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VOL. VI.

NO. 4.

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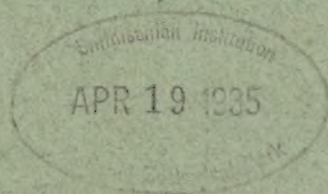
RECORD OF THE FISHES OBTAINED IN JAPAN IN 1911

By DAVID STARR JORDAN AND WILLIAM FRANCIS THOMPSON

PITTSBURGH.

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RECORD OF THE FISHES OBTAINED IN JAPAN IN 1911.

BY DAVID STARR JORDAN AND WILLIAM FRANCIS THOMPSON.

(PLATES XXIV-XLII.)

The senior author spent the summer and autumn of 1911 in Japan and Korea in the interest of International Conciliation under the auspices of the World Peace Foundation.

His naturalist friends in Japan at once began to make collections of fishes for him, at the same time cheerfully assisting him in his efforts to study the fishes in the scant leisure which his other occupations allowed. A large collection was obtained and through the courtesy of Mr. Asano and Mr. Shiraishi of the Toyo Kisen Kaisha delivered without charge in California. About three hundred and ninety species were obtained in Japan. This collection which forms the subject of this paper is shared between the Carnegie Museum at Pittsburgh, and Stanford University. The types are in the former institution, as the new species are published under its auspices.

The collection consists of the following:

1. A large collection made by Mr. Alan Owston of Yokohama, covering various localities in Japan, the most valuable materials being dredged by him in his steamer, the "Golden Hind." Many valuable specimens from Mr. Owston's collections were obtained by Jordan and Snyder in 1900. Other new species obtained from him have been described by Mr. Shigeo Tanaka, and by naturalists in Europe.

2. A collection made at Misaki by Mr. Kumakichi Aoki, fisherman at the Seaside Laboratory of the Imperial University of Tokyo, under the direction of

Professor Ijima. Mr. Aoki is the most accomplished collector of fishes in Japan, and his services to Jordan and Snyder in 1900 were invaluable.

3. Collections made by Dr. Jordan assisted by Mr. M. Sagimoto, director of the Zakoba market in Osaka, and by a former student, Mr. Michitaro Sindo, in Kobe. These collections were mostly from Osaka, partly from the Yodo River, and partly from the deep-water nets of the trawling fleet, which operates in the Straits of Tsushima between Shimonoseki and Fusan.

4. Collections made by Dr. Jordan at Matsubara on Lake Biwa with the aid of Mr. Kogetsuko Nakagawa, a local fisherman.

5. Collections made about Nagoya by Mr. Kingsbury, principal of a mission-school, and his pupils.

6. Collections made about Okayama by Mr. K. Kusano and Mr. Y. Otaki.

7. A collection made by a former student of Dr. Jordan, Mr. Yoshiro Manabe, teacher of science in the Kwansei Gakuin (college) at Kobe.

8. Collections made by Dr. Jordan about Sendai and Matsushima Bay with the aid of Mr. T. Takamura of the Sendai Museum.

9. Collections made by Dr. Jordan and Mr. Manabe at the island of Awaji near Kobe.

10. Collections made by Dr. Jordan in the markets of Tokyo, Yokohama, and Shimonoseki.

Of these collections those obtained through the help of Mr. Owston and of Mr. Aoki are vastly more important than the others.

A few species seen and here recorded were for one reason or another not secured in the collection. The following are described as either generically or specifically new:

Alepocephalus umbriceps, No. 6030.¹

Nansenia ardesiaca, No. 6023.

Gnathopogon ishikawæ, No. 6029, Cotypes.

Acheilognathus tabira, No. 6007,

Acheilognathus moriokæ,

(*Metzia*)* *mesembrina*,

Acanthorhodeus atremiuus,

Acanthorhodeus sciosemus,

Rhodeus kurumeus, No. 5011,

(*Tanakia*) *oryzæ*,

Cephalopholis boninius, No. 6038.

(*Franzia*) *nobilis*, No. 6452.

Franzia ardens, No. 6451,

Xyrichthys sciistius, No. 6028,

Sebastodes owstoni, No. 6026,

Thysanichthys evides, No. 6019,

Careproctus burkei, No. 6457,

Careproctus gilberti, No. 6456,

Chelidonichthys ischyryus, No. 6459,

Synchiropus ijimæ, No. 6015,

¹ The numbers following the names of species in this paper are the catalog numbers of the specimens in the Carnegie Museum as supplied by Dr. C. H. Eigenmann (*W. J. Holland*).

* Generic names in parentheses are new (*W. J. Holland*).

<i>Pseudaspis atrilatus</i> , No. 6012,	(<i>Calymmichthys</i>) <i>xenicus</i> , No. 6027,
<i>Solenostomus pægnius</i> , No. 6020,	(<i>Spectrunculus</i>) <i>radcliffei</i> , No. 6061.
(<i>Ectenias</i>) <i>brunneus</i> , No. 453,	<i>Lycodes tanakæ</i> , No. 6004,
(<i>Icticus</i>) <i>ischanus</i> , No. 6036,	<i>Coryphænoides bona-nox</i> , No. 6462,
<i>Amia sialis</i> , No. 6021,	(<i>Tarphops</i>) <i>oligolepis</i> , No. 6010.

The following additional species are for the first time recorded from Japan:

- Diaphus cæruleus* (Klunzinger), No. 6603a-g.
- Lutianus quinquelineatus* (Bloch), No. 6349a.
- Plectorhynchus pica* (Cuvier & Valenciennes), No. 6018a,
- Chatodon setifer* Bloch, No. 6152a,
- Chatodon vagabundus* Linnæus, No. 6138a,
- Tilesina gibbosa* Schmidt, No. 6022a-f,
- Ostracion fornasini* Bianconi,
- Neobythites fasciatus* Radcliffe, No. 6206a.

Most of the new figures in this paper are the work of Mr. William Sackston Atkinson. A few are by Mrs. Anna Brown Nash. Others are reproduced from papers in the Proceedings of the United States National Museum. We are indebted to Mr. Charles William Metz for important aid in the determination of species.

Family PETROMYZONIDÆ.

1. *Lampetra mitsukurii* Hatta.
Lake Biwa, at Matsubara, 6103a-b.

Family GALEORHINIDÆ.

2. *Mustelus manazo* Bleeker.
Shimonoseki.
3. *Mustelus griseus* Pietschmann.
Osaka, 6358a.
4. *Triakis scyllium* Müller & Henle.
Osaka, 6359a.

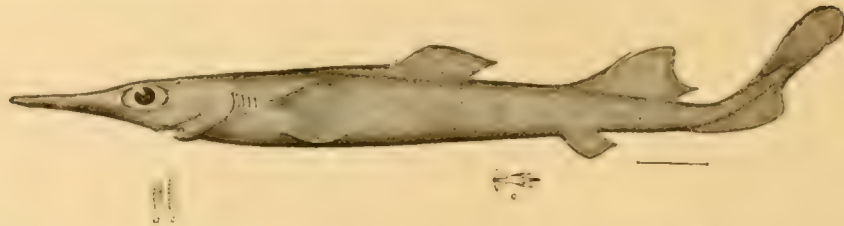
Family SPHYRNIDÆ.

5. *Sphyrna zygaena* (Linnæus).
Osaka, 6361a.

Family LAMNIDÆ.

6. *Isuropsis glaucea* (Müller & Henle).
Tokyo Market; two seen, not taken.

Family SQUALIDÆ.

7. *Deania eglantina* Jordan & Fowler.FIG. 1. *Deania eglantina* Jordan & Fowler. (From Proc. U. S. N. M., Vol. XXVI, p. 632).

Misaki. A large example, otherwise like the type. Head 4.125 in length, eye 7. The validity of the genus *Deania*, which is related to *Centrophorus*, has been questioned.

Family NARCOBATIDÆ.

8. *Narce japonica* (Temminck & Schlegel).

Tokyo, No. 6393a.

Family RAJIDÆ.

9. *Raja meerdervoorti* Bleeker.

Misaki, Nos. 6173a-b. (Mem. Carn. Mus., Vol. VI, p. 5, fig. 3).

10. *Raja kenojei* Müller & Henle.

Schinabara, Misaki, No. 6183a.

Family DASYATIDÆ.

11. *Urolophus fuscus* Garman.

Osaka.

Family DOROSOMATIDÆ.

12. *Konosirus punctatus* (Temminck & Schlegel).

Nagoya, Nos. 6020a-c; Misaki, No. 6448a.

Family CLUPEIDÆ.

13. *Stolephorus japonicus* (Houttuyn).

Misaki, Nos. 6248a-g.

14. *Harengula zunasi* (Bleeker).

Osaka, Nos. 6178a-e.

Adipose eyelid not obsolete; depth 3.4 in length; eye 3.5 in head.

15. *Ilisha elongata* (Bennett).

Osaka.

Family GONORHYNCHIDÆ.

16. *Gonorhynchus abbreviatus* Temminck & Schlegel.

Misaki, No. 6033a, the third specimen known. 240 mm. in length; identical with the one described by Jordan & Herre.

Compared with *Gonorhynchus gonorhynchus* from Port Jackson, Australia, the eye is larger, the head longer, the depth greater, the pectoral longer, and there is one ray less in dorsal and anal. Head 4.25 in body; depth 7.5; D. 11; A. 8. Eye 4 in head, snout 2.5; interorbital 4; pectoral 5 in body. Scales 162-42. In *G. gonorhynchus*, the head is 4.66 in length, the depth 8.66. D. 12; A. 9. Scales 161-48.

Family ALEPOCEPHALIDÆ.

17. *Alepocephalus umbriceps* sp. nov. (Plate XXIV, fig. 1.)

A single specimen from Aomori. 270 mm. in total length. Type No. 6030a, Catalog of Fishes, Carnegie Museum.

Head 2.75 to base of caudal; depth at pectorals 5.33; eye equal to snout, 4 in head; maxillary 2.66; D. 17; A. 17; P. 11; branchiostegals 7; 65 pores in lateral line.

Head very large, nearly as deep as body, which is deepest at pectorals; bony interorbital space, 6.5 in head; postorbital length of head equal to half its whole length; maxillary ending under center of eye; jaws equal; teeth in single series on premaxillaries, of small size, not canine-like; a row of very delicate and minute teeth on lower edge of maxilla, not visible to naked eye as teeth; close-set cardiform series in lower jaw of same size as those on premaxillaries; palatines ridge-like, set on edge with narrow band of similar teeth; gill-rakers 7+19, longest one-third diameter of eye.

Dorsal inserted over anus, which is midway between edge of opercle and base of middle caudal ray, and its base 2.5 in head; caudal forked, central rays half length of longest, tenth or eleventh ray longest, counting rudimentary rays from either edge; each edge continued on caudal peduncle by a thin fold of skin half-way to last dorsal and anal rays; anal inserted under third or fourth dorsal ray, and terminating a quarter of the length of the eye behind last dorsal ray; both anal and dorsal on fleshy bases; ventral inserted nearly midway between pectoral and anal insertion, its length slightly greater than diameter of eye; pectoral small, 2.8 in head.

Scales imbricate, deciduous, bases narrower than tips, sides straight; concentric lamellæ distinctly visible to naked eye; scales present on bases of vertical fins; head entirely scaleless, covered with loose skin.

Color of head dense black, each scale of body tipped with black; all fins black; mouth-cavity and peritoneum black.

Family MICROSTOMATIDÆ.

18. *Nansenia ardesiaca* Jordan & Thompson, sp. nov. (Plate XXIV, fig. 2.)
(*Nansenia granlandica* Tanaka, non Reinhardt.)

This species is well figured by Tanaka.

Description of a specimen (No. 6023a) 190 mm. in total length, taken in three hundred and fifty fathoms at Okinose, in Sagami Bay, Alan Owston collection:

Head 4.5 in body, 5 in total length; body-depth 8 in body-length; eye 2.33 in head; snout 6.5; maxillary 4.5; interorbital space 4; dorsal rays 10; anal 10; pectoral 12; ventral 12; scales in lateral line 55 (five of which are on caudal); from center of breast to middorsal line 8 (counting lateral line); gill-rakers 12+25.

Body elongate, subcylindrical, greatest depth from between posterior margin of eye to insertion of dorsal fin; caudal peduncle half this depth. Eyes very large, projecting somewhat above dorsal profile of head and approaching ventral profile; snout very short and blunt; lower jaw somewhat projecting; mouth opening obliquely; line of maxillary approaching vertical; maxillary covered by anterior end of pre-orbital, reaching slightly behind anterior margin of eye; teeth small, conical, in a single rather thick-set row in each jaw, none enlarged or canine-like; vomer and palatines toothless; interorbital space broad, concave; suborbital and opercular bones thin and flexible; latter with emargination above angle, leaving open passage to gill-cavity.

Dorsal fin inserted slightly before middle of distance between snout and base of caudal, its base half the length of the fourth ray, which is equal to the distance from the tip of snout to posterior border of eye; ventrals inserted slightly behind last dorsal ray, length equal to fourth dorsal ray; anal inserted nearer caudal base than tips of ventrals, longest ray less than diameter of eye; pectorals narrow, first and twelfth rays simple, others branched, longest ray 1.75 in head; adipose fin small, inserted above posterior half of anal fin, its length 2.33 in eye. Caudal 1.5 in head, forked, but not deeply.

Scales large, thin, loosely attached; base of scales coarsely serrate, each basal radius projecting; circuli parallel to serrated edges, forming acute angles to correspond to teeth of base; circuli very fine and numerous. Tube of lateral line very large, its breadth a fourth of that of its scales; pores large, single; lateral line continued beyond base of caudal as an appendage formed of six or seven successive scales and attached only at the base to caudal ray. Lateral line tube continued over dorsal surface of head to snout, over the occiput and along lower margin of eye.

Color brilliant silvery; dusky on snout, jaws, opercular plate, and bases of caudal and ventrals; scales of a bright, silvery appearance. Along the center of

the back from the occiput to the insertion of the dorsal is a rather firm rod of tissue immediately below the skin. Having but the single specimen, we are unwilling to dissect it to ascertain the nature of this structure.

This is probably distinct from *Nansenia grænlandica* described from a single specimen from Greenland, but Reinhardt's scanty account indicates no certain difference.

Family SALMONIDÆ.

19. *Oncorhynchus keta* (Walbaum).

(Mem. Carn. Mus., Vol. VI, p. 9, fig. 8).

Sendai.

A breeding male, weighing 8 pounds; greenish, side silvery, barred with dirty crimson; no spots; top of dorsal black; A. 14, D. 12 or 13. Gill-rakers 10+13. Scales 130. Pyloric cæca about 100. Flesh orange, rather soft, becoming pale and mushy when cooked, palatable, but, at the best, much inferior to that of the Masu.

This species, the Dog Salmon or Calico Salmon of Alaska, is the large salmon or Sake of Japan. It is very extensively salted, the flesh when salted being quite red. It ranges southward as far as the Tonegawa, north of Tokyo. No specimen in the Carnegie Museum.

20. *Oncorhynchus masou* (Brevoort). (Plate XXIV, fig. 3.)

(*Salmo macrostomus* Günther).

Lake Biwa, Sendai, Lake Chuzenji (planted in latter locality). No. 6002a.

The Masu, the young being called Yamame or Yamabe, is a species close to the Silver Salmon (*O. kisutch*) of Alaska. It is common as far south as Lake Biwa, and is sometimes landlocked, as in Lake Chuzenji, where it has been artificially introduced. This is a true *Oncorhynchus*, all its individuals dying after spawning. There is no true trout, that is, no species of *Salmo*, native in Japan.

The salmon called *Oncorhynchus yessoënsis* is not known to the Japanese Bureau of Fisheries and is probably not different from *O. masou*. *O. kisutch* is not certainly known from Japan, the specimens thus far called by that name being *O. masou*. Mr. Tokishiro Koshida of the Bureau of Fisheries informs us that the king Salmon, *Oncorhynchus tshawytscha*, known as "Masunosuke," or Lord of the Salmon, is found in Nemuro and occasionally as far south as Hakodate.

The "Benimasu" or Red Salmon, *Oncorhynchus nerka*, is common in Nemuro and landlocked in the lakes of that region. *Oncorhynchus masou* is known in Lake Chuzenji as "Hinemasu." It was introduced there from Akita, and has become landlocked.

Gill-rakers long, 9+15 to 18; scales 133. A. 14; D. 13; vomer with seven or eight sharp teeth.

Color olive, sides silvery; back with two or three irregular rows of brown spots, a few on dorsal, some at base, some on upper part of caudal, none on adipose fin. The sides turn red in fall.

Another specimen, a male, somewhat hook-nosed. A. 14, besides rudiments. Gill-rakers 8+17. Caudal forked; tip of dorsal paler, not black. Adipose fin large. Unspotted bases of fins dark. Dorsal and caudal with some black spots; back with spots; spots along base of dorsal; pyloric caeca few, not over forty to fifty. Weight three or four pounds.

21. *Plecoglossus altivelis* Temminck & Schlegel.

(Mem. Carn. Mus., Vol. IV, p. 167, fig. 3; *l. c.* Vol. VI, p. 10, fig. 9).

Matsushima, Nos. 6257a-b; Okayama, Nos. 6101a-g; Lake Biwa at Matsubara, Nos. 6409a-f; Yodo River, near Osaka, Nos. 6315a-c.

Family SALANGIDÆ.

22. *Salanx microdon* Bleeker.

Matsushima Bay, Nos. 6065a-f.

Depth eight to eleven inches in length.

Family AULOPIDÆ.

23. *Aulopus japonicus* Günther. (Plate XL, fig. 1).

Misaki, No. 6461.

Family SYNODONTIDÆ.

24. *Saurida argyrophanes* (Richardson).

Osaka, Nos. 6332a-c; three specimens, the longest being 250 mm. in length, as long as the types of *Saurida eso*. Scales 47-54. Misaki, Nos. 6306a-b; Shimonoseki, No. 6194a.

25. *Saurida eso* Jordan & Herre.

(Mem. Carn. Mus., Vol. VI, p. 12, fig. 12).

Osaka, No. 6323a. Length 264 mm. Scales 63. In *S. argyrophanes*, the scales are always larger. Shimonoseki, No. 6162a.

26. *Synodus japonicus* (Houttuyn).

Kobe, No. 6085a.

27. *Trachinocephalus myops* (Forster).

Kobe, Nos. 6231a-b; Misaki, Nos. 6193a-b.

Family MYCTOPHIDÆ.

The Japanese species of this family are described in a preceding paper by Professor Gilbert. The following were obtained by us from Mr. Owston's dredgings with the "Golden Hind."

28. *Dasyscopelus orientalis* Gilbert.
(Mem. Carn. Mus., Vol. VI, Pl. XI, fig. 1).
Misaki, No. 4613 type, 4614a-z, 4615; 4616.
29. *Diaphus gigas* Gilbert.
(Mem. Carn. Mus., Vol. VI, Pl. XII, fig. 2).
Sagami Bay, No. 4602a.
30. *Diaphus cæruleus* (Klunzinger).
Sagami Bay, Nos. 4603a-g.
31. *Diaphus latus* Gilbert.
(Mem. Carn. Mus., Vol. VI, Pl. XIII, fig. 1).
Sagami Bay, No. 4604 type, 4605a-d.
32. *Diaphus sagamiensis* Gilbert.
(Mem. Carn. Mus., Vol. VI, Pl. XIII, fig. 2).
Sagami Bay, No. 4608 type, 4609a-c.

Family SILURIDÆ.

33. *Parasilurus asotus* (Linnæus).
(Mem. Carn. Mus., Vol. IV, fig. 4, p. 168; *l. c.*, Vol. VI, fig. 13, p. 12).
Okayama, Tama River, near Tokyo, Nos. 6440a-b; Lake Biwa, Nos. 6291a-e.
34. *Liobagrus reini* Hilgendorf.
Lake Biwa at Matsubara, No. 6125.

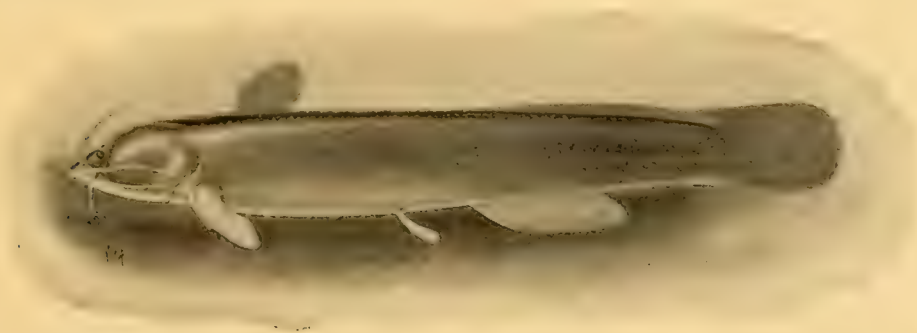


FIG. 2. *Liobagrus reini* Hilgendorf. (From Proc. U. S. N. M., Vol. XXVI, p. 910).

Depth 6 in total; eye 4 in interorbital; spines of fins not half length of soft rays.

5. *Fluvidraco nudiceps* (Sauvage).

Lake Biwa at Matsubara. Nos. 6275a-b. Young piebald; fins dark; a white caudal spot.

36. *Pseudobagrus aurantiacus* (Temminck & Schlegel).
Near Tokyo, No. 6422a.

Family PLOTOSIDÆ.

