

DESCRIPTIONS OF A NEW FAMILY, TWO NEW GENERA,  
AND TWENTY-NINE NEW SPECIES OF ANACANTHINE  
FISHES FROM THE PHILIPPINE ISLANDS AND CON-  
TIGUOUS WATERS.

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In the present paper there are described the new fishes of the order Anacanthini obtained on the Philippine cruise of the fisheries steamer *Albatross*. The families represented are the Gadidæ, Macrouridæ, Macrouroididæ (new), and Ateleopodidæ, the last being placed provisionally in this order.

Family GADIDÆ.

Genus PHYSICULUS Kaup.

PHYSICULUS NIGRESCENS Smith and Radcliffe, new species.

Plate 22, fig. 1.

Dorsal 8-66; anal 72; ventrals 6; pectorals 23; scales about 9+25-100.

Head 4.12 (4.56 in total length), depressed, as broad as deep, broadly rounded from shoulders to snout; body compressed, tapering rapidly posteriorly to a very narrow peduncle, greatest depth 5.15 (5.70 in total length); eye rather small, subcircular, 4.80 in head, 1.44 in snout, 1.52 in interorbital; snout 3.33, broad, blunt, and rounded at the end; mouth large, oblique, lower jaw included; maxillary 2.06, barely reaching vertical from posterior margin of orbit; bands of villiform teeth on jaws; vomer and palate edentulous; interorbital 3.43, broad and flat; nostrils small, close together, immediately in front of eyes; barbel small, about five-twelfths diameter of eye; pseudobranchiæ absent; gill-rakers on first arch short, 3+13; vent situated at one-third of the distance from origin of anal to base of ventrals; scales small, covering head and body, lateral line arched anteriorly.

<sup>1</sup> In the study of this collection the writer has had the assistance of Dr. Hugh M. Smith, who assumes joint authority for the new forms described.

Anterior dorsal low, longest ray a little longer than snout; second dorsal close to first, lower in the middle, the longest rays being near the caudal, tips of posterior rays reaching base of caudal; caudal long, narrow, posterior margin rounded; anal similar to second dorsal, its distance from tip of snout slightly less than one-third the distance from base of caudal; ventrals 1.30 in head, small, far apart, tip of longest ray reaching base of seventh anal ray; pectorals 1.43 in head, as long as part of head behind anterior margin of pupil.

Color in alcohol: Ground color brownish black with silvery reflections, lightest on top of head and sides of body posteriorly, darkest on belly, the latter has a bluish cast and metallic reflections; vertical fins dusky, margins and basal portions somewhat darker; paired fins buff, their axils black; peritoneum and an area on posterior part of gill chamber silvery white.

*Type*.—Cat. No. 72923, U.S.N.M., 27.4 cm. in length, taken with a beam trawl at station 5296 (lat.  $13^{\circ} 40' 09''$  N.; long.  $120^{\circ} 57' 45''$  E.), in Verde Island Passage, at a depth of 210 fathoms, on a bottom of mud and sand.

From our examples of *P. japonicus* Hilgendorf, which agree with an example from Kagoshima, Japan, identified by Smith and Pope, *P. nigrescens* appears to be distinct, separable on the greater number of rays in the anal (66 to 72 in *nigrescens*, 58 to 65 in *japonicus*), much lower first dorsal, longer pectorals and ventrals, smaller barbel, smaller eye, longer snout, broader interorbital, and darker coloration. From Hilgendorf's meager description of the type of *japonicus* it differs in having the head longer, the interorbital broader, the first dorsal shorter, and the anal longer. *P. edelmanni* Brauer is very similar in form but has a shorter head, no barbel, only 5 ventral rays, 20 pectoral rays, and is of lighter coloration.

### Family MACROURIDÆ.

#### Subfamily BATHYGADINÆ.

Our observations do not agree with those of Mr. Regan<sup>1</sup> as to the position of the coracoid foramen in *Gadomus* and *Melanobranchus*. In one of the types of *G. longifilis* (Goode and Bean) and in our examples of *G. multifilis* (Gunther)<sup>2</sup> from the Philippines the coracoid foramen is not within the substance of the hypercoracoid, but between the hypercoracoid and hypocoracoid as in the gadoids. From the foramen a shallow but distinct fossa extends obliquely toward center of each coracoid bone, its breadth and depth decreasing posteriorly. In some individuals more of the foramen lies within the hypercora-

<sup>1</sup> Regan, Ann. Mag. Nat. Hist., ser. 7, vol. 11, 1902, No. 65, p. 459, fig. 2A.

<sup>2</sup> We consider these species distinct, separable on the smaller number of pectoral rays in the former. *B. furvescens* Alcock is also distinct, belonging to the genus *Regania* Jordan.

coid than within the hypocoracoid, careful dissection being necessary to show its true position. In *Melanobranchus antrodes* Jordan and Gilbert the foramen lies on the edge of the hypercoracoid, and does not encroach on the substance of the hypocoracoid; there is a shallow fossa leading from the foramen in the former bone but none in the

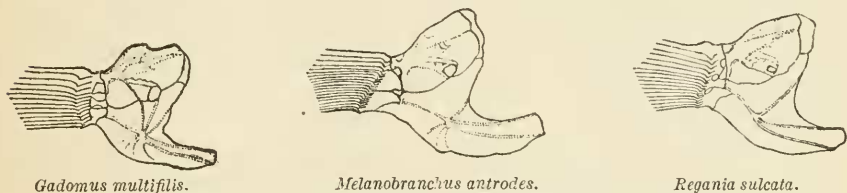


FIG. 1.—POSITION OF CORACOID FORAMEN IN CERTAIN MACROURIDS.

latter. In the species of *Regania* examined the foramen lies within the substance of the hypercoracoid, close to or at some distance from the suture between the coracoid bones; the portion above and behind the aperture is somewhat thinner, but does not form as distinct a fossa as in other forms.

#### Genus REGANIA Jordan.

REGANIA FILAMENTOSA Smith and Radcliffe, new species.

Plate 22, fig. 2.

Dorsal II,10-107; anal 90; ventrals 8; pectorals 14.

Head 5.34 in total length, broad, depressed anteriorly, cavernous, greatest breadth slightly exceeding length of snout plus eye; body slender, tapering, greatest depth 7.58 in total length; length of head and trunk 3.36; vent close to origin of anal; tail slender, compressed; eye 4.30 in head, 1.34 in snout, 1.52 in interorbital, small; interorbital 2.81, broad, flattened, with a low central depression; snout 3.22, broad, blunt, depressed, with a low median ridge; nostrils close to eye, the anterior small, circular, the posterior large, slit-like; mouth large, terminal, slightly oblique; maxillary 1.61, extending beyond vertical from hinder margin of eye for one-half an eye diameter; mandible included, shutting within premaxillary band of teeth; mandibular barbel absent; narrow bands of small, slightly depressible teeth in jaws; vomer and palatines toothless; opercle terminating in a slender spine; gills 4, a small slit behind the fourth; outer set of gill-rakers long and slender, 5+20; pseudobranchiæ absent; coracoid foramen small, situated at some distance from the edge of the hypercoracoid, a shallow fossa extending backward from its aperture toward center of bone; scales small, deciduous, unarmed, concentric striæ well developed, lateral line arched anteriorly, becoming median posteriorly.

Origin of dorsal over base of pectorals; first spine small, concealed second elongate, filiform, 2.70 in total length; rays of first dorsal

forked and articulated; interval between dorsals scarcely wider than space separating successive rays; anterior rays of second dorsal much higher than those of anal, longest 2.81 in head; outer ventral ray elongate, filiform, 2.70 in total length; second pectoral ray elongate, filiform, as long as longest ventral ray; base of ventrals midway between tip of mandible and vent.

Color in alcohol: Ground color wood-brown; top of head light gray; inside of opercle and mouth, and under side of head blackish, with silvery reflections; vertical fins dusky gray; paired fins somewhat darker.

*Type*.—Cat. No. 72924, U.S.N.M., 24.2 cm. in length, taken with a beam trawl at station 5587 (lat.  $4^{\circ} 10' 35''$  N.; long.  $118^{\circ} 37' 12''$  E.), near Sipadan Island, west coast of Borneo, at a depth of 415 fathoms, on a bottom of green mud, sand, and coral.

This species resembles *Melanobranchnus micronemus* Gilbert from the Hawaiian Islands in form, but differs in having the interorbital much broader, 1.5 times width of eye, fewer pectoral rays, coracoid foramen within the substance of the hypercoracoid, and no mandibular barbel. There are 3 examples of this species in the collection, the second a cotype, and the third from station 5650, taken at a depth of 540 fathoms.

REGANIA SULCATA Smith and Radcliffe, new species.

Plate 22, fig. 3.

Dorsal 11, 10–105; anal 88; ventrals 9; pectorals 16.

Head 4.85 in total length, cavernous, mucous canals large, membranous covering thin, dorsal surface with a higher arch than in *R. nipponica* Jordan and Gilbert from Japan, greatest width equal to length of snout plus eye; body stout, greatest depth at origin of dorsal 6.60 in total length; length of head and trunk 2.84; vent separated from origin of anal by a distance equal to diameter of pupil; tail tapering, compressed; eye 3.96, large, subelliptical; interorbital 4.77 in head, 1.20 in eye, flattened; snout about as long as eye, depressed, blunt, with a conspicuous knob at tip; nostrils close to eye, the anterior small, circular, the posterior large, elliptical; mouth large, terminal, slightly oblique; maxillary 1.82, truncate at tip, extending slightly beyond vertical from hinder margin of eye; mandible pointed, shutting entirely within premaxillary band of teeth; mandibular barbel rudimentary, represented by a slight knob; narrow bands of small depressible teeth in jaws, a toothless space at symphysis of upper jaw equal in width to 0.75 diameter of pupil; palate toothless; opercle armed with two sharp, slender spines, the first above, the second below, base of pectoral, the latter not reaching edge of opercle; gills 4, a long slit behind the fourth; outer set of gill-rakers long and slender, 5+16; pseudobranchiæ absent; coracoid foramen small,



situated near the edge of the hypercoracoid, a shallow fossa extending backward toward center of bone; scales small, deciduous, unarmed, striæ well developed; 9 scales from last dorsal ray to and including lateral line; lateral line arched anteriorly, becoming median at a distance from tip of opercle equal to length of head.

First dorsal spine small, concealed, above base of pectoral, second about 0.33 length of head, rays of first dorsal forked at tip and articulated; interval between dorsals scarcely greater than space separating successive rays; second dorsal rays much better developed than those of anal; base of ventrals an eye diameter nearer origin of anal than tip of snout, outer ventral ray 1.72, slightly longer than remaining rays; pectoral about 1.33.

Color in alcohol: Ground color chocolate; scales, top and sides of head grayish; edges of jaws and opercle, inside of opercle and mouth, and fins brownish black.

*Type*.—Cat. No. 72925, U.S.N.M., 44 cm. in length, taken with a beam trawl at station 5423 (lat.  $9^{\circ} 38' 30''$  N.; long.  $121^{\circ} 11' 00''$  E.), near Cagayan Island, Jolo Sea, at a depth of 508 fathoms, on a bottom of gray mud and coral sand.

This species resembles *R. nipponica* Jordan and Gilbert, from Japan. In the Philippine form the interorbital is much narrower, being less than or equal to horizontal diameter of eye, and the eye is larger, less than 0.25 length of head. Our specimens were taken at depths of 182 to 508 fathoms.

Subfamily MACROURINÆ.

Genus HYMENOCEPHALUS Giglioli.

HYMENOCEPHALUS LONGIPES Smith and Radcliffe, new species.

Plate 23, fig. 1.

Dorsal 11, 10–100; anal 101; ventrals 8; pectorals 15.

