless part. Circumorbitals separated from preopercle by a wide naked area, which at the widest point is about one-half the greatest width of third circumorbital. Lower ramus of first branchial arch with a single series of gill rakers. Adipose fin present. Predorsal area scaled. Caudal naked, with 4 irregular series of scales at its base, the lobes equal. Dorsal closer to tip of snout than to base of caudal rays. Anal emarginate, with iii, 20 to 22 rays. Dorsal rays, i, 9. Pectoral rays, i, 11 or 12. Pelvic rays, i, 7. Humeral spot present; lateral dark stripe expanded posteriorly to form a conspicuous black spot at base of caudal rays.

This genus differs from the other known genera of cheirodontine fishes in the presence of a weak secondary row, composed of 1 to 3 teeth on each side of the premaxillary and lying in front of the main row. Another interesting dentitional feature involves the differentiation of the median teeth

of the main row, from the other teeth on upper jaw: the median teeth are much expanded distally and have the points rounded and subequal. The development of a secondary row of teeth is regarded as a modification derived from the typical single-rowed condition in the group. The arrangement of these teeth (alternating with those of the principal row) associated with the marked expansion of the teeth of the main row is taken as support for this interpretation. A close relationship with other cheirodontines having multicuspoid teeth is evidenced in the close correspondence of body form, dentition, fin development, coloration, and other characters.

Distoechus is similar to *Odontostilbe* in the oblique maxillary, inclined backward and downward, but *Odontostilbe*, *Saccoderma*, *Othonocheirodus*, *Holoshesthes*, and *Cheirodontops* differ from *Distoechus* in having the third circumorbital in contact with preopercle below. *Distoechus* appears to be most closely related to *Odontostoechus*, *Othonocheirodus*, and *Monotocheirodon*. The dentition of *Distoechus*, however, is very different, and *Odontostoechus*, *Othonocheirodus*, and *Monotocheirodon* have 2 rows of gill rakers on the lower ramus of the first branchial arch. *Monotocheirodon* differs trenchantly also in the absence of an adipose fin. These genera are compared above (pp. 6-7).

The name *Distoechus* (from $\delta\iota\varsigma$, "double," and $\sigma\tau\omicron\iota\chi\omicron\varsigma$, "row") refers to the 2 rows of premaxillary teeth, a unique feature in the Cheirodontinae.

Distoechus stigmaturus, new species

(Fig. 2; Pl. I, Fig. 2)

The holotype, U.M.M.Z. No. 143273, 26.0 mm. in standard length, was collected in a backwater of Rio Maquiné, a tributary to Lagôa dos Quadros, Conceição do Arroio County, Rio Grande do Sul, Brazil, during June, 1941, by H. Kleerekoper (field number 334). Eight paratypes, U.M.M.Z. No. 143274 (7) and Stanford University No. 40187 (1), 19.4 to 36.1 mm. in standard length, were taken with the holotype.

DESCRIPTION OF HOLOTYPE.—For proportional measurements see Table II.

Body compressed, the maximum depth at origin of dorsal fin, 3.2 in standard length; dorsal and ventral profiles about equally arched. Standard length, 1.3 in total length. Head small, 3.2 in standard length, deeper than wide, the dorsal profile decurved anteriorly. Head depth, 1.2 in head length; head width, 2.3 in head length, 1.9 in head depth; postorbital length, 2.7 in head length. Eye large, 2.6 in head, its length and depth subequal; bony interorbital width, 3.5 in head length, 1.3 in eye length. Nostrils contiguous, slightly closer to eye than to tip of snout, with a single flap; posterior nostril much larger than anterior nostril. Snout short, decurved, rather sharp, 4.0 in head length, 1.5 in eye length. A crescent-shaped naked area between eye and nostrils. Height of cheek, 6.7 in head length. First circumorbital

TABLE II

PROPORTIONAL MEASUREMENTS AND CERTAIN COUNTS IN *Distoechus stigmaturus*

The proportions are expressed as thousandths of the standard length or of the head length. In the enumeration of teeth the count of the right side precedes that of the left.

	Holo- type	Paratypes								Mean
		36.1	25.6	25.0	24.5	22.9	22.3	22.0	19.4	
Standard length (mm.)	26.0	36.1	25.6	25.0	24.5	22.9	22.3	22.0	19.4	24.9
Proportions of standard length										
Head length	307	279	304	308	297	305	309	309	309	303
Body depth	307	315	312	311	289	296	304	295	304	303
Predorsal distance	534	529	527	528	506	524	533	504	530	523
Distance from tip of snout to pectoral insertion	303	271	300	292	289	292	300	304	314	296
Distance from tip of snout to pelvic insertion	500	484	500	516	489	489	497	500	515	498
Distance from tip of snout to anal origin	669	664	671	676	653	654	672	645	659	662
Distance from tip of snout to adipose origin	853	875	859	880	861	873	892	863	875	870
Caudal peduncle depth	115	116	113	116	105	104	103	104	103	108
Caudal peduncle length	157	152	156	156	159	152	156	145	144	153
Highest dorsal ray (second branched ray)	253	254	253	260	248	257	264	263	288	260
Length of dorsal base	126	136	125	123	122	126	125	127	123	125
Distance from dorsal to adipose (excluding fin bases)	250	254	242	244	244	262	260	245	252	250
Highest anal ray (third branched ray)	184	.....	187	196	179	187	188	181	.....	186
Length of anal base	238	249	234	240	244	235	242	240	242	240
Longest pectoral ray	192	204	199	204	204	213	210	213	201	204
Longest pelvic ray	161	166	156	160	155	148	147	150	154	155
Proportions of head length										
Head width	437	455	435	441	424	428	434	441	450	438
Head depth	850	891	846	831	821	785	811	808	833	830
Eye length	387	386	384	376	383	400	406	382	400	389
Snout length	250	267	243	246	.....	.....	.....	.....	.....	251
Bony interorbital width	287	297	282	272	.....	.....	.....	.....	.....	284
Postorbital length	362	305	346	337	342	342	347	323	350	339
Greatest width of third circumorbital*	137	158	128	129	.....	.....	.....	.....	.....	138
Height of cheek	150	168	141	142	.....	.....	.....	.....	.....	150
Maxillary length†	262	257	269	259	.....	.....	.....	.....	.....	261
Upper jaw length	400	415	384	402	410	428	420	411	466	415
Counts										
Teeth on external row of premaxillary	2-2	1-1	2-2	2-2	2-2	2-2	2-2	3-2	1-1	2
Teeth on internal row of premaxillary	5-6	5-5	5-5	5-5	5-5	5-5	5-5	5-5	5-5	5
Teeth on maxillary	6-5	4-5	4-4	5-5	4-4	4-5	5-5	5-5	4-5	5
Teeth on mandible	9-10	11-11	9-9	8-8	8-8	8-8	8-9	9-9	9-9	9
Scales on lateral line (to base of caudal fin)	.....	36	36	36	35	36	36	.....	.....	36
Anal rays (principal rays)	20	21	20	21	22	21	21	21	22	21
Pectoral rays (principal rays)	12	12	11	11	11	11	12	12	12	11-12

* The greatest width of third circumorbital was measured from the interior edge of orbital rim.

† The maxillary length was measured from the lowest part of the maxillary-premaxillary symphysis to the posterior extremity of the bone.

small, elongate, separated from maxillary below by a narrow groove, and in contact above with the naked area between eye and nostrils; second circumorbital larger than the first, deepest posteriorly, in contact with the orbital rim above; third circumorbital a large plate separated from preopercle along its margin by a relatively wide naked area; greatest width of third circumorbital, 7.3 in head length, 2.8 in eye length; fourth and fifth circumorbitals

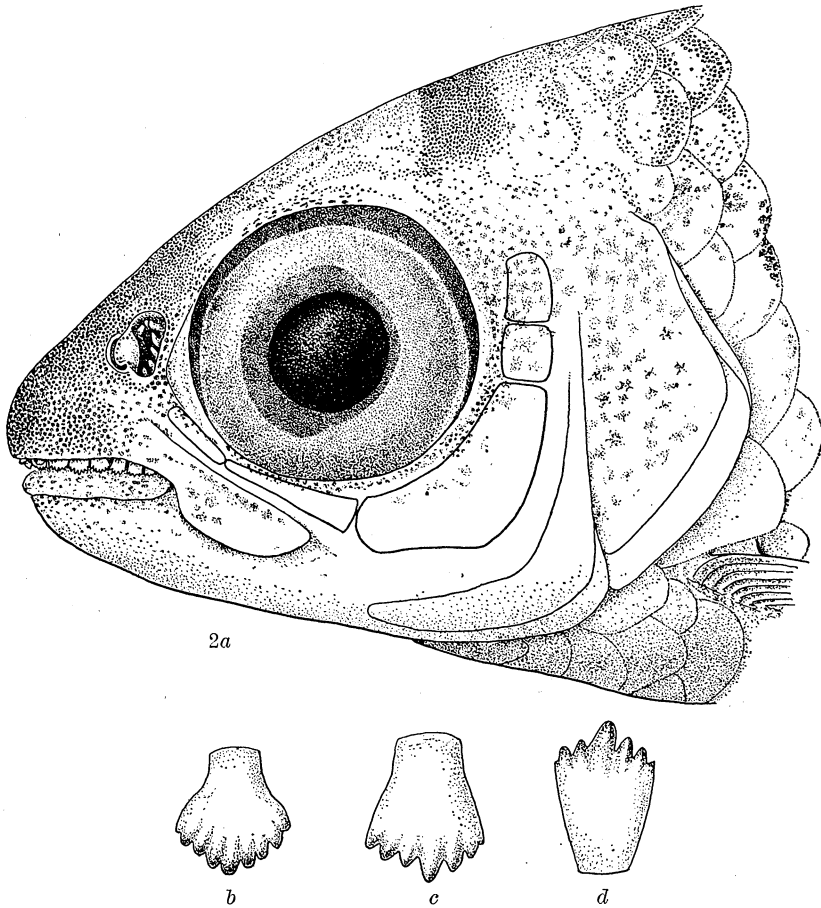


FIG. 2. *Distocochus stigmaturus*, new genus and species. Holotype U.M.M.Z. No. 143273, 26.0 mm. in standard length: (a) Head, (b) Front premaxillary tooth, (c) Lateral premaxillary tooth, (d) Mandibular tooth. Drawings by Grace Eager.

small, well separated from preopercle by a naked area. Fontanel on top of head elongate, from level of anterior margin of eye to base of occipital process, narrow anteriorly, the frontal and parietal portions subequal. Occipital process small, triangular, bordered by 2 scales on each side and by 1 scale at its tip.

Lateral-line canals on head developed and similar to those described for

Odontostoechus lethostigmus. Vertical extent of operculomandibular canal with only 1 pore; horizontal arm with 6 pores. Supraorbital canal with only 4 pores, terminating in front of nostrils; a branch projects mediad along fronto-parietal suture and has a pore at its extremity near fontanel.

Mouth rather large, terminal, the gape horizontal; lips not completely covering teeth, especially on upper jaw; upper jaw, 2.5 in head length, slightly the longer so that when the mouth is shut, its teeth completely sheath those of lower jaw. Maxillary relatively long, 3.8 in head length, 1.5 in upper jaw length, articulating with premaxillary below middle of nostrils, oblique, inclined downward and backward, the extremity free, with the tooth-bearing part longer than the toothless extent. Teeth with 5 to 9 points, usually 8 or 9 on premaxillary, 6 or 7 on maxillary, and 7 on lower jaw. Main row of premaxillary with 5 teeth on right side and 6 on left; those near midline much expanded distally, almost as high as wide, their greatest width about twice the least width (at the base); points subequal, more rounded than those of maxillary and mandibular teeth; lateral premaxillary teeth intermediate in shape between those near midline and those on maxillary. Anterior (secondary) premaxillary row with 2 small tricuspid teeth on each side, placed between first and second and between second and third premaxillary teeth of main row. Maxillary with 6 teeth on the right side and 5 on left, decreasing gradually in size posteriorly, expanded distally, with fewer points posteriorly; teeth about twice as high as wide, their least width about half the greatest width; last 2 teeth on maxillary without distinct points, especially on right side. Lower jaw with 9 teeth on the right side and 10 on left, of more or less the same shape as the anterior maxillary teeth, especially near midline, decreasing in size posteriorly to the last small tricuspid tooth; left side with last 2 teeth small and 3-pointed. Lateral points of teeth sometimes minute and visible only under high magnification. Gill rakers flexible, lanceolate, in a single series on lower ramus of each branchial arch, in 2 series on upper ramus.³

Scales regularly imbricated, more or less firmly implanted. Base of caudal rays with 4 irregular series of scales, the last transverse series formed by 4 scales. Interspace between pelvic fins with 3 large, imbricated scales, 1 particularly long; a modified scale in axil of pelvic fin. Anal fin with a sheath of 7 scales covering base of the 7 anteriormost principal rays. Midline of lower surface with 15 scales before pelvic insertion, and 6 between last anal ray and base of lower caudal ray. Lateral line complete, decurved anteriorly. There are 31 scales on lateral line to the level of base of last anal ray, as in the paratype 36.2 mm. in standard length; those behind are missing. The same paratype has 36 scales on body and 4 pored scales on

³ Gill rakers on first branchial arch of paratype 36.2 mm. in standard length: external, 10 + 1 + 16; internal, on upper ramus, 10.

caudal base. Scales between lateral line and dorsal origin, 6, and from lateral line to insertion of pelvic, 4.