37. *Plotosus anguillaris* Lacépède.
Misaki, 6222a-b, 6352 many; Goto Islands, 6421a.

Family COBITIDÆ.

38. *Misgurnus anguillicaudatus* (Cantor).
(Mem. Carn. Mus., Vol. VI, p. 14, fig. 15).
Nagoya; Yodo River, at Osaka 6284 many; Lake Biwa, at Matsubara, Nos. 6080a-b.

39. *Hymenophysa curta* (Temminck & Schlegel).
Lake Biwa, at Matsubara, No. 6097a. Body with eight transverse black bars, the first on the occiput; two others on the caudal; those on the body broadest above and fading out entirely on the ventral region; fifth bar continuous with black base of dorsal; a light bar across dorsal fin, the fin otherwise black with a clear edge; anal with a black submarginal shade. Caudal with two dark cross-bars, the first across its base, with a central blotch; each lobe tipped with black. The colors in life have not hitherto been fully described.

40. *Cobitis tænia* Linnæus.

Okayama, Nos. 6112a-c. Nos. 6096a-f, Lake Biwa.

The Japanese species, if distinct from the European *C. tænia*, is *Cobitis biwa* Jordan & Snyder.

Family CYPRINIDÆ.

41. *Hemibarbus barbus* (Temminck & Schlegel).

Matsubara, on Lake Biwa, No. 6232a.

42. *Pseudogobio esocinus* (Temminck & Schlegel).

Lake Biwa, at Matsubara, Nos. 6399a-b, Okayama.

43. *Sarcocheilichthys variegatus* (Temminck & Schlegel).

Lake Biwa, at Matsubara, No. 6333 many.

44. *Gnathopogon gracilis* (Temminck & Schlegel).

(*Leucogobio biwa* Jordan & Snyder.)

Lake Biwa, at Matsubara, No. 6064a.

The genus *Gnathopogon* of Bleeker is identical with *Squalidus* of Dybowsky and *Leucogobio* of Günther, both later names. *Leucogobio biwa* seems to be the same as *Capoeta gracilis* of Schlegel, which, according to Schlegel's figures and description,

has the depth 5.5 in length to fork of caudal, the barbel a little longer than in *G. elongatus*, the pectorals extending nearly to the ventrals, the vent well-removed from the anal fin, and the scales 4-35-5.

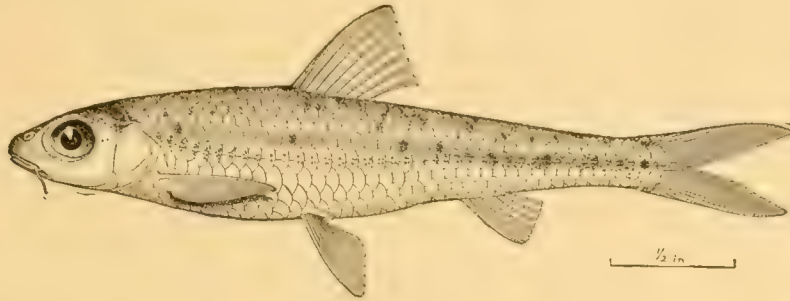


FIG. 3. *Gnathopogon gracilis* (Temminck & Schlegel). (From Proc. U. S. N. M., Vol. XXIII, Pl. IX, fig. 1).

45. *Gnathopogon elongatus* (Temminck & Schlegel).

(*Leucogobio güntheri* Ishikawa).

Lake Biwa, at Matsubara; Nagoya; No. 6161 many, Yodo River, at Osaka.

The specimens from Lake Biwa, described as *Leucogobio güntheri* by Jordan and Fowler, correspond entirely to Professor Ishikawa's account of the species. The *Capoeta elongata* of Schlegel is certainly the same, agreeing in the deep caudal peduncle and the short pectoral, not extending half way to ventrals. Depth 4 in body; barbel long; scales thirty-eight.

46. *Gnathopogon mayedæ* (Jordan & Snyder).

(*Leucogobio mayedæ* Jordan & Snyder).

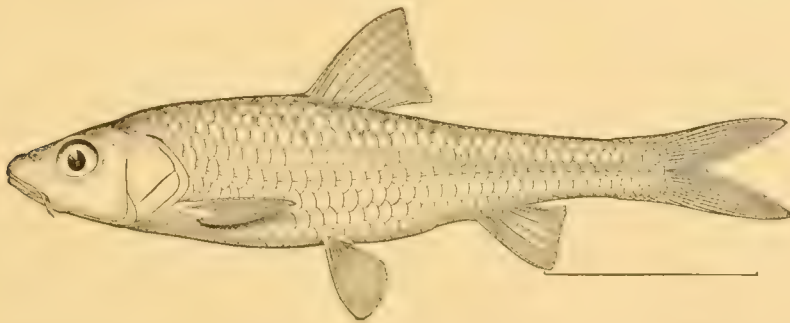


FIG. 4. *Gnathopogon mayedæ* (Jordan & Snyder). (From Proc. U. S. N. M., Vol. XXVI, p. 828).

Lake Biwa, at Matsubara, No. 6134a. The males bear an overgrowth about the mouth, placed as are the tubercles in *Acheilognathus*.

47. *Gnathopogon ishikawæ* sp. nov. (Plate XXIV, fig. 4).

The description is of type and cotypes, Nos. 6014-c, C. M., altogether fifteen in number from the Chikugo River at Kurume, collected by Jordan and Snyder in

1900, the largest breeding female, sixty-three millimeters in total length, being taken as the type.

Head 3.14 in length of body to base of caudal (50 mm.); depth equal to head; D. III, 7; A. II, 6; scales in lateral line 34; in transverse series between insertions of vertical fins 3.5-2.5; pharyngeal teeth 5, 2-2, 5.

Snout slightly longer than eye, which is 3.75 in head; tip of premaxillaries at, or below, level of lower margin of orbit; mouth but little oblique; barbel long, one-half to two-thirds diameter of eye, its base under the posterior nostril; maxillary ending under the anterior margin of the eye; distance from snout to occiput 5 in body length; gill-rakers very short and soft, 2 or 3 on each limb of first arch; pharyngeal teeth smooth, unserrated, the tips bent toward the lateral surface of each tooth, a grinding surface present; breadth of body more than half its depth, which is greatest at the insertion of the dorsal and slopes evenly to the rather deep caudal peduncle, the length of which is contained 1.33 in head and its depth 2.5 in head.

Dorsal inserted, as in all known species of the genus, nearer the snout than the base of the caudal by the length of the former; its margin straight, each ray extending beyond the following one when supine, the first branched ray the longest, 1.12 in head; anal inserted under twenty-second scale of lateral line and beyond tip of dorsal rays, its margin straight, the tips coinciding when supine, extending more than half the distance between last anal ray and the first of the caudal, the length of the longest ray 1.6 in the head; pectorals extending more than two-thirds of the distance to the base of the ventrals, failing to reach them by the diameter of the pupil, their length nearly equal to the distance between the snout and the occiput; ventrals reaching anus, their length less than that of the pectorals by half the diameter of the pupil, the anus removed from the first anal ray by two-thirds the diameter of the eye, and by two and one-half scales; caudal nearly equal to length of head.

Lateral line but slightly decurved, complete; scales of middle line of back much enlarged, especially behind the dorsal, where they are slightly over twice the diameter of those on either side of them; before the dorsal there are three rows between the central row and the lateral line, while behind the dorsal there are two.

Color-pattern lacking, save for a spot of dark at the base of the first dorsal rays; space above the lateral line with irregular spots the size of the scales, the edges of which are occasionally pigmented; scales of the lateral line in the type pigmented where overlapped by the preceding scales; an indistinct dark line or stripe along side behind dorsal, continued anteriorly in an unpigmented space; caudal spot lacking; peritoneum silvery, with small spots of black.

This species is most closely related to *Gnathopogon mayedæ*, from which it may be at once differentiated by the longer barbel and the extension, when supine, of the anal rays, more than half-way from the last anal ray to the first caudal ray. Other differences are the scales enlarged in the middle line of the back, the presence of one more series of scales above the lateral line, the slightly shorter distance from the tip of the snout to the occiput, the longer ventrals, and deeper caudal peduncle.

Among the cotypes are both males and females, with ripe gonads. The male is distinguished from the females by the presence of a smooth overgrowth on the front and sides of the snout. The eggs are small, as in others of the genus, being about half a millimeter in diameter. As the female, which was taken as the type, is the most strongly pigmented of any of the specimens, it is probable that the males are not, as a rule, colored more highly than the females.

Among the specimens recorded by Jordan and Snyder from Lake Biwa as *Leucogobio mayedæ* there are a number of specimens of this species, all of them very small. Nos. 6009a-c Lake Biwa.

This species is named for Professor Chiyomatsu Ishikawa, of the Imperial University of Tokyo, who early studied the fishes of Lake Biwa.

KEY TO JAPANESE SPECIES OF *Gnathopogon*.

- a. Anus distant but the breadth of one scale from first anal ray; pectoral extending less than two-thirds of distance to ventrals; gill-rakers numerous, 4+9 or 10; body-depth 4.
 - b. Caudal peduncle deep, 8.5 in body; barbel long, three-fifths of diameter of eye; scales 36 to 38; pharyngeal teeth only occasionally and slightly serrate.....*elongatus*.
 - bb. Caudal peduncle slender, about 10 in body; barbel short, one-fourth of diameter of pupil; scales 42; pharyngeal teeth constantly and strongly serrate on grinding surface.....*jordani*.
- aa. Anus distant at least 2.5 scales from first anal ray (two-thirds of eye); pectoral extending more than two-thirds distance to ventrals; gill-rakers short and rudimentary, 3 or 4+4, lacking anteriorly.
 - c. Depth 4 in body; anus 2.5 scales (two-thirds diameter of eye) distant from first anal ray.
 - d. Scales in middle line of back enlarged; rows between lateral line and dorsal 3.5; anal rays extending over half-way from base of last to first caudal rays; maxillary not reaching beyond orbit, its barbel under nostril; barbel two-thirds of eye.....*ishikawæ*.
 - dd. Scales in middle line of back not enlarged; rows between lateral line and dorsal 4.5; anal rays not extending half-way to first caudal rays; maxillary reaching beyond orbit; its barbel short, less than pupil.....*mayedæ*.
 - cc. Depth 6 in body-length; anus distant the breadth of 4.5 scales (1.16 times diameter of eye) from insertion of anal fin; 5 scales above lateral line; barbel one-half diameter of eye; scales in middle line of back but slightly enlarged.....*gracilis*.

48. *Acheilognathus rhombeus* (Temminck & Schlegel).

Lake Biwa, at Matsubara, No. 6327 many.

Capoeta rhombea Schlegel, Fauna Japonica, Poiss., 1846, p. 205, pl. C., fig. 6; near Nagasaki.

Acheilognathus rhombeus Bleeker, Prodr. Cypr., 1, 1860, p. 255.

Paracheilognathus rhombeus Bleeker, Atl. Ichthyol. Cypr., 1863, p. 33.

Achilognathus rhombeus Günther, Cat. Fish., VII, 1868, p. 279; Nagasaki, from one of Schlegel's types; Ishikawa, Prel. Cat., 1897, p. 12; Tokyo, Lake Biwa, Yamashiro.

Paracheilognathus rhombea Jordan and Fowler, Proc. U. S. N. Mus., Vol. XXVI, 1903, p. 815, Lake Biwa, Yodo River, Chikugo River, Funayado; Lake Yogo, Tanaka, Ann. Zoöl. Jap., VII, Part. 1, 1908, p. 2; Lake Biwa, at Katata and Iba.

Acheilognathus rhombeum Jordan & Snyder, Proc. U. S. N. M., XXIII, 1901, p. 343; Lake Biwa.

Achilognathus steenackeri Sauvage, Bull. Soc. Philom., Paris, 1883, p. 3; Lake Biwa.

Apparently the genus *Paracheilognathus* Bleeker, of which this species is type, characterized by the plicate teeth and the long dorsal, cannot be separated from *Acheilognathus*. The species of this genus, very numerous in Japan and China, are much alike in appearance and have been the object of much confusion.

This species is here described from numerous specimens from Lake Biwa and Chikugo, the longest 11.5 cm. in total length. These are in part those of Jordan and Fowler (Proc. U. S. Nat. Mus. XXVI, p. 815).

Depth 2.5 to 2.12 in body-length; D. III, 12 (11 to 14); A. II, 10 (9 or 10); scales in lateral line thirty-five to thirty-eight, in transverse series between insertion of vertical fins 6/5 or /6; pharyngeal teeth 5-5.

Head 4 in body-length; snout 3.56 in head; mouth horizontal, tip of premaxillaries level with lower edge of orbit; profile of snout arched at nostrils, that of occiput strongly depressed in adults; eye equal to snout or somewhat less; barbels very short, at most, eight times in eye; gill-rakers 4+11 on first arch, equal in length to barbels; pharyngeal teeth folded or plicate on the lower lateral face of each in a transverse direction, not truly serrate, with narrow grinding surface and hooked tip; depth of caudal peduncle slightly more than half the length of head, its length 1.25 in head.

Dorsal inserted midway between snout and base of caudal, its base 1.12 times length of head, its height nearly equal to head; outline of fin rounded, first rays not extending beyond base of last when supine; anal inserted under sixth branched dorsal ray, its base 1.5 in that of the dorsal, its height 1.5 in head, margin rounded, first rays not extending beyond base of last; pectorals and ventrals 1.5 in head.

Body dark above, especially on line of back; a blue-black stripe as wide as pupil arising abruptly at fourth scale from last in lateral line and extending forward to below first branched rays of dorsal; a blue-black spot just behind and above angle of opercle nearly as large as eye. Dorsal fin-rays with a white spot on each, half-way to tip, the membranes marked with a corresponding blue-black blotch, just behind white parts of rays; often a second row of white spots on rays distal to the others and separated by darker spaces, giving the appearance of two fine stripes;

anal similar; caudal dark; paired fins clear; peritoneum black; pharyngeal teeth with pigmented covering save on grinding surfaces.

The males of this species differ in no way from the females, save in a darker belly and the presence of tubercles on the snout, and in two patches which are separated from the large tuberculated area before the eyes by a deep fold. The extent of the patches is larger than in most of the other species, but very variable according to the breeding season.

49. *Acheilognathus longipinnis* Regan.

Acheilognathus longipinnis Regan, Ann. Mag. Nat. Hist., 1905, p. 364; Lake Biwa (Yamasabu River), Nagoya.

Nos. 6418a-b, Nagoya.

The following is a description of five specimens, four of them males, the longest 87 mm. in total length, from Lake Biwa, at Matsubara, collected by Dr. Jordan in 1911:

Depth 2.16 in body-length to base of caudal; D. III, 15; A. II, 14 or 15; scales in lateral line 36, in transverse series 6/6 (between insertions of vertical fins); pharyngeal teeth 5-5.

Head 4 in body-length; snout 4 in head, very short in appearance and with its dorsal profile strongly arched; dorsal profile of head depressed at occiput; caudal peduncle short, its length from last anal ray to last vertebra equal to length of head without snout, or 1.4 in head; its depth 2 in head; tip of the premaxillaries at, or below, the level of the lower edge of the pupil; mouth more oblique than usual, due to the short snout; eye longer than snout, 3 in head; barbel absent; gill-rakers 3+13 on first arch, comparatively long, and not much shorter anteriorly than posteriorly; pharyngeal teeth plicate transversely on the lower lateral surface of each tooth, the narrow grinding edge not serrate, tip hooked.

Dorsal fin inserted midway between tip of snout and base of caudal peduncle; third and longest dorsal ray 1.1 in head; margin of fin straight or slightly rounded, its base 2.86 in body-length; anal fin inserted under fifth or sixth dorsal ray, its margin somewhat falcate, its base 3.5 in body-length, its last ray reaching half the distance between its own base and that of the first caudal rays; pectorals reaching base of ventrals, equal to length of caudal peduncle; ventrals extending slightly beyond first anal ray, their length contained 1.33 in head.

Color of specimens preserved in formalin very pale, somewhat darker above the lateral line, especially in the case of the female, the line of back darkest; no lateral stripe, or shoulder spot; dorsal fin with two black lines running longitudinally along the center of the fin, alternating with pale lines, the margins of the fins in the males

with a narrow margin of intense blue-black; anal similarly colored, but with a broader margin of black and more distinct stripes of black and white; pectorals, ventrals, and caudal in female but slightly pigmented, the ventrals in the males of an intense black with the outer rays white; the belly of the males black from throat to anal fin, including the base of the pectorals, the area sharply separated from the colorless area above.

The males of this species differ from the females in color as shown above and also in the possession of paired tuberculated areas on the tip of the snout and an area with slightly smaller tubercles on the dorsal surface of the snout between the nostrils and above the anterior edge of the orbit.

The fact that this species does not possess a barbel does not exclude it from this genus, because *Acheilognathus cyanostigma* Jordan & Fowler possesses the merest rudiment. All of the group with plicate pharyngeal teeth possess very small barbels.

50. *Acheilognathus tabira* sp. nov. (Plate XXV, fig. 1).

Acheilognathus limbata Jordan & Fowler, Proc. U. S. N. M., XXVI, 1903, p. 818, Lake Biwa at Matsubara and Karasaki, and Lake Yogo; (not of specimens from Morioka, and not of Schlegel) Tanaka, Ann. Zoöl. Jap., VII, Part 1, 1908, Iba, Matsubara, and Kihama.

The types of this species are the original of the description of *Acheilognathus limbata* Jordan & Fowler, although the specimens utilized by them were mingled with *A. moriokæ* Jordan & Thompson. They are now in the collection of Stanford University.

Described from numerous specimens No. 6007a type, No. 6016, forty specimens from Lake Biwa at Matsubara, collected by Dr. Jordan in 1911 and by Jordan and Snyder in 1900, ranging in length from very young to 85 mm. in total length.

Depth 3.12 in body-length; D. III, 9 or 10; A. II, 9 or 10; scales in lateral line thirty-six or thirty-seven, in transverse series from first rays of vertical fins 6/5; pharyngeal teeth 5-5 (occasionally 6-5 or 5-6).

Head 4 in body-length; snout 3.66 in head; mouth very oblique, anterior edge of premaxillaries slightly above lower margin of pupil, the region of the articulation of the mandible prominent; profile of snout arched above nostrils, not at tip of snout, which it does not overhang; eye large; gill-rakers 2+7; pharyngeal teeth hooked, with narrow grinding surface, some of them always serrated or folded on the lower lateral surface, although all are not usually so; lateral line complete; barbel very minute, fine of texture, less than one-fourth diameter of eye in length; caudal peduncle slightly more than twice in head, its length 1.25; breadth of body 2 in head.

Dorsal inserted nearly midway between snout and base of caudal, its base 1.2 in head, its height (first rays) 1.5, these when depressed just reaching base of last ray; anal inserted under last dorsal rays, its base 1.5 in head, its margin nearly straight, tips of first rays not reaching base of last; height of first rays 1.66 in head; ventrals as long as anal rays, inserted under first dorsal ray; pectorals 1.25 in head.

Color plain, save for a blue-black lateral stripe along center of caudal peduncle, nearly half as wide as pupil, tapering to a point under center of dorsal, its broadest part on caudal peduncle, not reaching caudal; a sharply margined blue-black shoulder spot as large as pupil; dorsal with two clear stripes half way up the rays, alternating dark, the margin being dusky; anal similar; other fins colorless, save the dusky caudal; peritoneum black.

This species is very hard to distinguish superficially from *Acheilognathus moriokæ*, from which it differs in more oblique mouth, less falcate anal fin, larger eye, and less strongly marked coloration. The most striking difference is in the plication of the teeth.

All the males of this species in hand have lesser depth than the females; anal black, edged with white, ventrals black, the first two rays white; and the ventral surface of the belly black or pigmented.

Our only specimen from Okayama, a male, has a shorter caudal peduncle and smaller eye than any of our examples from Lake Biwa, and is much paler in color. One specimen from Nagoya has a similar caudal peduncle, but is in other respects similar to specimens from Lake Biwa.

“Tabira” is a vernacular name for these fishes about Lake Biwa.

51. *Acheilognathus cyanostigma* Jordan & Fowler.

Lake Biwa, at Matsubara, Nos. 6063a-d.

Acheilognathus cyanostigma Jordan & Fowler, Proc. U. S. Nat. Mus., XXVI, 1903, p. 820, Fig. 2; Lake Biwa, at Matsubara, and Lake Yogo, in Mino.—Tanaka, Ann. Zoöl. Jap., VII, Part 1, 1908, p. 3; Matsubara, on Lake Biwa.

The following is a description of the type and cotypes of this species in the ichthyological collection of Stanford University, with numerous other specimens from Matsubara, Lake Biwa.

Depth 3.33 in body-length to base of caudal; D. III, 8; A. III, 8 or 9; scales in lateral line 38, in transverse series between insertions of vertical fins 6/4; pharyngeal teeth 5-5.

Head 4; snout 3.7 in head; anterior edge of premaxillaries level with lower edge of pupil; mouth horizontal; gill-rakers 2+8, longest at angle, short and thick; pharyngeal teeth hooked, plicate on lower surfaces, usually a narrow grinding sur-

face; lateral line complete; barbel nearly obsolete, but present as a knob on end of maxillary; caudal peduncle slightly longer than usual, 4 in body-length, its depth 10 in body-length.