Head 5.65 in total length, pointed, elongate, slightly resembling that of *H. longibarbis* (Günther), crests and membranes roofing the canals firmer than in related species, middle length of head at posterior margin of pupil, breadth of head 1.88 in its length; body arched, greatest depth, at origin of first dorsal, 7 in total length; tail long, tapering; eye 2.95, subcircular, orbital rims not as markedly expanded as in related species; interorbital 5, narrow, rugose; snout 3.69, nearly as long as eye, rather pointed; nostrils close to eye, a narrow membranous strip of skin separating the two apertures; suborbital very narrow, its width less than diameter of pupil; mouth large, slightly oblique, lower jaw included; maxillary 1.68, extending slightly beyond vertical from posterior margin of eye; mandibular barbel absent; teeth in jaws small, villiform, in narrow bands; gill membranes forming a free fold across the isthmus; no traces of pseu-

dobranchiæ discernible: scales large, 3 rows from last dorsal ray to and including lateral line, exposed portion of each scale armed with small slightly procumbent spinules, these quite regular in their arrangement; region below and behind pectoral base naked, belly scaled; a triangular area, with well-marked striæ, its apex below base of pectorals, extending down to and including base of ventrals.

Tip of snout to origin of dorsal 5.15 in total length; first dorsal spine minute, second 1.20 in head, longer than adjacent soft rays; interdorsal space 7.61 in total length; second dorsal low; tip of tail broken, provided with five rays; tip of snout to origin of anal 3.50; tip of snout to origin of ventrals 5.22, the outer ventral rays greatly produced, the longest 3.57 in total length; pectoral 1.55 in head.

Color in alcohol: Ground color, brownish buff, minutely dotted with darker brown; an indistinct silvery band along middle of side; snout, inside of mouth, angle of mouth, and a narrow line along mandible whitish; cheek and preopercle silvery; opercle posteriorly blackish, margin lighter; front margin of first dorsal blackish; second dorsal and anal whitish, each ray with a distinct black dot at base; distal half of ventral rays, with the exception of the two inner rays, black, rest of fin whitish, base black; pectorals white, black dots on upper axil; region around vent blackish, area in front of this silvery.

*Type*.—Cat. No. 72926, U.S.N.M., 17.5 cm. in length, taken with a beam trawl at station 5421 (lat.  $10^{\circ} 33' 30''$  N.; long.  $122^{\circ} 26' 00''$  E.), between Panay and Guymaras at a depth of 137 fathoms, on a bottom of green mud.

This species differs from other described forms not provided with a mandibular barbel in the elongate snout and produced ventral rays.

*HYMENOCEPHALUS TORVUS* Smith and Radcliffe, new species.

Plate 23, fig. 2.

Dorsal 11.8-102; anal 97; ventrals 7; pectorals 14.

Head 5.81 in total length, closely resembling our examples of *H. striatissimus* Jordan and Gilbert; as in that species the crests are all very thin and papery and the membranes roofing the canals very delicate and easily ruptured; the middle length of head lies immediately behind posterior margin of pupil; body not strongly arched, depth 7.12 in total length; tail tapering abruptly, slender, elongate; eye 2.75, large, circular, orbital rims greatly expanded; interorbital 2.90, much broader than in *H. longipes*; snout 4.23, short, blunt, median ridge not greatly projecting above level of interorbital space; nostrils close to eye as in related species; suborbital broader than in *H. longipes*, breadth at narrowest point about equal to diameter of pupil; mouth moderate, slightly oblique, lower jaw included; maxillary 1.83, barely reaching vertical from posterior margin of eye;

mandibular barbel present, small, as long as diameter of pupil; narrow villiform bands of teeth in jaws; gill membranes forming a free fold across the isthmus; no traces of pseudobranchiæ discernible; scales small, deciduous, 6 rows from last dorsal ray to and including lateral line; lateral line arched anteriorly; striated area above ventral base extending upward nearly to base of pectorals.

Tip of snout to origin of dorsal 5.32 in total length; first dorsal spine minute, second dorsal spine 1.15 in head, longer than adjacent soft rays; interdorsal space 6.72 in total length; second dorsal low; tip of snout to origin of anal 3.47; anal rays longer than soft dorsal rays; tip of snout to origin of ventral 5.50; outer ventral ray with a filamentous tip, 1.25 in head; pectoral 1.37.

Color in alcohol: Ground color, brownish buff, sides minutely dotted with darker brown; traces of a silvery band along middle of side; belly and under side of head blackish with metallic glints; snout, angle of mouth, and narrow line along mandible whitish; cheek and preopercle silvery; suborbital silvery, with darker shades underneath; opercle blackish, with silvery glints; insertion of dorsal and second spine blackish, distal half of soft rays dusky, basal half whitish; each ray of second dorsal and anal with a black spot at base; first anal ray blackish; ventrals and pectorals dusky black, their bases black.

*Type*.—Cat. No. 72927, U.S.N.M., 16 cm. in length, taken with a beam trawl at station 5548 (lat. 6° 00' 20" N.; long. 120° 45' 35" E.), near Jolo, at a depth of 232 fathoms, on a bottom of sand and broken shells.

This species is very close to Philippine examples of *H. striatissimus*, differing in having 7 (rarely 6) instead of 8 (rarely 9) ventral rays and in its darker coloration. These characters appear to be constant for the entire series of specimens in the collection.

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

Plate 23, fig. 3.

Dorsal 11,10–138; anal 135; ventrals 8; pectorals 15.

Head 5.27 in total length, low, pointed, elongate, resembling *H. longibarbis*; crests firmer than in *H. torvus*, and membranes lining the canals less easily ruptured; middle length of head slightly in front of posterior margin of orbit, breadth of head 1.86 in its length; depth of body 7.71 in total length, back moderately arched, greatest depth being at origin of first dorsal; tail slender, elongate; eye 3.28, subcircular, orbital rims not as prominent as in *H. torvus*; interorbital 5.86, very narrow; snout 4.10, longer than in any of the other Philippine species, pointed, scarcely protruding beyond tip of premaxillary; nostrils as in related species; suborbital very narrow, its width equal to about 0.5 diameter of pupil; mouth large, oblique, lower jaw

included; maxillary 1.78, extending beyond vertical from posterior margin of eye for a distance equal to about one-half diameter of pupil; mandibular barbel 2.15 in head, very long and slender; teeth small, villiform in narrow bands, a toothless space at tip of upper jaw about 0.4 of diameter of pupil in width; gill membranes forming a free fold across the isthmus; no traces of pseudobranchiæ discernible; scales large, deciduous, 5 rows from last dorsal ray to and including lateral line; middle of belly between vent and ventrals naked.

Tip of snout to origin of dorsal 5 in total length; first dorsal spine minute, second 1.37 in head, longer than adjacent soft rays; interdorsal space 6.35 in total length; second dorsal low; tip of snout to origin of anal 3.10, anal rays much better developed than those of second dorsal; tip of snout to origin of ventral 5; outer ventral ray 4.80 in total length, long, filamentous; pectoral 1.71 in head.

Color in alcohol: Ground color, ochraceous-buff; region below middle line of side with silvery reflections; region around and below the first dorsal dusky; snout, angle of mouth, and a narrow line along mandible whitish; roof of mouth, suborbital, cheek and preopercle silvery; opercle, under side of head and body blackish, with silvery reflections; a striated area above ventral base extending backward on median line of belly to vent; vertical fins brownish; a black spot at base of each ray of second dorsal and anal; paired fins dusky, black at base.

*Type*.—Cat. No. 72928, U.S.N.M., 21.6 cm. in length, taken with a beam trawl at station 5459 (lat. 13° 10' 21'' N.; long. 123° 59' 54'' E.), off southeastern Luzon, at a depth of 201 fathoms.

This species resembles *H. longibarbis* Günther, and may prove to be identical with it. In the Philippine species the snout and maxillary are longer and the eye smaller than in Günther's figure, and there are more dorsal and pectoral rays. It differs from *H. longipes* in having a well developed barbel, longer snout, slightly narrower interorbital, more rays in the second dorsal and anal, and the rays adjacent to outer ventral ray shorter.

#### Genus MACROURUS Bloch.

Some of the species included in the present genus possess characters showing relationship to the genus *Coryphænoides*, but the intergradation of characters among the species is so gradual that we have failed to discover any satisfactory line of separation. The contention of Garman<sup>1</sup> that the generic term *Coryphænoides* based on *C. rupestris* of Gunner (1765) should supersede *Macrourus* of Bloch (1787) seems well founded. The retention of the generic name *Macrourus* is provisional.

<sup>1</sup> Garman, Deep-Sea Fishes, 1899, p. 194.



## MACROURUS LUCIFER Smith and Radcliffe, new species.

Plate 24, fig. 1.

Dorsal II, 11-140; anal about 175; ventrals 7; pectorals 18.

Head 6.50 in total length, 1.25 in distance from tip of snout to anal fin, short, compressed, blunt anteriorly, its greatest depth nearly equaling its length, breadth 1.78 in its length; region over anterior part of eye slightly concave, strongly arched posteriorly; body deep, compressed, region in front of dorsal strongly arched, greatest depth at origin of dorsal, 6 in total length; vent slightly nearer first anal ray than insertion of ventrals; tail long, slender, tapering posteriorly; eye 2.91 in head, circular, longer than snout; interorbital 2.58, slightly convex, wider than eye; snout 3.53, short, blunt, evenly rounded, slightly projecting beyond mouth; supranarial and sub-orbital ridges very inconspicuous; anterior nostril circular, with slightly raised margin, posterior slit-like; mouth moderate, as broad as long; maxillary 2.58, reaching vertical from middle of pupil; teeth small, subconical, not very closely set, outer row in upper jaw scarcely enlarged; barbel short, rather stout, equal to diameter of pupil; scales small, about 14 from origin of dorsal to and including lateral line, 10 from last dorsal ray to and including lateral line, exposed portion of each scale armed with many small, slender, hair-like prickles; a conspicuous pearly, lens-like body, about .75 pupil, embedded on the ventral surface between base of ventrals.

Tip of snout to origin of dorsal 5.41 in total length; first dorsal spine minute, second dorsal spine 1.34, curved, armed, except for a short distance at base, with many small, pointed, spinules; longest dorsal ray 1.26; interdorsal space 2.40; rays of second dorsal inconspicuous anteriorly, more distinct posteriorly; anal better developed, its origin under base of first ray of first dorsal; ventrals 3.04, small, tips reaching beyond insertion of anal; pectoral 1.42.

Color in alcohol: Back fawn-color; sides wood-brown; dorsal dusky, a large black spot on distal margin; second dorsal and anal cream anteriorly, distal 0.4 blackish; ventrals, region around luminous organ and vent, blackish; pectorals dusky.

*Type*.—Cat. No. 72929, U.S.N.M., 21.7 cm. in length, taken with a beam trawl at station 5516 (lat.  $8^{\circ} 46' 00''$  N.; long.  $123^{\circ} 32' 30''$  E.), near Point Tagolo, Mindanao, at a depth of 175 fathoms, on a bottom of globigerina ooze.

Eight examples were taken at station 5519 at a depth of 182 fathoms.



## MACROURUS NIGROMARGINATUS Smith and Radcliffe, new species.

Plate 24, fig. 2.

Dorsal II,10-(about)110; anal about 100; ventrals 10; pectorals 20.

Head 5.64 in total length, 1.40 in distance from tip of snout to anal fin, rather blunt anteriorly, compressed, breadth about 0.5 its length, bones rather firm, ridges inconspicuous; body arched, compressed, greatest depth at origin of dorsal 6.20 in total length; vent just behind base of ventrals; tail short, tapering; eye 3.08 in head, subcircular, longer than snout; interorbital 4, flattened; snout 3.64, short, blunt, rounded, projecting but little beyond mouth, its height at tip about 0.8 diameter of eye; mouth of moderate size; maxillary 2.67, reaching vertical from middle of eye; teeth of moderate size, subconical, outer row in upper jaw enlarged; barbel stout, 0.8 diameter of eye in length; scales small, about 12 from origin of dorsal to and including lateral line, exposed portion of each scale armed with long, slender spinules, normally arranged in about 6 to 8 nearly parallel rows; spinules larger, in smaller number, and more regular in their arrangement than in *M. macronemus*; lateral line prominent, arched anteriorly, becoming median above tenth anal ray.