Origin of dorsal fin above first fifth of pelvic fin, its distance from tip of snout, 1.9 in standard length; last dorsal ray above last fifth of pelvic fin; highest dorsal ray, 3.9 in standard length; length of dorsal base, 7.9 in standard length, 2.0 in distance from dorsal to adipose; distance from dorsal to adipose (excluding fin bases), 4.0 in standard length. Pectoral low, anterior, the distance from its insertion to tip of snout, 3.3 in standard length, its tip reaching pelvic insertion; longest pectoral ray, 5.2 in standard length. Pelvic fin reaching midway between anus and origin of anal fin; distance from tip of snout to insertion of pelvic, 2.0 in standard length; longest pelvic ray, 6.2 in standard length. Origin of adipose above insertion of penultimate anal ray, its distance from tip of snout, 1.2 in standard length. Anal emarginate, the distance from its origin to tip of snout, 1.5 in standard length; highest anal ray, 5.4 in standard length; length of anal base, 4.2 in standard length. Caudal forked, the lobes equal, pointed, with several accessory nonprojecting rays. Caudal peduncle length, 6.3 in standard length; caudal peduncle depth, 8.7 in standard length, 1.4 in caudal peduncle length. Dorsal rays, i, 9; anal rays, iii, 20; pectoral rays, i, 12; pelvic rays, i, 7.

General coloration of body yellowish olive, darker toward the back. Upper part of head more or less uniformly dark on occiput, grayish toward snout; lower part of head yellowish; cheek and operculum light, with minute brown points which are concentrated on upper part of opercle and fifth circumorbital. Peritoneum dark, easily seen through the translucent body wall. Body sprinkled with minute brown points, most numerous on dorso-lateral surface, concentrated along scale margins so that they are outlined with dark; a brown line at base of dorsal fin and a faint middorsal streak. Humeral spot conspicuous, above third and fourth scale of lateral line. Dark lateral stripe conspicuous, indistinct anteriorly, darkest toward caudal peduncle, where it is expanded into a large black spot. Fins immaculate, light, the dorsal, anal, adipose, and caudal with a faint dusky coloration; middle caudal rays dusky.

VARIATION.—Proportional measurements of the holotype and 8 paratypes are given in Table II. The paratypes agree with the description of the holotype with the exception of the variations noted below.

Supratemporal canal varying as in *Odontostoechus lethostigmus*. Operculomandibular canal interrupted superiorly in all paratypes, except in the largest, each part terminating in a pore. Operculomandibular canal with 1 to 3 pores in the vertical portion, and 5 to 8 in the horizontal extent.

Teeth of front row on premaxillary of the largest specimen pentacuspoid. For variations in tooth counts see Table II.

Scales in sheath at base of anal fin, 7 or 8. Lateral line, 35 or 36 + 4. Anal rays, iii, 20 to 22; pectoral rays, i, 11 or 12 (see Table II). The dorsal dorsal count is i, 9, and the pelvic, i, 7, in all specimens.

In small specimens the coloration is paler, the characteristic features as described for the holotype are somewhat fainter; in the largest specimen, on the contrary, they are somewhat more marked.

The name *stigmaturus* (from *στιγμα*, -ατος, "spot," and *οὐρά*, "tail") refers to the large and intense black spot at the base of caudal fin.

Characidium pterostictum, new species

(Pl. I, Fig. 3)

The holotype, U.M.M.Z. No. 143289, 49.3 mm. in standard length, was collected in swift current of Rio Maquiné, a tributary to Lagôa dos Quadros, Conceição do Arroio County, Rio Grande do Sul, Brazil, during June, 1941, by H. Kleerekoper (field number 339). Eight paratypes, U.M.M.Z. No. 143290, 25.3 to 47.0 mm. in standard length, were taken with the holotype.

DESCRIPTION OF HOLOTYPE.—For proportional measurements see Table III.

Body elongate, compressed, the maximum depth, 4.9 in standard length, the dorsal profile decurved in front of dorsal fin, the ventral profile more or less straight in front of anal fin. Standard length, 1.3 in total length. Head very small, deep; its length, 4.2 in standard length, its depth, 1.6 in head length, its width, 2.0 in head length. Dorsal profile of head strongly decurved, especially in front of eye; ventral profile slightly convex. Post-orbital length, 1.8 in head length. Eye large, the orbital length subequal to snout, 4.2 in head length; bony interorbital width, 9.0 in head length, 2.1 in orbital length. Nostrils far apart, the distance from eye to posterior nostril a little less than the distance between nostrils; anterior edge of anterior nostril about equidistant from eye and tip of snout; anterior nostril tubular, and posterior nostril with a flap directed backward, covering its anterior half. Snout strongly decurved, short, blunt. Head covered with thick tegument which completely hides all bones, with a deep, narrow groove along the posterior edge and part of the lower edge of preopercle, and another above maxillary. Occipital process short, triangular, bordered by three scales on each side. Opercle large, pointed posteriorly.

Mouth antero-inferior, very small, the gape transverse, roughly 2 in snout length; lips thick, the lower lip median, not extending on sides of mouth; upper jaw as long as the snout, the maxillary free posteriorly and along its inferior edge, not quite reaching the level of anterior margin of eye. Teeth in 1 main series in each jaw, and a weak secondary inner series in lower jaw formed by extremely minute teeth. Teeth in main rows small, elongate, more or less cylindrical, with conical tip and a minute notch at each side;

TABLE III
 PROPORTIONAL MEASUREMENTS IN *Characidium pterostictum*

The proportions are expressed as thousandths of the standard length or of the head length.

	Holo- type	Paratypes							Mean	
		47.0	32.8	30.5	29.7	26.6	26.3	26.3		25.3
Standard length (mm.)	49.3	47.0	32.8	30.5	29.7	26.6	26.3	26.3	25.3	32.6
Head length	237	236	274	292	270	286	285	289	284	272
Body depth	203	202	189	197	199	214	198	194	198	199
Predorsal distance	452	466	482	492	478	500	494	490	490	483
Distance from tip of snout to pectoral insertion	205	208	238	256	225	241	247	251	249	235
Distance from tip of snout to pelvic insertion	507	517	518	524	508	534	532	528	482	517
Distance from tip of snout to anal origin	720	745	738	747	744	759	764	757	711	743
Distance from tip of snout to adipose origin	811	828	829	843	842	827	836	836	822	830
Caudal peduncle depth	132	132	131	138	118	116	118	118	115	123
Caudal peduncle length	219	211	201	197	202	188	186	186	198	198
Highest dorsal ray	182	185	216	226	232	199	.....	198	186	192
Length of dorsal base	148	153	161	164	151	150	152	148	154	153
Distance from dorsal to adipose (excluding fin bases)	233	230	216	229	236	229	232	224	209	226
Highest anal ray	162	157	186	.....	175	188	186	.....	198	179
Length of anal base	83	83	85	82	71	79	76	80	80	80
Longest pectoral ray	245	236	274	262	270	293	285	285	312	273
Longest pelvic ray	201	206	.....	210	232	218	217	220	233	217
Proportions of head length										
Head width	504	468	444	427	437	394	400	394	403	430
Head depth	641	649	578	573	625	553	560	553	555	587
Orbital length	239	261	233	236	250	263	280	276	278	257
Snout length	239	225	222	235	237	250	240	237	208	231
Bony interorbital width	111	108	111	112	.....	.....	.....	.....	.....	110
Postorbital length	564	540	467	460	500	500	480	513	500	503

4 on upper jaw (1 missing on left side), and 6 on lower jaw. Gill rakers on first branchial arch, 4 + 1 + 7, lanceolate, flexible, the uppermost and lowermost short, conical, stubby.

Scales large, regularly imbricated, firmly implanted. Middorsal line with 12 scales in 1 series before dorsal fin, and 11 between dorsal and adipose fins. Lower surface with 14 scales in 3 longitudinal series, from the posterior part of isthmus to insertion of pelvic fin; 3 scales of the median series are somewhat enlarged between pectoral fins, and the corresponding lateral scales are very small, 1 scale lacking on each side, leaving a relatively wide naked area on breast. Interspace between pelvic fins with 2 scales covering another large, median scale. Mid-ventral line with 8 scales between pelvic and anal origin, and 10 between last anal ray and lower caudal ray. Lateral line complete, more or less straight along middle of body, with 36 scales and 2 pored scales on base of caudal fin. Scales between lateral line and dorsal origin, 5; from lateral line to pelvic insertion, 3, and from lateral line to adipose origin, 3.5.

Dorsal fin truncate, its origin above tip of depressed pectoral fin, its distance from tip of snout, 2.2 in standard length, the length of its base, 6.7; tip of depressed dorsal fin reaching the fifth scale behind dorsal, half way to origin of adipose fin; highest dorsal ray, the second branched ray, 5.5 in standard length; distance from dorsal to adipose (excluding fin bases), 4.3 in standard length. Pectoral fin flabelliform, the distance from its insertion to tip of snout, 4.9 in standard length, its 4 outermost rays thickened; longest pectoral ray, the sixth, 4.1 in standard length; tip of depressed pectoral fin 1 scale distant from pelvic insertion. Pelvic fin flabelliform, just reaching anal origin, the distance from its insertion to tip of snout, 2.0 in standard length, its 3 outermost rays thickened; longest pelvic ray, the third, 5.0 in standard length. Anal fin small, truncate, the distance from its origin to tip of snout, 1.4 in standard length; longest anal ray, the second branched ray, 6.2 in standard length. Adipose small, a little posterior to base of last anal ray, its distance from tip of snout, 1.2 in standard length. Caudal forked, the lobes subequal, rounded. Caudal peduncle length, 4.6 in standard length; caudal peduncle depth, 7.6 in standard length, 1.7 in caudal peduncle length. Dorsal rays, ii, 8; anal rays, ii, 7; pectoral rays, iii, 10; pelvic rays, i, 8.

General coloration of body yellowish olivaceous, sprinkled with minute dark brown points, less numerous in the lower surface; upper surface darkest. Head light, with an indistinct brown blotch on operculum, near upper corner of gill opening, and an oblique, dark band from tip of snout to anterior margin of eye; occiput brown. Lips dusky. A dark lateral band extends along body immediately above lateral line, darkest anteriorly, where it forms a humeral spot, and between dorsal and adipose fins, where it is deeper. Nine dark crossbands on side of body: first and second before dorsal

origin; third at dorsal origin; fourth at the middle of dorsal; 3 between dorsal and adipose; and 2 on caudal peduncle. Peritoneum dark, seen along mid-line of lower surface through the translucent body wall. Paired fins and anal light. Dorsal fin with 2 series of small, light brown spots over the rays, forming 2 irregular bands parallel to edge of fin, less distinct posteriorly; base of rays dark brown. Adipose fin dusky, the posterior edge light. Caudal fin variegated.

VARIATION.—Proportional measurements of the holotype and 8 paratypes are given in Table III. The paratypes agree with the description of the holotype with the exception of the variations noted below.

Length of snout much less than orbital length in 2 specimens. Upper jaw with 5 to 8 teeth on each side (2 specimens with 7 or 8, and the others with 5 or 6); lower jaw with 5 or 6 teeth. The gill rakers were not counted in the paratypes.