Dorsal inserted nearly midway between snout and base of caudal, its base 1.5 in head, its height 1.5; anal inserted under sixth branched ray of dorsal, its base 2

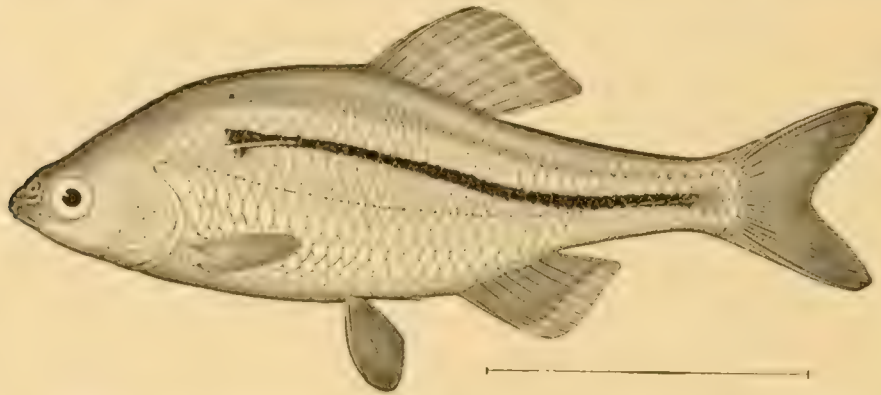


FIG. 5. *Acheilognathus cyanostigma* Jordan & Fowler. (From Proc. U. S. N. M., Vol. XXVI, p. 821).

in head, its height 1.66; its margin straight; pectoral 2 in body-depth; ventral equal to pectoral, inserted below origin of dorsal.

Color in alcohol plain, save for the lateral stripe of blue-black originating the width of a scale above the fifth or sixth scale of lateral line in a black spot as large as pupil and continued parallel to line of back to center of caudal, not reaching caudal fin; the anterior end of band frequently faint and the initial spot small; no shoulder spot; dorsal dusky, with a black line on first of distal half of rays, the black margined above and below by narrow white or clear stripes, the margin of fin sometimes touched with black; anal similar, but paler in strongly pigmented forms, with a broad margin of white; ventrals and pectoral clear, the former occasionally black.

52. *Acheilognathus limbatus* (Schlegel).

Capoeta limbata Schlegel, Fauna Japonica, Poiss., 1846, p. 203, pl. C, Fig. 5; near Nagasaki.

Achilognathus limbatus Günther, Cat. Fishes, VII, 1868, p. 277; from one of Schlegel's types.

Acheilognathus shimasui Tanaka, Ann. Zoöl. Jap., VII, Part 1, 1908, p. 3; Tokiwa, on Lake Biwa.

Among the specimens recorded as *Acheilognathus lanceolatus* from Funayado, Kiusiu, Japan, by Jordan and Fowler, is a third species, evidently identical with *Capoeta limbata* Schlegel.

The following description is based upon a specimen 56 mm. in total length, 44 mm. in body-length, and five smaller males and females, the smallest 34 mm. in body-length.

Depth 2.3 in body-length to last vertebra, D. III, 8; A. II, 10 or 11; scales in lateral line 33, in transverse series between insertions of dorsal and anal 6/4; pharyngeal teeth 5-5.

Head 4 in body-length; eye 3.12 in head, snout 4, with tubercles in breeding males; gill-rakers short, 2+7; pharyngeal teeth smooth, not plicate, hooked, with narrow grinding surface, without color; caudal peduncle strongly tapering, its length 1.3 in head, its depth 2; lateral line complete; barbel long, slightly shorter than snout.

Dorsal inserted nearer base of caudal than tip of snout, distance from snout to first ray 1.66 in body; dorsal base slightly less than four-fifths of length of head, its height 1.5 in head; anal inserted under second branched ray of dorsal, its base equal to that of dorsal; its height 2 in head, its margin straight; ventrals inserted before dorsal, their length slightly greater than anal height; pectorals 1.3 in head.

Color plain, without stripes or spots on body, although as a whole darker than usual and with the line of the back very dark; dorsal margined narrowly with black; a broad band of white below the margin as wide as pupil, the lower part so shaded as to form an indistinct dark band below the white; anal dusky, similar to the dorsal, but stripes less distinct, margin straight; ventrals and pectorals clear; peritoneum black.

This species is easily distinguished from all others of its genus in Japan by its greater depth, plain coloration, and fewer number of scales in the lateral line.

53. *Acheilognathus intermedius* (Temminck & Schlegel).

Lake Biwa, at Matsubara, No. 6258 many.

Capoeta intermedia Schlegel, Fauna Japonica, Pisces, 1846, p. 203, Pl. C, Fig. 4, near Nagasaki.

Acheilognathus intermedius Günther, Cat. Fishes, VII, 1869, p. 278, after Schlegel.—Sauvage, Bull. Soc. Philom., 1883, p. 3; Lake Biwa.—Ishikawa, Prel. Cat., 1897, p. 12; Tokyo, Yodo River at Kyoto; Maebara and Matsubara on Lake Biwa.

Acheilognathus melanogaster Bleeker, Act. Soc. Sci. Indo. Nederl., Japan, VI, p. 92, pl. 11, fig. 1, Tokyo.—Sauvage, Bull. Soc. Philom., 1883, p. 3; Lake Biwa.—Günther, Cat. Fishes, VII, 1868, p. 278, Tokyo, from Bleeker's types.—Ishikawa, Prel. Cat., 1897, p. 12, Lake Biwa, Owari.—Günther, Shore Fishes. Challenger, Repts., 1880, p. 72; Lake Biwa.

Acheilognathus lanceolata Jordan and Snyder, Proc. U. S. Nat. Mus., XXIII, 1901, p. 344; Lake Biwa.—Jordan & Fowler, Proc. U. S. Nat. Mus., XXVI, 1903, p. 819; Tsuchiura, Chikugo River, Yodo River. Lake Biwa, Katata, Lake Yogo, Wakanoura, Owari, near Nagoya (not specimens from Funayado),

This species is here described from very numerous specimens, adult and young, from Lake Biwa, at Matsubara, in part the collection of Dr. Jordan in 1911, and in part specimens previously recorded from that locality by earlier authors and now in the collection of Stanford University. They are the originals of *Acheilognathus lanceolata* Jordan and Fowler.

Depth 3.33 in body-length to base of caudal; D. III, 9; A. II, 10; scales in lateral line 36 to 39, in transverse series between insertions of dorsal and anal $6\frac{1}{4}$, pharyngeal teeth 5-5.

Head 4 in body-length; eyes 3.57 in head; snout 4; mouth but slightly oblique; barbel long, somewhat more than half diameter of eye, coarse; gill-rakers 2+8; pharyngeal teeth hooked, smooth, and with narrow grinding surface; caudal peduncle short, 1.14 in head, its depth 2 in head.

Dorsal inserted nearly midway between snout and base of caudal, its base 1.125 in head, its height 1.33; anal inserted under fifth or sixth branched dorsal ray, its base 1.33 in head, its height 1.83; its margin straight; pectorals and ventrals equal, 1.5 in head, the ventrals inserted under first dorsal ray.

Color in alcohol plain, without lateral stripes or spots, except for an indistinct line along sides of caudal peduncle; dorsal in adult with a broad indistinct bar of blue-black along the middle of membrane; anal similar, but margined with white; pectorals clear; ventrals and belly from jaws to middle of anal nearly black in all the males; peritoneum black.

54. *Acheilognathus lanceolatus* (Temminck & Schlegel).

Capoeta lanceolata Schlegel, Fauna Japonica, 1846, p. 202, pl. C., fig. 5, near Nagasaki.

Matsubara, on Lake Biwa.

We give here a description of a female specimen 93 mm. in total length, with numerous others, male and female, between 56 and 75 mm. in body-length, from Funayado, Kiusiu, collected by Jordan and Snyder (No. 7359, Stanford University Collection):

Depth 3.33 in body-length to last vertebra; D. III, 8; A. II, 9; scales in lateral line 35, in transverse series between insertions of vertical fins $6\frac{1}{4}$; pharyngeal teeth 5-5.

Head about 4 in body length; eye 3.16 in head; snout slightly longer than diameter of eye; mouth but little oblique; anterior edge of premaxillaries level with lower edge of pupil; gill-rakers 2+8, slender and short; pharyngeal teeth smooth, hooked, with narrow grinding surface, and uncolored; barbel long, equal to snout; lateral line complete; caudal peduncle short, 1.14 in head, measured from last anal ray, its depth moderate, 2 in head; breadth of body, 2 in head.

Dorsal insertion midway between snout and base of caudal, its base 1.33 in head, its height 1.5; anal inserted under last dorsal ray. Its base 1.5 in head, its height the same, its margin straight; ventral 1.83 in head, inserted under first dorsal ray; pectoral equal to length of base of dorsal.

Color in alcohol plain, save for faint trace of black in a line along sides of caudal;

dorsal surface of head and line of back dark; belly in males coarsely pigmented, with colored area sharply limited above, extending over ventral surface of head and along base of anal; dorsal with black along middle of membrane, but with the rays uncolored, and pattern frequently obscured by a general heavy pigmentation; anal narrowly margined with black, otherwise as dorsal; ventrals black, pectorals and caudal dusky; in many cases fins entirely colorless; peritoneum silvery with black reticulations.

This species may be distinguished from others by the absence of strongly marked lateral bands, the long barbels, the number of fin-rays, smooth pharyngeal teeth, proportions of the fin-bases and the measurements of the caudal peduncle. The specimens described were recorded as *Acheilognathus lanceolata* by Jordan and Fowler. From this species it is differentiated by the possession of one less divided ray in both the dorsal and anal fins, by the longer barbel, and by the greater average depth of the caudal peduncle.

55. *Acheilognathus moriokæ* sp. nov. (Plate XXV, fig. 2).

Acheilognathus limbata Jordan & Fowler, Proc. U. S. N. Mus., XXVI, 1903, p. 818, in part. Specimens from Morioka, on the Kitakama River, and some specimens from Lake Biwa, at Matsubara.

Among the specimens recorded from Morioka by Jordan and Fowler as *Acheilognathus limbata* is a species which appears to be new. The type is in the collection of Stanford University. Cotypes are in the Carnegie Museum.

Description of the type, 95 mm. in total length and 75 mm. in length to base of the caudal.

Head 4 in body-length; depth of body 2.86; D. III, 9; A. II, 8; thirty-seven scales in lateral line, in transverse series between vertical fins 6/5; pharyngeal teeth 5-5.

Tip of premaxillaries at level of, or slightly below, lower edge of pupil; snout slightly overhanging premaxillaries; mouth not very oblique; gill-rakers 2+12, of equal length throughout; pharyngeal teeth smooth, with a narrow grinding surface and hooked tip; lateral line complete; barbel a quarter of diameter of eye in length, or less, somewhat coarse in texture; depth of caudal peduncle 2 in length of head, its length 1.14 in same, or 4.5 in body-length.

Dorsal inserted midway between tip of snout and base of caudal; its base 1.25 in head; its length 1.5; anal inserted under last dorsal ray, its base 1.7 in head, its height the same, first branched ray extending beyond base of last; margin of fin somewhat falcate; ventrals under dorsal insertion, their length equal to anal height; that of pectorals slightly greater.

A blue-black lateral stripe along sides of caudal, its width over half as wide as

eye, tapering to a point under first dorsal rays and shortly before base of caudal; shoulder-spot very indistinct, diffuse, extending posteriorly over five or six scales. Dorsal slightly margined with black, three narrow white stripes alternating with dark ones on median part of fin; anal nearly colorless, with traces of white stripes on middle of rays; other fins colorless. In a cotype the ventral and anal fins are dusky, but with a clear edge.

Of this species we also have a number of specimens from Lake Biwa, resembling the type in every respect. It is distinguished from other species by the number of the fin-rays, short dorsal base, broad lateral stripe, indistinct shoulder-spot, and short barbel. From *Acheilognathus tabira* it is distinguished by a less oblique mouth, serrated pharyngeal teeth, smaller eye, less depth, more falcate anal, the first developed ray extending always beyond the insertion of the last, and one less ray in both the dorsal and the anal. In none of our specimens is the shoulder-spot so distinct as in *Acheilognathus tabira*.

A specimen from Funayado, Kiusiu, collected by Jordan and Snyder, is a female differing from this species by one less ray in the anal, a very short barbel, and shorter fin-bases. The lateral line is complete, the pharyngeal teeth smooth, with a very narrow grinding surface.

KEY TO JAPANESE SPECIES OF *Acheilognathus*.

- a. Pharyngeal teeth in part at least plicate transversely on the lower lateral face of each tooth (not verified in *A. brevianalis*); barbels small or obsolete.
 - b. *Paracheilognathus* Bleeker; barbels small.
 - c. Dorsal fin very long, of fourteen or fifteen developed rays; shoulder-spot present, close behind opercle; depth 2.25 in length; anal rays nine or ten; dorsal base 3.5 in body; teeth all plicate. *rhombeus*.
 - cc. Dorsal fin short, of eight to ten developed rays.
 - d. Shoulder-spot close behind opercle; depth 2.75 in length; base of dorsal short; teeth not all plicate, scales thirty-seven; dorsal rays nine or ten; anal rays nine or ten. *tabira*.
 - dd. Shoulder-spot five or six scales behind opercle; dorsal base very short, 5 in length; scales thirty-nine. *cyanostigma*.
 - bb. *Rhodeops* Fowler, barbel wanting.
 - c. Dorsal with fifteen developed rays; opercular spot wanting; anal rays fourteen or fifteen; depth 2.125 in length. *longipinnis*.
 - cc. Dorsal with ten developed rays; anal with ten; depth 2.5; scales thirty-three; no shoulder-spot; teeth undescribed. *smithi*.
 - ccc. Dorsal with eight developed rays, anal rays seven, depth 3.2 in length; scales thirty-seven; no shoulder-spot; teeth little plicate (?). *brevianalis*.
- aa. *Acheilognathus*; pharyngeal teeth all smooth; barbel present, short or long; dorsal short, of about eight rays.
 - g. Depth great, 2.33 to 2.125 in body-length; no lateral stripe; barbels long, over half diameter of eye, and equal to snout; D. III, 8; A. II, 10 or 11. *limbatus*.

gg. Depth less, 3.33 to 2.77.

h. Barbels slightly over half diameter of eye; lateral stripe indistinct, or lacking.

i. D. with nine developed rays; A. 10; barbel 1.5 in snout.....*intermedius*.

ii. D. 8; A. 9; barbel equal to snout.....*lanceolatus*.

hh. Barbels much less than half of eye; lateral stripe indistinct, as wide as pupil of eye...*moriokæ*.

NOTE ON *Metzia* Jordan & Thompson, A NEW GENUS OF *Cyprinidæ*, ALLIED TO
Acheilognathus.

The species described by Jordan and Evermann (Proc. U. S. N. Mus., Vol. XXV, 1902, p. 323), as *Acheilognathus mesembrinus*, may be taken as the type of a new genus, *Metzia*, characterized by three rows of pharyngeal teeth 1-3-5 on left side, 1-3-4 on right; lateral line complete, decurved; anal inserted behind last dorsal ray; maxillary long, extending beyond anterior border of eye; body deep, compressed; peritoneum black; intestine elongate; no barbel. Characters otherwise as in *Acheilognathus*. Named for Charles William Metz, assistant in Stanford University, and associated with the writers in the identification of the fishes of the collection upon which we are now reporting.

56. *Acanthorhodeus atremius* sp. nov. (Plate XXV, fig. 3).

The genus *Acanthorhodeus* Bleeker is separated from *Rhodeus* by the development of one of the rudimentary rays of the dorsal as a distinct spine. The Chinese species of the genus are large fishes, sharply separable from *Rhodeus*, but the Japanese species of *Acanthorhodeus* are scarcely distinct from the other genus. This may make the mergence of the two groups necessary.

Described from two specimens collected by Jordan & Snyder in the Chikugo River at Kurume in 1900; both males, 4.5 and 5 cm. in total length; type in the Stanford University Collection: cotype in the Carnegie Museum.

Head 4 in body-length; depth 2.4; eye 2.66 in head; snout 4; length of caudal peduncle from last anal rays 1.25 in head, its depth 2; dorsal height 1.25; dorsal base 1.125; anal height 1.5, its base 1.2; D. rays II, 10; A. II, 9 or 10; pharyngeal teeth 5-5; scales in lateral series, 32, in transverse series between insertions of vertical fins 11, between occiput and dorsal 16.

Snout not overhanging premaxillaries, its tip level with lower half of pupil; maxillaries not quite reaching anterior border of orbit; mouth not very oblique; male with tubercular prominences on snout widely separated and protuberant; a small tuberculated area above and between eye and nostril; no barbels present; pharyngeal teeth hooked, with narrow grinding surface occasionally plicate on the lower side as in *Acheilognathus rhombeus*; gill-rakers short, 3+6.

Dorsal inserted midway between snout and base of caudal, its third, or first

branched ray extending beyond base of last; second ray somewhat spine-like and strong, its length two-thirds that of succeeding ray; first spine three-fifths of length of second; outline of fin straight, last ray nearly as long as third; anal similar, save that its spine is three-quarters of the length of the succeeding ray; its insertion under fourth branched ray of dorsal; its third ray, when supine, extending beyond base of its last ray; pectorals reaching beyond base of ventrals, their length 1.2 in head; ventrals reaching insertion of anal, length slightly less than that of pectorals.

Lateral line continued horizontally, only through first four scales, its lateral series of scales then dropping sharply towards ventral line of body.

Color-pattern that of *Acheilognathus*, a lateral blue-black stripe, widest posteriorly where it nearly equals diameter of pupil, and ending abruptly; anteriorly the stripe narrows, vanishing two or three scales in front of dorsal; an indefinite shoulder-spot just behind angle of gill-opening, succeeded by a silvery area two scales wide, another indefinite spot behind this, the whole slightly larger than eye; line of back very dark; belly pigmented, as is usual in males of this group; dorsal anteriorly margined with white, posteriorly tipped with black; remainder of fin dusky, with two faint narrow longitudinal stripes about the middle; anal similar, but with white margin continued posteriorly proximal to black tips of rays; stripes on fin very indistinct, pectorals and ventrals without pattern, latter dark, as is the belly.

This species may be easily distinguished by the broad lateral band of blue-black and the white margined anal, besides by the depth and the pharyngeal teeth.

57. *Acanthorhodeus sciosemus* sp. nov. (Plate XXVI, fig. 1).

Described from six females and three males, the longest 4 cm. in total length, from Chikugo, collected by Jordan and Snyder in 1900. The type is in the Stanford University Collection.

Head 3.75 in body-length; depth 2.5; eye 2.75 in head; snout 4.25; length of caudal peduncle from last anal rays 1.4 in head, its depth 2; dorsal height 1.33; anal height 1.4. Dorsal rays II, 10; anal rays II, 9 or 10; scales in lateral series 32, in transverse series, between insertions of vertical fins, 11; pharyngeal teeth 5-5.

Snout not overhanging premaxillaries, its tip level with center of eye; maxillaries extending to below anterior margin of eye; no barbel present; mouth but slightly oblique; tuberculated areas on snout of males not prominent in any specimens examined, nor are patches present before eyes; pharyngeal teeth hooked, with narrow grinding surface, without serrations or plicate sides; gill-rakers short, 2+4.

Dorsal inserted nearer base of caudal than tip of snout by length of latter; first branched ray extending beyond base of last, when supine; second ray spine-like with flexible tip, as long as succeeding ray; first spine half length of second; last ray

three-fifths length of third; outline of fin straight; anal similar in all respects, its insertion under fourth branched ray of dorsal; first branched ray barely reaching base of last one; pectorals 1.33 in head, just reaching base of ventral, latter four-fifths length of pectorals, and not reaching insertion of anal.

Lateral line present in first four scales, series continuing, dropping sharply from fourth towards ventral line of body.

A blue-black lateral stripe, half as wide as pupil, beginning three or four scales from last scales on caudal base and continued to within eight scales of angle of gill-opening, broadest part above anal base; shoulder-spot behind angle of gill-opening present in males only, represented in females by an occasional dusky area; in males very definite, square, as large as pupil, followed by a similar silvery area and a subsequent dark blotch; line of back darkest just before dorsals; belly in males pigmented as usual; dorsal with a prominent, definite blue-black spot somewhat triangular, its tip at base of fifth branched ray, its base as wide as pupil and half-way up second spiny ray; this spot being apparently the anterior portion of a broad stripe which is posteriorly indistinct; distally to this the fin is white having distad a narrower dusky band parallel to margin of fin; other fins without visible pattern.

The males of this species are apparently slenderer than the females with a depth slightly more than two and one-half times in the body-length; the anal narrowly edged with black; a broader and more vivid lateral stripe and shoulder-spots. The belly is pigmented as usual. In one specimen the spot on the dorsal is lacking.

KEY TO JAPANESE SPECIES OF *Acanthorhodeus*.

- a.* Lateral band broad as pupil, not pointed posteriorly; lateral line completely absent; no large spot on dorsal..... *atremius*.
aa. Lateral band very narrow, less than half width of pupil; lateral line present in first four scales; a large black spot anteriorly on dorsal..... *scioscimus*.

58. *Rhodeus kurumeus* sp. nov. (Plate XXVI, fig. 2).

