

DESCRIPTIONS OF SEVEN NEW GENERA AND THIRTY-  
ONE NEW SPECIES OF FISHES OF THE FAMILIES  
BROTULIDÆ AND CARAPIDÆ FROM THE PHILIPPINE  
ISLANDS AND THE DUTCH EAST INDIES.

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In the present paper are described 6 new genera and 30 new species of the family Brotulidæ and a new genus and species of the family Carapidæ collected by the U. S. Fisheries steamer *Albatross* on the Philippine expedition.

Family BROTULIDÆ.

This collection of brotulids is noteworthy for the large number of species and individuals taken in tropical waters, comprising 475 specimens, representing 26 genera and 40 species. The region about Gillolo and the Gulf of Tomini, Celebes, are particularly rich in new forms.

The collection is so large that, in the following descriptions of species, when the number of specimens is more than two or three the list of localities has been omitted.

In all cases where the opercular spine is distinct, the length of the head has been measured to its tip instead of to the tip of the opercular flap, and comparative measurements are made in terms of that length.

The urinary bladder is very well developed in many genera, and in a large number of specimens a partial or entire eversion has taken place.

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<sup>1</sup> In the study of this collection the writer has been associated with Dr. Hugh M. Smith, who becomes joint author of the new genera and species herein described.

Heretofore practically no attempt at a natural classification of the brotulid genera has been attempted, and many of the generic and specific descriptions are lacking in details. These and other factors make the identification of species and their arrangement unusually difficult. This is especially true of the viviparous forms which possess many characters in common and yet have differences which are bewildering if one attempts any reduction in the number of described genera.

In the following key an attempt has been made to arrange the genera according to relationship, as far as could be ascertained:

KEY TO THE GENERA OF BROTULIDS TAKEN ON THE "ALBATROSS" PHILIPPINE EXPEDITION.

- a*<sup>1</sup>. SIREMBINÆ. Clavicular bones greatly produced, meeting below eye; ventral fins inserted under eyes, behind tip of humeral symphysis.
- b*<sup>1</sup>. Preopercle unarmed; snout without sharp spine at tip; head entirely scaled; ventrals simple.....*Siremba*.
- b*<sup>2</sup>. Preopercle with three spines; snout with a sharp spine as in species of *Lepo- phidium*; head partially naked; ventrals bifid.....*Hoplobrotula*.
- a*<sup>2</sup>. Position of humeral symphysis normal, behind eyes; ventral fins inserted behind tip of humeral symphysis.
- c*<sup>1</sup>. BROTULINÆ. Snout and lower jaw with barbels; ventral filaments bifid.....*Brotula*.
- c*<sup>2</sup>. Head without barbels.
- d*<sup>1</sup>. NEOBYTHINÆ. Head (normally) entirely scaled. Species as far as known oviparous.
- e*<sup>1</sup>. Lateral line when present narrow, less than one-third diameter of eye in width, not unusually modified, without an inner series of enlarged plate-like scales covered by band of small scales; no fang-like canines present; ventrals present.
- f*<sup>1</sup>. Lateral line distinct anteriorly, disappearing mesially or posteriorly; preopercle armed.
- g*<sup>1</sup>. Ventral filaments bifid.
- h*<sup>1</sup>. Pectorals simple; preopercle with one or two spines; pyloric cœca large, finger-like, forming a ring around the pylorus and extending onto neighboring part of gut. (Coloration bright)..*Neobythites*.
- h*<sup>2</sup>. Lower pectoral rays detached; angle of preopercle with three small spines; pyloric cœca small or rudimentary.....*Dicrolene*.
- g*<sup>2</sup>. Ventral filaments entire.
- i*<sup>1</sup>. Lateral line terminating posteriorly; pyloric cœca 10 to 12, arranged as in *Neobythites*.
- j*<sup>1</sup>. Teeth in narrow bands; ventrals longer than head; pectorals narrow, of about 21 rays; preopercle truncate, without a distinct incision at angle.....*Homostolus*.
- j*<sup>2</sup>. Teeth in broad bands; ventrals reduced; pectorals with 25 to 28 rays; preopercle rounded, *Neobythites*-like, with a distinct incision on upper angle.....*Monomitopus*.
- i*<sup>2</sup>. Lateral line terminating mesially; pyloric cœca more rudimentary, about five.....*Monomeropus*.
- f*<sup>2</sup>. Lateral line indistinct, rudimentary or absent.
- k*<sup>1</sup>. Head with prominent, outstanding crests, which are almost membranaceous in character; preopercle unarmed, rounded; pseudobranchiæ rudimentary.

- l<sup>1</sup>. Pyloric cœca absent; bones of head soft and cavernous without large, distinct mucous cavities or pores with a heavy covering of skin which covers and obscures the angles of the skull; pectorals without free rays, less than one-half total length.
- m<sup>1</sup>. Ventral filaments bifid.
- n<sup>1</sup>. Snout much produced and dilated; body very short, deep and compressed.....*Barathrodemus*.
- n<sup>2</sup>. Snout not greatly produced and dilated; body elongate.
- o<sup>1</sup>. Teeth in villiform bands; eye distinct, not deep-set; body not anguilliform.....*Bassogigas*.
- o<sup>2</sup>. Teeth in a single row; eye deep-set; body anguilliform.....*Enchelybrotula*.
- m<sup>2</sup>. Ventral filaments simple.
- p<sup>1</sup>. Head relatively low, bones of skull obscure; lower half of pectoral produced, rigid, oar-like.....*Eretnichthys*.
- p<sup>2</sup>. Head strongly arched posteriorly, bones of skull quite distinct, the scales covering it deciduous; pectorals unmodified.  
.....*Bassozetus*.
- l<sup>2</sup>. Rudimentary pyloric cœca present; head massive with distinct mucous cavities or pores; angles of skull not obscured by thick, heavy skin.
- q<sup>1</sup>. Ventral filaments simple; two lower pectoral rays differentiated; pseudo branchiæ small, rudimentary.....*Mizonus*.
- q<sup>2</sup>. Ventral filaments bifid; pectorals produced into a long, whip-like organ, without detached rays; pseudobranchiæ absent,  
.....*Mastigopterus*.
- k<sup>2</sup>. Head with prominent outstanding crests, covered with deciduous scales; pseudobranchiæ well developed; ventral filaments simple or bifid.....*Glyptophidium*.
- e<sup>2</sup>. Lateral line very broad, with an inner series of enlarged plate-like scales covered by a band of smaller scales.
- r<sup>1</sup>. Ventrals absent; head with outstanding crests; no fang-like canines; parapophyses normal.....*Lamprogrammus*.
- r<sup>2</sup>. Ventral filaments simple; bones of head firm; fang-like teeth present; parapophyses greatly enlarged.....*Hypopleuron*.
- d<sup>2</sup>. BYTHITINÆ. Head naked or only partially scaled; ventrals present or absent; small cilia often present on naked portion of head. Species as far as known viviparous.
- s<sup>1</sup>. Caudal differentiated, with a distinct stem; cheeks scaly.....*Dinematichthys*.
- s<sup>2</sup>. Caudal not differentiated.
- t<sup>1</sup>. Ventral filaments present; preopercle without well-developed spines; three developed gill-rakers on first arch.
- u<sup>1</sup>. Head naked; lateral line incomplete or absent; body elongate.  
*Diplacanthopoma (Sarcocara)*.

*u*<sup>2</sup>. Cheeks, opercles, and usually top of head posteriorly scaled; lateral line interrupted in the middle; body relatively short.

*v*<sup>1</sup>. Palatine teeth absent; margin of preopercle firm, ending in an obtuse-angled point.

*Grammonus.*

*v*<sup>2</sup>. Palatine teeth present; margin of preopercle fleshy, unarmed.

*w*<sup>1</sup>. Head low, depressed; tips of clavicular bones firmly united; D. 85 to 98; A. 68.

*x*<sup>1</sup>. Ventral filaments simple; eyes superior; rudimentary pyloric cœca present... *Catætyx.*

*x*<sup>2</sup>. Ventral filaments bifid; eyes dorso-lateral; head pike-like; pyloric cœca absent.

*Luciobrotula.*

*w*<sup>2</sup>. Head robust, rounded; tips of clavicular bones more or less free; D. 76; A. 52... *Bythites.*

*l*<sup>2</sup>. Ventrals absent; six or more developed gill-rakers on first arch.

*y*<sup>1</sup>. Head normal, cheeks and opercles scaled; preopercle armed with five spines; six developed gill-rakers on first arch; rudimentary pyloric cœca present; lateral line present... *Xenobythites.*

*y*<sup>2</sup>. (HEPHTHOCARINÆ.) Head greatly dilated, covered with a thick, gelatinous, scaleless skin; pyloric cœca absent; lateral line indistinguishable..... *Hephtocara.*

Genus NEOBYTHITES Goode and Bean.

*Neobythites* GOODE and BEAN, Proc. U. S. Nat. Mus., vol. 8, 1885, p. 600, *gilli.*

*Watasea* JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 765, *sivicola.*

Body elongate, compressed; head rounded, its bones firm, both head and body covered with small cycloid scales; tail not filamentous, lateral line usually distinct, becoming obsolete posteriorly; operculum armed with a single strong spine; preoperculum armed at or near its angle with 1 or 2 small spines; no barbels; mouth large, snout moderate, rounded, projecting very slightly beyond mouth; teeth villiform, in broad bands on both jaws, palatines, tongue, and lower pharyngeals, a patch on vomer, and 5 small patches on each side on upper pharyngeals; gill-openings wide, the membranes deeply cleft and not attached to the isthmus; vertical fins united; ventrals

filamentous, each of 2 rays separate at tip, their bases not close together, inserted behind tip of humeral symphysis; pseudobranchiæ present; pyloric cœca finger-like in a ring around the pylorus, and in 2 short rows along neighboring part of gut.

There are slight variations in the form and armature of the preopercle. In several species including the type there is a single spine-like tip at or near the angle of the preopercle; in others there is an additional small spine above the first, which character is used as the basis of the genus *Watasea*. We find a corresponding amount of variation in some of the other closely related genera and do not consider this character of generic value.

NEOBYTHITES LONGIPES Smith and Radcliffe, new species.

Plate 7, fig. 1.

Dorsal 95; caudal 11; anal 80; ventrals 2; pectorals 26.

Head 4.25 (4.58 in total length), long, low, subconic; body moderately compressed, greatest depth 5.05 (5.44 in total length); eye 5.08, elliptical oval; snout 4, long, pointed, not projecting beyond mouth; mouth large, oblique, lips thin, upper jaw overhanging lower; maxillary 1.89, reaching beyond vertical from posterior margin of eye for slightly less than a half diameter of eye, posterior end of maxillary incised, as broad as eye; teeth small, blunt, in bands on jaws, on vomer, palatines and tongue, a narrow band along the hypobranchial between bases of third and fourth gill-arch, diverging bands on lower pharyngeals; opposed to these, on each side of the roof of the pharynx, are five small patches of teeth; patch on vomer  $\cap$ -shaped, palatine bands mesially somewhat broader than mandibular bands; interorbital 4.85, broad, slightly convex; nostrils widely separated, the anterior circular, with a raised border, near edge of snout, posterior near eye; opercle armed with a single sharp spine, a short flat spinule at angle of preopercle; above this the margin is incised as in species of *Watasea*, but the spinule which marks the upper termination of this incision in species of *Watasea* is lacking in this species; pseudobranchiæ well developed; gill-rakers 4+7, the longest slightly less than a half-diameter of eye; a ring of long finger-like pyloric cœca around the pylorus, and a short series along each side of the neighboring part of gut, the longest of these about equal to major diameter of eye; scales small, cycloid, elliptical-oval, completely covering head and body, surface of each scale covered with a network of radiating and concentric striæ after the pattern of a spider's web; 10 scales in a series from origin of dorsal to and including lateral line; vertical fins scaled nearly to margin; lateral line in upper third of body, disappearing at a point about 0.4 length of head from base of caudal.

Dorsal and anal continuous with the caudal, tips of last rays extending to posterior fourth of caudal; distance of dorsal from tip of

snout 3.73 (4.03 in total length), distance of anal from tip of snout 2.07 (2.24 in total length); distance of anal from lower pectoral base equal to length of head; ventrals bifid, bases well separated, inserted slightly behind humeral symphysis, inner ray longest, more than twice as long as head, 1.87 (2.01 in total length), outer ray 0.5 as long as inner ray, 1.07 in the distance from base to origin of anal; pectorals 1.70 in head, acutely rounded.

Color in alcohol: Raw sienna, becoming pearl-gray on belly; sides and ventral surface of head and body finely punctulate with darker; traces of a brownish band extending from tip of snout through middle of eye to tip of opercular spine; ground color of dorsal dusky gray, a large black ocellus margined with lighter lies between the twenty-first and thirty-second rays; behind this is a median band of dusky black, widening posteriorly until it covers nearly the entire fin; upper rays of caudal dusky gray, distal two-thirds of lower rays black; anterior half of anal gray, punctulate with darker, color changing to black on posterior rays, the black coloration not extending to base of rays; paired fins gray, finely punctulate with darker; peritoneum very dark brown.

*Type*.—Cat. No. 74126, U.S.N.M., 30.2 cm. in length, taken with a beam trawl at station 5550 (lat.  $6^{\circ} 02' 00''$  N.; long  $120^{\circ} 44' 40''$  E.), near Jolo, at a depth of 258 fathoms, on a bottom of fine sand and shells.

This species is readily distinguished from the other members of the genus by the elongate ventrals and the characteristic form of the proopercle.

In an example 9.8 cm. long, from station 5580, Darvel Bay, Borneo, a dark-brown band extends from tip of snout through eye, along-side of head and body, interrupted below dorsal ocellus, continuing again along side in a slight arch to within a head length of base of caudal; indistinct brown markings on top of head, and a broad arch of brown from upper angle of opercle to below dorsal ocellus; a brown blotch on side behind ocellus. Some examples of intermediate size show faint indications of these markings.

NEOBYTHITES (WATASEA) UNIMACULATUS Smith and Radcliffe, new species.

Plate 7, fig. 2.

Dorsal 83; caudal 10; anal 71; ventrals 2; pectorals 26.

Head 4.37 (4.75 in total length), short, subconic; body elongate, compressed, greatest depth 5.10 (5.52 in total length); eye 4.67, subelliptical; snout as long as eye, subconic, blunt, projecting but slightly beyond mouth; mouth large, slightly oblique, lips thin, upper jaw overhanging lower; maxillary 1.90, reaching beyond vertical from posterior margin of eye for about 0.5 an eye diameter, longer than snout plus eye, upper edge slipping under suborbital; teeth

small, blunt, arranged as in *macrops*, interorbital 4.37, convex; nostrils widely separated as in related species; opercle armed with a single long, sharp spine; a sharp spinule at angle of preoperculum, a second slightly shorter spinule about 0.5 an eye diameter above this; pseudobranchiæ present, consisting of several quite well-developed filaments; gill-rakers 5+12, reduced to mere protuberances at ends; pyloric cœca long, finger-like, arranged as in other species of the genus; scales small, cycloid, entirely covering head and body, 9 or 10 in a series from origin of dorsal to and including lateral line; lateral line in upper third of body, disappearing at a point slightly less than 0.5 length of head from base of caudal.

Dorsal and anal continuous with the caudal, the last rays extending to about the middle of caudal fin; distance of dorsal from tip of snout 4 (4.30 in total length); distance of anal from tip of snout 2.34 (2.53 in total length); distance of anal from lower pectoral base four-sevenths length of head; ventrals bifid, bases well separated, inserted slightly behind humeral symphysis, inner ray longest, 1.21 in head, 1.24 in the distance from its base to origin of anal; pectorals 1.60 in head, acutely rounded.