Lateral line, 33 to 36 + 2; scales between lateral line and dorsal origin, 4 or 5, and from lateral line to pelvic insertion, 2 or 3. Middorsal line with 11 or 12 scales before dorsal origin.

In specimens less than 33 mm. in standard length the tip of depressed pectoral fin reaches the insertion of pelvic fin or beyond it and is posterior to level of insertion of dorsal fin; the dorsal is longer, reaching the sixth or seventh scale posterior to dorsal base. Pelvic fin not reaching anal origin in few specimens. Dorsal rays, ii, 8; anal rays, ii, 6; pectoral rays, iii, 9 or 10 (8 in paratype 33.8 mm.); pelvic rays, i, 8.

Coloration lighter in smallest specimens. Indistinct blotch on operculum lacking in several specimens. Side of body with 8 to 12 dark crossbands. Dorsal with an indistinct third band in 2 specimens. Anal fin with some light brown marks on anterior rays in 1 specimen.

Characidium pterostictum differs from other species in the genus in the color pattern, the mouth antero-inferior, proportions of body and head, and in counts of scales and fin rays. It seems to be most closely related to *C. borellii* (Boulenger, 1895) from Tucuman, Argentina.

An interesting feature of the present species is the partly scaleless breast. Schultz (1944: 277) has pointed out that this character has been overlooked or not mentioned by authors, and that probably other species in the genus present a scaleless breast as did his species from Venezuela, *C. voladorita* (1944: 280). The condition present in *C. pterostictum* is intermediate between the scaleless breast of Schultz's species and the well-scaled breast of more common occurrence in the genus. I had the opportunity to study the following species, all of which have a fully scaled breast: *C. fasciatum* Reinhardt, 1866, *C. blennioides*, *C. pellucidum*, *C. pteroides*, *C. catenatum*, *C. zebra* (a synonym of *C. fasciatum*), and *C. vintoni* Eigenmann, 1909 and 1912a; *C. caucumum* Eigenmann, 1912b and 1922, *C. bolivianum* Pearson,

1924—all in the collection of the California Academy of Sciences; *C. rachovii* Regan, 1913 (Stanford Univ. [= S.U.] No. 3170, Santos, Brazil), *C. steindachneri* Cope, 1878 (S.U. No. 35214, Pevas, Peru), *C. brevirostre* Pellegrin, 1908 (S.U. No. 35206-12, Pevas, Peru), *C. fasciadorsale* Fowler, 1914 (S.U. No. 35213, Pevas, Peru), and *Characidium* sp. (an undescribed species collected in the vicinity of Rio de Janeiro, Brazil, S.U. No. 36966).

The name *pterostictum* (from *πτερόν*, "fin," and *στικτός*, "spotted") refers to the variegated dorsal and caudal fins, a feature by which this species can be readily distinguished from the type of the genus, *C. fasciatum*, and from other species with similar color pattern.

Acestrorhamphus hepsetus (Cuvier)

Hydrocyon hepsetus.—Cuvier, 1829; 312 (original description; no locality). Valenciennes, 1847, *Poissons*, 5: 9 (description); *Poissons*, 9: Pl. 9, Fig. 2.

Xiphorhamphus hepsetus.—Steindachner, 1876: 593, Pl. 3, Fig. 2 (description).

Acestrorhamphus hepsetus.—Eigenmann, 1903: 143 (designation as genotype of *Acestrorhamphus*),

One specimen, U.M.M.Z. No. 143293, 206 mm. in standard length, collected in Lagôa dos Quadros. Head length, 3.1 in standard length; body depth, 3.5; predorsal distance, 1.7; caudal peduncle depth, 10.8; length of anal base, 4.0; highest dorsal ray, 4.7; longest pectoral ray, 4.3; longest pelvic ray, 6.4. Snout length, 3.6 in head length; bony interorbital width, 5.2. Scales on lateral line, 72 + 5 (on caudal base); scales from lateral line to dorsal origin, 15; scales from lateral line to pelvic insertion, 8. Dorsal rays, ii, 8; anal rays, iii, 26.

GYMNOTIDAE

Gymnotus carapo Linnaeus

Gymnotus carapo.—Linnaeus, 1758: 246 (original description; America). Ellis, 1913: 117, Fig. 2 (description).

Two specimens, U.M.M.Z. No. 143282, 55 and 129 mm. in total length, collected in Lagôa dos Quadros. Head length, 6.5 and 8.0 respectively in total length; body depth, 7.2 and 8.0. Head width, 1.7 in head length; snout length, 2.4 and 3.0; interocular width, 2.6 and 2.7.

Hypopomus brevirostris (Steindachner)

Rhamphichthys brevirostris.—Steindachner, 1868: 254, Pl. 2, Fig. 2 (original description; Rio Guaporé).

Hypopomus brevirostris.—Eigenmann and Kennedy, 1903: 530 (listed). Ellis, 1913: 134, Fig. 7 (description).

Two specimens, U.M.M.Z. No. 143283, 50 and 102 mm. in total length, collected in Lagôa dos Quadros. Head length, 7.2 and 9.1 respectively in total length; body depth, 6.2 and 9.3. Head width, 1.5 and 1.6 in head length; snout length subequal to interocular width, 2.6 and 3.6.

PIMELODIDAE

Heptapterus mustelinus (Valenciennes)

Pimelodus mustelinus.—Valenciennes, 1847, *Poissons*, 5: 7 (original description; no locality); *Poissons*, 9: Pl. 2, Figs. 1-4.

Heptapterus mustelinus.—Bleeker, 1858: 197; 1862: 15. Eigenmann and Eigenmann, 1890: 144 (description; gives as type locality Santa Cruz, Rio Grande do Sul).

One specimen, U.M.M.Z. No. 143286, 71.0 mm. in standard length, collected in Lagôa dos Quadros. Head length, 5.3 in standard length; body depth, 10.9; predorsal distance, 2.9; distance from tip of snout to origin of anal fin, 1.6; length of maxillary barbel equal to length of outer mental barbel, 8.3; length of inner mental barbel, 10.9. Eye length, 6.7 in head length; snout length, 2.7; interocular width, 4.5. Dorsal rays, i, 5; anal rays, iv, 14; pectoral rays, i, 7; pelvic rays, i, 5.

Microglanis cottoides (Boulenger)

Pimelodus (Pseudopimelodus) cottoides.—Boulenger, 1891: 233, Pl. 25, Fig. 2 (original description; Rio Camacua, Rio Grande do Sul).

Microglanis cottoides.—Gomes, 1946: 15-16.

One specimen, U.M.M.Z. No. 143294, 36.0 mm. in standard length, collected in the Lagôa dos Quadros basin has already been reported (Gomes, 1946).

Rhamdia sebae (Valenciennes)

Pimelodus sebae.—Valenciennes, in Cuvier and Valenciennes, 1840: 169 (original description; Surinam, Cayenne, Rio Janeiro, Buenos Aires).

Rhamdia sebae.—Eigenmann and Eigenmann, 1890: 123 (description). Ribeiro, 1911: 279, Pl. 45, Fig. 3 (description).

One specimen, U.M.M.Z. No. 143287, 51.0 mm. in standard length, collected in Lagôa dos Quadros. Head length, 3.5 in standard length; body depth, 4.8; caudal peduncle depth, 9.4; caudal peduncle length, 5.1; length of dorsal base, 7.3; length of adipose base, 2.7; length of pectoral spine, 9.3. Eye length, 5.8 in head length; snout length, 2.6; bony interorbital width, 4.1. Fontanel extended to the level of posterior margin of eye. Pores on head nonaggregated. Gill rakers, 2+9. Body deeper than wide. Lateral line decurved anteriorly. Length of occipital process, 1.5 in the distance from its tip to dorsal origin. Dorsal rays, i, 5; anal rays, i, 7.

This specimen presents slight differences from the descriptions of *R. sebae*, mainly in the head length and proportions of the eye (2.2 in snout length, 1.4 in interorbital width).

CALLICHTHYIDAE

Corydoras paleatus (Jenyns)

Callichthys paleatus.—Jenyns, 1842: 113 (original description; no locality).

Corydoras paleatus.—Eigenmann and Eigenmann, 1890: 471 (description). Ribeiro, 1911: 160, Fig. 77 (description). Gosline, 1940: 21 (comparisons; synonymy).

One specimen, U.M.M.Z. No. 143292, 23 mm. long, collected in swift current of the Rio Maquiné, tributary to Lagôa dos Quadros. Head length equal to body depth, 2.9 in standard length; length of dorsal spine equal to length of pectoral spine, 3.7 in standard length. Eye length, 3.7 in head length; snout length, 2.1. Plates along body, 21. Dorsal rays, 1, 6; anal rays, 1, 5.

The specimen has the typical color pattern, but differs from current descriptions of the species in the following characters: head somewhat longer; pectoral spine shorter than the head length; upper caudal lobe longer than the lower one.⁴

LORICARIIDAE

Canthopomus sp.

One young specimen (plates on body not completely formed), U.M.M.Z. No. 143295, 27.5 mm. in standard length, collected in the Lagôa dos Quadros basin.

The genus *Canthopomus*, proposed by Eigenmann (1910: 404) to include loricariids related to *Plecostomus* Gronow and *Rhinelepis* Spix but with well-developed marginal bristles on opercle and interopercle, is in need of revision, as are most of the genera of Loricariidae. So far as I am able to determine only 3 species belong in this genus: *C. genibarbis* (Valenciennes, in Cuvier and Valenciennes, 1840), *C. pellegrini* (Regan, 1904), both from the Amazon, and *C. montebelloi* Fowler, 1940, from Tarija, Bolivia. The specimen described below probably represents a new species but in view of its small size and the lack of comparative material proposal of a name is withheld.

DESCRIPTION.—Body depressed in front of dorsal fin, compressed toward caudal peduncle, the maximum depth, 6.4 in standard length. Standard length, 1.3 in total length. Head depressed, unplated, covered with skin, 3.3 in standard length; head depth, 2.0 in head length; head width equal to head length. Eye small, superolateral, the orbital length, 5.8 in head length; interorbital width, 2.5 in head length. Nostrils superior, close together, slightly nearer to eye than to nostrils of other side. Snout more or less elliptical in contour, naked, 1.4 in head length. Side of head with small spines on lateral edge, in front of branchial aperture, curved backward, their tips brown, and small bristles between eye and operculum. Upper part of head with 2 very shallow grooves, one from the antero-inferior margin of eye and the other from nostrils, both extended forward to margin of snout.

⁴ In a series of 19 specimens in the Carnegie Museum, collected by Haseman (1909), in Cacequí, Rio Grande do Sul (C.M. No. 3516), the head is contained from 2.9 to 3.4 in the standard length (23 to 62.5 mm.); upper caudal lobe always longer than the lower; pectoral spine shorter than head in 10 specimens, equal in 5, and longer in 4; plates along body, 20 in 2 specimens, 21 in 13, and 22 in 4.

Nape covered with skin; occipital process triangular, quite far from dorsal plate.

Mouth inferior, the gape, 1.9 in head length; upper lip thick, deep, crenulate at edge, papillose internally, covering premaxillary teeth; lower lip very wide, long, the exposed surface papillose, crenulate at edge, with a minute barbel at each side. Premaxillary ramus equal to mandibular ramus, 4.3 in head length, with 28 teeth; mandibular ramus with 32 teeth. Teeth subequal, in a single series, curved inward at the tips (which are light brown), and with a minute notch on the external edge.

Plates on ventrolateral series along body, 26, from tip of humeral process to base of caudal rays, plus 1 on caudal base; dorsolateral series with only 6 developed plates from the twentieth plate of ventrolateral series to base of caudal rays, plus 1 on caudal base; remainder of side naked. Back with 8 small median plates between tip of depressed dorsal fin and upper caudal ray, and 1 over upper caudal ray. Lower surface naked in front of pelvic insertion, covered by skin, with 10 plates on each side, between base of last anal ray and lower caudal ray, and with 4 between insertions of pectoral and pelvic fins. Other regions of body completely naked. Plates spinulose, except on the lower surface, where they are smooth, the spines directed backward, their tips brown. Upper and lower caudal rays, first ray of dorsal, of anal, and of paired fins, spinulose, the spines retrorse, with the tips light brown. Lateral line with 12 pores, the first 10 at the end of short projections directed backward and downward, the last situated near the first developed plate of the upper series, its distance from tip of snout, 1.4 in standard length.