Described from numerous specimens collected in the Chikugo River at Kurume in Kiusiu by Jordan and Snyder in 1900, the longest female 5 cm. in total length, the longest male 5.3 cm., both breeding, the females frequently with eggs partly extruded through the ovipositor. A male in the Stanford collection is taken as the type; No. 6011a Carnegie Museum is the cotype.

Head 3.83 in body-length; depth 2.75; snout 4 in head; eye 3.2; length of caudal peduncle from last anal rays 1.5 in head, its depth 2.125; dorsal height 1.4; dorsal base 3.4 in body-length; anal height 1.33 in head; its base nearly equal to head; dorsal rays II, 10 (or 11); anal rays II, 10 (or 11); pharyngeal teeth 5-5; scales in lateral series 33 (32-35), in transverse series, 11, between occiput and fifteenth dorsal.

Tip of snout level with center of eye; maxillary ending below nostril and before eye; mouth but slightly oblique; male with tubercular prominences close together on front of snout; a number of horny buds ranged along upper anterior rim of orbit, and numerous others over dorsal surface of head in full breeding male; no barbels present; gill-rakers (in cotypes of same size) 3+10; pharyngeal teeth smooth, some hooked, others simple, sickle-shaped, grinding surface narrow, in some an indication of transverse striation.

Dorsal inserted midway between tip of snout and base of caudal, its first branched ray not reaching base of last, when supine; second ray flexible and pointed at tip, not spine-like, equal to length of succeeding ray; last ray more than three-fourths the length of the second; anal similar, its last ray two-thirds the length of third, its margin straight, not falcate nor emarginate; its insertion under third branched ray of dorsal, tips of last dorsal and anal rays opposite, when supine; pectorals not reaching bases of ventrals; latter barely reaching anal insertion; caudal longer than head. Lateral line lacking, scales in corresponding series in no way modified. Dorsal line of body very dark between occiput and insertion of dorsal; lateral blue-black band rather faint, pointed acutely at both ends, one-fourth as wide as pupil, beginning under fifth or sixth dorsal ray and continued to within four scales of base of caudal; shoulder-spot behind angle of gill-opening indefinite, though present, succeeded by a similar silvery area and another indefinite blotch, the whole larger than eye; dorsal dusky, with two rows of white spots on rays, the proximal row half-way up fin; no large spot present; anal similar, but much less distinctly colored, narrowly edged with black; ventrals dusky (breeding male); pectorals and caudal clear; ventral surface of belly pigmented.

The females of this species seem to be slenderer, depth 2.5 in length; without dark ventrals; anal with black margin; belly pigmented and with a fainter lateral stripe and color-pattern on fins less plainly shown.

A male specimen from Nagoya, resembling this species, has thirteen dorsal rays and fourteen rays in the anal, with a lesser depth of body. Having but the single specimen, we hesitate to regard it as a distinct species. The fins are plain dusky, the lateral stripe as in the other specimens; the lateral line entirely lacking. Two from Lake Biwa have a like number of fin-rays, and have a black spot anteriorly on the dorsal. As the normal number of anal rays in *Rhodeus kurumeus* is but twelve, it is probable that these specimens represent at least one other species.

59. *Tanakia oryzæ* (Jordan & Seale) gen. nov.

An examination of the type of *Rhodeus oryzæ*, at present in the collection of Stanford University, shows the lateral line to be apparently lacking posteriorly,

although the scales are modified throughout in a continuous series. The tip of each scale is emarginate and a groove lies along the center of the scale where the tube should lie. This species, with *Rhodeus miobuta* Tanaka, has barbels as in *Acheilognathus*. *Rhodeus oryzae* may be taken as the type of a new genus *Tanakia*, separated from *Rhodeus* by the presence of a barbel. It is named for Shigeho Tanaka, the accomplished ichthyologist of the Imperial University of Tokyo.

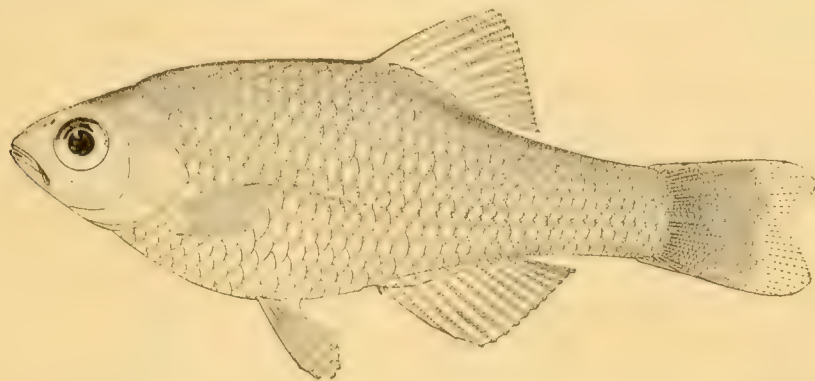


FIG. 6. *Tanakia oryzae* (Jordan & Seale). (From Proc. U. S. N. M., Vol. XXX, p. 144).

Body deep, compressed; mouth small, maxillary not reaching eye; a short barbel at its tip; dorsal and anal of about twelve rays, the first two unbranched; pharyngeal teeth 5-5, smooth, hooked at tip; gill-rakers very short; lateral line incomplete, but marked posteriorly by modifications of a series of lateral scales; peritoneum black; intestine elongate. Fresh-water fishes of small size, about two or three inches in length.

60. *Pseudaspius atrilatus* sp. nov. (Plate XXVI, fig. 3).

Lake Biwa at Matsubara, No. 6012a.

D. III, 7; A. III, 7; P. 16; V. 8; scales in lateral line 82 (79 to 83), in oblique transverse series between dorsal and anal insertions, 22/12, between occiput and dorsal, 59 (52-59); pharyngeal teeth 4, 2 on left, 2, 4 on right; gill-rakers 1+5 (1 or 2+4 to 7).

Head 4 in length to base of caudal; width of head 1.9 in its length; depth of body 5 in its length; eye 5 in head; snout 3.66; interorbital space 3.375; maxillary 3.375; caudal peduncle, depth 2.25, length 1.125; first dorsal ray, length 1.4; base 2.5; first anal ray, length 1.66, its base 2.5; pectoral 1.5; ventral 1.8.

Body elongate, not greatly compressed, snout slightly projecting; lower jaw included; upper profile of head straight from nostrils to occiput; posterior margin of eye midway between snout and edge of opercle; maxillary not reaching eye; pharyngeal teeth hooked, with very narrow grinding surface or none; gill-rakers small, widely set; intestine short, one convolution; peritoneum dark.

Dorsal very slightly nearer base of caudal than tip of snout, its margin straight; anal inserted under last dorsal ray; pectorals extending over half-way to ventrals; latter reaching vent, not anal. Caudal forked.

Scales small, especially on occiput and breast, lateral line slightly deurved, continuous.

Color dark above, with fine irregular stippling; a darker band arising on snout and terminating with slight dilation at base of caudal, which has a basal spot in young; breadth of band equal to diameter of eye. A dark median band from occiput to caudal. Upper fins slightly dusky, lower clear.

We have five specimens, 62 to 87 mm. in total length, all from Lake Biwa.

The species may be readily separated from Japanese species of *Leuciscus* by the insertion of the anal fin, which lies under the last ray of the dorsal, and by the small scales.

In form and coloration this species resembles the American genus *Rhinichthys*. In the form of the head it differs considerably from the type of *Pseudaspius*, resembling more the species of *Leuciscus*. It may be generically different from *Pseudaspius*. It has an ally in Korea, which we have also referred to *Pseudaspius*,

61. *Zacco platypus* (Temminck & Schlegel).

Lake Biwa at Matsubara, No. 6219 many, Okayama No. 6013a.

A young male much slenderer than the others and the color more vivid. Females with lower fins.

62. *Zacco temmincki* (Temminck & Schlegel).

Okayama, No. 6081a.

63. *Zacco sieboldi* (Temminck & Schlegel).

(*Zacco mitsukurii* Tanaka.)

Lake Biwa at Matsubara, Nos. 6210a-h; Sendai; Nagoya, No. 6449a.

Teeth 1, 4, 5-4, 4, 1. Scales 62.

64. *Opsariichthys uncirostris* (Temminck & Schlegel).

Lake Biwa, at Matsubara, No. 6278 many.

This abundant chub is an excellent food-fish and deserves introduction into the lakes of America.

65. *Pseudorasbora parva* (Temminck & Schlegel).

Yodo River, Osaka, No. 6283, many; Lake Biwa, at Matsubara.

66. *Leuciscus hakuensis* Günther.

Two specimens, No. 6331a-b, from Lake Biwa at Matsubara, differ from all others in the lower fins and slightly shorter maxillary. One from Hakodate, No. 6195a, has scales 75; another from Sendai, No. 6245a, has scales 16-79-13. This

may correspond to *Leuciscus taczanowskii* as described by Jordan and Fowler, no distinction appearing. This very widely distributed and abundant species shows slight differences in various localities, some of them perhaps being permanent distinctions.

67. *Ishikauia steenackeri* (Sauvage). (Plate XL, fig. 2).

Lake Biwa at Matsubara, No. 6321 many; Yodo River, at Osaka, Nos. 6271a-b, Teeth 2, 4, 5-4, 4, 2. Scales 65.

Family ANGUILLIDÆ.

68. *Anguilla japonica* Temminck & Schlegel.

Misaki, Nos. 6249a-d; Okayama, No. 6336a.

Family SIMENCHELYIDÆ.

69. *Simenchelys leptosomus* Tanaka.

Izu (Owston Collection).

A large specimen eighteen inches long, much larger than the types. The pectoral is much larger, the eye smaller. The body is 1.33 not 1.66 times in the tail.

Family LEPTOCEPHALIDÆ.

70. *Leptocephalus myriaster* (Brevoort).

Osaka, Nos. 6324a-b.

71. *Leptocephalus nystromi* Jordan & Snyder.

Misaki, No. 6105a; Osaka, No. 6090a.

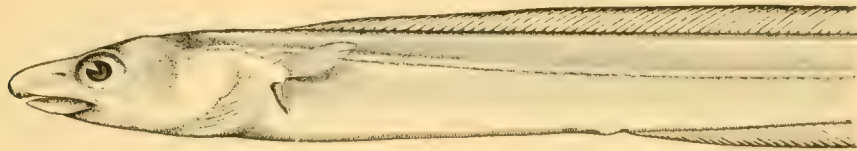


FIG. 7. *Leptocephalus nystromi* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIII, p. 853).

This may be *L. heterognathus* of Bleeker, but again that nominal species may be the young of *L. japonicus*, which may in turn be the young of *L. erebennus*.

72. *Leptocephalus riukiuanus* Jordan & Snyder.

One large example, No. 6288a, 61 cm. long. Head 1.875 in trunk; head and trunk 2 in tail; maxillary 2.5 in head; lower jaw slightly shorter; snout 4; eye 7;



FIG. 8. *Leptocephalus riukiuanus* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIII, p. 852).

dorsal inserted over middle of pectoral; thirty-six pores before vent. Pectorals black with lower margin white.

Compared with the original type of *L. riukiuanus*, this specimen seems to be the same.

73. *Leptocephalus erebennus* Jordan & Snyder.

Misaki, Nos. 6286a-b.



FIG. 9. *Leptocephalus erebennus* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIII, p. 850).

The two specimens agree with the type, which according to Franz is the same as *L. japonicus*.

74. *Leptocephalus anago* (Temminck & Schlegel).

Shimonoseki.

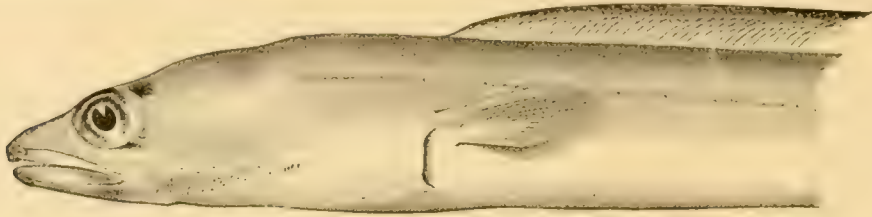


FIG. 10. *Leptocephalus anago* (Temminck & Schlegel). (From Proc. U. S. N. M., Vol. XXIII, p. 856).

75. *Leptocephalus megastomus* (Günther).

Misaki, No. 6433a.

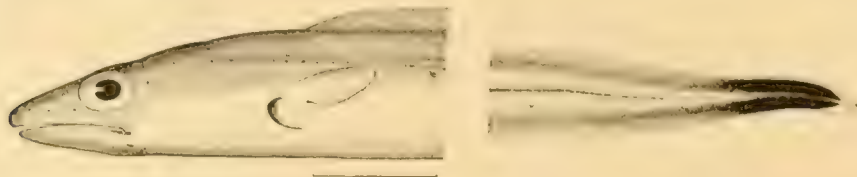


FIG. 11. *Leptocephalus megastomus* (Günther). (From Proc. U. S. N. M., Vol. XXIII, p. 855).

It has the maxillary shorter than in the figure of Jordan & Snyder and the snout is somewhat shorter. The species is mid-way between *Leptocephalus* and *Congrellus*, requiring apparently the union of the two groups.

Family MYRIDÆ.

- 76.
- Myrus uropterus*
- Temminck & Schlegel. No. 6460 (Plate XXVII, fig. 7).

We here figure a larval eel from Misaki, which we refer, very doubtfully, to this species. We can identify it with no other from Japan.

Family MURÆNESOCIDÆ.

- 77.
- Murænesox cinereus*
- Forskål.

Osaki, Nos. 6385a-b, Shimonoseki.

Family NEMICHTHYIDÆ.

- 78.
- Nemichthys scolopaceus*
- Richardson.

Misaki, No. 6025a.

Two specimens sixty-nine and ninety-three centimeters long, from Sagami Bay. No tangible distinction from Atlantic specimens is apparent, except that the head is noticeably larger. It is recorded from Papua, and by Franz from Sagami Bay.

Family OPHICHTHYIDÆ.

- 79.
- Ophichthys asakusæ*
- Jordan & Snyder.

Kobe, No. 6216a, C. M. Cat. of Fishes (Coll. Manabe). Hitherto known only from a specimen from Misaki in the Aquarium of Asakusa in Tokyo.

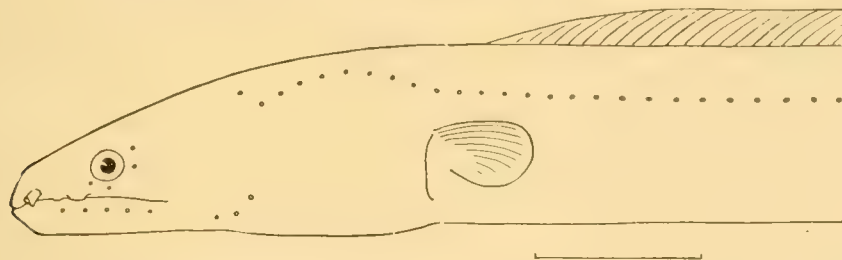


FIG. 12. *Ophichthys asakusæ* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIII, p. 873).

Family SOLENOSTOMIDÆ.

- 80.
- Solenostomus pægnius*
- sp. nov.

Described from the type from Misaki, C. M. Cat. of Fishes, No. 6020, a male specimen 101 mm. in total length, badly shrunken from immersion in strong alcohol.

Head 2.2 in body-length without caudal; depth at base of ventrals 4.23; snout 3.33 in body; eye 6 in snout; maxillary 5 in snout; depth of snout 3 in its length, or 4.5 in head; length of caudal peduncle from last anal ray to middle caudal rays 4.7 in head; dorsal rays V. 20; A. 19; P. 25; V. 8.

Body-depth slightly greater than in known species, despite shrunken body; snout very deep, its depth equal to postorbital portion of head; the dorsal ridge, or edge of snout, arched in profile, beginning a diameter of eye before the anterior

edge of orbit, and ending shortly before the premaxillaries; lower edge of snout not as deep, but longer; siphonate part of snout noticeably deeper than the diameter of eye; upper edge of snout serrate anteriorly and posteriorly (contrasting with *S. cyanopterus*) (Pl. XLI, fig. 1), the supra-orbital ridges, which fuse to form dorsal edge of snout, likewise serrated; upper and posterior edges of orbit very coarsely and noticeably serrate, or roughened.

Distance from anterior border of eye to first dorsal spine greater than length of snout; height of dorsal spine 3.66 in body-length; tip of spinous dorsal extending to centre of base of second dorsal; distance between dorsal insertions 4.33 in body-length; height of second dorsal equal to diameter of eye; caudal peduncle from last anal ray to middle caudal rays short, 4.75 in head, length of caudal rays slightly greater than that of head; anal similar to soft dorsal; ventrals not adnate to belly, reaching middle of anal base.

Color somewhat similar to that of *S. cyanopterus*; body with small brown spots; pectorals with somewhat larger ones; caudal with numerous elongate, irregular, large spots, the biggest half diameter of eye in length; dorsal with two elongate black spots on membranes between first three rays at mid-height, remainder of fin spotted, as is caudal.

The measurements in hundredths of body-length of the type of *Solenostomus pægnius* are as follows:—Head, .45; snout, .30; eye, .05; maxillary, .06; body-depth at base of ventrals, .22; length of caudal peduncle from last anal to middle caudal rays, .095; depth of snout at middle, .10; height of first dorsal, .26; of second, .05; length of ventral fin, .26; of caudal, .48; distance between tip of snout and first dorsal, .62; between eye and first dorsal, .28; between insertion of dorsal fins, .22. Those of *S. cyanopterus* (Bleeker), in so far as they differ, are: depth at ventral bases, .19; length of caudal peduncle, .08; depth of snout, .06; length of ventral, .33; of caudal, .34; distance eye to first dorsal, .25; between dorsal insertions, .26.

This species differs from the Japanese specimen of *Solenostomus cyanopterus* (Bleeker) cited by Jordan and Snyder in the much deeper snout; form of the dorsal edge of the snout; the serrated ridges of head; the shorter snout as compared to the distance from the first dorsal spine to the anterior border of the eye; longer caudal; slightly greater depth; and shorter ventral. It is probable that the depth of the snout is not a sexual mark, as the male described by Tanaka as *S. leptosomus* has the slenderest snout of any as yet described, save that of the female of *S. paradoxus*. (Plate XLI, fig. 2). Franz has recently declared the two latter species synonymous, comparing his own specimen from Dzushi. This is not impossible. The position of the dorsal bases, and their ray-length may be sexual marks, as they must be, if

the contention of Franz is true. The two nominal species, *S. leptosomus* and *S. paradoxus* vary widely in this regard, as well as in the length of the caudal peduncle. The present species is sharply differentiated from these two forms by the very short caudal peduncle (a difference too great to be bridged by variation), and the much deeper snout, being in these regards most nearly related to *S. cyanopterus*. For purposes of illustration the figures of the latter and of *S. paradoxus* are given on Plate XLI, figs. 1 and 2.

81. *Syngnathus schlegeli* Kaup.

Yokohama, Nos. 6412a-b.

82. *Urocampus rikuzenius* Jordan and Snyder. (Plate XLI, fig. 3).

Misaki, Nos. 6083a-b. Rings 11+55 to 11+59.

Family AULORHYNCHIDÆ.

83. *Aulichthys japonicus* Brevoort.

Kobe, Nos. 6167a-c (Coll. Manabe); Misaki, No. 6410a.

Family FISTULARIIDÆ.

84. *Fistularia petimba* Lacépède.

Misaki, Nos. 6348a-g.

85. *Fistularia serrata* Cuvier.

Misaki, Nos. 6290a-e.

It corresponds to Günther's plate XXXII, in the "Shore Fishes of the Challenger."

Family MACRORHAMPHOSIDÆ.

86. *Macrorhamphosus sagifue* Jordan and Starks.

Misaki, Nos. 6185a-d.

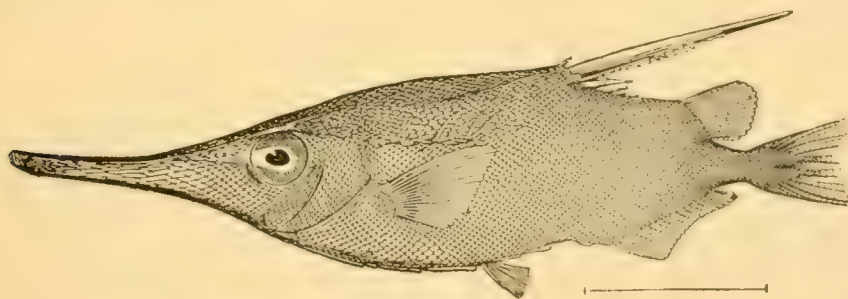


FIG. 13. *Macrorhamphosus sagifue* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXVI, p. 69).

Depth variable, 3.5 to 4.5 in body. Possibly a variant of *M. japonicus* (Günther).

Family HEMIRAMPHIDÆ.

- 87.
- Hyporhamphus sajori*
- (Temminck and Schlegel).

Kobe, Nos. 6442a-b (Coll. Manabe).

- 88.
- Hemiramphus japonicus*
- Brevoort. (Plate XXVII, fig. 2).

