







LELAND STANFORD JUNIOR UNIVERSITY PUBLICATIONS

CONTRIBUTIONS TO BIOLOGY

FROM

THE HOPKINS LABORATORY OF BIOLOGY

I

THE FISHES OF SINALOA

BY

DAVID STARR JORDAN,

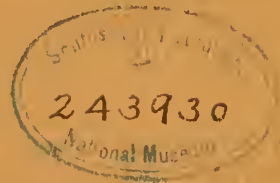
President of the Leland Stanford Jr. University,

Assisted by EDWIN CHAPIN STARKS, GEORGE BLISS CULVER
and THOMAS MARION WILLIAMS.

LELAND STANFORD JR. UNIVERSITY,

PALO ALTO, CALIFORNIA,

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THE FISHES OF SINALOA.*

BY DAVID STARR JORDAN,

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[With Plates xxvi-lv.]

The Mexican State of Sinaloa lies along the east shore of the Gulf of California, mostly to the north of the Tropic of Cancer, extending from Rio Fuerte on the north, which separates it from Sonora, to the northwest boundary of Jalisco. The greatest length of the State along the coast is about 325 miles. The land forms an irregular and broken slope from the high table-lands and cliffs of the Sierra Madre on the east downward to the coast. Down this slope flow several streams of clear water, which acquire great volume in the rainy season (June to November) and which dwindle rapidly in the dry season of the winter. The coast line is very irregular, being formed of rocky islands, mostly of volcanic origin, and of abrupt cliffs or "rincones," the terminations of hills or spurs from the Sierra Madre. Between these are long curved sand beaches, and occasionally sand-spits across the mouth of some estuary which is thus converted into a lagoon. The water of the sea off the coast is very clear. The bottom is very irregular, as is the contour of the shore.

The chief port of Sinaloa is Mazatlan. This city of about 20,000 inhabitants lies on a peninsula between the Estuary or Astillero de Mazatlan on the south and a curving bay known as the Puerto Viejo on the north. On this peninsula are two considerable headlands, Nevería on the north and Vijía on the southwest, between which is a sand beach, facing the west, noted for its high surf, for

* Contributions to Biology from the Hopkins Seaside Laboratory of the Leland Stanford Jr. University. No. 1.

which it is named las Olas Altas. North of Puerto Viejo, at a distance of about seven miles, are three large rocky islands, very much alike, close together and in a right line, known as the three Venados. Opposite them on the shore is a similar headland, Camarron. About all these headlands and islands are many rock-pools and basins left filled with water by receding tides. Beyond the extremity of Vijia is a tall conical island, over 500 feet in height, known as Creston. This is surmounted by a lighthouse and is the most conspicuous land mark of the harbor of Mazatlan. North of Creston lie a number of large barren rocks of white volcanic rock, known collectively as Islas Blancas. The scanty harbor of Mazatlan lies to the south of Vijia and Creston, between these and the Isla de los Chivos and Isla de las Piedras. It ends in a long deep winding channel, known as the Astillero or Estuary, which extends around the south side of the city, with many muddy arms lined with Mangrove bushes, then turns to the south, forming for some ten miles the narrow channel between Isla de las Piedras and the mainland. No fresh waters of importance flow into the Astillero and the tides form strong currents as the waters pass in and out.

At Altata, in the northern part of Sinaloa, is a small harbor, the port of the capital City of Culiacan.

Of the several rivers in the State, only one, Rio Presidio or Rio de Mazatlan, was visited by us. This is a swift clear stream, rising in the mountains. At Presidio and Villa Union, where it was visited by us, it flows rapidly over gravel, being in January some three rods wide and rarely more than two feet deep.

The fishes of Sinaloa are known chiefly from the collections made by Dr. Charles H. Gilbert in the winter of 1881. Under the auspices of the U. S. Fish Commission,

Mr. Gilbert spent six weeks at Mazatlan where he secured a collection of about 180 species, of which number about fifty were new to science. These were described by Jordan and Gilbert in the Proceedings of the U. S. National Museum in 1881, the typical specimens being deposited in the Museum at Washington. Previous to this time a number of specimens had been sent, by collectors who had visited Mazatlan and Altata, to the Museum at Vienna, where they were described by Dr. Franz Steindachner, and to Berlin where they were recorded by Professor Peters.

Subsequent to the visit of Dr. Gilbert, collections were made at Mazatlan and Presidio by Mr. Alphonse Forrer, now of Santa Cruz, California. Most of these were sent to the U. S. National Museum, where they were described by the present writer. A few specimens were also sent to the British Museum.

In December, 1894, through the kindly interest of Mr. Timothy Hopkins of Menlo Park, California, and under the auspices of the Hopkins Seaside Laboratory, a branch of the Leland Stanford Jr. University, an expedition was sent to Mazatlan for the purpose of collecting fishes. This was in charge of David S. Jordan, assisted by George B. Culver and Edwin C. Starks. In addition, Mr. Thomas M. Williams, Mr. Norman B. Scofield and Mr. James A. Richardson accompanied the expedition as volunteer assistants, with Frank H. Lamb as botanist, and Mr. George B. Seward as herpetologist.

One month, Dec. 24, 1894 to Jan. 25, 1895, was spent at Mazatlan in the collection of fishes. One hundred and eighty-five species were obtained, of which twenty-nine seem to be new to science, besides two species from La Paz. A full series of the specimens obtained is in the Museum of Leland Stanford Jr. University. Other series

nearly complete have been sent to the British Museum and to the Museums at Vienna and Berlin. Partial sets are in the Academy of Sciences at San Francisco and in the U. S. National Museum. It is evident that the list here given is by no means a complete record of the fishes of Sinaloa. Doubtless all the species enumerated from Sonora by Gilbert, Jenkins and Evermann, and by Gilbert and others from Lower California, will ultimately be found in this region. Every day spent at Mazatlan either by Dr. Gilbert or by ourselves brought some addition to the list, and the deep water fishes have not been studied at all.

Besides our obligations to Mr. Hopkins, and to the volunteer assistants above named, the writers wish to express their especial indebtedness for local assistance to Dr. George Warren Rogers, a scholarly physician resident at Mazatlan; to Señor Ygnacio Moreno, the leading fisherman of the port, whose efforts in aiding our work were unwearying. We also owe many favors to Messrs. William W. Felton, Bert L. Smith, John L. Kendall and J. Rippey, American residents in Mazatlan. From Dr. Charles H. Gilbert, in whose laboratory the present paper has been written, we have received much valuable aid in many ways.

The plates accompanying this paper have been drawn by Miss Anna L. Brown, artist of the Hopkins Laboratory.

The following species are here described as new to science. The numbers after each name are those borne by the type specimens on the register of the Museum of Leland Stanford Jr. University.

Pristis zephyreus Jordan & Starks. (Skin.)

Narcine entemedor Jordan & Starks. 1699.

Urolophus rogersi Jordan & Starks. 1700.

Urolophus umbrifer Jordan & Starks.

Pteroplatea rava Jordan & Starks. 1587.

- Galeichthys gilberti* Jordan & Williams. 1666, 1667, 1668.
Galeichthys azureus Jordan & Williams. 1575.
Stolephorus scofieldi Jordan & Culver. 2941.
Pæcilia presidionis Jordan & Culver. 2687.
Siphostoma starksi Jordan & Culver. 2686.
Mugil hospes Jordan & Culver. 2890, 2954, 1695.
Thyrina evermanni Jordan & Culver. 2688.
Thyrina crystallina Jordan & Culver. 2685.
Scomberomorus sinaloa Jordan & Starks. 1720.
Caranx medusicola Jordan & Starks. 2645.
Hynnys hopkinsi Jordan & Starks. 1563.
Trachinotus paloma Jordan & Starks. 2690.
Trachinotus culveri Jordan & Starks. 2691.
Mycteroperca venadorum Jordan & Starks. (British Museum.)
Mycteroperca boulengeri Jordan & Starks. 1621.
Lythrulon opalescens Jordan & Starks. 2963.
Microspathodon azurissimus Jordan & Starks. 1636, 2895, 1610.
Teuthis crestonis Jordan & Starks. 2899.
Balistes naufragium Jordan & Starks. 1656.
Aboma etheostoma Jordan & Starks.
Gobius manglicola Jordan & Starks. 3095.
Scorpana mystes Jordan & Starks. 1616, 1617, 2919, 1501.
Symphurus williamsi Jordan & Culver. 2943.
Orthopristsis reddingi Jordan & Richardson.
Alexurus armiger Jordan & Richardson.

Family GINGLYMOSTOMIDÆ.

1. *Ginglymostoma cirratum* (Gmelin.) GATA.

Two large specimens, respectively five and six feet in length, were taken. These agree fairly with published descriptions, except that the black spots scattered over the body are very small and pepper-like. It is possible that these spots vanish with age, and that *Ginglymostoma fulvum* Poey, the unspotted form, is the adult of the other.

This species was obtained by Dr. Gilbert, at Mazatlan and Panama.

Family GALEIDÆ.

2. *Galeus lunulatus* (Jordan & Gilbert). GATO.

Rather common at Mazatlan, where the original types were obtained by Dr. Gilbert.

3. *Galeocerdo tigrinus* Müller & Henle.

Recorded by Dr. Gilbert, from Mazatlan and from San José de Guatemala; not seen by us. It has not been compared with the Brazilian type of the species.

4. *Scoliodon longurio* (Jordan & Gilbert).

Rather common in the harbor at Mazatlan, where the original types were taken by Dr. Gilbert, who also found the species at Panama.

5. *Carcharhinus æthalous* Jordan & Gilbert.

Original described from Mazatlan; not seen by us. Also recorded by Dr. Gilbert, from Panama. It is not likely that *Carcharhinus limbatus* occurs on the Pacific Coast. Probably this related species has been mistaken for it.

6. *Carcharhinus lamiella* (Jordan & Gilbert).

A very young specimen with a deformed tail was obtained by us at Mazatlan, the first record of the species from that port.

7. *Carcharhinus fronto* Jordan & Gilbert.

This large shark is not uncommon about Mazatlan, where the original types were taken by Dr. Gilbert. No specimens were seen by us, but the species is said to be common in the surf about the Olas Altas. It is said that during the time that Mazatlan was occupied by French soldiers a number of these were killed by the sharks while bathing in the surf.

Family SPHYRNIDÆ.

8. *Sphyrna tiburo* (Linnæus). CORNUDA.

One specimen obtained by us at Mazatlan. It was not secured by Dr. Gilbert; this being the first record on the Pacific Coast of America of this common Atlantic species. Our specimen seems to agree fully with an example from Florida.

9. *Sphyrna tudes* (Cuvier). CORNUDA.

Not rare at Mazatlan, where specimens were obtained by Dr. Gilbert, and one by the Hopkins expedition.

10. *Sphyrna zygaena* Linnæus. CORNUDA.

Common in the sea about Mazatlan. Three young specimens taken by us. Also recorded by Dr. Gilbert from Mazatlan and Panama.

Family PRISTIDIDÆ.

11. *Pristis zephyreus* Jordan & Starks n. sp. PEZ DE ESPADA.

Snout to nostrils, 3 in length to base of caudal; breadth of saw at anterior end between first two pairs of teeth half breadth of its base behind the last pairs; teeth on saw trenchant behind, arranged in 22 pairs; hinder teeth wide apart, the interspaces 5 times their base; posterior teeth turned slightly backward, a groove on their posterior edge; front teeth not quite half as long as the saw is broad at their base; distance between first and second tooth three times base of first. (Other specimens examined for us by Dr. G. W. Rogers show 18 to 21 pairs of teeth.) Eye equal to spiracle, contained 3 times in base of saw just behind last pair of teeth; width of mouth a little greater than base of saw; mouth with about 65 series of blunt teeth; slant height of pectoral in front, a little more

than half distance from tip of snout to mouth. Dorsals sub-equal; first dorsal inserted in advance of ventrals; about half its base over ventrals; caudal, with a lower lobe, which is equal to slant height of pectoral; tail with a keel on side.

Color, plain olive grey above, light below.

Measurements—Length, 50 inches; caudal, 7 inches; pectoral, 7 inches; dorsal front, $5\frac{1}{2}$ inches; snout without nostril, 11 inches.

Type—A skin in L. S. Jr. Univ. Museum.

Common in brackish waters at the mouth of the Rio Presidio, where one fine specimen was obtained. The species is also recorded (as *Pristis perroteti*) by Dr. Gilbert from Mazatlan, and by Dr. Günther from Chiapam. Dr. Günther identifies this species with *Pristis perroteti* described by Müller & Henle, from the Senegal River. In view of the great difference in the fauna of the Gulf of California from that of Equatorial Africa, this identification may be questioned, especially as there are several details in which the description of *Pristis perroteti* differs from our fish.

We append the description of Müller & Henle, as also the descriptions given by Latham of his *Pristis antiquorum* and *Pristis pectinatus*, together with our account of the common saw fish of the Gulf of Mexico, usually and probably correctly identified as *Pristis pectinatus* Latham.

The following is the original description of

“Spec. 4. *Pristis Perotteti*, N.

Kopf. “Die Form des Kopfes und der Naslöcher wie *Pristis antiquorum*.

Die Säge läuft nach vorn sehr allmählig spitz zu. Sie ist an der Basis 1 Zoll 7 Linien, an der Spitze zwischen den beiden letzten Zähnen 10 Linien breit, 19 Zähne jederseits. Die hintersten Zähne sind kurz, wahrscheinlich abgenutzt. Die vordersten sind etwas breiter als die Hälfte der Breite der Säge, alle am hintern Rande gerinnt. Die hintern Zähne stehen weit aus einander, um 5-6 Mal die Breite des Zahns. Die vordersten sind einander etwas mehr

genähert. Die Distanz zwischen den beiden letzten ist nicht ganz 3 Mal so breit als die Basis des Zahns. Alle Zähne nur wenig nach hinten geneigt.

“Die obere Nasenklappe reicht mit ihrem innern Rande bis zum innern Nasenwinkel. Die Zähne sind grösser als bei *Pristis antiquorum*, 60-70 in einer Reihe.

Flossen. Die Brustflossen vom Kopf scharf abgesetzt. Erste Rückenflosse mit der Hälfte ihrer Basis vor den Bauchflossen. Schwanzflosse mit kurzem aber deutlichem untern Lappen.

Farbe. Farbe wie *Pristis antiquorum*.

Maasse. Von der Spitze der Säge zur Mitte zwischen den

“aussern Naswinkeln.....	11''	6'''
Von den Naslöchern zum Maul.....	1''	10'''
Vom Maul zum After.....	11''	
Vom After zur Schwanzflosse.....	8''	
Länge der Schwanzflosse.....	5''	6'''
Breite der Säge in der Mitte.....	1''	2'''
Länge des Längsten Zahns.....		6'''
Breite desselben.....		1½'''
Distanz der Naslöcher.....	2''	
Breite des Maules.....	2''	

Fundort. Aus dem Senegal. Soll nur im süßen Wasser leben.

Ein Exemplar ♂ trocken in Paris durch Perottet.”

(Muller & Henle, Plagiostomen, p. 108.)

From the work of Latham we take the following description of his

“*Pristis antiquorum*:

Pr. rostro spinis validis utrinque 18-24. Tab. 26, f. i.

Squalus pristis, Lin. Syst. Nat. I., p. 401, 15. Faun. Suec. 297.

Mus. Ad Fr. I., p. 52. Mull. Lin. Th. 3, Tab. ii, f. 2 (spin. 18).

Gmel. Lin. I., p. 1494, 15. Fab. Fn. Groenl., 130, 91, Mull.

Prodr., p. 38, 319. Klein. Miss. Pisc. 3, p. 12, No. ii, tab. 3, f. 1, 2. (pullus.)

Plin. Nat. Hist., lib. 9, cap. 2. Clus. Ex., tab. 14, p. 136 (spin. 20).

Aldrov. Cet., p. 692. Will. Ieth., p. 61, Tab. B. 9, fig. 5 (fig. Clusii).

Raii, Syn. Pisc., p. 23. Olear. Mus., p. 41, t. 26, f. i. Rondel. Pisc. 487.

Bell. de Aq., t. in p. 66 (Langue de Serpent).

Valent. Amboin, p. 33, t. 19, f. 52. Bloch, Fisch. Deutsch., p. 37, t. 120.

Du Tertre Ant., p. 207 (Spadon). Bonann. Mus. Kirch., t. 288, t. 21.

Cabinet de Ste. Genev., t. p. 100. Brouss. Act. Par. 1780, p. 671.

(La Scie.) Pis. Ind. Occ., p. 51. Marcgr. Bras., p. 158 (Aragnagua).

Gronov. Zooph., p. 33. Arted. Syn. 66, Id. Syn. 93. Brown. Jam. 458, I.

HABITAT IN OCEANO.

“Totum corpus ad 15 pedes longum, supra nigricans, seu leucophæo-griseum, abdomine albicante. Caput antice planum. Rostrum ad 5 pedes longum, spinis validis numero utrinque 18-24. Os dentibus granulatis instructum. Oculi magni iride aurea. Pone oculos foramina duo oblonga. Spiracula quinque. Pinna dorsalis prima ventralibus opposita, altera inter primam & caudæ apicem media. Pectorales latæ longæque. Caudalis brevior quam congeribus.

This species and the following grow to the largest size of any which have yet come under the inspection of the naturalist, some specimens measuring 15 feet in length.

The head is rather flat at top, the eyes large, with yellow irides, behind which is a hole, which some have supposed may lead to an organ of hearing.*

* Nos foramina hæc meatus auditorios esse credimus. Willughb.

The mouth is well furnished with teeth, but they are blunt, serving rather to bruise its prey than to divide it by cutting. Before the mouth are two other foramina, supposed to be the nostrils. The rostrum, beak or snout, is in general about one-third of the total length of the fish, and contains in some eighteen, in others as far as twenty-three or twenty-four spines on each side; these are very stout, much thicker at the back part, and channelled, inclining to an edge forwards. The fins are seven in number, viz.: two dorsal, placed at some distance from each other; two pectoral, taking rise just behind the breathing-holes, which are five in number; two ventral, situated almost underneath the first dorsal; and lastly the caudal, occupying the tail both above and beneath, but longest on the upper part. The general color of the body is a dull grey, or brownish, growing paler as it approaches the belly, where it is nearly white.” (*Latham, Trans. Linn. Soc., 1794, p. 277.*)

Mr. Latham thus describes his

“*Pristis pectinatus*:

Pr. rostro spinis angustioribus utrinque ad 34. Tab. 26, fig. 2.

Pristis seu *Serra*, Gesner Aq., fig. in p. 728 (spin. 34), Id. Ic. An., p. 171-

Mus. Besler, tab. 17, f. 3 (spin. 28). Id. f. i (caput, spinis, 25)

Aldr. Cet. f., p. 692. *Johust. Pisc.*, p. 8, t. iii (spin. 28). Blas.

Anat., p. 466, t. 49, f. 13. Bloch, *Deutsch. p.* 37, t. 120 (rostr. arcuat.).

Knorr, *Delic.*, p. 56, t. H. 4. Olear. *Kunst.*, p. 38, t. 25, f.

i. *Pontop. Hist. Norv.* ii, p. 240. (spin. 25.)

HABITAT IN OCEANO.

Corpus a priore non multum differt. Rostrum spinæ longiores, & minus validæ, numero variant a 25 usque ad 34. Pinnæ posticæ magis excavatæ.

This and the former species have been confounded hitherto by naturalists,

nor are we certain that any others have been observed by them; and if we may judge by their figures of each, it should seem that the first described was the most plentiful. That figured in Gesner is far from a bad representation, and the one engraved by Knorr in his *Deliciæ* is sufficiently accurate. This species differs from the first, in having the snout more narrow in proportion at the base, and the whole of it more slender in all its parts; whereas the first is very broad at the base, and tapers considerably from thence to the point. The spines on each side also are longer and more slender, and vary from 24 to 34 in the different specimens; we have indeed been informed of one which contained no less than 35 spines on each side of the snout; but we must confess that we have never been fortunate enough to have seen such a specimen. This is supposed to grow to as great a size as the former, and in the general make and shape of the body does not materially differ." (*Latham*, Trans. Linn. Soc., 1794, p. 278.)

The following description of *Pristis pectinatus* Latham (*Pristis granulosa* Bloch & Schneider) is taken from a specimen two feet long, from Key West, Fla. :

Snout to nasal-lobes, 3 in length of body to base of caudal; width of anterior end of saw between first two pairs of teeth, equal to the internasal space, $\frac{2}{3}$ the base behind last pair of teeth; saw with 26 teeth on a side; eye larger than spiracle, half interorbital space; width of mouth equal to its distance to front of nostril; teeth in mouth in about 70 series; width across outer angle of pectoral fins, $2\frac{1}{3}$ in length from eyes to base of caudal; width of body behind pectorals, 7. Height of pectoral slant in front, 3 in snout to mouth; dorsals subequal; caudal, with no lower lobe, equal to pectoral slant.

Color, uniform brown above, below light.

Family RHINOBATIDÆ.

12. *Rhinobatus glaucostigma* Jordan & Gilbert. GUITARRO.

Very common on sandy bottoms in the estuary or Astillero at Mazatlan, where the species was originally found by Dr. Gilbert.

Family NARCOBATIDÆ.

13. *Narcine entemedor* Jordan & Starks, n. sp. EN-TEMEDOR.

Two specimens taken in the estuary at Mazatlan, and

a third procured by Mr. James A. Richardson in the harbor of La Paz. Specimens had also been obtained by Dr. Gilbert, at Panama, in 1883, but having been destroyed by fire, the species has remained undescribed until the present time.

Snout $3\frac{3}{4}$ in length of disk; preocular part of snout equals preoral; interocular space in snout, $1\frac{1}{2}$; width of mouth, $2\frac{1}{4}$. Eye much smaller than spiracle; spiracles edged with small tubercles. Length of disk equal to its width; disk equal to length of tail, without caudal fin; tail with a loose fold of skin on each side. First and second dorsals equal, rounded behind; ventrals large, ending midway between posterior edge of disk and caudal fin. Color: Pale olive brown, a little clouded with darker; second dorsal edged with pale; dots on head dusky.

Length of largest specimen, 20 inches. Type, No. 1699, L. S. Jr. Univ. Mus.

The Spanish name *Entemedor* seems to be equivalent to *Intimidator*.

Family DASYATIDÆ.

14. *Urolophus asterias* Jordan & Gilbert. RAIA.

Very common in the surf and on the sandy beaches about Mazatlan. Spinules on back and tail 18 to 32 in number. The upper side of the disk is marked with round dusky spots, faint, as if washed or faded out.

15. *Urolophus rogersi* Jordan & Starks, n. sp.

Disk broader than long by a distance $2\frac{1}{2}$ times the interorbital width; anterior margins of disk nearly straight, the tip of snout projecting; snout from eye, $3\frac{3}{4}$ in length of disk; eyes little smaller than spiracles; width of mouth, $2\frac{1}{2}$ times in preoral part of snout; caudal spine inserted in front of middle of tail. Skin with minute prickles on

margin of pectorals and on middle of back, leaving smooth areas near middle of pectorals and over branchial arches; 16 to 20 large spinules along median line of back and tail.

Color, plain brown; caudal fin darker, edged with white.

This species differs from *Urolophus asterias*, in having a wider disk, more acute snout, much smaller prickles, and fewer spinules on back and tail.

Three specimens obtained in the Astillero, the longest 18 inches in entire length. Type, No. 1700, L. S. Jr. U. Museum.

This species is named for Dr. George Warren Rogers, a scholarly physician, native of Vermont, but long resident in Mazatlan.

16. *Urolophus umbrifer* Jordan & Starks n. sp.

Occasionally taken with *Urolophus asterias*, but much less common.

Disk round, not wider than long, its length greater than tail; snout pointed, not exerted. Snout from eye, $4\frac{1}{2}$ in disk; eyes equal to spiracles; mouth 2 in distance to tip of snout; caudal spine inserted in front of middle of tail; skin perfectly smooth.

Color, brown above, with blackish cross-shades or bars, radiating from the shoulder; a dark band behind eyes, and one from eyes; caudal fin dark.

One adult female specimen, the uterus containing four young.

This is probably not identical with Garman's *Urolophus nebulosus*, being perfectly smooth and different in color.

17. *Dasyatis longus* Garman.

Rather common at Mazatlan, where specimens were also taken by Dr. Gilbert; also recorded by Mr. Garman

from Acapulco and from Panama, and by Evermann & Jenkins from Guaymas.

18. *Pteroplatea crebripunctata* Peters. MANTARAIA.

Very common on sandy shores everywhere about Mazatlan, from which locality it was originally described; also taken by Dr. Gilbert.

Width of disk twice length to posterior end of anal slit; snout forming a regular curve from a little in front of middle of pectorals, a very small blunt projection at tip; anterior margin of disk convex near snout and lateral angles, pectorals concave medially; posterior margin weakly convex; posterior angle broadly rounded; lateral angle sharply rounded; distance from snout to a line drawn through lateral angles, $2\frac{1}{2}$ times in distance to tip of tail.

Interorbital a little wider than its distance to tip of snout; eyes twice spiracles; mouth equals snout, $6\frac{1}{2}$ in disk. Tail rat-like, with a scarcely perceptible fold of skin on its dorsal side.

Ground color olive brown, everywhere with small dark points, not so close set as in *Pteroplatea rava*, indistinct greyish spots, half as large as iris, scattered over the body among the dark points, these spots are more distinct on anterior edge of disk; tail mottled with darker; lower parts light. Markings nowhere so distinct as in the next species.

Several specimens, the largest 15 inches long.

19. *Pteroplatea rava* Jordan & Starks, n. sp. MANTARAIA COLORADA.

One specimen taken in the Astillero at Mazatlan.

Length of disk $1\frac{2}{3}$ width; snout forming an angle which is almost a right angle; pectorals slightly concave medially; posterior margin of disk weakly convex; posterior angle not broadly rounded, but curved in somewhat suddenly; lateral angles acute.

A line drawn through lateral angles would bisect a line from snout to tip of tail. Interorbital $1\frac{1}{3}$ in snout; eye $1\frac{1}{2}$ in spiracles; mouth 7 in disk, $1\frac{1}{2}$ in snout; tail straight and slender, with a very slight fold on dorsal side.

Ground color light olive brown, thickly set with sharp cut black points; conspicuous grey or white spots, half as large as iris, scattered over the body, around which the black spots form rings; brighter yellowish spots and half spots around anterior edge of disk: tail mottled above with darker; lower parts chiefly light orange red or rust colored in life.

All the markings are very distinct and clear cut, the reddish of the belly conspicuous.

One specimen, 12 inches long. Type No. 1587, L. S. Jr. Univ. Mus.

20. *Ætobatus narinari* (Euphrasen). GAVILAN.

Rather common in the harbor of Mazatlan, where it was also taken by Gilbert; a beautifully colored species reaching a large size.

Length of disk $1\frac{2}{3}$ in width; proximal half of anterior margin of pectoral fins straight, distal half convex; posterior margin concave, the end of each ray forming a small scallop; lateral angle sharp.

Snout forming an angle, from its tip to division of nasallobes, $1\frac{1}{3}$ times breadth of head; width of snout $1\frac{1}{3}$ times distance from its tip to the division of nasallobes; nasallobes projecting back over the mouth; width of mouth $1\frac{1}{2}$ its distance to tip of snout; numerous blunt buccal papillæ around upper dental plate and on ridge between nostrils; interorbital $4\frac{3}{4}$ in disk; eyes smaller than spiracles, which are as long as base of dorsal. Ventrals well rounded, $3\frac{2}{3}$ in length of disk; tail $3\frac{1}{2}$ times disk. First caudal spine equals base of dorsal, which is half second spine.

Color bluish black with many round yellowish spots scattered equally over the back and ventral fins; spots about as large as eye on back, smaller on head, sometimes two spots run together forming an elliptical spot, about sixteen spots from eye along anterior margin of pectoral to lateral angle; posterior margin of pectoral very narrowly margined with white; ventral side pearly white.

From the description of *Ætobatus laticeps* this species differs in the following respects: disk not so broad; tail not so long; width of head and snout less; ventrals not truncated behind; pectorals not margined with blackish; spots on ventrals not assuming the form of ocelli.

Five large specimens obtained; length of disk in each, 15 inches.

This description has been compared by Dr. Barton W. Evermann, with specimens of *Ætobatus narinari* from Brazil. No difference of any importance appears, and in his judgment the Atlantic and Pacific Coast American forms are identical.

NOTE.—This species has been several times obtained by Dr. Gilbert and others in the Gulf of California, having been identified as *Ætobatus laticeps* of Gill. It does not, however, agree with Dr. Gill's description and there is no evidence that his specimen came from Mexico. *Ætobatus laticeps* was described from an example from unknown locality received from San Francisco. It is therefore quite as likely to have come from Honolulu or from China, as from the Gulf of California.

The following is Dr. Gill's description:

“*Ætobatis laticeps* Gill.

“The greatest width is rather *more* than twice as great as distance from snout to front of anus. The head is broad and nearly equals the distance from snout to division of nasal lobes. The snout is obtusely angulated in front, and at its sides is convex and scarcely angulated;

its width at a line in front of the nostril is as great as the distance from its point to interlobular nasal emargination. The rostro-frontal fontanelle is constricted at its anterior third; the interval between the crests of the anterior portion enters about $2\frac{2}{3}$ times in the interorbital area; at the constriction, about 4 times; at the posterior portion, about $2\frac{2}{3}$ times; the posterior portion gradually expands backwards and terminates with an oval contour behind. The nasal lobes are about twice as long as wide, their length externally exceeding half the length or breadth of the rostral area.

“The dental plate has a triangular contour; its anterior angle obtusely rounded.

“The dorsal commences immediately behind the pectoral fins. The ventral fins almost truncated behind, between the well rounded angles; their breadth $2\frac{1}{2}$ times their length. The tail is four or five times as long as the body.

“The color is bluish-black above, relieved on the head by numerous, but rather distinct, whitish or yellowish spots, smaller than eye, much larger on the body and behind towards the sides, and on the ventrols sometimes assuming the form of ocelli; below white; pectorals margined with blackish.

“This species is closely related to *A. narinari* and its allies, and especially *A. latirostris* A. Dum., but is apparently distinguished by the combination of characters given in the diagnosis. It belongs to the genus *Goniobatis* Ag., proposed for a species with a more angular lower dental plate than in *A. narinari*, and is related to the *Goniobatis meleagris* Ag.* of the Sandwich Islands,

* “This species has not been characterized, but a dried Aëtobatine obtained at the Sandwich Islands by the Wilkes Exploring Expedition probably belongs to it.”

but is distinguished by the more declivous forehead and the shape of the rostr-frontal fontanelle.

"A single specimen was forwarded to the Smithsonian Institution by S. E. Hubbard, Esq., of San Francisco, Cal." (Gill.)

21. *Manta birostris* (Walbaum).

Said to be frequently seen in the open sea about Mazatlan; not obtained by us.

Family SILURIDÆ.

22. *Felichthys pinnimaculatus* (Steindachner).

Occasionally taken in the estuary. Recorded by Gilbert from Mazatlan and Panama, by Steindachner from Altata, Costa Rica and Panama. Two specimens obtained by us.

23. *Felichthys panamensis* (Gill).

Not rare in the estuary, reaching a considerable size. Obtained by Gilbert at Mazatlan, Libertad, Punta Arenas; by Gill and Günther at Panama; and by Steindachner at Magdalena Bay, Altata and Panama. One specimen obtained by us.

24. *Galeichthys peruvianus* Lütken. PANAMA.

Recorded by Steindachner from Altata; not seen by us, and taken by Dr. Gilbert only at Panama; apparently not common.

The so-called genus *Galeichthys* is distinguished from *Hexanematichthys* only by having the bones of the head covered by skin. In several species of other genera (notably *platypogon*, *dasycephalus*, *gilberti*), the skin on the head is thickened in females, obscuring the outline and granulation of many of the bones. It may be that the species called *Galeichthys* represent only the extreme

of this condition, and that the species referred to it should be arranged in other groups.

As the dentition of the typical species of *Galeichthys* agrees in essential respects with that of *Hexanematichthys*, we unite the two groups under the earlier name, *Galeichthys*.

25. *Galeichthys gilberti* Jordan & Williams, n. sp.
BAGRE BLANCO. Plate xxvi.

Extremely abundant in the upper part of the Astillero, along sandy bottoms, exceeding by far in numbers all other cat fishes. Also found by Gilbert at Mazatlan, whence it was erroneously recorded by Jordan & Gilbert as *Arius assimilis* Günther. Large numbers of this species are left on the beach after seining, and the various sea birds, pelicans, man-of-war birds, gulls and the like, come down to take possession of them. In two cases specimens of this cat-fish were swallowed by pelicans; the spines were erected after the fish was partly engorged, and these spines entering the skin of the sack of the pelican, made it impossible for the bird to swallow them or to dislodge them. Considerable numbers of pelicans are doubtless destroyed every year by attempting to swallow living cat-fish which have been left by the fishermen.

The following description is essentially that of Jordan & Gilbert, Bull. U. S. Nat. Mus., 1882, under the name of *Arius assimilis*. The type of that description, 29,213 U. S. N. M., from Mazatlan, coll., Gilbert, may be taken as the special type of the species, numerous co-types (numbered 1666, 1667 and 1668, L. S. Jr. Mus.), having been sent by us to different museums:

Head, $3\frac{1}{7}$ to 4; width of head, $5\frac{1}{3}$; depth, 5; D. 1. 7;
A. 4, 14.

Body comparatively elongate, the head depressed but not very broad, somewhat broader than high; eye rather large, 5 to 6 in length of head; width of interorbital space, $2\frac{1}{4}$ in head; breadth of mouth, $2\frac{2}{3}$; length of snout, 3.

Teeth all villiform; bands of vomerine teeth separated by a rather wide interval, each small, roundish, confluent with the neighboring palatine band, the junction marked by a slight constriction; palatine bands ovate, broad behind, varying considerably in size and somewhat in form, the width ranging from one-third diameter of eye to two-thirds, being generally largest in adults; band of palatine teeth without backward prolongation; band of maxillary teeth rather broad and short, its length about five times its breadth. Maxillary barbel broad and flattened at base, reaching a little past base of pectoral in the young, scarcely to the gill opening in the adult; outer mental barbels, 2 in head, inner 3. Gill-rakers, $4+12$.

Dorsal shield very short, narrowly crescent-shaped, its length on the median line not more than half that of one of its sides. Occipital process subtriangular, not quite as long as broad at base, with a strong median keel, its edges slightly curved. A short distance in front of the beginning of the keel is the end of the very narrow groove-like fontanelle, which is somewhat widened anteriorly, finally merging into the broad, flat, smooth interorbital area, the boundaries of which are not well defined; shields of head usually smooth, all finely and very sparsely granular, the granules not forming distinct lines.

Gill membranes forming a rather broad fold across isthmus.

Dorsal spine long, usually, but not always, shorter than the pectoral spine, about $1\frac{3}{4}$ in head; axillary pore absent. Humeral process rather broadly triangular, not

much produced backward, less than half length of pectoral spine, its surface not granular, covered by skin. Adipose fin half length of anal, its posterior margin little free. Upper lobe of caudal longest and somewhat falcate, about as long as head. Ventrals unusually long about reaching anal in females, shorter in the males. Vent much nearer base of ventrals than anal.

Color olive green, with bluish luster, white below; upper fins dusky olivaceous; caudal yellowish dusky at tip; anal yellowish with a median dusky shade; ventral yellowish, the basal half of the upper side abruptly black; pectorals similarly colored, the black area rather smaller; maxillary barbel blackish; other barbels pale.

Length, 12 to 18 inches.

The following specimens from Dr. Gilbert's Mazatlan collections are registered in the United States National Museum:

28,161, 28,189, 28,210, 28,213 (2), 28,221, 28,232, 28,276, 28,304.

This species is nearest allied to *Galeichthys seemanni* (Günther), a Panama species. *Galeichthys jordani* (Eigenmann) from Panama differs in the gill rakers and in other regards. *Galeichthys assimilis* is an Atlantic species, not yet known from the Pacific Coast. With each of these *Galeichthys gilberti* has been at one time or another confounded. *Galeichthys gilberti* differs from *Galeichthys seemanni*, as described by Dr. Eigenmann, in the absence of pectoral pore, in the shorter spines and in the fontanelle not quite reaching occipital process; ventrals unusually long, no dark specks on side of belly, barbel short, compressed. As noted below, *Galeichthys gilberti* bears a superficial resemblance to *Netuma platypogon*. Its teeth are different, the ventrals are much longer, and the adipose dorsal much larger. *Netuma*

platypogon has the sides of belly much soiled by dark specks.

26. *Galeichthys azureus* Jordan & Williams, n. sp.
BAGRE AZUL. Plate xxvii.

