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FISHES OF THE YUCATAN PENINSULA

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## FISHES OF THE YUCATAN PENINSULA

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Introduction. Relationships of the Yucatan Inshore Fish Fauna. Relationships of the Yucatan Fresh-water Fish Fauna. Acknowledgments. List and Descriptions of Stations occupied in the Fishery. Clupeidæ. Engraulididæ. Characidæ. Ariidæ. Pimelodidæ. Belonidæ. Hemiramphidæ. Cyprinodontidæ. Pœciliidæ. Tetraodontidæ. Lutianidæ. Atherinidæ. Gerridæ. Carangidæ. Sparidæ. Sciaenidæ. Cichlidæ. Syngnathidæ. Gobiidæ. Batrachoididæ. Blenniidæ. Soleidæ. Literature cited.

## INTRODUCTION

This paper is based primarily on the fish collections obtained during the 1932 Yucatan biological explorations, which were undertaken cooperatively by the Carnegie Institution of Washington, Duke University and the Museum of Zoology of the University of Michigan, and were led by Dr. A. S. Pearse of Duke University.

Most of the cienaga and cenote fishes obtained on the two previous biological expeditions, those reported on by Evermann and Goldsborough (1902) and by Hubbs and Cole (1906), have been reexamined at the U. S. National Museum and the Museum of Comparative Zoology. These older collections have yielded for the present report one new species from the cienaga at Progreso, *Fundulus grandissimus*; a new subspecies of cichlid from Mujeres Island, *Cichlasoma ophthalmus amarum*, and one other fresh-water species, *Symbranchus marmoratus*, none of which was obtained by the 1932 expedition.

Collections from several aquarists, representing fishes from the Progreso region and imported for aquarium purposes, have also been studied. These collections include the only known specimens of the new subspecies *Pseudoxiphophorus maculatus peninsulæ*.

A collection of five species made by C. L. Lundell in an aguada at Tuxpeña, near Campeche, is reported upon for the sake of completeness, as it adds three subspecies to the known fauna of the Yucatan Peninsula, one of which, *Cichlasoma ophthalmus aguadæ*, is described as new.

To complete comparisons of the Yucatan fresh-water fish fauna with that of the adjacent region of Middle America, descriptions are given of four new forms—*Cichlasoma urophthalmus stenozonum* from "Central America," based on Steindachner's description of *Heros urophthalmus*; of *Cichlasoma urophthalmus albatrossi* and *Cichlasoma heterospilum*, based on material from the Rio Usumacinta basin, Mexico, reported on by Evermann and Goldsborough, and of *Gambusia affinis holbrooki*.

*busia nicaraguensis sexradiatus* from southern Mexico, founded on original material.

The Yucatan collections have proved remarkably rich in hitherto unnamed fishes. Of shore and bay fishes there were obtained, including the new *Fundulus* based on the older collections, 27 genera, 29 species and 4 subspecies. Of the genus, 3 species and 3 subspecies are described as new. The percentage novelties among these few shore and estuarine fishes is 4 per cent for genera, per cent for species and 75 per cent for subspecies.

The known fresh-water fish fauna of the peninsula, which is completely treated in the present report, has also been materially increased. Of the 11 genera, species and 19 subspecies now recognized, 1 genus, 4 species and 12 subspecies are here described for the first time. The percentage of novelties among the fresh water fishes of Yucatan is consequently 9 per cent for genera, 22 per cent for species and 63 per cent for subspecies.

Following is a list of the new names proposed in this paper (2 new genera, new species and 18 new subspecies) :

- styanax fasciatus altior*, new subspecies.
- Rhamdia guatemalensis decolor*, new subspecies.
- Rhamdia guatemalensis stygæa*, new subspecies.
- Fundulus grandissimus*, new species.
- Rivulus myersi*, new species.
- Floridichthys carpio polyommus*, new subspecies.
- Floridichthys carpio barb ouri*, new subspecies.
- Garmanella*, new genus.
- Garmanella pulchra*, new species.
- Cyprinodon variegatus artifrons*, new subspecies.
- Gambusia nicaraguensis sexradiatus*, new subspecies.
- Belonesox belizanus maxillosus*, new subspecies.
- Pseudoxiphophorus bimaculatus peninsulæ*, new subspecies.
- Allophallus*, new genus.
- Allophallus kidderi*, new species.
- Mollienisia sphenops altissima*, new subspecies.
- Menidia colei*, new species.
- Cichlasoma heterospilum*, new species.
- Cichlasoma champotonis*, new species.
- Cichlasoma urophthalmus stenozonum*, new subspecies.
- Cichlasoma urophthalmus alborum*, new subspecies.
- Cichlasoma urophthalmus aguadæ*, new subspecies.
- Cichlasoma urophthalmus cienagæ*, new subspecies.
- Cichlasoma urophthalmus amarum*, new subspecies.
- Cichlasoma urophthalmus conchitæ*, new subspecies.
- Cichlasoma urophthalmus zebra*, new subspecies.
- Cichlasoma urophthalmus mayorum*, new subspecies.
- Herichthys pearsei*, new species.