Origin of dorsal fin above first fourth of first pelvic ray, its distance from tip of snout, 2.0 in standard length; length of first dorsal ray, 4.2 in standard length. Insertion of pectoral fin a snout length from pelvic, its distance from tip of snout, 3.5 in standard length; first pectoral ray strong, straight, its spinules stronger than on other fin rays, its length, 4.4 in standard length; distance between insertions of pectoral fins, 3.2 in standard length. Humeral process strong, short, covered by skin, 2.2 in length of first pectoral ray, 1.9 in interorbital width. Pelvic fin reaching anal origin, the distance from its origin to tip of snout, 2.3 in standard length; first pelvic ray strong but flexible, broadest in the middle, its length, 4.4 in standard length; distance between insertions of pelvic fins, 5.5 in standard length. Distance from tip of snout to anal origin, 1.4 in standard length. Caudal truncate, the lower lobe a little the longer. Caudal peduncle depth, 7.4 in standard length; caudal peduncle length, 3.8. Dorsal rays, i , 6; anal rays, i , 3; pectoral rays, i , 6; pelvic rays, i , 5.

Body dark brown in the naked areas as well as on top of head; plated regions lighter, grayish, the spines producing a velvety sheen. Ventral sur-

face yellowish. Fins light, with a faint dusky coloration; dorsal, caudal, and paired fins with 2 or 3 rows of dark spots on the rays, forming irregular bands.

Ancistrus stigmaticus Eigenmann and Eigenmann

Ancistrus stigmaticus.—Eigenmann and Eigenmann, 1889: 47–48 (original description; Goiaz and São Matheos); 1890: 446 (same locality). Regan, 1904: 259 (description; Rio Mogi-guassú, São Paulo). Gosline, 1945: 96 (listed).

Xenocara multispinis.—Regan, 1912: 668, Pl. 76, Fig. 1 (original description; Rios Humboldt and Novo, Santa Catarina).

Six specimens, U.M.M.Z. Nos. 143276 and 143281, 20.6 to 53.0 mm. in standard length, collected in swift waters of Rio Maquiné, a tributary to the Lagôa dos Quadros. Head length, 3.1 to 3.4 in standard length; body depth, 5.5 to 5.8; predorsal distance, 2.0; length of dorsal base, 4.2 to 4.5. Orbital length, 4.1 to 5.1 in head length; length of mandibular ramus, 1.6 to 2.0 in interorbital width. Caudal truncate. Plates along body, 23 or 24 + 1 (on caudal base); back with 5 plates on each side between dorsal and adipose fins; lower surface between anal and caudal with 11 or 12 + 1 (on lower caudal ray). Dorsal rays, 1, 6; and rays, 1, 3.

The specimens at hand present some minor differences from the descriptions of *A. stigmaticus* in the proportions of body, head, snout, and eyes. They differ also in the following characters, which probably vary with age: In the largest specimens the interopercle has 25 or 26 unciform spines (each partly enveloped by a sheath of skin which covers three-fourths of the spine), of which only 17 to 19 are well developed and easily counted; small specimens with spines proportionately shorter and less numerous. In the sides and anterior part of interopercle one can distinguish some minute spines which are largely or entirely covered with skin; these are most numerous in smaller specimens, the larger ones having only 6 to 9. Snout with the typical naked area and tentacles; the largest specimens with 6 tentacles on the median part of anterior edge of snout, 2 on top of snout, also median, and 5 on each side along edge of snout, the last 2 close to the interopercle; a 44 mm. specimen has 4 tentacles on each side; another specimen, 41 mm. in length, has 2 median tentacles anteriorly, and 3 minute lateral tentacles; a 36 mm. specimen has only one anterior, median, and 2 minute lateral tentacles; in smaller specimens the tentacles are wholly undeveloped. Light spots on top of head almost indistinguishable in larger specimens, completely lacking in small ones. Fins, except adipose, with dark spots, in 4 or 5 series on caudal and 2 or 3 on other fins, sometimes faint on paired fins, especially in small specimens. The smallest specimens have the caudal lobes faintly tipped with reddish, and a transverse band of the same color across the peduncle, bordered before and behind by a narrow, dark crossband.

Xenocara gymnorhyncha (Kner)

(Pl. II, Figs. 1 and 2)

Ancistrus gymnorhynchus.—Kner, 1854: 275 (original description; Puerto Cabello, Venezuela).

Xenocara gymnorhynchus.—Regan, 1904: 254 (description). Eigenmann, McAtee, and Ward, 1907: 149 (listed).

Fourteen specimens, U.M.M.Z. Nos. 143275 and 143277, 13.4 to 36.0 mm. in standard length, collected in Rio Maquiné, a tributary to the Lagôa dos Quadros.

The present species, formerly known from Venezuela and Guianas, was reported by Eigenmann, McAtee, and Ward from the Paraguay basin. Since only the short original description is available, the species is here redescribed on the basis of the specimens at hand.

DESCRIPTION.—For proportional measurements see Table IV.

Body at tip of humeral process wider than greatest depth at first dorsal ray, where its cross section is more or less triangular; depressed in front of dorsal fin, becoming compressed and more slender toward tail; greatest depth, 1.4 to 1.8 in head length. Standard length, 1.3 to 1.4 in total length. Head depressed, covered with skin, about as long as wide, its depth about two-thirds of its width, the dorsal profile decurved. Eye circular, superolateral, the orbital length, 1.7 to 2.0 in interorbital width, 2.7 to 3.2 in snout length; interorbital width, 1.4 to 1.6 in snout length. Nostrils superior, close together, with a large flap, the anteriormost part of the anterior nostril about 1 orbital diameter distant from anterior orbital rim. Snout more or less elliptical in contour, naked. Side of head covered with small bristles, scarcely visible in specimens under 32 mm. in standard length, except under great magnification. Interopercle small, independently movable from opercle (but not as freely as in *Ancistrus*), with small spines which cannot be completely retracted between opercle and interopercle (as in *Ancistrus*); in the largest specimen the spines are relatively longer. Opercle with 4 to 6 irregular longitudinal rows of spines; in the largest specimen the lowest row is formed by 8 spines, longer than the others; smaller specimens with fewer spines. Upper part of head smooth, with a rather wide groove extending forward on each side from the nostrils to margin of snout; occipital region not keeled, slightly arched except in the smallest specimen, which has the head more depressed.

Mouth inferior, rather large, the lips well developed, papillose; upper lip deep, not completely covering the premaxillary teeth; lower lip wide and rather long, with the edge crenulate, its maximum length scarcely more than 1 orbital diameter, more than 3 in its width; a small barbel on each side, coalescent with the lower lip, free only at its tip. Mandibular ramus somewhat shorter than premaxillary ramus, 1.8 to 2.1 in interorbital width; premaxillary ramus, 1.7 to 2.0. Teeth, 20 to 30 on each jaw.

TABLE IV

PROPORTIONAL MEASUREMENTS IN *Xenocara gymnorhyncha* (KNER)

The proportions are expressed as thousandths of the standard length or of the head length.

																Mean
Standard length (mm.)	36.0	34.2	34.0	32.5	32.0	30.0	27.0	26.0	26.0	26.0	25.2	24.8	23.5	13.4	27.9	
Proportions of standard length																
Head length	336	321	329	341	343	336	351	350	350	350	329	322	340	358	339	
Body depth	222	216	211	212	218	226	207	203	203	203	206	201	200	201	209	
Body width*	308	309	308	307	312	306	292	273	265	300	293	286	297	.....	296
Predorsal distance	500	467	473	467	475	483	481	500	500	500	480	479	476	537	487	
Distance from tip of snout to pectoral insertion	305	307	323	307	312	330	333	346	346	330	317	322	327	.....	323
Distance from tip of snout to pelvic insertion	483	491	500	492	493	483	481	503	503	500	496	483	472	.....	490
Distance from tip of snout to anal origin	725	657	673	676	668	666	670	688	688	684	674	653	676	.....	676
Distance from tip of snout to adipose origin	811	789	794	818	784	816	807	838	838	807	830	766	765	.....	804
Caudal peduncle depth	116	116	120	123	125	130	118	119	119	115	119	120	123	.....	120
Caudal peduncle length	305	277	279	276	281	296	296	284	284	276	277	282	276	.....	283
Length of first dorsal ray	247	236	241	230	218	220	222	.....	230	215	238	221	217	.....	227
Length of dorsal base	277	263	264	249	256	263	259	269	269	261	246	250	255	.....	260
Distance from dorsal to adipose (excluding fin bases)	411	406	391	409	406	400	388	388	388	384	376	362	348	.....	389
Length of first pectoral ray	277	277	267	273	268	286	255	257	257	269	250	245	251	.....	264
Distance between insertions of pectoral fins	277	289	291	280	281	296	292	300	300	300	285	286	280	.....	289
Length of first pelvic ray	247	236	241	230	253	240	248	276	276	280	289	241	242	.....	253
Distance between insertions of pelvic fins	188	175	176	181	181	166	155	153	161	161	158	161	165	.....	167
Proportions of head length																
Orbital length	206	218	223	225	209	207	210	219	219	222	228	234	237	.....	219
Snout length	661	700	696	639	636	633	642	659	659	666	698	641	637	625	656	
Bony interorbital width	413	445	437	405	409	405	421	439	439	444	445	432	400	437	426	
Width of gape	504	509	500	486	463	475	500	461	461	466	481	493	437	.....	479
Width of premaxillary ramus	239	263	250	234	218	217	221	219	219	222	228	234	237	.....	230
Width of mandibular ramus	214	227	223	207	190	198	200	197	197	200	216	222	227	.....	209

* The body width was measured at tip of humeral process.

Plates on side of body unkeeled, spinulose, arranged in 3 lateral rows anterior to adipose, behind that fin in only 2 lateral rows and 1 middorsal series; 25 plates between tip of humeral process and base of caudal rays, plus 1 on base of caudal; 6 lateral plates between dorsal and adipose; 8 along dorsal base. Back with 1 median and 2 lateral plates in front of dorsal fin; 3 between adipose and caudal, plus 1 on upper caudal ray. Lower surface of body in front of anal fin and lateral parts between pectoral and pelvic fins naked; 6 lateral plates between pelvic and origin of anal; 12 pairs of plates between anal and caudal fins, plus 1 on lower caudal ray. First ray of fins and upper and lower caudal rays with small spines, longest toward tip of ray on pectoral and pelvic.

Predorsal distance subequal to the distance from tip of snout to insertion of pelvic fin, 1.9 to 2.1 in standard length; first dorsal ray slightly curved, 1.1 to 1.2 in length of dorsal base, 1.1 to 1.3 in length of first pectoral ray; last depressed ray reaching adipose origin; dorsal base, 1.4 to 1.6 in distance from dorsal to adipose (excluding fin bases); a narrow naked area along sides of and behind dorsal fin. Distance from tip of snout to adipose, 1.2 to 1.3 in standard length. Pectoral anterior, the distance from its insertion to tip of snout less than head length, 2.9 to 3.3 in standard length. Humeral process strong, spinulose. Insertion of pelvic fin under base of third dorsal ray, at the level of fifth plate on lateral series; first pelvic ray curved, subequal to first dorsal ray in largest specimens, longer in specimens under 30 mm. in standard length; distance between insertions of pelvic fins, 1.5 to 1.9 in distance between insertions of pectoral fins. Anal fin very small, the longest ray (second) about one-half the first dorsal ray, its origin at the level of the twelfth plate of lateral series, its distance from tip of snout, 1.4 to 1.5 in standard length. Caudal fin slightly emarginate, the lower lobe a little the longer. Caudal peduncle depth, 2.2 to 2.6 in caudal peduncle length. Dorsal rays, I, 6 (I, 5 in 1 specimen); anal rays, I, 3; pectoral rays, I, 6; pelvic rays, I, 5.

Coloration of body dark brown, darker on top of head than on trunk. Light zones on the side form 2 incomplete and indistinct broad bands, one at the level of adipose fin, the other between this fin and dorsal; in some specimens there is a third faint band below dorsal fin or a streak between origins of dorsal and of pectoral fins. Ventral surface whitish, except behind anal fin where it is light gray. Dorsal rays dusky, sometimes with 1 to 3 series of specks on part of or all rays, the first ray darker and with 2 or 3 indistinct crossbands; these in several specimens alternating with reddish bands. Anal colorless, hyaline. Paired fins with 2 or 3 series of dusky specks along the rays, sometimes alternating with reddish zones, occasionally very faint or lacking; the colors are more intense on first ray. Adipose spine dusky, sometimes with a reddish tone in the middle. Membrane of fins light dusky.

