NUMBER 674 SEPTEMBER 1, 1976

OCCASIONAL PAPERS OF THE MUSEUM OF ZOOLOGY
UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN

SCOLOPLAX DICRA, A NEW ARMORED CATFISH FROM THE BOLIVIAN AMAZON

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INTRODUCTION

ONE OF US (RMB) was privileged to participate in an expedition of the American Museum of Natural History to the Bolivian Amazon from August to November 1964. Among the fishes collected is a tiny catfish displaying a spectrum of features that not only mark it as novel but pose a problem as to its proper systematic position.

The purposes of this paper are (1) to provide a name as a basis for subsequent discussion of relationships and (2) to make known this fascinating fish to stimulate and facilitate search for more material of the same or related forms. The limited sample indicates that this is one of the smallest of freshwater fishes; the largest specimen is 13.8 mm in standard and 17.6 mm in total length. All specimens were collected in a nylon seine of 1/8 inch (3 mm) square mesh. That our specimens are adult or nearly so is inferred from the advanced ossification of alizarin-stained examples. It is most likely that so small a tropical fish has an annual life cycle; maximum size would then be expected at the breeding season which is still unknown. The gonads are not enlarged.

The classification of this new fish is a problem. It presents features that clearly set it apart from any genus known to us and we christen it *Scoloplax dicra*. Beyond that we are unable to assign it with confidence to any of the siluriform families usually recognized. The presence of bony plates on the body, absence of an adipose fin, very short anal fin, and other features eliminate most families (such as the Pimelodidae) from consideration. It was initially thought to be an aspredinid, a placement supported by marked superficial resemblances. However,

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the pattern of hypural fusion and the fusion of upper hypurals with the compound caudal centrum as reported for *Scoloplax* (as "*Bunocephalus* sp.") by Lundberg and Baskin (1969, Table 1) agree with the Loricariidae rather than the Aspredinidae. Also the presence of integumentary teeth on the head, body and fins, and the encapsulated lateral swimbladder vesicles, both advanced conditions for catfishes not found among the Aspredinidae, indicate that the relationships of *Scoloplax* lie with the loricarioid families, the Loricariidae,[2] Callichthyidae, and Trichomycteridae. *Scoloplax* differs from the Trichomycteridae in having a dorsal spine equipped with a locking mechanism and the dorsal fin placed forward of the pelvics (instead of a posteriorly placed fin lacking spines), widely distributed integumentary teeth (restricted to the opercle and interopercle in Trichomycteridae), absence of nasal barbels, and other characters.

The body plates in *Scoloplax* are in dorsolateral, ventrolateral, and a short midventral series, an arrangement totally different from that in the Doradidae where most plates are midlateral on the body, or absent (in the Auchenipterinae). The doradids differ further, among other features, in lacking integumentary teeth, in lacking encapsulated lateral vesicles of the swimbladder, and in the presence of an adipose fin.[3] A notable feature shared by *Scoloplax* and the doradids is the slender, paired posterior processes from the coracoid which lie below the pectoral fins and are well separated from the humeral processes.

Despite an abundance of differences, *Scoloplax* bears surprising superficial resemblance to the African amphiliid catfish *Phractura clauseni*. Notable among the similar features are lengthwise series of external bony plates on the dorsolateral and ventrolateral surfaces. In each genus the neural and haemal spines are bifid. However, in *Phractura* the external plates are the expanded distal tips of the vertebral processes themselves whereas in *Scoloplax* the plates are dermal, tooth-bearing ossifications supported by the vertebral processes.

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[2] We follow Regan (1911) and Gosline (1947) in including in the Loricariidae *Astroblepus* (Astroblepinae), placed by some (e.g., Chardon, 1968) in a separate family Astroblepidae.

[3] The doradid *Physopyxis lyra* Cope (1872: 273, pl. 5), known from a single small individual, was described as lacking an adipose fin. Specimens identified as belonging to this species were collected by Bailey in the Rio Iténez near Costa Marques, Brazil. They have well formed though very small adipose fins. Dr. James E. Böhlke of the Academy of Natural Sciences, Philadelphia, has examined one of our specimens and compared it with the holotype of *P. lyra*. He, too, believes that they belong to the same or possibly a closely related species and confirms our suspicion that Cope overlooked the adipose fin in his type.

TABLE 1

CONDITION OF SOME CHARACTERS IN *Scoloplax* AND ITS RELATIVES. FEATURES DISTINCTIVE TO ONE OF THESE GROUPS IN ITALICS.