Sta. 45, aguada at **Tuxpeña**, Campeche (27, young to adult, 22 to 58 mm. long).

These two lots correspond fairly well, the second lot quite well, with the **comuni** characin of southern Mexico and northern Guatemala, which has been worked out *Astyanax fasciatus ~~eneus~~* by Hubbs and Gordon (MS) and by Hubbs (1935, 6). **T** variation in the number of anal rays, probably the most valuable single character, is indicated in table 5. The main proportions in the Rio Champoton specimens are : depth 2

TABLE 5—Frequency distribution in number of anal rays in *Astyanax fasciatus ~~eneus~~* and *A. f. altior*.

Subspecies and locality	Principal anal rays					Average
	22	23	24	25	26	
A. 1. <del>eneus</del> :						
A guada at Tuxpeña	1	3	17	5	1	24.07
Rio Champoton	2	3	2	1	..	23.25
A. f. altior:						
Pool near Progreso	2	1	1	..	..	22.75
Xlaka Cenote		1	..	..	..	13.00

to 3.1; head 3.2 to 3.4; eye 2.8 to 3.3; interorbital 3.5 to 3.8. The same proportions in the larger **Tuxpeña** specimens are : depth 2.6 to 3.1; head 3.1 to 3.6; eye 2.9 to 3 interorbital 3.3 to 4.0. Gill rakers 9 + 13 in one from Rio Champoton and 8 + 14 in one from **Tuxpeña**. Teeth in a Champoton specimen: 4 in each premaxillary series; 3 maxillary; 4 anterior teeth and 8 abruptly smaller posterior teeth on dentary.

The specimens here recorded were, when fresh, colored much like Mexican specimens of either subspecies *dneus* or *mexicanus*. The Rio Champoton specimens when fresh in formalin had the body olive; cheeks cream-colored; dorsal fin slightly tinged with watery orange toward the front medially; caudal lobes bright orange, in blotches separated by bright lemon from the median black band, caudal margin pale; front of anal and a rather large triangular area above anus orange red; pelvic fin with some of same color on outer half. The **Tuxpeña** specimens showed on arrival a lemon-yellow caudal anal and pelvic becoming bright-red toward front rays, especially medially; trunk yellowish; body above anal with a suffusion of red.

### 3b. *Astyanax fasciatus altior* n. subsp.

Plate 1, fig. x

Sta. 22, Chapultepec Cenote, Merida (characins probably of this subspecies were seen but not captured in this artificial cenote, which was said to have been stocked from cienagas).

Sta. 28, Xlaka Cenote, 14 km. north, then 2 km. northeast of Merida (1, large young, 21 mm. long to caudal; identified with doubt).

Sta. 33, roadside pool 3 km. south of Progreso (adult holotype 53 mm. long caudal base, Cat. No. 10244, Museum of Zoology, University of Michigan; one adult paratype 44 mm. long and two young paratypes 15 and 17.5 mm. long, Cat. No. 10214 Museum of Zoology, University of Michigan).

The two adults from the pool near Progreso, the only specimens really identifiable appear to represent a distinct subspecies, probably confined to Yucatan. The two young specimens from Station 33 and the one young from Xlaka Cenote are referred to

same subspecies, because of the locality and because they are rather deep for characins of such small size.

The outstanding feature of this subspecies seems to be the extremely deep body, for the depth enters the standard length 2.2 times. In the abundant material at hand of the Mexican subspecies *æneus* and *mexicanus*, there are no specimens having the depth more than two-fifths the standard length. It is very probable, however, that study of further material will show an overlapping in the relative depth. Regan (1906-1908, 170) gives the depth as  $2 \frac{1}{4}$  to  $3 \frac{1}{3}$  in the length in his *æneus*, which, however, includes some probably differentiable Central American forms with a higher average number of anal rays. The anal rays in *altior* (see table 5) are fewer than in any collection we have identified as *æneus*, averaging intermediate between the means for *æneus* and *mexicanus*. In this respect alone the Rio Champoton series identified above as *æneus* definitely approaches *altior*. The fins in *altior* are unusually high (or long) and sharp.