Caudal grayish, the lower and the upper rays darker. In the smallest specimen the body and head are more uniformly colored, the fins hyaline, the peduncle with a dark crossline, and the mid-caudal rays dusky.

Microlepidogaster laevior (Cope)

Hisonotus laevior.—Cope, 1894: 95, Pl. 8, Figs. 12, 12-a and 12-b (original description; Rio Jacuí, Rio Grande do Sul).

Otocinclus nigricauda.—Regan, 1904: 268 (*partim*; description).

Microlepidogaster nigricauda.—Eigenmann, 1910: 413 (*partim*; listed). Ribeiro, 1911: 88 and 422 (*partim*; description).

Regan (1904) included *H. laevior* Cope in the synonymy of *Otocinclus nigricauda* Boulenger (1891: 234, Pl. 25, Fig. 3; Rio Grande do Sul), even though the latter species was described as having 1, 5 pectoral rays, 24 to 26 plates along body, and 2 plates before dorsal origin, whereas Cope's type had 1, 7 pectoral rays, 28 plates along body, and 3 plates before dorsal origin. Other characters described for *O. nigricauda* Boulenger (1891, and Regan 1912) and for *H. laevior* Cope (1894) are similar and agree well with the specimens described below. The structure of lips, shape, and relations of transversal part of coracoclavicular and of paired fins, as figured by Cope for *H. laevior* (Fig. 12-b), are the same as in the 3 specimens herein reported. In Cope's figure, which does not seem to be very accurate, the belly plates are arranged somewhat differently, especially in the cloacal region, those of the lateral rows are more numerous, and the naked area is wider. *O. nigricauda*, according to the descriptions of Boulenger and Regan, has the abdomen covered with 5 to 7 irregular rows of shields, there being a naked area in front of the coracoids.

The differences between *H. laevior* and *O. nigricauda*, in pectoral ray count and in number of plates before dorsal fin (characters found constant in the 3 specimens studied), seem to me to be of specific significance. Moreover, the number and disposition of plates on the belly are different in these species: the type of *O. nigricauda* (42 mm.) was smaller than that of *H. laevior* (52 mm.), and, therefore, the greater number of plates in *nigricauda* cannot be explained as an age difference. The specimens in hand (smaller) again agree rather well with *H. laevior*. For these reasons *H. laevior* is resurrected from the synonymy of *O. nigricauda*. The 2 species may be differentiated as follows:

- 1a.—Pectoral rays, 1, 5; plates along body, 24 to 26; 2 plates between dorsal origin and occipital plate; lower surface covered with 5 to 7 irregular longitudinal rows of plates *M. nigricauda* (Boulenger)
- 1b.—Pectoral rays, 1, 7; plates along body, 27 to 28; 3 plates between dorsal origin and occipital plate; lower surface with lateral plates between transverse part of coracoclavicular and insertion of pelvic fin, and plates in a median row, there being a naked area between these rows *M. laevior* (Cope)

Three specimens, U.M.M.Z. No. 143298, 25.0, 27.0, and 27.0 mm. in standard length, collected in swift waters of Rio Maquiné, a tributary to the Lagôa dos Quadros.

DESCRIPTION.—Body elongate, compressed toward caudal peduncle, depressed in front of dorsal fin; body depth, 6.1 to 6.2 in standard length. Standard length, 1.3 in total length. Head depressed, convex between eyes, slightly concave on snout, its length, 3.4 in standard length, its depth, 1.7 to 1.9 in its length, its width, 2.7; postorbital length, 3.9 to 4.0 in head length, 2.4 to 2.5 in snout length; height of cheek, 5.6 to 6.6 in head length. Eye small, superolateral, much nearer the posterior opercular edge than the tip of snout, the orbital length, 4.8 to 5.2 in head length, 3.0 to 3.2 in snout length, 2.0 to 2.1 in interorbital width; interorbital width, 2.4 to 2.6 in head length, 1.5 to 1.6 in snout length. Nostrils contiguous, with a single flap, close to eye, situated in a rather deep groove, which extends forward to about an orbital diameter from the margin of snout. Snout, 1.5 to 1.6 in head length, its margin broad and deep, with numerous, curved, retrorse spines in 6 or 7 irregular rows; spines directed downward in the 2 lowest series and upward in the other series, longer and stouter in the lowest series and in the 2 uppermost series; 20 to 22 spines in the lowest series from the level of angle of mouth of one side to the other side. Side and upper part of head, except the nasal grooves, with small retrorse bristles. Occipital plate large, with 3 shields along its posterior edge on each side, the outermost in contact with the temporal plate below. Temporal plate rather large, covered with skin, with a largely open posterior foramen, and an anterior foramen with 4 apertures, separated by thin osseous trabeculae; 1 lateral pore above posterior foramen and 1 superior, above anterior foramen. Side of head with 2 or 3 cutaneous pores; 4 to 6 infraorbital pores, 2 or 3 supranasal, and 2 or 3 infranasal pores. Lower part of head naked except for a small triangular area covered by the interopercle, and for the margin of snout, which is covered with skin.

Mouth inferior, the upper lip small, the lower lip long and very wide (about twice as wide as long), both coarsely granular, the margins crenulate; a small barbel on each side of lower lip; width of gape, 3.9 to 4.0 in head length. Teeth long, scarcely recurved inward at tips, which are slightly cochleariform. Mandibular and premaxillary rami subequal, with 13 to 16 and 8 to 12 teeth, respectively.

Side of body with plates in 3 series, each with 2 or 3 irregular rows of small spines, somewhat longer and more numerous on the lowest series of plates and toward caudal peduncle; plates in the uppermost series more or less vertical, directed slightly downward and forward; in the lowest series they are directed slightly downward and backward; plates of median series

very small, more or less vertical. Median series of plates along side, 27 plus 1 on caudal base. Back with 3 plates before dorsal origin, the predorsal plate median, and the 2 others paired; 4 plates along each side of dorsal base; 18 on each side, behind dorsal fin plus 1 on upper caudal ray. Lower surface in part naked in front of pelvic insertion, with 4 large shields between clavicular process and pelvic insertion, and 6 smaller median ones, between midline of transversal part of coracoclavicular and level of pelvic insertions, all weakly spinulose; in the smallest specimen they are not so well developed as in the 2 larger specimens, and in 1 of these the naked area between the median and lateral rows of shields is very narrow. Interspace between insertions of pelvic fins with 2 median plates and 1 lateral plate on each side, followed posteriorly by a transverse row of 3 plates, in contact with the lateral plates between pelvic and anal fins, and with the naked cloacal region behind. There are 1 median plate and 3 lateral plates between cloacal region and anal origin; 6 or 7 between pelvic and anal fins; 14 posterior to anal base, on each side, plus 1 on lower caudal ray.

Dorsal fin rather high, in front of middle of body, a little posterior to level of pelvic insertion, the distance from its origin to tip of snout, 2.1 in standard length; first dorsal ray, more or less straight, with antrorse spines, its length, 3.9 to 4.0 in standard length; length of dorsal base, 8.7 to 9.6 in standard length; tip of depressed dorsal fin reaching the fourth plate behind dorsal base, a little behind the level of base of last anal ray. Pectoral spine more or less straight, pungent, with antrorse spines, the distance from its insertion to tip of snout, 3.5 to 3.6 in standard length, its length, 3.9 to 4.3 in standard length, its tip reaching beyond middle of first pelvic ray; distance between insertions of pectoral fins, 5.0 to 5.2 in standard length. First pelvic ray more or less straight, the distance from its insertion to tip of snout, 2.3 to 2.4 in standard length, its length, 5.9 to 6.1 in standard length, its tip just reaching anal origin; distance between insertions of pelvic fins, 9.0 to 9.3 in standard length. Anal small, the distance from its origin to tip of snout, 1.6 to 1.7 in standard length, its first ray with antrorse spines, 6.1 to 6.4 in standard length; distance from pelvic insertion to tip of depressed anal fin, 2.7 in standard length. Caudal peduncle length, 2.7 to 2.9 in standard length. Caudal emarginate, the lower lobe a little the longer; upper and lower caudal rays subequal, 3.6 to 3.8 in standard length, with antrorse spines. Dorsal rays, I, 6; anal rays, I, 4; pectoral rays, I, 7; pelvic rays, I, 5.

General coloration of body uniform, olivaceous brown, a little darker on snout, brownish on top of head. Ventral surface pale. Fins with faint brownish along rays, more intense on the first ray, the membrane colorless. Caudal as dark or darker than top of head, brownish along rays, blackish along interradiial spaces, lighter dorsally and ventrally.

Loricaria (Rhineloricaria) steinbachi Regan

(Pl. III, Figs. 1 and 2)

Loricaria steinbachi.—Regan, 1906: 97 (original description; Salta, Argentina). Eigenmann, 1910: 414 (listed).

Eighteen specimens, U.M.M.Z. Nos. 143278 to 143280 (15), 32.0 to 62.0 mm. in standard length, collected in Rio Maquiné, a tributary to the Lagôa dos Quadros; U.M.M.Z. No. 143288 (3), 32.7 to 36.0 mm. in standard length, collected in the Lagôa dos Quadros.

Since I find only the short original description of *L. steinbachi*, I redescribe the species on the basis of the specimens at hand.

DESCRIPTION.—For proportional measurements see Table V.

Body greatly depressed, elongate, becoming progressively narrower from the level of pectoral insertion to the narrow and very flat caudal peduncle; body depth and body width at first anal ray subequal, 1.8 to 2.1 in head length; body width at level of axil of pectoral fin, 8.6 to 9.8 in standard length. Standard length, 1.1 to 1.2 in total length. Head depressed, plated, slightly longer than wide, its length, 4.2 to 5.1 in standard length, the dorsal profile decurved. Eye superolateral, the orbit raised superiorly and with a small notch posteriorly, the orbital length, 2.4 to 2.8 in snout length; interorbital width, 1.7 to 2.0 in snout length. Nostrils close to eye, with a flap directed backward, the anterior one tubular, situated in a shallow depression between a median ridge and a lateral keel. Snout angular, the tip naked and rounded. Upper part and side of head rough, covered with retrorse bristles, with a median ridge from tip of snout to internasal space, where it bifurcates, the branches extended to interorbital space; a broad, shallow, lateral keel from anterior orbital rim forward half the distance to margin of snout, and distal to this keel a shallow groove extends almost to the margin of snout. Occipital region with a weak keel directed forward and outward to the inner side of orbital rim.

Mouth roughly triangular, inferior; lips well developed, papillose, with short marginal fringes and a short lateral barbel which is contained more than twice in orbital length; lower lip about 3 times as wide as long, its width roughly 1.5 in head width. Mandibular and premaxillary rami subequal. Teeth in a single series in each jaw, slightly curved inward, a small notch dividing their tips (which are light brown) into a large inner lobe and a small outer lobe; 6 to 9 teeth on upper jaw and 5 to 8 on lower jaw, the number greatest in larger specimens.

Plates along body rough, spinulose, with 2 weak lateral keels from the level of pelvic insertion (sixth plate), which converge posteriorly and run together from the nineteenth to twenty-first plate to the last plate on caudal peduncle. Side with 30 to 32 plates, usually 30, plus 1 on caudal base. Back with 3 plates before dorsal origin, the dorsal plate median and the other

TABLE V

PROPORTIONAL MEASUREMENTS IN *Loricaria (Rhineloricaria) steinbachi* REGAN
 The proportions are expressed as thousandths of the standard length or of the head length.