Tip of snout to origin of dorsal, 5.15 in total length; second dorsal spine as long as head, armed with about 15 spinules; interdorsal space 1.45 in head; origin of anal behind base of first dorsal, its anterior rays as long as eye, much better developed than those of second dorsal; outer ventral ray 1.68 in head, not greatly produced beyond adjacent rays; pectoral 1.60.

Color in alcohol: Ground color light clay; region below pectorals blackish underneath; scales of this region smoke-gray; dorsal spines and anterior rays dusky black, posterior rays straw-colored; anal straw-colored; distal half of first 7 rays black, tips of anterior ventral rays blackish, remaining rays dusky; pectoral dusky, axil blackish.

*Type*.—Cat. No. 72930, U.S.N.M., 18 cm. in length, taken with a beam trawl at station 5569 (lat. 5° 33' 15'' N.; long. 120° 15' 30'' E.), near Simaluc Island, at a depth of 303 fathoms, on a bottom of coral sand.

Among the examples of this small species are several females with well-developed eggs. The black markings on dorsal, anal, and ventrals are distinctive, and in some examples are much more distinct than in the type.

## MACROURUS MACRONEMUS Smith and Radcliffe, new species.

Plate 24, fig. 3.

First dorsal 11,8; ventrals 9-11; pectorals 21.

Head 6.83 in total length, 1.36 in distance from tip of snout to anal fin, rather blunt anteriorly, deeper than broad, breadth about 0.5 its length, dorsal profile relatively straight, ascending to base of dorsal; body somewhat arched, compressed, greatest depth at origin of dorsal; 7.80 in total length; vent just behind base of ventrals; tail long, slender, thread-like; eye 3.33 in head, circular, longer than snout; interorbital 4, nearly flat; snout 3.85, short, blunt, without prominent tubercles, projecting but little beyond mouth, its height at tip about 0.75 diameter of eye; nostrils close to eye, anterior circular, posterior slit-like, nearly as long as pupil; mouth well developed, lips thick, fleshy; maxillary 2.63, reaching vertical to posterior margin of pupil; teeth rather large, outer row in upper jaw considerably enlarged, teeth in lower jaw well developed, narrowing posteriorly to a single row; barbél distinct, about 0.6 diameter of eye in length; scales small, about 13 from origin of dorsal to and including lateral line, exposed portion of each scale densely packed with long, stout spinules, some of which extend beyond free margin of scales; lateral line conspicuous, arched anteriorly.

Tip of snout to origin of dorsal 5.61 in total length; first dorsal spine small, second nearly as long as head, armed with small, widely set spinules; interdorsal space 3.12 in head; origin of anal behind first dorsal, its rays better developed than those of the second dorsal; outer ventral ray long, filamentous, about 0.14 total length, 9 ventral rays on left side, 11 on the right side; pectoral 1.72 in head.

Color in alcohol: Ground color walnut brown, scales smoke gray; region below pectorals slightly darker than rest of body; branchiostegal membranes blackish; vertical fins dusky black, paired fins very dark.

*Type*.—Cat. No. 72931, U.S.N.M., 34.3 cm. in length, taken with a beam trawl at station 5424 (lat.  $9^{\circ} 37' 05''$  N.; long.  $121^{\circ} 12' 37''$  E.), near Cagayan Island, Jolo Sea, at a depth of 340 fathoms, on a bottom of coral sand.

## MACROURUS PARADOXUS Smith and Radcliffe, new species.

Plate 25, fig. 1.

Dorsal 11,9-100; anal 105; ventrals 9; pectorals 19 and 21.

Head 5.10 in total length, large, deeper than broad, its breadth 1.80 in its length; depth of body 5.78, back slightly arched, greatest depth being at origin of dorsal; vent immediately in front of anal; tail rapidly tapering, elongate; eye 4.60 in head, 1.12 in snout; interorbital 3.98, its breadth greater than horizontal diameter of eye,

flat; snout 4.12, blunt at tip, not projecting beyond tip of upper jaw, its height at this point above premaxillary about 0.5 its length, a small protruding tubercle at its extreme tip, traces of lateral tubercles; nostrils close to eye, anterior circular, posterior slit-like; suborbital about 0.75 diameter of eye in width; median ridge indistinct, not reaching angle of preopercle; mouth large, slightly oblique, tip of lower jaw included; maxillary 2.35, barely reaching vertical to posterior margin of pupil; mandibular barbel large, equal to diameter of eye in length; upper jaw with an outer row of small canine-like teeth and an inner villiform band of small teeth, a single row of small canines and an outer series of smaller irregularly set teeth on mandible, mandibular teeth smaller, in about three series in front of mouth, narrowing to a single row posteriorly, bearing a strong resemblance to the arrangement found in species of *Chalinura*, no teeth on vomer or palatines; gill membranes attached to isthmus; opening of last gill-slit small; scales large, distinct, 9 rows from insertion of dorsal to and including lateral line, 7 rows from last ray of first dorsal, 34 between middle of dorsal and vent; free portion of each scale armed with well-developed spinules irregularly arranged; spinules on the scales of head arranged more regularly in about 12 radiating lines.

Tip of snout to origin of dorsal 4.30 in total length; first dorsal spine small, second 1.80 in head, basal portion smooth, small spinules on distal portion; rays of second dorsal anteriorly small, not connected with one another by membrane, gradually growing longer to middle of fin, then gradually becoming shorter, longest ray about 0.4 diameter of eye; tip of snout to origin of anal 3.50 in total length; anal rays much better developed than those of second dorsal; tip of snout to origin of ventrals 4.40 in total length; outer ventral ray 1.77 in head, filamentous at tip; pectoral 1.77.

Color in alcohol: Ground color, hair brown; fins seal-brown, posterior dorsal and anal rays much faded; free opercular membrane, margin of lips, membrane connecting nostrils, and peritoneum dark seal-brown.

*Type*.—Cat. No. 72932, U.S.N.M., 58.5 cm. in length, taken with beam-trawl at station 5428 (lat.  $9^{\circ} 13' 00''$  N.; long.  $118^{\circ} 51' 15''$  E.), off eastern Palawan, at a depth of 1,105 fathoms, on a bottom of gray mud.

MACROURUS MICROPS Smith and Radcliffe, new species.

Plate 25, fig. 2.

Dorsal 11,9-51; anal 70; ventrals 7; pectorals 19.

Head 5.12 in total length, long, pointed, compressed, its breadth less than 0.5 its length; dorsal profile from tip of snout to origin of dorsal nearly straight; body deep, compressed, greatest depth at origin of dorsal 5.18 in total length; vent close to origin of anal; tail

short, deep, compressed; eye 6.10 in head, 1.74 in snout, 1.23 in interorbital, small, subcircular; interorbital 4.94, convex; snout 3.50, rather blunt, projecting but little beyond mouth, terminal tubercles and suborbital ridge inconspicuous; mouth relatively large; lips fleshy; maxillary 3.23, barely reaching vertical to anterior margin of pupil; teeth long, slender, incurved, outer row of premaxillary teeth but little enlarged; scales large, 9 in a series from origin of dorsal to and including lateral line, 8 from last dorsal ray, exposed portion of each scale armed with rather weak recumbent spinules arranged in about 13 to 18 parallel series; lateral line conspicuous, not strongly arched anteriorly.

Tip of snout to origin of dorsal 4.22 in total length; first dorsal spine small, second long, whip-like, 2.30 in total length, traces of a few small spinules on anterior margin near base; interdorsal space about 0.18 length of head, less than base of first dorsal; anterior rays of second dorsal small, rather widely separated, not connected by membrane; rays posteriorly better developed; origin of anal behind origin of second dorsal, its distance from tip of snout 2.78 in total length, rays well developed; outer ventral ray 1.79 in head, not greatly produced, its tip not reaching origin of anal, base under origin of first dorsal; pectoral 1.42, its base a little in advance of vertical from origin of first dorsal.

Color in alcohol: Ground color, sepia, scales with a grayish cast; fins dark seal-brown.

*Type*.—Cat. No. 72933, U.S.N.M., 43 cm. in length, taken with a beam trawl at station 5470 (lat.  $13^{\circ} 37' 30''$  N.; long.  $123^{\circ} 41' 9''$  E.), near Atulayan Island, east coast of Luzon, at a depth of 560 fathoms, on a bottom of mud.

In addition to the type, the collection contains 4 examples, 11.4 to 18.3 cm. in length, from station 5325, off northern Luzon. From our examples of *M. macrolophus* Alcock, which it closely resembles, it differs in the much smaller size of the eye and in the number of ventral rays, 7 in *microps*, 8 in *macrolophus*; these characters are constant.

MACROURUS DUBIUS Smith and Radcliffe, new species.

Plate 25, fig. 3.

Dorsal 11,9-73; anal 90; ventrals 8; pectorals 21.

Head 4.48 in total length, long, pointed, slightly depressed dorsally, its breadth 1.97 in its length, slightly greater than depth at middle of eye; bones firm, suborbital ridge distinct, the slope from ridge to mouth scarcely steeper than from ridge to eye, terminal tubercles on snout rather prominent; body slender, not strongly compressed, greatest depth at origin of dorsal 6.04 in total length, vent close to origin of anal; eye 5.30 in head, 1.50 in snout, 1.10 in interorbital, small, subcircular; interorbital 4.75, flat; rest of upper profile of head



convex, the flattened area forming a slight concavity in dorsal contour line; snout 3.52, rather blunt, projecting slightly beyond anterior margin of mouth; mouth large, gape barely reaching anterior margin of eye; barbel stout, five-ninths as long as eye; maxillary 2.97, nearly reaching vertical from middle of eye; teeth small, cardiform, incurved, subequal; scales heavy, regular in their arrangement, 8 in a series from second dorsal spine to and including lateral line, 6 from last dorsal ray; exposed portion of each scale armed with a mass of densely packed recumbent spinules, more or less regularly arranged in V-shaped rows, their apices pointing forward and lying in the median horizontal line of scale; spinules somewhat flattened, some of them, especially those near outer edge of scales, lanceolate, strengthened by a longitudinal keel, similar to that described for *M. nasutus* (Günther); spinules on scales of head not as erect as commonly found in *Macrourus*; head scaled.

Tip of snout to origin of dorsal 3.82 in total length; first dorsal spine small; second long, slender, 1.46 in head, armed with small spinules; interdorsal space 1.38 in eye; anterior rays of second dorsal rudimentary, posterior rays becoming well developed; origin of anal under base of fifth rudimentary dorsal ray; origin of ventral in vertical to first dorsal spine, slightly behind base of pectoral; outer ventral ray long, filamentous, 1.46 in head, reaching to base of sixth anal ray; pectoral 1.70.

Color in alcohol: Hair-brown, fins blackish.

*Type*.—Cat. No. 72934, U.S.N.M., 42.5 cm. in length, taken with a beam trawl at station 5511 (lat.  $8^{\circ} 15' 20''$  N.; long.  $123^{\circ} 57' 00''$  E.), Iligan Bay, Mindanao, at a depth of 410 fathoms, on a bottom of gray mud and fine sand.

This species resembles *M. nasutus* (Günther); it has a longer head and snout, smaller eye, 8 ventral rays instead of 10, a much shorter interdorsal space, and outer ventral ray reaching beyond base of anal.

*M. wood-masoni* Alcock, which resembles this species, has a slightly larger eye and shorter snout, fewer scales between last ray of dorsal fin and lateral line, a longer interdorsal space, and shorter outer ventral ray.

MACROURUS ASPRELLUS Smith and Radcliffe, new species.

Plate 26, fig. 1.

Dorsal 11,9-71; anal 70; ventrals 8 (?); pectorals 20.