Character	Callichthyidae	*Scoloplax*	*Astroblepus*	Other Loricariidae
Mouth disc	absent	absent	present	present
Adipose fin	present	absent	present or absent	present or absent
Lateral bone	*absent*	present	present	present
Neural spines postdorsally	simple	bifurcate	simple	simple or bifurcate
Attachment of rib on 6th vertebra	*on parapophysis*	sessile	sessile	sessile
Connection of 6th vertebra and Weberian complex	articular	articular	sutured	sutured
Nostrils	separate	separate	juxtaposed	juxtaposed
Lateropterygium	absent	absent	*present; ovoid*	usually present; rodlike
Interhyal	*present*	absent	absent	absent
Dorsal hypohyal	*present*	absent	absent	absent
Haemal spines:				
postanal	simple	bifurcate	simple	simple or bifurcate
preanal	none	*5 simple, 2 bifid*	1 to 3 bifid	none
Large, toothed rostral plate	none	*present*	none	none
Caudal peduncle:				
shape	compressed, oval	*quadrangular*	compressed, oval	oval or depressed
plates	full encasement	*four series*	*none*	full encasement
Maxillary barbel	simple	*forked*	simple	simple
Midventral series of preanal plates	none	*present*	none	0 or 1 plate
Coracoid suture	present	present	*lacking*	present
Dorsal and pectoral simple rays:				
structure	spinous	spinous	*articulated, flexible*	spinous
locking mechanism	present	present	*absent*	present
Jaw teeth	multiserial or rudimentary	uniserial	multiserial	uniserial
Pelvic rays, usually	I,5	i,4	i,4	I,5

Phractura lacks midventral plates between the genital papilla and anal fin, the haemal spines being bifid in this area rather than simple and median as in *Scoloplax*. Nevertheless, the similarity in the pattern of plates constitutes an interesting convergence.

The relationships of *Scoloplax* appear to lie among the armored catfish groups, with well-developed integumentary teeth on the fins, head, and usually on the separate bony plates on the body, the Loricarioidae of Chardon (1968), i.e., the Callichthyidae and the Loricariidae. Among the characters which indicate the integrity of this group of fishes is the fusion of the pterotic and supracleithrum into a single large bone (Baskin, MS.). The Callichthyidae and Loricariidae, despite unquestioned alliance, differ abundantly in many characters and in overall appearance (Table 1). *Scoloplax* shares some of these characters with each group and in addition has unique features. The characters *Scoloplax* shares with the Callichthyidae are primitive, at least for the armored catfishes if not for all siluriforms. For example, *Scoloplax* and callichthyids lack a lateropterygium and an expanded oral disc, and the sixth vertebra articulates with the Weberian complex, whereas loricariids have a lateropterygium and an expanded oral disc and the sixth vertebra is sutured to the Weberian complex.

Scoloplax, however, agrees with the Loricariidae in a number of characters that are clearly advanced for these armored catfishes. Both *Scoloplax* and loricariids lack dorsal hypohyal and interhyal bones (present in Callichthyidae), commonly have bifurcate neural spines (simple postdorsally in Callichthyidae), have the first rib sessile (i.e., articulating directly with centrum) on the sixth vertebra, and have a "lateral bone" connecting the distal end of the second dorsal pterygiophore with the distal part of the first rib (not present in Callichthyidae). Also, the body configuration and pattern of plating in *Scoloplax* (Table 1) are more like loricariids than callichthyids. Notable unique features of *Scoloplax* are given in Table 1 and in the generic diagnosis.

The information at hand therefore suggests that *Scoloplax* is more closely related to the Loricariidae than to anything else. The Loricariidae have been classified in six subfamilies by Gosline (1947). To these Boeseman (1971) has added the Hartiinae and the Ancistrinae, split off from the Loricariinae and Hypostominae (=Plecostominae) respectively. *Scoloplax* fits into none of these eight. We therefore provisionally place *Scoloplax* in a separate subfamily of the Loricariidae and point out that this requires a significant expansion of the family definition. A discussion of the osteology and relationships of *Scoloplax*

as well as its implication for loricarioid evolution will be published elsewhere (Baskin, MS.).

Scoloplacinae, new subfamily

Scoloplax, novum, is the single known genus. The definition of the subfamily is therefore the same as that of the genus. The generic account includes most of the characters discussed by Gosline (1947:92–95) for other subfamilies, and the reader's attention is called to this work and Boeseman (1971:10–18) for additional comparative data on the Loricariidae.