Head $3\frac{1}{4}$; width of head $4\frac{5}{9}$, depth 9. Length from tip of snout to tip of upper lobe of caudal fin $19\frac{1}{4}$ inches. D. I, 7: P. I, 10. A. 4, 14. Gill rakers $6+13$.

Body robust, its width anteriorly greater than its depth; caudal peduncle short, stout; distance from end of anal fin to base of median caudal rays about one-half length of head. Head flat, very broad; its depth at posterior angle of jaw about one-half its width; interorbital region flat, smooth anteriorly and granulated posteriorly; fontanelle almost obsolete, wide anteriorly and ending in a short groove posteriorly at a point one-half distance from tip of snout to posterior end of occipital process: top of head, occipital process and dorsal shield finely granular, granulations mostly arranged in radiating striæ and extending forward to a line with the pupils, nostrils very large and close together; posterior one with a broad valve.

Occipital process pentagonal, its length $4\frac{1}{2}$ in head, about as long as wide, with a very low ridge; dorsal shield crescent shaped with points extending back on each side of fin, its median length about one-half the length of its side. Eye small, about 9 in head; interorbital width almost 2 in head: snout 3 in head: breadth of mouth $2\frac{3}{10}$ in head.

Maxillary barbel slender, thick at base, $1\frac{4}{5}$ in head: outer mental barbel reaches to posterior angle of jaw, about $2\frac{3}{5}$ in head: inner mental barbel about 4 in head.

Teeth all villiform: premaxillary band narrow, about one-eighth as wide as long, vomerine and palatine bands of teeth fully confluent on each side, forming together a crescent-shaped patch, narrowly divided on the median

line of the vomer; form of vomerine bands similar to that of the palatine bands but smaller. Palatine band of teeth without backward prolongations.

Opercle with radiating ridges; humeral process granular, triangular, lower posterior corner prominent; axillary pore very small. Gill membranes forming a broad fold across isthmus.

Dorsal fin short, base not including spine equal to base of adipose dorsal; dorsal spine robust, but little shorter than pectoral spine, about two in head; its anterior serræ small and tubercle-like; its posterior edge, as well as that of pectoral, retrosely serrate: soft rays of dorsal extending but little beyond spine, the longest about three-fifths length of head. Adipose dorsal about one-half as high as long. Caudal lobes unequal, the upper lobe about one-third longer than lower lobe. Anal short, of medium height. Distance from vent to base of ventrals one-half distance from origin of anal. Pectoral spine very strong, its anterior margin with serræ towards the tip, which become small tubercles towards base; soft rays but little longer than spine, which reaches slightly beyond one-half distance from its origin to base of ventrals.

Color dark blue with silvery reflections on sides; belly pale, mental barbels dusky; maxillary barbels light below and black above; paired fins darkest on inner side; other fins almost uniformly dusky.

One specimen, $19\frac{1}{4}$ inches long, was taken by the Hopkins expedition in the estuary at Mazatlan. It is numbered 1575 in the collection of the Leland Stanford Jr. University.

27. *Galeichthys guatemalensis* (Günther).

Taken by Dr. Gilbert at Mazatlan; not seen by us. Also recorded from Chiapam (Günther), and the coast of Colima (Xantus).

28. *Netuma platypogon* (Günther).

Very common at Mazatlan; several specimens taken in Astillero, where it is scarcely less abundant than *Galeichthys gilberti*. Also recorded by Dr. Gilbert from Mazatlan, Libertad and Punta Arenas; by Günther from San José; and by Steindachner from Magdalena Bay and Callao. To the southward it is very abundant.

In some specimens, perhaps females, granulations are visible on the occipital process only, the other bones being covered by smooth skin, as in the subgenus called *Galeichthys*. This species much resembles *Galeichthys gilberti*. It is, however, readily known by the short, pale ventrals, as well as by the generic character of the backward extension of the palatine bands of teeth.

29. *Netuma kessleri* (Steindachner).

Recorded by Steindachner from Altata; recorded from Panama both by Gilbert and Steindachner. Not taken by us.

30. *Sciadeichthys troscheli* (Gill). BAGRE COLORADO.

Rather common in the Astillero at Mazatlan, reaching a considerable size. Also taken at Mazatlan by Gilbert, at Altata by Steindachner; found by Gilbert and Steindachner at Panama, and by Gilbert at Punta Arenas. Its general coloration is decidedly reddish or coppery. The sculpture of the large dorsal shield and of the occipital process is subject to considerable variation, and possibly more than one species of this type exists.

We follow Dr. Eigenmann in referring the short description of *Sciades troscheli* Gill to the species called *Arius brandtii* by Steindachner. Dr. Gill does not fully describe the dorsal shield and the type of his description is lost. In recalling the matter to his memory, he is, however, positive that the type of *troscheli* had the large

dorsal buckler shown in Steindachner's figure of *brandtii*. In that case *troscheli* and *brandtii* must be the same.

Family MURÆNIDÆ.

31. *Muræna lentiginosa* Jenyns. ANGUILA PINTA.

Not rare in the rocky places about the islands at Mazatlan, where a few specimens were taken by us. Numerous others, the types of *Muræna pinta*, were found by Dr. Gilbert. The species is widely distributed, having been recorded from Cape San Lucas (Xantus), Colima (Xantus), Panama (Rowell) and San Josef Island (Nichols).

32. *Lycodontis dovii* (Günther). ANGUILA PINTITA.

Not seen by us at Mazatlan. The original types of *Muræna pintita* (which we now identify with *dovii*) were taken at Mazatlan by Dr. Gilbert. Specimens which we have elsewhere referred to this species have been recorded from Espiritu Santo (Belding), Galapagos Islands (Herendeen) and from Panama (Günther).

The name *Gymnothorax* as originally proposed by Bloch, is an exact synonym of *Muræna* as understood by us. Of the many later names applied to this type, *Lycodontis* of McClelland seems to claim priority.

33. *Lycodontis castaneus* (Jordan & Gilbert).

This enormous eel is very common about the islands near Mazatlan, where numerous specimens were obtained both by Dr. Gilbert and by us. Our largest specimen is 5½ feet in length. The species is very close to the West Indian *Lycodontis funebris* (Ranzani), but is apparently distinct from the latter. The colors are not the same, *funebris* being of a greenish black and *castaneus* bordering upon purplish chestnut. This species and its congener (*funebris*) reach a larger size than any other American morays.

Family OPHICHTHYIDÆ.

34. *Myrichthys tigrinus* Girard. CULEVRA.

Not uncommon in the harbor of Mazatlan, where several specimens (types of *Ophichthys xysturus* Jordan & Gilbert) were taken by Dr. Gilbert. Several specimens were also obtained by us. It has been recorded also from Acapulco and Panama. The original types of *Myrichthys tigrinus* were said to come from Adair Bay in Oregon. It has, however, not yet been taken north of the Gulf of California, and the locality assigned to the type is very doubtful. We have not been able to find a bay of this name on any map of Oregon.

35. *Ophichthus triserialis* (Kaup.) (*Ophisurus californiensis* Garrett; *Herpctoichthys callisoma* Abbott.)

Recorded by Gilbert from Mazatlan; not seen by us. A specimen certainly belonging to this species has been lately obtained by Dr. Gilbert in the Bay of Monterey. The only other definitely known localities are Cape San Lucas and the Galapagos Islands, whence it was described as *Ophichthus rugifer* Jordan & Bollman.

36. *Ophichthus zophochir* Jordan & Gilbert.

Rather common in the Bay of Mazatlan, where it was also taken by Dr. Gilbert. We have examined specimens from Acapulco.

Olive brown, abruptly paler olive below middle of side. Dorsal with a black edge, which shades toward olive at base of fin; anal similar, paler. Pectoral uniformly dusky, the base paler. Teeth 2-rowed above and below, canines small. Pectoral $2\frac{2}{5}$ in head; snout $5\frac{1}{2}$; eye $1\frac{2}{3}$ in snout; gape $2\frac{3}{5}$ in head; head and body $1\frac{2}{3}$ in the long tail.

Family MURÆNESOCIDÆ.

37. *Murænesox coniceps* Jordan & Gilbert. CULEVRA
BLANCA, ANGUILA BLANCA.

Very common about the islands in the neighborhood of Mazatlan. It reaches an enormous size, a specimen obtained by us being 6 feet and 10 inches long and having a girth of 22 inches.

Family CHANIDÆ.

38. *Chanos chanos* (Forskål). SÁBALO.

Very common on the sandy shores of the bay, reaching length of about 5 feet. The flesh is poor, and the fish is seldom brought into the market, but is frequently used as bait. The hard enamelled scales are used for ornamental work by the Indians. We are unable to see any difference between our specimens and others brought by Dr. Jenkins from the Hawaiian Islands. We have no doubt that our species is identical with the common East Indian form.

Head $4\frac{2}{5}$; depth 4; D. 2, 12; A. 2, 9; V. 12; scales 12-70-14; snout $3\frac{1}{2}$ in head; eye $3\frac{1}{2}$; maxillary $4\frac{1}{3}$; pectoral $1\frac{3}{5}$; ventral $1\frac{4}{5}$; caudal $\frac{1}{3}$ longer than head; dorsal $1\frac{1}{4}$ in head.

Body elliptical, moderately compressed, the caudal peduncle slender. Head pointed, rounded above. Eye and side of head covered by a large transparent, imperforate adipose eyelid. Mouth small, terminal, toothless, transverse, the lower jaw included; maxillary broad, slipping under the adipose preorbital, without supplemental bone. Branchiostegals 4. Opercle truncate behind. Pseudobranchiæ very large. Gill-rakers fine and flexible, very close set, rather long, the gill-rakers of all the arches bound together so as to form a perfect strainer. Bones

of gill-rakers flexible. Scales firm, enamelled at base, with strongly marked longitudinal striæ, becoming bony when dry; used by the Indians for ornamental work. Lateral line well developed. Dorsal somewhat nearer snout than base of caudal, before ventrals, its first ray falcate, its last produced in a short filament, longer than pupil. Base of fin with a large scaly sheath; pectoral and ventral with scaly axillary appendage. Anal similar to dorsal, but much smaller. Pectorals and ventrals rather small; caudal very long, forked to the base, its lobes subequal, straight; base of fin with small scales. Ventrals somewhat falcate.

Brilliant silvery in color, greenish above; fins more or less darker; inside of pectoral and ventral blackish.

Stomach forming a muscular crop. Pyloric cæca many. Intestinal canal long, filled only with remains of plants.

The skeletal peculiarities of *Chanos* are numerous and remarkable, many archaic characters persisting. The following account of the skeleton has been prepared by Mr. Starks:

SKELETON OF CHANOS CHANOS.

a. Cranium.

The frontals are very large, covering nearly the whole top of the head, and extending over the dorso-anterior part of the parietals, supra-occipital and the parotic process.

On the side of the skull there is an area bounded by the supra-occipital, the opisthotic and the sphenotic, which is not ossified but is composed of cartilage.

Between the frontals, at about their middle, there is a place in which the bone is fibrous and largely cartilaginous; it is easily broken through.

The basal cavity under the brain cavity is large.

On the upper part of the operculum is a large scale-like bone.

The suborbitals are well developed and plate-like, extending back nearly to the posterior edge of the preopercle.

b. Vertebral Column.

There are forty-two vertebræ in the spinal column.

The first vertebra is co-ossified to the skull, and apparently bears no ribs; the second vertebra supports a pair of very small, slender ribs, which articulate directly with the sides of the vertebra; the third vertebra supports the first pair of large ribs; they are articulated with the transverse processes.

The first fourteen or fifteen neural spines and pairs of transverse processes are articulated with the vertebræ by sutures, they are easily separated from the vertebræ by boiling or maceration.

The vertebræ gradually increase in size and reach their largest size about two-thirds of the distance from the anterior to the posterior end of the spinal column, where they are three or four times the size of the anterior ones. This character is more marked in the adult than in the young.

c. Shoulder Girdle.

The shoulder girdle is exceedingly well braced, the post-temporal is widely forked, and strongly articulated to the epiotic processes of the skull.

The supra-clavicle is long and slender, its posterior face is hollowed out and attached some distance from the upper end of the clavicle, which projects upward.

This projecting upper end of the clavicle is braced to the skull by two long bones.* The first bone is very slender, at its anterior end it is connected to the exocci-

* See Dr. R. W. Shufeldt's report on the osteology of *Amia calva*; Bull. U. S. F. C., 1883, page 59.

pital: near its middle it is connected with the posterior end of the post-temporal, at which point it turns at a sharp angle and runs to the clavicle. The second bone is much larger, it is articulated to the basioccipital. Its posterior edge is nearly straight for its whole length, but its anterior edge is produced and much swollen near its middle, and joins the post-temporal over the first bone, then runs to the upper end of the clavicle.

The inner part of the clavicle and the coracoid are thin and pierced by many holes, so that the bone in places is little more than network.

The hypercoracoid has a very large foramen; at its posterior edge is a projection which supports a thin bone, probably a dermal bone.

The mesocoracoid is well developed.

There are four actinosts; the first is long, but they rapidly decrease in size to the fourth, which is short and triangular.

The first ray of the pectoral is large at the basal end, and hollowed out; it works directly on the hypercoracoid.

d. Branchial Apparatus.

The branchial apparatus is peculiar in the adult, in having gill-rakers somewhat resembling the filaments of a feather, on both sides of each arch and on the basi-branchial. They meet in a middle line between the arches and unite forming a continuous lattice-work screen, through which nothing but the very smallest bodies can pass. The pharyngeals have no teeth, but have gill-rakers similar to those on the arches: they are enclosed in sac-like projections on each side.

This description is taken from the skeleton of a large specimen 4 feet long. The gill-rakers are not united in young specimens.

e. Other Parts.

The septæ between the myotomes are ossified about half an inch under the skin, forming long, slender rays of bone.

There is an upper series running from the middle of the sides up on the back, and a lower series from the sides down on the belly, they form a sort of a basket around the body. Those below have a single branch near the middle of each, the ones above have two branches each, these branches are lost towards the posterior end.

These bones are not present in the young.

The large caudal fin is attached very firmly to the hypural, the long rays of each lobe join the hypural at about the same oblique angle, the base of each ray is deeply divided and articulated immovably with the hypural. The middle short rays are all nearly horizontal and are much less firmly fastened.

The first interspinal ray of the anal is hollow and cone-shaped, the posterior end of the air-bladder runs into it as in the genera *Eucinostomus* and *Calamus*. The scales are very thick and closely imbricated; the skin anteriorly is a quarter of an inch thick.

Family ELOPIDÆ.

39. *Elops saurus* Linnæus. CHIHO.

Very common in the estuary, ascending into brackish mud puddles at high tide; not valued as food. Also found by Gilbert at Mazatlan.

Family ALBULIDÆ.

40. *Albula vulpes* (Linnæus). SANDUCHA.

Very common in the estuary at Mazatlan; not valued as a food fish. Also found by Gilbert at Panama and Mazatlan. The band-shaped young, which Dr. Gilbert has shown to be the larvæ of this species, were obtained in abundance.

Family CLUPEIDÆ.

41. *Sardinella stolifera* (Jordan & Gilbert). SARDINA DE ACEITE. Plate xxviii.

Exceedingly abundant in the Astillero at Mazatlan, where many specimens were taken by Dr. Gilbert, as well as by the Hopkins expedition. This species is also recorded by Gilbert from Panama, and has been found in several other localities. The flesh of this sardine is very rich and delicate, quite equal to that of the European Pilchard (*Clupanodon pilchardus*), and it is therefore a most excellent pan fish. It is, however, not eaten by the Mexicans, no fish having less than one-half pound weight being salable in the market at Mazatlan. The art of properly cooking delicate fish like this is unknown to the people of this region.

42. *Opisthonema libertate* (Günther). SARDINA MACHETE.

Common in shallow water, in the surf and in the harbor at Mazatlan, where it was also taken by Dr. Gilbert.

43. *Opisthopterus lutipinnis* (Jordan & Gilbert).

Extremely common in the surf outside the bay, where great numbers are taken with the seine; a delicate fish which, probably, is of excellent quality as food.

Our specimens are all smaller than the single one taken by Dr. Gilbert at Mazatlan, and they differ in some minor details. Doubtless all belong to the same species.

Head $4\frac{2}{5}$; depth $3\frac{5}{8}$; scales 48-13; D. 14; A. 54; snout 4 in head; eye $3\frac{1}{3}$; maxillary 2; pectoral $1\frac{1}{8}$; anal base $2\frac{1}{4}$ in body; scutes 27.

Gill-rakers moderate, slender, about $x+15$.

Body strongly compressed, translucent, the belly much compressed, with sharp scutes; vent midway between tip of snout and base of caudal. Front of dorsal midway

between preopercle and base of caudal. Teeth strong, sharp, unequal in both jaws; small teeth in patches on palate and tongue. Maxillary pointed behind, reaching middle of eye.

Color bright silvery, bluish above; a very distinct black spot at shoulder on level of eye, two-thirds diameter of eye; chin and nose black. Fins all pale, with no yellow; a trace of a broad diffuse, lateral streak of silvery, most distinct in young. Upper ray of pectoral dusky, some pale olive spots on back, very faint.

Very many specimens taken, the longest $5\frac{1}{2}$ inches in length.

Family ENGRAULIDIDÆ.

44. *Stolephorus miarchus* Jordan & Gilbert.

Obtained by Dr. Gilbert in the open water about Mazatlan; not found by us. These translucent type specimens are apparently immature, but the small number of anal rays would indicate that it is a species distinct from any other now known.

The immature or larval specimens obtained by us in the open sea have the fin-rays of *Stolephorus ischanus* and must belong to that species.

45. *Stolephorus exiguus* Jordan & Gilbert.

Originally found by Dr. Gilbert in the Astillero at Mazatlan; not seen by us.

46. *Stolephorus curtus* Jordan & Gilbert.

Rather common in the Astillero at Mazatlan, where it was originally found by Dr. Gilbert. Numerous specimens taken by us.

47. *Stolephorus ischanus* Jordan & Gilbert.

Very common in the Astillero at Mazatlan, where it was originally found by Dr. Gilbert. Many specimens obtained.

In the open sea many slender larvæ, similar in form to *Stolephorus miarchus* were obtained by the use of dynamite. The number of anal rays shows that these larvæ belong to the present species.

48. *Stolephorus lucidus* Jordan & Gilbert.

Originally found by Dr. Gilbert in the Astillero at Mazatlan: not obtained by us.

49. *Stolephorus scofieldi* Jordan & Culver, n. sp.

* Head $3\frac{3}{4}$ to $3\frac{9}{10}$ in length to base of caudal; depth $4\frac{1}{2}$ to 5; eye $3\frac{3}{4}$ to 4 in head; dorsal 12; anal 25 or 26; scales 41 or 42.

Close to *Stolephorus delicatissimus*, but with larger head, wider lateral band, and greater number of dorsal and anal rays.

Body somewhat compressed and elevated, the belly not carinated or serrated. Teeth in both jaws, and on palatines; a few on vomer. Maxillary covered with teeth its entire length and reaching beyond base of mandible, but not to opercular margin.

Gill-rakers 10+12, the longest a little more than half the eye.

Origin of dorsal midway between base of median caudal rays and center of eye; anal not quite as long as head, its origin below the middle of dorsal. Lower caudal lobe longer than upper; longest ray equaling length of

* The following are the measurements, etc., of seven specimens:

Anal rays.	Dorsal rays.	Head in length.	Depth in length.	Eye in head.	Scales.
26	12	$3\frac{9}{10}$	$4\frac{3}{4}$	4	42
26	12	$3\frac{9}{10}$	$4\frac{1}{2}$	4	41
26	12	$3\frac{9}{10}$	$4\frac{3}{4}$	$3\frac{3}{4}$	42
25	12	$3\frac{4}{5}$	$4\frac{3}{4}$	$3\frac{3}{4}$	41
26	12	$3\frac{3}{4}$	$4\frac{3}{4}$	$3\frac{3}{4}$	42
26	12	$3\frac{3}{4}$	$4\frac{3}{4}$	$3\frac{3}{4}$	42
25	12	$3\frac{3}{4}$	5	$3\frac{3}{4}$	41

the head; shortest caudal ray $2\frac{1}{2}$ in longest. Pectorals not reaching ventrals, $1\frac{3}{4}$ in head. Both anal and dorsal fins preceded by a rudimentary spine, not half length of first true ray.

Color translucent, with a distinct broad silvery stripe as wide as the eye, growing more diffuse at lower anterior edge, narrowing on caudal peduncle, and becoming fan-shaped on the base of caudal. Tip of snout black; a distinct median band of black specks extending from tip of snout to base of caudal. No distinct black markings on fins.

Length, 3 inches. Type, No. 2941, L. S. Jr. Univ. Mus.

Found in the Astillero at Mazatlan, not very abundant.

Named for Mr. Norman Bishop Scofield, a member of the Hopkins expedition to Sinaloa.

50. *Anchovia* * *macrolepidota* (Kner & Steindachner).

Originally described from the neighborhood of Panama; recorded by Dr. Gilbert from the Bay of Mazatlan, but not seen by us there; apparently rare.

Family SYNODONTIDÆ.

51. *Synodus scituliceps* Jordan & Gilbert. CAIMAN.

Not very common, on sandy bottoms in the Bay, where the species was originally found by Dr. Gilbert; also recorded from Panama.

Color brown, with markings of pale bluish green. No yellow anywhere.

52. *Synodus jenkinsi* Jordan & Bollman.

Not rare, occurring in deeper water than the preceding and reaching a much larger size. The two species are very closely related, but seem to be distinct. In *Synodus*

* *Anchovia* (Jordan & Evermann, Fishes of North America), is a new generic name applied to this species, distinguished from *Stolephorus* by its robust form and the absence of teeth in the adult.

jenkinsi, the head is much larger and the form more robust, besides slight differences in the scales. The specimens obtained were sent to us by Señor Ygnacio Moreno after our departure from Mazatlan.

Family PÆCILIIDÆ.

53. *Pæcilia butleri* Jordan.

Common in the fresh waters of the Rio Presidio below the village of Presidio, where the species was originally taken by Mr. Alphonse Forrer.

Head $3\frac{1}{2}$; depth $2\frac{3}{4}$ to $3\frac{1}{3}$; dorsal 9; anal 6; scales 26-9; eye 3 in head, equal to snout; interorbital 2; pectoral $1\frac{1}{4}$ in head; caudal equal to head. Longest dorsal ray $1\frac{1}{4}$ in head in male; $1\frac{2}{3}$ in female.

Body much deeper and more compressed than in *Pæcilia presidionis*, the profile rather steeply rising to front of dorsal. Dorsal and ventral outlines of head meeting at mouth and forming a somewhat sharp point; snout as viewed from above, truncate. Teeth in two series, the inner smaller, more close set, not trifid, the two series well separated. Interorbital space wide and flat, about twice as wide as eye.

The sexes differ greatly in the position of the anal fin, it is under or rather behind dorsal in females, much in front in males, the tips of ventrals reaching much past the base of fin. The sexes similar in size, not very unlike in coloration; both with traces of faint olive cross-bands, especially on caudal peduncle; a dark curved streak behind eye on opercle bounding a roundish silvery area on opercle and breast.

Male green with pale blue spots on each scale surrounded by pale bronze shades; no bars. Dorsal and caudal pale orange, with many small black spots. Lower fins pale. Female similar, paler, without cross-bands,

with a dark spot behind pectoral; lower fins bright orange, caudal nearly plain; dorsal speckled as in male. Form similar to that of male, deeper than in *Pœcilia presidionis*.

Alcoholic specimens show no dark spot behind pectoral and only a few specimens show traces of orange coloration on fins.

The following is a list of the species of fishes found in the fresh waters of Rio Presidio about Presidio and Villa Union:

- Sardinella stolifera*. Scarce.
- Pœcilia butleri*. Rather common.
- Pœcilia presidionis*. Very common.
- Thyrina crystallina*. Rather common.
- Agonostomus nasutus*. Very common in ripples.
- Siphostoma starksii*. Common in algæ in sluggish water.
- Centropomus ensiferus*. Common in cut-offs of rivers.
- Centropomus pedimacula*. Scarce.
- Eucinostomus gracilis*. Common.
- Xystema cinereum*. Not rare.
- Heros beani*. Common in deep places.
- Philypnus lateralis*. Common (young very common).
- Eleotris æquidens*. Scarce.
- Dormitator latifrons*. Common.
- Awaous taiasica*. Common.
- Citharichthys gilberti*. Not rare in river; colors very bright.
- Achirus mazatlanus*. Very common.
- Achirus fonsecensis*. Scarce.

54. *Pœcilia presidionis* Jordan & Culver, n. sp. Plate xxix.

In the clear waters of the Rio Presidio, about Presidio; with the preceding, and still more abundant.

Head $4\frac{1}{5}$; depth $3\frac{1}{5}$ to $4\frac{1}{5}$; D. 7 or 8; anal 7; scales 28-9; eye equal to snout, $3\frac{1}{2}$ in head; interorbital 2; caudal 1 to $1\frac{1}{5}$; pectoral $1\frac{1}{4}$. Body rather elongate, shaped as in a *Fundulus*, the profile scarcely rising to dorsal.

Teeth much as in *Pœcilia butleri*, the outer smaller

than in *butleri*: broad and movable, apparently in two well separated series, the inner row similar to the outer, but smaller.

Fins all low and short, except anal in male, in which the first one or two rays are produced and extend back nearly to the caudal fin.

Dorsal in female inserted over middle of anal, behind anal in male: caudal truncate.

Female greenish above, sides with violet sheen; three or four black cross bars, sometimes obsolete in adult, but very distinct in young; one or two blackish oblong spots before the anterior bar, representing other bars; a dark pencil-like streak on sides of body below the scales: a dark blotch on opercle; a trace of a dark ocellus on last ray of dorsal at base. Fins without spots: lower fins plain; a dark streak along edge of caudal peduncle; faint traces of black markings on edge of dorsal and caudal.

Male much smaller, reddish, with the lower fins yellowish; the coloration generally similar; both sexes rather dull.

Type. No. 2687, L. S. Jr. Univ. Mus.

Family ESOCIDÆ.

55. *Tylosurus fodiator* Jordan & Gilbert. AGUJON.

Common in the harbor at Mazatlan, where numerous specimens, large and small, were taken: the largest of these is about four feet long.

It reaches a length of five feet. Greatly valued as food in Acapulco: but not at Mazatlan, the people disliking it on account of the green bones. It often leaps at lights in boats, and is regarded as a species dangerous to fishermen, as its sharp beak readily pierces their scanty clothing.

56. *Tylosurus stolzmanni* (Steindachner). SIERRITA.

Occasionally taken in the harbor of Mazatlan, where specimens, the types of *Tylosurus sierrita*, were taken by Dr. Gilbert. One large specimen obtained by us. Its measurements differ somewhat from those given in the type of *Tylosurus sierrita*. The distance between the eyes is $8\frac{3}{4}$ in head. The maxillary reaches beyond the vertical from front of pupil. The eye is 3 in postorbital part of head. Head not quite 2 in length. D. 1.15; A. 1.17. Pectorals with dusky specks, but not notably black at tip.

This fish is probably identical with *Tylosurus stolzmanni*, described by Steindachner from Tumbes, Peru. The snout in our specimen, as in the type of *sierrita*, is shorter than in *Tylosurus stolzmanni*.

Family HEMIRAMPHIDÆ.

57. *Hyporhamphus roberti* (Cuvier & Valenciennes). PAJARITO.

Exceedingly common about Mazatlan, swimming in schools in open water, especially numerous in the bay; those of the same age and size go together. Schools of adults and schools of half grown specimens will be found, each moving about independently of the other. It is highly valued as a food fish, although distinctly inferior to *Sardinella stolidifera*.

Lower jaw, measured from tip of upper, two times length of rest of head. Snout, $2\frac{1}{2}$ in head.

This species is found along the whole Pacific Coast of tropical America, and from Cape Cod to the mouth of the Rio Grande, being everywhere common southward. We have seen no specimens from the West Indies.

The type of *Hemirhamphus roberti* Cuvier & Valenciennes, came from Cayenne, coll. Poiteau. Through the kindness of our friend, Dr. F. Bocourt, of the Mu-

seum at Paris. we have received a drawing of this specimen. In the drawing the lower jaw, from tip of upper, is $1\frac{3}{4}$ times length of head. The head, with lower jaw, is $1\frac{5}{6}$ times in length from tip of upper jaw to base of caudal. The ventral is midway between front of eye and base of caudal. The name *roberti* belongs, therefore, to the common long-jawed form; the short-jawed West Indian form being *Hyporhamphus unifasciatus*.

Family SYNGNATHIDÆ.

58. *Siphostoma starksii* Jordan & Culver, n. sp. CUL-
EVRA DE RIO. Plate xxx.

Common in the Rio Presidio in sluggish water, on the bottom, about a mile below the village of Presidio. The species is probably found in brackish and fresh waters rather than in the sea.

Head $10\frac{1}{2}$; depth 21; dorsal 38, on 0+10 or 11 rings. Rings 13 or 14+37 or 38. Head and body in tail 2. Snout $2\frac{3}{5}$ in head. Dorsal half longer than head.

Body rather stout. Head scarcely carinate above. Snout with a slight smooth carina. Two lateral keels, confluent into one behind.

Belly slightly keeled; no keel on opercle.

Color, dark olive, much mottled with darker but without distinct markings: yellow below.

Male and female common in the fresh waters of Rio Presidio among algæ: not seen in salt or brackish water. The pouch of the male teeming with eggs in January.

Length 4 to 6 inches.

Type, No. 2686, L. S. Jr. Univ. Mus.

59. *Siphostoma arctum* Jenkins & Evermann.

Two specimens taken in the Astillero at Mazatlan, both males, the egg-pouch filled with eggs. Length 4 inches. Previously known only from Guaymas. This species re-

sembles the preceding, but its dorsal fin has but 20 rays, being placed on 0+5 rings.

60. *Hippocampus ingens* Girard. CABALLITO DE MAR.

Rare in the harbor at Mazatlan. Three male specimens and one female, each about six inches long, obtained. Also recorded by Dr. Gilbert.

D. 19. Rings about 11+36; dorsal on 3+2 plates.

Spines on head and body high, with large fringed flaps and with many small papillæ. Every 3d to 5th tubercle of dorsal series enlarged.

Greatest depth $1\frac{1}{10}$ to $1\frac{1}{3}$ in head. Tail longer than rest of body. Snout moderate, $2\frac{1}{3}$ to $2\frac{1}{4}$ in head, rather longer than opercle, $2\frac{1}{3}$ times eye. Shoulder girdle with three tubercles; anterior spine on frontal triangle much smaller than the others.

Color blackish, unspotted, faintly barred with darker; dorsal speckled with black and edged with white; papillæ on body pale, giving an appearance of scattered whitish dots everywhere; a white speck before eye; a faint trace of radiating streaks behind it; one specimen further dotted with black on body, the radiating streaks behind eye distinct.

Here described from an adult male, 6 inches long. The female is entirely similar except that the body is much more slender, the depth $1\frac{3}{5}$ in head; the snout is longer, as long as rest of head.

The male specimens agree fairly with the description of *Hippocampus ingens*. The female evidently corresponds to *Hippocampus gracilis* Gill.

Family FISTULARIIDÆ.

61. *Fistularia depressa* Günther. CORNETA.

Common in the Bay at Mazatlan; many specimens taken with the seine in shallow water. Also, found in

abundance by Dr. Gilbert: not yet recorded from localities further south.

Family ATHERINIDÆ.

62. *Eurystole eriarcha* (Jordan & Gilbert). Plate xxxii.

One specimen found in a rocky pool by Dr. Gilbert; a second one taken by us with a seine on the sandy beach just south of Mazatlan. Only these two specimens are known, and the species is probably rare. This species is allied to the genus *Menidia* rather than to *Atherina*. It differs from the species of *Menidia* chiefly in the extremely long anal fin and in the smallness of its dorsal, which is unusually far backward. These characters have been used by Jordan and Evermann to define the genus *Eurystole*, of which this species is type. The mouth is shorter than in *Menidia*, but its structure is exactly the same.

Head 5; depth 5; dorsal III-1, 11 or 12, anal 1, 27; scales about 48.*

Body short, deep, much compressed: head short, deep, about $\frac{1}{4}$ longer than deep, rather broad above; opercles, truncate behind. the interorbital space about equal to eye. Mouth very small, terminal, very oblique, with curved cleft as in *Menidia*; the premaxillary very short, wide behind, with curved edge, slipping under the narrower maxillary; the premaxillary protractile, but not much movable; jaws subequal, the lower slightly included. Maxillary scarcely as long as eye, not quite reaching front of eye. Teeth rather large, hooked backward. Snout short, $3\frac{1}{2}$ in head. Eye large, $2\frac{3}{4}$ in head. Gill-rakers numerous, long and slender. Scales smooth, caducous, not easily counted, 21 before dorsal. Pectoral moderate,

* Not to be exactly counted; the number (36-7) stated in our original description is an error.

not falcate, inserted high, $1\frac{1}{3}$ in head, 6 in body, reaching to the middle of the small ventral. Belly not especially compressed, not cultrate. First dorsal very small, slightly nearer snout than base of caudal, over first ray of anal; last ray of dorsal much before last of anal. Anal very long, somewhat elevated in front, its base 3 times in length of body. Soft dorsal and anal scaleless.

Color translucent green, very pale; back, lips and bases of vertical fins faintly dotted; lateral band very broad and highly silvery, about two-thirds as broad as eye; lower fins pale; air-bladder not visible through the flesh.

One specimen, $2\frac{3}{4}$ inches long.

63. *Thyrina evermanni* Jordan & Culver, n. g. and n. sp.
Plate xxxiii.

Common in the estuary. In this species the structure of the mouth is exactly as in *Thyrina crystallina*. It differs from that seen in *Menidia* only in having the upper jaw shorter. It is apparently closely related to the genus *Atherinella* of Steindachner, but it has not the toothed scales of the type of that genus, *Atherinella panamensis*. The other characters of *Atherinella*—the great length of the pectoral fin, the great compression of the breast and the long anal fin—are shared by this species which we have made the type of a new genus, *Thyrina*. The name (*θύρας*, window) refers to the translucent sides. Both *Eurystole* and *Thyrina* are intermediate between *Menidia* and *Atherinella*.

Thyrina evermanni differs from *Thyrina crystallina* in the longer anal, the more falcate pectoral, the smaller scales, more compressed breast and the absence of black on the fins.

Head $4\frac{3}{4}$; depth $4\frac{2}{3}$ to 5; dorsal IV, 1, 7; anal I, 23 to I, 25; scales 36-9; eye $2\frac{2}{3}$ in head; snout $3\frac{2}{5}$ in head; maxillary $3\frac{2}{5}$ in head; lower jaw $2\frac{2}{3}$ in head;

pectoral $1\frac{1}{4}$ longer than head, $3\frac{1}{2}$ in body; caudal slightly longer than head; interorbital space broad, nearly equal to eye.

Body much compressed, the belly sharp edged, concave on each side below pectorals, as if pinched together between the fingers, the ribs reaching the edge, the scales passing around it; the edge almost carinate. Back narrow. Scales smooth, none on dorsal or anal. Mouth small, terminal, the short jaws curved, the structure precisely as in *Menidia*, the teeth moderate, curved, those in the upper jaw longer; opercles oblique behind, not vertically truncate. Gill-rakers numerous, long and slender. Pectorals very long and falcate, reaching to front of anal and beyond tips of the short ventrals, their posterior margin concave; spinous dorsal small, inserted midway between edge of preopercle and base of caudal, about over sixth ray of anal; last ray of dorsal considerably before last of anal; base of anal $1\frac{2}{3}$ times length of head, $2\frac{3}{4}$ in body.

Color, light green, much dotted above, translucent below; a black streak of dots along base of anal; some on sides of head; median line of back dusky; fins all pale; no black on spinous dorsal, ventral or pectoral; lateral stripe $\frac{2}{3}$ width of eye, underlaid by black: a large, perfectly transparent, space above front of anal, marking the posterior portion of the air-bladder.

Length, $2\frac{1}{2}$ to 3 inches. Rather common in the estuary at Mazatlan.

About twelve specimens obtained, numbered 2688 in the L. S. Jr. Univ. Mus.

64. *Thyrina crystallina* Jordan & Culver, n. sp.

Rather common in the Rio Presidio in fresh water; not seen elsewhere. It is apparently not found in the sea, but confined to fresh or brackish waters.

Head $4\frac{3}{4}$; depth $4\frac{1}{2}$ to 5; dorsal IV-I, 8; anal I, 21; scales 40-11; pectoral $\frac{1}{5}$ longer than head, $4\frac{1}{4}$ in body; anal base more than half longer than head, 3 in body; eye $2\frac{3}{4}$ in head; snout $3\frac{1}{4}$; maxillary $2\frac{2}{3}$; lower jaw $2\frac{1}{2}$.