Color in alcohol: Clay, lighter ventrally, becoming dusky pearl-gray on belly; brownish shades along back above lateral line, a line of similar color along side, the lighter interspace crossed by lines of a darker coloration, posteriorly these extend downward to base of anal; dorsal dusky gray, median portion posteriorly much darker; a large, black, white-rimmed ocellus on dorsal, the black portion lying between fourteenth and twenty-fourth rays; caudal dusky; anterior anal rays light gray, minutely dotted with darker; beginning with the fourteenth ray there is a narrow, mesial, dusky line which becomes broader posteriorly, until it covers nearly the entire width of fin; paired fins gray, finely punctulate with darker; peritoneum brownish black.

*Type*.—Cat. No. 74127, U.S.N.M., 16.6 cm. in length, taken with a beam trawl at station 5590 (lat. 4° 10' 50'' N.; long. 118° 39' 35'' E.), near Mabul Island, Borneo, at a depth of 310 fathoms, on a bottom of green mud and sand.

This species closely resembles our examples of *N. macrops*, but differs in having fewer rays in the dorsal and anal (dorsal about 96, anal about 83 in *macrops*), and in the presence of but a single ocellus upon the dorsal fin. The collection contains a single other example from station 5520, off northern Mindanao.

NEOBYTHITES (WATASEA) PURUS Smith and Radcliffe, new species.

Plate 7, fig. 3.

Dorsal about 87; caudal 12; anal 70; ventrals 2; pectorals 27.

Head 4.35 (4.74 in total length), subconic; body elongate, compressed, greatest depth 5.25 (5.75 in total length); eye 4.86, sub-

circular; snout 4.15, pointed, projecting beyond mouth; mouth large, slightly oblique, lips thin, upper jaw overhanging lower; maxillary 1.89, reaching beyond vertical from posterior margin of eye for about 0.5 an eye diameter, its length greater than snout plus eye; teeth small, blunt, arranged as in *unimaculatus*; interorbital 4.25, convex; opercle armed with a single sharp spine, a small spinule at angle of preoperculum, a second about 0.5 an eye diameter above this, these project but little beyond the skin covering preopercle; pseudobranchiæ consisting of several small filaments; gill-rakers 5+11; pyloric cœca finger-like, arranged as in other species of the genus; 10 scales in a series from origin of the dorsal to and including lateral line; lateral line disappearing at a point less than 0.5 the length of the head from base of caudal.

Dorsal and anal continuous with the caudal, the last rays extending nearly to middle of caudal fin; distance of dorsal from tip of snout 3.60 (4.03 in total length); distance of anal from tip of snout 2.51 (2.73 in total length); distance of anal from pectoral base about 0.7 length of head; ventrals bifid, bases well separated, inserted slightly behind humeral symphysis, inner ray longest, 1.37 in head, 1.33 in the distance from base to origin of anal; pectorals 1.55 in head, acutely rounded.

Color in alcohol: Back above lateral line wood-brown, becoming lighter below; belly pearl gray, punctulate with darker; vertical fins dusky gray; caudal and basal portion of anal posteriorly darker, paired fins pearl-gray, finely punctulate with darker; peritoneum brownish black.

*Type*.—Cat. No. 74128, U.S.N.M., 16.1 cm. in length, taken with a beam trawl at station 5392 (lat. 12° 12' 35'' N.; long. 124° 02' 48'' E.), near Destacado Island between Samar and Masbate, at a depth of 135 fathoms, on a bottom of green mud and sand.

This species is very close to *N. unimaculatus*, from which it is distinguished by the entire absence of a black ocellus on the dorsal fin, the slightly greater number of rays in the dorsal fin, by the more anterior insertion of dorsal and anal, and by the smaller size of the ventrals. The collection contains a single other example from the neighboring station 5393.

NEOBYTHITES (WATASEA) FASCIATUS Smith and Radcliffe, new species.

Plate 7, fig. 4.

† *Watasea sivicola* JORDAN and STARKS, Bull. U. S. Fish Comm., vol. 22, 1902, p. 601, pl. 3, fig. 3, 1904, Suruga Bay, Sagami Bay, Japan.

Dorsal 96; caudal 9; anal 81; ventrals 2; pectorals 25.

Head 4.74 (5.08 in total length), short, subquadrangular in transverse section; body elongate, compressed, greatest depth 4.87 (5.22 in total length); eye 4.13, large, subcircular; snout as long as eye, blunt,



fleshy, less pointed than in *macrops*; mouth comparatively small, nearly horizontal, lips fleshy, upper jaw overhanging lower; maxillary 2.05, reaching slightly beyond vertical from posterior margin of eye, shorter than in related species, equal to snout plus eye, entire upper edge slipping under the suborbital; bands of small blunt teeth on jaws, vomer, palatines, tongue, hypobranchiæ and lower pharyngeals, 5 small patches on each side of roof of pharynx, those on the vomer arranged in a triangular patch, differing in this respect from related species; interorbital convex, its width nearly equal to diameter of eye; nostrils rather widely separated, the anterior subtubular, near edge of snout, the posterior close to eye; opercle armed with a single sharp spine; a short, flat spinule at angle of preoperculum, and another similar but slightly shorter spinule a short distance above it; pseudobranchiæ present, consisting of 3 or 4 small filaments; gill-rakers 5 + 15, rather long near the middle of arch, reduced to mere protuberances at the ends, longest about 0.5 diameter of eye; a ring of extremely short cœca around the pylorus, and a short series of somewhat larger cœca along each side of the neighboring part of the gut; scales small, cycloid, elliptical-oval, 9 or 10 in a series from origin of dorsal to and including lateral line, 31 from origin of anal to lateral line, vertical fins scaled at base; lateral line slightly arched anteriorly, disappearing at a point about 0.5 the length of head from the base of the caudal.

Dorsal and anal continuous with the caudal, last rays extending about to middle of caudal fin; distance of dorsal from tip of snout 4 (4.29 in total length); distance of anal from tip of snout 2.40 (2.58 in total length); distance of anal from lower pectoral base slightly less than length of head; ventrals short, bifid, bases well separated, inserted slightly behind humeral symphysis, inner ray longest, 1.52 in head, 1.86 in the distance from its base to origin of anal; pectorals 1.52 in head, acutely rounded.

Color in alcohol: Dusky clay, becoming dusky gray on belly, a narrow dark russet band from tip of snout through middle of eye extending backward along side for nearly a head-length beyond tip of opercular spine, a similar band extending from above eye along back at base of dorsal, terminating above end of first band, the two ends connected by a slightly broader vertical band of the same color, behind this there are 6 crossbands of similar coloration, first, third, and fifth continued on dorsal and anal, where the color becomes dark brown or black; second, fourth, and sixth bands narrower, indistinct below middle of side, adjacent portion of vertical fins dusky; interspaces on vertical fins dusky white, becoming blackish behind fifth crossband, each fin narrowly margined with white; paired fins dusky gray; peritoneum dark brown. (Coloration of smaller examples much more distinct than in the type.)

*Type*.—Cat. No. 74129, U.S.N.M., 19.3 cm. in length, taken with a beam trawl at station 5290 (lat.  $13^{\circ} 40' 09''$  N.; long.  $120^{\circ} 59' 30''$  E.), in Batangas Bay, Luzon, at a depth of 214 fathoms, on a bottom of lava and gravel.

From *N. macrops* Günther this species differs in having the head shorter, tip of snout more prominent and fleshy, maxillary shorter (equal to snout plus eye), ventrals shorter, vomerine teeth in a triangular patch (Y-shaped in *macrops*), and body crossed by well-defined bands of darker coloration. From the alleged cotype of *N. sivicola* (Jordan and Snyder), from Yokohama, in the United States National Museum, which we have examined, it differs in having 9 or 10 scales from origin of dorsal to and including lateral line (12 or 13 in *sivicola*), the mouth smaller, maxillary much shorter, distance from snout to vent much less, distance from lower pectoral base to origin of anal less than length of head (considerably greater in *sivicola*), and vomerine teeth in a triangular instead of a Y-shaped patch. The Yokohama specimen of *N. sivicola* is much faded, and there are no traces of darker cross-bands on body or fins.

Examples from Suruga and Sagami Bays, Japan, identified by Jordan and Starks as *Watasea sivicola*, agree very closely with our examples of *N. fasciatus*, but their drawing fails to show the banded appearance of our examples. Their statement "greater distance from snout to vent" should read "lesser distance."

#### Genus DICROLENE Goode and Bean.

*Dicrolene* GOODE and BEAN, Bull. Mus. Comp. Zoöl., vol. 10, 1883, p. 202, *intronigra*.

This genus differs from *Neobythites* in the relatively weaker, more porous character of the bones of the head; more deciduous scales; margin of preopercle armed with three small sharp spines; ventrals reduced; pyloric cœca small or rudimentary, in reduced number; lower pectoral rays detached, not connected by membrane; pseudo-branchiæ very small (said to be absent in some species).

DICROLENE LONGIMANA Smith and Radcliffe, new species.

Plate 8, fig. 1.

Dorsal 103; caudal 7; anal 83; ventrals 2; pectorals 16 + 8.

Head 4.70 (5.21 in total length), long, low, nearly as broad as high; body slender, tapering, greatest depth 5.75 (6.37 in total length); eye 4.80, small, subelliptical; snout 4.08, short, rather blunt, not overhanging mouth; mouth large, slightly oblique, upper jaw overhanging lower; maxillary 1.75, extending beyond vertical from posterior margin of eye for 0.6 an eye diameter; teeth small, villiform; patch on vomer narrow, semicircular; interorbital 4.26, narrow, slightly convex; opercle armed with a single strong sharp spine;

angle of preopercle armed with three spines; pseudobranchiæ consisting of 2 small, rudimentary filaments; gill-rakers 5+20, the longest slightly more than 0.7 as long as eye; 5 short rudimentary cœca around pylorus; scales small, cycloid, deciduous, covering head and body and forming a scaly sheath at base of dorsal and anal; 7 scales in a series from origin of dorsal to and including lateral line, about 19 from origin of anal to lateral line; the sculpturing of scales essentially as in *Neobythites*, except that the circuli are less distinct; lateral line broad, disappearing on posterior half of tail.

Dorsal and anal continuous with caudal; distance of dorsal from tip of snout 3.71 (4.12 in total length), distance of anal from tip of snout 2.37 (2.63 in total length); lower pectoral base and anal separated by a distance equal to length of head; ventrals small, rather widely separated at base, each consisting of 2 rays united for a short distance, inner ray longest, 1.63 in head; upper pectoral rays united, the longest a little longer than head; lower rays separate, long, filamentous, the longest about 2.6 times as long as head, 0.5 total length.

Color in alcohol: Raw umber; opercular region, branchiostegals and fins dark clove brown; peritoneum dark chestnut brown.

*Type*.—Cat. No. 74130, U.S.N.M., 25.5 cm. in length, taken with a beam trawl at station 5488 (lat. 10° 00' 00" N.; long. 125° 06' 45" E.), between Leyte and Mindanao, at a depth of 772 fathoms, on a bottom of green mud.

Our examples of this species were taken from the interinsular waters of the Philippine Archipelago. One specimen 18.5 cm. in length from station 5406 was from the stomach of a *Lophiodes infrabrunneus* Smith and Radcliffe 12.7 cm. in length.

According to Alcock's description of examples of *D. intronigra* from the Andaman and Arabian seas, that species has 18 or 19+8 or 9 rays in the pectoral, the longest 1.5 to 2 times the length of the head, the inner ventral ray equal to length of head behind middle of eye, and the distance from base of pectoral to first anal ray more than the length of the head.

DICROLENE TRISTIS Smith and Radcliffe, new species,

Plate 8, fig. 2.

Dorsal 103; caudal 6; anal 80; ventrals 2; pectorals 18+10.

Head 4.85 (5.31 in total length), low subconic, more porous than in *longimana*; body compressed, greatest depth 5.83 (6.38 in total length); eye 4, large, subcircular; snout 3.82, rounded; mouth large, oblique, upper jaw overhanging lower, maxillary 1.71, extending beyond vertical from posterior margin of eye for 0.33 an eye diameter, posterior margin truncate, teeth small, villiform, the patch on vomer

broadly  $\eta$ -shaped; interorbital 3.43, broad, flattened; opercle armed with a single strong sharp spine; angle of preopercle armed with 3 small sharp spines; pseudobranchiæ consisting of 2 small filaments; gill-rakers 5+20, the longest nearly 0.75 as long as eye; slight traces of rudimentary pyloric cœca; scales small, cycloid, deciduous, covering head and body, and forming a low sheath at the base of dorsal and anal; 8 scales in a series from origin of dorsal to and including lateral line, about 25 from origin of anal to lateral line; lateral line broad, distinct anteriorly, disappearing at about a head's length from base of caudal.

Dorsal and anal continuous with caudal; distance of dorsal from tip of snout 4 (4.10 in total length); distance of anal from tip of snout 2.43 (2.66 in total length); ventrals small, rather widely separated at base, each consisting of 2 rays united by membrane for a very short distance at base, inner ray longest, 2.23 in head, ventral base behind tip of humeral symphysis; upper pectoral rays united, the longest about equal to head, lower rays separate, filamentous, 1.5 times as long as head, base of lower rays about a head-length in advance of anal.

Color in alcohol: Tawny olive; opercular region, branchiostegals, and fins dark clove brown; peritoneum dark chestnut brown.

*Type*.—Cat. No. 74131, U.S.N.M., 25.5 cm. in length, taken with a beam trawl at station 5467 (lat.  $13^{\circ} 35' 27''$  N.; long.  $123^{\circ} 37' 18''$  E.), Lagonoy Gulf, Luzon, at depth of 480 fathoms, on a bottom of gray mud.

The examples in the collection came from the east coast of Luzon; Sibuko Bay, Borneo; and from the Celebes; none were taken in the interinsular waters of the Philippine Archipelago.

The number of detached pectoral rays varies from 8 to 10.

This species differs from *longimana* in the much larger eye, longer snout, broader interorbital, shorter ventrals and pectorals, rudimentary character of pyloric cœca, smaller scales and lighter coloration. It appears to be closely related to *D. multifilis* (Alcock) but identification from the description and figure of that species is impossible.

#### HOMOSTOLUS Smith and Radcliffe, new genus.

This genus is closely related to *Neobythites*, distinguished by the elongate, sharply pointed, compressed head which is very cavernous but lacks the high crests characteristic of *Glyptophidium*; by the narrow bands of teeth, especially those on mandible, and by the long, simple ventral filaments, each composed of 2 fused rays. The eyes are very large; the lateral line is broad, with a clearly defined covering of skin above the scales, the latter wider than those above and below and distinctly modified.

*Type of the genus*.—*Homostolus acer*, new species.

## HOMOSTOLUS ACER Smith and Radcliffe, new species.

Plate 8, fig. 3.

Dorsal about 93; caudal 10; anal about 70; ventrals 1; pectorals 21.

Head 4.50 (4.75 in total length), long, pointed, low, compressed, cavernous, the bony crests much less prominent than in species of *Glyptophidium*, subquadrangular in transverse section; body compressed, relatively short, greatest depth 5.54 (5.90 in total length); eye 3.41, elliptical-oval; snout 3.41, as long as eye, low, pointed, slightly overhanging maxillary; mouth long, narrow, oblique, upper jaw overlapping lower except at tip, where a knob at tip of mandibular symphysis projects slightly; maxillary 1.64, extending about 0.5 an eye diameter beyond vertical from posterior margin of eye; narrow bands of minute villiform teeth on jaws, vomer, palatines and tongue, 5 small patches of teeth on roof of mouth posteriorly as in *Neobythites*; interorbital 3.72, flattened, slightly broader than eye; nostrils small, the posterior close to eye; opercular spine slender, sharp; 2 small spines at angle of preopercle; pseudobranchiæ small; gill-filaments short; gill-rakers 7+20, long and slender, the longest about 0.7 diameter of eye; about 10 long, finger-like pyloric cæca arranged as in *Neobythites*; scales small, cycloid, *Neobythites*-like, 9 in a series from origin of dorsal to lateral line, about 18 from origin of anal to lateral line; lateral line broad and distinct, disappearing within 0.5 a head length from base of caudal.