Head 4.60 in total length (tail mutilated), its dorsal surface broad and flat, subrectangular in transverse section, its breadth 2.04 in its length, less than its depth at middle of eye; bones not very firm, suborbital ridge less distinct than in *M. dubius*, terminal tubercles on snout less prominent; body compressed, greatest depth at origin of



dorsal 5.58 in total length; vent close to origin of anal; eye 4.18 in head, 1.16 in snout, large; interorbital 3.60, equal to length of snout, broad, flat, depressed; snout blunt, overhanging mouth for a distance about 0.33 diameter of eye; mouth large, maxillary 3, barely reaching vertical to middle of eye; teeth long, slender, cardiform, those in outer row of upper jaw slightly enlarged; scales large, regular, somewhat deciduous, very rough, 6 in a series from second dorsal spine to and including lateral line, 5 from last dorsal ray; exposed portion of each scale armed with about 13 subparallel rows of rather strong spinules, those in median row slightly larger than the others; spinules of scales of head more nearly erect, the rows on some of the scales somewhat divergent; lateral line distinct, with a long, low arch anteriorly.

Tip of snout to origin of dorsal 4.05 in total length, first dorsal spine 0.28 as long as eye, second longer than head, 4.35 in total length, armed with rather close-set spinules; interdorsal space nearly equal to diameter of eye, 0.2 length of head; ventrals lost, pectorals broken.

Color in alcohol: Hair brown; fins dusky black; scattered black spots on under side of snout and sides of head.

*Type*.—Cat. No. 72935, U.S.N.M., 41.3 cm. in length, taken with a beam trawl at station 5632 (lat.  $1^{\circ} 00' 00''$  S.; long.  $127^{\circ} 50' 00''$  E.), southeast of Bachian Island, Dutch East Indies, at a depth of 845 fathoms.

MACROURUS PROXIMUS Smith and Radcliffe, new species.

Plate 26, fig. 2.

Dorsal 11,9-103; anal 102; ventrals 9; pectorals 19.

Head 5.18 in total length, 1.56 in distance from tip of snout to anal fin, low, tapering, pointed, subquadrangular in transverse section, without conspicuous ridges on dorsal surface, suborbital ridge prominent; trunk short, slender, greatest depth at origin of dorsal 6.09 in total length; vent nearer base of ventrals than origin of anal; tail long, slender, compressed; eye 3.53 in head, subcircular; interorbital 5.12, slightly convex, narrower than eye; snout 3.42, depressed, pointed, without conspicuous tubercles at tip, projecting beyond mouth; region on either side of tip of snout with a slight, semicircular, scaleless groove similar to but not so well developed as in species of *Matxocephalus*, portion of snout lying anterior to this groove apparently capable of slight distension; nostrils close to eye, surrounded by a narrow scaleless area; mouth of moderate size, about as broad as long; maxillary 3, reaching vertical from posterior margin of pupil; teeth small, slender, pointed, outer series in upper jaw very slightly enlarged; barbel small, slender, 0.75 diameter of eye; scales small, 9 in a transverse series from origin of dorsal to and including lateral

line, 7 from last dorsal ray; exposed portion of each scale densely packed with numerous well-developed spinules, those near distal margin broader, spear-shaped, becoming narrower near center of scale, spinules strengthened by a longitudinal keel, as in *M. nasutus* (Günther); lateral line conspicuous, slightly arched anteriorly; interopercle projecting behind margin of preopercle, its distal margin rounded.

First dorsal spine small, second 1.06 in head, armed with about 24 spinules; interdorsal space 2.82 in head; insertion of anal under middle of interdorsal space, its rays better developed than those of second dorsal; insertion of ventral in advance of first dorsal, outer ray filamentous, 1.76; pectoral, 1.66.

Color in alcohol: Ground color dark clove-brown, darkest on belly, scales with a conspicuous silvery sheen; opercular flap, branchiostegal membranes, and ventrals almost black, other fins dusky.

*Type*.—Cat. No. 72936, U.S.N.M., 29.2 cm. in length, taken with a beam trawl at station 5202 (lat.  $10^{\circ} 12' 00''$  N.; long.  $125^{\circ} 04' 10''$  E.), in Sogod Bay, Leyte, at a depth of 502 fathoms, on a bottom of gray mud.

This species appears to be very closely related to *M. nasutus* (Günther); the 3 examples in the collection differ from this species in having a comparatively short interdorsal space, vent nearer to base of ventrals than to origin of anal, origin of anal and ventrals more anterior, and 9 ventral rays instead of 10.

MACROURUS ÆQUATORIS Smith and Radcliffe, new species.

Plate 26, fig. 3.

Dorsal II, 11-60; anal 70; ventrals 9; pectorals 22.

Head 4.48 in total length, 1.57 in distance from tip of snout to anal fin, nearly as high as wide, broad and rounded forward, flattened on the crown, subquadrangular in transverse section; suborbital ridges and rostral edges moderately prominent; trunk short, compressed, greatest depth at origin of dorsal 5.87 in total length, 2.6 in distance from tip of snout to anal; vent close to origin of anal; tail compressed, rather short (tip slightly mutilated); eye 3.62 in head, circular; interorbital 4.20, flattened, slightly narrower than eye; snout 3.50, evenly rounded at tip, its width across prenares angles about equal to its length, tip projecting beyond mouth; mouth small, broader than long, not extending backward beyond vertical from middle of eye; maxillary 3.23; teeth small, subconical, in villiform bands, outer row of teeth in the upper jaw considerably longer than the others; barbel moderate, equal to 0.5 diameter of eye; scales large, 6 from origin of dorsal to and including lateral line, each scale armed with rather widely separated spinules, the tips projecting considerably beyond margin of scale, these are arranged in horizontal rows; those project-

ing beyond margin of scale are somewhat flattened spear-shaped; those on head smaller, standing more nearly at right angles to body.

Tip of snout to origin of dorsal, 3.92 in total length; first dorsal spine small, but distinct, second about 1.40 in head, armed with long slender spinules; interdorsal space about two-ninths as long as head; second dorsal low, feebly developed; anal better developed, its origin from tip of snout 2.85 in total length; ventrals small, outer ray filamentous, as long as head, origin under insertion of first dorsal; pectoral 1.90 in head.

Color in alcohol: Tail and upper part of trunk chocolate, top and sides of head hair-brown, lower sides of head and trunk dark seal-brown, fins dusky.

*Type*.—Cat. No. 72937, U.S.N.M., 18.8 cm. in length, taken with a beam trawl at station 5608 (lat.  $0^{\circ} 8' 00''$  S.; long.  $121^{\circ} 19' 00''$  E.), Gulf of Tomini, Celebes, at a depth of 1,089 fathoms, on a bottom of gray mud.

This species is close to *M. asper* of Günther, from Japan, differing in the number of pectoral and ventral rays, and character of scales. *M. petersonii* of Alcock appears to be closely related, but differs markedly in shape of snout, size of mouth, length of barbel, and distance between dorsals.

MACROURUS HYOSTOMUS Smith and Radcliffe, new species.

Plate 27, fig. 1.

Dorsal II, 9-90; anal 101; ventrals 8; pectorals 18.

Head 4.75 in total length, short, broad, firm, little elevated posteriorly; body slender, little compressed, slightly arched, the greatest depth at origin of dorsal 6.84 in total length; vent slightly nearer insertion of anal than base of inner ventral rays; tail rather stout; eye 4.50 in head, 1.46 in snout, subcircular, nearly as wide as interorbital; interorbital 4.21, broad, flat; snout 3.10, pointed, depressed, its tip above level of middle of eye, and at a distance from mouth slightly greater than diameter of eye; on either side of tip the marginal portion is capable of some distention, on the dorsal surface this portion is set off from the rest of the snout by a semicircular scaleless groove as in species of *Matæocephalus*; nostrils close to eye, the anterior circular, free portion provided with a well-developed flap; suborbital ridge quite distinct; mouth of moderate size, broader than long; lips fleshy; maxillary 3.28; mandibular barbel small, slender, equal to diameter of pupil; teeth cardiform, incurved, outer row in upper jaw slightly enlarged; scales large, 6 in a transverse series from second dorsal spine, 5 in a series from last dorsal ray to and including lateral line; exposed portion of scale armed with long, slender, needle-like spinules, the outer row extending for a considerable dis-

tance beyond distal margin of scale; under side of head naked; lateral line conspicuous, little arched anteriorly.

Tip of snout to origin of dorsal 4.45 in total length; first dorsal spine small; second 2.33 in total length, long filiform, several small, widely separated spinules on anterior margin of basal portion; posterior margin of free portion with a narrow membranous fringe; interdorsal space slightly less than diameter of eye; anterior rays of second dorsal small but distinct; origin of anal under insertion of second dorsal, its rays somewhat longer than those of the dorsal; outer ventral ray 1.69 in head, tip filamentous, reaching base of sixth anal ray; pectoral 1.73.

Color in alcohol: Dorsal surface mars-brown, somewhat lighter below lateral line; region below pectorals blackish; head anteriorly whitish-gray; branchiostegals, membrane separating nasal apertures, and fins tinged with dark seal-brown.

*Type*.—Cat. No. 72938, U.S.N.M., 28 cm. in length, taken with a beam trawl at station 5470 (lat.  $13^{\circ} 37' 30''$  N.; long.  $123^{\circ} 41' 09''$  E.), in Lagonoy Gulf, Luzon, at a depth of 560 fathoms, on a bottom of mud.

MACROURUS CAMURUS Smith and Radcliffe, new species.

Plate 27, fig. 2.

First dorsal 11.9; ventrals 9; pectorals 22.

Head 5.10 in total length, short, high, compressed, greatest breadth 1.81 in its length, upper profile slightly arched; suborbital ridge sharp, distinct; body rather deep, compressed, greatest depth at origin of dorsal 5.66 in total length; vent immediately in front of anal; tail slender, compressed, tapering; eye 3.33 in head, large, circular, longer than snout; interorbital broad, flat, 3.28 in head, nearly equal to diameter of eye; snout 3.64 in head, short, broad, rather blunt, with a distinct angulation on sides as in species of *Mateocephalus*, but not produced as in species of this genus, almost truncate, with a distinct median tubercle, median ridge on snout quite distinct in the alcoholic specimen; mouth rather large, anterior; maxillary 2.44; mandibular barbel long, slender, as long as eye; teeth small, villiform, in narrow bands, outer row in upper jaw slightly enlarged; scales small, deciduous, apparently about 15 in a series from origin of dorsal to and including lateral line, but the scales are lost, and in this small individual it is impossible to determine accurately the position of the lateral line; exposed portion of each scale armed with about 5 slender, nearly erect spinules, a median row of 3, with a single spinule on each side; under side of head partially sealed.

First dorsal spine small but distinct, second about 0.5 as long as head, with 4 widely separated, distinct spinules; interdorsal space narrow, about 0.66 diameter of eye; rays of second dorsal very small,



those of anal somewhat longer; outer ventral ray filamentous 2.22 in head; pectoral 2 in head.

Color in alcohol: Sepia, darker on belly, sides, and ventral surface of head; fins dusky.

*Type*.—Cat. No. 72939, U.S.N.M., 10.2 cm. in length, taken with a beam trawl at station 5428 (lat.  $9^{\circ} 13' 00''$  N.; long.  $118^{\circ} 51' 15''$  E.), off eastern Palawan, at a depth of 1,105 fathoms, on a bottom of gray mud.

MACROURUS ORTHOGRAMMUS Smith and Radcliffe, new species.

Plate 27, fig. 3.

First dorsal 11, 11; ventrals 10; pectorals 22.