Body rather deep and compressed; snout shortish; opercle shortish, rounded behind; mouth small, the upper jaw very protractile, the premaxillary strongly curved; jaws equal; teeth rather strong, the outer curved, those in upper jaw largest; eyes very large, silvery; breast compressed, as in *Thyrina evermanni*, but less sharp at edge, appearing as if pinched between thumb and finger; pectoral long, pointed, not truly falcate, reaching more or less past the middle of the short ventrals, its posterior margin not concave, the middle rays considerably more than half length of upper rays; dorsal and anal naked; gill-rakers numerous, long and slender; first dorsal small, behind front of the long anal, midway between gill opening and base of caudal; first ray of soft dorsal over about fourth of anal; last rays of soft dorsal considerably before last of anal. Caudal lunate, the lower lobe the longer and broader, as long as head. Color, translucent green, with considerable dusky dottings, no yellow; fins dotted; ventrals black, as are lobes of second dorsal and anal; silvery stripe narrow, little more than half diameter of the eye; first dorsal and base of anal dusky; air-bladder evident through the translucent sides of body, but less clearly so than in *Thyrina evermanni*.

In fresh water, very common in the lower Presidio; many specimens taken; the longest $3\frac{1}{4}$ inches long. Type, No. 2685, L. S. Jr. Univ. Mus.

Family MUGILIDÆ.

65. *Mugil cephalus* Linnæus. LISA MACHO. LISA CABEZUDA.

Very common in the bay of Mazatlan; a fish of almost universal distribution on both coasts of tropical America, and extending to Europe. We are unable to distinguish the specimens from the two coasts one from another, and find no permanent difference between these and specimens from the Mediterranean. This species is largely used as food, and often enters lagoons and sheltered places.

66. *Mugil curema* Cuvier & Valenciennes. LISA BLANCA.

Excessively common everywhere, especially in the harbor and estuary. This species is also valued as a food, but reaches a considerably smaller size than the other. In life the iris is tinged with orange, and there is an orange spot on the side of the head behind the eye. This species, like the preceding, is very widely distributed, being found on both coasts of tropical America.

67. *Mugil hospes* Jordan & Culver, n. sp. LISITA. Plate xxxi.

Rather scarce in the harbor at Mazatlan, where it occurs in company with schools of the preceding species; some eight specimens obtained by us. According to Dr. Gilbert, it is quite common at Panama, but the specimens obtained there by him in 1883 were destroyed by fire, so that the species has not thus far received a name. Most specimens of this species have in the mouth or about the branchial cavity a small Crustacean allied to *Oniscus* or *Cymothoa*, the condition being similar to that seen in the eastern Menhaden (*Brevoortia tyrannus*). This Crustacean is found in none of the other species of mullet and its presence is a distinctive character of the present one, which is also readily known at sight by the much greater

length of its pectoral fins as compared with *Mugil curema*. The Crustacean is also common and characteristic of the same species at Panama.

Head $3\frac{2}{3}$ to 4; depth 4 to $4\frac{1}{3}$; D. IV-8; A. III, 9; scales 38-13; eye $4\frac{1}{2}$ in head; snout 4; maxillary 4.

Body a little slenderer and more compressed than in *Mugil curema*, the back considerably more arched, the profile evenly curved from tip of snout to soft dorsal. Eye moderate, with a large adipose eyelid. Head broad and round above; interorbital width $2\frac{2}{3}$ in head. Teeth very small, perceptible with a lens. Tip of lower jaw forming about a right angle. Space between dentaries club-shaped, very much larger than in *Mugil curema*, the subopercles barely touching below. First dorsal inserted above middle of body nearly over tip of ventral spine. Second dorsal moderate; its edge incised. Upper lobe of caudal a little longer than lower, as long as head. Anal rather high. Ventral inserted before middle of pectorals. Pectoral very much longer and more pointed than in *curema*, $1\frac{1}{4}$ in head.

Soft dorsal and anal covered with small scales.

Color much as in *curema*, rather greener above, sides silvery, with less trace of longitudinal streaks. Fins pale; base of pectoral with a round black spot. Upper edge of pectoral and end of caudal dusky. No golden on head. Iris with a little brown, green above eye.

Types, Nos. 1695, 2890, 2954, L. S. Jr. Univ. Mus.

68. *Mugil setosus* Gilbert.

Four young specimens taken in a rock pool. The pectoral is as long as in *Mugil hospes*, reaching the first dorsal, and there is a distinct dark blue spot at its base. Color bluish above, much as in *Mugil curema*; much darker than in the original types of the species, with which our speci-

mens have been compared. The original specimens came from a bottom of volcanic ashes.

69. *Chænomugil proboscideus* (Günther). LISITA.

Very common in rocky places, reaching a length of about 6 inches; not found by us in open water.

70. *Querimana harengus* (Günther). VERDE.

Very common in the bay and estuary; often seen swimming in schools on the surface after the fashion of whirligig beetles; occasionally taken in rock pools. Back bright green, in life with a large, shining, silvery spot on each side of the back. This spot becomes inconspicuous when the fish is taken out of the water, but is a prominent recognition mark while the fish is swimming.

71. *Agonostomus nasutus* Günther. TRUCHA.

Extremely abundant in the fresh waters of the Rio Presidio, especially in the swift places or ripples. It reaches a length of over a foot, but most of the specimens are much smaller.

Head 4 to $4\frac{1}{4}$; depth $4\frac{1}{3}$ to $4\frac{1}{2}$; dorsal IV-I, 8; anal usually II, 10, very rarely II, 9; scales 43-13; maxillary $3\frac{1}{3}$ to $3\frac{1}{6}$; eye $3\frac{2}{3}$ to $4\frac{1}{3}$; snout $3\frac{2}{3}$ to 4; pectoral $1\frac{1}{3}$ to $1\frac{1}{2}$; caudal equal to head.

Body moderately elongate, not much compressed, nape prominent, rounded. Interorbital much rounded, 3 in head. Preorbital narrow, as wide as pupil. Mouth rather small; maxillary reaching front of pupil; lower jaw included. Eye large without adipose eyelid. Teeth small, in villiform bands. Gill-rakers slender, short, close set. Pectoral short, not reaching first dorsal. Ventrals under middle of its length, each with a small axillary scale. Anal and soft dorsal with the free edge concave; caudal well forked. First spine of anal very short, almost ru-

dimentary; second $3\frac{1}{2}$ in longest soft ray. First soft ray slender, but articulate, half length of longest ray.*

Olivaceous, sides creamy, white. Many scales on sides punctate so that black scales seem scattered among the others. A conspicuous black bar at base of pectoral, followed by a white streak; a narrow black rim around lower half of eye. Fins all creamy yellow, the upper ones blotched and dotted with blackish. Young with a black blotch surrounded by orange on first dorsal. Spot on pectoral distinct at all ages.

Family SPHYRÆNIDÆ.

72. *Sphyræna ensis* Jordan & Gilbert. VICUDA.

Rather common in the harbor, where it was found by Dr. Gilbert; also recorded from Panama by Gilbert, and from San Bartholomé Bay and Panama by Steindachner. An excellent food fish, but reaching a smaller size than most species of the group.

Family POLYNEMIDÆ.

73. *Polydactylus approximans* (Lay & Bennett). RATON.

Very common, especially on sandy beaches; many specimens taken by us; also recorded by Gilbert from Mazatlan and from other localities. Used as food.

74. *Polydactylus opercularis* (Gill.)

Obtained by Dr. Gilbert from Mazatlan and Panama; not seen by us.

Family HOLOCENTRIDÆ.

75. *Holocentrus suborbitalis* Gill. MOJARRA CARDENAL.

Very abundant in all rocky pools about Mazatlan. It reaches only a small size, barely exceeding six inches,

* Apparently taken for a spine by Dr. Gunther, who counts A, III, 9.

and its coloration is less red than that of the Atlantic species of the genus.

Head 3; depth $2\frac{2}{3}$; D. XI, 12; A. IV, 8; scales 3-36-7; longest dorsal spine $1\frac{3}{4}$ in head; longest dorsal ray $1\frac{3}{4}$; caudal lobes $1\frac{1}{3}$; third anal spine $1\frac{2}{3}$; pectoral $1\frac{2}{3}$; ventral rays 1, 7. Seven scales on cheek. Maxillary slipping under preorbital. Ventral with accessory scale. Dorsal lying in a groove.

Body short and deep, compressed, with slender caudal peduncle: anterior profile rounded. Mouth small; upper jaw protractile. Teeth in villiform bands on jaws, vomer and palatines. Maxillary moderate, slipping under the very narrow preorbital, which, like rest of suborbital ring, is armed with close-set sharp teeth, turned backwards. Preopercle, opercle, subopercle, interopercle and postemporal armed with similar teeth. Preopercular spine nearly as long as pupil: nearly as long as eye on large specimens. Two spines on opercle.

Steel gray, underlaid by bright coppery red, which becomes brighter after death. Everywhere much punctate with black, the dots coarse. Sides, and especially back, with purple reflections. Top and side of head coppery; a curved bright silvery streak from tip of snout, below eye and around it, ceasing opposite middle of pupil. A vertical silver streak on edge of opercle and extending out on spine. Head yellowish, upper lip reddish; lower with throat silvery. Dorsal brown, clouded with reddish and dark; dark brown near edge, then a series of grayish clouds; roundish, irregular, whitish spots at its base. Second dorsal reddish, its rays pale, its first two black; the caudal red, base pale; the upper and lower rays dark yellowish, darkest in young, the dark extending on peduncle above and below. Anal spines whitish, the soft rays bright red, the last ones pale, the first soft rays

dark. Ventral reddish, the spine and first soft ray whitish, the first ray dark red; when the fin is closed it seems reddish, edged with whitish or yellowish, and with a blackish line. The dark is fainter in larger specimens.

It is not impossible that *Rhamphoberyx pacilopus* Gill is the very young of this species. *Rhamphoberyx leucopus* may be the young of *Myripristis occidentalis*, which has the ventrals plain.

Family MULLIDÆ.

76. *Upenus grandisquamis* Gill. CHIVO. (*Upenus tetraspilus* Günther.)

This small species, rarely exceeding a foot in length, is generally common in the harbor and estuary at Mazatlan, where it was found also by Dr. Gilbert. It seems to be everywhere common on the coast.

Color evanescent, olive with two rows of light bluish green spots toward back, then a bronze band, then a blue streak on level of pupil; 2 or 3 yellowish streaks below it. Sides of head golden, with a light green streak forward from eye and some blue behind eye. A large black blotch below last dorsal spine. First dorsal reddish, clouded with dark. Second mesially black, edged with orange. Caudal and anal red. Ventral and pectoral pale.

In alcohol much red appears. In life, sides with curved light yellowish brown, cross bands most distinct on the silvery lower parts.

Family SCOMBRIDÆ.

77. *Germo alalunga* (Gmelin).

Recorded from near Mazatlan by Lay and Bennett; not seen by us, it being probably a migratory fish coming in the spring or fall.

78. *Scomberomorus sierra* Jordan & Starks, n. sp.
SIERRA.

Rather common in the harbor at Mazatlan, numerous specimens being taken; also found by Dr. Gilbert at Panama. This is not valued as a food fish, little attention being paid to it by fishermen. This, however, may be due to the lack of appreciation of good fishes by the people of Mazatlan, who have not learned the art of properly cooking any fish.

This species is very closely allied to its Atlantic cognate, *Scomberomorus maculatus*. It differs in the slightly more backward insertion of its soft dorsal, in its coloration, the spots in *maculatus* being elliptical and fewer in number, and perhaps in the fewer pores in the lateral line (175 in *maculatus*). In *Scomberomorus maculatus* the soft dorsal is inserted one eye's diameter before anal.

Head $4\frac{3}{4}$; depth equal head: dorsal XVIII-15-IX; anal II-15-IX; maxillary $1\frac{3}{4}$ in head; eye 5 in head; pectoral $1\frac{3}{4}$; ventral $3\frac{1}{2}$; dorsal and anal lobes equal, $1\frac{3}{4}$ in head.

Body elongate, its dorsal and ventral outlines about equal; profile straight from snout to dorsal: head small and pointed; mouth large, oblique; jaws equal; maxillary reaching to posterior edge of orbit. Teeth large, compressed and sharp, 26 to 32 in each jaw; gill-rakers 4+11. Soft dorsal inserted almost directly over front of anal; lateral line undulating, about 165 pores.

Silvery, above bluish, sides with numerous round brownish spots; three rows of spots below lateral line and one above. Spinous dorsal white at base, black above; soft dorsal tinged with yellowish; its margins black; anal white; posterior face of pectoral entirely black, anterior face yellowish with blackish borders; caudal black.

Another example supposed to be a male has five rows

of spots below the lateral line, these spots decrease in size towards the belly, covering both sides nearly to level of pectoral.

Types, 1720. L. S. Jr. Univ. Mus.; the largest 24 inches long.

Family CARANGIDÆ.

79. *Oligoplites altus* (Günther). MONDA.

One large specimen taken by us. Recorded by Dr. Gilbert from Mazatlan and Panama.

80. *Oligoplites saurus* (Bloch & Schneider). MONDA.

Common in the harbor of Mazatlan, where it was also taken by Gilbert. On comparison of specimens from Mazatlan with others from Havana we are unable to find any difference whatever. The species called *inornatus* is therefore fully identical with *saurus*.

81. *Trachurops crumenophthalmus* (Bloch).

Common in the harbor at Mazatlan, where numerous specimens were taken: not recorded by Dr. Gilbert. Specimens have been compared with others from Havana and no difference of any kind is observable. *Trachurops brachychirus* must therefore be regarded as an exact synonym of *Trachurops crumenophthalmus*.

82. *Caranx vinctus* Jordan & Gilbert.

Rather common in the estuary, where numerous specimens were taken. The original types were found by Gilbert at Mazatlan, and the species has been recorded from San Blas and Punta Arenas.

83. *Caranx caballus* Günther. COJINERO.

Extremely common in the harbor; also found in abundance by Dr. Gilbert.

84. *Caranx medusicola* Jordan & Starks, n. sp. Plate xxxiv.

Rather common in the surf outside the harbor. Not found in the Astillero. The young from 1 to 2 inches long live in the body cavity of the large white jelly fish, which is very abundant about the Venados Islands in January. Sometimes two or three specimens will be found in the body cavity of one jelly fish.

Head $3\frac{2}{5}$; depth $2\frac{1}{5}$; D. VII-1, 22 or 23; A. II, 1, 19 or 18; scutes 30 to 32; pectoral $\frac{1}{8}$ longer than head; dorsal lobe $1\frac{2}{3}$ in head; caudal lobe, as long as head; curve of lateral line $1\frac{1}{2}$ in straight part; height in chord 4; eye 4 in head; snout 3; maxillary 3; ventral $2\frac{1}{3}$.

Body unusually deep and compressed, the back elevated, the belly similarly arched; head moderate, deep, the nape arched. Mouth small, maxillary broad, with broad supplemental bone. Teeth in moderate bands, the outer enlarged but not canine-like; upper teeth rather larger and in broader bands. Villiform bands on vomer, palatines and tongue. Eye moderate; preorbital rather narrow. Gill-rakers rather long and slender, about 12 below angle of arch. Soft dorsal and anal with falcate lobes. Caudal well forked, the lobes equal. Pectoral very long and falcate; ventrals short. Lateral line rather strongly curved, with moderate armature. Breast entirely scaly.

Clear blue above, silvery below; no bands or spots anywhere, except a small black axillary spot and a blue green patch on back of caudal peduncle; pectoral bright yellow; anal yellow, the lobe blackish; caudal grayish, the lobes black with whitish posterior edge; ventrals yellow.

Length of largest specimens, 6 inches. Type, No. 2645, L. S. Jr. Univ. Mus.

Another example was, in life, blue above, silvery below; no dark spots on opercle or pectoral; pectoral bright yellow, very long. D. and A. and C. lobes, all tipped with black. Base of dorsal bright blue. Anal and dorsal largely blue. Base of caudal peduncle green above. No trace of bands; a slight dusky shade on axil.

The very young, taken from the body of a *Medusa*, may be thus described:

Head 3 in length; depth $2\frac{5}{8}$; dorsal IX, 24; anal II, I, 18 or 19; ventral with a sheath; scales minute; caudal keel scarcely appreciable; lower jaw projecting; mouth oblique; body deep, compressed; caudal peduncle slender, the fin short, moderately forked; pectoral short, not falcate, shorter than head; maxillary broad, reaching pupil; preorbital narrow; dorsal and anal not falcate; lateral line arched before, then straight; jaws with teeth; preopercle with flexible spines.

Clear white, fins all pale, a bright violet blue area above and behind eye, fading in spirits; dark dots above; dorsals both dusky at tip.

85. *Caranx marginatus* (Gill).

Not rare in the Astillero, where several specimens were taken by us. This species is well distinguished from *Caranx latus*, with which it has hitherto been confounded, since it was originally described by Dr. Gill. The following are its characters:

Head $3\frac{1}{3}$; depth $2\frac{2}{3}$; dorsal VIII-1, 19; anal II-1, 15; eye $3\frac{2}{3}$ in head; pectoral $3\frac{1}{3}$ in length, equal to head; ventral $7\frac{1}{4}$; dorsal lobe $5\frac{1}{4}$; caudal $3\frac{2}{3}$.

Dorsal outline of body evenly curved from snout to caudal peduncle; ventral outline straight from gill openings to anal spine, behind which it is curved like the dorsal portion.

Top of head, snout, lower jaw, orbitals, maxillary, lower two-thirds of opercle and preopercle naked; cheeks scaled: eye large, with membranous eyelid to posterior edge of pupil in specimens six or eight inches long, not conspicuous in young examples. Snout equal to eye, twice width of preorbital; lower jaw entering profile; maxillary reaching to posterior edge of orbit. Teeth strong, in a single row: lower teeth close together, with two canines in front; upper teeth larger, the distance between them irregular, not much enlarged anteriorly: vomer, palatines and tongue with exceedingly small villiform teeth. Gill-rakers hardly half eye, $4+13$. Breast scaled: curved part of lateral line, $1\frac{1}{2}$ in straight part; scutes large, about 30: scales, 80.

Color, silvery, bluish above with golden reflections below; a dark band along plates of lateral line; fins largely yellow, dorsal, anal and caudal, broadly edged with black; a distinct small black spot at upper end of gill-opening; a dark blotch on opercle, and one behind pectoral.

Body more elongate than in *Caranx latus*, the fin rays fewer, the eye larger and the coloration more yellow, with more black on the fins.

86. *Caranx latus* Agassiz.

Occasionally taken in the bay at Mazatlan, and generally distributed throughout the waters of the tropical Pacific and West Indies. We are unable to distinguish the specimens from the west coast of Mexico from the common West Indian form.

87. *Caranx hippos* (Linnæus). TORO.

Very common in the sea about Mazatlan, occasionally entering the estuary. A food fish of some importance, reaching the length of two or three feet. We are unable

to see any difference between specimens from the west coast and specimens from Havana.

88. *Gnathanodon speciosus* (Forskål). MOJARRA
DORADA.

Very common in the harbor and estuary, being one of the more valuable food fishes, the flesh being firm and delicate. We have compared specimens with others taken by Dr. Jenkins at Honolulu and find no difference. We have, therefore, no hesitation in continuing to identify our species (*Caranx panamensis* Gill) with this common East Indian fish, of which the oldest name is *speciosus*.

In life, everywhere deep golden yellow, with black cross bands.

89. *Citula dorsalis* (Gill). PÁMPANO.

Rather common in the estuary. Three specimens taken by us, one half-grown and the others adult, the change in form being strikingly marked, as will appear from the following descriptions:

Citula dorsalis (half grown):

Head $3\frac{1}{5}$; depth $1\frac{3}{4}$; D. VI-I, 19; A. II, 1, 17; eye $4\frac{3}{4}$ in head, the orbit $3\frac{1}{2}$; snout $2\frac{2}{3}$; pectorals $2\frac{1}{2}$ in body, $\frac{1}{5}$ longer than head; ventrals 3; caudal lobe equal to head; dorsal with one long filament, as long as body, reaching middle of caudal; anal with one filament; caudal moderately elongate, the lobes equal; pectoral very long, falcate, reaching tenth anal ray; ventrals small, reaching just past vent.

Body deep, compressed, rather ovate than angular; profile straight from the vertical truncate snout to nape, then rounded, then straight to front of dorsal. A nearly straight line from chin to front of anal. Eye rather small, preorbital deep. Mouth large, the lower jaw included. Teeth small, in broad bands on jaws, vomer and palatines.

maxillary reaching pupil. Cheek entirely scaly, some scales on opercle above. Breast naked, body well scaled. Body with small scales, the nuchal region naked, scarcely carinate. Gill-rakers rather long, $2+15$.

Lateral line evenly curved, the curve high, equal to straight part. Scutes small, eighteen with keels; the total number of scales on straight part 58.

Steel blue above, silvery below, with golden reflections and shades; fins all pale, tinged with yellowish, none of them dusky; no black on pectorals. Axil jet black; opercle slightly dusky, blackish within; a dark spot on orbit above.

Specimen described, ten inches long.

Citula dorsalis (adult):

Length 24 inches; head $3\frac{1}{4}$; depth $2\frac{1}{4}$; D. 18; A. 17. About 25 scutes developed. Body moderately compressed, with angular outlines. Profile of head rounded, of belly somewhat concave, forming an angle at anal similar to one at front of dorsal. Eye 5 in head. Maxillary $2\frac{1}{2}$; lower jaw included. Teeth in broad villiform bands on both jaws and on vomer and palatines. Nostrils large, equal, close together. Gill-rakers $3+14$, rather stout, shorter than eye. Dorsal spines nearly obsolete, three of them present; first dorsal ray filamentous, $1\frac{3}{4}$ in body. Long anal ray $2\frac{3}{4}$ in body. Caudal keel considerably elevated, with a small keel above and below it; scutes not sharp. Caudal lobes subequal, about as long as head. Pectoral falcate, $\frac{1}{3}$ longer than head. Ventral short, $3\frac{2}{3}$ in head. Curve of lateral line low, $1\frac{1}{8}$ times in straight part, its height $\frac{1}{4}$ its chord. Maxillary broad, with very broad supplemental bone, its width $\frac{2}{3}$ eye.

Color, silvery, strongly tinged with golden, olive on upper parts, pearly reflections below. A large black spot in axil, nearly as large as eye. Fins pale.

90. *Alectis ciliaris* (Bloch). PÁMPANO.

Obtained by Dr. Gilbert; not seen by us. We have hitherto been unable to distinguish the specimens of this species from the two coasts of Mexico. We are furthermore unable to find any distinction between the American form called *crinitus*, and the East Indian species, *Alectis ciliaris*. We do not believe that any distinction exists, and therefore find ourselves compelled to believe that this species, like *Caranx hippos* and *Caranx latus*, is almost cosmopolitan in the tropical seas, ranging from the coast of Arabia to the West Indies. None of the three are found in the Mediterranean.

91. *Hynnys hopkinsi* Jordan & Starks, n. sp. PÁMPANO. Plate xxxv.

One large specimen taken with the seine in the harbor at Mazatlan.

Head $3\frac{1}{2}$; depth $2\frac{1}{5}$; D. VI-1, 18; A. II, 1. 15; snout $2\frac{3}{4}$; eye $3\frac{5}{6}$ in head; maxillary $2\frac{3}{4}$; pectoral, $3\frac{1}{5}$ in body: ventral, $2\frac{1}{4}$ in head: dorsal lobes $2\frac{1}{5}$ in head; caudal lobes $1\frac{2}{5}$ in head; anal lobe, $2\frac{1}{4}$; preorbital, $4\frac{1}{4}$ in head.

Body oblong, compressed, elevated, with angular outlines, ventrals outline sharp. Top of head sharply carinate; profile nearly straight from snout to nape, there boldly convex, then nearly straight to elevated front of soft dorsal; a concavity in profile before soft dorsal and before anal. Mouth oblique, rather large, the jaws equal. Broad bands of small sharp teeth on jaws, vomer and palatines. Eye very large. Dorsal and anal lobes low. Lateral line with a long arch, as long as straight part, which has about twelve elevated scutes and thirty-seven scales in all from end of curve; curved part of lateral line undulating behind. Gill-rakers short rather few, twelve in all, those above angle obsolete. Body minutely

scaly. Belly and lower parts largely naked, a large patch of scales on cheeks: head otherwise naked.

Bright blue above, with bright reflections, sides bright silvery: no golden; a narrow brownish streak not quite so wide as pupil from upper part of gill opening to middle of base of soft dorsal. Pectoral tipped with black; axil of pectoral dusky. Upper fins rather dusky, lower white. Dusky on opercle inside and out but without definite spot.

More elongate than *Citula dorsalis*, the anterior profile more convex, the base of dorsal and anal more elevated, the caudal scutes stronger and fewer, the ventrals longer though the specimen is larger. Gill-rakers fewer. Pectoral long and falcate, reaching seventh anal ray. Ventrals not short, reaching vent. Caudal moderate.

One specimen obtained, twenty-six inches long, No. 1563, L. S. Jr. Univ. Mus.

We take great pleasure in naming this interesting fish for Mr. Timothy Hopkins, in recognition of his great interest in scientific research.

We provisionally admit *Citula* and *Hyunnis* as genera distinct from *Alectis*. No structural characters of importance distinguish this group, and all these genera are merely form variations from *Caranx*.

92. *Vomer setipinnis* (Mitchill).

Recorded by Dr. Gilbert as common at Mazatlan and Panama: no specimens, however, were seen by us. It is not unlikely that this species disappears from the coast with the end of the rainy season.

93. *Selene ørstedii* Lütken.

Recorded by Dr. Gilbert as frequently found both at Mazatlan and Panama. One specimen, sixteen inches long, taken by Ygnacio Moreno and sent to us.

Head 3; depth 2; dorsal V-I, 15; anal (II) I-I₄; eye 4 in head; snout 1 $\frac{3}{4}$; maxillary 2 $\frac{3}{4}$; ventral 3 $\frac{1}{3}$; caudal lobes equal to head; pectoral one-eighth longer than head.

Body compressed and elevated; profile oblique, concave over snout then straight to occiput, which is well rounded; line of back straight to soft dorsal, then lightly curved to caudal peduncle; ventral outline rounded on breast to ventrals, then straight to anal, forming an angle at first ray, then straight to caudal peduncle. Mouth projecting, with minute teeth on jaws, vomer, palatines, and tongue; gill-rakers thick and blunt, many of them knobbed at tip—in old examples at least, one above angle with 3 or 4 rudimentary ones, and 13 below. A large bony knob at occiput, conspicuous in adult, the thickened supraoccipital crest.

Pectoral falcate, reaching to tenth anal ray; dorsal and anal lobes filamentous, reaching past tips of caudal lobes; lateral line strongly arched; curve equal to straight part. Color silvery, with bluish reflections above, dorsal and caudal dark, pectoral, ventral and anal white; axil dusky.

94. *Selene vomer* (Linnæus).

One large specimen obtained by us. Recorded by Dr. Gilbert as common at Mazatlan and Panama. It perhaps disappears with the end of the autumn, going farther south.

95. *Trachinotus paloma* Jordan & Starks, n. sp. PALOMA.

A few small specimens taken in the surf at Puerto Viejo, just north of Mazatlan; other specimens were taken by Mr. Xantus on Cape San Lucas, and still others were obtained by Dr. Gilbert in San Juan Lagoon. The species is apparently not common, and it is not known to

the fishermen. On the Atlantic coast, the very closely related Pámpano, *Trachinotus carolinus*, is one of the most valued food fishes. We are unable to see any difference of any importance between the present species and the Pámpano of the gulf other than the fact that in the Sinaloan form the head seems to be larger and longer. On this difference we have ventured to give a new specific name to our specimens from Mazatlan. We shall not, however, be surprised if the species proves inseparable from *Trachinotus carolinus*.

Allied to *Trachinotus carolinus*, but with the head larger.

Head 3, depth $2\frac{1}{2}$; D. VI-I. 24. A. II. 1, 23; eye $3\frac{1}{2}$ in head; snout $3\frac{2}{3}$; maxillary $2\frac{1}{3}$; dorsal lobe $1\frac{2}{3}$; caudal $1\frac{1}{10}$.

Body rather elongate, the back moderately and regularly arched; snout bluntish. Mouth large, horizontal, the lower jaw included, maxillary reaching past pupil. Lateral line little arched, its curve $1\frac{1}{6}$ in straight part. Teeth well developed. Caudal not widely forked.

Silvery without spot or band; anal creamy orange, its tip whitish. Other fins pale, except dorsal lobe which is dusky. Axil silvery.

A few specimens taken in the surf, the largest $2\frac{1}{2}$ inches long. Type No. 2690 L. S. Jr. Univ. Mus. Other specimens taken by the Albatross in San Juan Lagoon examined; some of these are five inches in length.

96. *Trachinotus rhodopus* Gill. (*Trachinotus fasciatus* Gill; *Trachinotus nasutus* Gill.)

Very common on sandy shores about Mazatlan, reaching the length of about a foot; not much valued as food. Readily distinguished at all ages by the reddish color of the lobes of the dorsal, anal and caudal. These lobes become considerably elevated with age, but at all times

they are marked by shades of brownish red or maroon color. There seems to be little doubt that the *Trachynotus rhodopus* Gill is the young of the species which he called at the same time *Trachynotus fasciatus*. The very young specimens to which Gill gave the name *Trachynotus nasutus* were probably also the young of the same species, but it may be that they were the young of *Trachinotus kennedyi*. Dr. Jordan's identification of the great Pámpano of the Florida Keys with Gill's *Trachynotus rhodopus* is doubtless incorrect. There is at present no evidence that any species of *Trachinotus* is common to both coasts of Mexico.

Young specimens, $2\frac{1}{2}$ inches long. Blue above, white below, no bars. Dorsal and caudal lobes black, with strong orange shade. Lobes of caudal orange brown, verging on black. Pectoral and ventral white.

Specimens 6 or 7 inches long, have from 3 to 5 narrow dark cross-bars, not quite so wide as pupil, running from a point on a level with pectoral fin to within a short distance of the dorsal line of the back, but never quite to it; these bars vary in number and position; posterior face of pectoral fin dusky. Otherwise colored as the younger ones.

97. *Trachinotus culveri* Jordan & Starks n. sp. PALOMETA. Plate xxxvi.

Five specimens, each 7 inches long, obtained in the market at Mazatlan; no others seen. This species is related to *Trachinotus falcatus* of the Atlantic, but its fins are lower and different in coloration. It is also allied to *Trachinotus kennedyi*, but the body is much deeper and there is no black axillary spot. It does not seem possible that with age *culveri* should become transformed into *kennedyi*.

Head $3\frac{2}{5}$; depth $1\frac{1}{2}$; D. VI-1, 17; A. II-1, 17; max-

illary 3 in head; eye $3\frac{2}{3}$; snout $4\frac{1}{3}$; dorsal lobe $1\frac{1}{10}$ in head; pectoral $1\frac{1}{3}$ in head; caudal $\frac{1}{8}$ longer than head.

Body very deep, compressed, the back much elevated. Snout very blunt and convex, the rest of profile straight and steep; base of dorsal and anal very oblique. Dorsal and anal lobes rather low. Caudal long. Lateral line little elevated in front, the curve $1\frac{1}{4}$ in straight part. Gill-rakers very short, about 5+9. Teeth persistent, in specimens 7 inches long.

Bluish gray, silvery below, tinged with yellow, everywhere much soiled with blackish spots, no distinct markings anywhere, the axil only slightly dusky; fins all dusky except middle of caudal and lobe of anal, and the ventrals which are whitish.

Types, No. 2691, L. S. Jr. Univ. Mus.

98. *Trachinotus kennedyi* Steindachner. PALOMETA.

Two large specimens obtained in the surf. This species was originally described by Steindachner from Magdalena Bay, and has been recorded by Dr. Gilbert from Mazatlan and from Panama.

Head $3\frac{2}{3}$; depth at vent $2\frac{1}{3}$; at anal $2\frac{1}{10}$; D. VI-1, 19; A. II, 1, 16. Curve of lateral line $1\frac{2}{5}$ in straight part. Eye 5 in head; maxillary $2\frac{2}{3}$; dorsal lobe $1\frac{1}{5}$; caudal $\frac{1}{4}$ longer than head; pectoral $1\frac{1}{4}$ in head; snout $3\frac{2}{5}$; least depth of caudal peduncle $3\frac{1}{2}$ in head.

Body oblong, compressed, and elevated at bases of dorsal and anal. Anterior profile of head an even curve, the snout blunt and convex; line straight from nape to dorsal. Mouth moderate, very oblique, subinferior, the lower jaw much shorter than upper, the maxillary reaching to posterior border of pupil. Teeth obsolete. Tail widely forked, the lobes equal. Lobes of dorsal and anal low, not sharp.

Gray above, with deep green reflections, lower half silvery, with strong golden tinge. Axil jet black, the color covering base of fin and extending behind for a distance nearly equal to eye, so that the fin does not cover it; upper fins dusky, the caudal edged with paler, anal dusky with golden tinge, ventrals purplish white. Pectorals dusky; maxillary with a black streak.

99. *Seriola mazatlana* Steindachner.

Originally described from Mazatlan by Steindachner, but not seen by Dr. Gilbert or by us: probably a migratory species.

Family NEMATISTIIDÆ.

100. *Nematistius pectoralis* Gill. PAPAGALLO.

Very common in all the waters about Mazatlan; specimens reaching the length of about three or four feet found about the islands of Venados, Isla Blanca and Creston.

Color silvery, iridescent bluish above, with black bands: the first across tip of snout; the second across interorbital, involving the top of membranous eyelid; the third from nape across opercle; the fourth including the first dorsal spine and running obliquely down on the belly, where it fades out at about the tip of the pectoral fin; the fifth running from middle of first dorsal obliquely to lateral line, then backwards along lateral line to upper lobe of caudal, including the whole upper half of caudal peduncle; a sixth indistinct band, following the line of the back for a short distance, under the soft dorsal; upper part of maxillary dusky; long spines of dorsal with alternate bands of yellow and black, and much slaty-bluish at base; soft dorsal and caudal uniform dusky; pectoral with a black spot on lower rays, not involving the axil; ventrals white; anal slightly dusky.

Described from a specimen sixteen inches long.

The two anal spines united with rest of the fin. No free anal spines. Ventral ray really I, 5, the inner ray very wide, made up of four branches so that the rays seem more numerous; ventral spine obscure. Anal fin short. Pectoral fin falcate. Both dorsal and ventral with sheath. Soft dorsal and anal low, the last ray slightly lengthened.

Dr. Gill is probably right in regarding *Nematistius* as type of a family distinct from the *Carangidae*.

Family STROMATEIDÆ.

101. *Rhombus medius* (Peters).

Originally described by Dr. Peters from Mazatlan; not seen by Dr. Gilbert or by us. Only the original type in the museum at Berlin seems to be yet definitely known.

Family CHEILODIPTERIDÆ.

102. *Apogon dovii* Günther.

This species was found by Dr. Gilbert at Mazatlan, but was not seen by us.

103. *Apogon retrosella* Gill. CARDENAL. Plate xxxvii.

Two specimens of this most beautiful little fish were obtained by us with dynamite off the Isla Blanca and Creston Islands. Only the very young, found by Mr. John Xantus, at Cape San Lucas have been hitherto known.

Head $2\frac{6}{7}$; depth $2\frac{7}{8}$; scales 3-26-9; dorsal VI-1, 10; anal 11, 9; eye $2\frac{7}{8}$ in head; maxillary $1\frac{3}{4}$; snout $4\frac{1}{2}$; interorbital 4; first dorsal $2\frac{1}{4}$; second dorsal $1\frac{2}{3}$; caudal $1\frac{1}{3}$; pectoral $1\frac{1}{2}$; ventral $1\frac{3}{5}$.

Body rather plump, not much compressed, the profile rising steeply from snout to first dorsal. Caudal peduncle long and strong; eye very large; mouth large, oblique, the maxillary opposite posterior margin of pupil. Teeth small, the outer scarcely enlarged. Premaxillary protractile; no supplemental maxillary.

Bright scarlet much dotted with black, cheek with many dark points, a diffuse dark blotch on opercle; a diffuse black blotch at base of caudal. First dorsal with triangular red area in front. Second dorsal red at base, the anterior half jet black above the red, the posterior half translucent. From black anterior rays, a rather faint black saddle falls to middle of side. Caudal red at base, upper and lower lobes black, the middle pale. Anal red at base, the anterior rays black, the posterior pale. Pectoral white, the base deep scarlet. Ventral white, red at base, blackish at tip. Opercle reddish within, with some dusky. Preopercle minutely serrulate on its vertical margin only, these serrulations soft and easily rubbed off.