Dorsal and anal continuous with the caudal; origin of dorsal from tip of snout 3.76 (4.15 in total length), its rays somewhat longer than those of anal; caudal narrow, pointed; origin of anal from tip of snout 2.52 (2.67 in total length); ventrals elongate, 1.55 times length of head, each composed of 2 closely bound rays, the inner the longest, bases rather widely separated, situated behind tip of humeral symphysis; pectoral 1.64, narrow.

Color in alcohol: Dusky ocher yellow, darkest dorsally, becoming dusky cream-buff on belly and sides and ventral surface of head; opercular region silvery; fins dusky, dorsal and anal margined with blackish, darkest anteriorly; peritoneum blackish brown.

*Type*.—Cat. No. 74132, U.S.N.M., 19.5 cm. in length, taken with a beam trawl at station 5508 (lat. 8° 17' 24'' N.; long. 124° 11' 42'' E.), in Iligan Bay, Mindanao, at a depth of 270 fathoms, on a bottom of green mud and fine sand.

This species is found in the same general regions as our examples of *Glyptophidium*.

## Genus MONOMITOPUS Alcock.

*Monomitopus* ALCOCK, Ann. Mag. Nat. Hist., p. 297, Oct., 1890, *nigripinne*.  
*Dicromita* GOODE and BEAN, Oceanic Ichthyology, p. 319, 1895, *agassizii*.

This genus differs from *Neobythites* in the weaker, more spongy character of the bones of the head; scales more deciduous; lower margin of preopercle more produced, armed with 2 or 3 weak spine-like projections and with a distinct incision in region of angle; ventrals reduced, inserted close together, each of 2 closely united rays, not separate at tips. The ring of pyloric cæca around the pylorus may or may not extend on neighboring part of gut. The type of *Dicromita* (*agassizii*) does not differ generically from *Monomitopus*.

MONOMITOPUS PALLIDUS Smith and Radcliffe, new species.

Plate 9, fig. 1.

Dorsal 93; caudal 7; anal 76; ventrals 1; pectorals 28.

Head 4.73 (5.22 in total length), short cavernous, subquadrangular in transverse section, slightly arched posteriorly; body short, compressed, greatest depth 5.56 (6.12 in total length); eye 3.90, large, elliptical-oval; snout 3.90, short, broad, slightly overhanging mouth; mouth of moderate size, oblique, upper jaw overhanging lower; maxillary 1.94, reaching a little beyond vertical from posterior margin of eye, posterior end expanded, truncate, its width more than 0.5 an eye-diameter; teeth small, villiform, the outer row in jaws somewhat enlarged, differing in this respect from the other Philippine species; patch on vomer  $\wedge$ -shaped; interorbital 3.36, broad, convex; nostrils widely separated, anterior without well-developed tube; opercle armed with a single sharp spine; angle of preopercle formed as in the subgenus *Watasea*, with 2 sharp spines, the lower being nearly as strong as in the species of that subgenus; pseudobranchiæ distinct, slender; gill-rakers 7 + 16, long, slender, the longest about 0.66 diameter of eye; a ring of 11 small finger-like cæca extending around the pylorus, one on each side being on the neighboring part of the gut; scales small, cycloid, deciduous, covering head and body, and forming a sheath along base of dorsal and anal, about 8 in a series from origin of dorsal to and including lateral line; the surface of the scale is intermediate between that found in species of *Neobythites* and other Philippine species of *Monomitopus*, the radiating striæ persisting over entire surface of scale, these are much more rudimentary in character than in species of *Neobythites*; lateral line broad, distinct anteriorly, disappearing at a point about equal to length of head from base of caudal.

Dorsal and anal continuous with caudal, the last rays extending nearly to middle of caudal fin; distance of dorsal from tip of snout 4.12 (4.54 in total length); distance of anal from tip of snout 2.25 (2.47 in total length); distance of anal from lower pectoral base about equal

to head; ventrals slender, close together, each consisting of 2 closely-bound rays, the inner 1.61 in head, reaching more than half way to origin of anal; ventral base slightly behind tip of humeral symphysis; pectorals 1.68.

Color in alcohol: Fawn on back, becoming light smoke-gray on head and belly; anterior rays of dorsal and anal smoke gray; posterior rays and caudal light clove brown; ventrals gray; pectorals gray; punctulate with darker; inside of mouth plumbeous, changing to seal-brown in region surrounding gills; peritoneum dark seal-brown.

*Type*.—Cat. No. 74133, U.S.N.M., 19.5 cm. in length, taken with a beam trawl at station 5259 (lat.  $11^{\circ} 57' 30''$  N.; long.  $121^{\circ} 42' 15''$  E.), between Mindoro and Panay, at a depth of 312 fathoms, on a bottom of gray mud and globigerina ooze.

The close relationship of *Monomitopus* to *Neobythites* is well shown in the characters of this species; the bones of the head are more cavernous, the scale are deciduous but *Neobythites*-like in character, and the two rays composing each ventral are fused.

This species differs from our examples of *M. nigripinnis* in having the outer row of teeth in the jaws enlarged, the armature of the preopercle stronger, radiating striæ on scales extending over entire surface, fewer rays in dorsal, anal, and pectoral, larger eye, longer ventral, and lighter coloration.

**MONOMITOPUS LONGICEPS** Smith and Radcliffe, new species.

Plate 9, fig. 2.

Dorsal 97; caudal 9; anal 81; ventrals 1; pectorals 28.

Head 3.94 (4.21 in total length), long, robust, arched posteriorly, cavernous; body short, deep, compressed, greatest depth 4.60 (4.92 in total length); eye 5.43, subelliptical; snout 4, broad, blunt; mouth large, slightly oblique; upper jaw overhanging lower; maxillary 1.84, reaching beyond vertical from posterior margin of eye for about 0.7 of an eye diameter, posterior end expanded very slightly incised, its width about equal to diameter of eye; teeth small, blunt, in villiform bands, the patch on vomer  $\Lambda$ -shaped; interorbital 3.53, very broad, probably convex in life; nostrils widely separated; opercle armed with a single sharp spine, margin of preopercle weak, irregularly crenulate, armed with three weak, spine-like projections; pseudo-branchiæ small; gill-rakers 5+22, long, slender, the longest slightly less than 0.7 diameter of eye, the outer ones reduced to small knob-like protuberances; a ring of 10 large finger-like pyloric cœca extending around the pylorus out onto the neighboring part of gut; scales small, cycloid, deciduous, completely covering head and body, 8 or 9 scales in a series from origin of dorsal to and including lateral line, 27 from origin of anal to lateral line; dorsal and anal with a scaly sheath-like base; lateral line broad, distinct, disappearing at a point more than half head-length from base of caudal.

Dorsal and anal continuous with the caudal; distance of dorsal from tip of snout 3.48 (3.72 in total length); distance of anal from tip of snout 2.17 (2.32 in total length); distance of anal from lower pectoral base about 0.7 length of head; ventrals small, close together, each consisting of 2 loosely-bound rays, the tips of which may become torn apart, bases slightly behind tip of humeral symphysis, a head-length in front of origin of anal; pectorals broken.

Color in alcohol: Raw sienna; fins, lateral line, branchiostegal membranes, margin of eye, and lips dusky brownish-black; inside of mouth washed with plumbeous; peritoneum very dark seal brown.

*Type*.—Cat. No. 74134, U.S.N.M., a single example 32 cm. in length, taken with a beam trawl at station 5299 (lat. 20° 5' 00'' N.; long. 116° 5' 00'' E.), in the China Sea south of Hongkong, at a depth of 524 fathoms, on a bottom of gray mud and sand.

MONOMITOPUS MICROLEPIS Smith and Radcliffe, new species.

Plate 9, fig. 3.

Dorsal 95; caudal 8; anal 78; ventrals 1; pectorals 28.

Head 4.52 (5 in total length), long, rather pointed in the adult; body elongate, compressed, greatest depth 5.58 (6.25 in total length); eye 5.32, small, elliptical-oval; snout 3.85, long, slightly overhanging mouth; mouth of moderate size, slightly oblique, upper jaw overhanging lower; maxillary 1.92, reaching beyond vertical from posterior margin of eye for a distance nearly equal to five-eighths diameter of eye, its expanded posterior end very slightly incised; teeth small, villiform, the patch on vomer  $\Lambda$ -shaped; interorbital 3.71, broadly convex; opercle armed with a single sharp spine; angle of preopercle with a deep incision, the spine-like tips above and below this flat and thin (smaller examples have the double incision more closely approximating the form found in the type of the genus); pseudobranchiæ very small, of 2 filaments, partially concealed in a depression; gill rakers 5+17, the longest about five-eighths diameter of eye, the 7 outer ones on lower arch reduced to mere protuberances; a ring of 11 pyloric cæca around the pylorus, one on each side being on the neighboring part of the gut, those on the sides being much longer, finger-like; scales smaller than in related species, cycloid, more or less deciduous, covering head and body, and forming a sheath along base of dorsal and anal, 12 or 13 in a series from origin of dorsal to and including lateral line, 35 from origin of anal to lateral line; as in typical examples, radial striæ are found only on the basal end of the scale, but the concentric lines are fewer in number and farther apart; lateral line distinct, disappearing at a point slightly less than length of head from base of caudal.

Dorsal and anal continuous with the caudal, the last rays extending to middle of caudal fin; distance of dorsal from tip of snout 3.84



(4.31 in total length); distance of anal from tip of snout 2.42 (2.72 in total length); distance of anal from lower pectoral base 1.16 in head; ventrals slender, close together, each consisting of 2 closely bound rays, the inner 1.67 in head, ventral base slightly behind tip of humeral symphysis, at a distance from anal somewhat greater than length of head; pectoral 1.56.

Color in alcohol: Ground color burnt umber, darkest on back and head; fins and peritoneum dark seal brown.

*Type*.—Cat. No. 74156, U.S.N.M., 25 cm. in length, taken with a beam trawl at station 5410 (lat.  $10^{\circ} 28' 45''$  N.; long.  $124^{\circ} 05' 30''$  E.), between Cebu and Leyte, at a depth of 385 fathoms, on a bottom of green mud.

This species differs from *M. nigripinnis* in the more elongate form of head and body, smaller eye, smaller scales, and darker coloration.

#### Genus MONOMEROPUS Garman.

*Monomeropus* GARMAN, Deep Sea Fishes, 1899, p.158, *malispinosus*. (No generic description.)

Brotulids similar in structure and appearance to *Monomitopus* but distinguished by the more cavernous structure of the head and weaker armature of opercle and preopercle; by the more rudimentary character of the lateral line which ends above or slightly behind origin of anal; by the smaller number and the more rudimentary character of the pyloric cœca; and by the smaller ventral filaments.

#### MONOMEROPUS GARMANI Smith and Radcliffe, new species.

Plate 10, fig. 1.

Dorsal 96; caudal 8; anal 80; ventrals 1; pectorals 31.

Head 4.91 (5.20 in total length), short, deep, slightly depressed anteriorly, strongly arched posteriorly; body compressed, greatest depth 5.52 (5.85 in total length); eye 5.30, small, subcircular; snout 4.08, short, as broad as long, very slightly overhanging mouth; mouth large, oblique, upper jaw overhanging lower; maxillary 1.77, reaching beyond vertical from posterior margin of eye for about 0.7 an eye diameter, posterior end expanded, its breadth equal to diameter of eye, upper margin slipping under suborbital; teeth small, villiform; head of vomer prominent, knob-like, covered with teeth, a narrow short series on each side extending backward nearly to palatines; interorbital 3.21, broad, convex; nostrils widely separated; opercle armed with a single slender spine; angle of preopercle with a double incision, and traces of three flat, weak points, weaker than in typical examples of *Monomitopus*; pseudobranchiæ consisting of 2 small filaments, gill-rakers 5+22, long, slender, longest 0.65 diameter of eye; a ring of 5 small, rudimentary cœca extending around the pylorus; scales small, cycloid, deciduous, covering head and body,

and forming a sheath along base of dorsal and anal; 7 or 8 scales in a series from origin of dorsal to and including lateral line, 25 from origin of anal to lateral line; sculpturing of scale as in typical examples of *Monomitopus*; lateral line inconspicuous, disappearing at a point slightly behind origin of anal.

Dorsal and anal continuous with the caudal; distance of dorsal from tip of snout 4.13 (4.37 in total length); distance of anal from tip of snout 2.57 (2.72 in total length); ventrals short, slender, very close together, broken, presumably less than 0.25 length of head; pectorals 1.83, broad, scaled at base.

Color in alcohol: Clove-brown; opercular region blackish; fins somewhat darker; peritoneum dark seal brown.

*Type*.—Cat. No. 74135, U.S.N.M., 27.5 cm. in length, taken with a beam trawl at station 5610 (lat. 0° 36' 00" S.; long. 122° 01' 00" E.), in the Gulf of Tomini, Celebes, at a depth of 678 fathoms, on a bottom of gray mud.

This species is named in honor of Dr. Samuel Garman in recognition of his noteworthy contributions to our knowledge of deep-sea fishes.

#### Genus BARATHRODEMUS Goode and Bean.

BARATHRODEMUS NASUTUS Smith and Radcliffe, new species.

Plate 10, fig. 2.

Dorsal 99; caudal 9; anal 81; ventrals 2; pectorals 24.

Head 4.78 (5.38 in total length), fleshy covering entirely concealing bony structure; body short, deep, so thin that the interneurals and interhæmals are discernible, strongly arched, greatest depth 4.25 (4.77 in total length); eye 6.40, small, elliptical oval; snout 4, much produced and dilated, overhanging mouth; mouth small, inferior, nearly horizontal, upper jaw overhanging lower; maxillary 2.28, short, almost entirely concealed by suborbital, posterior end dilated, truncate, extending beyond vertical from posterior margin of eye for 0.8 an eye-diameter; teeth small, villiform; patch on vomer broadly  $\Lambda$ -shaped; opercle armed with a single slender, sharp spine; almost entirely concealed by skin; preopercle unarmed, the fleshy skin covering both it and opercle continuous; pseudobranchiæ small, rudimentary; gill-filaments short; gill-rakers 4 + 19, those on upper arch and near end of lower arch reduced to small protuberances, the longest about 0.63 diameter of eye; no pyloric cæca; scales small, cycloid, persistent, entirely covering head and body, forming a scaly sheath at base of dorsal and anal, about 39 scales in a series from origin of anal to dorsal; the sculpturing of the scale essentially as in *Neobythites*; lateral line absent.

Dorsal and anal continuous with the caudal; distance of dorsal from tip of snout 4.50 (5.06 in total length); distance of anal from tip of snout 2.64 (2.96 in total length); ventrals small, each consisting

of 2 branched rays, separated at tip, the inner slightly longer, 2.60 in head, tips of rays expanded; ventral base behind tip of humeral symphysis; pectorals narrow, pointed, twice as long as ventrals.

Color in alcohol: Body sepia; sides, ventral surface of head, belly, and fins, slightly darker; peritoneum dark seal brown.

*Type*.—Cat. No. 74136, U.S.N.M., 17.2 cm. in length, taken with a beam trawl at station 5609 (lat.  $0^{\circ} 11' 00''$  S.; long.  $121^{\circ} 16' 00''$  E.), in the Gulf of Tomini, Celebes, at a depth of 1,092 fathoms, on a bottom of green mud.

The collection contains 2 smaller examples from the neighboring station 5608, taken at a depth of 1,089 fathoms.

#### Genus BASSOGIGAS Gill.

*Bassogigas* GILL MS., in Goode and Bean, Oceanic Ichthyology, 1895, p. 328, *pterotus*.

This genus is closely related to *Barathrodemus*, distinguished by the shorter snout which does not project beyond the terminal mouth and is not dilated; by the less elevated, more robust form of the body. The head is firmer, less spongy, the lower preopercular margin is free, the opercular spine is strong and each ventral is divided nearly to its base. Except for traces of a few rudimentary pores near head, the lateral line is indistinguishable.