Head 5.12 in total length, arched, depressed anteriorly, breadth 2.18 in length, bones firmer than in *M. parvipes*, which it somewhat resembles; suborbital ridge sharp, wavy; body rather slender, strongly compressed, greatest depth at origin of dorsal 7.20 in total length; vent immediately in front of anal; tail long, slender, compressed; eye 4 in head, subcircular; interorbital 3.30, broader than eye, nearly flat, a slight mesial depression in the alcoholic specimen; snout 3.18, short, depressed, a distinct angulation on sides as in species of *Matxocephalus*; from this point the snout narrows rapidly, the margin being slightly concave in the alcoholic specimen, tip pointed, no well-developed groove along anterior margin such as is found in *Matxocephalus*; mouth rather large; mandibular barbel small; teeth in narrow villiform bands, outer row in upper jaw slightly enlarged; scales of moderate size, 8 in a series from origin of dorsal to and including lateral line, 5 or 6 from last dorsal ray, exposed portion of each scale armed with about 5 parallel rows of slender spinules, these in reduced number, usually a single spine in each outside row, 2 in each of the next and 3 in the median row, those on head erect, hair-like, giving the head a furry appearance; under side of head partially scaled posteriorly.

Tip of snout to origin of dorsal 4.50 in total length; first dorsal spine slender, 0.45 diameter of eye; second spine about 1.67 in head, armed with 6 slender, widely separated spinules; interdorsal narrow, about 0.66 eye; rays of second dorsal low, small; anal rays better developed; outer ventral ray long, filamentous, 1.52 in head; pectoral 1.67.

Color in alcohol: Ground color Vandyke brown; head and belly darker; fins dusky.

*Type*.—Cat. No. 72940, U.S.N.M., 18 cm. in length, taken with a beam trawl at station 5636 (lat.  $1^{\circ} 55' 00''$  S.; long.  $127^{\circ} 42' 30''$  E.), near Gomomo Island, Dutch East Indies, at a depth of 1,262 fathoms, on a bottom of gray mud and fine sand.

This species was taken with the type of *M. parvipes* and structurally it bears quite a close resemblance; it is readily distinguished



by the greater number of rays in first dorsal, pectorals, and ventrals, and the armature of the scales.

MACROURUS PARVIPES Smith and Radcliffe, new species.

Plate 28, fig. 1.

First dorsal 11,8 (tail mutilated); ventrals 6; pectorals 18.

Head 1.31 in distance from tip of snout to anal, short, slightly arched, not as wide as deep, bony framework not very firm, interosteal tissue badly shrunken in alcoholic specimen; suborbital ridges and rostral edges sharp, prominent; body short, compressed, greatest depth at origin of dorsal 1.80 in distance between tip of snout and origin of anal; vent immediately in front of anal; tail very long, strongly compressed, filamentous in examples in which it is complete; eye 4.08 in head, small, subcircular; interorbital 3, broader than eye, slightly arched; snout 2.75, rather short, depressed, a distinct angulation on sides, as in species of *Matæocephalus*; from point of angulation the snout narrows rapidly, the margin being slightly concave in the alcoholic specimen, tip pointed, the well-developed groove along anterior margin found in species of *Matæocephalus* lacking; mouth rather small, well forward, an eye diameter from tip of snout; maxillary 3.64, scarcely as long as distance between tips of maxillaries posteriorly; teeth small, villiform, in bands, narrowing posteriorly, outer row of teeth in upper jaw scarcely enlarged; barbel minute, scarcely as long as pupil; scales small, 10 from origin of dorsal to and including lateral line, each scale armed with about 15 slender spinules not very regular in their arrangement, spinules of scales of head much larger than those on body; under side of head scaled.

Tip of snout to origin of dorsal 1.17 in distance to anal, first spine small, second 1.30 in head, armed with small, slender spinules; interdorsal space 3 in head; second dorsal low, not as well developed as anal; origin of anal under posterior rays of first dorsal; ventrals small, rays in reduced number, outer ray longest, about 0.33 as long as head; pectorals 2.21 in head, small.

Color in alcohol: Tail and upper part of trunk wood-brown; top and sides of head hair-brown; under side of head and body to twelfth anal ray dark clove-brown; fins dusky.

*Type*.—Cat. No. 72941, U.S.N.M., 22.8 cm. in length, taken with a beam trawl at station 5636 (lat.  $1^{\circ} 55' 00''$  S.; long.  $127^{\circ} 42' 30''$  E.), near Gomomo Island, Dutch East Indies, at a depth of 1,262 fathoms, on a bottom of gray mud and fine sand.

This species was taken by the *Albatross* at depths of 1,089 to 1,262 fathoms.

## Genus MATÆOCEPHALUS Berg.

This genus possesses characters intermediate between *Macrourus* and *Cælorhynchus*. The general form of the head is that of *Cælorhynchus*, but the spinous occipital ridges characteristic of the species of that genus are lacking and the second dorsal spine is serrate. The tip of the snout is provided with a spinigerous tubercle which is normally bifid, and there is a distinct angulation on the side of the snout with a submarginal groove anterior to it, which renders this portion more or less distensible. An approach to this characteristic form of the snout is found in such species of *Macrourus* as *camurus*, *orthogrammus*, and *parvipes*, and other species, as *hyostomus*, possess a distinct submarginal groove. The intergradations are such as to suggest the desirability of considering *Mateocephalus* and *Cælorhynchus* as subgenera under *Macrourus*.

## MATÆOCEPHALUS NIGRESCENS Smith and Radcliffe, new species.

Plate 28, fig. 2.

First dorsal 11,8; ventrals 8; pectorals 19.

Head 5.20 in total length, depressed, rugose, dorsal contour nearly straight, oblique, no well developed occipital ridges as in species of *Cælorhynchus*; suborbital ridge salient, ending at a short distance behind vertical from posterior margin of eye; body slender, compressed, greatest depth 8.44 in total length; vent immediately in front of anal; tail long, slender, compressed; eye irregularly subelliptical, horizontal diameter 3.47, vertical diameter 4 in head; interorbital 4.65, flat, a low suborbital ridge present; snout 2.75, broad, depressed, ending in a bifid tubercle; a distinct ridge extending downward in front of nostrils to suborbital margin, its projecting tip forming a distinct angle in lateral contour of snout, in front of this the contour lines converging much more rapidly and the marginal portion is separated from the rest of the snout by a scaleless groove, this portion of snout somewhat membranous, thickened along the margin and covered with spiny scales; mouth small, normal in position, its distance from tip of snout 3.06 in head; mandibular barbel slender, hair-like, about equal to diameter of pupil in length; teeth long, slender, cardiform; scales small, 7 or 8 in each series from origin of dorsal and from last dorsal ray to and including lateral line; spinules slender, recumbent, arranged in 6 to 10 parallel or nearly parallel rows, those on scales of head more nearly erect, giving the head a very rough appearance, especially along the lateral margins; the scales of preopercle encroach on under side of head as do those of anterior part of snout, remainder of under side of head naked.

First dorsal spine small, second spine 1.50 in head, strong, slightly curved, armed with strong, widely set, sharp-pointed spinules; inter-

dorsal space 2.60 in head; second dorsal rays small, especially the anterior ones; anal well developed, its rays long and slender; ventrals small, inner rays reaching origin of anal, outer ray filamentous 1.93 in head; pectorals 1.93.

Color in alcohol: Ground color dark sepia brown, under side of throat posteriorly, belly and fins blackish; inside of mouth blackish.

*Type*.—Cat. No. 72942, U.S.N.M., 27 cm. in length, taken with a beam trawl at station 5492 (lat.  $9^{\circ} 12' 45''$  N.; long.  $125^{\circ} 20' 00''$  E.), between Leyte and Mindanao, at a depth of 735 fathoms, on a bottom of gray mud.

*M. acipenserinus* (Gilbert and Cramer) and *M. microstomus* (Regan) are closely related species and all 3 may prove inseparable. In *acipenserinus* the snout, particularly the part in front of angulation, is longer and more pointed, the bifid tip more prominent, the number of pectoral rays appears to be somewhat greater, and the coloration is much lighter. The description of *microstomus* is too scant to admit of satisfactory comparison; in it the eye is larger, the interorbital relatively narrower, and in the figure the outer ventral ray is not filamentous.

MATŒOCEPHALUS ADUSTUS Smith and Radcliffe, new species.

Plate 28, fig. 3.

Dorsal 11,9-85+; anal 100+; ventrals 7; pectorals 16.

Head 4.80 in total length, depressed, dorsal contour nearly straight, oblique, no traces of occipital ridges; suborbital ridge sharp, ending as in other species of the genus near vertical from posterior margin of eye; body slender, compressed, greatest depth 7.40 in total length; vent immediately in front of anal; tail slender, compressed; eye small, subelliptical, horizontal diameter 3.88 in head; interorbital 4.33, narrow, flat; snout 2.90, broad, depressed, bifid tubercle at tip less prominent than in related species, projection of tip beyond angulation relatively short, groove less distinct, more completely scaled, rendering this portion of snout less mobile than in *nigrescens*; mouth small, its distance from tip of snout 3.34 in head; mandibular barbel short, slender, hair-like; teeth slender, in narrow cardiform bands; scales small, regular, 7 in each series from origin of dorsal and from last dorsal ray to and including lateral line, spinules on exposed portion of scale very slender, arranged in about 18 nearly parallel rows (the number somewhat less in the young), these on head small, hair-like; under side of head scaled.

First dorsal spine slender, longer than in most related forms, second spine long, slender, longer than head, 4.52 in total length, basal portion armed with several weak, very widely separated spinules; interdorsal space 2.37 in head; second dorsal low, its rays very slender; anal rays better developed than those of second dorsal; ventrals

small, inner rays not reaching base of anal, outer ray filamentous, 2.20 in head; pectoral 1.94.

Color in alcohol: Light brown; belly and opercular region blackish; fins dusky.

*Type*.—Cat. No. 72943, U.S.N.M., 23 cm. in length, taken with a beam trawl at station 5654 (lat.  $3^{\circ} 42' 00''$  S.; long.  $120^{\circ} 45' 50''$  E.), Gulf of Boni, Celebes, at a depth of 805 fathoms.

This species is readily distinguished from *nigrescens* by the armature of the scales, the less angular form of the snout, the fewer ventral rays, and the fewer, more widely separated spinules on the second spine of first dorsal.

#### Genus CÆLORHYNCHUS Giorna.

CÆLORHYNCHUS MACRORHYNCHUS Smith and Radcliffe, new species.

Plate 29, fig. 1.

Dorsal 11, 8–67; anal 76; ventrals 7; pectorals 18.

Head 3.10 in total length, very long, strongly depressed anteriorly, greatest breadth nearly equaling greatest depth, subquadrate in transverse section, lateral contour of head forming nearly a straight line; suborbital ridge strongly salient, ending abruptly at a distance nearly equal to diameter of pupil from angle of preopercle; the two ridges on each side of nape well developed, converging and meeting over anterior margin of eye; body robust, greatest breadth about 0.66 its depth, the latter 6.44 in total length; vent slightly less than half an eye diameter in front of origin of anal; tail compressed, tapering (tip mutilated, rays of tip well developed); eye subelliptical, horizontal diameter 5.48 in head, slightly more than 0.66 length of snout, vertical diameter 0.66 horizontal diameter; interorbital broad, flat, equal to horizontal diameter of eye; snout 2.15, outlines long, narrow, scarcely at all convex, converging regularly from base to tip, depressed, upper surface everywhere transversely convex, longitudinally slightly concave; width of snout opposite anterior margin of eye 1.73 in its length; anterior nostril small, subelliptical, about 0.4 vertical length of the posterior; mouth relatively large, its anterior margin slightly in front of nostrils; maxillary 3.48, nearly reaching vertical from posterior margin of orbit; mandibular barbel long, slender, about 0.87 horizontal diameter of eye; teeth slender, cardiform, those along outer margin of upper jaw very slightly enlarged; scales large, imbricate, 6 in a series from origin of dorsal to and including lateral line, the same number in a series from last dorsal ray to and including lateral line; scales on body armed with about 7 radiating subequal spinous ridges, posterior spines projecting but little beyond margin of scales; scales of the median dorsal line of snout, those between the two lateral ridges on each side of nape, on opercle and distal portion of preopercle, and



along suborbital ridge have the ridges very distinct, strongly radiating; other scales of head smaller, their ridges not so sharply defined.