Misaki, No. 6034a. = *CBS S. 22*

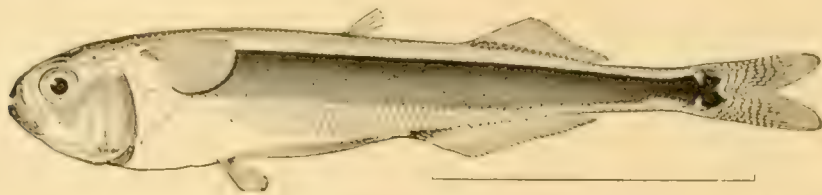
It agrees with the account given by Tanaka (Jour. Coll. Sci., Imp. Univ., Tokyo, XXIII, VII, 1908, p. 29) except that the eye is smaller, although Tanaka's specimen was larger than either of ours. Fins similar; air-bladder cellular, as in the type of *Hemiramphus*, the sides of body flattened and the ventrals posterior, nearly twice as far from the snout as from the base of the caudal. Head 4.5, with beak 2.4; mandible 3.5 in total length; D. 14, A. 12. Scales 53. Gill-rakers $x+26$.

This species, described by Brevoort from the Riu-kiu Islands, has only been lately recognized by Tanaka from Misaki.

Family ATHERINIDÆ.

- 89.
- Iso flos-maris*
- Jordan and Starks.

Misaki, No. 6239 many.

FIG. 14. *Iso flos-maris* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXIV, p. 205).

The genus *Tropidostus*, based on an Australian species, is identical with *Iso*, but this earlier name is preoccupied.

- 90.
- Atherion elymus*
- Jordan and Starks.

Misaki, No. 6087 many.

FIG. 15. *Atherion elymus* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXIV, p. 204).

- 91.
- Atherina bleekeri*
- Günther.

Kobe, Nos. 6400a-b (Coll. Manabe); Osaka, Nos. 6088a-b.

92. *Atherina tsurugæ* Jordan and Starks.

Misaki, Nos. 6415a-f.

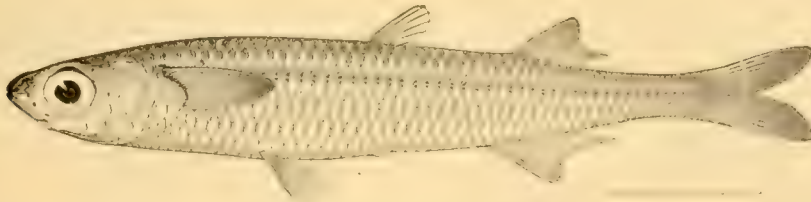


FIG. 16. *Atherina tsurugæ* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXIV, p. 202).

Family MUGILIDÆ.

93. *Mugil cephalus* Linnæus.

Matsushima Bay, Nos. 6293a-b; Osaka, No. 6259 many.

94. *Liza hæmatochila* (Temminck & Schlegel).

Misaki, Okayama, Nos. 6059a-j.

Family SPHYRÆNIDÆ.

95. *Sphyræna pinguis* Günther.

Misaki, Kobe, Yokohama, Osaka, Nos. 6304a-b.

Family BERYCIDÆ.

96. *Gephyroberyx japonicus* (Döderlein).

Misaki, No. 6340a.

D. VIII, 13; A. III, 11; P. I, 14; V. I, 6. Scales 30 (pores); abdominal scutes, 14.

Family HOLOCENTRIDÆ.

97. *Holocentrus spinosissimus* (Temminck & Schlegel).

Misaki, No. 6168a.

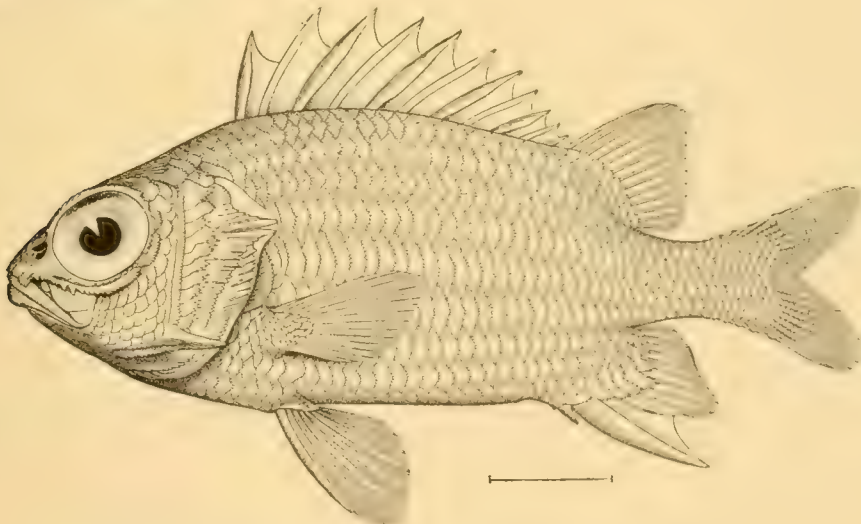


FIG. 17. *Holocentrus spinosissimus* (Temminck & Schlegel). (From Proc. U. S. N. M., Vol. XXVI, p. 14).

Young with a black spot between first and second dorsal spine. Body unmarked, except for faint pale streaks following the rows of scales.

Family SCOMBRIDÆ.

98. *Scomber japonicus* Houttuyn.
Osaka, Nos. 6388a-b.
99. *Auxis thazard* (Lacépède).
Osaka, Nos. 6294a-b; Sendai, No. 6392a.

Family TRICHIURIDÆ.

100. *Trichiurus japonicus* (Temminck & Schlegel).
Osaka, No. 6320a; Misaki, No. 6153a.

Family GEMPHYLIDÆ.

101. *Ruvettus pretiosus* Cocco.
Misaki, No. 6280a, a small example.

Family ISTIOPHORIDÆ.

102. *Istiophorus japonicus* Cuvier & Valenciennes.
Kobe (in collection of the Kwansei Gakuin).
103. *Tetrapturus mitsukurii* (Jordan & Snyder).
Abundant in Osaka Market.

Family CARANGIDÆ.

104. *Seriola purpurascens* (Temminck & Schlegel).
Osaka, No. 6292a; Sagami Bay, Nos. 6182a-b; Young specimens, the ventrals reaching slightly over halfway to soft anal. Depth 3.66 in total; head 4.
105. *Trachurus japonicus* (Temminck & Schlegel).
Kobe, Nos. 6177a-b.
106. *Decapterus russelli* (Rüppell).
Kobe, No. 6094a.
107. *Trachurops crumenophthalma* (Bloch).
Izu.
108. *Caranx equula* Temminck & Schlegel.
Osaka, No. 6367a; Shimonoseki, No. 6057a; Misaki.
Schlegel's plate of this species is correct as to depth of body notwithstanding the criticism of Steindaehner.
109. *Alectis ciliaris* (Bloch).
Misaki, Nos. 6334a-c; Yokohama, No. 4195a.

Family EQUULIDÆ.

110. *Leiognathus rivulata* (Schlegel).
Misaki, No. 6109a.
111. *Leiognathus argentea* Lacépède.
(*Equula nuchalis*, Temminck & Schlegel).
Osaka, No. 6119a; Misaki, No. 6446a.

Family MENIDÆ.

112. *Mene maculata* (Bloch & Schneider).
Sagami Bay, Nos. 4101a-e (from Owston Collection).

Family STROMATEOIDIDÆ.

113. *Stromateoides candidus* (Cuvier & Valenciennes).
Osaka.

Family STROMATEIDÆ.

114. *Psenopsis anomala* (Temminck & Schlegel).
Osaka, No. 6238a; Shimonoseki, Nos. 6227a-c; Kobe.
115. *Labracoglossa argentiventris* Peters.
Misaki, No. 6438a, a common and pretty little fish. The relationship of the genus is still uncertain.
116. *Ectenias brunneus* gen. et sp. nov. (Plate XXVII, fig. 3).
Type No. 6453a; cotype No. 6454, Misaki. Sagami, No. 6006a.

This new genus, *Ectenias*, is allied to *Centrolophus*, being distinguished by its elongate, subterete form of body. There is one dorsal fin, the anterior spines merging into the soft rays; mouth moderate, jaws equal; teeth moderate, few-rowed, slightly enlarged anteriorly; palatines with small teeth; gill-rakers short; teeth in the œsophagus; scales minute; lateral line complete; dorsal with about fifty-eight rays, anal with twenty-five; ventrals well developed.

We give below a description of the type of the species, *Ectenias brunneus*, No. 6453a, C. M. Cat. of Fishes, a specimen from Misaki one hundred millimeters long. Others, cotypes from the same locality, are smaller.

Head 4 in body-length; depth 5.8; eye 3.125 in head; snout 3.5; maxillary 2.25; interorbital space 3.5; depth of caudal peduncle 5; D. 58; A. 25; P. 20; V. 1.5. Scales with about two hundred and fifty pores in lateral line.

Head at nape as deep as body, which tapers evenly to caudal peduncle; latter slender, slightly compressed; eye large; maxillary reaching vertical from center of eye; suborbital space less than breadth of maxillary at tip; interorbital space broad, its sides parallel, projecting over anterior edge of eye; nostrils subequal,

midway between tip of snout and eye, closely apposed, anteriorly with slight rim; jaws equal; teeth of moderate size in both jaws, in a single row posteriorly, two rows present anteriorly, the inner some distance behind the outer; vomer with two somewhat large teeth; palatines with single row of small teeth; those in jaws slightly enlarged in outer row, especially anteriorly; gill-rakers short and blunt, about eleven on lower limb of first arch.

Dorsal inserted above pre-opercular margin and extending to within half an eye-diameter from base of caudal, its longest rays half length of head, but slightly lower in any portion of fin; anal inserted midway between base of caudal and center of eye, its longest rays about as long as snout, its base extending as far posteriorly as dorsal; pectoral 1.66 in head; ventrals 1.33 in head, inserted under pectoral base; caudal deeply forked.

Scales minute, imbedded, not imbricate; lateral line anteriorly sharply arched, apex of curve angular.

Color in alcohol dark brown; dorsal, anal, and ventral fins darker, nearly black; pectorals colorless; anal dusky, save for tips of lobes, which are clear.

Although allied to *Centrolophus*, the color and texture of *Ectenias* shows it to be a shore-fish.

Family ICOSTEIDÆ.

117. *Icticus ischanus* gen. et. sp. nov. (Plate XXVII, fig. 4.)

Type No. 6036a, from Okinawa.

The new genus *Icticus* seems related to *Icichthys*.

Body oblong, compressed, the tissues soft; lateral line present; inner ventral ray adnate to belly on either side of groove, which begins at ventrals and ends at the anus; body scaled; scales cycloid, small; teeth in a single series in each jaw, some on vomer and palatines. Fine loose teeth on upper pharyngeals; six branchiostegals; gill-openings wide, the membranes free from isthmus; four gills, a slit behind the fourth; pseudobranchiæ large; air-bladder present, small; dorsal long, divided into two separate fins, free from caudal; ventrals below pectoral base; body oblong, compressed; the skeleton soft and flexible, the whole structure soft as in *Icosteus* and *Icichthys*.

The type of *Icticus ischanus*, described here, is a specimen two hundred and forty-five millimeters in total length, coming from Okinawa, Riu-kiu Islands, No. 6036a Carnegie Museum Cat. of Fishes.

Head 3.4 in length to base of caudal; depth 4.166; eye 4 in head; maxillary 3.33; snout 3; pectoral 1.75; ventral 2.5; D. XII-30; A. 30; P. 19; scales in lateral line 125 (approximate); ten scales between insertion of first dorsal and lateral line.

Body soft, with little firmness; dorsal and ventral contours evenly arched; body compressed, especially at bases of dorsal and anal; depth of caudal peduncle 4.5 in head, dilating posteriorly at base of rudimentary rays; head blunt, sides flat, as is dorsal surface; snout vertical in profile at tip; jaws equal, lower series of teeth included; maxillary short, not reaching eye, completely hidden by preorbital; teeth in lower jaw close-set, cardiform, somewhat arrow-shaped, with fine antrorse serrations on each edge; diminishing quickly in size at mandibular symphysis; the teeth in the upper jaw widely set and irregularly placed, lacking posteriorly; teeth on upper pharyngeals fine, slender, and not thickly set.

Dorsal composed of two fins, base of first 1.5 in head, of second 1.5 times length of head; outline of first somewhat rounded, of second parallel with fin-base; height of both dorsals equal to eye; caudal forked; middle rays half length of outer; anal similar to second dorsal and of equal height, its insertion under that of latter; pectoral extending to midway between vent and anal insertion; ventrals inserted under pectoral base, their inner rays separate and adnate to either side of a shallow groove extending back to anus.

Scales small, cycloid, present on cheeks, opercles, pectoral and caudal bases, and body, very deciduous; lateral line two-thirds of eye-diameter below dorsal base, with which it is parallel.

Color uniformly dark; fins black; peritoneum and lining of mouth-cavity black.

Family CARISTIIDÆ.

118. *Caristius macropus* (Bellotti). (Plate XXVIII, fig. 7).

(*Pteraclis macropus* Bellotti, Atti. Soc. Sci. Nat. Ital., Milan, 1903, p. 137. fig. VI, Yokohama).

Sagami Bay, No. 6024a (from Owston Collection).

This specimen represents a second species of the singular genus *Caristius*, obtained from the shores of Japan. It was originally made known by Cristoforo Bellotti in 1905, under the name of *Pteraclis macropus*.

The specimen before us, from the Kuro Shiwo off Sagami Bay is, however, plainly a member of the genus *Caristius*, and at the same time distinct from *Caristius japonicus*. The following description of this specimen was drawn up for Professor Edwin Chapin Starks.

Dorsal rays 34; anal 22; pectoral 18; ventral I, 5. Head 3 in length; depth of eye 2. Eye 2.33 in head; maxillary 1.66. Body and fins extremely fragile.

The form is much compressed, elevated to a rounded angle above eye, sharply declivous in front of eye, and sloping backward in a straight line (straighter than

in the drawing) to caudal peduncle. The body is covered with small, circular, cycloid, deciduous scales, a few only remaining near the middle of the body behind the pectoral. One was found below the pectoral in the region where they are enlarged in *Caristius japonicus*. It was not larger than the others. The cheek

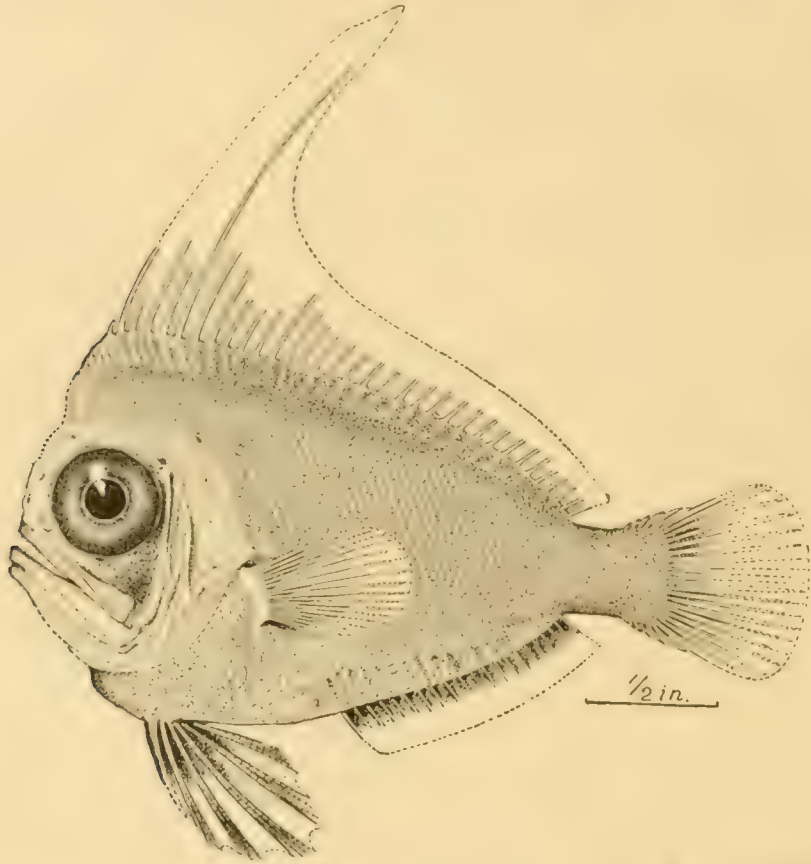


FIG. 18. *Caristius japonicus* Smith & Pope. (From Proc. U. S. N. M., Vol. XXXI, p. 491).

and opercle was fully scaled, the scales similar to those on the body, though few scales now remain. The lateral line is distinct and runs from the upper part of the opercle on a level with the upper margin of the pupil, straight back, with no curve whatever, to the middle of the caudal base. There was probably a sheath of scales along the base of the dorsal and anal, as in *Pteraclis*, but the scales are smaller and more deciduous than in this genus.

There are rather slender teeth in a straight row on the edges of both jaws and on the vomer and palatines. The cheek is deep and triangular, about four-fifths of the diameter of the eye in depth. The gill-rakers are rather slender, the longest about half the diameter of the pupil and they number 6+14.

The pectorals are a little shorter than head, reaching about to ninth anal ray.

The ventrals are very long, a little longer than the body without the head, and reaching base of caudal. Dorsal very high, beginning over the eye, the first two rays short, the third longest of all, nearly four times length of second, reaching middle of caudal, the posterior margin of the fin nearly straight, the rays gradually shortened to the last, which is about two-thirds head. Caudal short, shorter than head, apparently truncate, and beginning under middle of pectoral, its rays subequal, and not one-third as high as the dorsal. All the fin-rays extremely slender and fragile.

Little color remains. The body is light slate-blue; the dorsal, anal, and ventrals black, the caudal and pectorals colorless.

This species seems to differ from *Caristius japonicus* in being slenderer, in having the cheek deeper, the ventrals not nearly so far in front of the pectorals, the anterior scales not enlarged, the ventral rays longer and perhaps the dorsal and anal rays also. These fins are broken off in the type of *Caristius japonicus*.

The specimen, 5.5 inches long, was taken by Alan Owston in the Kuro Shiwo, or Black Current, off Misaki, Sagami Bay, in Japan. It is in the Carnegie Museum at Pittsburgh.

Since the publication of the excellent description and figure of Bellotti, the genus has been unnoticed, until the discovery by Dr. Hugh M. Smith of the related species which he called *Caristius japonicus*.

The type of this species (Proc. Biol. Soc. Washington, XVIII, 1905; p. 249), was described in 1905 by Gill and Smith from the island of Shikoku in Japan as the "type of a new family of jugular acanthopterygians." Smith and Pope, (Proc. U. S. Nat. Mus. XXXI., 1906; p. 490, fig. 10), in the following year published a figure of it. In December 1912, Dr. Jordan (American Naturalist, Dec., 1912, p. 148) referring to Dr. Shufeldt's work on the pteraclid fish *Pterycombus brama*, made this remark "the singular *Caristius*, lately described from Japan by Dr. Smith, is an ally of *Pterycombus* and belongs to the same family."

In the same month, Regan (Ann. Mag. Nat. Hist., Ser. 8, Vol. X., Dec., 1912, p. 637), expressed a belief that *Caristius japonicus* Gill and Smith, and *Platyberyx opalescens* Zugmayer (Res. Camp. Sci., Monaco, XXXV, 1911, p. 101, Pl. 5, fig. 5), were "probably congeneric and perhaps not specifically distinct" and that they both were referable to the berycoid fishes. As Mr. Regan had no specimens of either of these forms it is not surprising that he should have regarded the two as related. *Caristius* and *Platyberyx* have no more in common than a superficial resemblance, and *Caristius* is certainly not related to the berycoid fishes. Its affinities seem obviously to be with the scombroid forms, especially with *Pteraclis*, the genus in which Bellotti placed it.

In our judgment, the *Caristiidae* compose a family distinct from the *Pteraclidae*, their nearest relatives, and from the *Bramidae* to which both are allied. The apparent differences between *Caristius* and related genera may be thus indicated:

Family PTERACLIDÆ.

Dorsal very high, beginning on head, continuous, its rays all simple; anal similar, beginning far forward, almost as long as dorsal; ventrals jugular, small, inserted below the eye. Scales firm, lobate. Vertical fins with a basal sheath of scales.

Pteraclis Gronow (*velifera*).²

Centropholis Hilgendorf (*petersi*).

Dorsal with 10 to 13 graduated rays; ventral rays, 1, 5; anal very high, its first long ray reaching to end of base of fin.

Pterycombus Fries (*brama*).

As in *Pteraclis*, but the anal lower, the first long ray of anal reaching only to middle of fin.

Bentenia Jordan and Snyder (*asticola*).

Essentially as in *Pteraclis*, but with the fifth dorsal and second anal ray much enlarged. Ventrals very short, under the eye.

Family CARISTIIDÆ.

Anal beginning near middle of body; ventrals jugular, but behind eye. Scales small, caducous.

Caristius Gill and Smith (*japonicus*).

Family BRAMIDÆ.

Characters included above.

The *Bramidae* differ in the hard scales, and in the backward insertion of the dorsal which is low and behind the head. Anal moderate, inserted below middle of body.

Family VELIFERIDÆ.

The *Veliferidae* (*Vilifer* Schlegel), (*hypselopterus*), have the fins much as in *Caristius*, but the mouth is wholly different, and the family has no relation to *Caristius* or to *Pteraclis*.

Family PEMIPHERIDÆ.

119. *Pempheris japonicus* Döderlein.

Misaki, No. 6176a.

Family CHEILODIPTERIDÆ.

120. *Amia sialis*, sp. nov. (Plate XXVIII, fig. 2).

The following is a description of the type, No. 6021, C. M. Cat. of Fishes, a specimen 123 mm. in total length, coming from Suruga Bay, Japan.