BASSOGIGAS ÆQUATORIS Smith and Radcliffe, new species.

Plate 10, fig. 3.

Dorsal 104; caudal 9; anal 87; ventrals 2; pectorals 19.

Head 5.06 (5.65 in total length), bluntly rounded anteriorly, arched posteriorly, firmer than and not as fleshy as in *Barathrodemus*; body not strongly arched, somewhat compressed, greatest depth 6.07 (6.78 in total length); eye 6.80, small, elliptical-oval; snout 3.78, scarcely projecting beyond mouth; mouth of moderate size, subterminal, nearly horizontal, lower jaw included; maxillary 1.96, reaching an eye diameter beyond vertical from posterior margin of eye, posterior end dilated, truncate; teeth small, villiform, the patch on vomer broadly  $\Lambda$ -shaped; opercle armed with a single long, sharp pointed spine; preopercle unarmed; pseudobranchiæ consisting of 2 small filaments; gill-filaments short; gill-rakers 4 + 15, short, those on outer ends of arch reduced to small protuberances; pyloric cœca absent; scales small, cycloid, persistent, entirely covering head and body, fleshy bases of dorsal and anal covered with scales; about 32 scales in a series from origin of anal to dorsal; sculpturing of scales similar to that found in *Barathrodemus*; lateral line represented by a few rudimentary pores near head.

Dorsal and anal continuous with the caudal; distance of dorsal from tip of snout 4.30 (4.80 in total length); distance of anal from tip

of snout 2.45 (2.74 in total length); ventrals short, widely separated at base, each consisting of 2 superimposed divided rays, spatulate at tip, the upper ray longest, 2.55 in head; ventral base behind tip of humeral symphysis; pectorals narrow, pointed, elongate, 4.16 (4.65 in total length), tips reaching beyond base of anal; distance from base of lower pectoral rays to anal slightly greater than length of head.

Color in alcohol: Body burnt umber; head and belly with a grayish cast; fins and peritoneum dark seal brown.

*Type*.—Cat. No. 74137, U.S.N.M., 28.8 cm. in length, taken with a beam trawl at station 5608 (lat.  $00^{\circ} 08' 00''$  S.; long.  $121^{\circ} 19' 00''$  E.), in the Gulf of Tomini, Celebes, at a depth of 1,089 fathoms, on a bottom of gray mud.

This species may prove inseparable from *B. pterotus* of Alcock, but differs markedly from his description in having fewer rays in the dorsal and anal, and in the shorter distance between base of pectoral and first anal ray.

#### ENCHELYBROTULA Smith and Radcliffe, new genus.

A *Bassogigas*-like form, with a more elongate, anguilliform body. Mouth short, broad, teeth small, in a single series on jaws, vomer and palatines; eye small, deep-set; opercular spine feeble, covered with skin; pseudobranchiæ absent; gill-rakers few, small, tubercle-like; branchiostegals 7; ventral filaments bifid; stomach greatly elongated, opening of pylorus on mesial portion of its ventral surface, no pyloric cæca; urinary bladder exceedingly large.

*Type of the genus*.—*Enchelybrotula paucidens*, new species.

#### ENCHELYBROTULA PAUCIDENS Smith and Radcliffe, new species.

Plate 11, fig. 1.

Dorsal 125; caudal 10; anal 90; ventrals 2; pectorals 22.

Head 7.70 (8.42 in total length), short, bluntly rounded anteriorly, slightly arched posteriorly, angles of skull obscured by the thick fleshy skin; a row of small pores from upper angle of opercle extending forward nearly to eye, thence downward to maxillary, around lower margin of snout; other pores on lower lip, along margin of preopercle, and one on either side on occiput; body elongate, compressed, anguilliform, greatest depth 7.14 (7.82 in total length); eye 9.28 in head, 3 in interorbital, small, circular, very deep set in the alcoholic example, outside covering of skin transparent; snout 3.71, low, bluntly rounded, scarcely projecting beyond mouth; mouth short, broader than long, terminal; lower jaw included; maxillary 2.32, reaching slightly beyond vertical from posterior margin of eye, with a fleshy covering of skin; teeth small, reduced to a single series on jaws, vomer and palatines; opercular spine short, blunt, entirely covered by skin; preopercle unarmed, lower margin free; pseudobranchiæ absent; gills

4, a small slit behind the fourth; gill-filaments short; gill-rakers 4 + 5, reduced to slight protuberances; branchiostegals 7; pyloric cœca absent; stomach greatly elongated, opening to pylorus on lower mesial portion; urinary bladder greatly enlarged, nine-sixteenths as long as head, its breadth about 0.55 its length; scales long, elliptical oval, cycloid, persistent, entirely covering head and body; fleshy covering of dorsal and anal scaled, sculpturing as in related genera; lateral line indistinguishable, scales from origin of anal to dorsal 43, about 200 transverse rows between angle of opercle and base of caudal.

Dorsal and anal continuous with the caudal; distance of dorsal from tip of snout 6.42 (7 in total length); distance of anal from tip of snout 2.41 (2.64 in total length); both dorsal and anal covered with thick skin; ventrals long, each consisting of 2 divided rays, their basal portions joined together for a distance equal to twice diameter of eye, inner ray longest, a little longer than head, bases of ventrals close together, behind tip of humeral symphysis; pectorals short, acutely rounded, 1.30 in head; distance from base of lower rays to anal 3.57 (3.90 in total length).

Color in alcohol: Olivaceous; margin of opercle, lips, and fins slightly darker; the posterior rays of dorsal and anal and the caudal clove brown; peritoneum cinnamon, punctulate with darker.

*Type*.—Cat. No. 74138, U.S.N.M., 54.7 cm. in length, taken with a beam trawl at station 5608 (lat.  $00^{\circ} 08' 00''$  S.; long.  $121^{\circ} 19' 00''$  E.), in the Gulf of Tomini, Celebes, at a depth of 1,089 fathoms, on a bottom of gray mud.

#### Genus ERETMICHTHYS Garman.

ERETMICHTHYS REMIFER Smith and Radcliffe, new species.

Plate 11, fig. 2.

Dorsal 124; caudal 8; anal 100; ventrals 1; pectorals 26 (11 + 15).

Head 5.82 (6.32 in total length), flattened anteriorly, the loose fleshy covering obscuring the angles of the skull; body slender, strongly compressed posteriorly, greatest depth 7.46 (8.12 in total length); eye 8.60 in head, small, elliptical-oval, about one-third interorbital space, less than one-half length of snout; snout 3.91, broad, blunt, scarcely projecting beyond mouth; mouth wide, slightly oblique, the lower jaw included; maxillary 2.02, reaching an eye diameter beyond vertical from posterior margin of eye, largely concealed by suborbital, lower angle longer, acute; teeth in villiform bands on jaws, vomer, and palatines; opercular spine feeble; preopercle entire, produced backward nearly to posterior margin of opercle; pseudobranchiæ consisting of 2 small filaments; gill filaments short; gill-rakers 4 + 21, slender, the longest one and two-

thirds times as long as eye; pyloric cœca absent; scales small, deciduous, entirely covering head and body; lateral line indistinguishable.

Dorsal and anal continuous with the caudal; dorsal origin close to head, its distance from tip of snout 6.58 (7.16 in total length); caudal narrow, elongate, pointed; origin of anal a head-length behind base of lower pectoral rays, its distance from tip of snout about one-third standard length; ventrals simple, 1.26 in head, bases close together, behind tip of humeral symphysis; upper 11 pectoral rays shorter than head, lower rays greatly produced, less flexible, bound together and thickened near base, the longest 3.12 (3.40 in total length).

Color in alcohol: Cinnamon, darker shades on head and belly; fins light olivaceous; stomach and peritoneum dark chestnut brown.

*Type*.—Cat. No. 74139, U.S.N.M., 27.2 cm. long, taken with a beam trawl at station 5609 (lat.  $00^{\circ} 11' 00''$  S.; long.  $121^{\circ} 16' 00''$  E.), in the Gulf of Tomini, Celebes, at a depth of 1,092 fathoms, on a bottom of green mud.

#### Genus *BASSOZETUS* Gill.

*BASSOZETUS ROBUSTUS* Smith and Radcliffe, new species.

Plate 11, fig. 3.

Dorsal 120; caudal 9; anal 102; ventrals 1; pectorals 25.

Head 4.67 (5.14 in total length), its depth nearly twice its breadth, about 0.85 its length, large, compressed, depressed anteriorly, strongly arched posteriorly, bones soft and cavernous, a prominent interorbital ridge, and a ridge near each side of interorbital space, these slightly diverging posteriorly, separated by a deep concavity, with a smaller concavity lying between ridges and eyes (in life these concavities were probably much less distinct), a distinct prominence above and behind each eye; body robust anteriorly, tapering regularly, greatest depth 5.45 (6 in total length); eye 10 in head, 2.64 in snout, small, elliptical-oval; snout 3.78, somewhat swollen, as broad as interorbital, not projecting beyond mouth; mouth large, oblique, lower jaw included, its tip when closed fitting into a toothless space between intermaxillary bands of teeth; maxillary 1.84, with a deep groove posteriorly, dilated behind to nearly twice diameter of eye, extending 2 eye diameters beyond vertical from posterior margin of eye, posterior margin sinuous, upper margin concealed under expanded suborbital; teeth small, sharp, in broad bands on jaws, vomer, and palatines; band on vomer broadly  $\Lambda$ -shaped, each arm being bent with the convexity inward; tongue large, broad and pointed, margins thin, tip reaching within slightly more than an eye diameter of tip of mandible; opercular spine very feeble, broad, flat, covered with skin not extending as far backward and not nearly as

distinct as in *B. compressus*; preopercle unarmed, broadly rounded, its upper margin oblique; both opercle and preopercle with radiating striæ; pseudobranchiæ consisting of two short, thick, filaments; gill filaments short, 12 well developed gill-rakers on lower arch, the longest 1.4 times diameter of eye; no pyloric cæca; scales small, deciduous, covering head and body, and fleshy bases of dorsal and anal; about 32 scales in a series from origin of anal to dorsal (the scales are lost, but appear to have been smaller than in other described forms); lateral line indistinguishable.

Dorsal and anal continuous with the caudal; dorsal origin close to head, its distance from tip of snout 4.95 (5.46 in total length); caudal narrow, elongate, pointed; origin of anal about 0.66 length of head behind base of lower pectoral rays, its distance from tip of snout 2.77 (3.05 in total length); ventrals simple, 1.20 in head, tips reaching to vent, bases close together, behind tip of humeral symphysis; pectorals simple, about 1.63 in head.

Color in alcohol: Back and sides of body buff; belly with dusky black shades; head gray, blackish underneath; opercles, branchiostegals and lips blackish; fins dusky; inside of mouth grayish; inside of gill-coverings and peritoneum dark chestnut brown; fins dusky; marginal portion of dorsal and anal darker than basal portion.

*Type*.—Cat. No. 74140, U.S.N.M., 36 cm. in length, taken with a beam trawl at station 5349 (lat.  $10^{\circ} 54' 00''$  N.; long.  $118^{\circ} 26' 20''$  E.), in Palawan Passage, at a depth of 730 fathoms, on a bottom of coral and sand.

In this species the scales are smaller, the ventrals longer, the body more robust, opercular spine weaker and coloration lighter than in the type of *B. compressus* Günther. His example, 5.5 inches long, taken at station 205, Philippine Islands, had longer ventrals as in *robustus* and may have been this species.

**BASSOZETUS ELONGATUS** Smith and Radcliffe, new species.

Plate 11, fig. 4.

Dorsal 118; caudal 10; anal 102; ventrals 1; pectorals 22.

Head 5.43 (5.86 in total length), its depth less than twice its breadth about 0.75 its length; compressed, depressed anteriorly, arched posteriorly, bones soft and cavernous; ridges on head prominent, arranged as in *robustus*; body slender, compressed, elongate, tapering regularly, greatest depth 7.41 (8 in total length); eye 12.1 in head, 2.64 in snout, small, elliptical-oval; snout 4.55, swollen, slightly broader than interorbital, not projecting beyond mouth; mouth large, oblique, lower jaw included; maxillary 1.91, hollowed out and dilated posteriorly, its greatest breadth equal to its projection beyond vertical from posterior margin of eye, more than twice diameter of eye, slipping for nearly its entire breadth under expanded

suborbital bones; teeth small, sharp, in broad bands on jaws, vomer and palatines; band on vomer similar to that in *B. robustus*, except that the head of the vomer projects downward much more strongly; tongue not as broad as in *robustus*, margins rounded, tip pointed, its distance from tip of mandible 1.7 times diameter of eye; opercular spine feeble, covered with skin, extending nearly to tip of opercular flap; preopercle unarmed, more evenly rounded than in *robustus*; pseudobranchiæ consisting of 2 short filaments; gill-filaments very short; 16 long, well-developed gill-rakers on lower arch, the longest 1.7 times diameter of eye; pyloric cœca absent; scales large, deciduous, covering head and body and fleshy bases of dorsal and anal; it is impossible to determine accurately their number, but there appear to have been between 16 and 20 between origin of anal and dorsal; lateral line indistinguishable.

Dorsal and anal continuous with the caudal; dorsal origin close to head, its distance from tip of snout 5.63 (6.08 in total length); caudal very narrow and elongate; origin of anal about 0.7 length of head behind base of lower pectoral rays, its distance from tip of snout 3.10 (3.33 in total length); ventrals simple, about 1.90 in head, bases close together behind tip of humeral symphysis; pectorals about 1.90.

Color in alcohol: Body hair brown, becoming blackish on belly; head plumbeous, blackish underneath, darkest on opercles, branchiostegals and lips; fins dusky; inside of mouth grayish; inside of gill-covering and peritoneum dark chestnut brown; stomach brownish.

*Type*.—Cat. No. 74141, U.S.N.M., 48 cm. in length, taken with a beam trawl at station 5608 (lat.  $0^{\circ} 08' 00''$  S.; long.  $121^{\circ} 19' 00''$  E.), in the Gulf of Tomini, Celebes, at a depth of 1,089 fathoms, on a bottom of gray mud.

This species differs from *B. robustus* in the feebler bony structure of the head, the slenderer, more elongate body, larger scales, and greater prominence of the vomer, smaller tongue, smaller eye, shorter ventrals, and darker coloration.

#### MASTIGOPTERUS Smith and Radcliffe, new genus.

Body mixoniform, tapering gradually into the long, slender tail; head large, thick, with large sinuses and pores; bones of head heavy, firm; jaws nearly equal; teeth in narrow villiform bands in jaws and on vomer, in broad bands on palatines; pseudobranchiæ absent; 10 well-developed gill-rakers on first arch; branchiostegals 8; pyloric cœca rudimentary; operculum armed with a thin, flat, triangular spine, nearly concealed by scales; dorsal fin higher than anal; caudal fin elongate, of few rays on a very narrow base; pectoral fins of 10 rays, greatly produced, more than half total length, basal portion narrow, constricted, thickened, distal portion filamentous, the rays more or less separated; ventral filaments long, each composed of 2



nearly equal rays divided nearly to base; scales small, cycloid, covering head and body; lateral line indistinguishable.

*Type of the genus.*—*Mastigopterus imperator*, new species.

**MASTIGOPTERUS IMPERATOR** Smith and Radcliffe, new species.

Plate 12, fig. 1.

Dorsal 142; caudal 6; anal 130; ventrals 2; pectorals 11.