A younger specimen was, in life, scarlet, deeper below and on tail, fading on fins; second dorsal, anal, and caudal tipped with blackish. An oblong inky spot at middle of base of caudal. An inky bar below soft dorsal extending to level of pectoral and spreading on base of soft dorsal. A black bar from snout through eye to gill opening, broader and clearer behind, overlaid by reddish, a fainter dusky band below parallel with it.

Family SERRANIDÆ.

104. *Alphestes multiguttatus* (Günther).

This species is found in rocky places along the coast, having been taken by Gilbert at Mazatlan and Panama. But one small specimen was obtained by us.

105. *Epinephelus labriformis* (Jenyns). CABRILLA PINTA.

This species is generally common about the islands on the coast of Mexico all the way from Cape San Lucas to the Galapagos Islands. Only young specimens were seen by us.

Inside of mouth salmon yellow; pectoral with salmon color, its edge pale; caudal with a maroon band above and below; dorsal edged with blackish red, spots on belly nearly white; dorsal with white on membranes.

106. *Epinephelus analogus* Gill.

This species is also common in rocky places along the coast from Mazatlan to Panama. Several specimens were obtained by us.

107. *Promicrops guttatus* (Linnæus). MERO.

Rather common about the islands and in deep water, reaching an enormous size, greater than that of any other bony fish found in the region. The largest seen by us weighed some seventy pounds, but it is said to attain the weight at times of 500 or 600 pounds. Only one specimen was obtained in a condition for preservation. This was a small one 20 inches long. The species was found by Dr. Gilbert at Mazatlan, Panama and Punta Arenas; the type of *quinquefasciatus* were obtained by Dr. Bo-court at Tauesco.

This species seems to agree fully with the account of *Promicrops guttatus*, given by Gilbert & Swain, in 1884. There is not much doubt of the identity of the Pacific Coast *Promicrops quinquefasciatus* with *Promicrops guttatus* of the Atlantic.

108. *Dermatolepis punctatus* Gill.

This species seems to be rare along the coast. The type was found by Mr. Xantus at Cape San Lucas, another specimen was brought by Lieut. Nichols from Socorro Island, and a third was found by Dr. Gilbert about the islands near Mazatlan. It was found in abundance by Dr. Gilbert about the Revillagigedos.

109. *Mycteroperca bouleengeri* Jordan & Starks, n. sp.

CABRILLA RAIZER. "MANGROVE GROUPEK."

Plate xxxviii.

This species is found with *Mycteroperca jordani* Jenkins & Evermann in about equal abundance. It reaches a much smaller size than any other species of *Mycteroperca*. It is in many ways an aberrant form, showing affinities with *Epinephelus*. The anal fin is short, as in *Epinephelus*, while the general appearance and coloration is that of *Mycteroperca*. The structure of the skull shows that its affinities are with the latter.

Head $2\frac{4}{5}$ in length; depth $2\frac{5}{6}$. Dorsal XI-14 or 15; anal III-9 or 10; scales about 90, 20 above and 42 below; snout $3\frac{1}{2}$ in head; maxillary $2\frac{1}{5}$; eye $5\frac{1}{2}$; pectoral $1\frac{3}{4}$; ventral $1\frac{5}{6}$; longest anal ray $1\frac{2}{3}$; caudal $1\frac{3}{5}$; longest dorsal spine $2\frac{1}{2}$; gill-rakers short, about 6+17, the longest about $\frac{3}{5}$ eye; longest dorsal ray 2 in head; length 10 inches.

Body short and deep, compressed. Head moderate, compressed, its profile not steep, nearly straight, a depression before eye. Upper canines moderate, the lower quite small. Nostrils small, well separated, the anterior slightly larger. Lower jaw very strongly projecting. Maxillary reaching opposite posterior edge of pupil. Preopercle slightly notched, the angle slightly salient, with enlarged teeth. Dorsal not deeply notched, the fourth spine not much elevated. Second dorsal high, not long, its angle not rounded. Caudal scarcely lunate, the upper lobe long, the lower truncate. Anal very high, strongly elevated; its posterior border incised, the anterior rounded. Pectoral and ventral moderate. Scales smoothish, not very small.

Color olive gray, covered everywhere with oblong irregular markings of black, between which the ground

color forms rivulations. Gray lines radiating from the eye. A black blotch below maxillary. Pectoral olive yellow. Other fins blackish, clouded with pale. First dorsal with faint small black spots.

The supraoccipital and temporal crests are high, the supraoccipital crest extending to the posterior margin of orbit; the temporal crests are parallel to each other, and extending to pupil; interorbital space concave.

Several specimens, the largest (No. 1621, L. S. Jr. Univ. Mus.) one foot in length, taken in the Astillero at Mazatlan.

We take pleasure in naming this interesting species for Dr. George Albert Boulenger of the British Museum, in recognition of his excellent work on the *Serranidae*, in the first volume of his Catalogue of the Fishes of the British Museum, the proof sheets of which have been kindly placed in our hands.

110. *Mycteroperca rosacea* (Streets). CABRILLA CALAMARIA.

Occasionally taken at Mazatlan in rather deep water. Three specimens only of this species have been preserved: one of them from Mazatlan, collected by Gilbert; one, the original type, obtained by Dr. Streets at some point further northward in the Gulf of California, and the third sent to us by Señor Ygnacio Moreno after our return from Mazatlan. In all of these the life color seems to be bright orange.

111. *Mycteroperca venadorum* Jordan & Starks, n. sp. GARLOPA.

A very large species found in some abundance about the islands along the coast, in rather deep water. But a single specimen, weighing 75 pounds, was obtained by us, this specimen being a type of the species. We are

told by Dr. George W. Rogers and others that specimens weighing 150 pounds are not uncommon. The specimen from which the species is described was taken by the explosion of dynamite outside in the deep water not far from the island called Isla Blanca.

Head $3\frac{1}{6}$ in length; depth $3\frac{1}{4}$. Scales, small, smoothish, about 130. Dorsal XI, 16; anal III, 11. Snout 3 in head; maxillary 2; eye 8. Gill-rakers 3+8; pectorals $1\frac{9}{10}$; 4th dorsal spine $3\frac{3}{5}$; longest dorsal rays 3; longest anal ray $2\frac{1}{5}$; caudal lobe $1\frac{3}{4}$; ventrals $2\frac{1}{4}$.

Body robust, not strongly compressed, the head large. Lower jaw much projecting. Posterior nostril three times diameter of anterior. Preopercle scarcely notched, its angle scarcely salient, its teeth a little enlarged. Gill-rakers short, thick, few in number. Dorsal deep notched, 2d spine a little lower than the 4th. Soft dorsal high, slightly angulated. Anal very high, with exserted rays. Caudal well forked, lobes unequal.

Color olive brown, almost uniform; no spots or bands. Dorsal, anal and caudal with broad black margin narrowly edged with whitish. Pectoral and ventral darker behind. Pectoral with pale edge.

The type, a specimen weighing in life seventy-five lbs., has been sent as a skin to the British Museum. Its length was 40 inches to base of caudal fin.

112. *Mycteroperca pardalis* Gilbert. CABRILLA PIN TITA.

This species is said to be rather common at the Venados and other islands in the neighborhood of Mazatlan. A single specimen was obtained by us; a head was also found in the market. Dr. Gilbert tells us that he has seen salted specimens apparently of this species preserved by the fishermen at Guaymas, together with specimens of

a very large species, probably our *Mycteroperca venadorum*.

Head 3 in length; depth $3\frac{1}{10}$; dorsal XI, 16; anal III, 11. Scales 100, small, smooth, imbedded, difficult to count. Eye $6\frac{2}{3}$ in head; maxillary $2\frac{1}{2}$; pectoral $1\frac{2}{3}$; longest anal ray $1\frac{3}{4}$; longest dorsal 2; longest dorsal spine $3\frac{1}{2}$. Caudal upper lobe $1\frac{1}{3}$; ventrals 2.

Body deep, robust; anterior profile rather steep and straight; lower jaw moderately projecting. Small canines in both jaws; preopercle with notch and a salient angle. Gill-rakers about 15 + 25, rather stout, the longest about $7\frac{1}{2}$ in head; snout $3\frac{1}{2}$. Posterior nostril oblong, 4 times as long as anterior. Dorsal spines low, the third and fourth but little longer than the last. Dorsal fin pointed behind; anal very high, triangular in form; anterior margin convex, posterior concave. Sixth soft ray very high, reaching far beyond tip of last, which is short; spines graduated. Caudal fin broad, on a broad peduncle, unequally lunate; upper lobe longer and broader than lower. Pectorals rounded.

Color olive gray, paler below, clouded with dark above. Everywhere covered with small roundish dark olive or bronzed spots so thick as to obscure the ground color: very close set on head and back, small and distinct, not larger than anterior nostril, growing larger and less thick-set below; posteriorly still larger, often half diameter of pupil, and tending to run together forming elongated blotches and vermiculations. Dorsal similarly spotted with spots which grow faint on soft rays; pectoral, anal and caudal like soft dorsal. All soft fins growing dusky toward margin. Soft dorsal, anal and caudal very narrowly edged with pale. Pectoral with broader pale margin; ventral like pectoral, pale edge narrower. When seen from back an appearance of about 10 very faint dusky cross-shades, probably very conspicuous in young.

113. *Mycteroperca jordani* (Jenkins & Evermann).
CABRILLA DE ASTILLERO.

Common in the Astillero at Mazatlan, reaching a much smaller size than any of the three preceding, the largest among them not being more than two pounds in weight. It is not found about the rocks, but lives in abundance in the branches of the Astillero on the muddy bottoms below a growth of the mangrove bushes.

Head $2\frac{3}{4}$, depth $3\frac{1}{5}$. D. XI, 15. A. III, 10. Scales 23-125-43. Gill-rakers 3+10, short, barely longer than pupil. Eye $6\frac{1}{2}$ in head; snout $3\frac{2}{3}$; maxillary $2\frac{1}{3}$. P. $1\frac{4}{5}$. V. 2. 4th D. spine 3. Longest soft ray $2\frac{3}{4}$. A. $2\frac{1}{5}$. C. $1\frac{3}{4}$.

Body moderately elongate, compressed; profile anteriorly a little convex, depressed before eye. Mouth moderate, the lower jaw longer. Nostrils well separated, subequal. Preopercle scarcely notched, the teeth at angle scarcely enlarged. First dorsal low, scarcely notched, the fourth spine not elongate. Soft dorsal low and rounded. Caudal truncate or very slightly rounded. Anal high but not rounded, its posterior border not incised. Pectorals and ventrals moderate.

Color olive gray, with very obscure marks of darker olive in the form of diffuse dark clouds; lower parts pale olive. Pectorals yellowish green; other fins blackish, the soft dorsal and caudal narrowly edged with whitish. Sides of head with wavy blackish streaks; a black moustache behind maxillary; lower side of head clouded, lower lip greenish.

Several specimens, each about a foot long.

An adult specimen of the same species shows the following characters:

Head $2\frac{2}{3}$ in length; depth $3\frac{3}{4}$. Dorsal XI, 17; anal III, 11. Scales 120. Snout $3\frac{1}{4}$ in head; maxillary 2:

eye $7\frac{1}{2}$; pectoral $1\frac{3}{4}$; ventral $2\frac{1}{5}$; anal ray $2\frac{1}{5}$; caudal $1\frac{1}{5}$. Longest dorsal spine $2\frac{3}{5}$; longest dorsal ray $2\frac{3}{5}$. Gill-rakers short 3+8, not longer than pupil.

Body robust, rather elongate. Head large, low, its profile not steep, a depression before eye. Canines in both jaws, rather strong. Nostrils well separated, the posterior scarcely longer than anterior. Lower jaw strongly projecting. Preopercle slightly notched, the angle little salient. Dorsal rather deeply notched, the fourth spine not especially elevated. Second dorsal high and long, with rounded angles. Caudal slightly lunate. Anal high, but not falcate, its middle rays much elevated but not exerted; both outlines nearly straight.

Color olive almost black above, with four series of oblong blackish, cloud-like blotches along sides; these irregular in size, the largest twice length of eye. Fins all dark, clouded with darker. A little dark red on pectoral and on the lower edge of anal and caudal. Pale edge on dorsal, anal, and caudal very slight; none on pectoral. Cheeks and opercles clouded, the cheeks faintly reticulate, the lower parts grayish, faintly mottled. Inside of mouth pale.

114. *Mycteroperca xenarcha* Jordan.

One specimen, 22 inches long, from the Venados Islands.

Head $2\frac{2}{3}$; depth 3. Dorsal XI, 16. Anal III, 11. Scales 25-110 to 115-50.

Body rather deep and compressed; head compressed, with rather short, sharp snout, which is 4 in head; profile steep and nearly straight. Mouth large, the maxillary reaching scarcely beyond eye, 2 in head. Lower canines small; upper canines (two in number) strong, scarcely directed forward. Eye small, 7 in head. Preorbital

narrow, $\frac{3}{4}$ width of eye. Interorbital area convex, its width $4\frac{1}{2}$ in head. Nostrils small, the posterior scarcely the larger, separated from the anterior by one diameter. Angle of preopercle scarcely salient, but provided with coarser teeth; a small sharp notch above it. Opercular spine flat and divided into about six teeth at the end. Gill-rakers moderate 9+18. Scales moderate, scarcely ctenoid. Dorsal spines low, the outline of the spinous dorsal gently convex, the fourth spine longest, 3 in head. Soft dorsal high, its outline angular, the tenth ray produced, $1\frac{5}{6}$ in head. Anal fin formed as in *Mycteroperca falcata*, its seventh ray produced and falcate, $1\frac{4}{5}$ in head, its posterior outline concave. Caudal subtruncate, the outer rays slightly produced. Pectoral $1\frac{3}{4}$ in head.

Color plain dark olivaceous, the edges of the fins scarcely darker; no evident markings on body.

115. *Paralabrax maculatofasciatus* (Steindachner).
CABRILLA PINTA.

Rather common at Mazatlan. This is one of the very few northern species which extends its range thus far to the southward. It is found in some abundance about San Diego, and its center of distribution is probably between Mazatlan and San Diego, these two places being the limits of its range, so far as now known.

116. *Diplectrum radiale* (Quoy & Gaimard).

This small species is about a foot in length and is generally common on the Coast. It is apparently not very abundant at Mazatlan, the few specimens seen by us being all taken in the Astillero.

Much cherry red on head and fins in life, sides salmon color, streaks on head greenish.

117. *Prionodes fasciatus* Jenyns.

Generally common in rocky islands on the Coast. Obtained by Gilbert from the islands about Mazatlan, whence it was described as *Serranus calopteryx*. Not taken by us.

Serranus bulleri, lately described by Dr. Boulenger from Las Peñas, Jalisco, seems to be identical with *Prionodes fasciatus*.

118. *Rypticus xanti* Gill. JABON.

This species was found by Gilbert in some abundance at Mazatlan. It was not seen by us.

Family CENTROPOMIDÆ.

119. *Centropomus viridis* Lockington. ROBALO.

A common and valued food fish at Mazatlan, where it was also taken by Dr. Gilbert.

This Pacific Coast fish seems to be really a species distinct from *Centropomus undecimalis*, with which it has hitherto been identified. The only differences we find are these: In *Centropomus viridis* the anterior appendages to the air-bladder are two to three times diameter of orbit (in *C. undecimalis* not longer than orbit), and the third anal spine projects beyond second. In *C. undecimalis* the second spine is the longer.

Color in life olivaceous, the sides dull silvery, a very little yellow on ventral, none elsewhere: ventrals not black.

120. *Centropomus nigrescens* Günther. ROBALO
PRIETO.

Rather common: a food fish of some importance, reaching a length of about two feet, less common than *Centropomus viridis*. Recorded from Chiapam by Günther, and from Mazatlan, Panama and Punta Arenas by Gilbert.

121. *Centropomus pedimacula* Poey. ROBALITO, OR
CONSTANTINO DE LAS ALETAS PRIETAS. (*Centropomus medius* Günther.)

Rather common, reaching a length of a little more than a foot; found at Chiapam (Günther), San Blas (Nichols) and Punta Arenas (Gilbert).

We find but one difference between the Pacific form called *Centropomus medius* and its Atlantic analogue, *Centropomus pedimacula* Poey. In the Pacific specimens, *Centropomus medius*, the second anal spine is curved and $1\frac{1}{2}$ to $1\frac{3}{5}$ times in head. In *Centropomus pedimacula* it is straightish and longer, $1\frac{1}{4}$ to $1\frac{1}{3}$ in head. This difference is of very doubtful value, and for the present we place *medius* in the synonymy of *pedimacula*.

Color greenish, the sides bright silvery. Ventral pale yellow, black at tip, a little yellow on anal, none elsewhere. Upper fins dusky; dusky on anal behind the spine.

122. *Centropomus robalito* Jordan & Gilbert. CONSTAN-
TINO, OR ROBALITO DE LAS ALETAS AMARILLAS.

Rather common in the estuary and freely ascending the fresh waters, numerous specimens being taken by us in various places in the Rio Presidio. The species was found by Gilbert at Mazatlan and at Panama; it is probably generally common along the coast.

At our request, Dr. Evermann has compared specimens of the Pacific form called *Centropomus robalito* with *Centropomus ensiferus* from Cuba. He is unable to find any differences, and probably the two are identical. *Centropomus armatus* Gill from Panama is, however, distinct from *ensiferus* or *robalito*.

Olivaceous with bluish reflections; sides silvery, brightest above; ventrals bright yellow, not black at tip. Anal more or less bright yellow; upper fins dusky.

Family LUTIANIDÆ.

123. *Hoplopagrus guntheri* Gill. PARGO COCONACO.

This beautiful and most interesting species is very common about Mazatlan in deep water among the islands. It reaches a considerable size, the largest specimen seen by us having a length of 26 inches. There is considerable difference between the young and the old in coloration, the bands so conspicuous disappearing with age. The species has been found in abundance at Cape San Lucas, Altata and Guaymas, but has not been noticed further south.

Adult greenish above, belly coppery pink; head olive, sides with eight cross bands of warm brown, unequally placed; fins dusky olive shaded with pinkish and brown; ventrals black tipped. A dark crescent at base of pectoral.

124. *Lutianus novemfasciatus* Gill. PARGO PRIETO.
PARGO MAREÑO.

This species reaches a much larger size than any other members of the genus on the Pacific Coast, those specimens obtained by us with dynamite among the Venados Islands having a weight of about twenty-five pounds. It is a food fish of some importance. It undergoes very considerable changes with age, as the notes below will show. The young are dark in color, the bodies banded and the amount of red very slight. The adult becomes uniformly colored with much red, and with increased age there is a progressive lengthening of the snout and widening of the preorbital.

Description of adult of 30 inches: Head 3; depth 3 ($3\frac{1}{3}$ in young); dorsal X, 14; anal III, 18; scales 6 (4)-50-13; eye $6\frac{1}{2}$ in head; snout $2\frac{1}{2}$; maxillary $2\frac{2}{5}$. Pectoral $1\frac{1}{4}$. Ventral 2. Anal 3; 3d anal spine $5\frac{3}{4}$;

caudal $1\frac{3}{4}$: preorbital $3\frac{5}{8}$ ($4\frac{1}{3}$ in smaller specimens 20 inches long; 5 in those of one foot long).

Body very robust, not much compressed, the back not sharp. Head very large, the mouth very large, reaching middle of eye. Canines very strong, in front of jaw and on sides of lower. Vomerine teeth in a V-shaped patch, not prolonged behind. Gill-rakers 7, very small, the longest less than pupil. Posterior nostril oblong, much longer than anterior. Preopercle slightly notched; 7 or 8 rows of scales on cheeks.

Dorsal deeply notched, rather low. Soft dorsal low and rounded. Anal low and rounded. Pectoral long and pointed. Caudal short, scarcely concave. Anal spines short, graduated. Scales above lateral line not in a parallel series.

Maroon color above, copper red below, becoming salmon color before. Fins blackish, tinged with maroon. Pectoral dull yellow olive, blackish at tip; a blackish cross spot on base of pectoral, growing faint with age. Inside of the mouth salmon. Ventral quite dark, the tips black. Iris salmon color; no blue spots or line below eye.

Young with spinous dorsal edged with black; anal and caudal black; ventrals black tipped. A black crescent on upper part of base of pectoral.

Young of one foot, black with progressively less red and narrow preorbital. Color largely blackish, tinged with copper on belly and lower parts.

The young are called Pargo Negro; the half grown, Pargo Prieto; the adult Pargo Mareño, or Maroon Snapper.

125. *Lutianus argentiventris* (Peters). PARGO AMARILLO.

Very abundant everywhere about Mazatlan, and probably common all the way from Guaymas to Panama. It

reaches a weight of about five pounds, and is a food fish of some importance.

Back olivaceous, anterior parts washed with maroon red, bright on sides of head, becoming more orange posteriorly; posterior half of body bright yellow; some pale streaks on scales. Pectoral light orange red. Other fins mostly bright yellow. A row of round blue spots below eye. Belly silvery, slightly washed with red; inside of mouth white; iris white.

126. *Lutianus colorado* Jordan & Gilbert. PARGO COLORADO.

This large, handsomely colored species, is one of the staple food fishes at Mazatlan, being brought into the market every day, both from the estuary and from the deep water about the islands. It reaches a weight of about ten pounds. Thus far it has been recorded only from Mazatlan and Punta Arenas, all the known specimens having been collected by Dr. Gilbert.

127. *Lutianus guttatus* (Steindachner). PARGO FLAMENCO.

This small, beautifully colored species, is generally common about Mazatlan, and probably in all the localities along the coast; it is found both in the estuary and in the neighborhood of the rocks. It rarely reaches a pound in weight.

Light olivaceous above, the markings bronze olive; sides pale crimson, the marks more yellow. Belly golden yellow. Scarlet on iris, yellow about eye; first dorsal reddish, second with reddish brown markings; caudal deep rich red; lower fins golden; pectoral nearly colorless; side of head pink with golden stripes.

128. *Lutianus aratus* (Günther). PARGO RAIZERO.

This beautiful species is not very abundant about Mazatlan, specimens being only occasionally taken. It rarely reaches five pounds in weight. It is generally distributed along the coast, having been recorded from Punta Arenas by Gilbert, and from Chiapam and Panama by Günther.

Dark green, the dark stripes on sides dark brown, the interspaces yellowish white; belly coppery red; some bluish on cheek; pectoral maroon red; ventrals salmon red, the first ray white; anal creamy red; caudal dark red, blackish towards tip; dorsals dusky; throat silvery.

129. *Rabirubia inermis* (Peters). Plate xxxix.

The original type of this species in the museum at Berlin was said to have been brought from Mazatlan. A single specimen from Panama is in the museum of Stanford University. In this species the supra-occipital crest is continued forward on the head to the ethmoid region, as in the genus *Ocyurus*. This character widely separates *inermis* from the genus *Lutianus*. The genus *Rabirubia* Jordan & Fesler, of which it is the type, is separated from *Ocyurus* chiefly by the small number of the gill-rakers.

Family HÆMULIDÆ.

130. *Hæmulon sexfasciatum* Gill. RONCADOR ALMEJERO.

This species reaches a larger size than any other of the group, none that were found by us being less than two feet in length. It is not very common, living mainly about the islands. It was obtained by Peters and Gilbert at Mazatlan, and ranges from Cape San Lucas to Panama.

131. *Hæmulon scudleri* Gill. RONCADOR PRIETO.

This species reaches a length of about fifteen inches, and is very common at Mazatlan, more so than any other member of the group. Large specimens were taken by dynamite in the deep water about the Venados, and the young are rather common in the estuary. The species seems to have indifferently eleven or twelve dorsal spines, and there is a greater variation than usual in the form of the body and in the shade of coloration. There seems to be no doubt, however, that all the forms usually referred to this species belong to a single one. The species is found from Cape San Lucas to Panama.

Back bright yellow-olive to opposite front of soft dorsal, the posterior half, more or less abruptly, steel blue black. The vertical fins all blackish; in some the whole back is greenish, in others only half; lower parts all gray; most of the large ones show no traces of spots on scales, some show a few spots; fins silvery, with golden above and below; mouth red within; black under preopercle.

132. *Hæmulon steindachneri* (Jordan & Gilbert). RONCADOR RAIADO.

This small species, not reaching a length of more than eight inches, and too small to be regarded as a food fish, is very abundant in the harbor at Mazatlan, especially about the wharf and in the quiet waters in the estuary. It is generally distributed along the coast from Guaymas to Panama. It seems to be indistinguishable from a species found along the Brazilian coast and north to St. Lucia. For this species we have formerly taken the name of *Hæmulon schranki* Agassiz. This identification is probably an error. *Hæmulon schranki* is probably based on a faded example of *Hæmulon melanurum*. Apparently the appropriate name of *Hæmulon steindachneri* should stand.

Fins all golden yellow; body dark bronze, with rows of pearly blue spots; a large black blotch at base of caudal.

133. *Lythrulon flaviguttatum* (Gill). (*Hæmulon margaritifera* Günther.)

This species is not very common in the estuary at Mazatlan, a few specimens having been taken by Dr. Gilbert. It is widely distributed along the coast from Guaymas to Panama.

134. *Lythrulon opalescens* Jordan & Starks, n. sp.
Plate xl.

Rather common in the estuary at Mazatlan, not yet noticed elsewhere; all the specimens of *Lythrulon* from other localities examined by us being referable to *Lythrulon flaviguttatum*.

Head $3\frac{1}{2}$; depth $2\frac{2}{3}$; dorsal XII, 16; anal III, 9; snout $3\frac{2}{3}$ in head; maxillary reaching slightly past front of pupil, $2\frac{1}{2}$ in head; orbit $2\frac{5}{8}$; interorbital $3\frac{2}{3}$; longest dorsal spine 2; longest dorsal ray 4; second anal spine $2\frac{1}{2}$; pectoral $1\frac{1}{8}$; ventrals $1\frac{1}{2}$; scales 7-54-13.

Body deep, compressed, the back well elevated, the dorsal outline nearly uniformly curved from tip of snout to caudal peduncle; ventral outline curved from chin to breast, thence straight to anal spine, and slanting obliquely upwards to caudal peduncle.

Snout small and pointed; mouth small and oblique, the lower jaw slightly projecting; teeth all small, the outer scarcely enlarged; preopercle finely serrate, the posterior limb somewhat concave, the angle broadly rounded.

Gill-rakers short and slender, about half the diameter of pupil, 8+15; scales above lateral line arranged in oblique series; tip of snout, chin and maxillary naked; scales on head small and crowded; soft fins scaled.

Pectoral reaching to vent; ventrals reaching half way to second anal ray; second anal spine a little longer and stronger than third; upper lobe of caudal the longer, about equal to head.

Color as in *Lythrulon flaviguttatum*, in spirits, dark steel gray; a small very distinct pale spot on each scale of back and sides, surrounded by darker. This spot is, in spirits, light yellowish; in life of a pearly blue. Head plain; a small dusky blotch under angle of preopercle. Fins plain bright yellow in life. Young with a large black blotch at base of caudal, as in *Hæmulon steindachneri* and *Orthostæchus maculicauda*, and without the dusky horizontal streaks seen in most of the other species.

This species differs from *Lythrulon flaviguttatum* in having fewer gill-rakers, the depth and arch of the back greater.

Described from a specimen (No. 2963, L. S. Jr. Univ. Mus.) 9 inches long. Two others were obtained.

135. *Orthostæchus maculicauda* Gill:

This small species was not found at Mazatlan either by Dr. Gilbert or by the Hopkins expedition. Specimens from Mazatlan and from Acapulco have been recorded by Steindachner. It was obtained by Xantus at Cape San Lucas and Colima, and by Dr. Gilbert at La Paz and Panama.

136. *Anisotremus interruptus* (Gill). MOJARRON.

This large species occurs in great abundance about the islands near Mazatlan, many specimens, the largest over two feet in length, having been obtained by dynamite. It is occasionally seen in the Astillero. It is widely distributed along the coast, and specimens were obtained by Dr. Gilbert in 1881 at Mazatlan.

Body grayish anteriorly, most specimens gray before,

yellow on posterior half; the back tinged with brassy olive, which grows darker behind, the posterior parts pretty distinctly yellow; fin spines gray, the soft fins olive, the fins growing dusky at tip; scales on back and sides each with a distinct black spot; iris yellow; scales above lateral line much enlarged, 4 in number, 7 in an oblique series; 52 pores.

The generally larger size of the scales above the lateral line may possibly separate this species from the common Atlantic form, *Anisotremus surinamensis*.

137. *Anisotremus cæsius* (Jordan & Gilbert).

This species is known only from two or three specimens obtained by Dr. Gilbert in 1881 from Mazatlan. It was not seen by us, and is doubtless rare.

138. *Anisotremus dovii* (Günther).

This species was found by Gilbert at Mazatlan and Panama, but no specimens were obtained by us.

139. *Anisotremus tæniatus* Gill. CATALINA.

This species is rather common about the islands. It reaches a length of about 18 inches, and in life is very brilliant in color. It is seldom found in shallow water. It ranges from Magdalena Bay to Panama.

140. *Pomadasis macracanthus* (Günther). BURRO.

This species is extremely common everywhere about Mazatlan. It is a food fish of some importance, but the flesh is rather coarse. It reaches a length of about 18 inches. When taken from the water it makes a loud and singular noise extremely similiar to the noise made by the donkey or burro, from which this species receives its common name. Every species of the genus makes some noise, but in no case is it so loud as in this one.

141. *Pomadasis branicki* (Steindachner).

This small species, rarely exceeding six inches in length, was found by us in some abundance in the Astillero at Mazatlan. It was obtained by Gilbert both at Mazatlan and Panama. Steindachner described it from Tumbes on the coast of Peru.

142. *Pomadasis panamensis* (Steindachner).

This species is generally common along the west coast, but it was not seen by us. Dr. Gilbert found it both at Mazatlan and Panama.

143. *Pomadasis axillaris* (Steindachner). BURRO BLANCO.

This species reaches the length of about a foot, and is occasionally taken at Panama; a single specimen being found by us at Mazatlan. Both Steindachner and Gilbert also record it from Mazatlan, and a single specimen has been found by us in the collection of Dr. Streets from the coast of Lower California. It has not been noticed from any other locality.

144. *Pomadasis nitidus* (Steindachner).

This species was found at Mazatlan by both Steindachner and Gilbert, but it was not seen by us. Gilbert records it also from Panama.

145. *Pomadasis leuciscus* (Günther). BURRITO.

This small species seldom exceeds a length of six inches, and is generally common in the bay at Mazatlan, and on sandy bottoms where the water is shallow. We found large variations in the depth of body, in the width of the preorbital and in the length of the anal spines, but in no case have we been able to make these variations agree exactly with any of the differences by which we have hitherto distinguished *Pomadasis elongatus* (Stein-

dachner) from *Pomadasis leuciscus* (Günther). We have reached the conclusion that all of these forms belong to one species, and that *elongatus*, as we have understood it, cannot be maintained as a separate species. The two supposed forms have been recorded from various places between Guaymas and Panama. The name *elongatus* was first applied to a Peruvian specimen, which is possibly different from *leuciscus*, as we have seen none exactly like Steindachner's figure.

The young show yellowish shades on fins. Second dorsal mottled with blackish; a diffuse dusky blotch on opercular angle, and evident dark streaks, three or four, along middle of sides.

146. *Orthopristis chalceus* (Günther).

This species is generally common along the coast from Guaymas to Panama. It was obtained by Steindachner and Gilbert at Mazatlan, but no specimens were secured by us.

147. *Isaciella brevipinnis* (Steindachner).

The original type of this species was obtained by Dr. Steindachner at Mazatlan. A specimen from Panama, now in the museum of Yale University, was obtained by Prof. Bradley. The species seems to be rare, and no specimens were secured by us.

148. *Microlepidotus inornatus* Gill. JOPATON.

Five specimens of this rare species, the largest about fifteen inches in length, were obtained by us with dynamite off the shore of the southernmost of the three Venados Islands.

In life, steel-blue, with stripes of bright bronze; upper fins with golden; caudal partly dusky; preorbital with vertically oblong spots.

Family SPARIDÆ.

149. *Calamus brachysomus* (Lockington). MOJARRA
GARABATA.

This species is very common about Mazatlan, being a food fish of some importance and reaching a length of about fifteen inches. It was also obtained by Dr. Gilbert. Its range southward is not certain, but it is generally common in the Gulf of California.

Family KYPHOSIDÆ.

150. *Kyphosus analogus* (Gill). SALEMA.

This beautiful species is rather common about Mazatlan, both in the estuary and in deep water in the neighborhood of the islands. It was not found by Dr. Gilbert, and its range along the coast is not definitely distinguished from that of the following species, the two having been recorded as identical by authors who had seen but one. They were first properly distinguished by Jenkins and Evermann, who obtained both at Guaymas. The marked difference in color, however, does not appear in the description of Jenkins and Evermann, which was drawn from specimens preserved in alcohol.

Head 4; depth $2\frac{1}{4}$; dorsal XI, 14; anal III, 12; eye $4\frac{1}{2}$ in head; snout 3; maxillary $3\frac{1}{3}$; pectoral $1\frac{3}{4}$, equal to ventrals; longest ray of soft dorsal $3\frac{1}{2}$; longest dorsal spine $2\frac{1}{3}$; upper lobe of caudal as long as head.

Body compressed, elliptical; profile in some specimens evenly curved from tip of snout to dorsal, in others slightly produced before eyes and concave over snout.

Mouth small, horizontal; jaws equal; teeth in a single series, from 22 to 28 in each jaw; maxillary extending to the vertical from the front of eye. Snout, lower jaw and preorbital naked, head elsewhere with scales; 12 to 15 rows of scales on opercle; scales on body much crowded

anteriorly; scales 13-76-20; all the fins, with the exception of spinous dorsal, entirely scaled.

Tip of pectoral sharply rounded; front of anal not greatly elevated, its longest ray 3 in base of fin, which is about equal to head; spinous dorsal higher than soft dorsal; upper lobe of caudal the longer.

Color, steel blue, brighter than in *elegans*, with bronze streaks along the edges or rows of scales, much brighter than in *elegans*. A broader gray streak bordered with bronze at base of soft dorsal. A large brassy spot in the axil, extending along shoulder girdle; a deep bronze stripe through eye, another back from angle of mouth; the two separated by steel blue; fins all blue black, with some bronze, especially on pectoral. Body more elongate than in *elegans*; the form more elliptical; the mouth less blunt, with fewer teeth; the scales smaller and more crowded anteriorly; the fins lower, especially the anal. Well separated from *Kyphosus elegans*, living chiefly in the rocks outside; rare in the bay. Largest specimen eighteen inches long.

151. *Kyphosus elegans* (Peters). ЧОРА.

This species is rather common about Mazatlan, especially in the sluggish waters of the Astillero. Like the preceding, it reaches a length of about fifteen inches.

Head $3\frac{2}{3}$; depth 2; dorsal XI, 12; anal III, 11; eye 4 in head; snout $3\frac{1}{4}$; maxillary $3\frac{1}{5}$; pectoral $1\frac{3}{5}$, equals ventral; longest ray of soft dorsal $2\frac{1}{2}$; longest dorsal spine $2\frac{1}{2}$; longest anal ray 2; upper lobe of caudal equals head.

Body ovate, compressed; profile rounded, slightly produced before eyes; concave over snout in some specimens, straight in others; a gentle curve from eyes to dorsal. Mouth small, horizontal, the jaws equal; teeth in a

single series, about 36 in each jaw; maxillary extending to the vertical from anterior edge of orbit; snout, lower jaw and preorbital naked, head everywhere else scaled; opercles with 8 or 9 rows of scales; scales on body large, somewhat crowded anteriorly; scales 11-63-17; all the fins, except spinous dorsal, with scales to their edges, those on caudal exceedingly small.

Tip of pectoral sharply rounded, not reaching to tips of ventrals; ventral spine half as long as soft rays; anal spines short and stout, graduated; anal elevated in front and higher than soft dorsal; middle spines of dorsal the longest, about equal to highest rays of soft dorsal; upper lobe of caudal the longer.

Color grayish black, with paler centers to the scales; sides with large faint diffuse yellowish white spots; a little bluish and yellowish on sides of head; a yellow streak below lower part of eye. Vertebrae 9+16 or 10+15.

Family SCIÆNIDÆ.

152. *Cynoscion reticulatus* (Günther). CORVINA.

Generally common on the sandy bottoms about Mazatlan. An excellent food fish, very often brought into the markets, and reaching a length of nearly 3 feet. It was found by Dr. Gilbert at Mazatlan and is common south to Panama.

Caudal fin yellowish orange in life; inside of mouth deep orange yellow.

153. *Cynoscion xanthulum* Jordan & Gilbert. CORVINA ALETAS AMARILLAS.