	62.0	61.0	56.0	55.0	54.0	52.2	49.2	44.0	43.9	43.4	43.0	39.0	37.1	36.1	36.0	33.4	32.7	32.0	Mean
Standard length (mm.)	62.0	61.0	56.0	55.0	54.0	52.2	49.2	44.0	43.9	43.4	43.0	39.0	37.1	36.1	36.0	33.4	32.7	32.0	45.0
Proportions of standard length																			
Head length	198	198	196	204	204	211	210	216	218	216	216	228	226	222	222	234	236	225	215
Body depth	110	111	111	111	113	102	106	109	114	113	109	115	110	111	111	117	116	103	111
Body width*	169	172	164	167	170	178	171	175	178	168	170	177	175	166	175	180	180	163	172
Predorsal distance	342	348	343	348	352	359	346	355	362	346	350	359	372	355	364	360	364	369	355
Distance from tip of snout to pectoral insertion	186	195	189	196	202	199	199	202	202	205	206	212	218	218	222	218	223	225	207
Distance from tip of snout to pelvic insertion	316	328	322	324	330	334	306	325	324	325	326	334	334	334	336	324	330	329	327
Distance from tip of snout to anal origin	475	492	470	480	483	491	468	489	490	504	489	488	494	482	478	449	459	463	480
Caudal peduncle depth	19	20	20	20	20	21	20	23	23	23	.....	.....	.....	.....	.....	.....	.....	.....	21
Caudal peduncle length	486	476	474	488	489	484	498	478	482	485	466	467	458	471	473	440	456	438	473
Length of first dorsal ray	210	211	198	202	204	213	212	209	222	212	209	210	216	210	220	210	220	212	211
Length of dorsal base	111	107	98	98	104	104	102	98	91	97	100	103	105	100	103	99	101	94	101
Length of first anal ray	187	.....	182	198	189	209	199	202	205	205	186	205	205	199	200	206	214	200	199
Length of first pectoral ray	177	.....	177	186	185	192	183	189	187	184	184	200	189	.....	194	198	196	190	188
Distance between insertions of pectoral fins	174	180	175	182	185	178	173	179	178	180	181	195	183	172	169	168	183	162	178
Length of first pelvic ray	161	169	161	171	165	172	171	163	164	163	163	169	175	150	172	156	159	162	165
Distance between insertions of pelvic fins	113	118	104	111	109	117	106	96	94	92	102	100	84	83	83	84	81	72	97
Proportions of head length																			
Head width	976	984	927	965	927	927	913	894	854	884	882	899	894	888	900	846	870	862	905
Orbital length†	244	256	264	258	254	227	243	233	229	223	226	224	238	238	250	244	247	250	242
Snout length	634	628	636	625	636	627	602	610	609	585	603	585	595	613	625	577	623	653	615
Bony interorbital width	340	330	309	294	300	291	302	316	312	318	322	314	322	312	312	333	350	348	318

* The body width was measured at axil of pectoral fins.

† The orbit was measured including the posterior notch.

2 plates paired, and with 18 or 19, usually 18, between dorsal and caudal base, plus 1 on upper caudal ray. Lower surface naked in front of pelvic origin, except for 1 row of 4 to 8 (usually 6 to 8) lateral shields between pelvic and pectoral insertions; in larger specimens the number increases and the plates are better developed; plates in front of the large anal plate, 3 to 8, more numerous and better developed in larger specimens, the anteriormost ones smaller; 3 pairs of plates between cloacal region and anal origin; 18 or 19, usually 18, between anal and caudal fins, plus 1 on lower caudal ray. Side of body, posterior to pectoral insertion, with an elongate, grooved naked area between the ventrolateral series of plates and the lateral shields on belly; 5 plates on ventrolateral series of body to level of pelvic insertion, and 11 to anal origin.

Fins truncate, except caudal which is slightly emarginate. Dorsal a little behind level of pectoral insertion, the predorsal distance, 2.7 to 2.9 in standard length; first dorsal ray straight, longer than the first ray of other fins, roughly twice the length of dorsal base; tip of depressed dorsal fin reaching level of first third to middle of anal fin. First pectoral ray curved in its distal third, strongly so in larger specimens, the distance from its insertion to tip of snout slightly less than the head length, 4.4 to 5.4 in standard length, its tip reaching the first fourth of pelvic fin. First pelvic ray curved, somewhat smaller than first pectoral ray, the distance from its base to tip of snout, 3.0 to 3.3 in standard length, its tip reaching anal origin. First anal ray straight, longer than first pectoral or pelvic ray, its base in front of middle of body, the distance from tip of snout, 2.0 to 2.2 in standard length, its tip reaching the sixth plate behind the fin. Dorsal rays, 1, 6; anal rays, 1, 4; pectoral rays, 1, 6; pelvic rays, 1, 5.

Upper part of body brown, sometimes reddish brown, usually darker on larger specimens, and light brown on smaller specimens. Head brown, darker than body, especially on top. Anterior margin of snout, upper lip and barbels variegated, sometimes faintly, with reddish or yellowish. Back with 4 dark crossbands between dorsal and caudal fins, each 1 to 2 plates in length, extended on the sides of body, less distinctly contrasting on larger individuals but sometimes faint in smaller specimens; 1 crossband on the second to fourth plate behind dorsal fin, its anterior margin more or less at level of pelvic insertion, and 3 on caudal peduncle: the first on the eighth to tenth plate behind dorsal fin, more or less above tip of depressed anal fin; second and third, respectively, on the tenth to twelfth and fourteenth to sixteenth plates behind dorsal fin; first and second bands on caudal peduncle sometimes confluent. Side of body with an indistinct, dark band (lacking in some specimens), passing obliquely downward and forward from the bases of first 3 dorsal rays to before pelvic insertion. Fins usually variegated along the rays, lighter on smaller specimens, the membrane colorless or light

dusky, except on pectoral and base of pelvic fin, where it is usually reddish or brownish, especially on the largest individuals; anal fin light, in largest specimens with 1 transversal series of spots on the middle third of rays, and 2 or 3 spots on the distal fifth of the 2 or 3 anteriormost rays; upper and lower caudal rays, and first ray of other fins with dark spots, sometimes faint, usually 4 on pelvic and caudal, 5 on other fins, more numerous and conspicuous on larger specimens.

POECILIIDAE

Phalloceros caudimaculatus (Hensel)

Girardinus caudimaculatus.—Hensel, 1867: 362 (original description; São Leopoldo, Rio Grande do Sul).

Phalloceros caudomaculatus.—Eigenmann, 1907: 431, Fig. 7 (description, figure of gonopod). Henn, 1916: 124, Pl. 18, Fig. 2 (description).

Three immature specimens, U.M.M.Z. No. 143285, 15 to 21 mm. in standard length, collected in the Lagôa dos Quadros.

ATHERINIDAE

Odontesthes bonariensis (Valenciennes)

Atherina bonariensis.—Valenciennes, in Cuvier and Valenciennes, 1835: 469 (original description; "Buénos Ayres" and "dans le Rio de La Plata, auprès de Montévidéo").

Atherinichthys bonariensis.—Eigenmann, 1894: 637 (listed; no exact locality in eastern Brazil).

Odontesthes bonariensis.—Hubbs and Marini, MS.

Six specimens, U.M.M.Z. No. 143296, 309 to 388 mm. in standard length, collected in the Lagôa dos Quadros, were identified by Carl L. Hubbs.

CICHLIDAE

Crenicichla lepidota Heckel

Crenicichla lepidota.—Heckel, 1840: 429 (original description; Rio Guaporé, Mato Grosso). Regan, 1905: 158 (description).

One specimen, U.M.M.Z. No. 143291, 44 mm. in standard length, collected in the Lagôa dos Quadros. Head length, 2.7 in standard length; body depth, 3.7; predorsal distance, 2.9; distance from tip of snout to pectoral insertion, 2.7; distance from tip of snout to pelvic insertion, 2.4; distance from tip of snout to anal origin, 1.3. Eye length, 3.8 in head length; snout length, 4.2; bony interorbital width, 5.5. Pored scales on lateral line, 21 + 8 + 2 (over caudal base). Dorsal rays, XVII, 13; anal rays, III, 9.

LITERATURE CITED

BLEEKER, PIETER

1858 Siluri. Ichthyologiae Archipelagi Indici. Batavia: Lange & Co. (Act. Soc. Reg. Scient. Ind. Neerl., IV) 1: i-xii, 1-370.

1862 Atlas ichthyologique des Indes Orientales Néerlandaises. Amsterdam: Frédéric Muller. 2: 1-112, Pls. 49-101.

BOULENGER, GEORGE A.

- 1891 An Account of the Siluroid Fishes Obtained by Dr. H. von Ihering and Herr Sebastian Wolff in the Province Rio Grande do Sul, Brazil. Proc. Zool. Soc. (London), pp. 231-35, Pls. 25-26.
- 1895 XII—Poissons. Viaggio del dottor Alfredo Borelli nella Repubblica Argentina e nel Paraguay. Boll. Mus. Zool. Anat. Comp. Univ. Torino, 10 (196): 1-3.

COPE, EDWARD D.

- 1870 Contribution to the Ichthyology of the Maraçon. Proc. Amer. Phil. Soc., 11: 559-70, 8 figs.
- 1878 Synopsis of the Fishes of the Peruvian Amazon, Obtained by Professor Orton During His Expeditions of 1873 and 1877. *Ibid.*, 17 (101): 673-701.
- 1894 On the Fishes Obtained by the Naturalist Expedition in Rio Grande do Sul. *Ibid.*, 33 (144): 84-108, Pls. 4-9.

CUVIER, GEORGES

- 1829 Le Règne animal distribué d'après son organization, pour servir de base a l'histoire naturelle des animaux et d'introduction a l'anatomie comparée. 2d ed.; Paris. 2: 1-406, Pls. 5-7 and 10-13.

CUVIER, GEORGES, and ACHILLE VALENCIENNES

- 1835-40 Histoire naturelle des poissons. Strasbourg: Levrault. 10: i-xxiv, 1-482, 2, Pls. 280-306; 15: i-xxxii, 1-540, 2, Pls. 421-55. (These volumes accredited solely to Valenciennes.)

EIGENMANN, CARL H.

- 1894 V. Notes on Some South American Fishes. A—Fishes Collected by Frederick C. Hartt. Ann. N. Y. Acad. Sci., 7: 625-37.
- 1903 New Genera of South American Fresh-Water Fishes and New Names for Some Old Genera. Smith. Misc. Coll., (45): 144-48.
- 1907 The Poeciliid Fishes of Rio Grande do Sul and the La Plata Basin. Proc. U. S. Nat. Mus., 32: 425-33, Figs. 1-11.
- 1909 Some New Genera and Species of Fishes from British Guiana. Ann. Carnegie Mus., 6 (1): 4-54.
- 1910 Catalogue of the Fresh-Water Fishes of Tropical and South Temperate America. Repts. Princeton Univ. Exp. to Patagonia, 1896-1899, 3 (Zoology), Pt. 4: 375-511, 1 map.
- 1912a The Freshwater Fishes of British Guiana, Including a Study of the Ecological Grouping of Species and the Relation of the Fauna of the Plateau to That of the Lowlands. Mem. Carnegie Mus., 5: i-xxii, 1-578, Pls. 1-103, Figs. 1-39.
- 1912b Some Results from an Ichthyological Reconnaissance of Colombia, South America. Indiana Univ. Studies, 10 (8): 1-27.
- 1915 The Cheirodontinae, a Subfamily of Minute Characid Fishes of South America. Mem. Carnegie Mus., 7 (1): 1-99, Pls. 1-17, Figs. 1-36.
- 1922 The Fishes of Western South America, Part I. The Fresh-Water Fishes of Northwestern South America, Including Colombia, Panama, and the Pacific Slopes of Ecuador and Peru, Together with an Appendix upon the Fishes of the Rio Meta in Colombia. *Ibid.*, 9 (1): 1-346, Pls. 1-38, Figs. 1-21.

EIGENMANN, CARL H., and ROSA S. EIGENMANN

- 1889 Preliminary Notes on South American Nematognathi, II. Proc. Cal. Acad. Sci., 2 (2): 28-56.