Scoloplax, new genus

Type species, *Scoloplax dicra,* new species.

DIAGNOSIS.—A tiny loricariid with five series of toothed plates on body, two dorsolateral postdorsally, two ventrolateral from anal fin to caudal base, and one midventral between anus and anal fin. All of these plates separate, but supported by apophyses from vertebral column, those of the paired series from bifurcate neural and haemal spines. A movable, shield-shaped rostral plate, densely toothed. No bony bridge from supraoccipital to supraneural plate (=interneural of Gosline, 1947:89). No oral disc (as in other loricariids). Maxillary barbel forked. Anal fin placed well back on body. No adipose fin. Caudal peduncle quadrangular. Fin rays few, the pelvic i,4, caudal 10 or 11 (lowest count among the armored catfishes, see Lundberg and Baskin, 1969:35). (Other characters in Table 1.)

DESCRIPTION.—Mouth subterminal, lips normal, not expanded into an adhesive disc. Teeth bifid, a single row in either jaw, those of the lower jaw in a continuous row gently convex forward, not a convex arc or diagonal row on each side; teeth (in one specimen) about 14 in upper jaw, 10 in lower jaw. Gill aperture lateral, moderately restricted, extends from lower level of pectoral base to upper posterior corner of opercle. Gill rakers short, few. Ceratobranchials toothless except for the fifth, which bears a single file of simple conic teeth; pharyngobranchials toothless except for the fourth which bears a plate with a single file of few, elongate conic teeth. Branchiostegal rays four. Swimbladder vesicles encapsulated by a pair of lateral bony spheres, each with a sharp lateral projection that lies below a lateral foramen. Metapterygoid of moderate size, closely approximated to palatine, remote from skull.

Vertebrae (in one fish) 28: of these 6 are involved in the Weberian complex, 3 are normal abdominal vertebrae, one (number 10) has two abruptly deflected lateral parapophyses, 5 have unbranched haemal processes, and 12 (of which 2 are in front of anal origin) have forked haemal spines. The neural spines of the 18 posterior (postdorsal) vertebrae are bifid, the limbs meeting at an angle of 90° or more. A separate, thin, bony dermal plate with a few, usually 3 to 5, integumentary teeth is supported at the tip of each limb of each neural spine. Ten posterior vertebrae, beginning above the anal fin, similarly bear toothed dermal plates at the tips of the limbs of the divided haemal spines. Anterior haemal spines simple, elongate, extend as laterally compressed pedicels from vertebral column to skin where each supports a dermal plate that bears enlarged integumentary teeth; these 5 to 7 plates form a series from just behind genital papilla to origin of anal fin, those anteriorly are elongate ovals, those behind progressively broader, the last one supported by narrowly forked haemal spines. Cleithra and coracoids exposed, broadly connected and interlocking at midline; posterior process of coracoid prominent, straight, extends posteriorly more than half distance to pelvic base; ventral surface of coracoid with numerous integumentary teeth. The partly enclosed area of belly naked to pelvic base. Body armature includes two dorsolateral rows of 17 or 18 postdorsal toothed plates, two ventrolateral rows of 8 or 9 toothed plates extending from anal fin to base of caudal, a midventral row of 5 to 7 plates anterior to anal fin, a pair of toothed plates lying under the pelvic girdle, and a striking clump of teeth on a lateral plate at midside below dorsal spine. Otherwise middorsal and midlateral areas without plates. The lateral plate is supported by the tip of the strong first rib (from the sixth vertebra). Attached to the rib just proximal to the tooth plate is a lateral bone that extends upward and backward to the tip of the lateral wing of the second dorsal pterygiophore. Teeth on body also born laterally on second pterygiophore. There is a considerable unossified space between supraoccipital and supraneural. No lateropterygium (Shelden, 1937) in pelvic girdle.

Integumentary teeth are numerous and widespread on head and fins as well as on body plates. On top of snout is a distinctive, movable supraethmoid or rostral plate, shield shaped or subtriangular, broadest forward; it is covered with teeth. Large teeth present on lateral ethmoid at front of eye, smaller teeth on frontal along posterior part of dorsal rim of orbit, on lateral edge of sphenotic, laterally on compound pterotic-supracleithrum, and on opercle. Interopercular area spineless, not

eversible. Dorsal and pectoral spines with locking mechanisms. Dorsal spine with teeth distally; pectoral spine without serrae, but with 4 to 7 series of teeth along dorsal, anterior, and ventral surfaces; a few teeth on anterior edge of first anal ray, on outer pelvic ray (which is not thickened or spinelike), and along edges of marginal rays of caudal fin (which are somewhat thicker than other rays).