Found in company with *Cynoscion reticulatus*, but rather less abundant and perhaps reaching a smaller size. It is also a food fish. It has thus far been recorded only from Mazatlan, where the original types were taken by Dr. Gilbert.

154. *Larimus argenteus* (Gill).

One large specimen obtained; also found in the Gulf of California and southward on sandy shores to Panama.

155. *Larimus breviceps* Cuvier & Valenciennes.

Specimens of this species were obtained by Dr. Gilbert at Mazatlan, Punta Arenas and Panama. None were seen by us.

156. *Corvula macrops* (Steindachner). VACUOQUA.

One fine specimen from the Astillero at Mazatlan.

Head $3\frac{1}{2}$; depth 3; dorsal XI, 1, 25; anal II, 9; eye $3\frac{1}{2}$ in head; snout $4\frac{3}{4}$; maxillary $2\frac{1}{6}$; longest dorsal spine $1\frac{3}{4}$; longest dorsal ray $2\frac{1}{4}$; second anal spine $2\frac{1}{3}$; ventrals $1\frac{1}{2}$; pectoral $1\frac{2}{5}$; caudal fin $1\frac{1}{2}$.

Body oblong, moderately compressed, not much elevated; dorsal outline uniform from tip of snout to caudal peduncle; ventral outline rounded from chin to breast, then straight to anal spine, then slanting obliquely upward to caudal peduncle.

Snout blunt, shorter than large eye: upper jaw slightly projecting, teeth small and sharp, in one or two irregular series in lower jaw, in several series in upper jaw, the outer row slightly enlarged; maxillary extending to posterior edge of pupil; chin with four large pores; edge of preopercle covered with skin, which is serrated on the edge.

Gill-rakers slender, 9+13: scales ctenoid on the body, cycloid on the head; scales 8-56-11.

Spinous dorsal a little higher than soft dorsal; first dorsal spine very short, second about 5 times longer, third twice as long as second, third, fourth, fifth and sixth subequal, the others rapidly shorter; first anal spine very small, the second many times longer and stouter, but shorter than soft rays; ventrals inserted behind pectorals and reaching beyond them: caudal truncate.

Ground color silvery, but so closely set with small dark brown points as to almost obscure the silver; sides with about four faint dark cross bands and with conspicuous black stripes following the rows of scales, about 11 horizontal stripes below lateral line, those above slanting obliquely upward anteriorly, but becoming horizontal posteriorly, tips of ventrals and anal black, other fins dusky.

Described from a specimen 8 inches long.

157. Bairdiella icistia (Jordan & Gilbert).

This pretty species is not rare in the Astillero at Mazatlan, where specimens were obtained by Dr. Gilbert and by us. It has not been noticed elsewhere.

158. Ophioscion scierus (Jordan & Gilbert).

The species was obtained by Dr. Gilbert at Mazatlan; not seen by us. It is more common southward, having been taken by Dr. Gilbert at Punta Arenas and Panama.

159. Micropogon ectenes Jordan & Gilbert. VERRUGATO.

This species is a rather common food fish about Mazatlan, reaching a length of 18 inches. Numerous specimens were obtained both by Dr. Gilbert and by us. It has not been noticed at any other locality.

160. Umbrina xanti Gill. CODORNIZ.

This species is very common about Mazatlan, reaching a length of 15 inches, and being frequently brought into the market. It is generally common along the coast.

161. Umbrina dorsalis Gill.

This species seems to be scarce at Mazatlan, where a few specimens were found by Dr. Gilbert mixed with those of *Umbrina xanti* Gill. No specimens were obtained by us. It has elsewhere been noted only at Cape San Lucas.

162. *Menticirrus simus* Jordan.

This species was described from specimens obtained by Dr. Gilbert at Mazatlan. A single very small one was obtained by us in the surf north of the city.

163. *Menticirrus panamensis* (Steindachner).

Taken by Dr. Gilbert at Mazatlan; not seen by us.

164. *Menticirrus elongatus* (Günther). VERRUGATA.

This species is very common in the surf on the sandy beaches about Mazatlan. Specimens were also obtained by Dr. Gilbert. Elsewhere it has been recorded only from Chiapam, whence came Dr. Günther's original types.

Family GERRIDÆ.

165. *Eucinostomus californiensis* (Gill). MOJARRA CANTILEÑA. (*Diapteris californiensis* and *gracilis* Gill.)

Excessively common in the estuary, being by far the most abundant species, not excepting the White Mullet. It is rarely used as a food on account of its small size, its length when adult ranging from five to ten inches. The second interhæmal bone in this species is developed in a very singular manner, being short, much expanded and hollow, the broadly open upper end being occupied by the posterior part of the air-bladder, the structure being the same as in the genus *Calamus*, but more highly developed, the bone being shorter and more largely excavated. This structure is seen also in *Eucinostomus gula*, *harengulus*, and probably others. As *Gerres gula* (= *argenteus*) is the type of the genus *Eucinostomus*, this structure may be held to define that genus as distinct from *Gerres*. There can be no question as to its generic importance. In *Gerres* proper, the second interhæmal is

long and spear-shaped, very much more slender in proportion to its length, not hollow and not receiving any of the air bladder. This structure is seen in *Gerres cinereus* (Walbaum), in *Gerres peruvianus* Cuvier & Valenciennes, and in *Gerres lineatus* Humboldt, as also in several West Indian species.

Eucinostomus californiensis is generally common along the west coast of Mexico, from Guaymas to Panama. It is probably, however, not found in the West Indies, the closely related *Eucinostomus harengulus* being apparently a different species. The specimens called *californiensis* by Gill, having the premaxillary groove semi-oval or \cap -shaped, seem to represent the adult of this species. Those called *gracilis*, with the premaxillary groove linear, are the young or half-grown. Still others, especially adults, have the premaxillary groove round, forming a pit, and every intermediate character may be found.

At first we thought it possible to separate *californiensis* and *gracilis* as distinct species. The careful re-examination of some 200 specimens leaves us wholly unable to separate them, as all grades of variation occur. Apparently the premaxillary groove is linear in the young, growing broader with age, but the changes very irregular. The name *Eucinostomus californiensis* has priority over *E. gracilis*.

NOTE.—The genus *Gerres* was established by Cuvier in the second edition of the Règne Animal, the name being based on seven species as enumerated by him, *rhombus*, *oyena*, *aprion*, *poicti*, *lineatus*, *argyreus* and *filamentosus*. One of these species must, therefore, be chosen as the type of *Gerres*. In 1842, Ranzani established the genus *Diapterus* on *auratus*, a species closely related to *rhombus*, or rather to the allied *olisthostoma*. In 1850, the name *Catochænum* was proposed by Cantor as

a substitute for *Gerres*, regarded as preoccupied by the earlier name *Gerris*, applied by Fabricius to a genus of insects. The name *Catochaenum* can only be used if *Gerres* is regarded as ineligible. By the rules followed by us, *Gerres* must be retained, being spelled differently from *Gerris*. In different publications of Poey, *plumieri* is made the type of *Gerres*, although it is not one of Cuvier's original species. Bleeker substitutes *Diapterus* for *Gerres* and *Catochaenum*, specifying *plumieri* as its type, while Gill and Poey have used the name *Diapterus* for the allies of *gula*, to which the name *Eucinostomus* had been applied in 1855 by Baird and Girard. Although *plumieri* cannot be made the type of *Gerres*, it seems to us that the cognate species *lineatus* can be so regarded. If this view is adopted, the restricted *Gerres* of the present paper would correspond exactly with the restricted *Gerres* of Poey and Gill. This fact certainly justifies us in choosing *lineatus* as the type of the genus.

There can be no doubt of the generic value of *Eucinostomus (gula)* and of *Ulema* Jordan & Evermann MS. (*lefroyi*), as distinguished from *Gerres*. Of the other groups represented in American waters, *Xystæma* Jordan & Evermann MS. (*cinereus*) seems to be a valid genus, while *Diapterus (auratus)* should stand rather as a subgenus of *Gerres*. *Diapterus* differs from *Gerres* chiefly in the entire preorbital. *Xystæma* has the preopercle as well as preorbital entire, while *Ulema* has the second interhæmal very short, and the two spines of the anal are themselves scarcely enlarged.

Moharra Poey (*rhombeus*) differs from *Diapterus* only in the presence of two anal spines instead of three, a character of low importance, as the relation of the species included in the two groups is very close.

The exotic genera of this group have not been studied by us.

The specimens recorded by Eigenmann from San Diego Bay as *Gerres cinereus* var. (Amer. Nat., 1891, 156) seem to be *Eucinostomus californiensis*.

166. *Xystæma cinereum* (Walbaum). MOJARRA BLANCA.

Very abundant at Mazatlan, being one of the staple food fishes, and reaching a length of nearly two feet; its flesh is of an excellent quality. The species was found by Dr. Gilbert at Mazatlan and Panama, and seems to be generally common along the coast. Like the rest of the genus, it occurs in shallow water on sandy bottoms, away from the surf.

167. *Gerres peruvianus* Cuvier & Valenciennes. MOJARRA DE LAS ALETAS AMARILLAS.

This small species is abundant at Mazatlan, although less common than *Eucinostomus californiensis*, and *Xystæma cinereum*. It rarely exceeds six inches in length.

Gerres brevirostris Sauvage, from Rio Guayas, near Guayaquil, is not evidently different from this species.

**168. *Gerres lineatus* (Humboldt). MOJARRA CHINA.
(*Gerres axillaris* Günther).**

Rather common at Mazatlan, with the preceding, but reaching a rather larger size, from eight to twelve inches, and frequently used as food. It was found by Dr. Gilbert at Mazatlan, and has been recorded from Acapulco by Humboldt and Bradley, from San Blas by Nichols, and from Chiapam by Günther.

Family CIRRHITIDÆ.

169. *Cirrhites betaurus* Gill.

The young of this species, from two to six inches in length, are very abundant in rock pools about Mazatlan, where numerous specimens were obtained by us, as well

as by Dr. Gilbert. These small specimens are identical with those obtained by Xantus at Cape San Lucas, the types of *Cirrhites betaurus*. It has been supposed that these are the young of *Cirrhites rivulatus* Valenciennes, abundant about the Galapagos and Revillagigedos, as no differences except those of color appear. The color differences are, however, strongly marked, and we are disposed to let *Cirrhites betaurus* stand provisionally as a distinct species. The coloration of *betaurus* has been well described by Dr. Gill; that of *rivulatus* is well figured by Dr. Günther.

First dorsal fin bright orange red in life; second reddish; cross bands on body black.

Family CICHLIDÆ.

170. *Heros beani* Jordan. MOJARRA VERDE.

Common in the deeper and more quiet places in the Rio Presidio, especially just below the village of Presidio. It reaches a length of about eight inches, and is occasionally taken by the hook, its habits being very similar to those of the abundant sun fishes as seen in the more northern waters.

Adult light olive, banded with darker; black spots on each scale. First dorsal edged with dark red, the two black blotches and black bars obsolete. Young with the bars distinct; no blue, yellow or red in life.

Family POMACENTRIDÆ.

171. *Eupomacentrus rectifrænum* (Gill). PESCADO AZUL. (*Pomacentrus analigutta* Gill.)

This beautiful fish is very abundant in the rock pools about Mazatlan. It is excessively wary and hard to catch. Great changes in coloration, due to age, have been noticed by Dr. Günther and others. The chief peculiarity

is in the greater uniformity in coloration of the adult, in which the blue shades become obscure, and the ocelli, so conspicuous in the young, are more or less lost.

This species is exceedingly close to *Eupomacentrus fuscus* (Cuvier & Valenciennes), a species found on the Brazilian coast. Comparing specimens from Bahia with ours from Mazatlan, we note that in *E. rectifrænum* the blue markings persist longer and that the scales on the head are smaller, more crowded and more mixed with small scales in *E. rectifrænum* than in *Eupomacentrus fuscus*.

Head $3\frac{1}{3}$; depth 2; D. XII, 13; A. II, 11; scales 3-28-9; eye 4 in head; snout $2\frac{3}{5}$; D. lobe $1\frac{2}{5}$; C. upper lobe $1\frac{2}{5}$; V. $1\frac{1}{3}$; P. $1\frac{1}{8}$.

Preorbital and preopercle strongly serrate. Teeth firm, flattened, not notched. Lateral line ending under ninth dorsal ray. Caudal lunate, the upper lobe the longer. Dorsal and anal rounded, ventral filamentous. Gill-rakers short, slender, weak, numerous.

Color of adult ($5\frac{1}{2}$ inches) nearly uniform blackish olive, darker on head, back and fins, paler on pectoral and on axil. where is a yellowish area below the small axillary spot.

The coloration of the young and partly grown has been well described by Dr. Gill. Dr. Gill's last account (Proc. Ac. Nat. Sci. Phila., 1863) of this and related species is most excellent. The only error of importance contained in it is the failure to examine the teeth of "*Pomataprion*" *bairdii* and *dorsalis*. *Pomataprion* is identical with *Microspathodon*.

172. *Eupomacentrus flavilatus* (Gill). PESCADO AZUL DE DOS COLORES. Plate xlii.

This little fish is equally abundant with the preceding in rock pools. It seems to reach a smaller size. The

differences between the two are comparatively slight but very persistent, and we believe that the two species are fully distinct from each other. In life *Eupomacentrus flavilatus* is the most beautiful fish found on the coast of Mexico, showing a most intense shade in the blue of its back and the orange of its sides. Both this species and the preceding were found at Cape San Lucas, but only *Eupomacentrus rectifrænum* has been taken at Panama.

An irregular line from snout below eye to soft dorsal divides the fish into two parts; below this line all is brilliant yellow with an orange shade, deepest on anal; above all is the brightest sky blue. Scales darker, but all edged with sky blue, six sky blue stripes on upper part of head. An indigo spot on base of first soft dorsal and last dorsal spines extending on back, this surrounded by a ring of sky blue; a similar smaller ocellated spot on back of caudal peduncle.

173. *Abudefduf** *saxatilis* (Linnæus).

Common in rock pools about Mazatlan, where it was obtained in abundance by Dr. Gilbert and by us. The largest specimens were taken by dynamite off the Venados Islands.

Careful comparison of these specimens with others from the West Indies shows no difference whatever. *Glyphisodon troscheli* Gill, the name given to the Pacific Coast form, is therefore fully synonymus with *Abudefduf* (or *Glyphisodon*) *saxatilis*.

In life, bright greenish yellow above with steel blue bands. Dorsal like back; other fins dusky; axillary spot faint.

In alcohol, the color is a slaty brown tinged with red-

* *Abudefduf* Forskål seems to be identical with *Glyphisodon* and is entitled to priority, notwithstanding its barbarous form.

dish brown below, showing faint dark cross bars, with no bright color anywhere, the yellowish green of the back being last to fade; behind the pectoral each scale has a white spot, these form white lines that run back to a little past the tip of pectoral. All fins dark except pectoral, which is colorless.

174. *Abudefduf declivifrons* (Gill).

This species occurs in rock pools in abundance everywhere about Maxatlan, in company with *Abudefduf saxatilis*, from which its duller color readily distinguishes it.

In life, dusky brownish with many pale spots on edge of scales; these vary a good deal; cross bands blackish; no bright colors. Black spot at base of pectoral conspicuous, a good mark, varying in size, larger in older specimens.

175. *Microspathodon bairdii* (Gill). Plate xliii.

Numerous small specimens taken in the rock pools in company with *Eupomacentrus flavilatus*, a species which the present one closely resembles in color, and which scarcely excels it in brilliancy. This species has been well described by Dr. Gill. It seems to reach only a small size, none of ours being more than two inches long.

It differs from the other species of *Microspathodon* in its low fins and in color. The latter may be a matter of age only, but this does not seem likely, as the young of *Microspathodon dorsalis* (called by Dr. Gill *quadrigutta*) has essentially the coloration of the adult. Apparently four species of *Microspathodon* exist on the west coast of Mexico, but it is possible that all are forms of one protean species, for which the earliest specific name is *dorsalis*.

Head 3: depth 2: dorsal XII, 16; anal II, 13; eye $2\frac{2}{3}$ in head; pectoral $1\frac{1}{4}$; anal $\frac{1}{8}$ longer than head; soft dorsal and anal lobes equal $1\frac{1}{3}$ in head: caudal lobe $1\frac{1}{4}$ in head.

Body compressed, ovate; profile convex; mouth wide, lower jaw included; teeth in a single row and movable; gill-rakers small and numerous; head entirely scaled; scales on body large 3-30-9; scales running well up on fins; lateral line high, ending under last dorsal ray.

Color: Body divided into two parts by a line from the opercular flap to posterior end of soft dorsal, below this line it is rich, bright yellow, above it is sky blue, darker on head, with brilliant sky blue spots; a chain of these spots following the suborbitals below eye; a spot at angle of mouth, two converging lines of spots more or less run together from tip of snout to upper edge of orbit, each scale on nape with a spot and a few scattering spots on opercle; scales on upper part of body edged with dark; a dark spot on caudal peduncle anteriorly edged with sky blue; fins all more or less dusky except anal and ventrals, which are white and edged with black.

176. *Microspathodon dorsalis* (Gill). (*Pomacentrus quadrigutta* Gill.)

A single specimen 4 inches in length was obtained in a rock pool on the Peninsula called Vijía, by Mr. George B. Culver.

This specimen corresponds almost perfectly to Dr. Gill's account of *Pomataprion dorsalis*. A smaller specimen entirely similar was also obtained. The distinctions between this species and *Microspathodon bairdii* are constant though slight.

Head 3; depth $1\frac{5}{8}$; D. XII, 16; A. II, 12; scales 3-28-10; eye $2\frac{1}{2}$ in head; snout 4; D. lobe 1; C. lobe equals head; P. $1\frac{1}{6}$; V. equals head.

Body compressed, the profile rounded, depressed before eye so that snout projects. Gill-rakers numerous, very short, slender, close set. Preorbital deep. Preorbital and preopercle entire. Teeth in a single row, movable.

Dorsal spines rising to the last, subtruncate, flattened, each with a brown vertical streak in center; the soft rays and lobes of caudal much produced, as also ventrals.

Deep indigo blue on body and fins; no pale edgings to any of the fins; three round sky blue spots above lateral line, the one near its beginning, the one under front of spinous dorsal, the third under last spine, the first smallest, the other two as large as pupil; a larger sky blue saddle in axil of last soft ray. Head with many sky blue spots everywhere, those on preorbital and suborbital coalescing in a blue streak; another streak behind angle of mouth, and another above eye. Axil sky blue, a bar of sky blue across end of snout. Angle of snout sky blue.

177. *Microspathodon azurissimus* Jordan & Starks n. sp. Plate xlv.

A surpassingly beautiful little fish, obtained by dynamite from the rocks about the Venados Islands. Three specimens were taken, the largest twelve inches in length.

This species seems to agree fully with *Microspathodon dorsalis*, except in coloration, in the greater elongation of the lobes of the fins and in the greater depth of the preorbital and other bones of the head. All these latter may prove to be differences of age. The change in the coloration can hardly be of this nature. Another species of this type, *Microspathodon cinereus* Gilbert, has been described from Socorro Island. This is very close to *dorsalis* and *azurissimus*, but is of an ashy gray color and has a greater number of accessory scales on the large scales of its body. Pending investigation, we admit all four of these color forms—*bairdii*, *dorsalis*, *cinereus* and *azurissimus*—as distinct species, which they probably are, although the differences between *cinereus* and *azurissimus* may be derived from the character of the bottom, *cinereus* having been obtained from a bottom of volcanic ashes.

Head 3; depth 2; D. XII, 16; A. II, 13; eye 5 in head; snout nearly 2; pectoral $1\frac{1}{2}$; highest dorsal spine 3 in body; ventral $2\frac{1}{2}$ in length; anal lobe $2\frac{1}{6}$; dorsal lobe $1\frac{3}{4}$ in body.

Body compressed and deep; dorsal outline from snout to caudal peduncle uniform; breast prominent and well rounded, behind which the ventral outline is straight to anal spine, then slanting obliquely upward to caudal peduncle. Mouth wide with thick lips; the teeth flat, sharp and movable, in a single row in each jaw, those in the upper jaw are arranged in a crescent, in the lower jaw they are in a straight line in front, but at the sides they describe nearly a right angle and run back; isthmus with a notch made by the prominence of the breast. Tip of snout, maxillary and lower jaw naked; head everywhere else with scales, the scales on cheeks in about 5 rows; scales on body large, 3-28-9; all the fins with scales. Accessory scales very few.

Lateral line running high and ending under last ray of soft dorsal; gill-rakers numerous, short and weak, about $5+21$. Pectoral short and rounded at the tip; ventrals with the middle rays produced, $2\frac{1}{2}$ times ventral spine, reaching past vent to anal; spinous dorsal low; with the exception of the first the spines are about equal; soft dorsal and anal falcate and filamentous, the dorsal lobe slightly the longer, not quite reaching to tip of caudal fin; caudal widely forked, the lobes falcate, the upper lobe the longer; the middle rays are contained $3\frac{1}{2}$ times in the upper caudal lobe.

Specimens described twelve inches in length (Nos. 1610, 1636 and 2895, L. S. Jr. Univ. Mus.).

In life, deep indigo blue, with traces of olivaceous cross-shades. Pectoral, dorsal and caudal edged with bluish white. Eyes violet.

The species feeds on plants.

Family LABRIDÆ.

178. *Harpe diplotænia* Gill.

A single young female specimen was obtained by us at Mazatlan. This species is rare in collections, but is apparently not uncommon around the rocky islands. It has been recorded from Cape San Lucas by Xantus, and numerous specimens from the Revillagigedos have been taken by Dr. Gilbert. The form called *Harpe pectoralis* Gill is the male of the same species of which *Harpe diplotænia* Gill is the female.

179. *Pseudojulis notospilus* Günther.

This small species is common in rock pools about Mazatlan, where numerous examples, the largest about six inches long, were obtained by us. It was found in these pools by Gilbert, and has been recorded from Panama by Günther.

Coloration of adult blue green; bar across base of pectoral very bright; no dark spot behind eye; corners and tip of caudal pale, as in young. Each scale of posterior part of body with a small sky blue spot at tip; edges of scales bluish, the base olivaceous. Axil blue, golden behind. Breast and throat pale salmon color, with bluish streaks and shades; cheeks yellowish, snout blue. Young with blue spots more distinct, especially one behind eye. Adult with four dark shades on back extending on dorsal, the largest at front of soft dorsal; blackish spot diffuse, not ocellated. Caudal with faint bluish cross-streaks on faint bronze ground color, the angles broadly whitish; anal bronze with three bluish streaks, the tip pale. Ventrals dusky edged.

Young colored like adult but brighter, a paler olive streak from mouth across opercle above pectoral to base of caudal, this obsolete in adult. Dorsal unlike that of

adult. First dorsal bronze with bluish cross-streaks, the large black blotch ocellated with blue and with a patch of bright yellow before and behind it. Interspaces between this and the two other, smaller black spots also bright light yellow.

180. *Halichæres dispilus* (Günther). Plate xlv.

This beautiful little fish was found to be rather abundant in the branches of the Astillero which cross Isla de las Piedras south of Mazatlan. Unlike most species of the group, it lives on the muddy bottoms, and is abundant about the roots of the mangrove, which border the muddy branches of the Astillero. It reaches a length of about six inches. A few specimens were also obtained in tide pools with sandy bottom.

Head $3\frac{1}{3}$; depth 4; dorsal IX, 11; anal III, 12: eye 6 in head: snout $3\frac{1}{3}$; maxillary $4\frac{1}{4}$; pectoral $1\frac{2}{3}$; anal 3; caudal fin 2.

Body slender and compressed; dorsal and ventral outlines similar; head pointed, the profile slightly convex; mouth small, the jaws equal; teeth in a single row: canines $\frac{2}{4}$ in front of jaws: at the posterior end of the premaxillary is a single strong, sharp tooth, pointing forward, and entirely below the angle of mouth. Lateral line high, following the curve of the back to the eighth dorsal ray, where it curves sharply down through two rows of scales, and then runs straight through middle of caudal peduncle to tail; pores of lateral line simple; scales large 2-27-10; head entirely naked; gill-rakers very small and pointed 6+7. Dorsal spines slender but pungent: caudal slightly rounded, the upper angle slightly acute; ventrals short not filamentous: scales before dorsal in about six rows, not covering middle line.

Length of specimen described, five inches. Number 2904, L. S. Jr. Univ. Mus.

In life olive green, a bright blue streak, narrow and somewhat interrupted, from eye to base of caudal; a broader dark bronze streak just below it, containing a series of small dark spots, mostly arranged in threes, the last one darkest, at base of caudal, just above middle line, these obsolete in adult; below the bronze band, a faint blue streak, then a broad brown one, then a short one, bright sky blue bounding the belly, ending over the middle of anal; belly and throat pearl white. Head cherry red and bronze anteriorly, becoming olive in all specimens behind, mottled with blue: a dark blue edged spot behind eye: a large black spot smaller than eye below fifth dorsal spine, the spot crescent shaped, bordered with yellow behind, mostly on one scale. Iris red. A golden crescent at base of pectoral. Dorsal bright orange, bluish below. Caudal cherry red. Anal bright orange. No spots on fins. Larger specimens deeper in color, the head cherry red, a dark spot bordered with blue behind eye. Pectoral not black. In alcoholic specimens pearly streaks appear on sides of head and behind pectoral.

Found by Dr. Gilbert at Mazatlan. Specimens have also been obtained at Panama by Günther, and at Acapulco by Steindachner.

Our specimens differ somewhat in color from those described by Dr. Günther, especially in the hue of the head and caudal and in the presence of a black spot behind eye. They are, however, probably not specifically distinct.

181. *Thalassoma lucasanum* (Gill).

Obtained by Dr. Gilbert at Mazatlan; not seen by us. Also recorded by Mr. Forrer from Tres Marias, the original types taken by Xantus at Cape San Lucas.

Family SCARIDÆ.

182. *Scarus perrico* Jordan & Gilbert. PERRICO.

This large parrot-fish is rather common about the rocky islands near Mazatlan. A single specimen was obtained by us. The original type was found by Dr. Gilbert at the same locality. The fins of another specimen were found on the beach at La Paz by Mr. James A. Richardson.

Body olive brown. The markings, fins, teeth and spots on head all bright blue green.

Family EPHIPPIDÆ.

183. *Chætodipterus zonatus* (Girard).

Occasionally seen at Mazatlan, several specimens being taken by us in the Astillero. It was found by Dr. Gilbert at Mazatlan and Panama. The original type of the species came from San Diego, where no author subsequent to Girard has seen it. It is probably generally diffused along the coast, although less abundant than the corresponding species (*Chætodipterus faber* L.) is in the Atlantic.

Chætodipterus zonatus agrees with *Chætodipterus faber* in nearly all respects. The chief differences are that behind the great band from soft dorsal to anal in *Ch. zonatus* there are two other bands; one under middle of soft dorsal, the other at base of caudal, both distinct complete rings; no other bands. The third dorsal spine is not very high, being only about half length of head, and about twice height of the fourth. Dorsal VIII-1, 18; anal II, 16; scales 70. Long rays of soft dorsal and anal $\frac{1}{4}$ longer than head.

Family CHÆTODONTIDÆ.

184. *Chætodon humeralis* Günther. MUÑECA.

Exceedingly common in the Astillero, especially on rock bottom. It reaches a length of about six inches, and is seldom used as food, although its striking color, which has suggested the name of *Muñeca* or doll, makes it an object of attention.

185. *Pomacanthus zonipectus* (Gill). MOJARRA DE LAS PIEDRAS. (*Pomacanthus crescentalis* Jordan & Gilbert.)

Not uncommon in rocky places about Mazatlan. Two specimens were obtained by us with dynamite about the wreck of a French man-of-war in the Astillero. Smaller specimens, very different in color from the adult, and hence taken by us to be a distinct species (*Pomacanthus crescentalis*), were obtained by Dr. Gilbert at Mazatlan and Panama. The original type of the species was taken at San Salvador by Capt. Dow.

Description of the adult of *Pomacanthus zonipectus*:

Head $3\frac{2}{3}$; depth $1\frac{1}{4}$; D. XI, 23; A. III, 20. Preopercular spine longer than eye, $3\frac{1}{3}$ in head. Last dorsal spine $1\frac{1}{2}$ in head. Longest dorsal ray $\frac{1}{3}$ longer than head, falcate. Anal rounded. Caudal short, truncate, $1\frac{1}{4}$ in head. Pectoral moderate. Ventral very long, $\frac{1}{4}$ longer than head. Preorbital equals maxillary, $1\frac{1}{3}$ in head. Eye $3\frac{1}{2}$ in head. Interopercle with one stoutish spine. Preopercle very finely serrate. A large hump at nape in adult.

Dark gray, blackish posteriorly, most scales with black centers; edges of scales, bright sky blue in life, especially posteriorly: a triangular bronze yellow patch in front of line connecting pectorals with ventrals, then a diffuse blackish bar from front of dorsal along region behind pectorals to ventrals, then a broad curved bar of

yellow, obscured by blackish centers of scales; behind this a diffuse blackish area; breast vermiculated with blue and yellowish; a blackish bar covering most of head, behind which the opercles and nape are yellowish; jaws pale bluish; dorsal orange, vermiculate with sky blue, the edge bright sky blue, below which is orange; caudal orange, vermiculated with sky blue, the edge orange, the very margin blackish. Anal blackish, vermiculated with sky blue; pectorals light orange, marked with grayish blue. Ventrals largely blue-black, tipped with orange, the spine bluish.

Family TEUTHIDIDÆ.

186. *Teuthis crestonis* Jordan & Starks n. sp. BARBERO NEGRO. Plate xlvii.

Common in the Astillero and in rocky places about the islands. Also obtained by Dr. Gilbert in 1881 at Mazatlan and Panama. These specimens having been destroyed by fire, have never been described, and were provisionally and incorrectly referred to the West Indian species *Teuthis tractus (bahianus)*, from which this species differs in a few respects.

Head $3\frac{1}{3}$; depth $1\frac{5}{6}$; D. IX, 26; A. III, 24; snout $1\frac{2}{3}$ in head; eye $3\frac{1}{3}$; pectoral equal to head; caudal $\frac{1}{3}$ longer than head; longest dorsal spine equal longest soft ray, $1\frac{1}{2}$ in head; ventral $1\frac{1}{5}$ in head. *

Body deep and compressed, the anterior profile steep, convex before eye; caudal lunate, the upper ray $\frac{1}{3}$ longer than middle one, ventrals very long.

Body slaty brown, mottled with gray but without bands; dorsal with a bluish gray band at base, then a bronze one, forking on soft dorsal inclosing a bluish gray band: five gray bands and four bronze ones on dorsal more or less distinct, especially in young; anal with five bluish gray

and five bronze bands more oblique than those on dorsal and hence not continuous the whole length of fin; caudal peduncle black, a whitish yellow cross-band behind spine, faint in adult, the anterior margin vertical, the posterior concave: rest of caudal black. Pectoral yellowish; ventrals dusky, the spine black.

Adult with the pectoral quite yellow; pale band at base of caudal growing faint with age; a blue streak along base of dorsal.

Numerous specimens, the largest about six inches in length, numbered 2899, in the L. S. Jr. Univ. Mus.

187. *Xesurus punctatus* (Gill). COCHINITO. Plate xlv.

Young specimens very abundant in rock pools about Mazatlan, hitherto known only from Cape San Lucas. It was not found by Dr. Gilbert at Mazatlan. Most of our specimens were secured by the use of the fish poison called gervo. By pouring this liquid into the rock pools at low tide this and several other species were obtained in numbers. This gervo or gerbo is the milky juice of a tree called *hava*, abundant in the forests about Mazatlan, and apparently allied to the *Strychnos nux-vomica*. In rock pools no specimens exceeding two inches in length were found. Several very large specimens were obtained with dynamite about the islands of Creston and Isla Blanca, where the species reaches a length of 16½ inches.

Description of adult:

Head 4; depth 2; dorsal VII, 26; anal II, 23; snout 1½ in head; eye 5½; pectoral long as head; ventral 1½; caudal 1¼; second dorsal spine 2.

Body deep, compressed, covered with fine velvet. Caudal with three stout compressed blunt spines, with broad bases, the tips turned upward. Some specimens with no other spines; others with many spines, similar in form

but much smaller, scattered over posterior half of body; most numerous about the other spines. Gill-rakers extremely small and weak. Caudal evenly lunate. Pectoral not falcate; anterior profile concave before eye then convex, the short conic snout projecting; lower jaw included. Preopercle obliquely placed, its bony edge slightly roughened.

Color in life olive green, slightly paler below, everywhere evenly covered with small round black spots, close-set and not confluent, the largest about equal to nostril. Caudal peduncle and fin abruptly bright yellow, unspotted. Other fins colored like the body and similarly spotted, the spots more sparse, the edges dusky with few spots. Large caudal spines whitish, their bases black; other spines all black.

Among the young two different styles of coloration were noticed, but all probably belong to the same species:

1. Specimens with the caudal yellow are more dusky, the dark spots much smaller and more distinct than in the others. Ground color of back light steel blue gray, lighter below head. Caudal canary yellow, clouded with dark at base, the yellow running forward on caudal peduncle.

2. Specimens with the caudal white have ground color lighter, more milky in general, much more silvery below eye, the silvery forming an irregular triangular patch on breast and opercle; caudal gray and white, black at base, white running forward slightly on caudal peduncle; dark spots on body forming pale reticulations, above lateral line white patches. Body deeper than in yellow-tailed specimens.

Both have the first dorsal and anal black at base, otherwise mostly white; white line bounding the back; dark

bar from nape to eye: snout dusky: breast and opercles silvery.

This species is the type of the genus *Aesurus* Jordan & Evermann (MS.), distinguished from *Prionurus* by the armature of the caudal peduncle, as above described.

Family BALISTIDÆ.

188. *Balistes polylepis* Steindachner. PEZ PUERCO.

Generally common in rocky places on the coast from Magdalena Bay to Panama. Many specimens were obtained by us, the largest of them sixteen inches in length. It was found at Mazatlan also by Gilbert and by Steindachner.

189. *Balistes naufragium* Jordan & Starks n. sp. PEZ PUERCO DE PIEDRA.

Four specimens obtained with dynamite, about the wreck of a French man-of-war in the Astillero at Mazatlan, in company with *Pomacanthus zonipectus*. The largest of these was fourteen inches in length.

Allied to *Balistes carolinensis*.

Head 3; depth $1\frac{1}{3}$; D. III-27; A. 24; scales 50; 12 rows on cheek; snout $1\frac{1}{4}$ in head: eye 5; 1st D. spine $1\frac{3}{5}$; longest ray $1\frac{1}{5}$; longest anal ray $1\frac{2}{3}$; upper caudal lobe $1\frac{1}{3}$; pectoral $2\frac{1}{4}$.

Body very plump, not strongly compressed; no streaks on cheeks; no spinules on caudal peduncle; a few larger scutes behind gill-openings; groove before eye, slight not naked. Lateral line traceable for most of its length. First dorsal spine very stout, the third remote, moderate. Dorsal moderately elevated and falcate. Anal rounded. Caudal double concave, the pointed outer rays longer than the rounded inner ones.

Dark dull olive green, nearly plain, edges of scales

largely pale blue, especially toward the tail; faint traces of numerous dark cross-bands. Fins dusky olive, the pectoral and first dorsal paler, base of pectoral dusky.

Type No. 1656 L. S. Jr. Univ. Mus.

190. *Pachynathus capistratus* (Shaw). COCHE.

Common in rocky places about the islands of the Venados, Creston and Isla Blanca; many specimens obtained. This species was found by Gilbert at Mazatlan, and by Steindachner at Cape San Lucas. We have thus far been unable to find any distinction between the American form and the common East Indian species, to which the name *capistratus* was first given. Two markedly different types of coloration were obtained, supposed by us to be of the two sexes, since no other difference except that of coloration is noticeable. In all specimens obtained, however, the sexual organs were so immature that the sexes could not be distinguished thereby.

Specimens supposed to be female dull olive with darker clouds; no yellow on posterior parts which are scarcely paler behind; fins all plain olive blackish; streak behind mouth light bluish, very faint, soon fading after death: lower lip blue, then golden, then a blue ring, then yellow, then bluish; upper lip livid, bluish above.

Others supposed to be male are in life dark olive clouded with darker; posterior part of body deep yellow, below median line; fins blackish; first dorsal bright olive yellow on membranes; green on caudal membranes, the rays black. Anal reddish. Streak behind mouth bright red in one specimen, whitish in another. Upper lip livid blue then orange, then golden, then livid blue or purplish, then orange, then crimson, then dark.

Still other specimens were marked with whitish shades instead of red.

Family TETRAODONTIDÆ.

191. *Spheroides annulatus* (Jenyns) var. *politus* Girard.
TAMBOR.