- 1890 A Revision of the South American Nematognathi or Cat-Fishes. Occ. Papers Cal. Acad. Sci., 1: 1-509, Figs. 1-55, 1 map.
- EIGENMANN, CARL H., and CLARENCE H. KENNEDY
1903 On a Collection of Fishes from Paraguay, with a Synopsis of the American Genera of Cichlids. Proc. Acad. Nat. Sci. Phila., 55: 497-537.
- EIGENMANN, CARL H., WALDO L. MCATEE, and DAVID P. WARD
1911 On Further Collections of Fishes from Paraguay. Ann. Carnegie Mus., 4 (2): 110-156, Pls. 31-45.
- ELLIS, MAX M.
1913 The Gymnotidae Eels of Tropical America. Mem. Carnegie Mus., 6(3): 109-204, Pls. 15-23, Figs. 1-33.
- FOWLER, HENRY W.
1914 Fishes from the Rupununi River, British Guiana. Proc. Acad. Nat. Sci. Phila., 66: 299-84, Figs. 1-20.
1940 The Fishes. Zoological Results of the Second Bolivian Expedition for the Academy of Natural Sciences of Philadelphia, 1936-1937. Part I. *Ibid.*, 2d ed.; Paris. 2: 1-406, Pls. 5-7 and 10-13.
- GOMES, A. LOURENÇO
1946 A Review of *Microglanis*, a Genus of South American Catfishes, with Notes on Related Genera. Occ. Papers Mus. Zool. Univ. Mich., 494: 1-19, Pl. I.
- GOSLINE, WILLIAM A.
1940 A Revision of the Neotropical Catfishes of the Family Callichthyidae. Stanford Ichth. Bull., 2 (1): 1-29, Figs. 1-3.
1945 Catálogo dos Nematognatos de água-doce da América do Sul e Central. Bol. Mus. Nac. (Rio de Janeiro), N. S., Zool., (33): 1-138.
- HECKEL, JACOB
1840 Johann Natterer's Neue Flussfische Brasiliens nach den Beobachtungen und Mittheilungen des Entdeckers beschreiben. Ann. Wiener Mus. Naturgesch., 2 (2): 327-470, Pls. 29-30.
- HENN, ARTHUR W.
1916 On Various South American Poeciliid Fishes. Ann. Carnegie Mus., 10 (1-2): 93-142, Pls. 18-25, Figs. 1-17.
- HENSEL, REINHOLD
1867 Beiträge zur Kenntniss der Wirbelthiere Sudbrasilien. Fische. Arch. für Naturg., 1: 356-75.
- HUBBS, CARL L.
1944 Fin Structure and Relationships of the Phallostethid Fishes. Copeia, pp. 69-79.
- HUBBS, CARL L., and MOTT D. CANNON
1935 The Darters of the Genera *Hololepis* and *Villora*. Misc. Publ. Mus. Zool. Univ. Mich., 30: 1-93, Pls. 1-3.
- HUBBS, CARL L., and KARL F. LAGLER
1941 Guide to the Fishes of the Great Lakes and Tributary Waters. Bull. Cranbrook Inst. Sci., (18): 1-100, Figs. 1-118.
- JENYNS, LEONARD
1842 Fish. The Zoology of the Voyage of H. M. S. Beagle under the Command of Captain Fitzroy, R. N., During the Years 1832 to 1836. London: Smith, Elder & Co. 4: i-xvi, 1-172, Pls. 1-29.
- KNER, R.
1854 Die Hypostomiden, zweite Hauptgruppe der Familie der Panzerfische. Denks. k. Akad. Wiss. Wien, 7 (1): 251-86, Pls. 1-5.

LINNAEUS, CAROLIUS

1758 *Systema Naturae*. 16th ed.; Holmiae. Pp. 1-824.

MYERS, GEORGE S.

1927 Descriptions of New South American Fresh-Water Fishes Collected by Dr. Carl Ternetz. *Bull. Mus. Comp. Zool.*, 68 (3): 107-35.

PEARSON, NATHAN E.

1924 The Fishes of the Eastern Slope of the Andes. I. The Fishes of the Rio Beni Basin, Bolivia, Collected by the Mulford Expedition. *Indiana Univ. Studies*, 11 (64): 1-83, Pls. 1-12, Figs. 1-4.

PELLEGRIN, JACQUES

1908 Characinidés américains nouveaux de la collection du Muséum d'Histoire Naturelle. *Bull. Mus. Hist. Nat. Paris*, 14: 342-47.

REINHARDT, J.

1866 Om trende, formeentligt ubeskrevne Fisk af Characinernes eller Karpelaxenes Familie. *Oversigt over d. k. D. V. Selsk. Forhandl.*, pp. 49-68, Pls. 1-2.

REGAN, C. TATE

1904 A Monograph of the Fishes of the Family *Loricariidae*. *Trans. Zool. Soc. (London)*, 17 (3): 191-351, Pls. 9-21.

1905 A Revision of the Fishes of the South American Cichlid Genera *Crenacara*, *Batrachops*, and *Crenicichla*. *Proc. Zool. Soc. (London)*, 1: 152-68, Pls. 14-15.

1906 Notes on Some Loricariid Fishes, with Descriptions of Two New Species. *Ann. Mag. Nat. Hist.*, 17 (7): 94-98.

1912 Descriptions of New Fishes of the Family Loricariidae in the British Museum Collections. *Proc. Zool. Soc. (London)*, 2: 666-70, Pls. 75-77.

1913 Descriptions of Two New Fishes from Paranagua, Brazil, Presented to the British Museum by Herr. A. Rachow. *Ann. Mag. Nat. Hist.*, 8 (11): 231-32.

RIBEIRO, ALIPIO DE MIRANDA

1911 Peixes, IV (A)—Eleutherobranchios Aspirophoros. *Fauna braziliense. Arch. Mus. Nac. (Rio de Janeiro)*, 16: 1-504, 8, Pls. 22-54, Figs. 44-144.

SCHULTZ, LEONARD

1944 The Fishes of the Family Characinidae from Venezuela, with Descriptions of Seventeen New Forms. *Proc. U. S. Nat. Mus.*, 95: 235-367, Figs. 30-56.

STEINDACHNER, FRANZ

1868 Die Gymnotidae des k. k. Hof—Naturalienabinetes zu Wien. *Sitzungb. k. Akad. Wiss. Wien*, 58 (1): 249-64, Pls. 1-2.

1876 Die Süßwasserfische des Südöstlichen Brasilien (III). *Ibid.*, 74 (1): 559-694, Pls. 1-13.

VALENCIENNES, ACHILLE

1847 Catalogue des principales espèces de poissons rapportées de l'Amérique Méridionale par M. d'Orbigny. In Aleide d'Orbigny, *Voyage dans l'Amérique Méridionale (le Brésil, la République Orientale de l'Uruguay, la République Argentine, la Patagonie, la République du Chili, la République de Bolivia, la République du Pérou)*, exécuté pendant les années 1826, 1827, 1828, 1829, 1830, 1831, 1832 et 1833. Paris: Pitois-Levrault & Co. 5 (2—Poissons): 1-11; 9, Atlas zoologique (Poissons), Pls. 1-16.

PLATE I

FIG. 1. *Odontostoechus lethostigmus*, new genus and species. Holotype from Rio Maquiné, a tributary to Lagôa dos Quadros, Conceição do Arroio County, Rio Grande do Sul, Brazil; 47.0 mm. in standard length; U.M.M.Z. No. 143272. Lateral view.

FIG. 2. *Distoechus stigmaturus*, new genus and species. Holotype from Rio Maquiné, a tributary to Lagôa dos Quadros, Conceição do Arroio County, Rio Grande do Sul, Brazil; 26.0 mm. in standard length; U.M.M.Z. No. 143273. Lateral view.

FIG. 3. *Characidium pterostictum*, new species. Holotype from Rio Maquiné, a tributary to Lagôa dos Quadros, Conceição do Arroio County, Rio Grande do Sul, Brazil; 49.3 mm. in standard length; U.M.M.Z. No. 143289. Lateral view.

Photographs by F. W. Ouradnik.

PLATE I

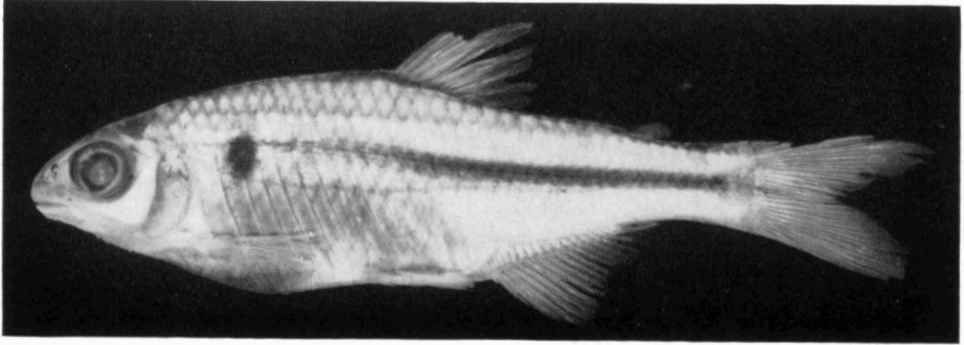


FIG. 1

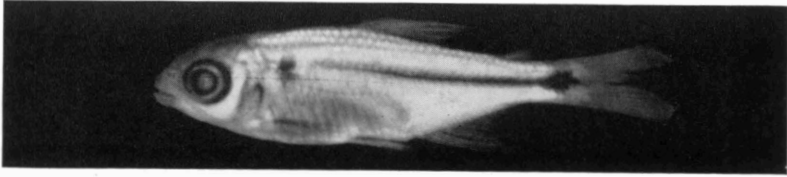


FIG. 2

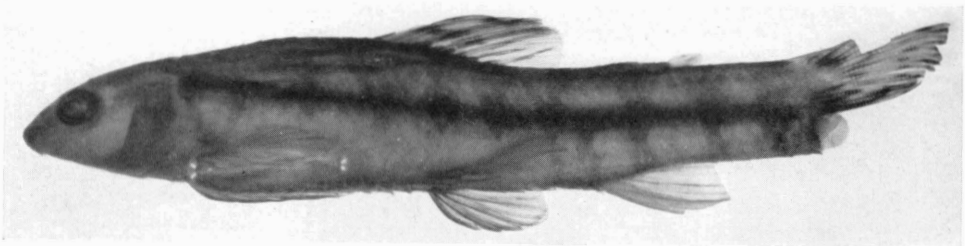


FIG. 3

PLATE II

FIG. 1. *Xenocara gymnorhyncha* (Kner). Specimen from Rio Maquiné, a tributary to Lagôa dos Quadros, Conceição do Arroio County, Rio Grande do Sul, Brazil; 36.0 mm. in standard length; U.M.M.Z. No. 143277. Lateral view.

FIG. 2. The same, dorsal view.

Photographs by F. W. Ouradnik.

PLATE II

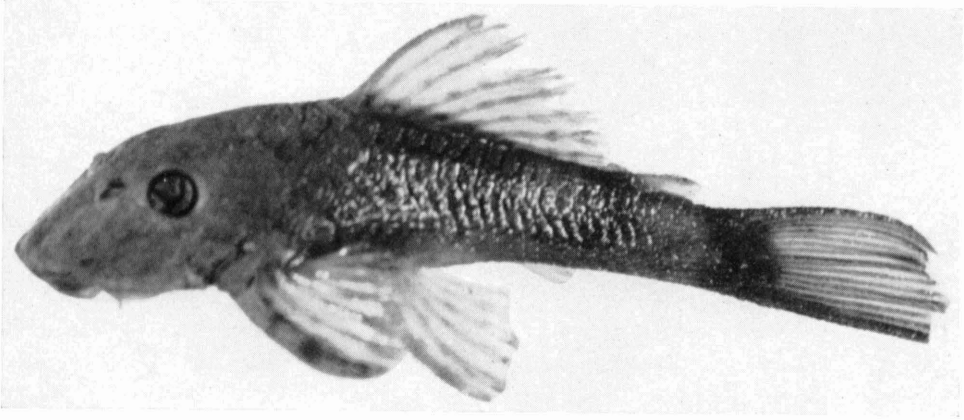


FIG. 1

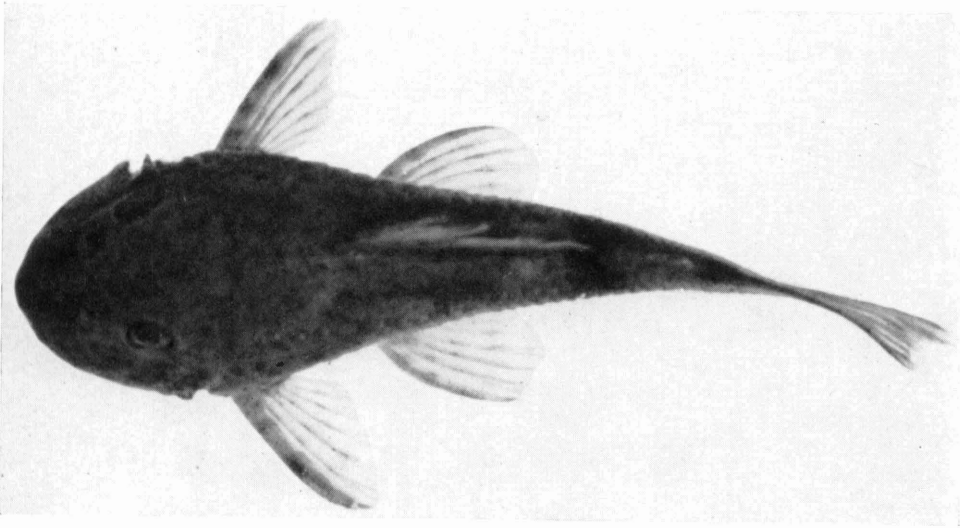


FIG. 2

PLATE III

FIG. 1. *Loricaria* (*Rhineloricaria*) *steinbachi* Regan. Specimen from Rio Maquiné, a tributary to Lagôa dos Quadros, Conceição do Arroio County, Rio Grande do Sul, Brazil; 62.0 mm. in standard length; U.M.M.Z. No. 143279. Lateral view.