Dorsal VII-I, 9; anal II, 8; scales in lateral line 25; in transverse series 10; head 2.6 in body-length to base of caudal; depth 2.4; eye 3.75 in head; depth of caudal peduncle 2.5 in head; gill-rakers 5+13.

Body deep, nearly equal in depth to length of head; maxillary reaching to below

² *Pteraclis ocellatus* Cuvier and Valenciennes, with but two graduated rays in the dorsal and the ventrals I, 3, if these characters are exact, belongs to a different genus. It is probably, however, a true *Pteraclis*.

middle of eye, 2 in head; lower jaw barely longer than upper; snout equal in length to eye; preopercle finely serrate on both limbs; no canines present.

Third and fourth dorsal spines subequal, half length of head; spine of soft dorsal 2.125 in head, its first two rays equal to post-orbital part of head. Anal inserted under second soft ray of dorsal, second spine 3 in head. Pectoral reaching nearly to anal, as do ventrals; caudal emarginate. Scales finely ctenoid, rather loose; lateral line as usual.

Color nearly uniform, pattern lacking, save for an indistinct, small caudal spot; ventrals and spinous dorsal dark, latter black at tip. All other fins somewhat dusky.

This species is apparently most closely related to *Amia nigra* (Döderlein) from which it differs in its longer spines, its soft dorsal and anal, longer pectorals, shorter maxillary, and lighter color of anal, ventral, and soft dorsal fins.

121. *Amia semilineata* (Temminck & Schlegel).

Kobe No. 6040; Shimonoseki, Nos. 6444a-h; Osaka, Misaki, Nos. 6221a b.

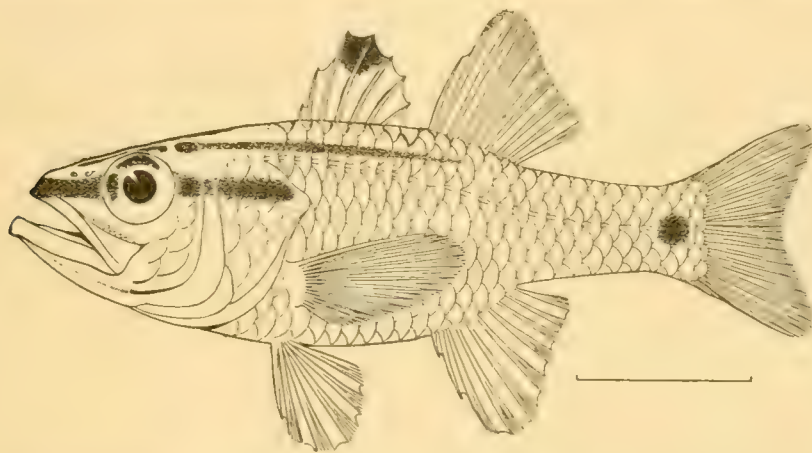


FIG. 19. *Amia semilineata* (Temminck & Schlegel). (From Proc. U. S. N. M., Vol. XXIII, p. 903).

122. *Amia kiensis* (Jordan & Snyder).

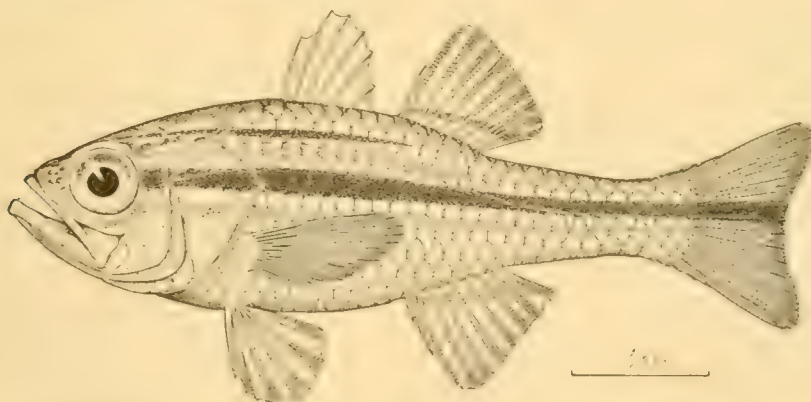


FIG. 20. *Amia kiensis* (Jordan & Snyder). (From Proc. U. S. N. M., Vol. XXIII, p. 906).

Misaki, No. 6051, tide-pools.

Young 3 cm. long, similar to adult in color, save lack of stripes on dorsal and anal.

Family KUHLIIDÆ.

123. *Safole Tæniura* (Cuvier & Valenciennes).

Misaki, No. 6091 many.

Abundant in the tide-pools. Color like that of the adult.

Family SERRANIDÆ.

124. *Lateolabrax japonicus* Cuvier & Valenciennes.

Shimonoseki, No. 7276a; Shinabara; Sendai.

125. *Nippon spinosus* Cuvier & Valenciennes.

Osaka; abundant in the market. Misaki, No. 6318a, tide-pools, young 6 cm. long.

A dark stripe from snout through eye to upper caudal rays, a fainter one below from lower caudal rays, and another as faint along dorsal profile of body from soft dorsal rays, where it is intense, separated narrowly from its fellow of the opposite side.

126. *Cephalopholis boninius* sp. nov. (Plate XXIX, fig. 7).

Description of type, No. 6038, a specimen 180 mm. in total length, from the Bonin Islands.

Head 2.6 in body-length to base of caudal, 3 in total depth; 3 in body; eye 5.75 in head; snout 3.66; maxillary 2; interorbital space 7.5; dorsal rays IX, 16; anal III, 9; scales in lateral series 108; in transverse series between insertion of dorsal and lateral line, 17; between lateral line and anal insertion 42; gill-rakers 7+11.

Maxillary extending to below posterior border of eye; latter small, 1.5 in snout; interorbital space narrow and slightly convex; teeth in upper jaw with enlarged outer row and minor band of minute teeth; a canine on each side anteriorly; a patch of enlarged depressible teeth behind each, most teeth posterior to these canine-like; similar and opposed patches in lower jaw, on sides and inner row of enlarged teeth, with several rows of much smaller teeth outside, all depressible save the outermost and smallest; vomer with a V-shaped patch of small depressible teeth; palatines with single row of similar ones. Gill-rakers stout and short, one half diameter of eye in length. Pre-opercular margin finely serrate on lower half of upper limb; opercle with three spines, middle longest.

Dorsal inserted over point of opercle; fourth to ninth spines subequal; 3.33 in head; first rays but slightly longer, longest (eleventh) 2.5 in head; anal inserted

under fourth dorsal ray, second spine longest and stoutest, 3 in head; longest ray 2.33 in head; tips of dorsal and anal rounded, reaching base of caudal; pectorals not quite reaching anal insertion 1.5 in head; ventrals reaching anus, 1.9 in head; caudal rounded. Scales small, ctenoid, absent on snout, jaws, and lower side of head, present on bases of vertical fins.

Body and vertical fins uniformly and evenly covered with brown spots (in alcohol) having a diameter one fourth that of eye arranged in irregular rows on fins and in part on body, separated by once or twice their own diameter. Two rows on spinous dorsal, four on dorsal and anal; pectoral with single spot on upper base; ventrals unspotted, narrowly tipped on outer rays with black; belly and breast unspotted, as is maxillary and chin.

127. *Epinephelus morrhua* (Cuvier & Valenciennes).

Misaki, No. 6055a.

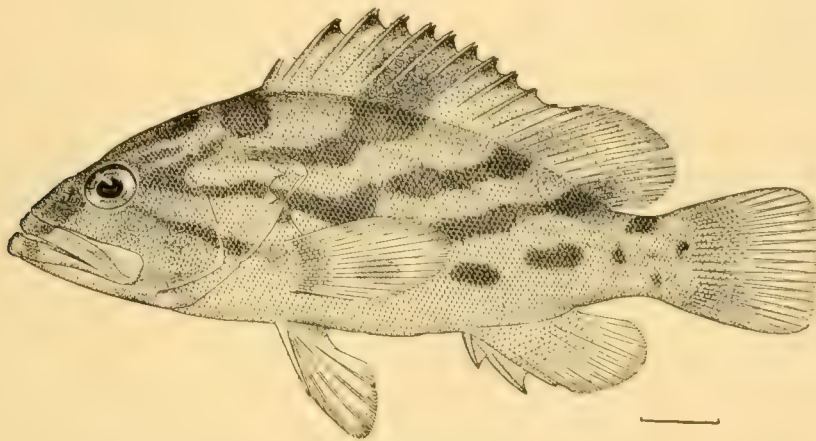


FIG. 21. *Epinephelus morrhua* (Cuvier & Valenciennes). (From Proc. U. S. N. M., Vol. XXXVII, p. 455).

Young with stripes as in the adult, but broader than the interspaces.

128. *Epinephelus megachir* Richardson. (Fig. 22).

A very small specimen, No. 6042a, doubtfully identified from a pool at Misaki. Second dorsal spine very elongate, 1.25 in head; ventral spines equally long. D. XI, 18; A. III, 8.

129. *Epinephelus akaara* (Temminck & Schlegel).

Osaka, Nos. 6353a-d; Misaki, tide-pools, No. 6047.

Young 32 mm. long. D. XI, 15; A. III, 8; scales about ninety-eight. Black in color everywhere, especially on fins, clear spots as large as pupil scattered regularly over body and fins. Caudal and anal narrowly margined with white. The identification of these young fishes is rather doubtful.



FIG. 22. *Epinephelus megachir* Richardson. (From Proc. U. S. N. M., Vol. XXXVII, p. 449).

130. *Epinephelus epistictus* (Temminck & Schlegel).
Kagoshima, No. 6172a.



FIG. 23. *Epinephelus epistictus* (Temminck & Schlegel). (From Proc. U. S. N. M., Vol. XXXVII, p. 453).

131. *Epinephelus septemfasciatus* (Thunberg).

Enoshima, Nos. 6424a-b; Misaki, Nos. 6049a-d; Shimonoseki, No. 6267a;
Osaka, Nos. 6354a-c.

One specimen has the coloration entirely plain, except for the black saddle on the caudal peduncle, and for the black moustache-streak.

132. *Chelidoperca hirundinacea* (Cuvier & Valenciennes).

Misaki, Nos. 6240a-b.

The smallest example has four dark lateral spots, or oblong blotches

133. *Aulacocephalus temmincki* Bleeker.

Misaki, No. 6381a.

Interorbital space strongly convex. Pale stripes not well defined anteriorly
D. X, 11; A. III, 9.

134. *Franzia nobilis* (Franz) gen. nov. (Plate XXIX, fig. 2).

Misaki.

One specimen, No. 6452, agreeing with the description and figure of *Anthias nobilis* given by Dr. Franz. The maxillary, however, reaches to opposite the posterior border of the pupil. Head 3.5, as long as pectoral; depth 2.66; D. X, 17; A. III, 8; Scales 6-42-14.

This species differs from all the others hitherto referred to *Anthias* and *Pseudanthias* in having the spinous dorsal closely scaled. In other respects it is similar to *Pseudanthias* and *Dalanthias*. It has the third dorsal spine much elongate, the caudal lobes much produced, but not the ventrals. It should form the type of a distinct genus, which may be named for its discoverer, Dr. Victor Franz, the type being *Anthias nobilis* Franz.

135. *Franzia ardens* sp. nov. (Plate XXX, fig. 1).

Type No. 6457, a specimen ninety-three millimeters long to tips of middle caudal rays, from Misaki.

Head 3.5 in body-length without caudal; depth 2.66; eye 3.66 in head; interorbital space 3; maxillary 2.33; snout 4.33; third dorsal spine 2.14; last dorsal ray 2; second anal spine 2; last anal ray 1.5; pectoral 1.1; ventrals equal to head; D. X, 17; A. III, 7; forty-three scales in lateral line; scales in transverse series from insertions of ventral fins to lateral line 5/15; gill-rakers 10+21.

Maxillary extending to below center of eye; teeth in upper jaw in an enlarged outer row and a narrow band of minute inner teeth; a short canine tooth at either side of tip of upper jaw, and a larger pair immediately behind, which point backward and slightly medially; lower jaw with a single row of teeth on sides similar to outer row of upper jaw, then forming a narrow band of minute teeth anteriorly, which is narrowly interrupted at the mandibular symphyses; a short pair of canines pointing forward at tip of lower jaw, and a larger pair on either side at some distance behind; inner rows not enlarged anteriorly; pre-opercle serrate, rounded; opercle and interopercle somewhat serrate, opposite pre-opercular angle; opercle with two spines; gill-rakers two-thirds of eye.

Dorsal spines nowhere elongate, outline of fin rounded, third spine longest; tip of last dorsal rays pointed, extending nearly to caudal base; soft anal sharply angular posteriorly, its last rays slightly produced, reaching slightly beyond last dorsal rays to base of caudal; second anal spine slightly longer than third, 2.125 in head; ventrals extending to anus, not filamentous, second ray but slightly longer than first; pectorals rounded at tip, not reaching anus; caudal lobes produced; basal third of spinous and soft dorsal, and of soft anal, scaled; snout, maxillary, head and body completely scaled.

Color-pattern lacking in alcoholic specimens, save for three indistinct yellowish stripes running longitudinally along body, the second through the eye; bases of dorsal and anal of similar color.

This species very greatly resembles *Zalanthias* or *Pseudanthias venator* Snyder, differing mainly in the remarkable fact that in the latter the bases of the vertical fins are not sealed, save for a "low sheath" at the base of the soft dorsal. From *Franzia nobilis* it is distinguished by the lack of the elongated dorsal spine, by the color, proportions of fins, etc.

136. *Sacura margaritacea* (Hilgendorf).

Misaki, Nos. 6174a-b.

Some specimens with, others without, a large black spot on body. *Anthias pulcher* Döderlein, characterized by the presence of this mark, is doubtless the same as *Sacura* or *Anthias margaritacea*, in which the spot is wanting.

137. *Zalanthias azumanus* (Jordan & Richardson).

(*Anthias japonicus* Hilgendorf, the name pre-occupied.)

Misaki, No. 6169a-c.

138. *Pikea japonica* (Döderlein).

(Coll. Owston) Boshu, No. 4168a; Yenoshima, Sagami Bay, No. 4238a.

Family LOBOTIDÆ.

139. *Lobotes surinamensis* (Bloch).

Matsushima, a large example seen, the second known from Japan. It is known locally as Matsudai (Pine-cone porgy).

Family LUTIANIDÆ.

140. *Lutianus quinquelineatus* (Bloch).

Kominato, No. 6349a, Oshima Island (off Sagami Bay).

This specimen from Oshima corresponds entirely with specimens from the East Indies. A strong interopercular knob and preopercular notch are present; dorsal surface of head sealed to above eyes; no lingual teeth; vomer with a Λ -shaped band of teeth; lateral stripes narrow, five in number, three upper converging to upper edge of eye (not as in *L. kasmira*); sixty-five scales above lateral line, fifty-five below in longitudinal series; the rows of scales above the lateral line oblique. This is the fish described and figured by Bloch. It differs from *L. kasmira* in having larger scales, narrower body-bands, and in the different distribution of the latter. It has not been recorded from Japan since the time of Bloch.

141. *Lutianus russelli* (Bleeker).

Osaka, No. 6394a.

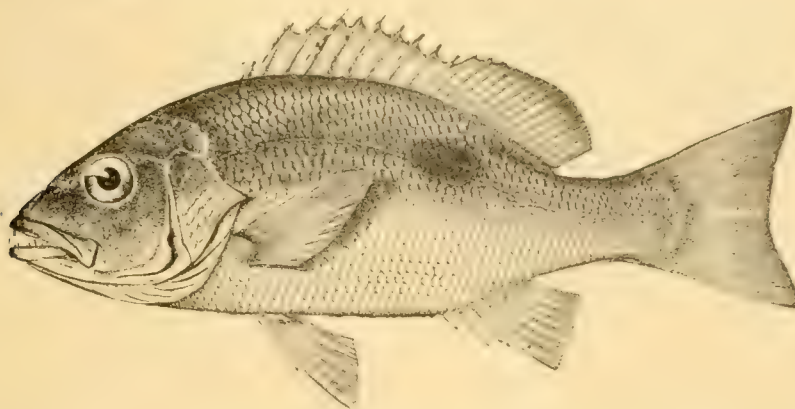


FIG. 24. *Lutianus russelli* Bleeker. (From Proc. U. S. N. M., Vol. XXXIX, p. 451).

142. *Lutianus vitta* (Quoy & Gaimard).

Osaka, No. 6378a.

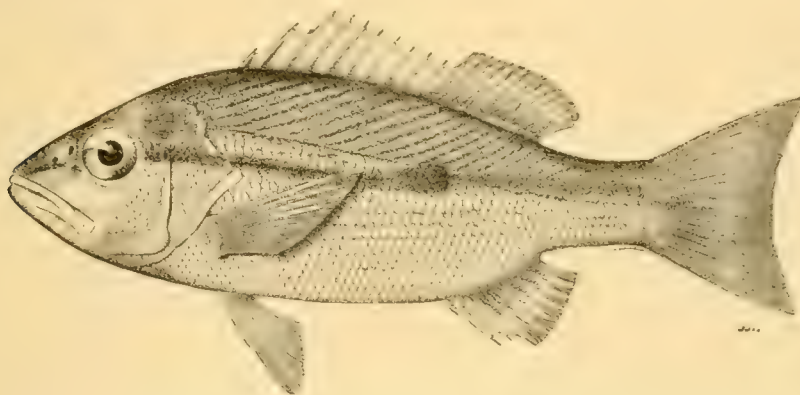


FIG. 25. *Lutianus vitta* (Quoy & Gaimard). (From Proc. U. S. N. M., Vol. XXXIX, p. 449).

143. *Pristipomoides sieboldi* (Bleeker).

(Coll. Owston) Sagami Bay, No. 4268a-d.

144. *Doderleinia berycoides* (Hilgendorf).

Odawara, Straits of Tsushima, in deep water, No. 6389a; found in the Zakoba market at Osaka, No. 6316a-b.

Four young specimens. The pre-opercle is set with long, rather weak spines, strongest at the angle.

145. *Euthyopteroma virgatum* (Houttuyn).

Osaka, No. 6310a-d.

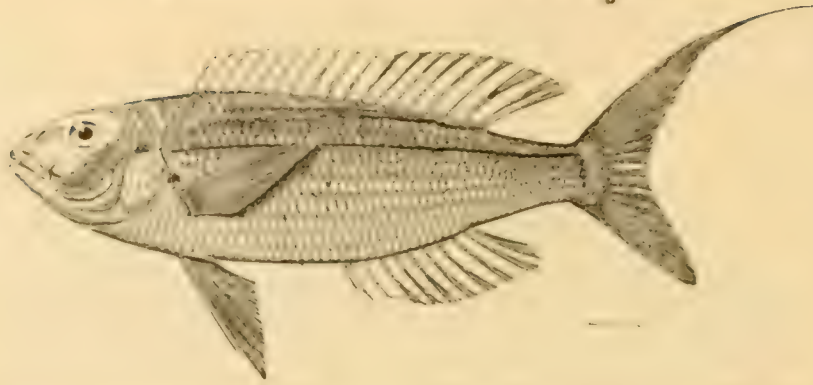


FIG. 26. *Euthyopteroma virgatum* (Houttuyn). (From Proc. U. S. N. M., Vol. XLI, p. 565).

Family HÆMULIDÆ.

146. *Therapon ocyrhynchus* Temminck & Schlegel.

Okayama (Kusano and Otaki), No. 6273a-b; Osaka.

147. *Parapristipoma trilineatum* (Thunberg).

Osaka, No. 6376a-b.

148. *Plectorhynchus pica* (Cuvier & Valenciennes). (Plate XXX, fig. 2).

One specimen No. 6018a, 100 mm. in total length, 73 mm. in length without caudal, from Boshu, Japan.

The color and proportions of this fish show the typical variations of the young of these forms. The caudal is elongate and pointed, the spines high, and the color-bands broad. The latter, as is known in allied forms, break up and disappear with age, or become narrowed. *Diagramma orientale* Cuvier and Valenciennes (Hist. Nat. des. Poiss., plate 124) shows almost identically the coloration of the present specimen, but differs in showing thirteen spines and larger scales. *Plectorhynchus pica* (Cf. Günther, Fische Südsee, Plate XXII, fig. A) corresponds very closely with the present specimen in all particulars, save a deeper pre-orbital in the plate given by Günther, which is not accurate in proportions. We here describe and figure our specimen, as it is apparently rare and not hitherto known from Japan. Most members of this group have a wide distribution.

Head 3.4 in body-length without caudal; depth 3.25; D. XII, 20; A. III, 7; scales ninety-seven in series below lateral line, fourteen between latter and dorsal insertion, twenty-two between lateral line and anal insertion; profile from snout to dorsal insertion strongly arched, nearly straight along dorsal base; pre-orbital depth two-thirds diameter of eye; snout 3 in head; eye 3 in head, equalling maxillary, which reaches anterior border of eye; teeth in villiform bands in both jaws, outer rows slightly enlarged; pre-opercle coarsely serrate.

Spinous dorsals rounded, third to fifth longest, 2.33 in head; pectorals 1.5 in head; ventrals same; caudal elongate, as is typical of the young of these forms.

Scales absent on snout, jaws, maxillary, and anterior three-quarters of pre-orbital, present on bases of soft fins, in a sheath at base of spinous dorsal; everywhere ctenoid; mandibular rami each with five large pores.