Very common everywhere in the Astillero. Specimens entirely smooth, and those variously prickly, were obtained; prickly ones, both young and old, were found, but no very young which were smooth. There seems to be no specific difference recognizable among these. All of them, however, differ from specimens taken farther south in the larger size of the dark spots and in a somewhat greater tendency to smoothness of the body. All of these, smooth or rough, seem to belong to the form called *politus*, which is probably the northern form or representative of *Spheroides annulatus*.

192. *Spheroides lobatus* (Steindachner). BOTETE.

Rather common in the estuary with the preceding, reaching a smaller size, the largest seen not over six inches in length. The species was first described by Steindachner from Altata, but until its recent discovery in the Albatross collections it was confounded with *Spheroides angusticeps* (Jenyns), from which it is probably distinct, although the latter, entirely smooth and uniform dusky in color, may prove to be the adult form. In both species the two small black flaps on the shoulder are present, and in both the interorbital space is very narrow and concave. Specimens taken at La Paz by Mr. James A. Richardson are intermediate in color, but retain the prickles.

In life grass green, with maroon colored spots and markings.

Family DIODONTIDÆ.

193. *Diodon hystrix* Linnæus. PUERCO ESPINO.

Very common about rocky places, especially among the islands, where it was also found by Dr. Gilbert. All specimens taken belong to the typical *Diodon hystrix*. *Diodon holocanthus*, if different, is unrepresented in our Mazatlan collections.

Family MOLIDÆ.

194. *Mola mola* (Linnæus). . PEZ MOLA.

Found in the open sea from San Francisco to Mazatlan. It was seen at the latter locality by Dr. Gilbert, but not by us.

Family SCORPÆNIDÆ.

195. *Scorpæna mystes* Jordan & Starks, n. sp. LAPON.
Plate lii.

Common in the Astillero, on the bottom. Very tenacious of life, and much dreaded by the fishermen from the poisonous sting of its dorsal spines.

Allied to *Scorpæna plumieri* Bloch, which species it represents on the Pacific Coast.

Head $2\frac{1}{3}$; depth $3\frac{1}{3}$; dorsal XII, 10; anal III, 5; scales about 30; orbit $6\frac{1}{2}$ in head; maxillary 2; pectoral 2; highest dorsal spine $3\frac{1}{2}$; second anal spine 3; caudal 2.

Body robust, not much compressed; interorbital space wide, not deeply concave, $\frac{1}{2}$ wider than orbit; a pit between preorbital and eye, and a broad depression behind coronal spines; membranous flaps on preorbital, edge of preopercle, over nostrils and above eyes; præocular, supraocular, tympanic, coronal, occipital, nuchal and exoccipital spines present. Maxillary reaching to behind eye; lower jaw included; gill-rakers short and thick, about

3+6; head naked, with the exception of a few imbedded scales on preopercle and posterior part of opercle; scales on body large, many of them with membranous flaps.

Olive-brown almost black, marbled with light drab; opercular flap with pale edge; the fins much spotted and marbled, all except spinous dorsal, with white margin, more distinct in the young; caudal fin showing three indistinct cross-bars; axil jet black, with white spots.

Largest specimen fourteen inches long.

This species differs from *Scorpaena plumieri* in having a wider and flatter interorbital area; the lower jaw wider and more rounded in front; the knob at symphysis not so sharp and projecting; the pit behind coronal spines broader and not so deep, and the color darker.

This species was also obtained at Mazatlan by Dr. Gilbert, who identified it provisionally as *Scorpaena plumieri*.

Types numbered 1501, 1616, 1617, 2919 on the L. S. Jr. Univ. Mus. register.

196. *Scorpaena sonora* (Jenkins & Evermann).

This small species is not uncommon in the Astillero, where numerous specimens, none of them over three inches in length, were obtained. It has hitherto been recorded only by Jenkins & Evermann from Guaymas.

Gray above, the flaps pinkish, the bars blackish; lower parts pink, bright on ventrals and anal; axil orange. mottled with dusky; ventrals and pectorals black at tip, edged with pale. Middle rays of pectoral slightly divided at tip, not all of them being strictly simple.

Family TRIGLIDÆ.

197. *Prionotus horrens* Richardson.

Two small specimens, each about two inches long, obtained in the Astillero.

Family GOBIIDÆ.

198. *Philypnus lateralis* Gill. ABOMA DE MAR.

Common in the Rio Presidio and occasionally taken in the Astillero, especially where the fresh water soaks into it. The species is common in fresh waters along the coast, but has not hitherto been noticed at Mazatlan.

199. *Dormitator maculatus* (Bloch). PUÑECA.

Rather common in the Rio Presidio and also in the brackish waters about the estuary. The young occur in considerable abundance in the mud puddles left by the winter rains or by the high tides. It reaches in the river a considerable size, and is a food fish of some importance, said to be the most valuable in the Rio Presidio. It is generally common along the coast, as well as everywhere along the Atlantic side.

200. *Eleotris æquidens* Jordan & Gilbert. GUAVINA.

Rather scarce in the Rio Presidio, where only one young specimen was obtained by us. A few others were found in brackish waters or muddy places about the estuary.

Blackish everywhere, sides with faint whitish streaks, along rows of scales; a broad blackish lateral band occupying whole of side; back and belly paler; traces of faint dark cross-bands; caudal black, with a pale margin and some dark cross-shades; pectorals, dorsals and ventrals more or less barred with black; a whitish bar at base of caudal with a darker one before it. Scales 68; preopercular spine well developed.

201. *Cotylopus gymnogaster* (Ogilvie-Grant).

Recorded from streams about Mazatlan; not seen by us.

202. *Awaous tajasica* (Lichtenstein). ABOMA DE RIO.

Found in company with *Philypnus lateralis*, from which most fishermen scarcely distinguish it. It is rather less abundant in the river, and was not noticed by us in the Astillero. Elsewhere on the coast it has been recorded only from the river at San José del Cabo in Lower California, where it was found by Mr. Lyman Belding and more recently by Dr. Gustav Eisen.

Comparison with specimens from Havana shows no differences.

203. *Gobius soporator* Cuvier & Valenciennes. CAIMAN.

Found in abundance in all rock pools, ascending farther above the low-tide mark than any other marine species. It does not occur in fresh water. There seems to be no difference between these specimens and those from the Gulf of Mexico, where it is found everywhere in water not exceeding two feet in depth.

204. *Gobius sagittula* (Günther).

A few small specimens, not over four inches in length, found in the Astillero on muddy bottoms. It was also taken by Dr. Gilbert at La Paz, Mazatlan and at Panama. *Gobius longicauda*, described by Jenkins & Evermann from Guaymas, is no doubt the adult of the same species, as Dr. Gilbert has already indicated.

Head $4\frac{1}{3}$; depth $6\frac{1}{4}$; caudal $\frac{2}{3}$ longer than head; eye $3\frac{1}{2}$ in head; maxillary $2\frac{2}{3}$; snout $3\frac{1}{2}$; scales about 52, the first 37 very small; dorsal VI-13; anal 14; skull with a median lengthwise ridge; interorbital space narrow, channelled; skull somewhat broader behind; scales before dorsal minute; head naked; scales ctenoid, much reduced anteriorly; lower jaw short, included; no flaps on shoulder girdle; maxillary reaching to pupil; dorsal spines

slender, some filamentous; caudal lanceolate; teeth sharp, rather small, the outer larger; lower jaw thin and flat, its acutish tip elevated.

Olive, speckled and marbled; side with five oblong black spots, the smallest at base of caudal; a black blotch on opercle; dark cross-bars under soft dorsal; head much mottled; dorsal speckled; caudal with ten zigzag cross-bars of dark specks; pectoral faintly barred; anal and ventral plain; a dark curved streak about yellowish base of pectoral; lower lip dusky; a blackish cross-blotch above gill opening.

In the adult, called *Gobius longicauda*, the caudal is much longer, but there is no other difference of importance.

205. *Gobius manglicola* Jordan & Starks n. sp.

One specimen found in the mud of the Astillero among the roots of mangrove bushes (*Rhizophora mangle*).

Head $4\frac{1}{4}$; depth $5\frac{2}{3}$; D. VI-12; A. 12; scales about 35, not to be exactly counted; caudal lanceolate, $2\frac{2}{3}$ in body; pectoral about equal to head; dorsal spine slender, not filamentous, $1\frac{2}{3}$ in head; eyes large, close together, the range partly vertical, the narrow interorbital deeply furrowed; no flaps on shoulder girdle; scales moderate, ctenoid anteriorly, becoming smooth behind; median keel on head slight; head naked.

Body long, compressed, the head depressed, the cheeks tumid; snout bluntly truncate; mouth large, the maxillary reaching the middle of eye, not produced backward, truncated behind, somewhat oblique, the lower jaw a little the longer; lower jaw flat; teeth strong, the outer in both jaws enlarged; cranium without median crest, abruptly widened behind eyes.

Color light olive mottled with darker; six oblong blotches of blackish on sides as in *Gobius boleosoma*, the

last at base of caudal; dorsals and caudal finely checkered and barred with dark brownish orange and blackish; anal mottled; a dark shoulder spot; a dark bar before eye and one below eye; ventrals dusky, the edge pale.

The species seems nearest allied to *Gobius sagittula*.

One specimen, $1\frac{1}{2}$ inches long, numbered 3095 on the L. S. Jr. Univ. Mus. register.

206. *Garmannia paradoxa* (Günther). Plate xlix.

A single specimen found on muddy bottom among the mangroves lining the estuary.

Head $3\frac{1}{2}$; depth $4\frac{1}{3}$; D. VI-11; A. 9; eye 4 in head; snout $4\frac{1}{4}$; pectoral $1\frac{1}{6}$ in head; dorsal spine $1\frac{1}{5}$.

Form of *Gobiosoma bosci*. Body compressed; head broad and depressed, with tumid cheeks; snout not very blunt, short, oblique-truncate; eyes rather large, high, the maxillary not produced, extending to their posterior margin; mouth large, oblique; lower jaw heavy, slightly projecting; teeth strong; gill-openings narrow, not wider than base of pectoral. First dorsal rather high, the first spine filamentous, reaching past soft dorsal; other fins low. Head and anterior half of body to front of soft dorsal naked; scattering scales coming in above. twelve rows of imbricated slightly ctenoid scales along median line of caudal peduncle and forward to middle of soft dorsal, the scaled area about as long as head, the upper parts better scaled than lower. No flaps on shoulder girdle.

Olivaceous with seven or eight dark cross-shades—two on head, one across gill-openings, one behind pectoral, and a broad one below soft dorsal; dorsals dusky, the filamentous ray pink; lower half of soft dorsal yellowish, upper dusky; lower fins black; caudal dusky; a dark speck at angle of opercle; skin everywhere punctate with black; a pale olive bar at base of caudal.

Skull without median crest. Interorbital space not concave. Head not very abruptly widened behind eyes.

One specimen $1\frac{1}{2}$ inches long obtained. This specimen differs but slightly from Günther's account of *Gobius paradoxus*, a species which is the type of the genus *Garmannia* of Jordan & Evermann (MS.), distinguished from *Gobius* by the half-naked body. The genus is named for Mr. Samuel Garman, the accomplished ichthyologist of the Museum of Comparative Zoology at Cambridge, Massachusetts, in recognition of his important contributions to ichthyology.

207. *Aboma etheostoma* Jordan & Starks, n. gen. and n. sp. Plate 1.

A single small specimen found in the mud on a shallow bottom in the Astillero.

ABOMA, new genus, allied to *Microgobius* Poey, distinguished by the large, ctenoid scales, which cover the body; head naked, rather long, pointed in profile, the mouth moderate, not very oblique: teeth rather strong. Dorsal spines more than six, none of them filamentous: soft dorsal and anal short; no flaps on shoulder girdle. Cranium with a slight median crest. The name *Aboma* is used by the Mexicans in Sinaloa as synonymous with goby. Besides the new species, *Aboma etheostoma*, which is the type of this genus, probably *Gobius chiquita* Jenkins & Evermann, and *Gobius lucretiæ* Eigenmann & Eigenmann, will be referable to it.

Head $3\frac{1}{3}$; depth 5; D. VIII-11; A. 10; scales 26: longest dorsal spine $1\frac{3}{4}$ in head; eye 3; snout 4; maxillary 3.

Body long and low, moderately depressed and pointed forward. Scales large, ctenoid behind, none on head, those on nape and belly much reduced. Mouth moderate, terminal, moderately oblique; the maxillary reaching

middle of pupil, jaws subequal or the lower a little the longer; teeth rather strong. No flaps on shoulder girdle. Cranium with a slight median crest. Interorbital ridge not hollowed out; skull not abruptly widened behind.

Color olivaceous, side with a very broad jet black lateral band, three times interrupted by silvery. Caudal white with four < shaped bands, growing progressively fainter behind. Pectoral mottled gray, with a jet black oblique crescent towards its base, surrounding a large yellow spot, side of head with four round gray spots separated by black, the largest below eye, with a black streak before it. First dorsal jet black; second mottled; the produced spine with yellowish. Ventrals and anal pale.

One specimen, $1\frac{1}{8}$ inches long, in the Museum of the Leland Stanford Jr. University.

208. *Evermannia zosterura* (Jordan & Gilbert). Plate li.

Very common on sandy bottoms everywhere about the estuary, numerous specimens being dug out of the sand by Mr. Williams. It is seldom found much if any below the mark of low tide. It is a very handsomely colored species, the male being more strikingly marked than any other of our Gobies. The species has hitherto been known only from a single specimen taken by Dr. Gilbert at Mazatlan.

Head $3\frac{1}{4}$; depth 6; dorsal IV-15; anal 14; eye equals snout, 5 in head; pectoral $1\frac{2}{3}$; caudal $1\frac{1}{3}$.

Body compressed, profile convex: snout short, not very blunt; eyes high, the maxillary reaching to their posterior margin; mouth oblique, jaws equal. First spine of dorsal filamentous, reaching to middle of soft dorsal (male). Body entirely naked.

Body everywhere speckled with dots of dark-brown.

Male sometimes with traces of eight olive cross-bands. Fins very ornate, the dorsal and anal yellowish at base, then a broad median band of jet black, then a broad white margin. Middle of caudal yellow to the tip, with a black band above and below, and a white edge above and below this as in dorsal and anal; no bands on tail.

Female with dorsal filament short, reaching about to first soft ray. Dorsals and anal checkered with blackish; caudal faintly barred; all vertical fins with pale edgings, but without the black stripe of the males.

Family GOBIESOCIDÆ.

209. *Gobiesox adustus* Jordan & Gilbert.

Obtained by Dr. Gilbert in rock pools at Mazatlan. Rare and not found by us.

210. *Gobiesox erythropros* Jordan & Gilbert.

Found rare in rock pools at Mazatlan by Dr. Gilbert, who also records a specimen from Tres Marias. Not seen by us.

211. *Gobiesox zebra* Jordan & Gilbert.

Very abundant in rocky places at Mazatlan, especially among sea urchins. Numerous specimens were obtained by us, as also by Dr. Gilbert.

The coloration is quite variable, although the markings are rather constant. In general, light pink with markings of gray, blackish and olive; a distinct dusky blotch behind eye and a dark bar across caudal.

212. *Gobiesox eos* Jordan & Gilbert.

Found in rock pools at Mazatlan by Dr. Gilbert. Not recorded from any other locality.

Two specimens obtained by us from rock pools among echini. The bright cherry red coloration is distinctive and persists in alcohol.

Family OPISTOGNATHIDÆ.

213. *Opistognathus punctata* Peters,

The original type of this species was described by Dr. Peters from Mazatlan. It was also found by Dr. Gilbert at Panama, the two specimens mentioned being as yet the only ones known.

Family BLENNIIDÆ.

214. *Isesthes brevipinnis* (Günther).

This species was found to be rather common in rock pools at Mazatlan both by Dr. Gilbert and by us.

215. *Rupiscartes atlanticus* (Cuvier & Valenciennes.)

This species is very common in rock pools about Mazatlan, where it reaches a length of about six inches. It was found in numbers by Dr. Gilbert at Mazatlan, but has not been recorded from localities farther south. Mr. Charles H. Townsend found it at San Cristobal Bay, and Mr. John Xantus at Cape San Lucas. Thus far no difference has been found between these specimens and those from the West Indies.

Body liver brown, paler below. Fins mostly blackish; an orange area on upper edge of caudal; a yellow one tinged reddish below. Eye red posteriorly.

216. *Rupiscartes chiostictus* (Jordan & Gilbert).

Only the original types of this species found by Dr. Gilbert in the tide pools at Mazatlan have been recorded. It was not seen by us.

Family CLINIDÆ.

217. *Labrosomus xanti* Gill.

Very common at Mazatlan in rock pools with *Rupiscartes atlanticus* (Cuvier & Valenciennes), and reaching

about the same size. It was also found by Richardson at La Paz and by Gilbert at Mazatlan. It has been recorded from Cape San Lucas by Xantus and from San Cristobal Bay by Townsend. The Pacific form called *Labrosomus xanti* seems to be scarcely if at all distinguished from the West Indian form, *nuchipinnis*, cognate to it. The only difference we have found is in the dentition of the vomer, and this may not be constant.

218. *Labrosomus delalandi* (Cuvier & Valenciennes).

Extremely common in rock pools at Mazatlan, where it was also found by Dr. Gilbert. It has not been noticed from any other locality on the Pacific Coast. Thus far we have not been able to distinguish it from *Labrosomus delalandi* of the coast of Brazil.

219. *Enneanectes carminalis* (Jordan & Gilbert) n. gen.
Plate liii.

Four specimens, types of the species, were found by Dr. Gilbert in a rock pool at Mazatlan. A single small example was obtained by us.

The short chubby body, large rough-ctenoid scales, little rounded profile, and short fins distinguish this species sufficiently from *Tripterygion* Risso, and characterize the new genus *Enneanectes*, framed for it by Jordan & Evermann.

220. *Auchenopterus monophthalmus* Günther.

Several specimens taken in rock pools at Mazatlan. At low tide it is often left by the recession of the water, in which case it creeps about in the Corallina.

In this species the first dorsal is higher and better separated from the rest of the fin than in the California species, *Auchenopterus integripinnis*, and there are some constant differences in coloration.

Family FIERASFERIDÆ.

221. *Fierasfer arenicola* Jordan & Gilbert.

A single specimen found in the sand at Mazatlan by Dr. Gilbert. At first described as a new species, *Fierasfer arenicola* Jordan & Gilbert, and subsequently identified with the species which occurs in more or less abundance in the shells of the pearl oyster. It was not found by the Hopkins Expedition. According to Prof. Putnam, the West Coast species, *Fierasfer arenicola*, is not distinct from *Fierasfer dubius* Putnam, of the Florida Keys. We may, however, retain the former as distinct until comparison of specimens can be made.

Family BROTULIDÆ.

222. *Dinematicthys ventralis* Gill. Plate liv.

Found abundant in rock pools at Mazatlan, where specimens were taken reaching a length of about four inches. This fish has hitherto been recorded as extremely rare, and very few were obtained by Dr. Gilbert. This is one of the species that were brought from their hiding places by the introduction of the poisonous juice of the Hava tree into the water. It has been recorded from Cape San Lucas and Mazatlan.

Color in life, everywhere liver brown, the fins edged with whitish or pinkish.

Family PLEURONECTIDÆ.

223. *Syacium ovale* (Günther).

Occasionally taken in the Astillero at Mazatlan, where specimens were found by Dr. Gilbert and by us. It is more abundant at Panama. The broad-headed form called *Syacium latifrons* (Jordan & Gilbert), which has been supposed, perhaps wrongly, to be the male of this species, has been seen only at Panama.

224. *Citharichthys gilberti* Jenkins & Evermann. LENGUADO.

Very common everywhere in the Astillero, and also ascending the Rio Presidio in the fresh waters nearly as far as the village of Presidio. In fresh water the color is considerably brighter than in the sea, and these fresh water specimens correspond to those described by Jordan & Goss as *Citharichthys sumichrasti*. These seem to be, however, of the same species.

225. *Azevia panamensis* (Steindachner).

Common in the Astillero, reaching a length of about eight inches. The following is a count of the fin rays of nine specimens: D. 95, A. 75; D. 89, A. 67; D. 92, A. 71; D. 89, A. 71; D. 94, A. 74; D. 89, A. 71; D. 90, A. 72; D. 92, A. 71; D. 91, A. 72.

These specimens seem to be inseparable from *Azevia panamensis*.

226. *Etropus crossotus* Jordan & Gilbert.

Rather common in the Astillero with the preceding species, but reaching a smaller size, rarely exceeding four inches. On careful comparison of our specimens with others from Beaufort, Pensacola, Panama, and other localities, we are unable to find any differences. The color varies with the bottom, some being plain light brown, others are much mottled with lighter or with darker.

227. *Hippoglossina macrops* Steindachner.

This species was described by Steindachner from a specimen obtained at Mazatlan. We have not seen it.

228. *Paralichthys adpersus* (Steindachner).

Very common in the bay and Astillero at Mazatlan, and in fact everywhere on the coast from Guaymas and

La Paz to Panama and Callao. It reaches a length of about three feet, and is a food fish of some importance, most specimens, however, being much smaller.

Head $3\frac{1}{2}$; depth about 2 in length of body; D. 73 (70 to 76); A. 57 (53 to 60); P. 12; V. 6; scales on lateral line about $106+8$ with 35 dorsally and 36 ventrally.

Flesh firm. Body oblong, moderately compressed; mouth large, oblique, the mandible very heavy, slightly projecting; 4 canine teeth on each side of lower jaw in adult specimens, 8 in young, the two anterior teeth long; anterior teeth of upper jaw strong, but smaller than those in the lower jaw; the lateral teeth very small and close set. Eye small, shorter than snout, about 7 (6 to 8) in length of head; interorbital area smooth, flattish, $\frac{2}{3}$ width of eye. Scales cycloid, small anteriorly and larger posteriorly. Lateral line strongly arched anteriorly, arch about $3\frac{1}{3}$ in straight part.

Gill-rakers of medium length, broad, retrose-serrate on inner side, longest about $\frac{2}{3}$ length of eye, from $4+13$ to $5+14$ in number, counted in eight specimens; pectoral fin about as long as mandible, slightly more than half length of head. Dorsal low, anterior origin opposite anterior margin of eye; caudal barely double concave; caudal peduncle very strong. Anal spine obsolete; ventral fins small, inserted symmetrically. Fins all scaly.

Color—Large specimens are dark brown, with blotches on fins; small specimens are covered with pearly white and very dark brown blotches. The brown blotches are almost circular, larger and with less definite outlines near the center of the body, very dark and distinct on caudal.

Seven specimens were taken by the Hopkins Expedition in the estuary at Mazatlan, where they reach a length of 44 cm. Several specimens were also taken at La Paz.

These specimens seem to be identical with *Paralichthys adspersus*, described from Callao by Steindachner. The original types have on the average more gill-rakers than we find on our Mazatlan specimens, but this character is subject to variation, and no other distinction appears.

In one of Dr. Steindachner's types from Callao (11,417, Mus. Comp. Zool.) we find the gill-rakers longer, 6+17; depth $2\frac{1}{2}$ in length; D. 67; A. 51; scales 120; arch of lateral line barely twice as long as high, nearly 5 in straight part; maxillary $2\frac{1}{6}$ in head.

Mr. Garman has kindly examined for us six other specimens, with the following results:

"*Paralichthys adspersus* from Callao has gill-rakers—

$\frac{7}{17}$ above, as long as the eye;

$\frac{1}{17}$ below.

$\frac{5}{15}$ about $\frac{2}{3}$ as long as the eye.

$\frac{7}{18}$ nearly as long as the eye.

$\frac{3}{14}$ about $\frac{2}{3}$ as long as the eye.

$\frac{5}{15}$ about $\frac{2}{3}$ as long as the eye.

$\frac{6}{17}$ near $\frac{3}{4}$ as long as eye."

—(Garman, in lit., May 3, 1895.)

Family SOLEIDÆ.

229. *Achirus mazatlanus* (Steindachner). LENGUADO DE RIO. (*Solea pilosa* Peters.)

Very abundant in the fresh waters of the Rio Presidio below the village, varying considerably in color, and somewhat in form. One specimen was taken in the brackish waters of the estuary.

230. *Achirus fonsecensis* (Richardson).

Two specimens found in the Rio Presidio with *Achirus mazatlanus*; not seen at Mazatlan.

231. *Symphurus williamsi* Jordan & Culver, n. sp.
Plate lv.

Two specimens, the largest about $1\frac{1}{2}$ inches long, were obtained by Mr. Thomas Marion Williams in tide pools with sandy bottom, in very shallow water, near the estuary at Mazatlan.

Head $4\frac{4}{5}$; depth $3\frac{2}{3}$; D. 93; A. 73; scales 92. Body slenderer than in *Symphurus plagiusa*, which it much resembles, but not so slender as in *Symphurus elongatus*, and the caudal fin not black. Upper eye slightly in advance of lower.

Sand color in life; light gray, everywhere finely mottled with light and dark, with traces of a few very narrow dark-cross bands. Fins all mottled; the caudal and posterior part of dorsal and anal not black, scarcely darker than anterior part.

Type numbered 2943, in the register of L. S. Jr. Univ. Mus.

Family ONCOCEPHALIDÆ.

232. *Oncocephalus elater* (Jordan & Gilbert).

One specimen, the type of the species, presented to Dr. Gilbert by Dr. Bastow, then a resident of Mazatlan. It is found in deep water, and was not seen by us, but numerous specimens have been since dredged by the Albatross in localities further to the south, so that the species is now well known.

SUPPLEMENTARY NOTE ON THE FISHES OF LA PAZ HARBOR.

Mr. James A. Richardson, a member of the Hopkins Expedition, spent two days at La Paz, the chief city of Baja California, where he made a small collection of fishes. The work was done under very unfavorable conditions, as La Paz has no fish market and its fish supply is obtained by the spear and the hook and line. There is but one seine at La Paz, a very old and rotten one, which was rented by Mr. Richardson, as was also a parachute seine and a small dip-net. Considering all the difficulties encountered, the list here given shows that the locality is well worthy of a detailed exploration.

Concerning the harbor of La Paz, Mr. Richardson has the following notes:

“The approach to La Paz estuary is guarded by several large islands, uninhabited, wild and precipitous. The entrance to the estuary is very wide, apparently ten or fifteen miles, the general direction being north and south and the length of the estuary about fifteen miles. The estuary gradually narrows to about one mile at ten miles from the entrance. As the steamer proceeds up the estuary it is noticed that she hugs the left bank closely. I was told that in all that breadth of water there is but a very narrow channel, the balance of the space in the estuary being of a sand formation, the sand bars coming very near the surface of the water so that they can be seen from the deck of the steamer. The steamer in following the channel nearly doubles on itself occasionally, and in the darkness of the night a boat is lowered and a search is made for certain buoys. The left bank is made up alternately of gravel beach and abrupt cliffs all the way to La Paz. The country behind La Paz is hilly and mountainous, of no value, covered with rocks and cactus. The right bank opposite La Paz, as far as

one could see, is one vast stretch of sand and mangrove bushes lying a little above tide water. This is considered to be fine soil for cocoanut trees, but it is uninhabited and uncultivated. The sand beach is very fine; one could ride a bicycle here for fifty miles following the shore line."

1. *Narcine entemedor* Jordan & Starks.

Common. One specimen somewhat decayed found on the beach.

2. *Opisthonema libertate* (Günther).

Two specimens obtained (1¾ in. long).

3. *Stolephorus ischanus* Jordan & Gilbert.

Two small specimens.

4. *Stolephorus curtus* Jordan & Gilbert.

One specimen.

5. *Mugil cephalus* Linnæus.

Very common.

6. *Mugil curema* Cuvier & Valenciennes.

Very common.

7. *Querimana harengus* (Günther).

Very abundant in the lagoons and small estuaries.

8. *Holocentrus suborbitalis* Gill.

Common in rock pools.

9. *Paralabrax maculatofasciatus* (Steindachner).

Common.

10. *Lutianus novemfasciatus* Gill.

Two specimens.

11. *Lutianus argentiventris* (Peters).

One specimen obtained.

12. *Xenistius californiensis* (Steindachner).

Several young specimens obtained.

Silvery, with continuous streaks of bright warm brown along the rows of scales.

13. *Pomadasis macracanthus* (Günther).

Common.

14. *Orthopristis reddingi* Jordan & Richardson, n. sp.

Plate xli.

Allied to *Orthopristis ruber* (Cuv. & Val.)

Head $3\frac{1}{6}$; depth 3; dorsal XII, 15; anal III, 10; scales 8-52-15; 53 pores.

Eye $4\frac{1}{4}$ in head; maxillary $3\frac{1}{4}$; preorbital $4\frac{1}{4}$ in snout; pectoral $1\frac{2}{3}$ in head; longest dorsal spine $2\frac{5}{8}$; longest soft ray $3\frac{2}{3}$; second anal spine $4\frac{2}{3}$; ventral $1\frac{2}{3}$; upper caudal lobe $1\frac{1}{2}$; base of soft dorsal in spinous $1\frac{3}{4}$.

Body oblong, the back not much elevated; the anterior profile straightish, slightly depressed above the eye; mouth small, low, the maxillary reaching to opposite the nostril; teeth subequal, in broad bands; lower jaw included; nostrils both oblong, the anterior the larger; eye rather large, about as wide as the broad preorbital; preopercle very finely serrated on its posterior margin only, the serrations very weak; gill-rakers short and small, about 12; scales moderate, the rows above lateral line very oblique, those below nearly horizontal, the series from the scapular scale reaching middle of spinous dorsal. Spinous dorsal moderate, not deeply notched, the median spines injured in youth in the type specimen: soft dorsal low, free from scales; anal spines low, the second a little longer than third; soft rays scaleless; caudal lunate, the lobes unequal, the upper longer than lower, which is more obtuse. Ventrals rather long, inserted just behind axil of pectoral. Pectoral rather short, not quite reaching tips of ventrals.

Color pearly gray, darker above; each scale of back and sides, with a bright bronze spot behind its center; these forming nearly continuous streaks along the rows of scales. These streaks run upward and backward anteriorly and nearly horizontally on sides, when they are more or less interrupted or transposed. Head plain gray, dorsal with some streaks and clouds; outer fins plain; ventrals somewhat dusky.

One specimen, $8\frac{3}{4}$ inches long, was taken by Mr. Richardson.

This species is very closely allied to the Atlantic species, *Orthopristis ruber* (Cuv. & Val.), but has the body a little more slender and the head larger.

The specimen from Guaymas provisionally referred to *Orthopristis cantharinus* (see Jordan & Fesler. Rept. U. S. Fish Com. for 1889 to 1891, 500, 1893), is perhaps a second specimen of *Orthopristis reddingi*.

This species is named in honor of Hon. Benjamin B. Redding, first Fish Commissioner of California, a man deeply interested in scientific research, to whom Mr. Richardson has been indebted for many favors, in his former capacity of Superintendent of the California Fish Hatching Station at Sisson.

15. *Microlepidotus inornatus* Gill.

One specimen, 10 inches long, obtained. Common.

16. *Umbrina xanti* Gill.

Common.

17. *Micropogon ectenes* Jordan & Gilbert.

One specimen.

18. *Eucinostomus gracilis* (Gill).

Common.

19. *Xystæma cinereum* (Walbaum.)

Common. About twenty specimens obtained.

20. *Gerres lineatus* (Humboldt).

Common.

21. *Scarus perrico* Jordan & Gilbert.

One specimen, found dead on the beach.

22. *Spheroides lobatus* (Steindachner).

Common. Two specimens obtained. In color these approach *Spheroides augusticeps* (Jenyns). It may be that *lobatus* is, after all, the young of *augusticeps*, as was supposed by Jordan and Gilbert.

23. *Diodon holacanthus* Linnæus.

Common. One specimen, 11 inches long, was obtained.

D. 12; A. 12; back and sides covered with spots; no spots on fins or tail; back very dark; a dark band between eyes; frontal spines nearly as long as pectoral spines which are longest.

24. *Alexurus armiger* Jordan, n. g. and sp. GOBIIDÆ.
Plate xlviii.

Head $4\frac{2}{3}$; depth 8; dorsal VI-13; anal 11; V. I, 5; scales about 102-30; eye 8 in head; maxillary $2\frac{2}{3}$; mandible $2\frac{1}{2}$; snout $5\frac{2}{3}$; interorbital $4\frac{1}{3}$; pectoral $1\frac{4}{5}$; caudal equals head; ventral 2; last dorsal ray $1\frac{3}{5}$.

Body long and low, compressed posteriorly, depressed in front. Head flattish and broad above, the cheeks moderately tumid. Eyes small, high up, separated by a broad flattish interorbital space; snout short; mouth moderate, very oblique, the maxillary ceasing below the center of pupil; lower jaw very heavy, oblique, projecting beyond upper, its outline horseshoe-shaped, obtuse in front. Teeth in rather broad bands, the outer enlarged below, but

scarcely so above; none of them canine-like. Top of head with very small scales. Cheeks and opercles with rudimentary scales above. Preopercle with a concealed antrose hook below as in *Eleotris*. Scales on body very small, perfectly smooth, partially imbedded; scales on nape and throat minute. Gill membranes extending a little forward below, so that the branchiostegals are free from the isthmus.

Insertion of dorsal twice as far from middle of base of caudal as from tip of snout; the fin low, its slender rays slightly filamentous. Soft dorsal low, its last ray highest. Anal similar, beginning under second dorsal ray. Caudal long, bluntly pointed behind, with strongly procurrent base above and below, the base above two-fifth length of head formed of fourteen short rays, that below a little shorter, of twelve rays, this procurrent portion forming an angle with the caudal proper where it joins it. Pectoral and ventrals short, the ventrals inserted under pectorals.

Color olive green, dusky above, paler below, but everywhere covered with fine black dots. Both dorsals with the membranes pale, the rays each barred with black. Caudal mesially blackish, all the rays barred or chequered in fine pattern. Pectoral and anal pale, similarly speckled; base of pectoral dusky; ventral finely speckled.

One specimen, $6\frac{1}{2}$ inches long, taken by Mr. James A. Richardson in the harbor of La Paz.

This species seems to be the type of a distinct genus allied to *Eleotris* and *Erotelis*, distinguished from *Eleotris* by its very small cycloid scales, from *Erotelis* by its concealed preopercular hook, and from both by the procurrent caudal fin. The generic name is from $\acute{\alpha}\lambda\acute{\epsilon}\xi\omega$, to protect; $\omicron\delta\sigma\acute{\alpha}$, tail.

25. *Gobius sagittula* (Günther).

Two large specimens, each six to eight inches long, besides one very young example, corresponding to the form called *Gobius longicauda* of Jenkins & Evermann. As Dr. Gilbert has noticed, this is the adult form of the species called by Dr. Günther *Euctenogobius sagittula*, of which specimens were found by us at Mazatlan.

The species is very similar to *Gobius oceanicus* of the Atlantic.

26. *Gobius soporator* Cuvier & Valenciennes.

Very common.

27. *Scorpæna mystes* Jordan & Starks.

Common.

28. *Labrosomus xanti* Gill.

Common in rock pools.

29. *Labrosomus delalandi* (Cuvier & Valenciennes).

Common in rock pools.

30. *Auchenopterus monophthalmus* Günther.

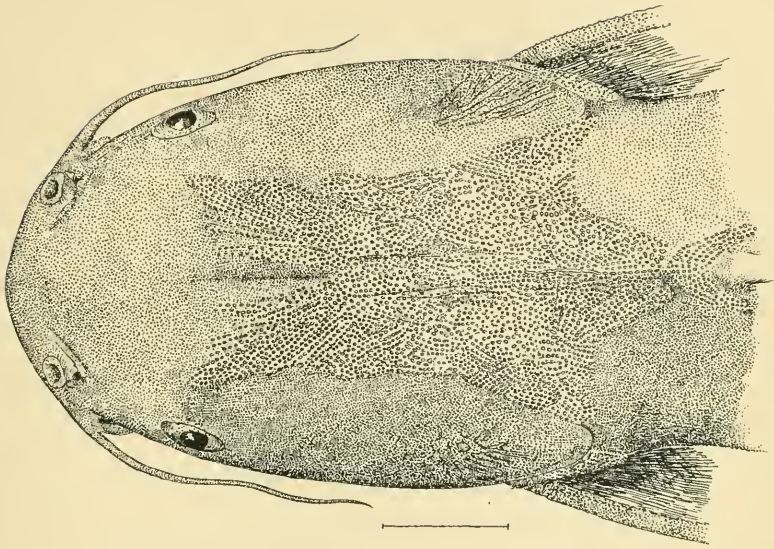
Not rare; in rock pools.

31. *Paralichthys adpersus* (Steindachner).