Anus close behind posterior base of pelvic fins and remote from anal fin; anal fin origin far behind dorsal, about equidistant from pelvic insertion and caudal base. Fin rays: dorsal I,4; anal i,4 or 5; pectoral I, 5 to 7; pelvic i,4; caudal 10 or 11.

Maxillary barbel extends to slightly beyond insertion of pectoral fin; barbel forks somewhat behind angle of mouth, the shorter branch, which extends downward, about two-fifths length of longer branch from their junction. Two pairs of mental barbels, outer pair near corners of mouth, shorter and lateral to inner pair, which are close together, about equal to eye, dilated in their basal half and bear tiny papillae on their leading edges (Fig. 1,B). No nasal barbel; anterior nostril in a short tube, posterior nostril without tube, about equidistant from anterior nostril and eye, a distance about equal to its greatest diameter.

ETYMOLOGY.—From the Greek, σκῶλος, thorn, and πλάξ, a plate, in reference to the movable, dermal bone on top of snout (rostral plate) that is studded with large integumentary teeth. Gender feminine.

Scoloplax dicra, new species
Figs. 1–3

Bunocephalus sp. (misidentification).—Lundberg and Baskin, 1969:6, 35, Table 1 (B64–15, see p. 10 herein; caudal fin and suspensorium).

MATERIAL.—The holotype, AMNH 32482, 13.0 mm in standard length and 16.7 in total length, was seined in an isolated ox-bow lagoon off the Río Iténez (also known, on the Brazilian side of the river, as Río Guaporé; this stream flows into the Río Mamoré, thence to the Río Madeira of the Amazon basin), about 400 meters southwest of the river at a point opposite Costa Marques (Brazil), latitude 12° 28.38′ S, longitude 64° 16.59′ W, Department of Beni, Bolivia, on September 1, 1964 (field number B64–13) by Reeve M. Bailey and Augusto Cabeza. Paratopotypes taken in the same collection are AMNH 32483 (1), 13.8 mm and UMMZ 198966 (2), 13.3 and 13.7 mm. Paratypes: AMNH 35354 (3), 10.8–11.9 mm and UMMZ 198967 (6),