Tip of snout to origin of dorsal 2.92 in total length; first dorsal spine inconspicuous; second 3.41 in head, long, slender, smooth throughout; interdorsal space 4.02 in head, the base of first dorsal being only about 0.55 of the interdorsal space; origin of anal under origin of second dorsal, its rays much longer and stronger than those of the second dorsal; ventrals small, outer ray with a short filament, its length 4.31 in head, tip not reaching vent, ventral base under base of lower pectoral rays; pectoral 2.83, equal to postorbital part of head.

Color in alcohol: Hair-brown; the fins, their bases, and branchiostegal membranes, dark clove-brown.

*Type*.—Cat. No. 72944, U.S.N.M., 56 cm. in length, taken with a beam trawl at station 5367 (lat.  $13^{\circ} 34' 37''$  N.; long.  $121^{\circ} 07' 30''$  E.), Verde Island Passage, Luzon, at a depth of 180 fathoms, on a bottom of sand.

In small specimens the snout is 2 in head; the eye is somewhat larger; the outer ventral ray reaches to or beyond origin of anal; the average number of radiating ridges on the scales is somewhat less, the longitudinal ridges on head are more distinct, and the second dorsal spine does not reach origin of second dorsal; in older examples this difference is much greater.

*C. quadricristatus* and *flabellispinis* of Alcock, from the Indian Ocean, and *C. tokiensis* of Steindachner and Döderlein, from Japan, appear to be closely related species. From *quadricristatus* the main differences are a much longer interdorsal space, fewer rays in the first dorsal, and an absence of black cross bands on body. In *flabellispinis* the snout is shorter, the eye is larger, the interdorsal space shorter, and scales between dorsal and lateral line in fewer number. In *tokiensis* the interdorsal space is shorter, the tip of the second dorsal spine reaching beyond origin of second dorsal, the snout and head shorter, and the eye larger.

The collection contains nine examples 15.2 to 56 cm. in length, taken at depths of 180 to 410 fathoms.

CÆLORHYNCHUS COMMUTABILIS Smith and Radcliffe, new species.

Plate 29, fig. 2.

First dorsal 11,9; ventrals 7; pectorals 20.

Head 3.37 in total length, long, relatively slender, subquadrangular in transverse section, slightly deeper than broad, depressed anteriorly, dorsal surface with two pairs of low but well marked spinous ridges, the inner pair on occiput slightly converging mesially, then again slightly diverging, the outer pair continuous with the supra-orbital margin, ending immediately in advance of the upper end of



gill-slit, suborbital ridge salient, ending abruptly in front of angle of preopercle; body rounded, greatest depth 7.28 in total length; vent less than a pupil's diameter in front of origin of anal; tail compressed, tapering; eye subelliptical, horizontal diameter 3.96 in head, about 0.4 length of snout, vertical diameter about 0.75 horizontal diameter; interorbital 4.32, broad, nearly flat, a slight depression behind median ridge of snout; snout 2.35, rather long and narrow, depressed, everywhere transversely convex, longitudinally a little concave, ending anteriorly in a short, slender spine; lateral outlines of snout moderately convex, the narrowing being more rapid in the terminal third, and forming with the projecting spinous tip a slight concavity in this portion of snout; width of snout at anterior margin of eye 1.4 in its length; its width midway between tip and eye less than 0.5 its length, about 0.66 its width opposite anterior margin of orbit; postorbital portion of head 1.33 in snout; nostrils well developed, anterior circular, posterior vertically elongate and weakly crescentic, the area immediately surrounding nostrils devoid of scales; mouth

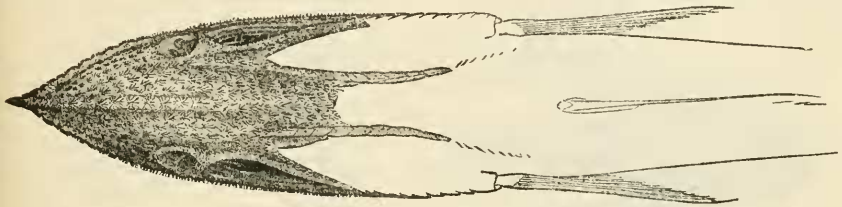


FIG. 2.—*CŒLORHYNCHUS COMMUTABILIS*.

large, the distance of its anterior margin from tip of snout 2.64 in head, exceeding postorbital portion of head by about 0.5 diameter of pupil; maxillary 3.80 in head; mandible extending behind vertical from posterior margin of eye; mandibular barbel slender, 0.37 horizontal diameter of eye; teeth incurved, cardiform; scales large, imbricate, 6 in each series from origin of dorsal and from last dorsal ray to and including lateral line; scales on body armed with from 5 to 7 well developed, radiating, subequal ridges; ridges on scales of head higher; those on median longitudinal line of snout, on sides of occiput between the occipital ridges, and on portion of head behind cheek very distinct and rather more divergent; under side of head scaled.

First dorsal well developed, first spine small, length of second slightly greater than distance from tip of snout to anterior margin of pupil; interdorsal space 4.13 in head; second dorsal relatively low; anal rays better developed than the corresponding rays of second dorsal; origin of anal slightly in advance of vertical from origin of second dorsal; ventrals small, outer ventral ray filamentous

as long as snout, tip reaching beyond origin of anal; pectoral equal to snout in length.

Color in alcohol: Hair-brown; belly, base of fins, and branchiostegal membranes darker.

*Type*.—Cat. No. 72945, U.S.N.M., 32 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 sand.

The type form (fig. 2) is at once distinguished from *C. macrorhynchus* by the much shorter and broader snout and large eye. It differs from *C. japonicus* (Schlegel) in the following characters: Dorsal rays 8 or 9 (9 or 10 in *japonicus*); lateral outline of snout convex (instead of straight); 5 or 6 scales from origin of dorsal to and including lateral line (instead of 6 or 7); 5 to 7 radiating ridges on scales (instead of 3 to 5). The anal rays in *japonicus* are much better developed than in this species.

Our examples of the present species, while fairly constant as far as scaling, form of fins, and body are concerned, nevertheless fall quite

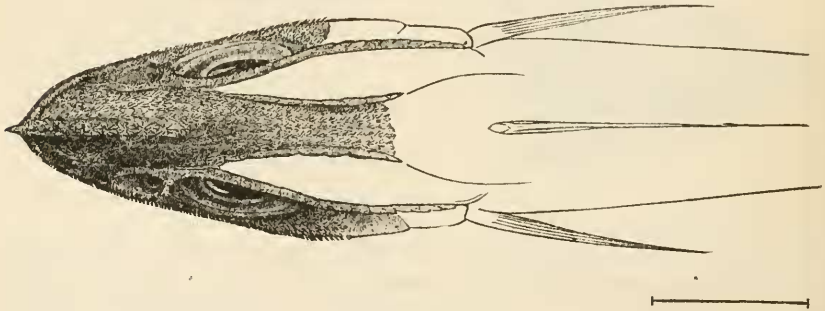


FIG. 3.—CÆLORHYNCHUS COMMUTABILIS, FORM ALPHA.

readily into one of several groups, each of which, had it been found alone in a separate locality, would have been regarded without doubt as representing a distinct species. The main points of difference of the typical examples of each group lie in the form, length, and scaling of the snout. As the tail is as often mutilated as complete and as a lengthened or shortened snout renders comparative measurements in terms of head of little or no value, the ordinary standardization of measurements does not serve as a satisfactory means of separation. That there is evidence of mutation seems quite certain, and the nature of the organism appears to have been a more important factor than environment in effecting these changes. We have described as the type the form which appears to be predominant; the others are described below as forms *alpha*, *beta*, etc. There are 19 examples of the predominant form from depths of 220 to 375 fathoms.

*Form alpha*.—Differs from typical *commutabilis* in having a shorter and broader snout, its length 2.50 to 2.80 in head (2.14 to 2.45 in

typical examples), its projection beyond mouth 1 to 1.10 in post-orbital (0.73 to 1.05 in typical examples), its lateral outline more convex, the breadth in front of eye 1 to 1.24 in its length (1.21 to 1.43 in typical examples), and the eye proportionately longer, 3.29 to 3.77 in head (3.80 to 4.04 in typical examples). Six examples from 260 and 310 fathoms. Figure 3 is of a specimen 28.9 cm. in length taken with a beam trawl at station 5589, near Mabul Island, Borneo, at a depth of 260 fathoms.

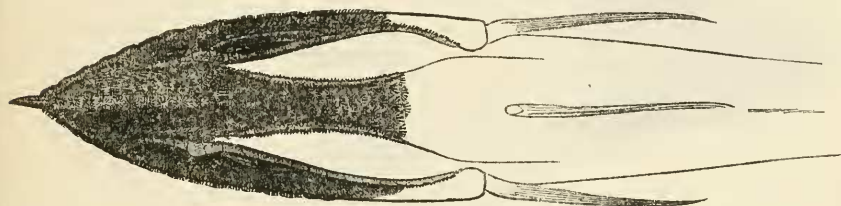


FIG. 4.—CÆLORHYNCHUS COMMUTABILIS, FORM BETA.

*Form beta.*—Differs in having the under side of the head naked, the snout shorter in examples of the same size, its projection beyond mouth somewhat less, 2.92 to 3.24 in head, and the eye proportionately larger, 3.47 to 3.71 in head. Six examples from 193 to 310 fathoms. Figure 4 is of a specimen 26.8 cm. in length taken with a beam trawl at station 5503, off northern Mindanao, at a depth of 226 fathoms.

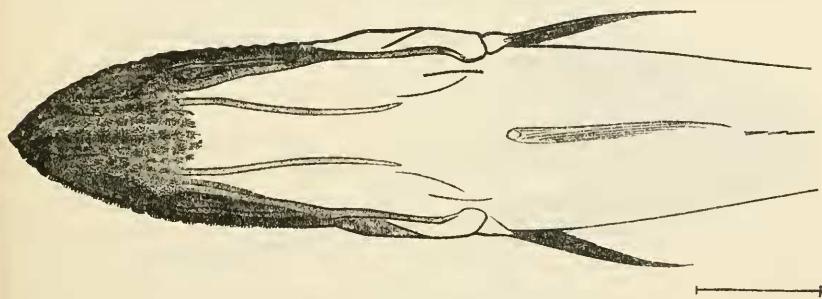


FIG. 5.—CÆLORHYNCHUS COMMUTABILIS, FORM GAMMA.

*Form gamma.*—Differs in having the dorsal profile of head much more convex, the under side of head naked, the snout shorter, 2.52 to 2.76 in head, broader, 1.07 to 1.26 in its length, less pointed, and slightly upturned at tip; the mouth more anterior than in any of the other forms, its anterior margin in vertical from anterior margin of naked area surrounding nostrils (in related forms its anterior margin is little or not at all in advance of vertical from anterior nostril); projection of the tip of snout beyond mouth 1.11 to 1.38 in post-

orbital, 3.25 to 3.92 in head (2.47 to 3.11 in typical examples), and the eye is relatively larger than in related forms, 3.17 to 3.50 in head. Five examples from depths of 214 to 279 fathoms. Figure 5 is of a specimen 34.7 cm. in length taken with a beam trawl at station 5502, off northern Mindanso, at a depth of 214 fathoms.

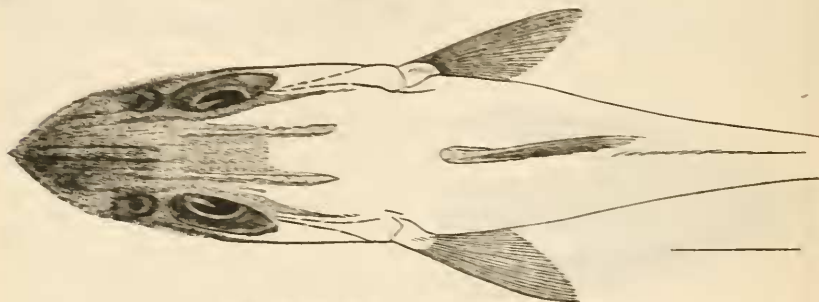


FIG. 5.—*CAELORHYNCHUS COMMUTABILIS*, FORM DELTA.