Head 5.42 (6.01 in total length), massive, arched posteriorly, large sinuses, more or less covered with transparent membrane, on infra-orbital, mandible, and preopercle; a row of small pores extending over nape, another from upper angle of operculum to upper margin of eye, 3 pores on posterior part of interorbital; 2 large pores between anterior and 2 smaller ones between posterior nostrils; greatest breadth of head 1.4 in its depth; body robust, compressed posteriorly, tapering into a long, filamentous tail, greatest depth 5.54 (6.15 in total length); eye 7.42, moderate, elliptical-oval, high, directed slightly upward; snout 3.95, broad, little depressed, evenly rounded, not projecting beyond mouth; mouth large, oblique, lower jaw included; maxillary 1.82, strong, reaching an eye-diameter beyond vertical from posterior margin of eye, posterior end expanded, 1.5 times as long as eye, lower angle longer, acute; teeth small, villiform, in very narrow bands on jaws and vomer, the vomerine patch crescent-shaped; band on right palatine bone nearly 0.5 as broad as long, broadest at the middle, anterior end broadly truncate; patch on left palatine with its inner margin strongly convex and with a deep incision near anterior end; interorbital 3.30, broad flattened, 2.25 times eye; nareal apertures large; opercle armed with a thin, flat triangular spine; preoperculum rounded, angle and horizontal margin with minute serrations; pseudo-branchiæ absent; gill-filaments short; gill-rakers 4 + 15, 10 on lower limb prolonged, the longest nearly equal to eye; traces of several small, rudimentary pyloric cœca; scales small, deciduous, covering head and body, and basal portions of dorsal, anal, and pectoral, about 45 in a row from origin of anal to dorsal; lateral line indistinguishable.

Dorsal and anal continuous with the caudal; dorsal fin much higher than the anal, the longest as long as snout plus eye; dorsal origin above base of pectoral, its distance from tip of snout 4.68 (5.20 in total length); caudal fin of few rays on a very narrow base longest rays more than 0.5 as long as head; origin of anal from tip of snout 2.65 (2.94 in total length), its rays shorter than those of the dorsal; ventrals bifid, inner ray slightly longer, 1.25 times as long as head, its tip reaching to vent; pectorals narrow at base, greatly produced, basal portion stiffened, the rays closely bound together, distal portion whip-like, the rays more or less separated, the longest more than 3.5 times as long as head, 1.48 (1.65 in total length).

Color in alcohol: Body light clay, grayish white beneath scales; top of head pearl gray, cheeks and lips écreu drab; opercle with blackish shades underneath; branchiostegals, inside of gill-cavity, and peritoneum dark seal brown; caudal, posterior rays and margin of anterior rays of dorsal and anal clove brown, outer pectoral rays dusky, remainder of fins body color.

*Type*.—Cat. No. 74142, U.S.N.M., 53.5 cm. in length, taken with a beam trawl at station 5495 (lat.  $9^{\circ} 06' 30''$  N.; long.  $125^{\circ} 00' 20''$  E.), between Leyte and Mindanao, at a depth of 976 fathoms, on a bottom of gray mud.

**MASTIGOPTERUS PRÆTOR** Smith and Radcliffe, new species.

Plate 12, fig. 2.

Dorsal 131; caudal 6; anal 115; ventrals 2; pectorals 11.

Head 5.85 (6.51 in total length), dorsal outline relatively straight, very large sinuses on infraorbital, preopercle, and mandible; pores on top of head small, arranged as in *imperator*; greatest breadth of head two-thirds of its depth; body compressed, tapering into a long, slender tail, greatest depth 6.51 (7.24 in total length); eye 5.36, large, elliptical-oval, lateral; snout 3.93, low, rather pointed, not projecting beyond mouth; mouth large, slightly oblique; maxillary 1.73 extending 0.5 an eye diameter beyond vertical from posterior margin of eye, posterior end somewhat expanded, its breadth equal to diameter of eye; teeth small, villiform, in narrow bands on jaws and vomer, vomerine patch  $\cap$ -shaped; palatine bands broad, as in *imperator*, inner margin anteriorly incised; tongue thick and fleshy; interorbital 3.28, flattened, about 1.6 times eye; opercle armed with a very thin flat spine, concealed by scales covering opercle; preoperculum unarmed; pseudobranchiæ absent; gill-filaments very short; gill-rakers 5+15, 10 on lower arch prolonged, slender, the longest about three-fourths diameter of eye; pyloric cæca small, rudimentary; scales small, somewhat deciduous, covering head and body, and basal portions of dorsal, anal and pectoral, between 40 and 45 in a row from origin of anal to dorsal; lateral line indistinguishable.

Dorsal and anal continuous with the caudal; dorsal high, the longest rays slightly greater than snout plus eye; origin of dorsal above base of pectoral, its distance from tip of snout 5.48 (6.10 in total length); ventrals bifid, tips filamentous, the inner longer, 1.25 times as long as head, its tip reaching vent; pectorals narrow, similar in form to those of *imperator*, longest ray about 4.5 times as long as head.

Color in alcohol: Clay, grayish-white underneath scales; cheeks, lips and pectorals écreu drab; opercle with blackish shades underneath; caudal, posterior rays and margin of anterior rays of dorsal and anal clove brown; peritoneum dark seal brown.

*Type*.—Cat. No. 74143, U.S.N.M., 38.4 cm. in length, taken with a beam trawl at station 5628 (lat.  $00^{\circ} 28' 30''$  S.; long.  $127^{\circ} 45' 00''$  E.), in Patiente Strait, at a depth of 1,291 fathoms, on a bottom of gray mud.

This species is distinguished from *imperator* by the slenderer form of head and body, more conspicuous sinuses and pores on head, larger eye and correspondingly narrower interorbital, less deeply bifid ventrals, longer pectorals and fewer rays in the dorsal and anal.

Genus GLYPTOPHIDIUM Alcock.

GLYPTOPHIDIUM LUCIDUM Smith and Radcliffe, new species.

Plate 12, fig. 3.

Dorsal 118; caudal 11; anal 100; ventrals 1; pectorals 24.

Head 4.73 (4.95 in total length), large compressed, subquadrate in cross-section, somewhat arched posteriorly, cavernous, with thin, well marked crests as in species of the macrourid genus *Hymenocephalus*; body compressed, tapering into a long slender tail; greatest depth 5.50 (5.75 in total length); eye 3, large, elliptical-oval, orbital rims greatly expanded; snout 4.04 in head, 1.36 in eye; 1.24 in interorbital, short, blunt, depressed, with a distinct median ridge; mouth large, oblique, lower jaw included; maxillary 1.86, barely reaching vertical from posterior margin of eye, slipping under expanded suborbital; bands of small villiform teeth on jaws, vomer, and palatines; vomerine patch  $\cap$ -shaped; interorbital 3.32, broad, flattened; opercle armed with a weak spine; preopercle with 2 small spines near angle; pseudobranchiæ represented by about 10 short filaments; gill-filaments short; gill-rakers 5+20, the longest less than 0.33 diameter of eye; about 6 short rudimentary appendages around pylorus; scales small, cycloid, more persistent than in *G. argenteum*; the frilled and crested bones of head apparently scaled in life; lateral line indistinguishable.

Dorsal and anal continuous with the caudal; origin of dorsal from tip of snout 4.76 (5 in total length); anal rays shorter than those of dorsal; origin of anal 2.82 (2.95 in total length); ventrals 1.72, longer than in *argenteum*, each composed of a simple filament, bases close together in advance of vertical from insertion of dorsal; pectoral 1.50.

Color in alcohol: Body ochraceous buff, with silvery glints and dusky punctulations (much lighter than *argenteum*); head and belly cream buff, a dusky brown area at base of dorsal, dusky coloration most distinct on the base of each ray; fins light gray, more or less translucent; stomach and long, coiled intestine slate gray.

*Type*.—Cat. No. 74144, U.S.N.M., 23 cm. in length, taken with a beam trawl at station 5625 (lat.  $00^{\circ} 7' 00''$  N.; long.  $127^{\circ} 28' 00''$  E.),

between Gillolo and Kayoa Islands, Dutch East Indies, at a depth of 230 fathoms, on a bottom of gray mud and fine sand.

With the exception of one specimen, which came from Palawan Passage, all of our examples were taken in the region of Gillolo Island. All of our examples of *G. argenteum* are from the interisland waters of the Philippine Archipelago, and are readily separable from this species, having a much darker coloration, smaller eye, the frill-like bony crests of the head less firm, and the ventrals shorter.

GLYPTOPHIDIUM OCEANIUM Smith and Radcliffe, new species.

Plate 12, fig. 4.

Dorsal 128; caudal 9; anal 90; ventrals 2; pectorals 23.

Head 4.81 (5 in total length), rather more pointed and depressed than in related species, crests firmer; body slender, compressed, tapering into a slender tail; greatest depth 5.94 (6.18 in total length); eye 3.23, large, broadly elliptical-oval; orbital rims expanded, scarcely as prominent as in *lucidum*; snout 3.65 in head, 1.13 in eye, equal to interorbital, rather blunt, median dorsal ridge distinct; mouth large, oblique, upper jaw overlapping lower, except at tip, where the knob at tip of mandibular symphysis projects slightly; maxillary 1.79, scarcely reaching vertical from posterior margin of eye, slipping under expanded suborbital; bands of small villiform teeth on jaws, vomer and palatines; interorbital flattened, slightly concave in the alcoholic examples; nostrils widely separated, anterior on anterior margin of snout, posterior close to eye; opercular spine slender, slightly stronger than in examples of *lucidum*, a weak incision above angle of preopercle; pseudobranchiæ represented by 12 to 14 short filaments; gill-filaments short; gill-rakers long and slender, 9 + 27, the longest one-half diameter of eye; about 8 slender appendages around pylorus, better developed than in *lucidum*; scales small, cycloid, deciduous; lateral line indistinguishable.

Dorsal and anal continuous with the caudal; the dorsal more anterior in its insertion than in *lucidum*, its distance from tip of snout 5.46 (5.68 in total length); anal rays much shorter than those of dorsal; distance of anal from tip of snout 2.52 (2.62 in total length); ventrals consisting of 2 slender rays divided nearly to base, inner ray longest, 2.20 in head, bases close together in vertical from origin of dorsal; pectoral 1.62.

Color in alcohol: Body raw sienna, darkest dorsally; head and belly somewhat lighter with silvery reflections; fins grayish, rays punctulate with darker, especially the distal portion of anterior dorsal rays; gill-rakers and lining of gill-chamber adjacent to gills seal-brown; on gill-chamber this is margined with silvery; peritoneum seal-brown; stomach and intestine dark clove-brown.

*Type*.—Cat. No. 74145, U.S.N.M., 21 cm. in length, taken with a beam trawl at station 5444 (lat.  $12^{\circ} 43' 51''$  N.; long.  $124^{\circ} 58' 50''$  E.), in the Pacific Ocean north of Samar, at a depth of 308 fathoms, on a bottom of green mud.

The collection contains 2 other examples, 1 from station 5298, Batangas Bay, Luzon, at a depth of 140 fathoms, and 1 from station 5331, west coast of Luzon, at a depth of 178 fathoms.

This species is distinguished from the other Philippine forms in having the ventrals bifid. It appears to be more closely related to *G. macropus* of Alcock, from which it is distinguished by the much shorter ventral filaments, these being only about 0.5 as long as head (in *macropus*, Alcock states that their length is an eye diameter longer than head, and Brauer gives them as 1.5 to 2 times the length of the head), and by the larger number of pseudobranchial filaments, 12 to 14 (5 to 8 in *macropus*). The snout is longer and the interorbital narrower than in Brauer's examples of *macropus*.

#### Genus LAMPROGRAMMUS Alcock.

LAMPROGRAMMUS MACROPTERUS Smith and Radcliffe, new species.

Plate 13, fig. 1.

Dorsal, 120; anal, 103; caudal, 9; pectoral, 21.

Head 4.77 (5.05 in total length), compressed, nearly as deep as long, covered by thin scales and by mucous channels under the skin, the scales more persistent than in *niger*; body deep, much compressed, greatest depth 5 (5.28 in total length); eye 7.30 in head, 2.03 in snout, 2.10 in interorbital, lateral, subcircular, orbital bones less prominent than in *niger*; snout 3.60, broad, blunt, depressed, not projecting beyond mouth; mouth large, oblique, lower jaw included; maxillary 1.86, longer than in *niger*, reaching nearly an eye-diameter beyond vertical from posterior margin of eye, its upper and hinder edges concave, its greatest breadth 1.35 times diameter of eye; bands of villiform teeth on jaws, vomer, and palatines, those on intermaxillary broad, those on mandible somewhat narrower, especially anteriorly, but broader than in *niger*; vomerine patch  $\Lambda$ -shaped, broader than in *niger*, especially at the head of the vomer; interorbital 3.49, convex, narrower than in other forms; nareal apertures small, close together; opercle armed with a thin, flat spine, all except the tip concealed by skin; preopercle with a slight emargination near the angle as in *niger*; no pseudobranchiæ; gill-filaments short; gill-rakers 3+15, well developed, flattened, longest nearly equal to diameter of eye; 2 short, stout rudiments of pyloric cæca; scales small, cycloid, without radiating striæ (differing in this respect from *niger*), covering head and body and bases of dorsal, anal, and pectorals; lateral line inconspicuous, not as wide as eye, the inner

plate-like scales much less distinct than in other described forms and the band of small scales covering plates more nearly equal in size to those above and below.

Dorsal and anal continuous with the caudal; origin of dorsal slightly in advance of base of pectoral, its distance from tip of snout slightly greater than length of head, 4.52 (4.78 in total length); origin of anal three-fourths of a head length behind base of lower pectoral rays, its distance from tip of snout 2.51 (2.66 in total length); ventrals absent; pectoral 1.72 in head, broader, and having more rays than other described forms.

Color in alcohol: Clove brown, fins and branchiostegal membranes somewhat darker; inside of gill-covers and peritoneum dark seal brown.

*Type*.—Cat. No. 74146, U.S.N.M., 54.5 cm. in length, taken with a beam trawl at station 5648 (lat. 5° 35' 00'' S.; long. 122° 20' 00'' E.), in Buton Strait, at a depth of 559 fathoms, on a bottom of green mud.

The greater number of rays in dorsal, anal, and pectoral; the firmer texture of the scaly skin of head and body rendering the crests of head and the enlarged plates of lateral line much less conspicuous; the outer band of small scales covering plates scarcely differentiated from those above and below; and the character of the teeth distinguish this species from other known forms.

#### HYPOPLEURON Smith and Radcliffe, new genus.

Body slender, elongate, *Catætyx*-like, covered with small cycloid scales; head low, depressed, elongate, scaled; teeth on mandible in a narrow band, villiform, some of those in outer row somewhat enlarged; a pair of small canine-like teeth on either side of symphysis of upper jaw, premaxillary band villiform; patch on vomer  $\cap$ -shaped, some of the teeth enlarged; band on palatines narrow with a few enlarged teeth; eyes lateral, high; opercle and preopercle unarmed. Vertical fins united; ventrals very small, simple, close together, situated behind tip of humeral symphysis; pectorals elongate, narrow. Gills 4, gill-filaments well developed, only 3 developed gill-rakers on first arch; pseudobranchiæ present. Branchiostegals 8. Pyloric cæca well developed. Lateral line broad anteriorly, narrowing posteriorly and disappearing on tail, structurally very much like *Lamprogrammus*, possessing the outer band of small scales pierced at regular intervals by pores, and an inner series of enlarged plate-like scales.

Parapophyses of abdominal vertebræ broadened, lengthened, and bent inward at ends and sides, the whole forming a large bony case containing the air bladder; the thickened ventral wall of the latter connecting the free ends of the parapophyses; ribs of the vertebræ which

bear the enlarged parapophyses greatly reduced, mere rudiments, the ends of median ones coalescent with the parapophyses. The accompanying photographs are from the type. (Pl. 14.) The nearest approach to this remarkable development of the vertebræ is found in the hake (*Merluccius*), and two photographs of the abdominal vertebræ of *Merluccius productus* (Cat. No. 26495, U.S.N.M.) from Monterey, California, are shown for comparative purposes. (Pl. 15.)

*Type of the genus.*—*Hypopleuron caninum*, new species.

HYPOPLEURON CANINUM Smith and Radcliffe, new species.

Plate 13, fig. 2; plate 14, 3 figs.

Dorsal 160; caudal 12; anal 122; ventrals 1; pectorals 24.