The types of *altior* agree with the *fasciatus* complex as that was indicated by Eigenmann (1921, 227-308): the caudal fin is scaleless; lateral line complete; suborbital not completely covering cheek; edge of maxillary not denticulate; nuchal region and belly covered across midline by normal scales; lateral line scales to caudal base fewer than 40; no lateral stripes between scale rows; humeral spot diffuse and vertically elongate; snout not very blunt; caudal spot elongated into a band extending to end of median rays; dorsal fin inserted somewhat nearer caudal base than tip of snout; premaxillary teeth 4 in each series; maxillary teeth 3; 4 anterior dentary teeth abruptly set off from about 8 very small posterior teeth.

The body is not only deeper but also more rhombic in outline than in most of the relatives. The dorsal profile is distinctly concave on top of head but convex between head and dorsal fin, being especially humped over the shoulders. The ventral contour is strongly and evenly convex from mouth to caudal peduncle. The width of the head, greater than that of the thin body, is not quite one-third the greatest depth, which enters the standard length 2.2 times (2.25 times in paratype). The least depth of the caudal peduncle is equal to its length, from end of anal base to middle of caudal base, and is contained in the head 2.4 (2.5) times. The distance from the origin of the well-developed adipose fin to the first rudimentary caudal ray enters the head 2.6 (2.65) times.

The head, including opercular membranes, is only a trifle longer than deep, as measured from the tip of the occipital process to the bony point at the lower end of the shoulder girdle. The occipital process measured along the midline is as long (or 0.8 as long) as the rather small eye, which enters the head 4.6 (3.8) times. The least bony depth of the convex interorbital is contained 3.7 (3.7) times in the head. The silvery suborbital is as broad (or 0.8 as broad) as the eye, and covers the cheek except for a narrow space, which widens gradually from upper posterior border to anterior margin, here it is still little more than half as wide as the pupil. The narrowly rounded and somewhat upturned snout is as long as the orbit (or nearly as long). The length of the strongly arched upper jaw enters the head 2.9 (2.8) times.

The premaxillary teeth on each side consist of an anterior row of 4 tricuspid and an inner row of 4 septicuspid. The maxillary bears two very low and long teeth set oblique so their ends overlap, and another still longer tooth flanking these within. The original dentary teeth are 4 in number, plus 8 abruptly smaller teeth which form a series set quite in line with the 4 larger ones. The slender gill rakers, the longest about one-third the orbit, number 9+13 (both specimens).

Principal rays: dorsal 9 (9); anal 22 (24); caudal 19 (19); pelvic 7-8 (8-8); pectoral 14-15 (13-13). The origin of the dorsal fin is slightly nearer the caudal base