*Form delta*.—Although the measurements of this form fall within the limits of typical examples, excepting in breadth of snout and horizontal diameter of eye, the snout is shorter than in examples of the same size, and its lateral outline more convex and less sharply pointed; breadth of snout at anterior margin of eye 1.1 in its length, and horizontal diameter of eye 3.59 in head 1.49 in snout. Under side of head nearly naked, a few scattered scales present posteriorly. A single example (fig. 6), 30 cm. in length, taken with a beam trawl at station 5172, vicinity of Jolo, at a depth of 318 fathoms.

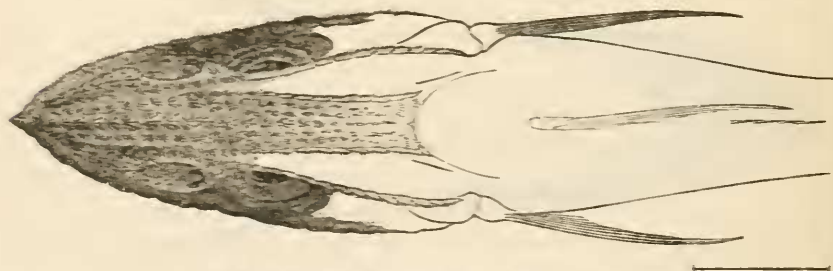


FIG. 6.—*CAELORHYNCHUS COMMUTABILIS*, FORM DELTA.

*Form eta*.—This form has the long snout of typical examples, but differs in having the average breadth of the snout greater, especially anteriorly, and the under side of the head naked. Three examples, taken at depths of 224 to 383 fathoms. Figure 7 is of a specimen 31.5 cm. in length, taken with a beam trawl at station 5325, off northern Luzon, at a depth of 224 fathoms.



## CÆLORHYNCHUS PLATORHYNCHUS Smith and Radcliffe, new species.

Plate 30, fig. 1.

Dorsal 11,9-88; anal 88; ventrals 7; pectorals 18.

Head 3.95 in total length, short, broad, greatest breadth and greatest depth being about equal; ridges on occiput distinct, arranged as in *commutabilis*; suborbital ridge salient, ending abruptly in front of angle of preopercle; body rounded, greatest depth 7.40 in total length; vent less than diameter of pupil in front of origin of anal; tail compressed, tapering; eye subelliptical, horizontal diameter 3.50 in head, about 0.75 length of snout, 1.21 in postorbital; vertical diameter about 0.75 horizontal diameter; interorbital 4.45 in head, 1.54 in postorbital, broad, slightly concave; snout 2.62, short, broad, a strong median ridge on dorsal surface; laterally convex, rather blunt at tip; width of snout at anterior margin of eye equal to its length, its width midway between tip and eye about 0.7 its length;

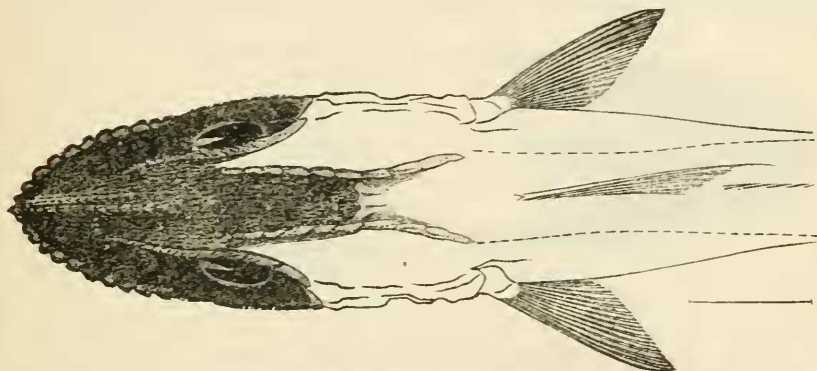


FIG. 8.—CÆLORHYNCHUS PLATORHYNCHUS.

postorbital portion of head 1.09 in snout; nostrils as in *commutabilis*; mouth large, its anterior margin in vertical from posterior margin of anterior nostril, as in the type of *commutabilis*, its distance from tip of snout 2.97 in head, 1.03 in postorbital; mandibular barbel about 0.3 horizontal diameter of eye; teeth incurved, cardiform; scales large, imbricate, quite deciduous, 5 in each series from origin of dorsal and from last dorsal ray to and including lateral line; scales on body armed with from 5 to 7 well-developed radiating ridges; the median ridge in many of the scales somewhat stronger than the others; scales of head and body similar to those found on *commutabilis* except that the ridges are more pronounced, especially those on under side of head.

First dorsal spine small, second longest, nearly as long as snout plus eye; interdorsal 0.22 length of head; second dorsal low; anal rays better developed than the corresponding rays of second dorsal, longest ray about 0.75 horizontal diameter of eye; ventrals small,

outer ray with a short filament, about 0.45 length of head, tip not reaching origin of anal; pectoral 2.28 in head.

Color in alcohol: Light clove brown, fins somewhat darker.

*Type*.—Cat. No. 72946, U.S.N.M., 38.7 cm. in length, taken with a beam trawl at station 5585 (lat.  $4^{\circ} 07' 00''$  N.; long.  $118^{\circ} 49' 54''$  E.), Sipadan Island, Borneo, at a depth of 476 fathoms, on a bottom of gray mud.

In the collection there are 3 examples of this species from station 5657 (492 fathoms), 3 from station 5658 (510 fathoms), and 1 from station 5460 (565 fathoms).

This species might be considered an additional form under *commutabilis*, but as the nature of the conditions under which it is found appears to have had a marked influence on its structure, rendering it more readily separable from the other forms (all of the typical examples having been taken from deeper water than specimens of *commutabilis* and showing in their structure characteristic differences), it has seemed best to describe it as a distinct species.

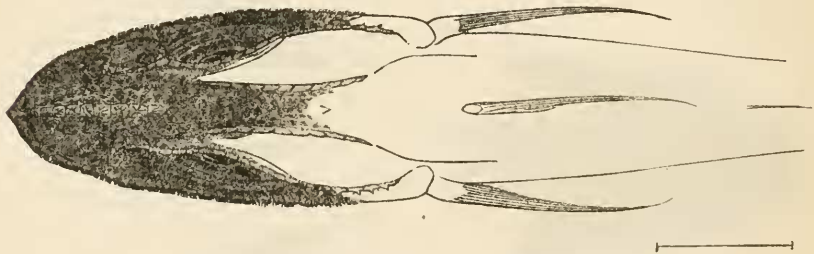


FIG. 9.—*CCELORHYNCHUS PLATORHYNCHUS*, FORM ALPHA.

Four specimens, 1 from station 5586 (347 fathoms), 2 from station 5587 (415 fathoms), and 1 from station 5111 (236 fathoms), vary from the typical examples as noted below:

*Form alpha*.—Differs from typical examples in having the underside of the head naked, a naked area on either side of the median line of snout anteriorly, and the snout less blunt. Figure 9 is of a specimen 31.6 cm. in length, taken with a beam trawl at station 5587, near Sipadan Island, Borneo, at a depth of 415 fathoms.

*CCELORHYNCHUS ACUTIROSTRIS* Smith and Radcliffe, new species.

Plate 30, fig. 2.

Dorsal II,8-75; anal 70; ventrals 7; pectorals 15 or 16.

Head 3.30 in total length, strongly depressed anteriorly, ridges on occiput very distinct, arranged as in related species; suborbital ridge strongly salient, ending in a sharp point in front of angle of preopercle; body compressed, greatest depth 6.82 in total length; vent immediately in front of origin of anal; tail compressed, tapering; eye irregularly subelliptical, horizontal diameter 4.60 in head, vertical diameter

1.17 in horizontal diameter; interorbital 4.77 in head, broad, flat, a slight depression, mesially; snout 2.07, long, very narrow, needle-like anteriorly, laterally concave in anterior portion, very slightly convex posteriorly; dorsally the snout is rather strongly concave, with a low median ridge on either side of which is a groove, these converging anteriorly and terminating at base of spine-like tip; mouth small, tip reaching vertical from anterior nostril, its distance from tip of snout 1.20 in length of snout; mandibular barbel slender, hair-like, its length about equal to diameter of pupil; teeth slender, cardiform; angle of preopercle a little produced, its posterior margin slightly concave, directed upward and forward; scales regular, imbricate, 8 in each series from origin of dorsal and from last dorsal ray to and including lateral line; each scale armed with 5 to 7 slightly radiating rows of small, suberect spinules; underside of head naked; traces of a narrow scaleless pit on median line in front of base of ventrals (in some cases this appears to be partially or entirely covered with cycloid scales); a narrow scaleless margin around vent, region in front of vent scaled.

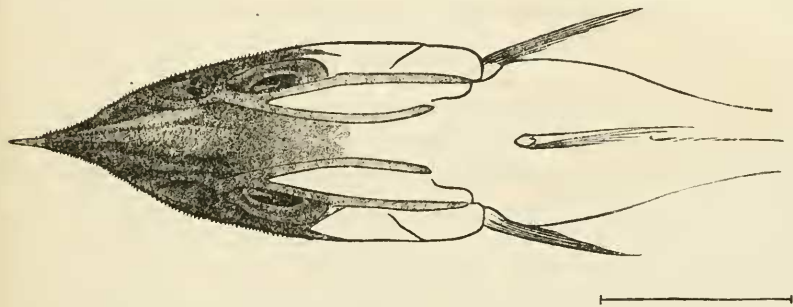


FIG. 10.—*Cœlorhynchus acutirostris*.

First dorsal spine minute, the second smooth; interdorsal space 1.7 in eye, slightly less than base of dorsal; anterior rays of second dorsal slightly longer than succeeding rays; anal similar to second dorsal, its rays somewhat longer; ventrals small, outer ray filamentous, its tip reaching origin of anal; pectoral moderate, slightly longer than postorbital part of head.

Color in alcohol: Ground color dusky olive brown, sides of trunk below pectoral with silvery reflections, becoming blackish on belly; traces of a dark band crossing back behind occiput, extending downward to lateral line, thence backward, then upward across back at origin of second dorsal; another similar band from behind pectoral along side fading out above anterior anal ray; slight dusky shades along median line of back in front of dorsal; first dorsal dusky white, darkest distally, second dorsal whitish; anterior anal rays punctulate with small dark spots, these becoming fewer and more widely separated posteriorly; outer ventral ray whitish, punctulate with darker,

inner rays much darker; upper pectoral ray blackish, rest of fin dusky white; underside of head cream white; underside of opercle blackish, the dark coloration showing through; lining of mouth whitish anteriorly becoming dusky posteriorly; peritoneum silvery black; no black spot above and behind pectoral.

*Type*.—Cat. No. 72947, U.S.N.M., 20.5 cm. in length, taken with a beam trawl at station 5418 (lat.  $10^{\circ} 08' 50''$  N.; long.  $123^{\circ} 52' 30''$  E.), between Cebu and Bohol, at a depth of 159 fathoms, on a bottom of gray mud and sand.

This species is very close to *C. gladius* of Gilbert and Cramer, from the Hawaiian Islands, but differs from the descriptions of that species in having fewer rays in the pectoral and the first dorsal (all of the specimens except the type have first dorsal II,7), the filamentous ventral ray reaching base of anal, interdorsal space about 0.5 orbit, the anterior rays of the second dorsal relatively shorter, the ridges on occiput more pronounced, in the absence of a large black spot on side above pectoral, and the anterior anal rays blackish instead of white.

**CÆLORHYNCHUS NOTATUS** Smith and Radcliffe, new species.

Plate 30, fig. 3.

First dorsal II,9; ventrals 7; pectorals 16.