Head 5.12 (5.18 in total length), low, pointed, depressed, elongate, dorsal contour nearly horizontal, greatest breadth about 1.4 times greatest depth; body slender, elongate, strongly compressed posteriorly, greatest depth 8.28 (8.52 in total length); eye 6.78 in head, 1.68 in snout, 1.42 in interorbital, high, lateral, elliptical-oval; snout 4.05, depressed, pointed; mouth large, oblique, lower jaw narrow, projecting beyond tip of upper; maxillary 2.39, reaching vertical from posterior margin of eye, expanded posteriorly, greatest breadth equal to diameter of eye; mandibular teeth in narrow bands, small, villiform, interspersed with a few slightly enlarged teeth on sides, premaxillary band of teeth somewhat wider, villiform, a pair of small, incurved canine teeth on anterior margin, vomerine teeth unequal, in a  $\cap$ -shaped patch; palatine band narrow, a few enlarged teeth present; interorbital 4.78, broad, flattened; nostrils close together, anterior circular, with a raised margin; opercle and preopercle unarmed; pseudobranchiæ present, consisting of about 6 small filaments; gills 4, a slit behind the fourth; gill-filaments well developed, only 3 gill-rakers developed on anterior arch; branchiostegals 8; stomach nearly as long as head; pyloric cœca well developed, about 10 in a row along each side of gut adjacent to the pylorus; the abdominal vertebræ with strongly expanded dipper-shaped parapophyses, extending slightly downward and outward as in *Merluccius*, thence inward forming a bony case nearly enclosing cavity normally occupied by air bladder; the margin of each parapophysis strongly infolded, forming a cup shaped pocket; mesially the tips of the ribs are coalesced with the parapophyses, on the ninth vertebra the tip of the slender rib is free, at about the thirteenth the rib is entirely free; the free ends of the parapophyses are united by a thick walled integument; this structure as is the case in species of *Merluccius* represents the ventral wall of the air bladder so that in *caninum* it is confined within the bony case formed by the expanded parapophyses; scales small, cycloid, somewhat deciduous; tip of snout and a narrow area including nostrils and extending backward

to eye, and the fold at upper angle of opercular flap, naked; lateral line anteriorly nearly 0.33 diameter of eye in width, narrowing posteriorly, disappearing at about 0.5 a head length from base of caudal; structurally it resembles *Lamprogrammus*, having an outer band of small scales, pierced at regular intervals by pore-like structures, and underneath a single row of enlarged, plate-like scales.

Dorsal and anal continuous with the caudal; origin of dorsal a head length behind tip of snout; distance of anal from tip of snout 2.22 (2.28 in total length); ventrals short, simple, about equal to diameter of eye, bases close together inserted behind humeral symphysis; pectoral 1.41 in head, long, narrow, its tip extending more than halfway to origin of anal.

Color in alcohol: Back and sides raw umber; belly straw yellow, punctulate with black dots; vertical fins similar to adjacent body color, punctulate with black, the black margin of the dorsal and anal widening posteriorly to include entire fin; pectoral dusky.

*Type*.—Cat. No. 74147, U.S.N.M., 57 cm. in length, taken with a beam trawl at station 5626 (lat.  $00^{\circ} 07' 30''$  N.; long.  $127^{\circ} 29' 00''$  E.), near Kayoa Island, Dutch East Indies, at a depth of 265 fathoms, on a bottom of gray mud and fine sand.

There are two small examples in the collection which appear to be referable to this species, one 22 cm. long from station 5372 (150 fathoms) near Marinduque Island, west coast of Luzon, the second 18.9 cm. long, from station 5523, between Negros and Mindanao.

The form and structure of this fish indicate that it is a very active species, not confining itself to the bottom regions. The body is firm and the pectorals are large and powerful. The exposed ventral wall of the air bladder is thick and muscular, attached at the sides to the roughened ends of the parapophyses; inside the bony case the wall is thin. Each of the hollow parapophyses was filled with a dark reddish mass undoubtedly rich in capillaries. It seems highly probable that this remarkable structure was of use to the fish in accommodating itself to rapidly changing conditions of pressure.

#### Genus *DIPLACANTHOPOMA* Günther.

In his description of the genus Günther<sup>1</sup> says: "Gills four, with lanceolate, widely-set gill-rakers and well-developed laminae. Pseudobranchiae none." The Philippine species has small gill-filaments, only 3 developed gill-rakers on the first arch, the remaining gill-rakers reduced to small knob-like protuberances; pseudobranchiae present, consisting of 2 small filaments; armature of operculum not unlike that of many other brotulids, the lower plate-like spine being a little more in evidence because of the absence of a covering of scales, but not a true spine as shown in the illustration of the type

<sup>1</sup> Deep-Sea Fishes, *Challenger* Report, 1887, p. 115.



of *Diplacanthopoma*; margin of preopercle partially free; dorsal and anal with a fleshy, scaleless sheath extending nearly to tips of rays anteriorly; ventral filaments simple, each composed of 2 closely bound rays; pyloric cœca indistinguishable; branchiostegals 8; head covered with a fleshy scaleless skin, with a few minute, scattered cilia.

Lloyd<sup>1</sup> has examined the types of *D. rivers-andersoni* and *raniceps* of Alcock and finds pseudobranchiæ present, represented by two very short, slender filaments. These species agree closely with the Philippine form. If the characters for *Diplacanthopoma* are correctly given, there would seem to be no doubt that these forms are at least subgenerically distinct. For them the name *Sarcocara* (new subgeneric name) is proposed, based on the Philippine species herein described.

DIPLACANTHOPOMA (SARCOCARA) BRUNNEA Smith and Radcliffe, new species.

Plate 13, fig. 3.

Dorsal 134; caudal 6; anal 104; ventrals 1; pectorals 25.

Head 3.67 (3.92 in total length), large, depressed anteriorly, arched posteriorly, covered with a thick scaleless skin, the line of demarcation between head and body very distinct; body compressed, elongate, greatest depth 4.93 (5.26 in total length), eye 5.10, elliptical-oval; snout 4.40, depressed, slightly longer than eye; mouth large, oblique, lower jaw included; maxillary 2.27, reaching 0.4 of an eye diameter beyond vertical from posterior margin of eye, its upper margin concealed under expanded suborbital; bands of small villiform teeth on jaws, vomer, and palatines, a few teeth near symphysis of upper and lower jaw, and on vomer slightly enlarged, the mandibular patch slightly narrower than that on intermaxillaries, the patch on vomer broadly  $\Lambda$ -shaped; interorbital 3.64, broader than eye, flattened; anterior nostril with a collar-like margin, situated close to edge of snout, posterior nostril large, close to eye; opercle armed with a long, slender spine at angle, a small spine-like projection opposite angle of preopercle, these 2 diverging opercular spines being connected by a thin, plate-like structure; this structure is developed to a greater or less degree in other brotulids, but is usually much less distinct, being covered by scales; preopercle unarmed; pseudobranchiæ consisting of 2 small filaments; gill filaments very short; 3 of the gill-rakers at angle of arch moderately developed, the rest reduced to knob-like protuberances; no pyloric cœca; scales small, cycloid; head naked; bases of dorsal and anal concealed in a thick scaleless skin, similar to that covering head; lateral line rudimentary, traces of pores anteriorly.

Dorsal and anal continuous with the caudal; origin of dorsal over axil of pectoral, its distance from tip of snout 3.28 (3.51 in total

<sup>1</sup> Records of the Indian Museum, vol. 1, pt. 1, 1897, p. 10; Memoirs of the Indian Museum, vol. 2, No. 3, 1909, p. 165.

length); distance of anal from tip of snout 2.12 (2.27 in total length), its distance from base of lower pectoral rays 1.34 in head; ventrals 2.22 in head, short, each consisting of 2 closely bound rays; bases of ventrals close together, behind humeral symphysis, more than a head-length in advance of origin of anal; pectoral 1.82, narrow.

Color in alcohol: Body Broccoli brown; top and sides of head and fleshy covering of bases of vertical fins light chestnut; under side of head whitish; inside of gill-cover light chestnut; peritoneum dark chestnut.

*Type*.—Cat. No. 74148, U.S.N.M., 20 cm. in length, taken with a beam trawl at station 5348 (lat.  $10^{\circ} 57' 45''$  N.; long.  $118^{\circ} 38' 15''$  E.), in Palawan Passage, at a depth of 375 fathoms, on a bottom of coral and sand.

#### Genus GRAMMONUS Gill.

The Philippine species which we have assigned to this genus differs from *Sarcocara* in having the body relatively short and deep, the tail not attenuated; the scales persistent, present on cheeks, opercle and occiput; no palatine teeth; eyes slightly upturned; a single opercular spine visible; preopercle well ossified, with a broad obtuse angled point on its posterior margin; lateral line distinct, interrupted mesially, the 2 parts overlapping the same vertical; a short but broad flap-like appendage on each side of the pylorus; dorsal rays about 84; anal about 60.

#### GRAMMONUS ROBUSTUS Smith and Radcliffe, new species.

Plate 13, fig. 4.

Dorsal 84; caudal 9; anal 60; ventrals 1; pectorals 25; scales about 14 + 24–80.

Head 3.51 (3.87 in total length), broad, depressed anteriorly, strongly arched posteriorly, a few small cilia present; body short, deep, compressed posteriorly, greatest depth 3.82 (4.21 in total length) eye 5.70 in head, 1.38 in snout, small, circular, dorso-lateral; snout 4.12, low, wide, bluntly rounded; mouth large, slightly oblique, lower jaw included; maxillary 1.68, extending for more than an eye diameter beyond vertical from posterior margin of eye, upper margin slipping under suborbital, posterior end expanded, truncate, 1.23 times diameter of eye; a narrow band of villiform teeth on mandible, a somewhat broader band of similar teeth on premaxillary, each arm of patch on vomer slightly incurved, palatine teeth absent; inter-orbital width equal to snout, broad, flat; opercle armed with a rather stout spine, nearly concealed by a scaly sheath; preopercle well ossified, a broad obtuse-angled point on its posterior margin; pseudobranchiæ consisting of 2 small filaments; gill-filaments short; 3 developed gill-rakers on first arch; branchiostegals 8; a broad

flaplike appendage on each side of the pylorus; scales small, cycloid, persistent; cheeks, opercles, and occiput covered with small inconspicuous scales, rest of head naked; lateral line distinct, interrupted in the middle, the 2 parts overlapping the same vertical.

Dorsal and anal continuous with the caudal, their bases sheathed with thin membranous skin; distance of origin of dorsal from tip of snout 2.85 (3.15 in total length); caudal narrow; distance of anal from tip of snout 1.80 (1.98 in total length); ventrals 2.47 in head, each composed of 2 rays closely united throughout their length, bases of ventrals close together; pectorals 1.40.

Color in alcohol: Wood-brown; dorsal and anal dusky anteriorly, becoming dark clove brown posteriorly; the basal portion of caudal clove brown, distal portion somewhat lighter; pectorals dusky; peritoneum silvery gray.

*Type*.—Cat. No. 74149, U.S.N.M., 14.3 cm. in length, taken with a beam trawl at station 5409 (lat.  $10^{\circ} 38' 00''$  N.; long.  $124^{\circ} 13' 08''$  E.), between Cebu and Leyte, at a depth of 189 fathoms, on a bottom of green mud.

#### Genus CATÆTYX Günther.

The Philippine species differs from *Sarcocara* in having the body slender, less attenuated, the head markedly depressed, porous; cheeks and opercle (and top of head posteriorly in the young) scaled; eyes superior; lower opercular spine very indistinct, covered with scales; a short but broad flaplike appendage on each side of the pylorus; scales persistent; dorsal about 100; anal about 70.

*Diplacanthopoma squamiceps* Lloyd<sup>1</sup> from the southeastern coast of Arabia should be included in the genus as characterized above.

#### CATÆTYX PLATYCEPHALUS Smith and Radcliffe, new species.

Plate 16, fig. 1.

Dorsal 98; caudal 11; anal 68; ventrals 1; pectorals 22.

Head 4.08 (4.61 in total length), long, low-depressed, its width at eyes greater than its depth; outline of dorsal surface longitudinally very slightly concave, laterally broadly convex; a series of large pores on lower suborbital region, preopercle and mandible, 3 large pores in a line between eye and shoulder, 2 on top of head behind eye, 1 between eyes, and 2 in front of eyes; body slender, strongly compressed posteriorly, greatest depth 6.12 (6.92 in total length), 1.52 in head; eye 5.13, small, superior; snout 4.70, slightly longer than eye, broad and bluntly rounded; mouth wide, oblique, jaws subequal; maxillary 2.45, extending beyond vertical from posterior margin of eye, upper margin slipping under suborbital; small, equal

<sup>1</sup> Lloyd, Records of the Indian Museum, vol. 1, pt. 1, 1907, p. 10; Illustrations of the Zoology of the Investigator, Fishes, pl. 42, fig. 2, 2a, 1908, and Memoirs of the Indian Museum, vol. 2, No. 3, 1909, p. 165.

villiform teeth in bands on jaws, vomer, and palatine; vomerine patch broadly  $\Lambda$ -shaped; interorbital 8.06, very narrow and flat; anterior nostril tubular, on anterior margin of snout, posterior larger, near eye; opercle armed with a long slender spine, preopercle unarmed; pseudobranchiæ consisting of 2 small filaments; gill-filaments short; 3 of the gill-rakers at angle of arch moderately developed, the others reduced to knoblike protuberances, as in *D. (Sarcocara) brunnea*; pyloric cœca two, short and thick, one on either side of the pylorus; ovaries large, fusiform, the wall thin and translucent; scales of moderate size, 26 in a row from origin of anal to dorsal; cheek and opercle scaled, those on post-orbital part of head apparently lost with age; traces of rudimentary pores parallel with the back to a point above vent, thence along middle of side to base of caudal; branchiostegals 8.

Dorsal and anal continuous with the caudal, origin of dorsal behind axil of pectoral, its distance from tip of snout 3 (3.21 in total length); origin of anal slightly nearer tip of snout than tip of caudal; ventrals 2.17, each consisting of 2 closely bound rays, bases close together behind humeral symphysis, much more than a head length in advance of origin of anal; pectoral 1.86, narrow.

Color in alcohol: Clay, the dark coloration of the peritoneum and lining of the gill-cavity showing through on belly and opercle; peritoneum brownish black.

*Type*.—Cat. No. 74150, U.S.N.M., 13 cm. in length, taken with a beam trawl at station 5618 (lat.  $00^{\circ} 37' 00''$  N.; long.  $127^{\circ} 15' 00''$  E.), in Molucca Passage, at a depth of 417 fathoms, on a bottom of gray mud.

The type is a gravid female. The eggs are large and are contained in a large cigar-shaped capsule.

*Diplacanthopoma squamiceps* Lloyd is very similar to this species. It differs in having the head slightly longer, fewer rays in the pectoral, and (if his figure is correct) ventrals bifid, scales larger, and origin of anal much nearer tip of caudal than tip of snout.

There is one other example in the collection 7.8 cm. in length from station 5515 (700 fathoms), off northern Mindanao. It has the top of the head scaled, as in *squamiceps*; the origin of the anal slightly farther back than in the type, but considerably farther forward than in *squamiceps*.

#### LUCIOBROTULA Smith and Radcliffe, new genus.

*Catætyx*-like brotulids, having the ventrals bifid, divided nearly to base; pyloric cœca absent; head pike-like; scales small, deciduous, scaling of top of head extending forward to front of eyes; eyes small; fleshy sheath at base of dorsal and anal scaled.

*Type of the genus*.—*Luciobrotula bartschi*, new species.

## LUCIOBROTULA BARTSCHI Smith and Radcliffe, new species.

Plate 16, fig. 2.

Dorsal, 85; caudal, 13; anal, 68; ventrals, 2; pectorals, 25.