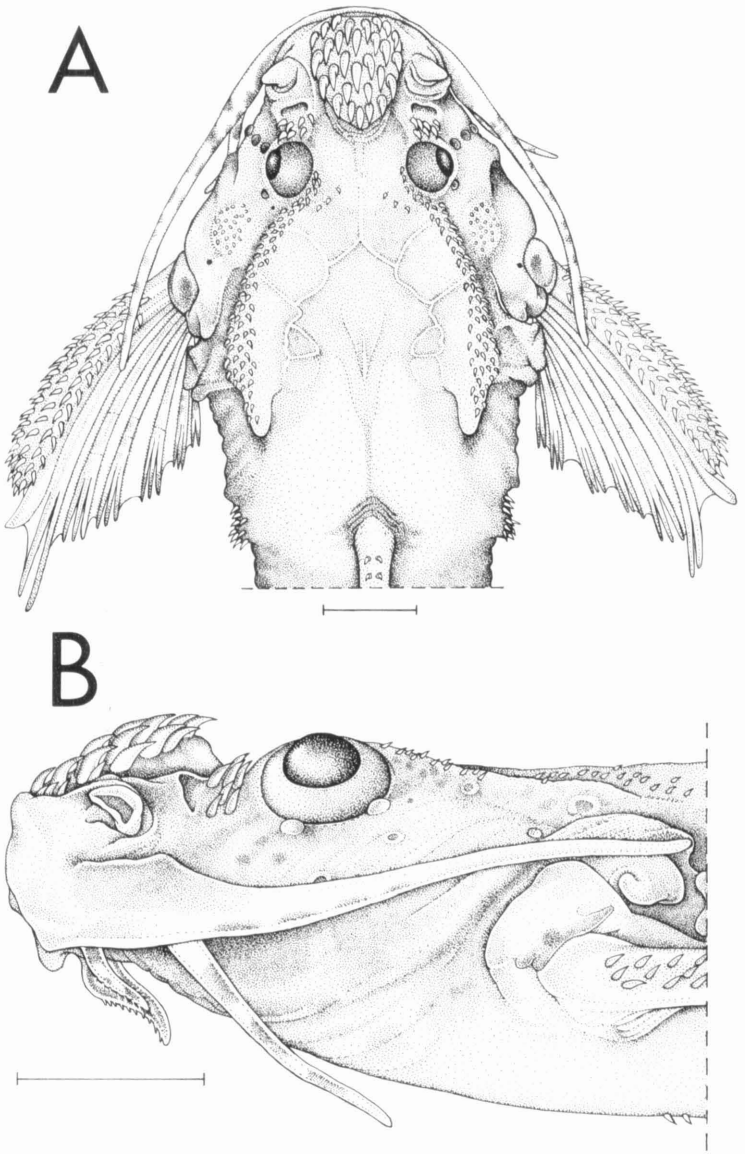

FIG. 1. *Scoloplax dicra*. Holotype, AMNH 32482, 13.0 mm in standard length. A. Dorsal view of head. B. Lateral view of head. Scale lines are 1 mm. Patricia J. Wynne, del.

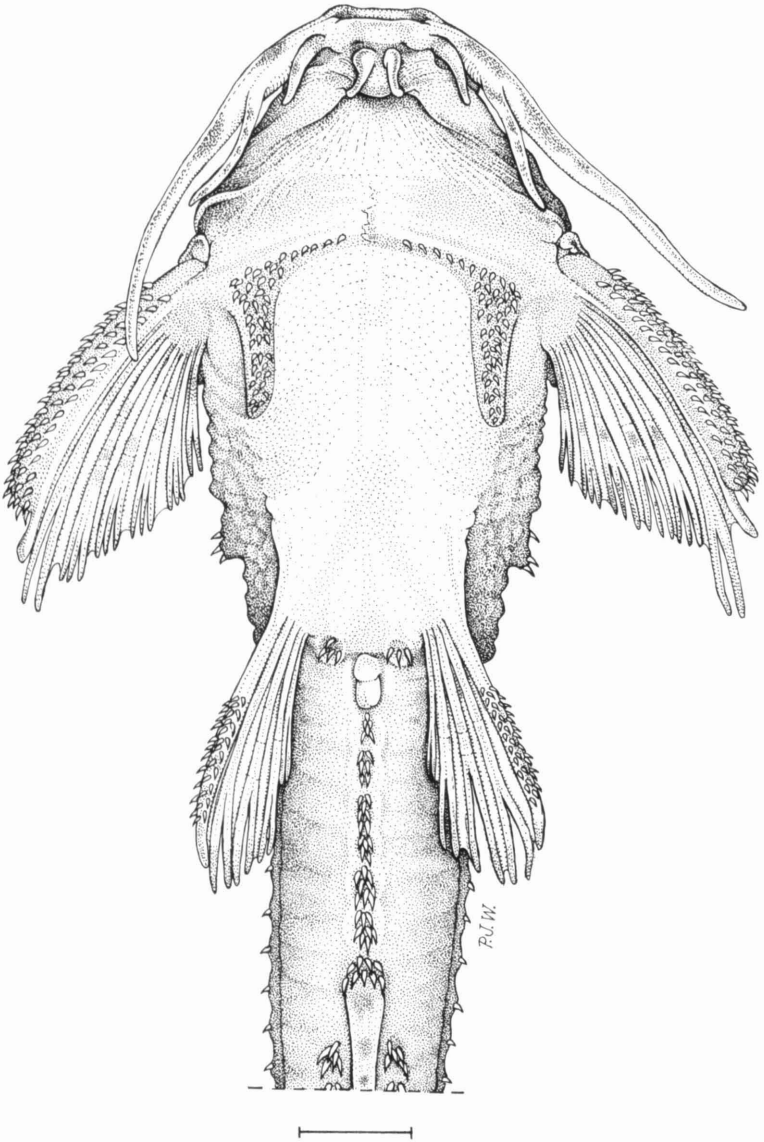

FIG. 2. *Scoloplax dicra*. Holotype, AMNH 32482, 13.0 mm in standard length. Ventral view of head and trunk. Scale lines are 1 mm. Patricia J. Wynne, del.