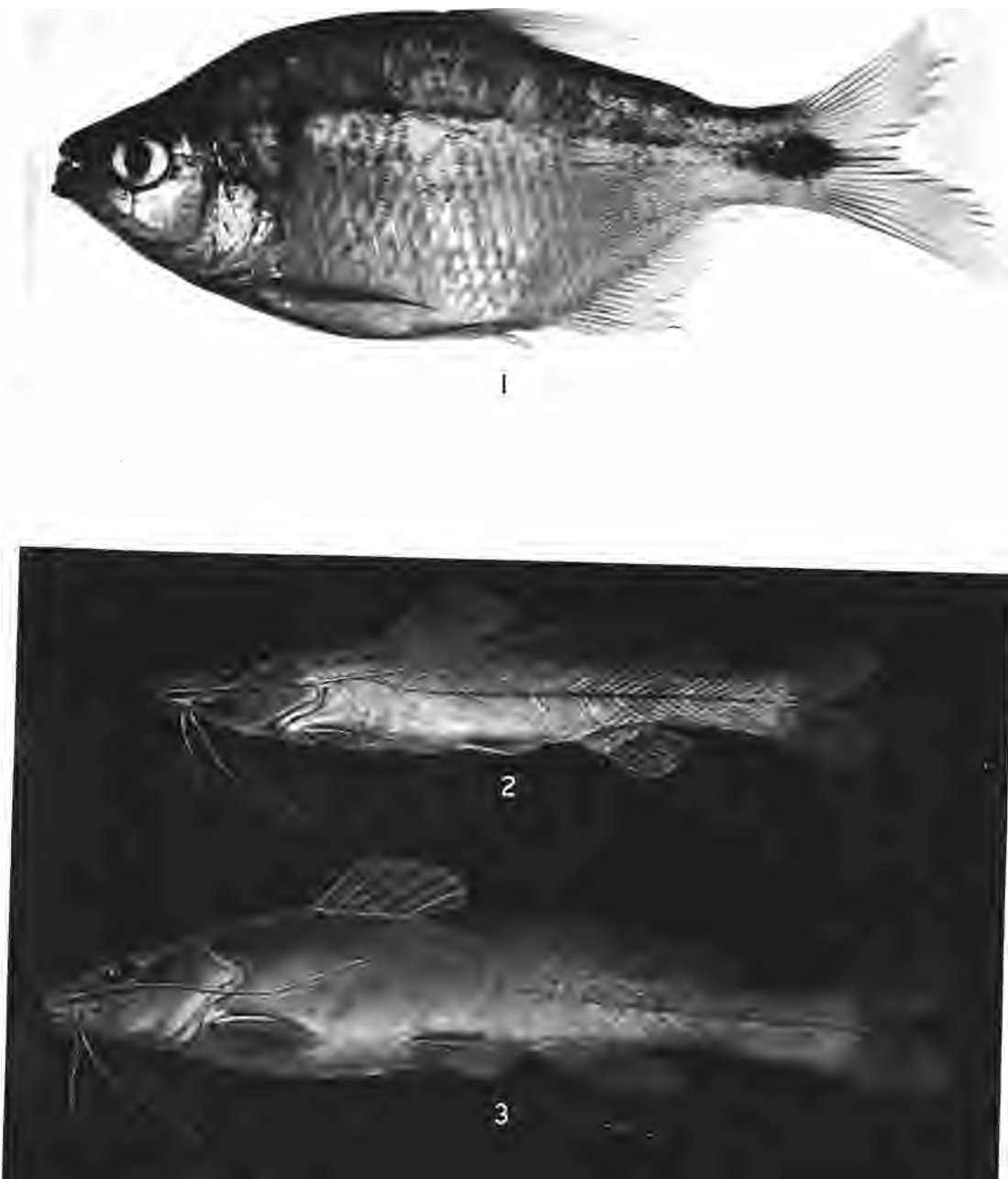
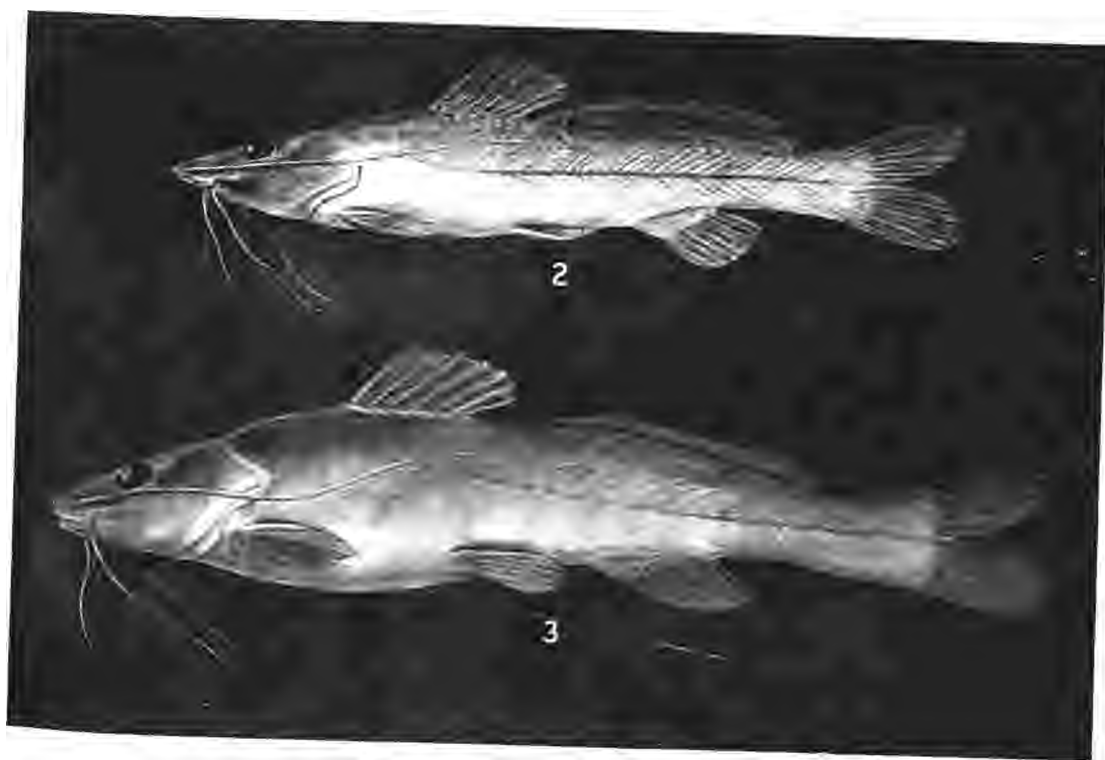