FIG. 2. The same, ventral view.

Photographs by F. W. Ouradnik.

PLATE III

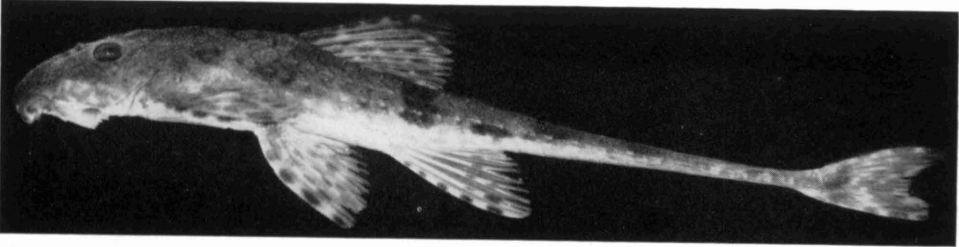


FIG. 1

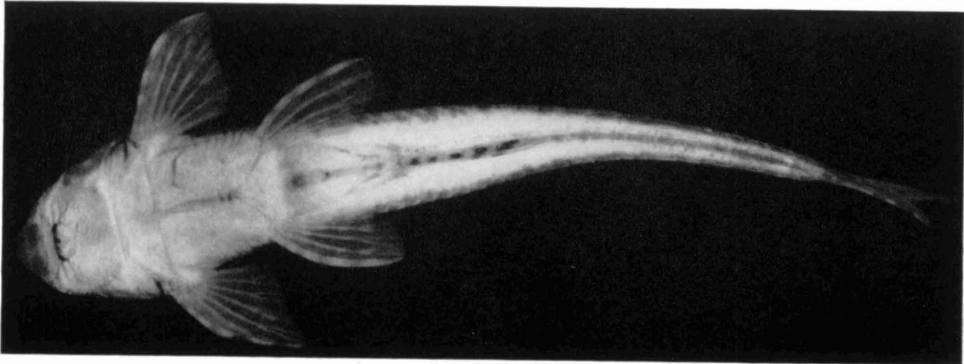


FIG. 2

(Continued from inside front cover)

No. 24.	A Comparative Life History Study of the Mice of the Genus <i>Peromyscus</i> . By ARTHUR SVIHLA. (1932) Pp. 39	\$0.50
No. 25.	The Moose of Isle Royale. By ADOLPH MURIE. (1934) Pp. 44, 7 plates	\$0.70
No. 26.	Mammals from Guatemala and British Honduras. By ADOLPH MURIE. (1935) Pp. 30, 1 plate, 1 map insert	\$0.35
No. 27.	The Birds of Northern Petén, Guatemala. By JOSSELYN VAN TYNE. (1935) Pp. 46, 2 plates, 1 map	\$0.45
No. 28.	Fresh-water Fishes Collected in British Honduras and Guatemala. By CARL L. HUBBS. (1935) Pp. 22, 4 plates, 1 map	\$0.25
No. 29.	A Contribution to a Knowledge of the Herpetology of a Portion of the Savanna Region of Central Petén, Guatemala. By L. C. STUART. (1935) Pp. 56, 4 plates, 1 figure, 1 map	\$0.50
No. 30.	The Darters of the Genera <i>Holelepis</i> and <i>Villora</i> . By CARL L. HUBBS AND MOTT DWIGHT CANNON. (1935) Pp. 93, 3 plates, 1 figure	\$0.50
No. 31.	Goniobasis of the Coosa River, Alabama. By CALVIN GOODRICH. (1936) Pp. 60, 1 plate, 1 figure	\$0.35
No. 32.	Following Fox Trails. By ADOLPH MURIE. (1936) Pp. 45, 6 plates, 6 figures	\$1.00
No. 33.	The Discovery of the Nest of the Colima Warbler (<i>Vermivora crissalis</i>). By JOSSELYN VAN TYNE. (1936) Pp. 11, colored frontis., 3 plates, 1 map	\$0.35
No. 34.	Mollusca of Petén and North Alta Vera Paz, Guatemala. By CALVIN GOODRICH AND HENRY VAN DER SCHALIE. (1937) Pp. 50, 1 plate, 1 figure, 1 map	\$0.50
No. 35.	A Revision of the Lamprey Genus <i>Ichthyomyzon</i> . By CARL L. HUBBS AND MILTON B. TRAUTMAN. (1937) Pp. 109, 2 plates, 5 figures, 1 map	\$2.00
No. 36.	A Review of the Dragonflies of the Genera <i>Neurocordulia</i> and <i>Platycor-</i> <i>culia</i> . By C. FRANCIS BYERS. (1937) Pp. 36, 8 plates, 4 maps	\$0.50
No. 37.	The Birds of Brewster County, Texas. By JOSSELYN VAN TYNE AND GEORGE MIKSCH SUTTON. (1937) Pp. 115, colored frontis., 5 plates, 1 map	\$1.25
No. 38.	Revision of <i>Sciurus variegatoides</i> , a Species of Central American Squir- rel. By WILLIAM P. HARRIS, JR. (1937) Pp. 42, 3 plates (2 colored), 3 figures, 1 map	\$0.50
No. 39.	Faunal Relationships and Geographic Distribution of Mammals in Sonora, Mexico. By WILLIAM H. BURT. (1938) Pp. 77, 26 maps	\$0.75
No. 40.	The Naiad Fauna of the Huron River, in Southeastern Michigan. By HENRY VAN DER SCHALIE. (1938) Pp. 83, 12 plates, 28 figures, 18 maps	\$1.00
No. 41.	The Life History of Henslow's Sparrow, <i>Passerherbulus henslowi</i> (Audu- bon). By A. SIDNEY HYDE. (1939) Pp. 72, 4 plates, 3 figures, 1 map	\$0.75
No. 42.	Studies of the Fishes of the Order Cyprinodontes. XVI. A Revision of the Goodeidae. By CARL L. HUBBS AND C. L. TURNER. (1939) Pp. 85, 5 plates	\$0.90
No. 43.	Aquatic Mollusks of the Upper Peninsula of Michigan. By CALVIN GOODRICH AND HENRY VAN DER SCHALIE. (1939) Pp. 45, 2 maps	\$0.50
No. 44.	The Birds of Buckeye Lake, Ohio. By MILTON B. TRAUTMAN. (1940) Pp. 466, 15 plates and a frontis., 2 maps	\$2.50
No. 45.	Territorial Behavior and Populations of Some Small Mammals in South- ern Michigan. By WILLIAM H. BURT. (1940) Pp. 58, 2 plates, 8 figures, 2 maps	\$0.50
No. 46.	A Contribution to the Ecology and Faunal Relationships of the Mam- mals of the Davis Mountain Region, Southwestern Texas. By W. FRANK BLAIR. (1940) Pp. 39, 3 plates, 1 map	\$0.35
No. 47.	A Contribution to the Herpetology of the Isthmus of Tehuantepec. IV. By NORMAN HARTWEG AND JAMES A. OLIVER. (1940) Pp. 31	\$0.35
No. 48.	A Revision of the Black Basses (<i>Micropterus</i> and <i>Huro</i>) with Descrip- tions of Four New Forms. By CARL L. HUBBS AND REEVE M. BAILEY. (1940) Pp. 51, 6 plates, 1 figure, 2 maps	\$0.75

No. 49. Studies on Neotropical Colubrinae. VIII. A Revision of the Genus <i>Dryadophis</i> Stuart. By L. C. STUART. (1941) Pp. 106, 4 plates, 13 figures, 4 maps	\$1.15
No. 50. A Contribution to the Knowledge of Variation in <i>Ophedrys vernalis</i> (Harlan), with the Description of a New Subspecies. By ARNOLD B. GROBMAN. (1941) Pp. 37, 2 figures, 1 map	\$0.35
No. 51. Mammals of the Lava Fields and Adjoining Areas in Valencia County, New Mexico. By EMMET T. HOOPER. (1941) Pp. 47, 3 plates, 1 map.	\$0.50
No. 52. Type Localities of Pocket Gophers of the Genus <i>Thomomys</i> . By EMMET T. HOOPER. (1941) Pp. 26, 1 map	\$0.25
No. 53. The Crane Flies (Tipulidae) of the George Reserve, Michigan. By J. SPEED ROGERS. (1942) Pp. 128, 8 plates, 1 map	\$1.25
No. 54. The Ecology of the Orthoptera and Dermaptera of the George Reserve, Michigan. By IRVING J. CANTRALL. (1942) Pp. 182, 10 plates, 2 maps	\$1.50
No. 55. Birds from the Gulf Lowlands of Southern Mexico. By PIERCE BROOKORP. (1943) Pp. 88, 1 map	\$0.75
No. 56. Taxonomic and Geographic Comments on Guatemalan Salamanders of the Genus <i>Oedipus</i> . By L. C. STUART. (1943) Pp. 33, 2 plates, 1 map	\$0.35
No. 57. The Amnicolidae of Michigan: Distribution, Ecology, and Taxonomy. By ELMER G. BERRY. (1943) Pp. 68, 9 plates, 10 figures, 10 maps	\$0.85
No. 58. A Systematic Review of the Neotropical Water Rats of the Genus <i>Nectomys</i> (Cricetinae). By PHILIP HERSHKOVITZ. (1943) Pp. 88 4 plates, 5 figures, 2 maps	\$1.15
No. 59. San Francisco Bay as a Factor Influencing Speciation in Rodents. By EMMET T. HOOPER. (1943) Pp. 89, 5 plates, 18 maps	\$1.25
No. 60. The Fresh-Water Triclad of Michigan. By ROMAN KENK. (1943) Pp. 44, 7 plates, 5 figures	\$0.50
No. 61. Home Range, Homing Behavior, and Migration in Turtles. By FRED R. CAGLE. (1944) Pp. 34, 2 plates, 4 figures, 1 map	\$0.35
No. 62. Monograph of the Family Mordellidae (Coleoptera) of North America, North of Mexico. By EMIL LILJEBLAD. (1945) Pp. 226, 7 plates	\$2.00
No. 63. Phylogenetic Position of the Citharidae, a Family of Flatfishes. By CARL L. HUBBS. (1945) Pp. 38, 1 figure	\$0.35
No. 64. <i>Goniobasis livescens</i> of Michigan. By CALVIN GOODRICH. (1945) Pp. 36, 1 plate, 1 figure, 1 map	\$0.35
No. 65. Endemic Fish Fauna of Lake Waccamaw, North Carolina. By CARL L. HUBBS and EDWARD C. RANEY. (1946) Pp. 30, 1 plate, 2 maps	\$0.35
No. 66. Revision of <i>Ceraticthys</i> , a Genus of American Cyprinid Fishes. By CARL L. HUBBS and JOHN D. BLACK. (1947) Pp. 56, 2 plates, 1 figure, 2 maps	\$1.00
No. 67. A Small Collection of Fishes from Rio Grande do Sul, Brazil. By A. LOURENÇO GOMES. (1947) Pp. 39, 3 plates, 2 figures	\$0.50

Price lists are available for the *Occasional Papers*, *Handbook Series*, and *Circulars* of the Museum of Zoology.