10.5–12.5 mm (two cleared and stained), Río Iténez at the mouth of a dry stream, 2 km SE of Costa Marques (Brazil), lat. 12° 29.46′ S, long. 64° 15.43′ W, Dept. Beni, Bolivia, on September 2, 1964 (field no. B64–15), by Bailey and Rosendo Ramos. AMNH 32484 (2), 11.2 and 11.5 mm, ox-bow lagoon about 100 m from Río Iténez, 9 km SE of Costa Marques (Brazil), lat. 12° 32.4′ S, long. 64° 12.72′ W, Dept. Beni, Bolivia, on September 12, 1964 (field no. B64–26), by Bailey and Ramos.

DIAGNOSIS.—The numerous distinctive features of this species are set forth in the generic account and in Table 1.

DESCRIPTION.—Characters given here amplify those of the generic account or were omitted there. Much of that description is based on two cleared and stained specimens (UMMZ 198967), one (10.5 mm) intact, the other (12.5 mm) dissected.

Proportional measurements given below are from 10 other fish. These range from 11.2–13.8 mm in standard length and proportions are expressed as thousandths of that length. The figure given first is that of the holotype, then follows the mean for the 10 fish, and ranges in proportional measurements are in parentheses. Head length 254, 235 (225–254); head width 262, 264 (255–271); head much depressed, its depth 115, 125 (113–138); snout length 100, 108 (100–116); eye without free orbital rim, its length 38, 40 (34–45); rostral plate length 77, 80 (72–89); body width across cleithral prominences 300, 294 (285–304); body flattened, greatest depth 131, 140 (131–152); caudal peduncle roughly quadrangular, its greatest depth 54, 57 (49–62) and its breadth at that level 62, 49 (41–62); predorsal length 369, 374 (352–390); dorsal origin to caudal base 638, 636 (616–656); snout tip to pelvic insertion 408, 421 (402–446); anus close to pelvic fins, which are well separated and far from anal, pelvic insertion to anal origin 300, 303 (278–325); anal origin to caudal base 308, 320 (301–339); dorsal spine length 108, 131 (108–144); pectoral spine length 223, 227 (204–246).

The esophagus is expanded abruptly into the large, thin-walled globelike stomach which extends backward beyond the coracoid processes. The short intestine emerges anteroventrally, forms a semicircle on the right side, has a tight loop behind stomach on the left, and a straight median run to the anus. What appear to be small, developing ova were observed in a specimen 10.8 mm long, but our fish were collected in the dry season, probably two or more months prior to maturity.

The color pattern of *Scoloplax dicra* is somber and lacks notable

markings. The dorsal and dorsolateral surfaces are light tan, slightly darker on the head, with a few indistinct narrow darker crossbars below and behind the dorsal fin. The midside and ventrolateral surfaces are darker brown than the back; that color grades into the whitish lower surface, which is broken by scattered brown pigment cells on the belly and by narrow brown crossbars on the lower surface of the caudal peduncle. The fins are light, with indistinct brownish markings; most evident is a dark brown crossband on the caudal base that inclines downward and backward. The barbels are crossbanded with light brown.

Fin ray and plate counts given below are from the 15 specimens at hand (number of specimens in parentheses; counts for the holotype are denoted by asterisks). Fin ray counts (all elements included): dorsal, I,4* (15); anal i, 4 (1), i, 5* (14); pectoral I, 5–I, 6 (1), I, 6–I, 6* (12), I, 6–I, 7 (1), I, 7–I, 6 (1); pelvic i,3–i,4 (1), i, 4–i, 4* (14); caudal (branched plus 2 simple), 10 (2), 11* (13). Dorsolateral plates, 17 (9—one with 16 on right side), 18* (5); ventrolateral plates, 8* (5), 9 (10); median plates between anus and anal fin, 5 (1), 6 (11), 7* (2), 6 or 7 (1).