FIG. 1—*Astyanax fasciatus altior* n. subsp. The holotype, 53 mm. in standard length, from a pool 3 kilometers south of Progreso, Yucatan.

FIG. 2—*Rhamdia guatemalensis stygæa* n. subsp. The holotype, 109 mm. in standard length, from San Isidro Cave, near Merida, Yucatan.

FIG. 3—*Rhamdia guatemalensis decolor* n. subsp. The holotype, 139 mm. in standard length, from San Bulha Cave, Motul, Yucatan.



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than tip of snout. The fins are high, or long, and falcate. The height of the depressed dorsal measures 3.1 (3.2) times in the standard length, and is 2.1 (2.0) times greater than the basal length of the fin. The length of the caudal, to tip of lower lobe, enters the standard length 2.8 (2.8) times. The anal is just two-thirds as high as long. The pelvic extends to origin of anal and is contained 1.8 (1.8) times in the head. The strong pectoral more than overlaps the whole pelvic base and enters the head 1.4 (1.4) times.

Scales 35 (35) along the complete and weakly decurved lateral line to caudal base.

In preservative the color is brownish above, bright silvery on the sides of body and head. The moderately distinct scapular blotch extends far downward, well toward the pectoral fin. It is followed by a larger and much more diffuse blotch. The jet-black caudal spot fades out forward, but is continued backward to the end of the middle caudal rays. The dorsal, caudal and pectoral become dusky toward their main edges; the anal dusky before its clear anterior border, and the pelvic dark toward its tip though its outer edge is clear.

The two young paratypes, 15 and 17.5 mm. long, from the type locality, in general appearance closely resemble the holotype and the larger paratype, differing in the characters which vary with age. Though much slenderer than the larger specimens, they are deep bodied for young of such small size: depth 2.8 and 3.0. The fins are relatively large: depressed dorsal 2.25 and 2.4. Head 2.6 and 2.7. Eye 3.0 and 3.2. Interorbital 3.6 and 4.0. Anal rays 22 and 23.

The single specimen from Xlaka Cenote, a young one 21 mm. long, may very well represent another subspecies, but of course the material is insufficient. It is very dark in general color, though the pattern is identical with that described for *altior*, except that the caudal spot is irregularly continued forward to above the posterior anal rays. The proportions are about the same as in the young of *altior*: depth 2.9; depressed dorsal 2.25; head 2.8; eye 3.0; interorbital 3.4. Scales in lateral line to caudal base 37; anal rays 23.

#### ARIIDÆ

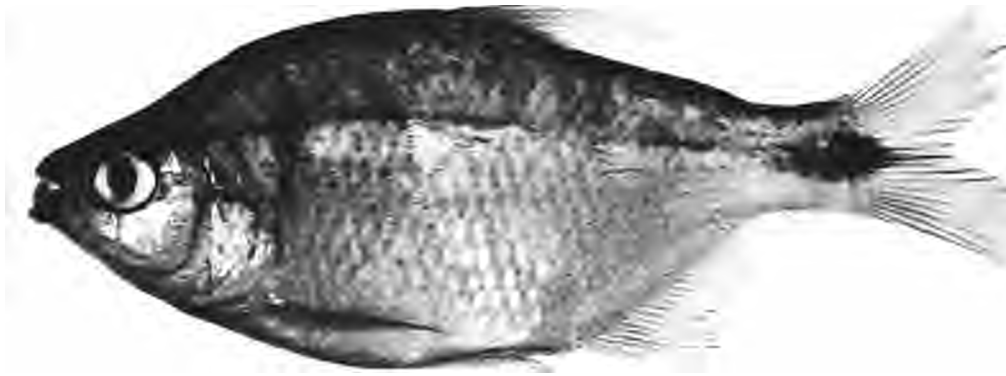
##### 4. *Bagre marinus* (Mitchill)

Sta. 42, Rio Champoton, Campeche, about 18 km. from mouth (2, adults, about 350 and 365 mm. long to caudal).