Head 4.29 in total length, short, occipital ridges low, suborbital ridge salient, ending abruptly in front of angle of preopercle; angle of preopercle projecting, free margin slightly concave; body compressed, greatest depth 6.72 in total length; vent 0.5 diameter of eye in advance of the anal; tail compressed, rather deep anteriorly, tapering posteriorly; eye large, subelliptical, horizontal diameter 3.31 in head, vertical diameter 1.44 in horizontal diameter; interorbital 4.77 in head, broad, flat, equal to vertical diameter of eye; snout 2.74, pointed, its dorsal outline slightly concave; laterally slightly convex; mouth of moderate size, its distance from tip of snout 3 in head; mandibular barbel rather stout, about half horizontal diameter of eye; teeth slender, in a narrow cardiform band; scales regular, 6 in each series from origin of dorsal and last dorsal ray to and including lateral line; each scale armed with about 7 to 9 low, nearly parallel ridges, each ridge composed of long, slender recumbent spinules; underside of head naked; a narrow scaleless fossa extending forward from vent along median line of belly to between base of ventrals.

First dorsal spine small; second spine 1.21 in head (frequently longer than head in smaller examples); interdorsal space about 0.3 of head; 8 series of scales crossing back between dorsal fins; second dorsal low; origin of anal slightly in advance of vertical from origin of second dorsal, its rays much longer than those of second dorsal; ventrals widely separated, outer ray filamentous, 1.80 in head, its



tip extending behind base of third anal ray; pectoral equal in length to filamentous ventral ray.

Color in alcohol: Ground color of back dusky russet brown, becoming lighter ventrally; belly with blackish shades showing through scales; a small dusky area above opercle; a large circular dark brown area extending from pectoral base upward to lateral line; a broad saddle of similar coloration extending across back behind origin of second dorsal; a second as far behind first as first is behind origin of first dorsal, slightly lighter in coloration; basal sixth of second dorsal spine light brownish yellow, distal portion dusky black, the dark markings of this spine extending onto distal portion of soft rays; second dorsal light; basal portion of anal light, distal portion punctulate with darker, the marginal portion of fin anteriorly almost black; ventrals dusky black, filament of outer ray whitish; pectoral dusky white.

*Type*.—Cat. No. 72948, U.S.N.M., 27 cm. in length, taken with a beam trawl at station 5162 (lat.  $5^{\circ} 10' 00''$  N.; long.  $119^{\circ} 47' 30''$  E.), Sulu Archipelago, at a depth of 230 fathoms, on a bottom of coarse sand and broken shells.

This species varies considerably in the form and length of the snout, but the variations are less marked than in *C. commutabilis*, and separation into distinct groups is impossible. It appears to be related to *C. australis* and *C. kishinouyei*, but is at once distinguished from these species by the smaller number of keels on the scales.

**CÆLORHYNCHUS ARGENTATUS** Smith and Radcliffe, new species.

Plate 31, fig. 1.

Dorsal II, 9–100; anal 100; ventrals 7; pectorals 14.

Head 3.88 in total length, pointed anteriorly, robust posteriorly, greatest depth about equal to length of snout plus eye, greatest breadth equal to snout plus 0.33 eye, occipital ridges low, inconspicuous, median pair diverging posteriorly shading into a shallow, scaleless groove which is continuous with lateral line; suborbital ridge scarcely as prominent as in other species; body moderately compressed, greatest depth 6.50 in total length; vent immediately in front of anal; tail strongly compressed, tapering; eye subelliptical, horizontal diameter 4.08 in head, vertical diameter 1.35 in horizontal diameter; interorbital 4, broad, convex; snout 2.80, upper surface convex, lateral outlines nearly straight, region near tip tapering more rapidly than rest of snout; mouth well forward, large; mandibular barbel 1.80 in horizontal diameter of eye, rather slender; teeth slender, cardiform, the outer row slightly enlarged; scales regular, rather deciduous, 7 from origin of dorsal and 6 from last dorsal ray to and including lateral line; spinules on scales inconspicuous, shagreen-like, somewhat irregular in their arrangement, typically divergent,

each radiating row meeting its fellow on median line; spinules on scales of head hair-like, those following ridges of head scarcely enlarged, unlike the other species of the genus from the Philippines, those on ventral surface of head minute.

First dorsal spine small, second 2.35, smooth; interdorsal space 3.55 in head; anterior rays of second dorsal rudimentary, becoming better developed posteriorly; anal rays much better developed than those of second dorsal; ventrals widely separated, small, outer ray with a short filament, 2.93 in head, reaching about 0.66 distance from its base to vent; pectoral 2.35 in head.

Color in alcohol: Ground color of back light brown, becoming silvery on sides; region around vent grayish black with silvery reflections, this color continued forward along median line of belly to base of ventrals where it widens out, including branchiostegals and extending forward to tip of mandible; cheek, opercles and region immediately below suborbital ridge silvery, the black lining of opercle showing through; fins punctulate with dusky black.

*Type*.—Cat. No. 72949, U.S.N.M., a gravid female 36.5 cm. in length, taken with a beam trawl at station 5172 (lat.  $6^{\circ} 03' 15''$  N.; long.  $120^{\circ} 35' 30''$  E.), vicinity of Jolo, at a depth of 318 fathoms, on a bottom of fine sand and shells.

The arrangement of the spinules on the scales appears to be somewhat variable, some have the spinules arranged in divergent rows, some in parallel rows and others without apparent regularity in their arrangement. The dark band extending forward from the vent along median line of belly, the somewhat swollen semitransparent appearance of the head and the shagreen-like appearance of the scales are characteristic of the species. The form of the head and the inconspicuous ridges on top of head add weight to the contention that the differences between the species of this genus and *Macrourus* are slight.

#### MACROUROIDIDÆ Smith and Radcliffe, new family.

Degenerate macrurids with a very large, ellipsoidal head and a short trunk, tapering into a long, compressed, leptocercal tail; a single dorsal of low, feeble rays beginning near nape and continuing to tip of tail; anal fin confluent with the dorsal; ventrals absent; pectorals small, lateral, complete; head and body covered with small spiniferous scales; bones of head very feeble; eye very small; teeth small, villiform, in narrow bands on jaws only; mouth moderate, inferior, horizontal; premaxillary protractile; snout subconic, high, projecting beyond mouth; gill-openings wide; gills 4, a narrow slit behind the fourth; gill-rakers small; pseudobranchiæ absent; branchiostegal membranes joined to the isthmus.

## MACROUROIDES Smith and Radcliffe, new genus.

Characters of the genus indicated in the description of the family.

*Type of the genus.*—*Macrouroides inflaticeps*.

## MACROUROIDES INFLATICEPS Smith and Radcliffe, new species.

Plate 31, fig. 2.

Dorsal 107 + ; anal 87 + ; pectorals 16.

Head 3.20 in total length, its depth 0.78 in its length, very large, ellipsoidal, very soft, cavernous, without prominent ridges, spiny armature or external depressions, the bony structure very feeble and the tissues insufficient to preserve the form in the alcoholic specimen; trunk extremely short, the head converging posteriorly into the slender, strongly compressed, tapering tail, depth at origin of anal 7.94 in total length; vent immediately in front of anal; eye 11.50 in head, 3.40 in snout, very small, circular; snout 3.40 in head, subconic, high, projecting for a considerable distance beyond mouth; nostrils small, immediately in front of eye; mouth moderate, U-shaped, entirely inferior, its cleft horizontal; maxillary 3.07 in head; premaxillaries protractile, lower jaw included; no mandibular barbel; teeth small, subequal, villiform, in very narrow bands, on jaws only; gill-openings wide, apparently a perfectly distinct slit behind the fourth arch; scales very small, covering head and body, each scale with a single mesial spinule, one or two small lateral spinules present on some scales.

Vertical fins low; distance from tip of snout to origin of dorsal 0.33 in total length; dorsal beginning near nape and extending to tip of tail, apparently not divided (the small size of the rays and their broken condition make it impossible to determine the exact form of the anterior part of the fin); remaining rays of nearly uniform height, scarcely longer than diameter of eye, anal similar to dorsal, its rays slightly longer, distance of origin from tip of snout 2.45 in total length; pectoral small, 3.17 in head.

Color in alcohol: Dark clove-brown.

*Type.*—Cat. No. 72950, U.S.N.M., 14.7 cm. in length, taken with a beam trawl at station 5450 (lat.  $13^{\circ} 23' 15''$  N.; long.  $124^{\circ} 00' 30''$  E.), near Batan Island, Lagonoy Gulf, Luzon, at a depth of 408 fathoms, on a bottom of green mud and coral.

## Family ATELEOPODIDÆ.

## PARATELEOPUS Smith and Radcliffe, new genus.

This genus differs from *Ateleopus* in the greatly reduced size of the dorsal, which consists of only 3 short rays, and in the much smaller size of the mouth. The head is short and more pointed than in *Ateleopus*, and the strong bony protuberance above and behind the eye is lacking.

*Type of the genus.*—*Parateleopus microstomus*.

## PARATELEOPUS MICROSTOMUS Smith and Radcliffe, new species.

Dorsal 3; anal + caudal 91; ventrals 2; pectorals 13.

Head short, pointed, 6.14 in total length, 2.16 in distance from tip of snout to vent, greatest breadth equal to snout plus eye; length of head and trunk 2.80 in total length; depth of body 8.32 in total length, 2.93 in head plus trunk; body and tail compressed, tapering; eye 6.32 in head, 2.55 in snout; snout 2.48, fleshy, pointed, projecting beyond mouth about 0.4 of its length; mouth small, semicircular, horizontal, lips fleshy; maxillary 4.55, not reaching vertical to anterior margin of eye; anterior nostril circular, with a low rim, posterior nostril slit-like, close to eye; no sharp, knob-like structure above or behind eye; a broad band of small teeth on anterior half of each premaxillary; mandible and palate toothless; interorbital 3.17; gills 4, the fourth arch with a slit behind it; gill rakers 7 in number on anterior arch, armed with small teeth; no pseudo-

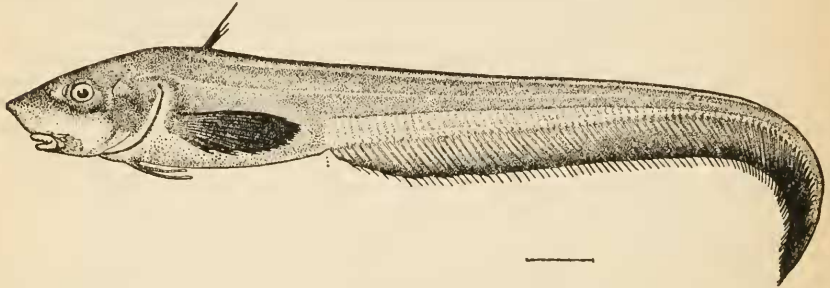


FIG. 11.—PARATELEOPUS MICROSTOMUS.

branchiæ; skin tender, scaleless; lateral line present, inconspicuous, pores widely separated.

Insertion of dorsal fin behind vertical to base of pectoral, first dorsal ray longest, 2.85, its base about one-ninth length of head; anal long, continuous with the caudal, anterior rays short increasing in length posteriorly, longest ray 2.72; pectorals 1.20, well developed, tips not reaching vent; ventrals reduced to a filament, tapering, 2.28, dissection shows filament to be composed of 2 closely joined rays, under the skin are traces of additional rudimentary rays; interhæmals very distinct, covered by a delicate semitransparent skin.

Color in alcohol: Top of head and body seal-brown, becoming sepia on sides of body and tail and gray on ventral surface; dorsal and pectorals very dark brown; ventrals grayish; margin of anal blackish, becoming lighter basally; lips cream-buff; peritoneum silvery with minute dots of brown.

*Type*.—Cat. No. 72951, U.S.N.M., 35 cm. in length, taken with a beam trawl at station 5622 (lat.  $0^{\circ} 19' 20''$  N.; long.  $127^{\circ} 28' 30''$  E.), near Makyan Island, Dutch East Indies, at a depth of 275 fathoms, on a bottom of gray mud.