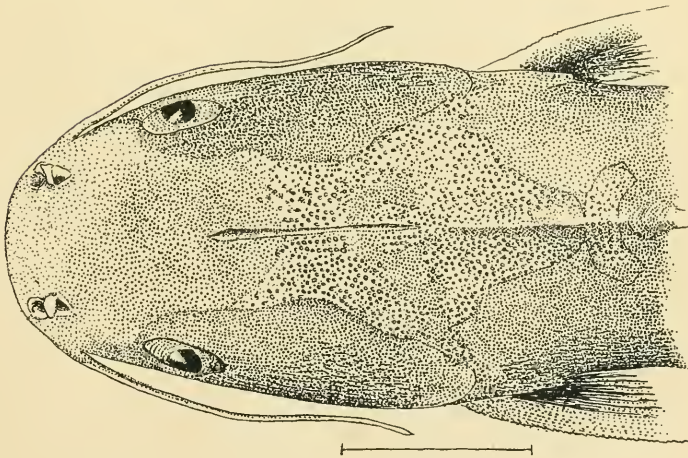
Very common; about ten specimens taken.

LIST OF PLATES.

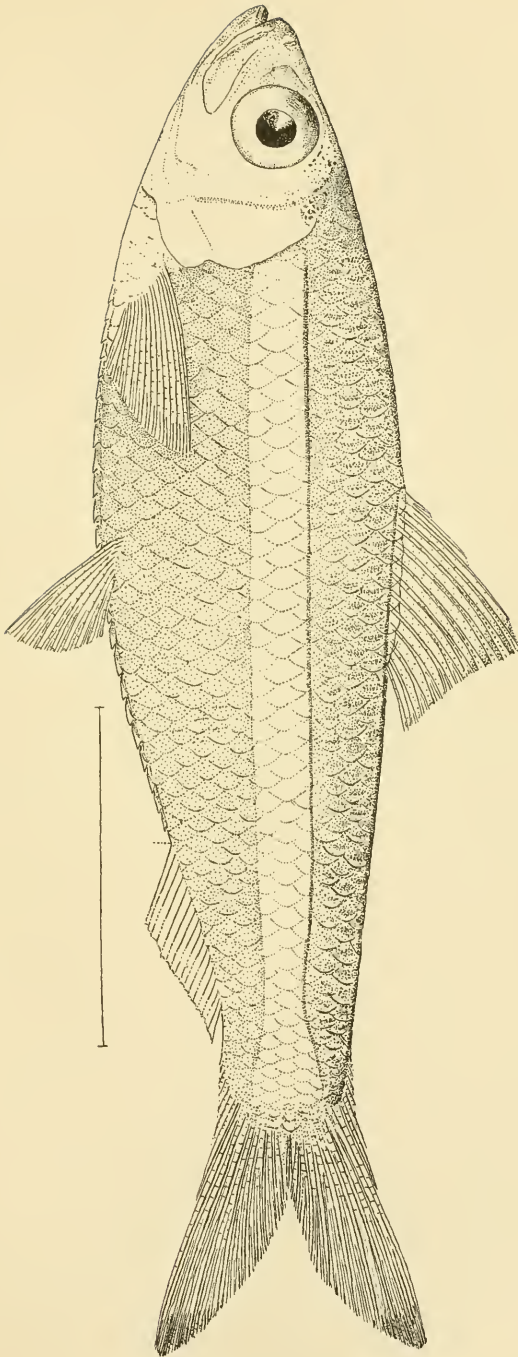
- XXVI. *Galeichthys gilberti*.
 XXVII. *Galeichthys azureus*.
 XXVIII. *Sardinella stolidifera*.
 XXIX. *Pœcilia presidionis*.
 XXX. *Siphostoma starksii*.
 XXXI. *Mugil hospes*.
 XXXII. *Eurystole eriarcha*.
 XXXIII. *Thyrina evermanni*.
 XXXIV. *Caranx medusicola*.
 XXXV. *Hynnys hopkinsi*.
 XXXVI. *Trachinotus culveri*.
 XXXVII. *Apogon retrosella*.
 XXXVIII. *Mycteroperca bouleengeri*.
 XXXIX. *Rabirubia inermis*.
 XL. *Lythrulon opalescens*.
 XLI. *Orthopristis reddingi*.
 XLII. *Eupomacentrus flavilatus*.
 XLIII. *Microspathodon bairdii*.
 XLIV. *Microspathodon azurissimus*.
 XLV. *Halichoeres dispilus*.
 XLVI. *Xesurus punctatus*.
 XLVII. *Teuthis crestonis*.
 XLVIII. *Alexurus armiger*.
 XLIX. *Garmannia paradoxa*.
 L. *Aboma etheostoma*.
 LI. *Evermannia zosterura*.
 LII. *Scorpæna mystes*.
 LIII. *Enneanectes carinalis*.
 LIV. *Dinematichthys ventralis*.
 LV. *Symphurus williamsi*.



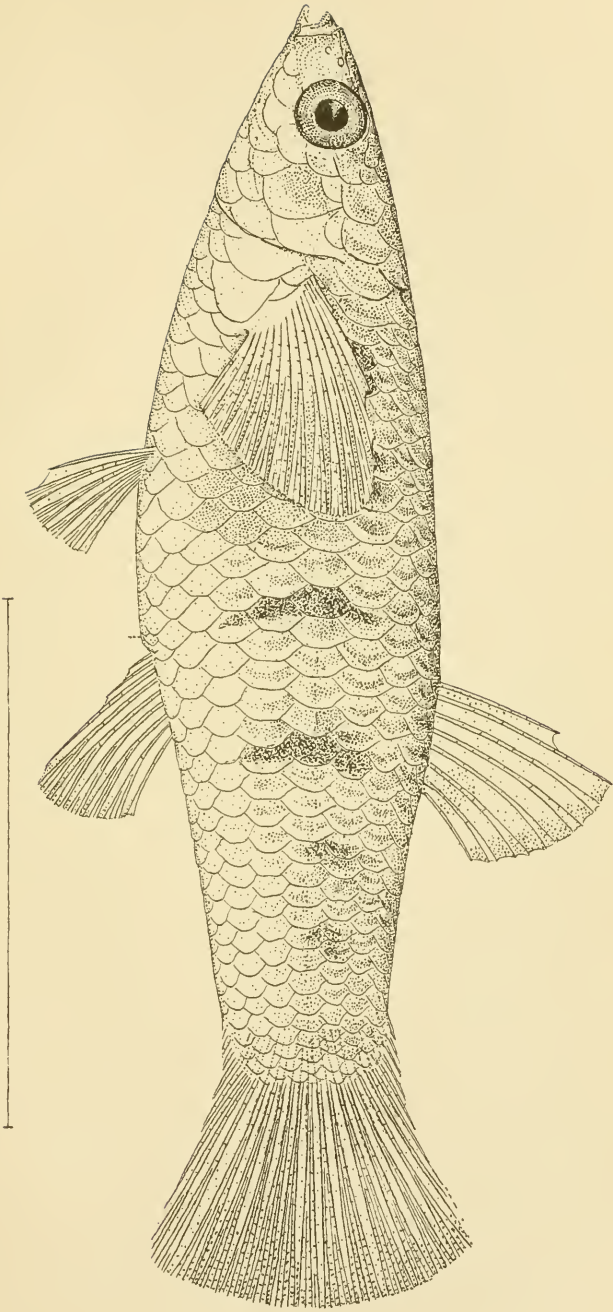
GALEICHTHYS AZUREUS.



GALEICHTHYS GILBERTI.



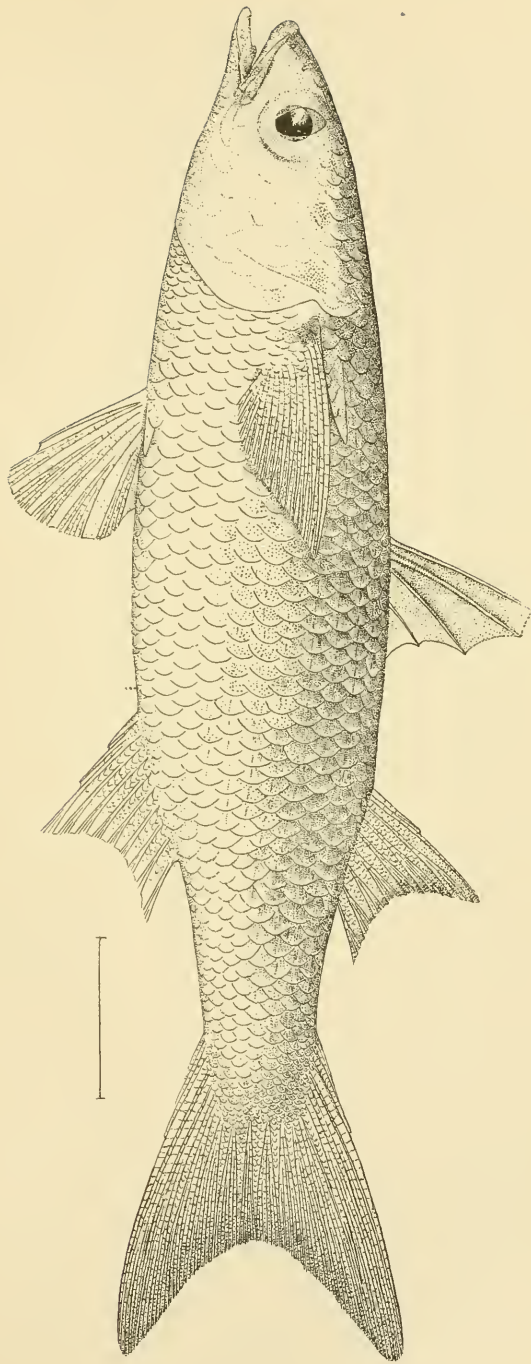
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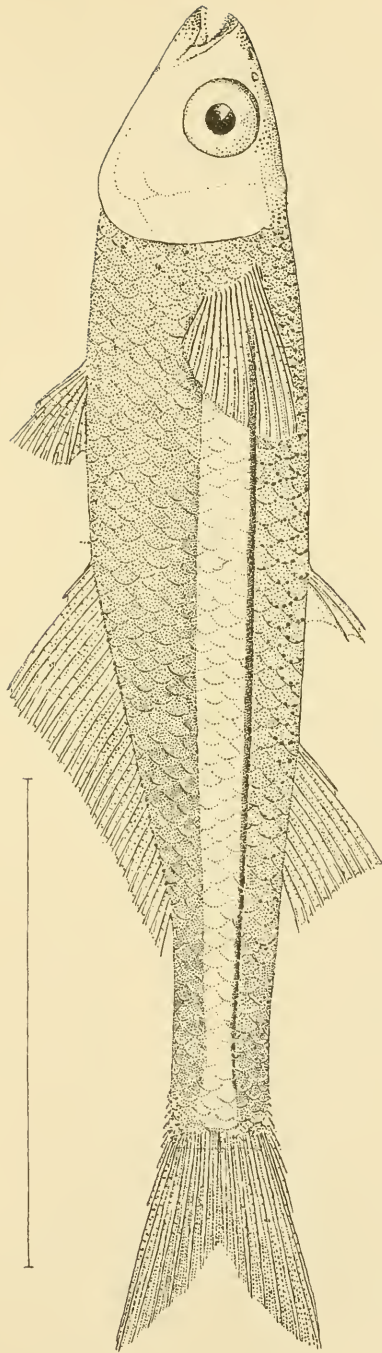
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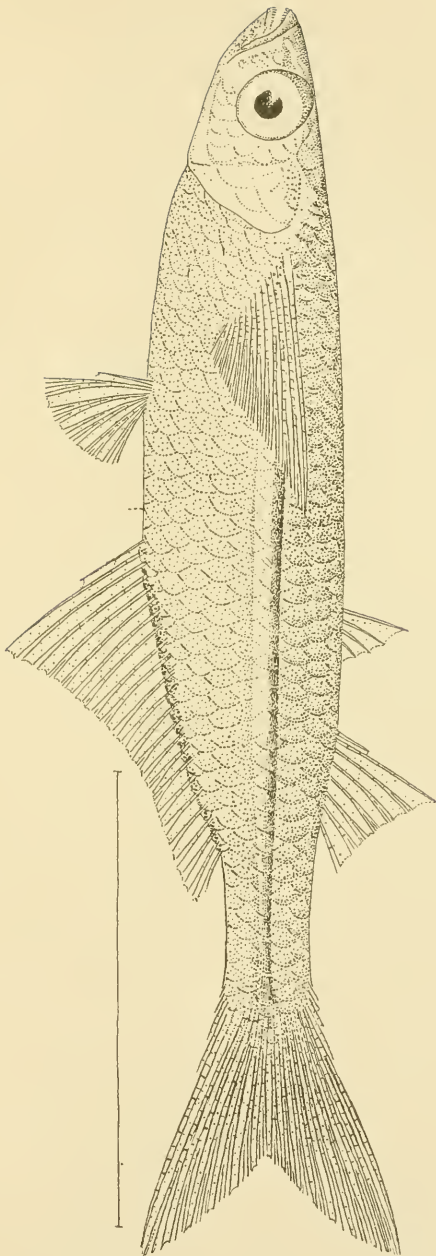
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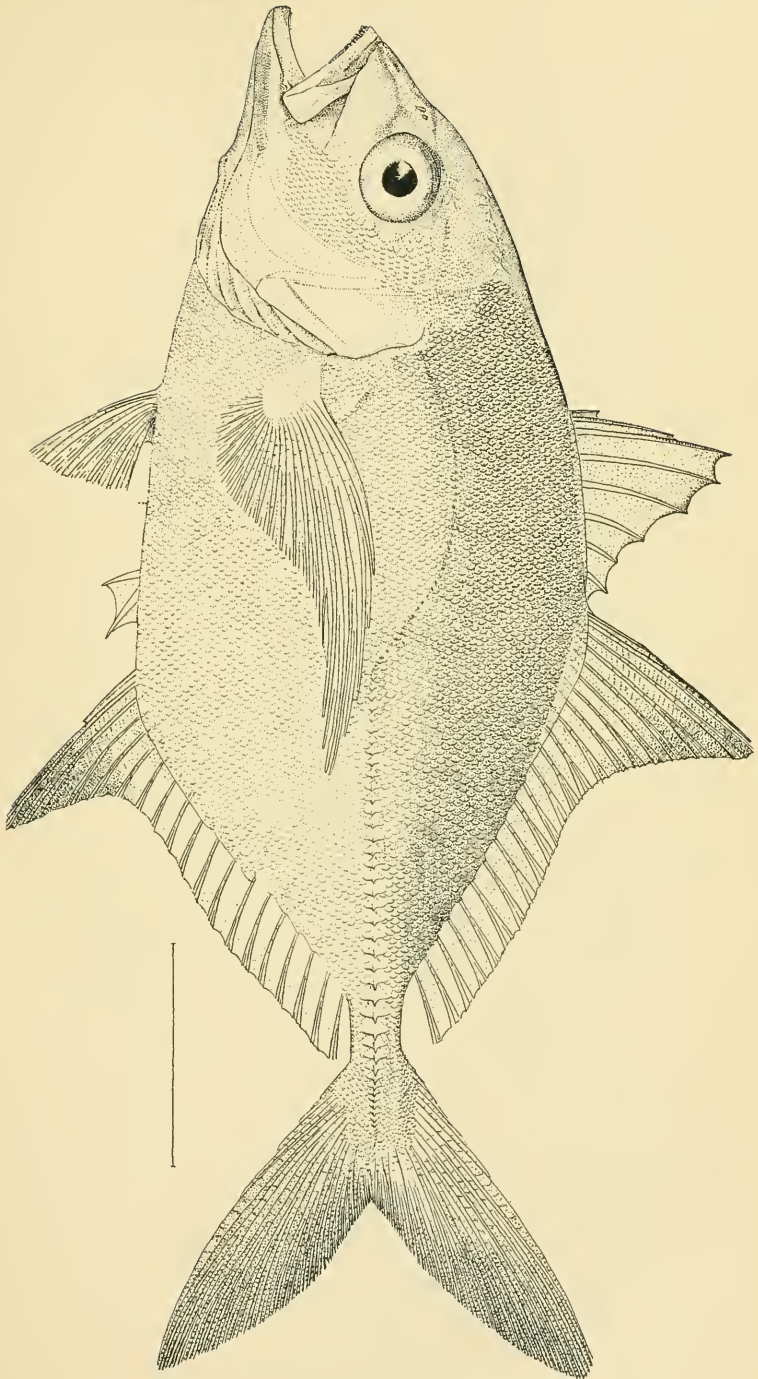
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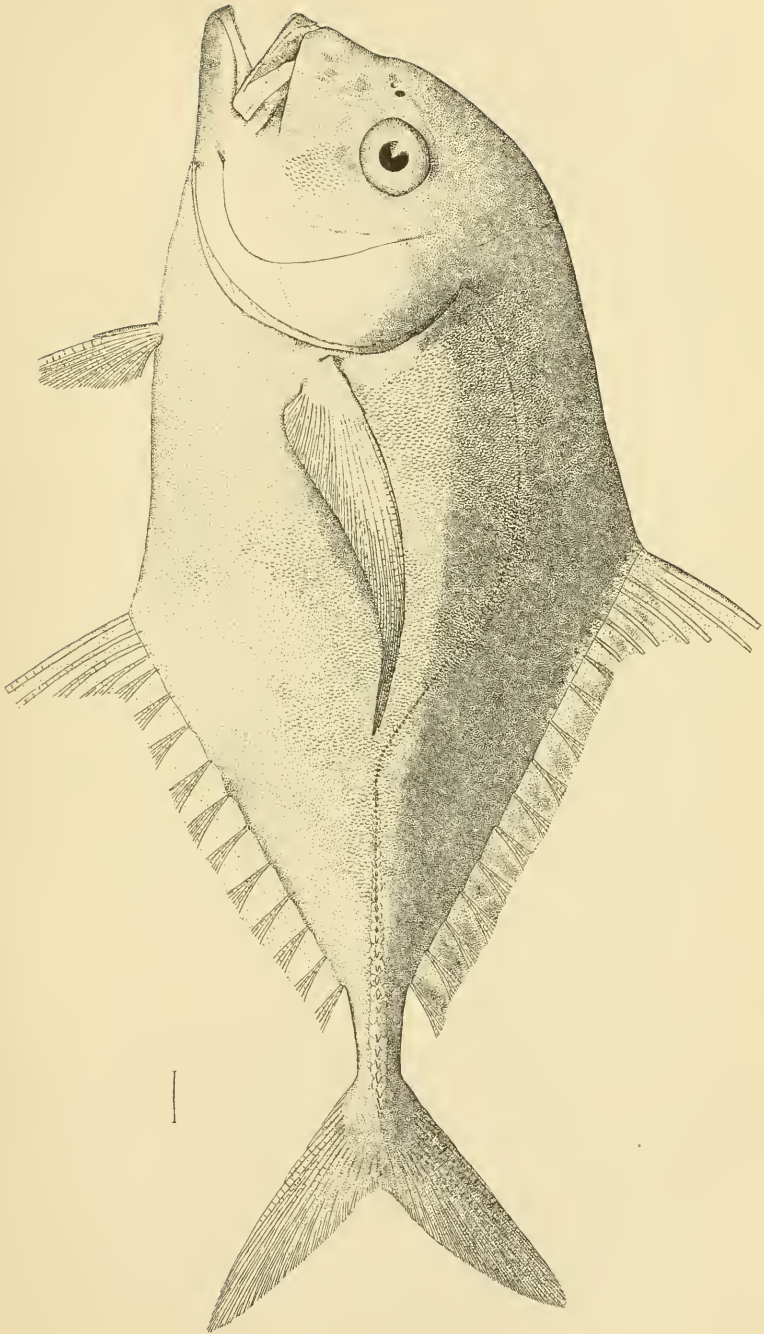
EURYSTOLE ERIARCHA.



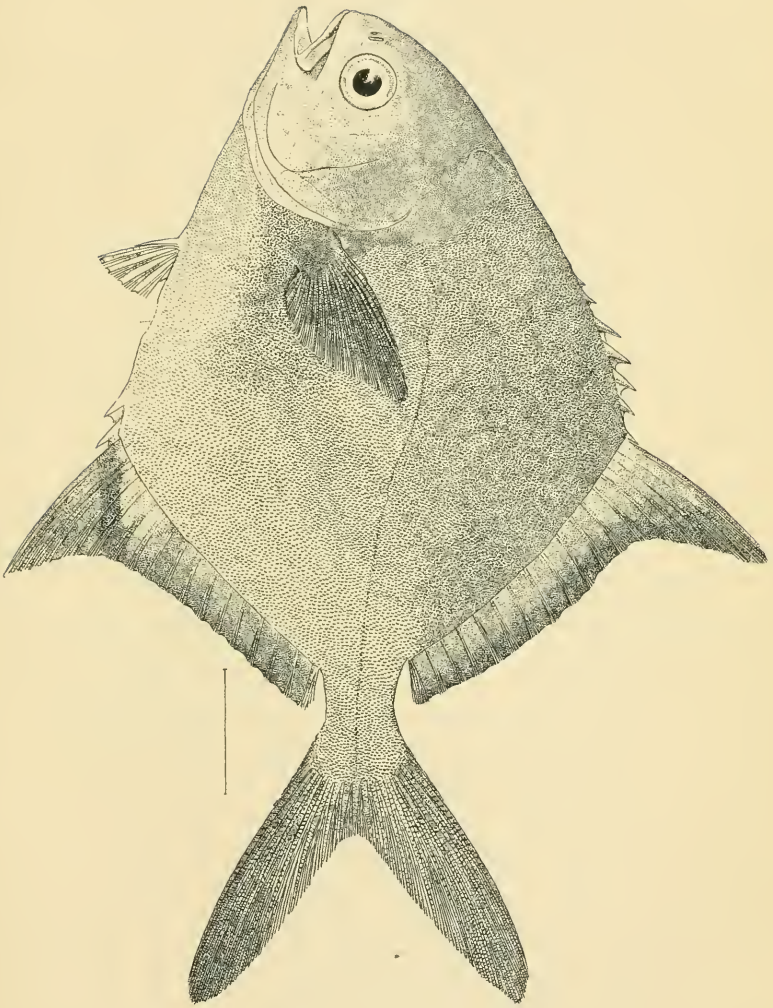
THYRINA EVERMANNI.



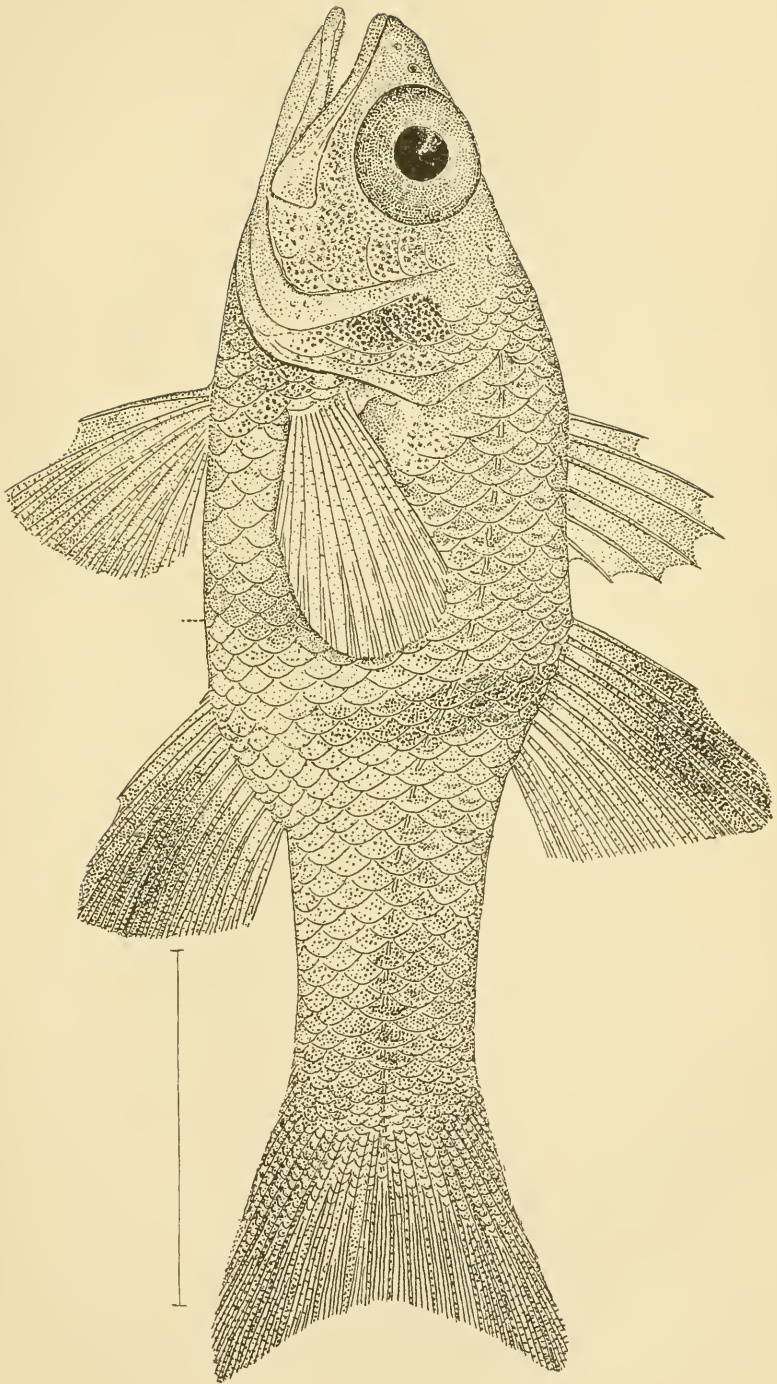
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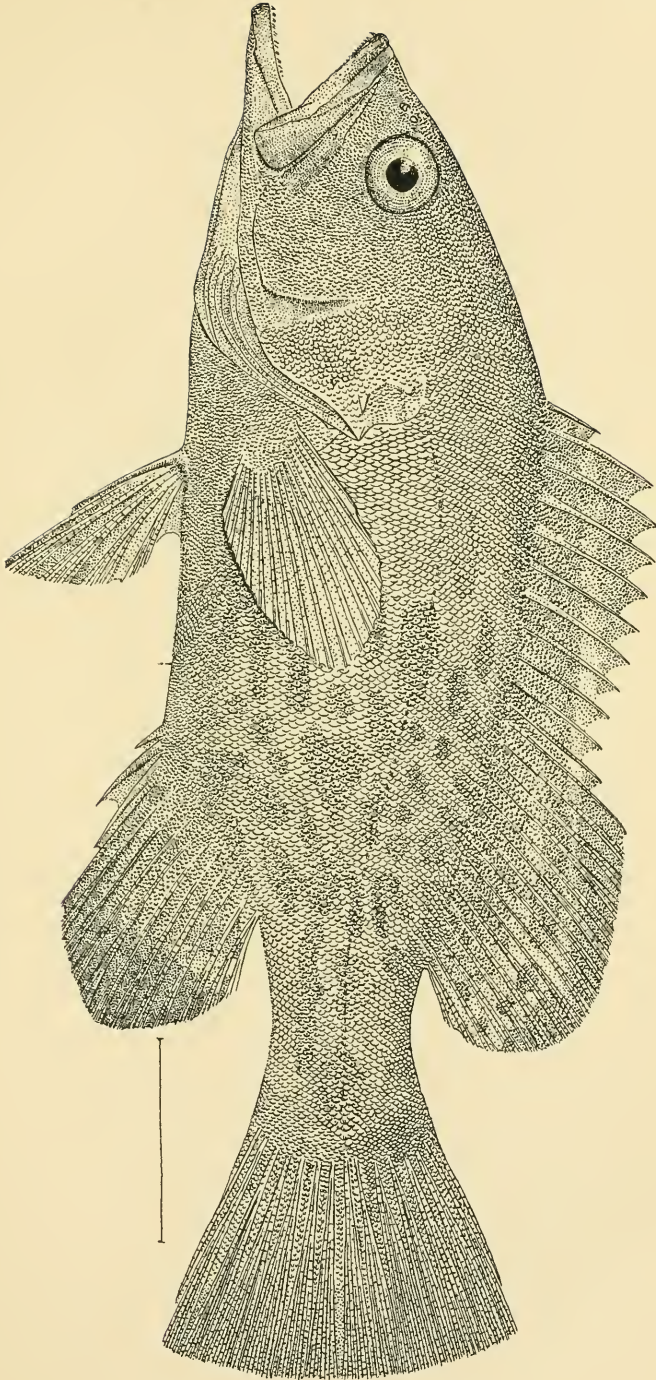
HYNNIS HOPKINSI.



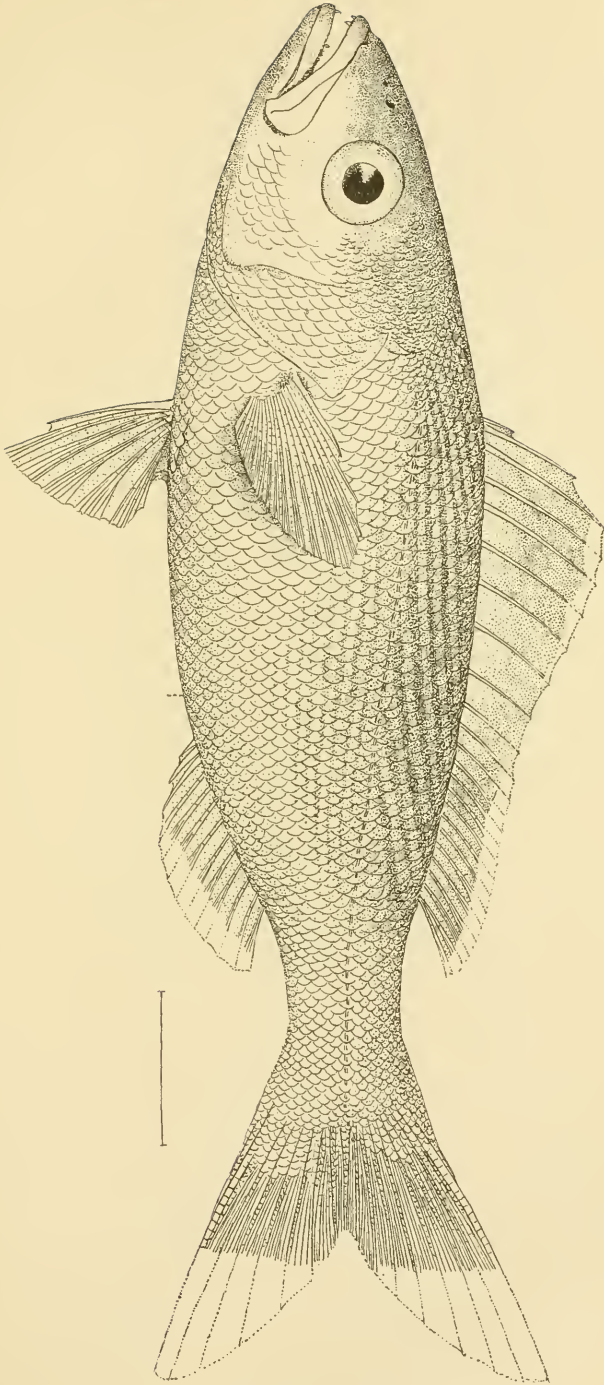
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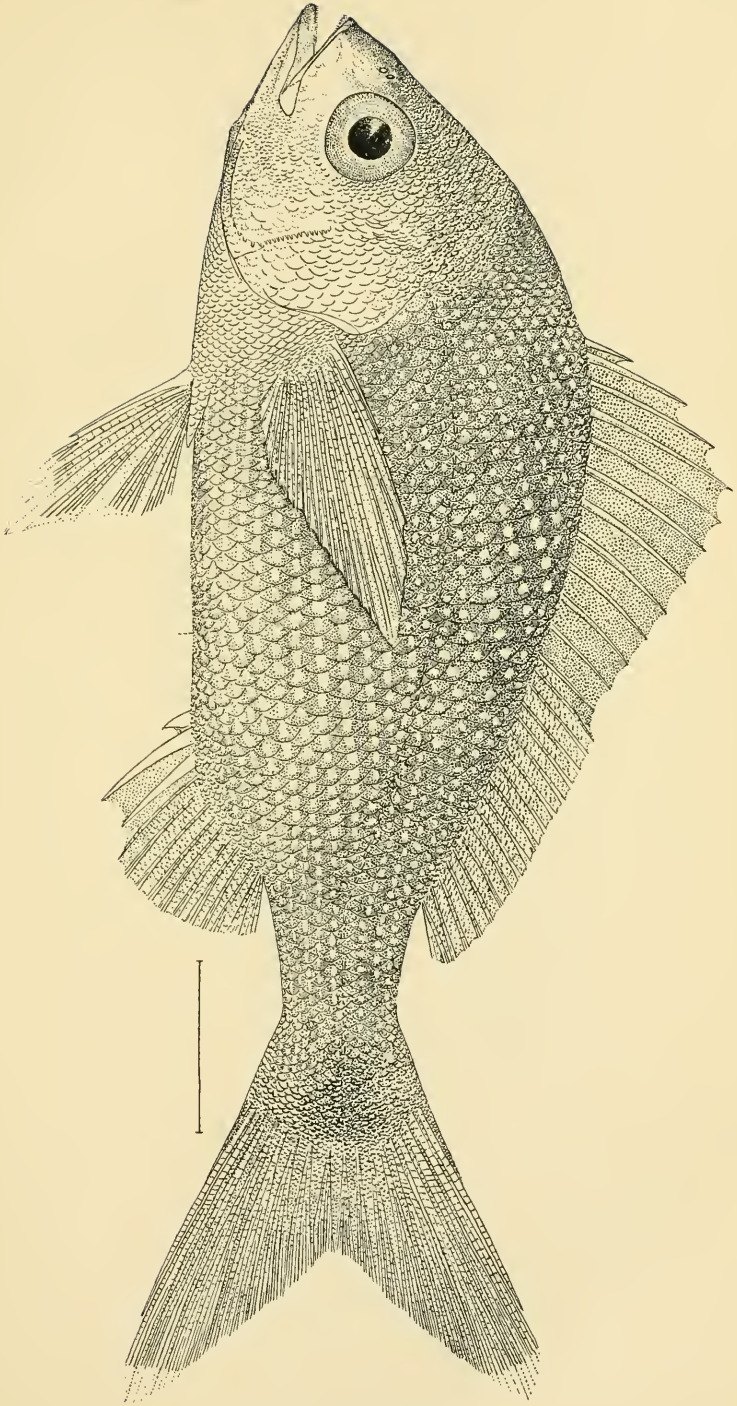
APOGON RETROSELLA.