HABITAT.—Two of the three collections of *Scoloplax dicra* are from stagnant, ox-bow lagoons, both heavily shaded by lowland forest, adjacent to the Río Iténez. The fish were seined in water less than a meter deep over a bottom covered with leaf debris and other organic litter; water temperatures were 25° and 26.6° C. The water was light or dark brown, there was little suspended material, and there were no macrophytes. The third locality (B64–15) was seined both in a small cut-off pond, separated from Río Iténez by a narrow barrier bar at the mouth of a dry creek bed, and along the river's edge. We are uncertain as to the source of the *Scoloplax* but suspect they were in the pond. In it the water was murky, temperature 30° C, the bottom was of mixed sand and silt with some organic detritus, there were thick mats of aquatic vegetation, and the pond was partially exposed though bordered by forest. Among the numerous fish associates of *Scoloplax,* the characids *Hemigrammus unilineatus* Gill and *Iguanodectes spilurus* (Günther) were especially obvious; both were common or abundant at all three stations. All three localities are seasonally inundated by the Río Iténez. No *Scoloplax* was taken in about 15 other collections from the same region in the Río Iténez and its tributary, Río Baures, using the same seine and by the use of ichthyocides, methods which could conceivably catch such tiny fish. We judge that quiet, probably acid

waters with organic trash on the bottom are part of the preferred habitat.

ETYMOLOGY.—The adjectival name *dicra* is from the Greek δίκρονς, forked, cloven, or bifurcate, with reference to the forked maxillary barbel.

ACKNOWLEDGMENTS

Discovery of *Scoloplax* stemmed from the opportunity to accompany the American Museum of Natural History Expedition to the Bolivian Amazon in 1964. Bailey is indebted especially to Drs. Richard van Gelder and Donn E. Rosen of the American Museum staff for their help and cooperation in making this trip possible. The National Geographic Society was instrumental in providing funds for an ichthyologist to accompany the expedition; this support is acknowledged with thanks. Dr. Sydney Anderson, field leader of the expedition during the period of Bailey's participation, was ever helpful and was a valued personal companion throughout the trip. Other scientists and members of the field crew repeatedly provided assistance.

Baskin expresses thanks to the American Museum of Natural History, New York, and especially to Dr. Donn E. Rosen, Curator of Fishes, for use of the library, laboratories, collections and other facilities of the museum. He is also indebted to Drs. John G. Lundberg, Donn E. Rosen and S. H. Weitzman for much valuable advice and many stimulating discussions. Portions of this work were carried out while Baskin was employed as an Invited Professor at the Instituto Zoologia Tropical, Universidad Central de Venezuela, Caracas, and he gratefully acknowledges this support. Dr. James E. Böhlke assisted by comparing a specimen with the holotype of *Physopyxis lyra* in the Academy of Natural Sciences of Philadelphia. The drawings in Figures 1 and 2 are by Mrs. Patricia J. Wynne and the photographs in Figure 3 are by Louis P. Martonyi, both of whom have our thanks.

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Accepted for publication July 8, 1976

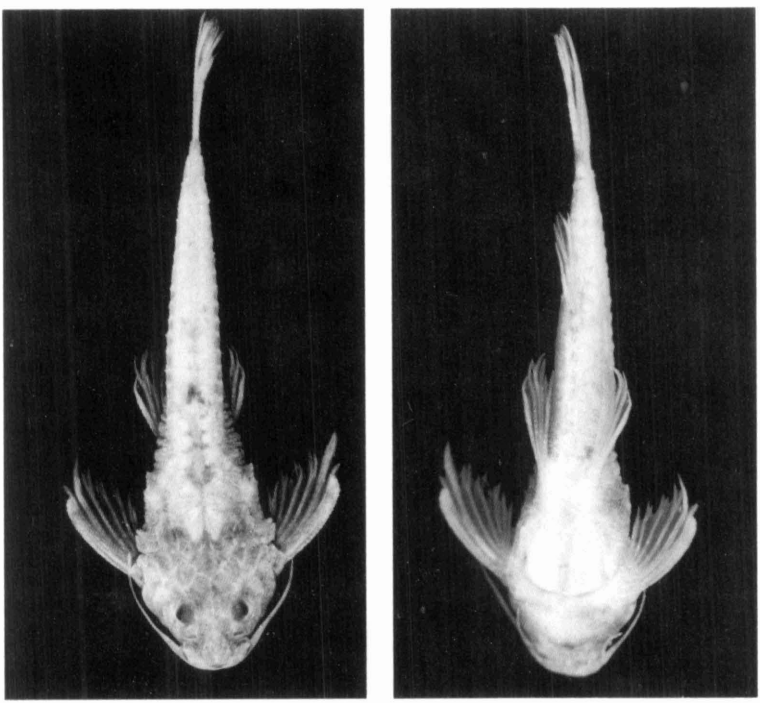

FIG. 3. *Scoloplax dicra*. Holotype, AMNH 32482, 13.0 mm in standard length. A. Dorsal view. B. Ventral view. Photographs by Louis P. Martonyi.