Head 4.40 (4.73 in total length), long, depressed, pike-like, porous, dorsal contour-line slightly concave; body relatively short, compressed, not markedly attenuated posteriorly, greatest depth 5.90 (6.34 in total length); eye small, dorso-lateral, 7.85 in head, 1.78 in snout, 1.28 in interorbital; snout 4.40, pointed, not projecting beyond mouth, mouth large, oblique, lower jaw included; maxillary 1.96, reaching for more than an eye-diameter beyond vertical from posterior margin of eye, posterior end expanded, 1.5 times as broad as eye, anterior upper margin slipping under expanded suborbital; bands of small villiform teeth on jaws, vomer, and palatines, vomerine patch broadly  $\cap$ -shaped; interorbital 6.12, flattened; nostrils small, rather close together; opercle armed with 2 spines as in *Sarcocara*, the lower one rather inconspicuous; preopercle unarmed; pseudobranchiæ present, represented by 2 small filaments; gills 4, a long slit behind the fourth; gill-filaments relatively short; only 3 developed gill-rakers on anterior arch; pyloric cœca absent; scales small, deciduous, covering body, cheeks, opercles, and top of head to front of eyes, apparently about 10 scales from origin of dorsal to and including lateral line, about 33 from anal to lateral line; lateral line indistinct, interrupted in the middle.

Dorsal and anal continuous with the caudal; dorsal posterior in its insertion, its distance from tip of snout 3.23 (3.47 in total length); distance of anal from tip of snout 1.95 (2.09 in total length); ventrals consisting of 2 flattened rays divided nearly to base, inner ray longest 1.83 in head, their bases close together behind tip of humeral symphysis; pectoral 1.90, short, broad, acutely rounded.

Color in alcohol: Body pinkish-buff, dark grayish on belly, becoming blackish in region of vent; opercular region blackish; cheek light chestnut; rest of head with a grayish wash; scaly sheath of the dorsal and anal similar in coloration to the adjacent parts of body; fins margined with blackish, the dark area widening posteriorly; pectorals grayish at base, with a brownish wash distally; ventrals light brown.

*Type*.—Cat. No. 74151, U.S.N.M., 26 cm. in length, taken with a beam trawl at station 5348 (lat.  $10^{\circ} 57' 45''$  N.; long.  $118^{\circ} 38' 15''$  E.), in Palawan Passage, at a depth of 375 fathoms, on a bottom of coral and sand.

This species is named in honor of Dr. Paul Bartsch, a member of the *Albatross* Philippine expedition and assistant curator in the National Museum.

## Genus BYTHITES Reinhardt.

The Philippine form which we have assigned to this genus differs from *Sarcocara* in having the body relatively short, the tail not attenuated; head high, thick; cheeks, opercles, and occiput covered with small inconspicuous scales (head said to be naked in type); eyes dorso-lateral; a short, thick, flap-like appendage on each side of the pylorus; scales small, subcircular, persistent; lateral line distinct, interrupted mesially, the 2 parts overlapping the same vertical; tips of clavicles loosely joined, apparently separate below; dorsal 76; anal 52.

BYTHITES LEPIDOGENYS Smith and Radcliffe, new species.

Plate 16, fig. 3.

Dorsal 76; caudal 11; anal 52; ventrals 1; pectorals 20.

Head 3.51 (3.85 in total length), large, thick, greatest breadth nearly equal to its depth, with small, scattered cirri; body short, compressed posteriorly, greatest depth 4.16 (4.57 in total length); eye 6, small, circular, dorso-lateral; snout 3.73, rounded, not markedly depressed; mouth broad, oblique, lower jaw included; maxillary 1.86, extending for about 0.4 an eye diameter beyond vertical from posterior margin of eye, nearly concealed by expanded suborbital, posterior margin truncate, about as wide as eye; narrow bands of villiform teeth on jaws, vomer, and palatines, each arm of patch on vomer slightly incurved; interorbital 4.10, broadly convex; opercle armed with a single sharp spine; preopercle unarmed; pseudo branchiæ consisting of 2 small filaments; gill-filaments short, only 3 developed gill-rakers on first arch; branchiostegals 8; a broad, flap-like appendage on each side of the pylorus; scales persistent; occiput, cheek, and opercle scaled, rest of head naked; 7 or 8 scales in a series from origin of dorsal to and including lateral line, 17 from origin of anal to lateral line; lateral line interrupted mesially, the 2 parts overlapping the same vertical.

Dorsal and anal continuous with the caudal; dorsal posterior in its insertion, its distance from tip of snout 2.82 (3.04 in total length); distance of anal from tip of snout 1.68 (1.84 in total length); basal portion of dorsal and anal with a scaleless, transparent membranous sheath; caudal short, pointed; ventrals 2.05 in head, composed of 2 flattened rays, united throughout their length, their bases close together behind humeral symphysis; tips of clavicles loosely joined, apparently separate at lower end; pectoral 1.71.

Color in alcohol: Broccoli brown; belly with a grayish wash, becoming nearly black in front of vent; vertical fins dusky; paired fins grayish.

*Type*.—Cat. No. 74152, U.S.N.M., 7.9 cm. in length, taken with a beam trawl at station 5214 (lat.  $12^{\circ} 25' 18''$  N.; long.  $123^{\circ} 37' 15''$

E.), east of Masbate Island, at a depth of 218 fathoms, on a bottom of green mud.

The characters of this species agree quite closely with those given for the genus *Bythites*, the main difference appearing to be the presence of scales on cheek, opercle, and top of head posteriorly. These are inconspicuous and might easily be overlooked.

**XENOBYTHITES** Smith and Radcliffe, new genus.

Body relatively short, covered with small, thin scales. Head high depressed anteriorly, cheeks and opercles covered with small, inconspicuous scales; a few small cilia scattered over naked portions of head; bones of skull firm; snout low; upper jaw very slightly overhanging lower; narrow bands of slightly unequal villiform teeth on jaws and palatines; patch on vomer arched, the teeth mainly in 2 rows; eyes lateral; opercle armed with a slender spine; margin of preopercle armed with 5 or 6 spines, portion between spines incised; lateral line inconspicuous, interrupted in the middle, the two parts overlapping the same vertical. Branchiostegals 8; gill-filaments short; 6 developed gill-rakers on first arch; pseudobranchiæ consisting of 2 small filaments; a short, thick, flap-like appendage on each side of the pylorus. Vertical fins united, dorsal about 85, anal about 72; ventrals absent; tips of clavicles apparently not united; pectorals simple. Species viviparous.

*Type of the genus.*—*Xenobythites armiger*, new species.

**XENOBYTHITES ARMIGER** Smith and Radcliffe, new species.

Plate 16, fig. 4.

Dorsal about 85; caudal 8; anal 72; pectorals 22.

Head 3.23 (3.47 in total length), short, depressed anteriorly, very strongly arched posteriorly, considerably deeper than broad, naked portions covered with small, scattered cilia; suborbital porous; body short, deep, strongly compressed posteriorly, belly decurved; greatest depth 3.64 (3.90 in total length); eye 5.50 in head, 1.32 in snout, 1.9 in interorbital, circular, lateral, but situated close to dorsal surface; snout 4.15, dorsal contour longitudinally very oblique, laterally evenly rounded; mouth broad, oblique, lower jaw slightly included; maxillary 2, extending about 0.5 an eye diameter beyond vertical from posterior margin of eye, the upper margin slipping under suborbital, the posterior end expanded, about as wide as eye; bands of slightly unequal villiform teeth on jaws and palatines; patch on vomer arched, mainly in 2 rows; interorbital 2.90, broad, slightly convex; opercle armed with a single slender spine; preopercle armed with 5 or 6 small, sharp spines, the portion between spines incised; pseudobranchiæ consisting of 2 small filaments; gill-filaments short; 6 developed gill-rakers on first arch; branchiostegals 8; tips of clavicular bones

apparently free; a broad flap-like appendage on each side of the pylorus; scales persistent; cheeks and opercles covered with small inconspicuous scales, rest of head naked; lateral line inconspicuous, interrupted in the middle, the two parts overlapping the same vertical.

Dorsal and anal continuous with the caudal; dorsal posterior in its insertion, its distance from tip of snout 2.15 (2.31 in total length); distance of anal from tip of snout 1.92 (2.06 in total length); caudal short, pointed; ventrals absent; pectoral 2 in head.

Color in alcohol: Clay color, becoming grayish ventrally; area in front of vent and median line of belly black; under side of head cream buff; fins translucent; peritoneum very dark seal brown.

*Type*.—Cat. No. 74153, U.S.N.M., 7.6 cm. in length, taken with a beam trawl at station 5504 (lat.  $8^{\circ} 35' 30''$  N.; long.  $124^{\circ} 36' 00''$  E.), in Macajalar Bay, Mindanao, at a depth of 200 fathoms, on a bottom of green mud.

A second example, 3.2 cm. in length, was taken at station 5624 (288 fathoms), near Makayan Island.

#### Genus HEPHTHOCARA Alcock.

HEPHTHOCARA CRASSICEPS Smith and Radcliffe, new species.

Plate 17, figs. 1 and 2.

Dorsal about 140; anal about 105; pectorals 19.

Head 4.85 in total length, very large, broad, and deep, its breadth about 0.75 its length, its depth about equal to its length; upper surface of snout nearly horizontal, nearly on a level with upper margin of eye, from this point the contour line rises very abruptly, the posterior part of head being much inflated; ventral contour line rather deeply convex; bones of head thin, smooth, covered with a thin, scaleless, gelatinous integument; body compressed, not as deep as head, tapering to a long slender filament; eye 6.44 in head, 1.78 in snout, 2.33 in interorbital, small, circular, the membrane bones surrounding it projecting rather strongly; snout 3.62, short, blunt, broader than long, depressed; mouth very broad and oblique, lower jaw included, its tip coterminous with incised toothless margin of upper jaw lying between ends of premaxillaries; maxillary 1.87, all except the lower posterior margin concealed by suborbital, reaching about 0.5 an eye-diameter beyond vertical from posterior margin of eye; a narrow band of small, unequal teeth with incurved tips on mandible; a broad band of villiform teeth on premaxillaries; teeth on vomer and palatines in very narrow bands; nostrils very large and conspicuous, the diameter of the aperture of posterior nostril being 0.5 as long as eye; interorbital 2.76, broad, flattened; opercle armed with a rather weak spine; preopercle unarmed; pseudobranchiae rudimentary; gill-filaments very short; gill-rakers 4 + 17, 3 near the angle about as long as eye, the others short, little produced; pyloric



cæca absent; lateral line indistinguishable; scales small, cycloid, deciduous, about 22 from origin of anal to dorsal.

Dorsal and anal continuous with the caudal; origin of dorsal from tip of snout 4.10 in total length; caudal very long and narrow (broken in the type); origin of anal from tip of snout 2.67; ventrals absent; pectoral 2.07, longer than snout plus eye.

Color in alcohol: Body russet, becoming dusky black on belly; the thin outer skin of head and fins clove brown; inside of gill-chamber and peritoneum dark clove brown.

*Type*.—Cat. No. 74154, U.S.N.M., about 28 cm. in length, taken with a beam trawl at station 5647 (lat.  $5^{\circ} 34' 00''$  S.; long.  $122^{\circ} 18' 15''$  E.), in Buton Strait, at a depth of 519 fathoms, on a bottom of green mud.

This species appears to be distinct from the poorly described and figured *H. simum* of Alcock.

#### Family CARAPIDÆ.

The types of *Snyderidia* Gilbert and *Pyramodon* (herein described) appear to have more characters in common with *Carapus* Rafinesque than with the type of *Lycodapus* Gilbert, and in our opinion belong in this family.

#### PYRAMODON Smith and Radcliffe, new genus.

This genus is distinguished from *Snyderidia* by the presence of ventral filaments; by the position of the vent and the origin of anal, which are farther cephalad under anterior dorsal rays, slightly behind vertical from axil of pectoral; by the shorter and deeper body; and by the larger, more nearly horizontal mouth.

The type of *Echiodon* Thompson is slenderer, more elongate, without ventral filaments, and without fang-like canines on the vomer.

*Type of the genus*.—*Pyramodon ventralis*, new species.

PYRAMODON VENTRALIS Smith and Radcliffe, new species.

Plate 17, fig. 3.

Dorsal about 140; anal about 140; caudal 4; ventrals 1; pectorals 26.

Head 6.43 in total length, pointed, compressed, arched, a slight concavity in upper profile above eye, posterior line of occiput midway between middle of eye and origin of dorsal; body deep, compressed, produced into a long slender tail, less attenuated than in *Snyderidia canina*; greatest body depth 6.76 in total length; eye 4.84, large, subcircular; snout equal to eye, low, narrow, laterally convex; mouth large, not as oblique as in *S. canina*, upper jaw overlapping lower except at tip; maxillary 1.70, extending 0.83 of an eye diameter beyond vertical from posterior margin of eye, channel on outer

face posteriorly shallower than in *S. canina*; a median row of small canine-like teeth on sides of mandible and a short inner and outer row of smaller teeth anteriorly; a short toothless space in front of lateral series and a pair of long, curved canines one on either side of symphysis at tip of mandible, fitting into a groove behind a pair of similar more widely separated fangs on upper jaw; a rather wide band of small cardiform teeth on sides of premaxillary, the inner row depressible; a long fang on head of vomer, a number of small, conical irregularly arranged teeth behind this; a single series of small conical teeth on palatines, anterior ones largest; fangs on left side of maxillary and mandible double; interorbital low, convex, its breadth equal to diameter of eye; opercle bearing 2 inconspicuous diverging ridges ending in a spine-like tip; margin of preopercle adnate in its upper half, free below, unarmed; pseudobranchiæ represented by 2 small filaments; gill-filaments short, 3 developed gill-rakers on anterior arch next the angle, small spinigerous tubercles along edge below these; gill-membranes separate, free from the isthmus; branchiostegals 7; pyloric cœca 2, one on either side of pylorus; skin thin, scaleless, smooth, lateral line absent; vent anterior, immediately in front of origin of anal, under origin of dorsal farther forward than in *S. canina*; stomach much distended, filled with the remains of a fish.

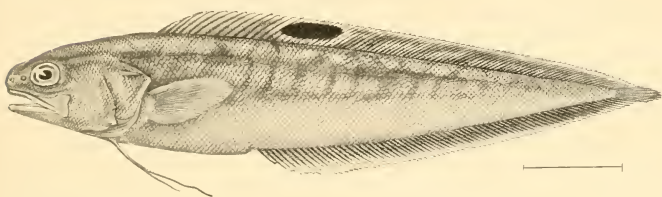
Dorsal and anal continuous with the caudal; origin of dorsal from tip of snout 5.02 in total length; dorsal rays shorter and weaker than those of the anal; anterior anal rays longest; origin of anal under second dorsal ray; ventrals present, each consisting of a slender filament, one-third the length of head; bases close together behind tip of humeral symphysis; pectorals broad, the median rays longest, nearly 1.33 times length of head. (In our example of *S. canina* the pectoral is also much longer than head; in the type the pectoral is said to be equal to head, but the rays are now broken, and their length can not be determined.)

Color in alcohol: Ochraceous-buff, dotted with small pigment spots smaller than in *S. canina*; belly more or less silvery; fins straw color; posterior rays of dorsal, anal, and adjacent part of the tail somewhat darker; peritoneum brownish black.

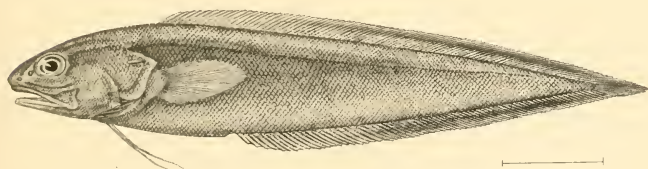
*Type*.—Cat. No. 74155, U.S.N.M., 19.6 cm. in length, taken with a beam trawl at station 5629 (lat. 00° 50' 00" S.; long. 128° 12' 00" E.), near Doworra Island, Dutch East Indies, at a depth of 205 fathoms, on a bottom of coral sand.