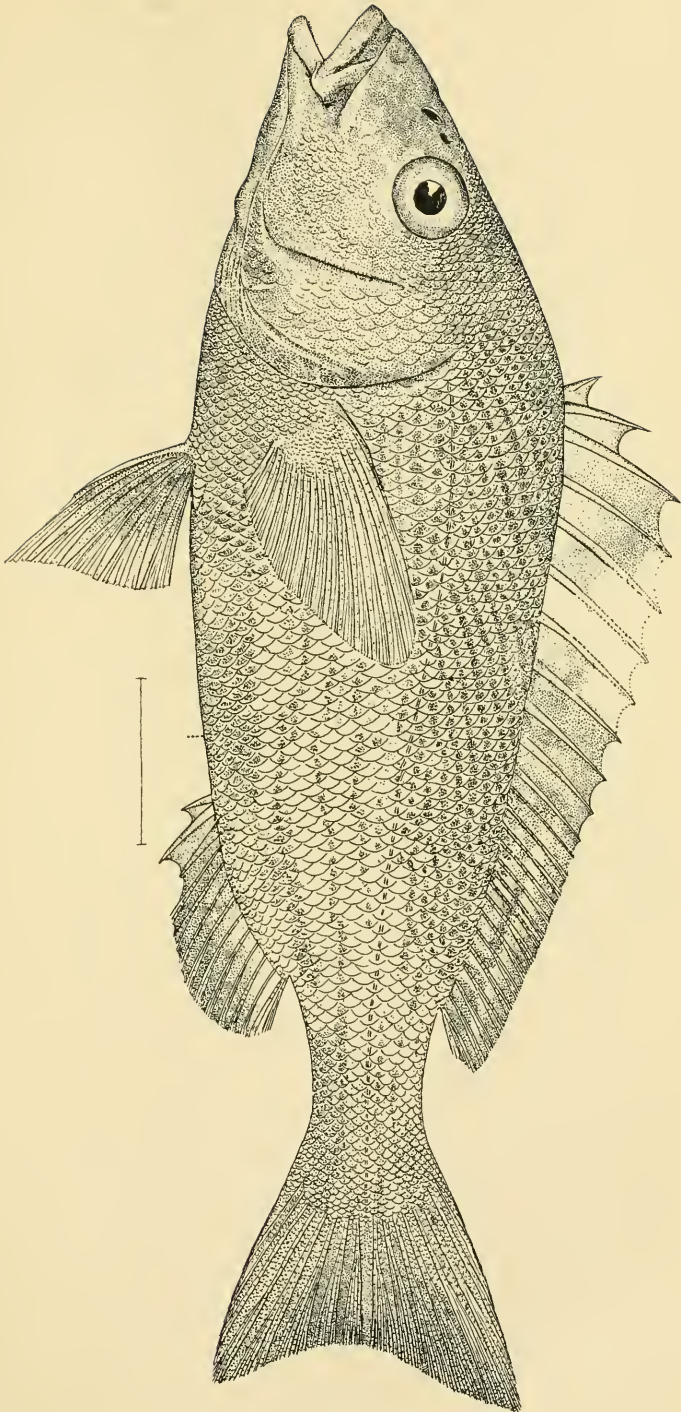
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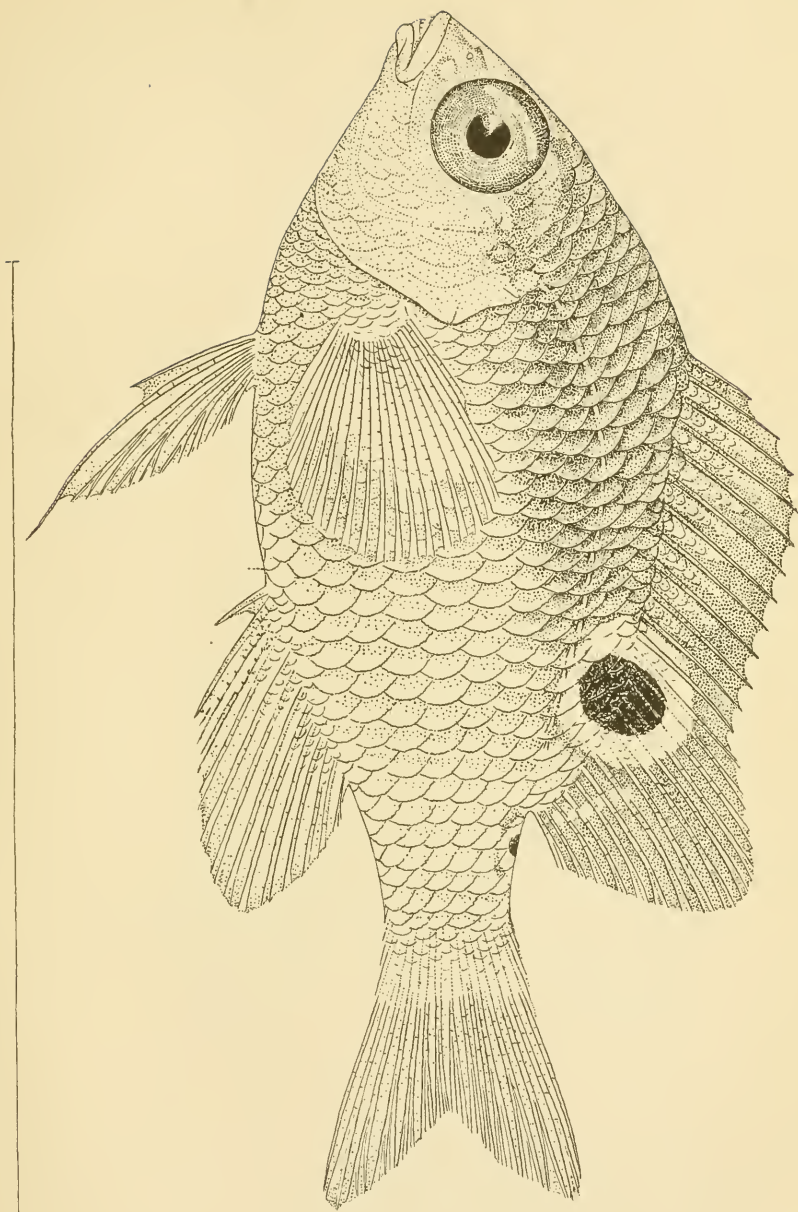
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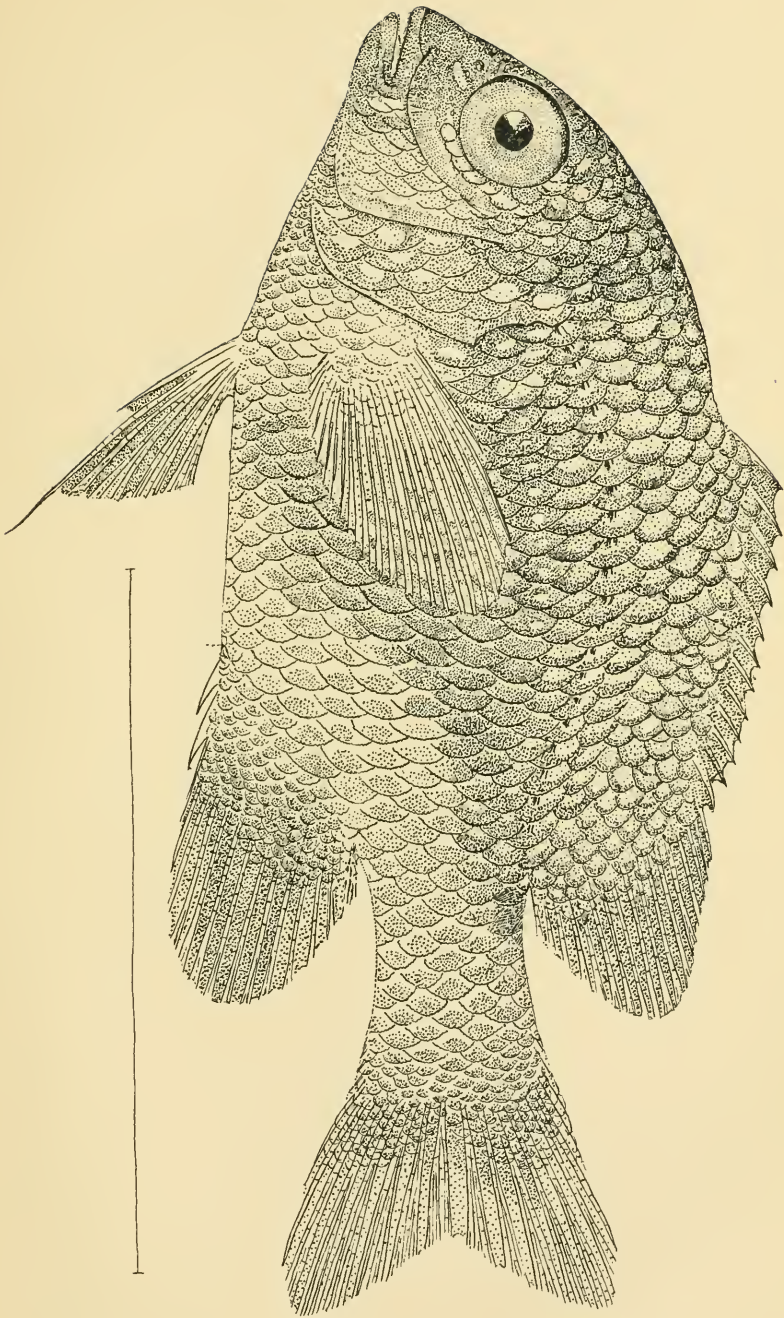
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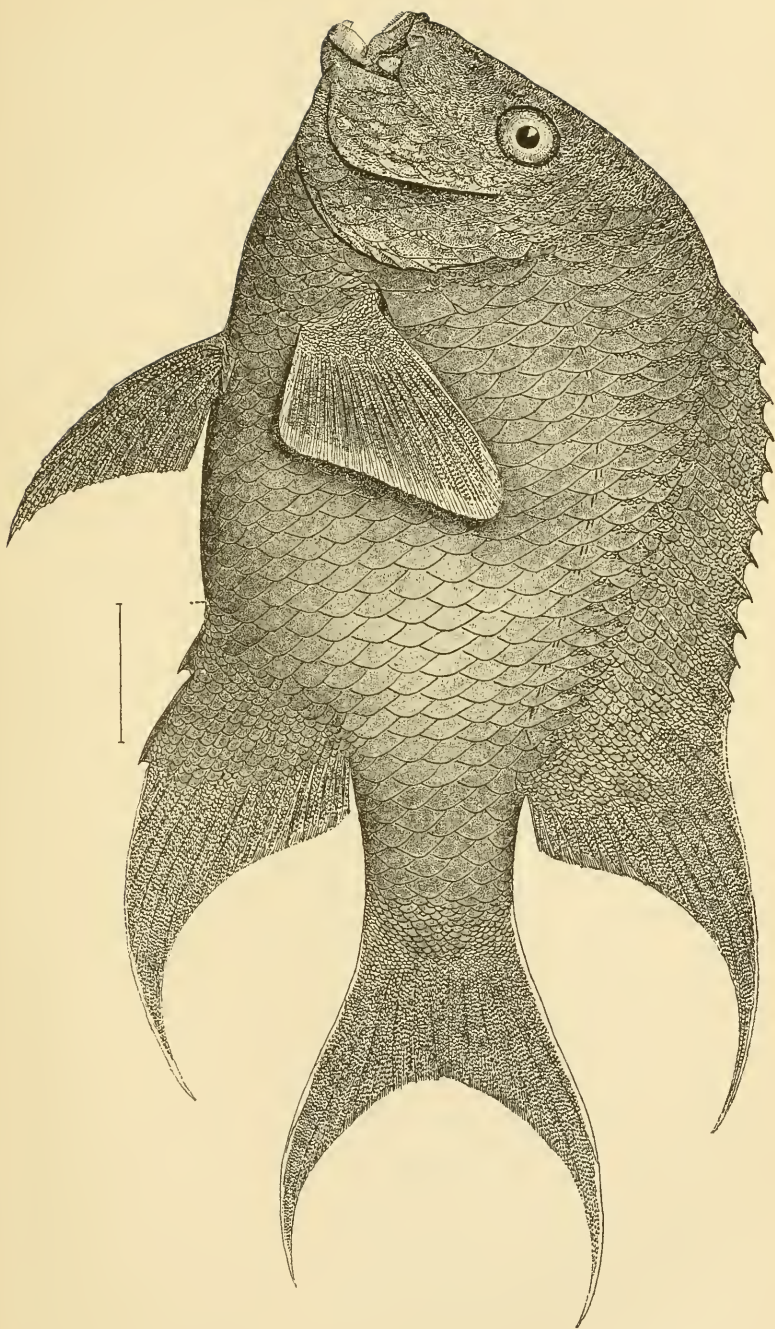
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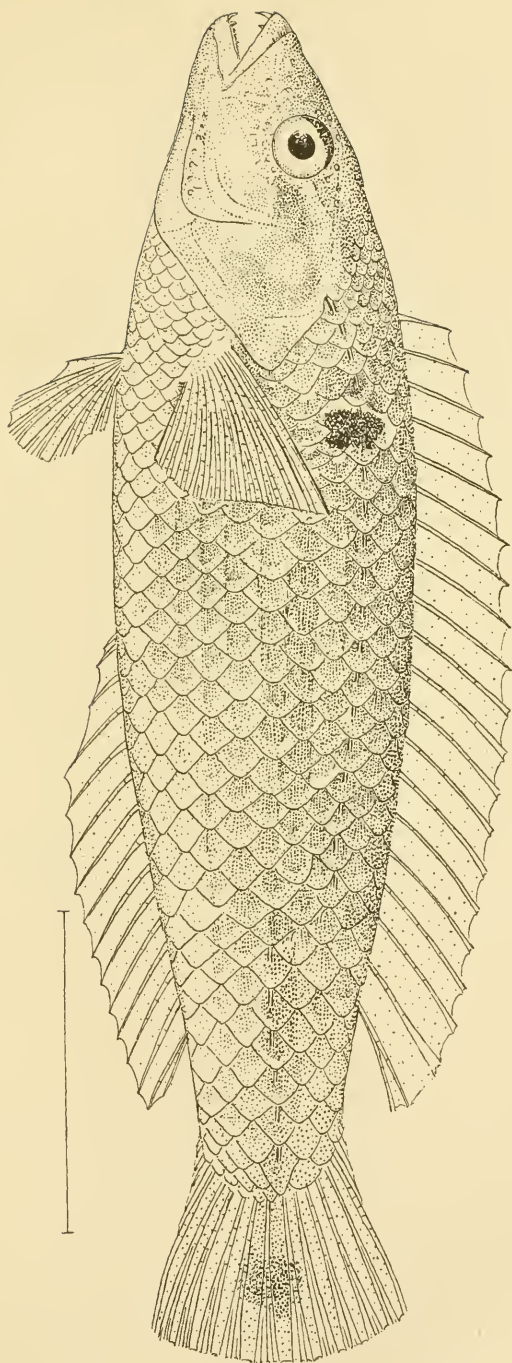
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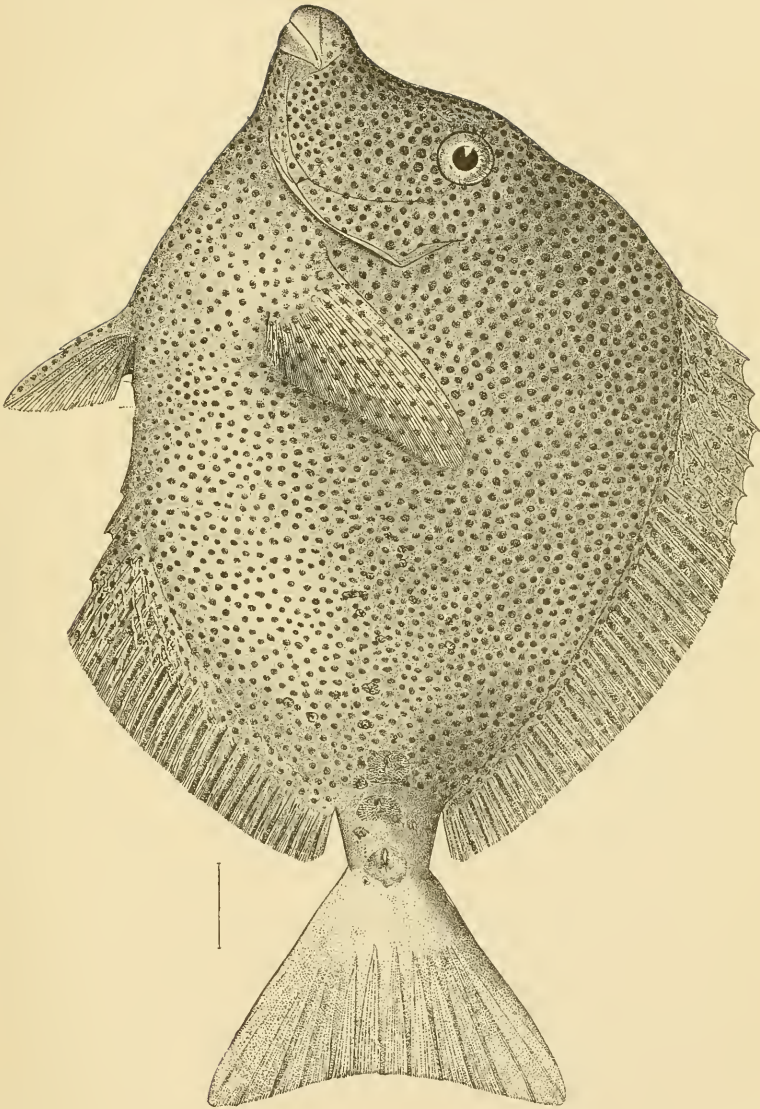
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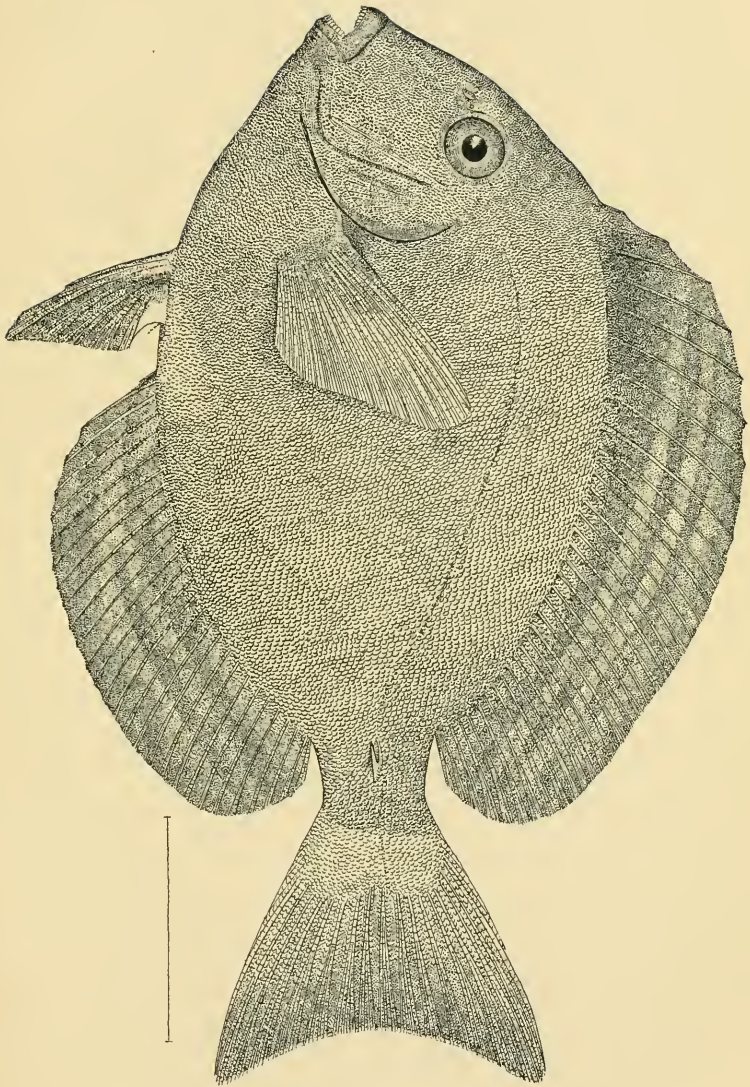
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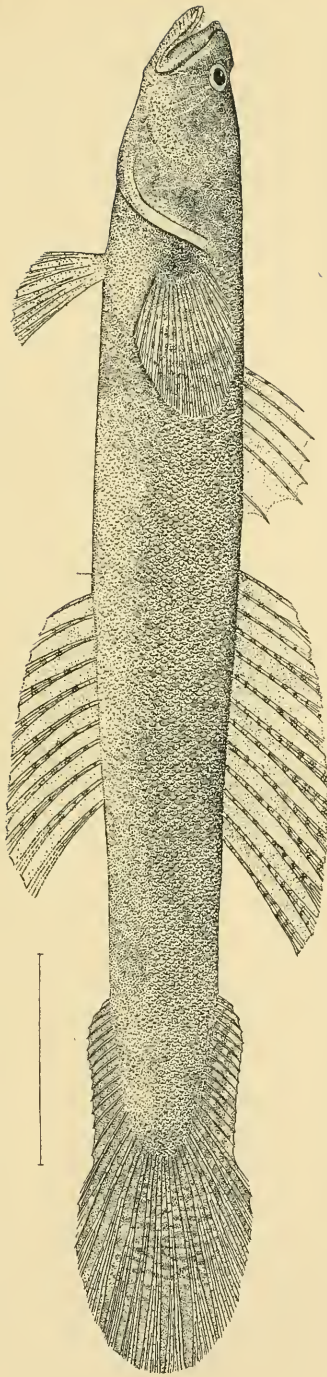
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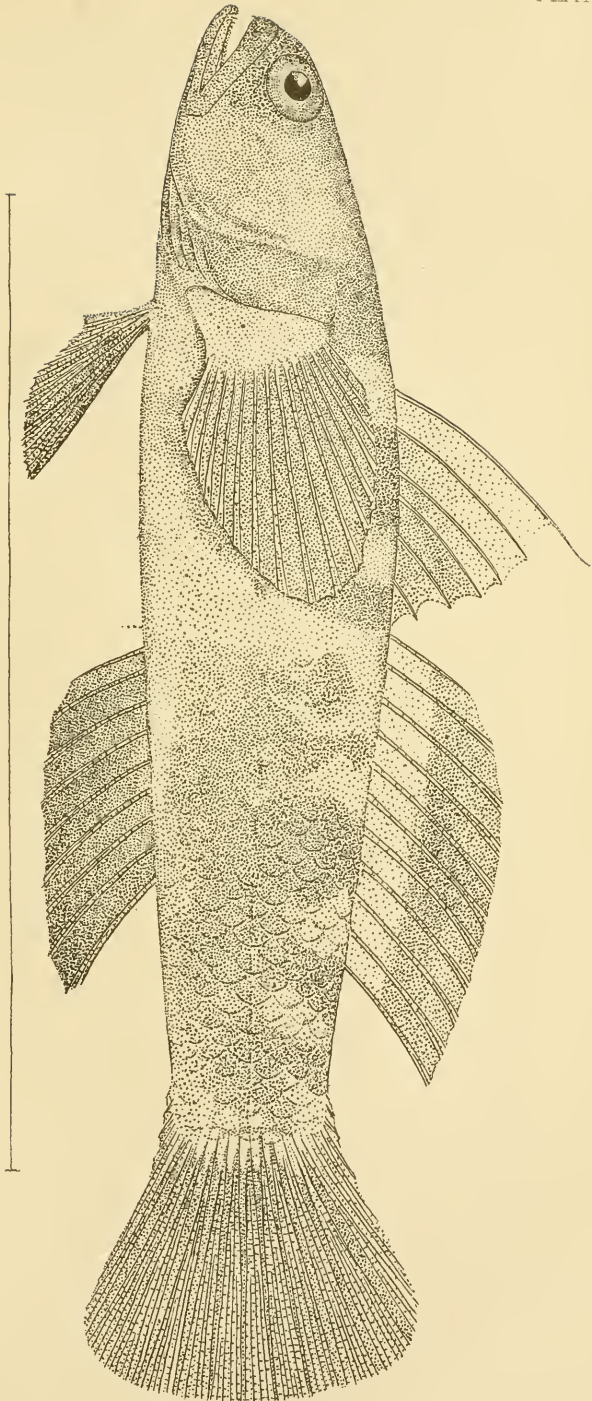
XESURUS PUNCTATUS.



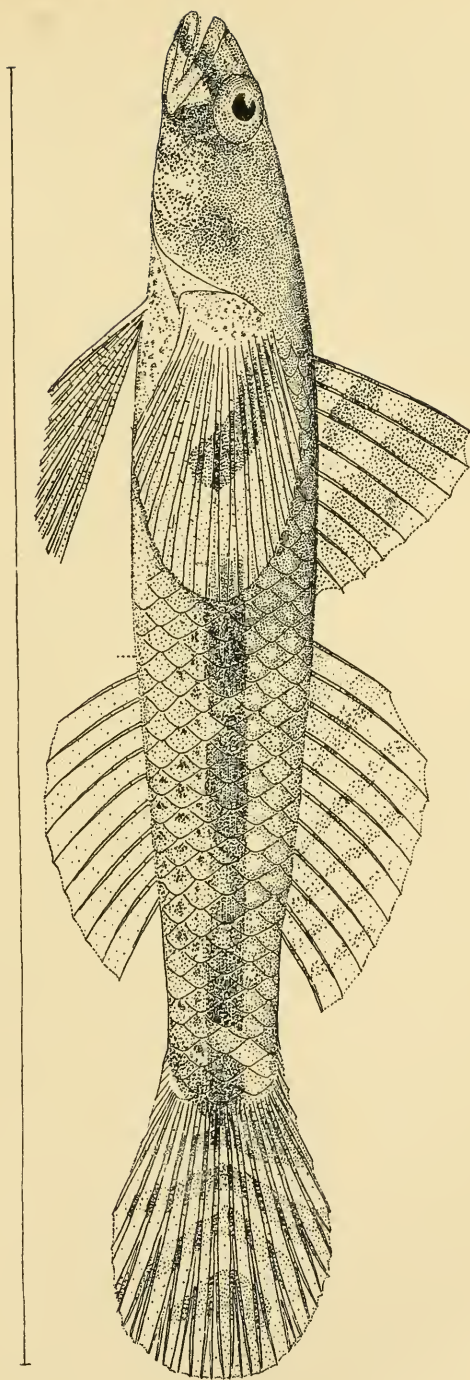
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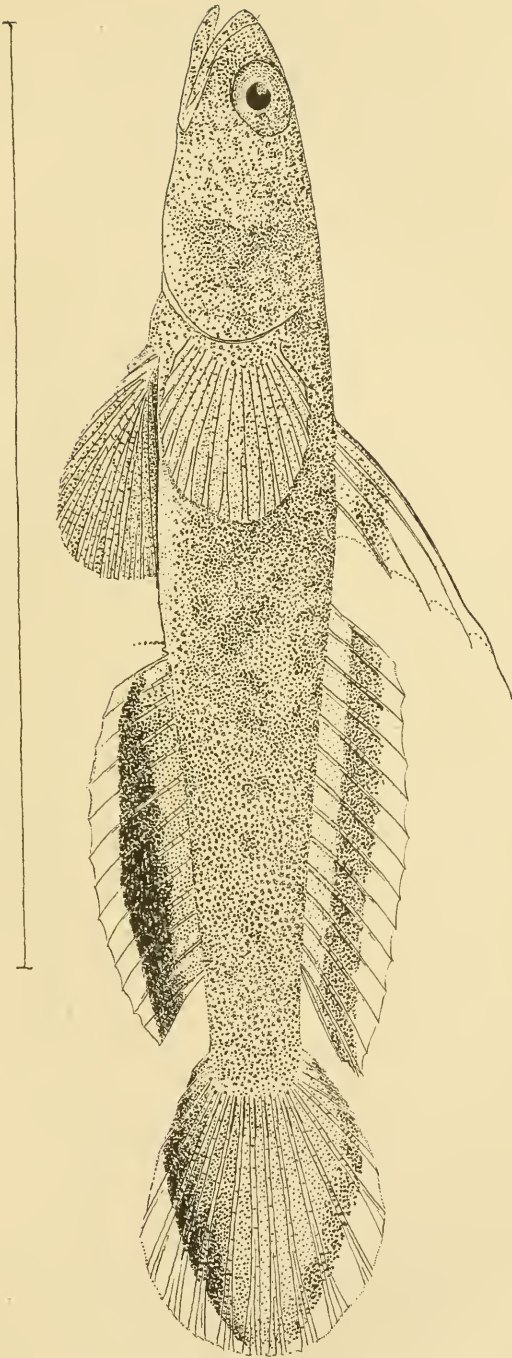
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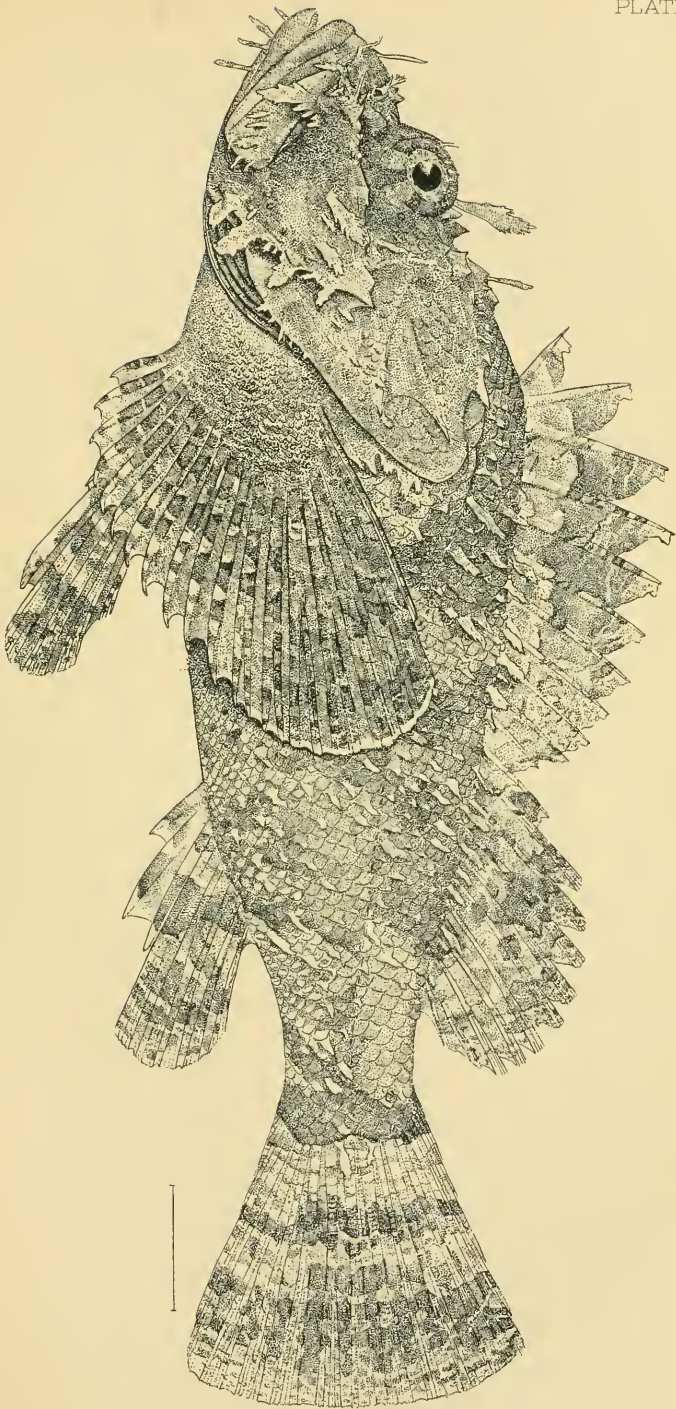
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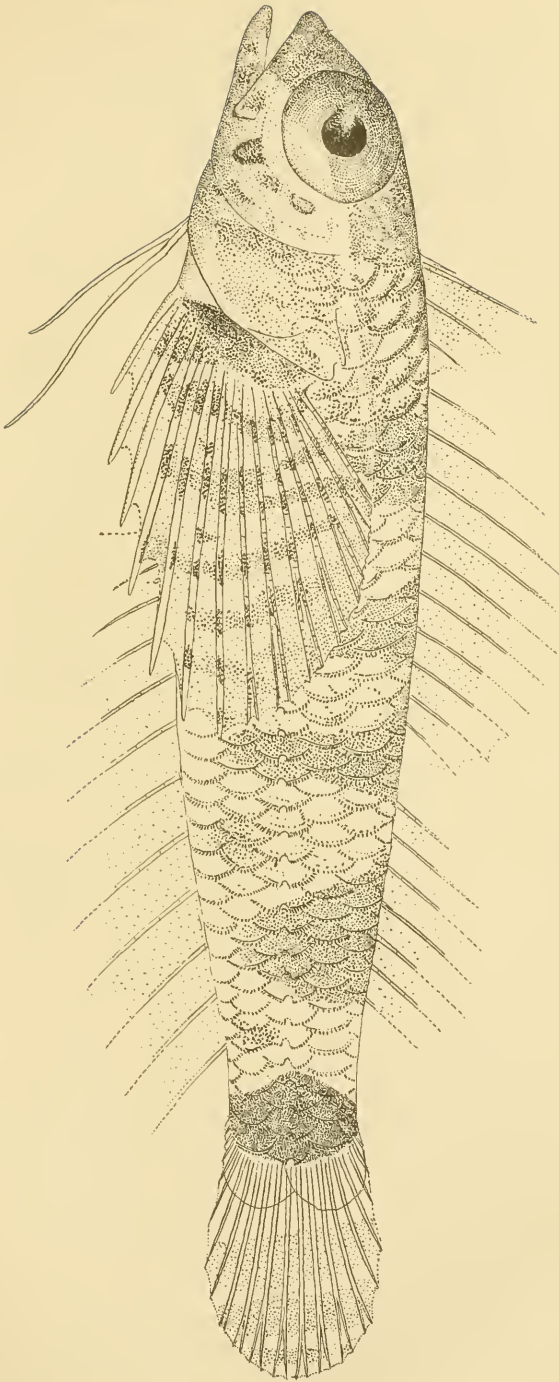
ABOMA ETHEOSTOMA.



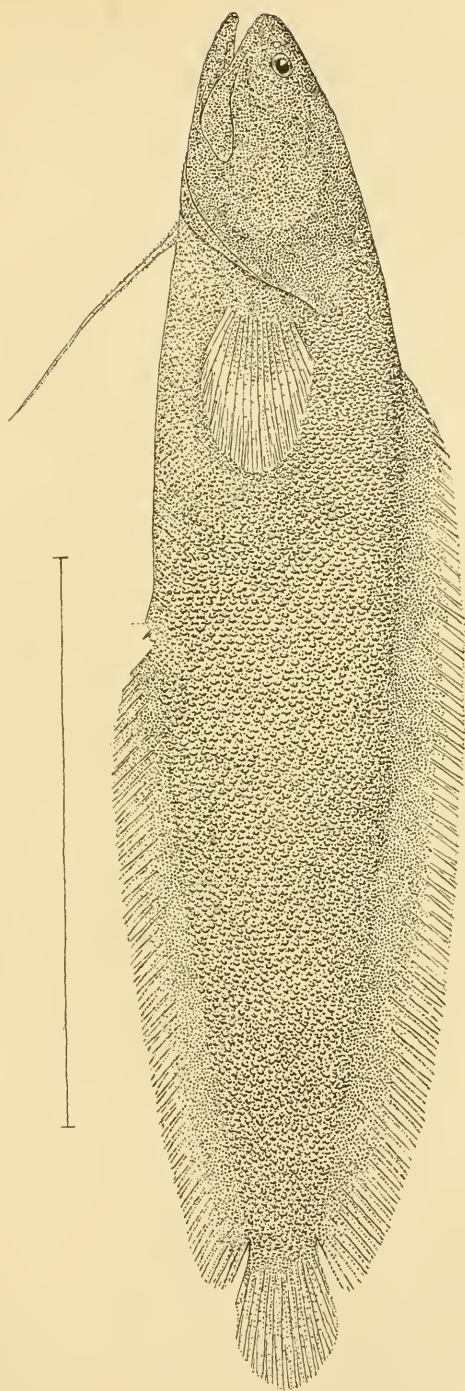
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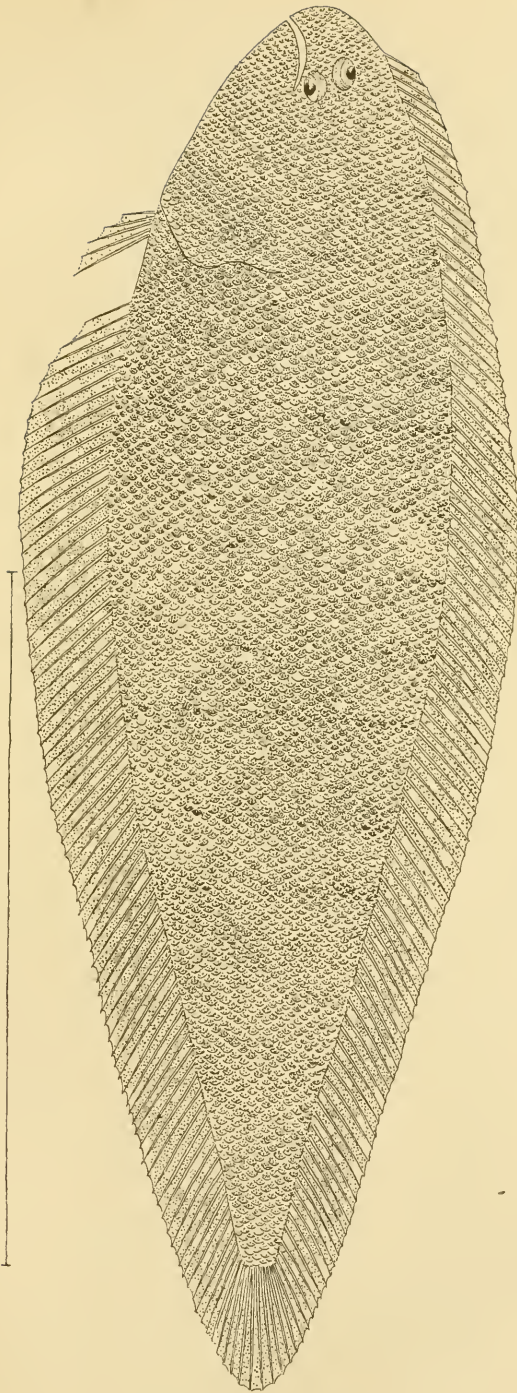
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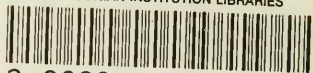
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