The use of the generic name *Bagre* Oken for the "gaff-topsail catfishes" seems required on the argument presented by Jordan (1917, 100), and supported by section of Article 30 of the International Rules of Zoological Nomenclature. *Bagre* thus places *Felichthys* Swainson and *Ailurichthys* Baird (or *Ælurichthys* as emended).

I regard as wholly unacceptable the view of Gunther (1899, 30) that the name *Silurus felis* Linnæus was based on this species, rather than as generally assumed on the following species. A conclusive reason for not following Günther's view, which was accepted in their addenda by Jordan and Evermann (1900, 3196) and by Regan (1901, 191), and followed by Meek and Hildebrand (1923, 99) is that Linnæus definitely described *S. felis* as having 6 barbels, 4 on the chin. It is surely more probable that there has been some misinterpretation or transposition of specimens or labels, than that Linnæus should have so definitely misdescribed a species with 4 barbels, only 2 on the chin. The circumstance that Gunther had to assume a misprint of the field number to line up the supposed Linnæan type specimen of *S. felis* with "Corresp. Linn. i. p. 306" in fact definitely indicates some mixup. Furthermore, Goode and Bean (1885, 205) earlier identified what they took to be Linnæus' type of *S. felis* with the following species.





1

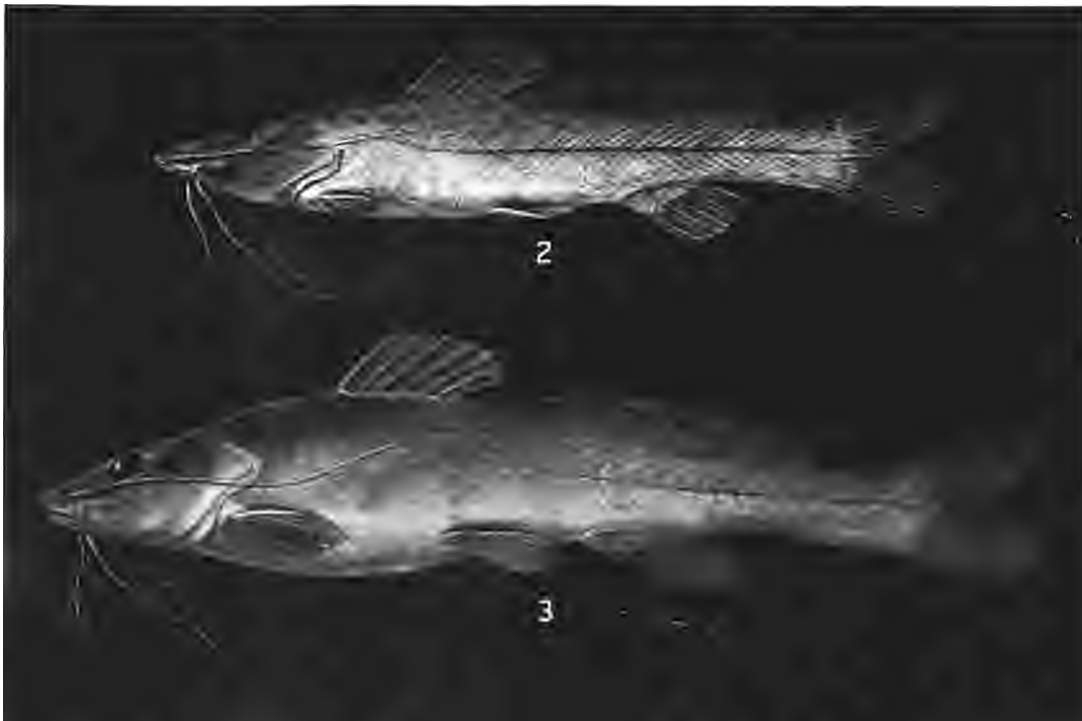


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