Color-pattern striking, of contrasting dark brown and white; belly and lower portion of sides white from last anal ray to throat and above level of pectoral; snout white from tip to a line from vertical of anterior margin of eye including all of maxillary and lower jaw; a large white saddle extending as far down as lateral line on nape, another at base of last three dorsal spines and first three rays of similar extent; caudal peduncle with broad white cross-band; upper rays of caudal white, save on base; anal, pectoral, and ventrals colorless; soft dorsals colorless on distal half; spinous dorsal black, save for last three spines; all other parts of body a deep brownish black, pattern everywhere clear cut with even margins, nowhere diffuse or indefinite.

149. *Plectorhynchus cinctus* (Temminck & Schlegel).

Kobe, No. 6205a (Coll. Manabe).

150. *Plectorhynchus pictus* (Thunberg).

Sagami Bay, No. 6154a; Misaki, tide-pools, No. 6043a.

151. *Haplogenyx mucronatus* (Eydoux & Souleyet).

Osaka, No. 6375a-e.

152. *Haplogenyx nigripinnis* (Temminck & Schlegel).

Misaki, No. 6406a.

A specimen everywhere intensely black in color on fins and body, save for lighter shades on breast.

Family BANJOSIDÆ.

153. *Banjos banjos* (Richardson).

Misaki, No. 6058a, young in the tide-pools.

Traces of seven or eight dark stripes on body, an interrupted band across nape, along edge of opercle, another from eye across maxillary; snout and head mottled with dark color; spinous dorsal black distally, a broad black stripe along base; body-bands continued on soft dorsal; a black spot between second anal spine and first soft ray; ventrals black; pectoral with a spot at base.

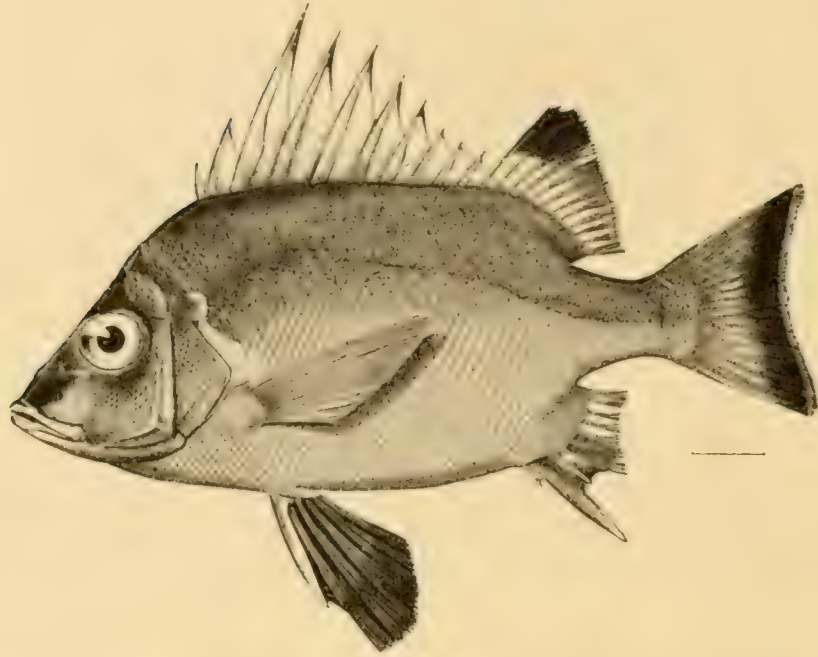


FIG. 27. *Banjos banjos* (Richardson). (From Proc. U. S. N. M., Vol. XLI, p. 541).

Family SPARIDÆ.

154. *Pagrosomus major* (Temminck & Schlegel).

(Mem. Carn. Mus., Vol. VI, p. 34, fig. 24).

Misaki, No. 6191a-d; Shimonoseki, Kobe, No. 6366a; Osaka, Yokohama, Sendai.

The young of this species is readily known from related species by having a black spot on base of pectoral.

155. *Evynnis cardinalis* (Lacépède).

Misaki, No. 6439a-d; Osaka, No. 6391a.

156. *Raius tumifrons* (Temminck & Schlegel).

(Mem. Carn. Mus., Vol. VI, p. 35, fig. 25).

Misaki, Tsushima Straits, No. 6371a-f.

This species makes the bulk of the fishing of the trawlers between Tsushima and Shimonoseki. They are sent frozen to the Osaka market.

Color light crimson, the nose yellow, a diffuse yellow blotch below middle of base of dorsal.

157. *Sparus latus* Houttuyn.

Osaka, No. 6298a-g.

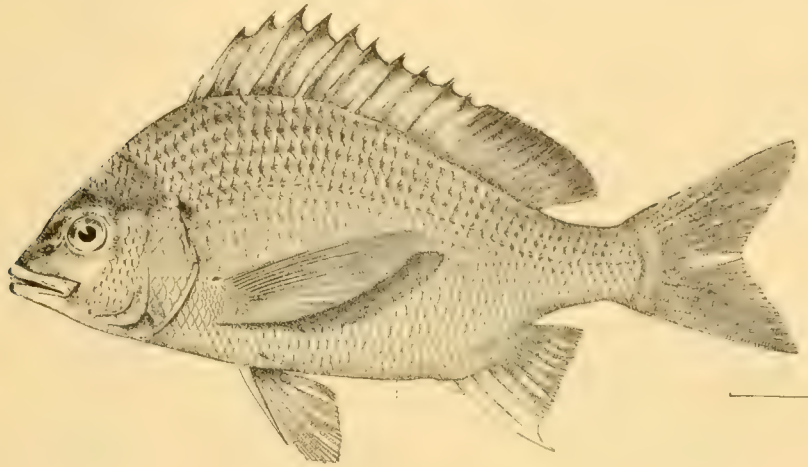


FIG. 28. *Sparus latus* Houttuyn. (From Proc. U. S. N. M., Vol. XLI, p. 584).

158. *Sparus macrocephalus* Basilewsky.

(Mem. Carn. Mus., Vol. VI, p. 35, fig. 26).

(*Chrysophyrs swinhonis* Günther.)

Matsushima Bay, No. 6428a; Shimonoseki, No. 6396a-g; Osaka.

Family KYPHOSIDÆ.

159. *Kyphosus cinerascens* (Forskål).

Misaki, No. 6067a. A young example, 67 mm. long.

D. XI, 12; A. III, 11. Identical with a specimen from Calayan in the Philippines. Only twice before recorded from Japan.

160. *Girella mezina* Jordan & Starks.

Misaki, No. 6132a.

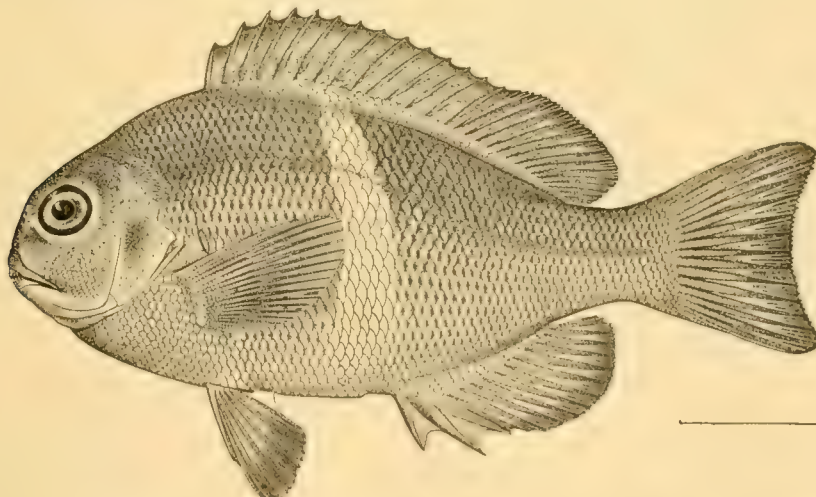


FIG. 29. *Girella mezina* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXXII, p. 497).

Fourteen centimeters long. The white band seen in the type is missing, doubtless disappearing with age.

161. *Girella punctata* Gray.

Kobe, No. 6335a; Misaki, No. 140a-b; Osaka, No. 6268a,

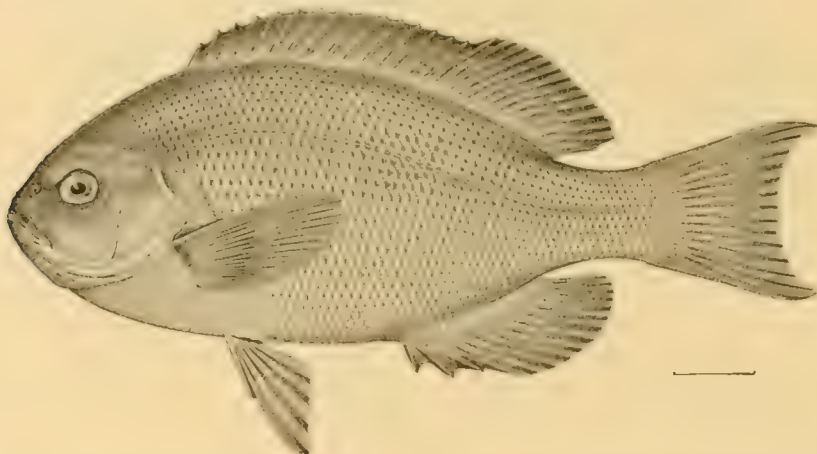


FIG. 30. *Girella punctata* Gray. (From Proc. U. S. N. M., Vol. XXII, p. 498).

162. *Girella melanichthys* (Richardson).

Misaki, No. 6203a-c.

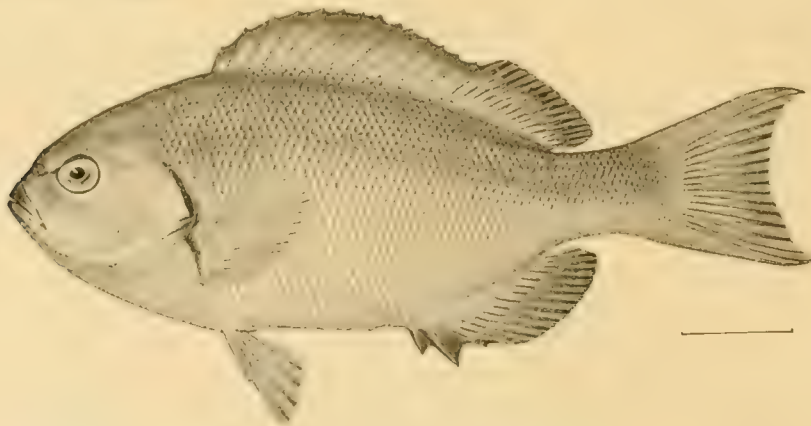


FIG. 31. *Girella melanichthys* (Richardson). (From Proc. U. S. N. M., Vol. XXXII, p. 498).

Family SCIÆNIDÆ.

163. *Sciæna mitsukurii* (Jordan and Snyder). (Plate XLII, fig. 1).
Sendai.

164. *Sciæna schlegeli* (Bleeker).

Matsushima Bay; No. 6297a; Osaka, No. 6347a-g.

Family OPLEGNATHIDÆ.

165. *Oplegnathus fasciatus* (Temminck & Schlegel).
Shimonoseki, No. 6337a-i; Kobe, No. 6209a-c (Coll. Manabe); Misaki, No. 6407a.
166. *Oplegnathus punctatus* (Temminck & Schlegel).
Osaka, No. 6369a.

Family HISTIOPTERIDÆ.

167. *Histiopaterus typus* (Temminck & Schlegel).
Misaki, No. 6247a.

Family PRIACANTHIDÆ.

168. *Pseudopriacanthus nipponius* (Cuvier & Valenciennes).
Misaki, No. 6074a-c; Sagami Bay.

Found at Misaki in tide-pools. Young three centimeters long. Dark cross-bands very wide, five or six times width of interspaces. Spinous dorsal and anal black, as are pectorals and ventrals. Soft vertical fins clear, with small vivid black oblong spots.

Family MULLIDÆ.

169. *Upeneus spilurus* (Bleeker).
Misaki, No. 6106a.
Three dark stripes barely visible. Eye 4.2 in head; depth of caudal peduncle 8.5 in body-length.
170. *Upeneus bensasi* (Temminck & Schlegel).
(Mem. Carn. Mus., Vol. VI, p. 40, fig. 32).
Misaki, No. 6181a; Awaji Island.

Family APLODACTYLIDÆ.

171. *Goniistius zonatus* (Cuvier & Valenciennes).
(Mem. Carn. Mus., Vol. VI, p. 41, fig. 34).
Misaki, No. 6263a; Enoshima, No. 6073a.

Family POLYNEMIDÆ.

172. *Polydactylus agonasi* (Jordan and McGregor).
(Mem. Carn. Mus., Vol. VI, p. 40, fig. 33).
Osaka.

Family SILLAGINIDÆ.

173. *Sillago sihama* (Forskål).
Misaki, No. 6166a-b.

174. *Sillago japonica* (Temminck & Schlegel).
Osaka, No. 6235a; Shimonoseki, No. 6218a-b.

Family LATILIDÆ.

175. *Latilus japonicus* (Houttuyn).
Misaki, No. 6149a-b; Osaka, No. 6304a.

Family MALACANTHIDÆ.

176. *Oceanops latovittata* (Lacépède).
Nafa, Okinawa, Riu Kiu (in collection of the Kwansei Gakuin at Kobe).

Family ECHENEIDIDÆ.

177. *Rhombochirus megalodiscus* (Franz).
One specimen, Misaki, No. 6274a.
Disk 2.8 in body-length to base of caudal. Eye 8 in head; otherwise as in Franz's figure. D. XVIII-22, A. 20.

178. *Remorina brachyptera* (Lowe).
Misaki, No. 6223a; Matsushima Bay; Sendai, No. 6295a.

Family CEPOLIDÆ.

179. *Acanthocepola limbata* (Cuvier & Valenciennes).
Misaki, No. 6435a.
Head 10.5 in length; depth 14. Eye 3 in head, snout 4.5; D. 103, A. 101. Scales four hundred and twenty or more. This agrees in all regards with the account given by Jordan and Evermann (Proc. U. S. N. M. XXV, 1902, p. 363) of a specimen from Formosa called *Acanthocepola mesapron*.

180. *Cepola schlegeli* (Bleeker).
Misaki, No. 6060a.
Head 7.5; depth 10; D. 65; A. 64; three hundred and seventy scales. Eye 2.66 in head; snout 5.33. Maxillary reaching posterior border of pupil; a black spot between maxillary and premaxillary.

Family EMBIOTOCIDÆ.

181. *Ditrema temmincki* Bleeker.
(Mem. Carn. Mus., Vol. VII, p. 42, fig. 36).
Shimonoseki; Osaka, No. 6404a; Misaki, No. 6397a-c.
182. *Neoditrema ransonneti* Steindachner.
(Mem. Carn. Mus., Vol. VI, p. 43, fig. 37).
Misaki, No. 6423a-c.

Family POMACENTRIDÆ.

183. *Chromis notatus* (Temminck & Schlegel).
Kobe, No. 6230a-c (Coll. Manabe).
184. *Abudefduf sordidus* (Forskål).
Misaki, No. 6146 many; 125 cm. long. Also numerous young from tide-pools.
185. *Abudefduf saxatilis* (Forskål).
Misaki, No. 6077 many.

Family LABRIDÆ.

186. *Chærodon azurio* (Jordan & Snyder).
Shimonoseki, Osaka, No. 6387a.
187. *Semicossyphus reticulatus* (Cuvier & Valenciennes).
(Mem. Carn. Mus., Vol. VI, p. 43, fig. 38).
Shimonoseki.
188. *Lepidaplois perditio* (Quoy & Gaimard).
Two young specimens, No. 6308a-b, the longest 18 cm., from an unknown locality, probably Misaki.

The color is pale, the black blotch under the dorsal very distinct, extending on the rays. The pale area before it is obscure. The black spots between the

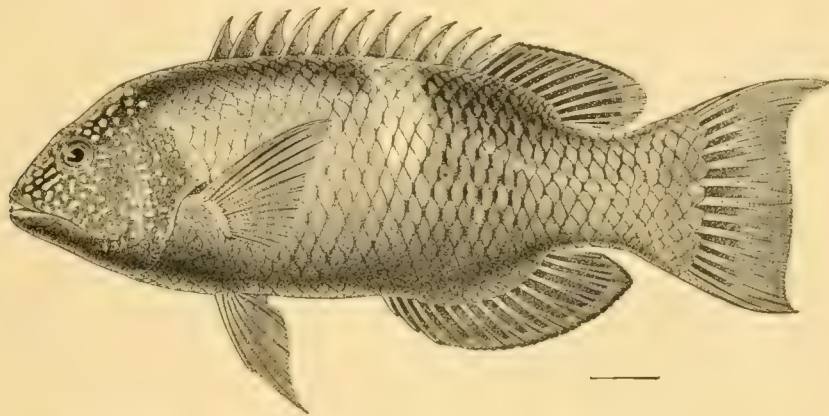


FIG. 32. *Lepidaplois perditio* (Quoy & Gaimard). (From Proc. U. S. N. M., Vol. XXIV, p. 618).

dorsal spines are very distinct. Head with violet reticulations around pale spots. The large specimens taken by Jordan and Snyder at Wakanoura are much deeper in color, verging on violet. *Cossyphus atrolumbus* Cuvier & Valenciennes is doubtless based on young examples like these. The figure of *L. perditio* given by Quoy & Gaimard from a sketch made by Quoy, when his ship was apparently being wrecked on the reefs of Tonga-tabu, is clearly incorrect; the black spot and the pale area are both wrongly placed.

D. XII, 10; A. 111, 12; Scales 5-34-13; head 3.5; depth 2.5.

189. *Lepidaplois macrurus* (Lacépède).

From Owston Collection; No. 4250a. (No label, probably from Okinawa).

190. *Pseudolabrus japonicus* (Houttuyn).

Misaki, No. 6158a-g; Shimonoseki, No. 6197a-b, ♀, 6202 a-b, ♂; Izu.

191. *Pseudolabrus gracilis* (Steindachner).

Misaki.

192. *Cirrhilabrus temmincki* Bleeker.

Misaki, No. 6458.

Young example with the ventrals not elongate; fins darker than usual.

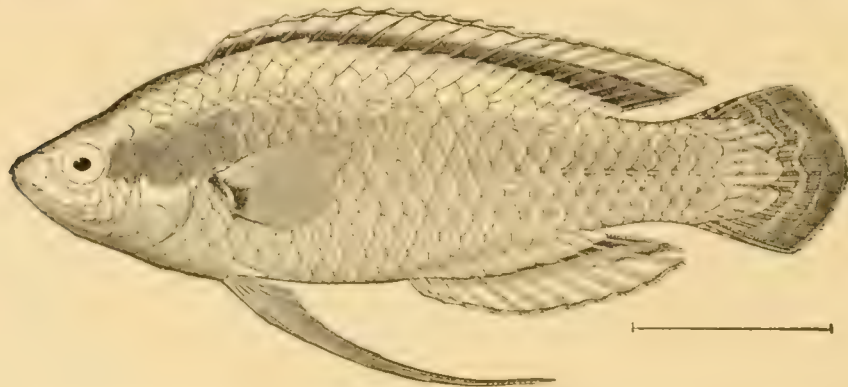


FIG. 33. *Cirrhilabrus temmincki* Bleeker. (From Proc. U. S. N. M., Vol. XXIV, p. 652).

193. *Stethojulis terina* Jordan & Snyder.

(Coll. Owston) Izu, No. 4305a.

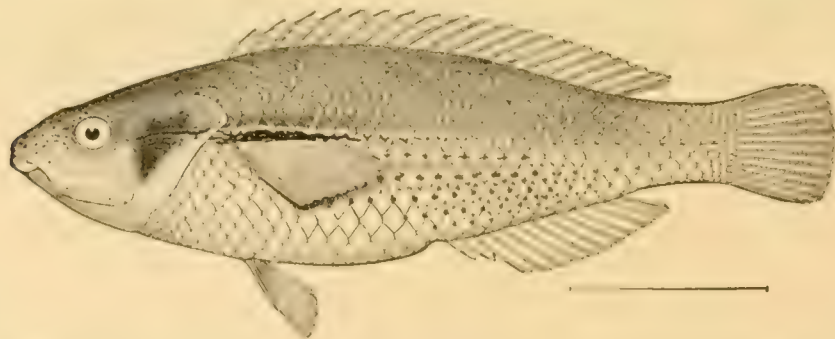


FIG. 34. *Stethojulis terina* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIV, p. 632).

This is probably the female of the species called *Stethojulis trossula*.

194. *Stethojulis trossula* (Jordan & Snyder).

Izu, No. 4264a-b; Owston collection.



FIG. 35. *Stethojulis trossula* (Jordan & Snyder). (From Proc. U. S. N. M., Vol. XXIV, p. 633).

195. *Halichoeres poecilopterus* (Temminck & Schlegel).

Misaki, No. 6247a-c; Shimonoseki, No. 6266a-b; Osaka, No. 6186a-d.

This seems to be the male, and the form called *H. pyrrhogrammus* is probably the female of the same species.

196. *Julis musume* (Jordan & Snyder).

From Owston Collection, No. 4115a, Okinose, Sagami Bay.

197. *Thalassoma cupido* (Temminck & Schlegel).

Misaki, No. 6425a.