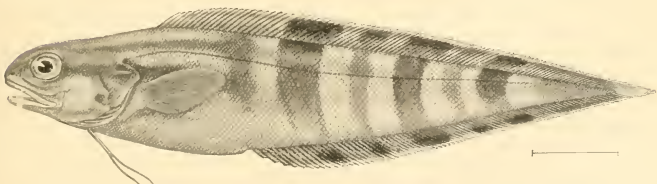
1. *NEOBYTHITES LONGIPES*. (PAGE 139.) FROM THE TYPE.



2. *NEOBYTHITES (WATASEA) UNIMACULATUS*. (PAGE 140.) FROM THE TYPE

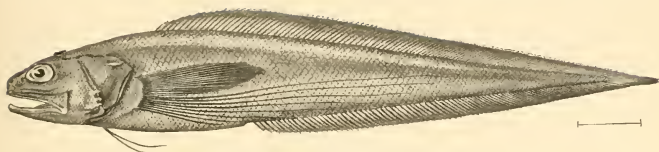


3. *NEOBYTHITES (WATASEA) PURUS*. (PAGE 141.) FROM THE TYPE.

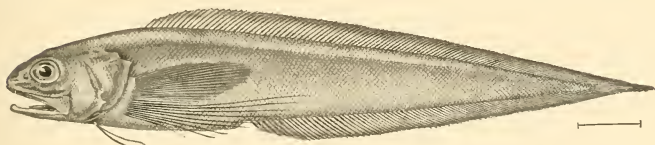


4. *NEOBYTHITES (WATASEA) FASCIATUS*. (PAGE 142.) FROM THE TYPE.

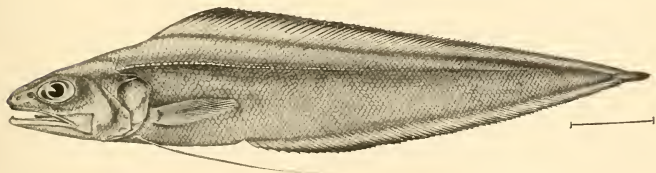




1. *DICROLENE LONGIMANA*. (PAGE 144.) FROM THE TYPE.

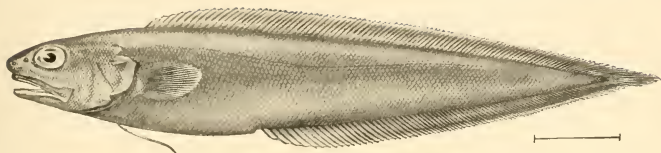


2. *DICROLENE TRISTIS*. (PAGE 145.) FROM THE TYPE.

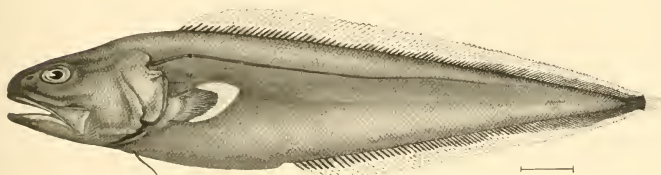


3. *HOMOSTOLUS ACER*. (PAGE 147.) FROM THE TYPE.

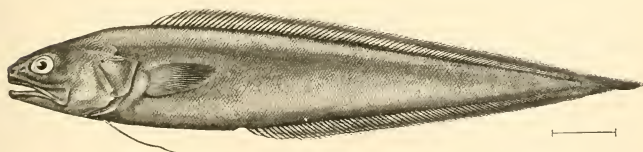




1. *MONOMITOPUS PALLIDUS*. (PAGE 148.) FROM THE TYPE.



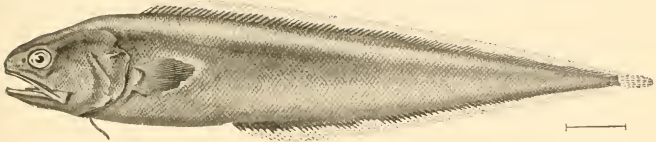
2. *MONOMITOPUS LONGICEPS*. (PAGE 149.) FROM THE TYPE.



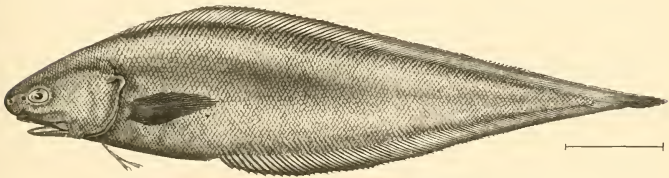
3. *MONOMITOPUS MICROLEPIS*. (PAGE 150.) FROM THE TYPE.



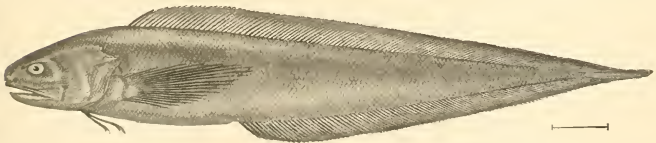




1. *MONOMEROPUS GARMANI*. (PAGE 151.) FROM THE TYPE.

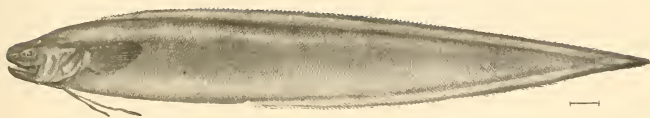


2. *BARATHRODEMUS NASUTUS*. (PAGE 152.) FROM THE TYPE.

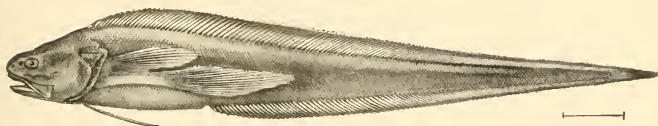


3. *BASSOGIGAS ÆQUATORIS*. (PAGE 153.) FROM THE TYPE.

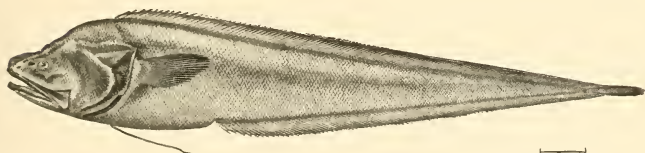




1. ENCHELYBROTULA PAUCIDENS. (PAGE 154.) FROM THE TYPE



2. ERETMICHTHYS REMIFER. (PAGE 155.) FROM THE TYPE.

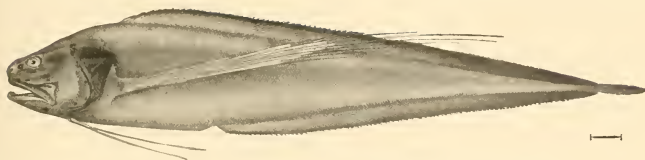


3 BASSOZETUS ROBUSTUS. (PAGE 156.) FROM THE TYPE.

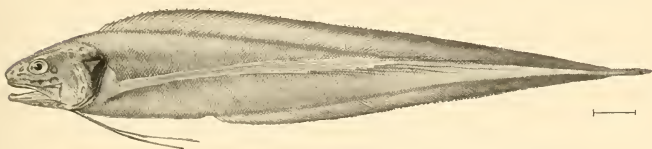


4 BASSOZETUS ELONGATUS. (PAGE 157.) FROM THE TYPE.

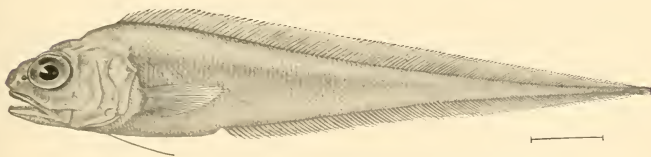




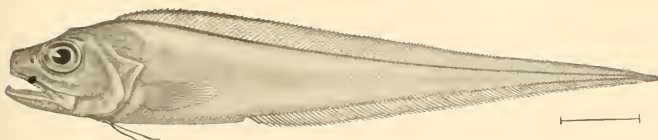
1. MASTIGOPTERUS IMPERATOR. (PAGE 159.) FROM THE TYPE.



2. MASTIGOPTERUS PRÆTOR. (PAGE 160.) FROM THE TYPE.



3. GLYPTOPHIDIUM LUCIDUM. (PAGE 161.) FROM THE TYPE.

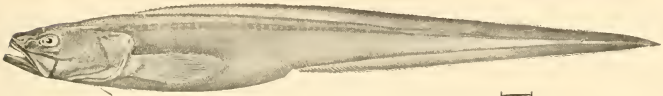


4. GLYPTOPHIDIUM OCEANIUM. (PAGE 162.) FROM THE TYPE.

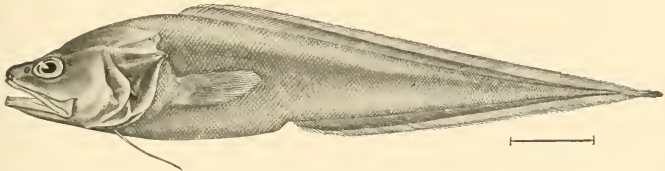




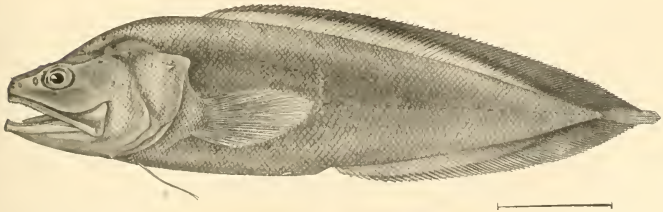
1. LAMPROGRAMMUS MACROPTERUS. (PAGE 163.) FROM THE TYPE.



2. HYOPLEURON CANINUM. (PAGE 165.) FROM THE TYPE.



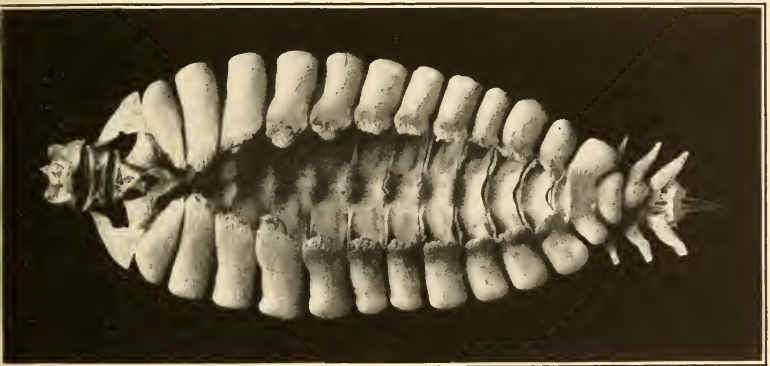
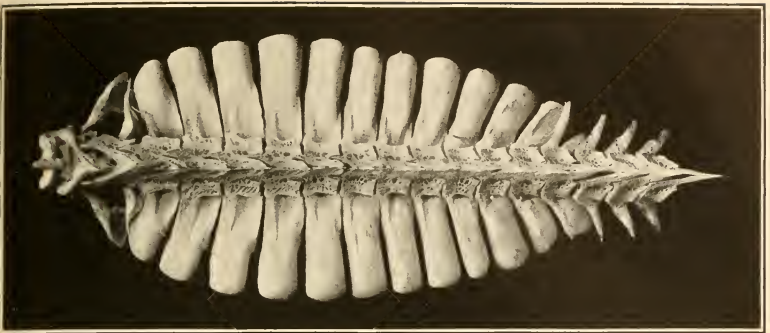
3. DIPLACANTHOPOMA (SARCOCARA) BRUNNEA. (PAGE 167.) FROM THE TYPE.



4. GRAMMONUS ROBUSTUS. (PAGE 168.) FROM THE TYPE.

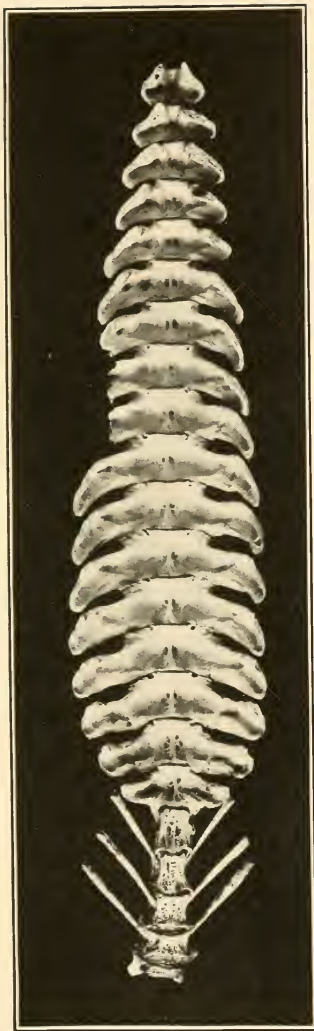






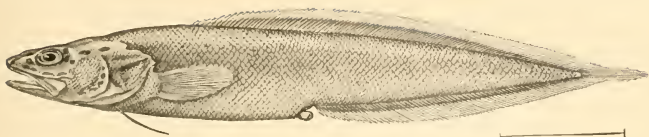
ABDOMINAL VERTEBRÆ OF HYPOPLEURON CANINUM. DORSAL, VENTRAL, AND LATERAL VIEWS.  
NATURAL SIZE. (PAGE 165.)



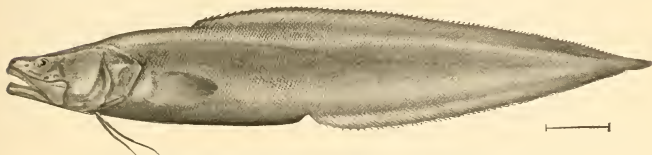


ABDOMINAL VERTEBRÆ OF MERLUCCIUS PRODUCTUS. VENTRAL AND LATERAL VIEWS. NATURAL SIZE. (PAGE 165.)

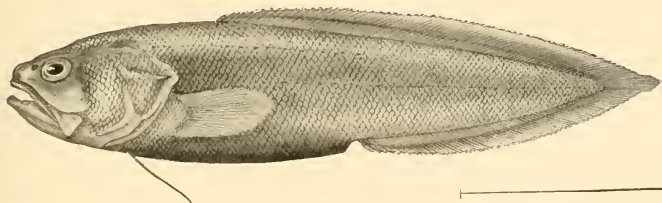




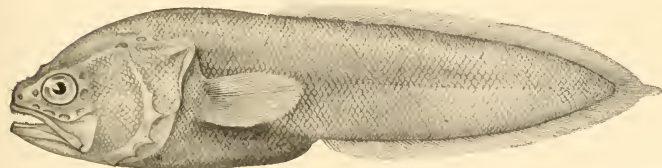
1. CATÆTYX PLATYCEPHALUS. (PAGE 169.) FROM THE TYPE.



2. LUCIBROTULA BARTSCHI. (PAGE 171.) FROM THE TYPE.



3. BYTHITES LEPIDOGENYS. (PAGE 172.) FROM THE TYPE.

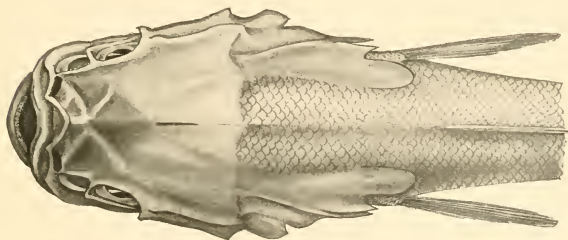


4. XENOBYTHITES ARMIGER. (PAGE 173.) FROM THE TYPE

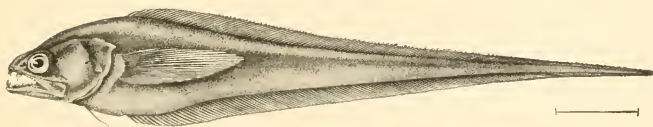




1. HEPHTOCARA CRASSICEPS. (PAGE 174.) FROM THE TYPE.



2. HEPHTOCARA CRASSICEPS. (PAGE 174.) DORSAL VIEW.



3. PYRAMODON VENTRALIS. (PAGE 175.) FROM THE TYPE.