198. *Xyrichtys sciistius*, sp. nov. (Plate XXX, fig. 3).

The following is a description of the type, 165 mm. long, from Sagami Bay, No. 6028, C. M. Cat. of Fishes:

Head 3.33 in body, without caudal; depth 2.66; eye 6 in head; preorbital depth 4.25; maxillary 3.4; depth of caudal peduncle 2; D. IX, 12; A. III, 12; scales in lateral series twenty-five; in transverse series at middle of body 2.5/9.5.

Eye set low in head, at diameter of an eye from dorsal profile and at the level of origin of lateral line; dorsal edge of snout and head moderately carinate, evenly arched from snout to dorsal origin, not more so on nape; distance from eye to dorsal origin greater than depth of pre-orbital; latter one and two-thirds diameter of eye; maxillary nearly reaching vertical from eye; cheek without furrow from end of maxillary; teeth of both jaws in three or four rows, the outer conical and slightly enlarged, the inner two granular and small; two forward pointing canines in each jaw in front, a single smaller canine in the center of each side of the lower jaw; no posterior canine; gill-rakers eleven on lower limb of first arch.

First two dorsal spines of very slightly greater height than the following, subequal, about 3 in head; soft rays 2.5 in head; anal similar to soft dorsal; its spines short, graduated; vent decidedly nearer snout than base of caudal; ventrals 1.33 in head, slightly filamentous, reaching anal insertion; pectorals 1.5 in head.

Body colorless, probably light red or yellowish in life, save on membranes of spinous dorsal, on which is a row of spots of black; smaller spots are present at the same level on the spines; peritoneum colorless.

199. *Iniistius dea* (Temminck & Schlegel). (Plate XXXI, fig. 7).

Sagami Bay, No. 6008a; Misaki, No. 6296a-d; Yokohama, No. 6287a, 6377a-b.

A young specimen from Sagami Bay, but eighty-four millimeters in total length, shows the juvenile coloration well, and a figure is given on Plate XXXI. In the adults the bands are very faint and the coloration of the fins has entirely changed. At a length of one hundred and thirty millimeters the bands are slightly stronger in coloration. The closely allied species, *Iniistius pavoninus* of the Hawaiian Islands, shows an exactly similar change, the bands, however, being distinct in specimens reaching as much as one hundred and fifty-five millimeters in length. The pre-orbital depth is very much less in the young than in the adult. These changes we have followed in detail in *Iniistius pavoninus* and partially in *Iniistius dea*. The species are so closely allied that there is no question that the same laws of change in color apply. A careful comparison of a large series of specimens and measurements taken in hundredths of body-length showed no prominent differences between *Iniistius dea*, *I. pavoninus*, and *I. niger*, the principal differences being those of color.

Adult with head 3.33 to 3.5 in body; depth 2.66. Black lateral spot absent in two specimens.

Misaki, Yokohama (Coll. Owston).

Family SCARICHTHYIDÆ.

200. *Calotomus japonicus* (Cuvier & Valenciennes).

Misaki, No. 6187a-d:

Snout 3 in head; caudal narrowly edged with white.

Family ZEIDÆ.

201. *Zenopsis nebulosa* (Temminck & Schlegel).

Kobe.

202. *Zeus japonicus* (Cuvier & Valenciennes).

Tsushima Straits; Misaki, No. 6064a; Kobe, No. 6045a; Osaka, No. 6368a-d.

Family ANTIGONIIDÆ.

203. *Antigonia rubescens* (Günther).

Misaki, No. 6414a-e.

Family PLATACIDÆ.

204. *Platax teira* (Forskål).

One specimen from the Owston Collection, Okinose, Sagami Bay, No. 4146a.

Family CHÆTODONTIDÆ.

205. *Chætodon setifer* Bloch.

Misaki, No. 6152a.

Length eleven centimeters. This common species of the South Seas had not been previously noted in Japan.

206. *Chætodon lunula* (Lacépède).

Misaki, No. 6214a; Goto Islands, No. 6131a-b; from the Owston Collection.

These specimens agree entirely with others from Samoa and Hawaii.

207. *Chætodon vagabundus* Linnæus.

Misaki, No. 6138a.

Young in the rock-pools at Yogashima.

208. *Microcanthus strigatus* (Cuvier & Valenciennes).

Misaki, No. 6356a-e.

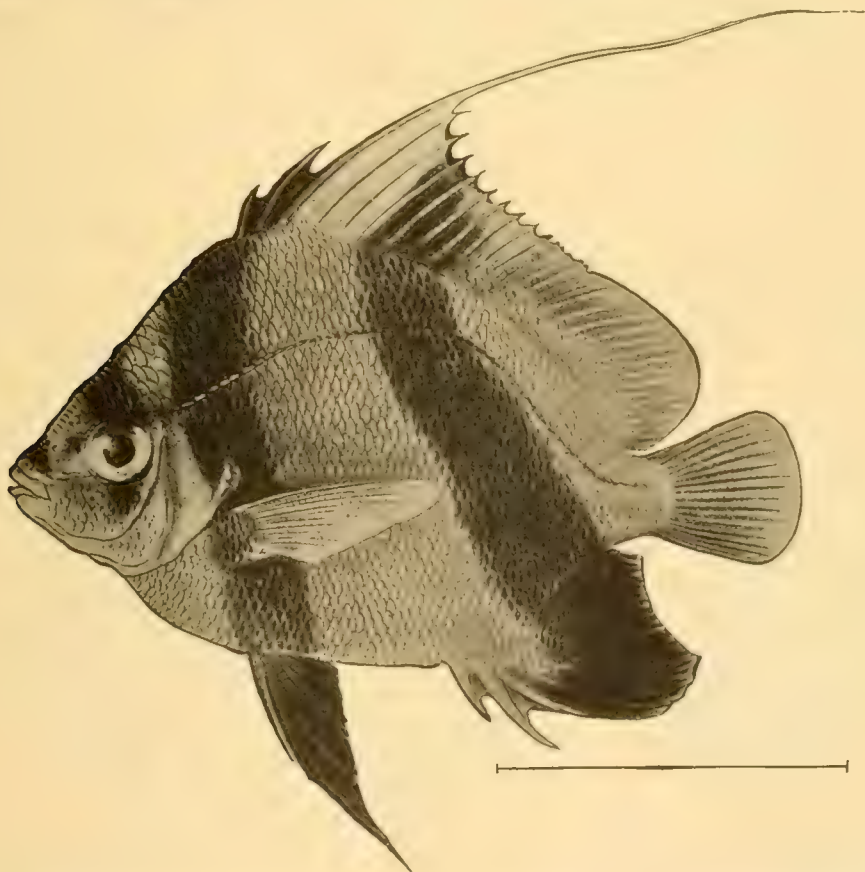


FIG. 36. *Heniochus macrolepidotus* (Linnæus). (From Proc. U. S. N. M., Vol. XXVI, p. 695).

209. *Heniochus macrolepidotus* (Linnæus). (See Fig. 36, p. 265).

Misaki, No. 6144a-j.

Family HEPATIDÆ.

210. *Naseus unicornis* (Forskål).

Misaki, No. 6136a.

Young example without frontal horn or caudal plate; D. V-27; A. II, 27.

211. *Xesurus scalprum* (Cuvier & Valenciennes).

Yokohama; Izu; Misaki, No. 6408a-b.

212. *Hepatus argenteus* (Quoy & Gaimard).

Misaki, No. 7137a.

Family TEUTHIDIDÆ.

(Siganidæ).

213. *Teuthis fuscescens* (Houttuyn).

Osaka, No. 6380a; Kobe, No. 6157a.

Under the rules of the International Zoölogical Congress, *Teuthis* should replace *Siganus*. Originally *Teuthis* of Linnæus included *Hepatus* Gronow—*Acanthurus* Forskål. *Teuthis* was first restricted by Cuvier to *Teuthis javus*, which is a *Siganus* of Forskål.

Family TRIACANTHODIDÆ.

214. *Triacanthodes anomalus* (Temminck & Schlegel).

Misaki, No. 6143a.

Family TRIACANTHIDÆ.

215. *Triacanthus brevirostris* (Temminck & Schlegel).

Misaki, No. 6344a-b; Sagami Bay, No. 6362a-j.

D. V-22; A. 18; Head 3.75; depth 2.8. Black blotch around base of spinous dorsal as well as on fin.

Family MONACANTHIDÆ.

216. *Monacanthus cirrhifer* Temminck & Schlegel.

Shimonoseki, 6141a.

217. *Monacanthus japonicus* (Tilesius).

(Mem. Carn. Mus., Vol. VI, p. 44, fig. 39).

Kobe, No. 6044a-d (Coll. Manabe).

218. *Stephanolepis cirrhifer* (Temminck & Schlegel).

Yokohama, No. 6141a; Shimonoseki.

Color well-preserved; besides the usual minute longitudinal lines, two broad, very indistinct curved bands are present between the dorsal and anal, the convexities forward.

219. *Pseudomonacanthus nigromaculatus* (Tanaka). (Plate XXXI, fig. 2).

Sagami Bay, No. 6365a; otherwise known only from Tanaka's type. We figure our example of this interesting species.

220. *Rudarius ercodes* Jordan & Fowler.

Misaki, No. 6139a-o.

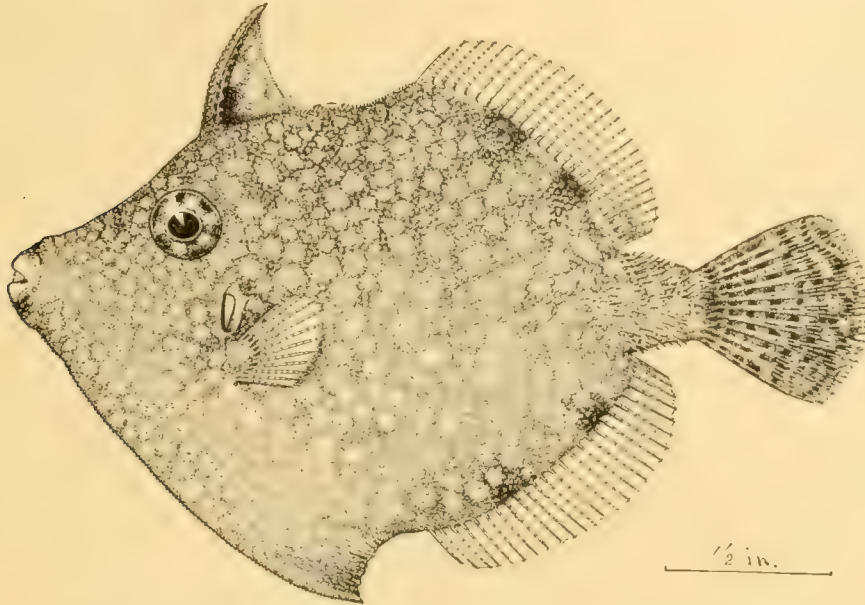


FIG. 37. *Rudarius ercodes* Jordan & Fowler. (From Proc. U. S. N. M., Vol. XXV, p. 270).

221. *Brachaluteres ulvarum* Jordan & Snyder.

Misaki, No. 6145a.

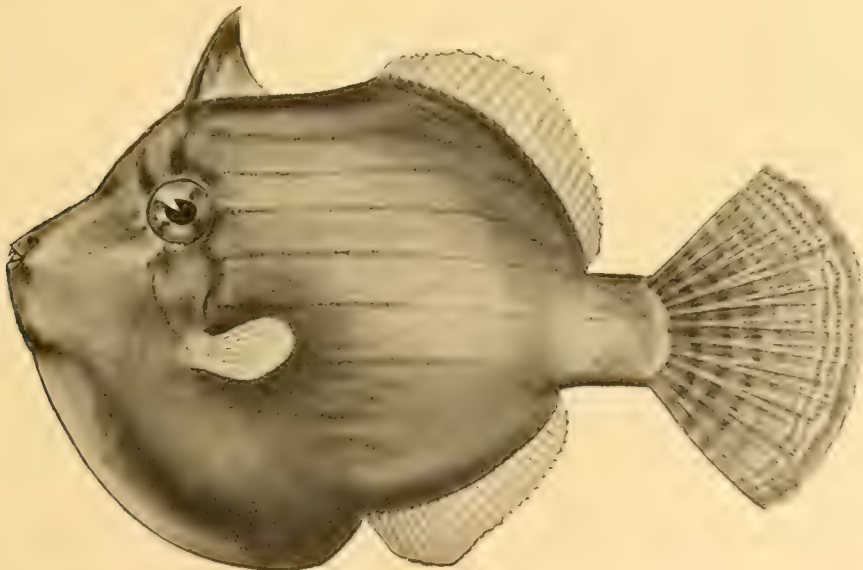


FIG. 38. *Brachaluteres ulvarum* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXV, p. 272).

Family OSTRACIIDÆ.

222. *Ostracion diaphanum* Bloch & Schneider.

Misaki, No. 6151a-c.

223. *Ostracion stellifer* Bloch & Schneider.

(*Lactophrys tritropis* Snyder).

One specimen, No. 6447a, 8 cm. long, from Misaki. This is identical with the cotypes of *Lactophrys tritropis* Snyder,³ No. 21424 Stanford University Collection, with which it was compared. It was also compared with a specimen of *L. stellifer* (Bloch) from Sydney and found identical in all respects, save the slightly smoother appearance of the scales; counts, measurements, color, spines, and shape were the same. The cotypes of *L. tritropis* Snyder, and the specimen at hand, are probably the young of the species erroneously termed *Lactophrys concatenatus* (Bloch). The original of the latter was a West Indian species, identical with *Ostracion triqueter* Linnæus, Bloch having described it and copied his plate from a drawing by Plümer of a specimen from Martinique.⁴

The name *Ostracion stellifer* Bloch & Schneider is then the oldest name of the species, and must be used instead of *concatenatum* (Bloch). The species is recorded as *stellifer* by Bleeker from Japan, but the earliest reference we have found is in his "Nieuwe Nalezingen"⁵ without locality other than Japan. In later lists it was evidently termed *Ostracion concatenatum*.

224. *Ostracion immaculatum* Temminck & Schlegel.

Misaki, No. 6260a-f.

A small specimen has black spots on dorsal and lateral surfaces; the others are normally colored.

225. *Ostracion fornasini* Bianconi.

Misaki (Coll. Aoki).

One young example identical with one from Lord Howe Island. Irregular spots and lines of pigment over head and upper half of body. This species has not before been noticed in Japan.

226. *Aracana aculeata* (Houttuyn).

Misaki.

Lateral ridges in young with five small spines, ventral with six.

³ Proc. U. S. N. Mus., Vol. XL, p. 536, 1912.

⁴ See Jordan & Evermann, Fish. N. & M. America, Vol. II, p. 1723 (= *L. triqueter*).

⁵ Verh. Bot. Genoot., XXVI, p. 40, 1857.

Family TETRAODONTIDÆ.

227. *Spheroides spadiceus* (Richardson).

Osaka, No. 6430a-b; Shimonoseki, No. 6179a-c.

Three young; some with a dark blotch at base of dorsal, upper jaw-teeth grooved, with parallel ridges.

228. *Spheroides pæcilonotus* (Temminck & Schlegel).

Shimonoseki, No. 6175a.

Spots above pectorals confluent across the back. The pore-line across the nose is convex anteriorly, not posteriorly, as described and figured by Richardson, whose Chinese fish *alboplumbeus* is probably different from the Japanese form called *pæcilonotus*. The specimen called *Spheroides ocellatus* by Jordan and Evermann, from Formosa, is the same species as this.

229. *Spheroides pardalis* (Temminck & Schlegel).

Shimonoseki, No. 6269a.

230. *Spheroides chrysops* (Hilgendorf).

Misaki, No. 6150a.

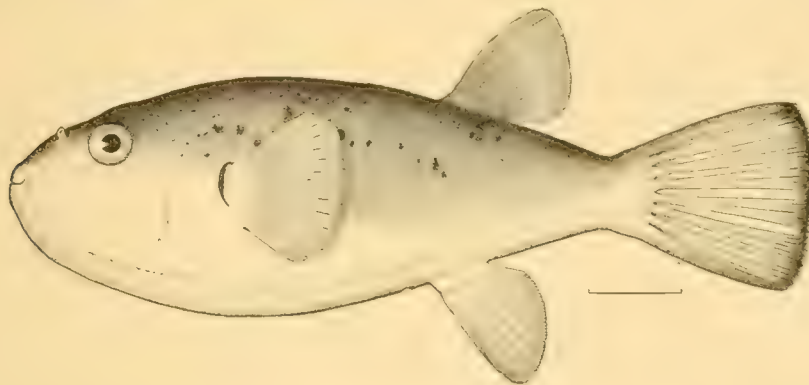


FIG. 39. *Spheroides chrysops* (Hilgendorf). (From Proc. U. S. N. M., Vol. XXIV, p. 249).

Distinguished from other species of the genus by the short and deep caudal peduncle, the extension of the pectoral over half-way to dorsal, and by the color.

231. *Spheroides borealis* Jordan & Snyder.

(Mem. Carn. Mus., Vol. VI, fig. 41, p. 46).

Misaki, No. 6116a.

232. *Canthigaster rivulatus* (Temminck & Schlegel).

Misaki, No. 6163a-d.

Family SCORPÆNIDÆ.

233. *Sebastodes owstoni* sp. nov. (Plate XXI, fig. 3).

Described from the type, No. 6025 Carnegie Museum Catalog of Fishes, a specimen from Aomori, Japan, 178 mm. in total length. Three cotypes, No. 6030a-c, are from the same locality.

Head 2.9 in body without caudal; depth 3.5; eye 3.33 in head; maxillary 2.33; interorbital space 4.5; snout 3.5; D. XIV, 13 (or 14); A. III, 8 (or 9); pores in lateral line 35; scales in longitudinal series 55 (60) (counting oblique rows); in transverse 6 from insertion of dorsal to lateral line, 16 from insertion of anal to lateral line.

Body elongate, slender; snout pointed; lower jaw with prominent symphyseal knob; maxillary reaching vertical from center of eye; interorbital space broad, but very slightly convex; nasal spines small, but sharp; pre-ocular spines of moderate size, sharp; orbital rim not raised; supra-ocular and parietal ridges visible, not covered by scales, each terminating in a very small sharp spine, as does nuchal ridge; pre-opercle with five flat spines; pre-orbital with a single sharp serration on lower border. Teeth in a single series on mandibles, a patch on symphyseal knob; in narrow bands in upper jaw.

Dorsal spines high, fifth and highest, 2.25 in head; last spine a half longer than penultimate; anal spines very long, second longest, 2 in head; pectorals reaching anal insertion, as long as head; ventrals extending to anus, two-thirds head; tip of last anal ray, when supine, reaching to diameter of eye from first caudal ray; caudal deeply emarginate, nearly forked.

Color in alcohol uniformly reddish, no black on fins or body. In some specimens there are faint indications of a blackish blotch below ninth to twelfth dorsal spines and another below middle of soft dorsal.

This species is most nearly allied to *Sebastodes itinus* Jordan and Starks, with the type of which it was compared. The differences are as follows: a lesser number of lateral line pores in *S. owstoni*, more prominent head armature, longer anal spines, and longer pectoral, as well as numerous small differences in proportions.

234. *Sebastodes flammeus* Jordan and Starks. (Plate XXXII, fig. 1).

Two fine specimens of this species from the Hokkaido, three hundred and thirty-seven and four hundred and seventeen millimeters in total length, No. 6463. The type only has hitherto been known, a very poorly preserved specimen without skin, the head stripped of skin and flesh, and the soft rays broken off. The unnatural prominence of the head armature led Jordan and Starks to regard it as allied to *S. iracundus*, but it is more nearly allied to *S. steindachneri*, the spines and cranial ridges being nearly obscured by the flesh and skin in both.

From *S. steindachneri* it differs in the scaled mandibles and tip of snout, and the dentition. A series of measurements taken of the type and of our specimens in hundredths of body-length are here given, as the type is very fragile and liable to destruction. The measurements of the type are included in parentheses:

Head without mandible .37 (.39); depth .31 (.31); eye .095-.11 (.105); maxillary length .175 (.175); snout .09-.095 (.09); mandible .20 (.21); pectoral .27 (.28) ventral rays .19; ventral spine .11-.12 (.14); fourth dorsal spine .105-.112 (.135); third anal spine .10 (.14); interorbital space .08-.085 (.083); pores in lateral line 31-33; least depth of caudal peduncle .08-.09 (.085); D. XIII., 14; A. III., 8.

Pectoral reaching to vent or to anal insertion; ventrals not reaching vent by two-thirds of eye or more; caudal emarginate; longest dorsal rays 2.5 in head, without mandible; longest anal rays 2.33.

Spines on head very small, merely the sharp tip of each projecting above the skin, save those of the parietals, which have a low naked ridge. Scales ctenoid, present on whole of body, including tip of snout, maxillaries, mandibles, and basal half of soft vertical fins. Spinous dorsal set in a narrow naked space, no scales on its base, about seven or eight scales between lateral line and edge of naked area. Scales above lateral line about 75; only 31-33 with pores. Gill-rakers 9+20.

Color in alcohol uniform, apparently red in life, a dark blotch on opercular flap; caudal a trifle dusky, and traces of a black margin on spinous dorsal. Peritoneum and lining of gill-cavity black.

The specimens show a variation in the lengths of fins and spines according to their relative size, the larger specimens having the shorter fins.

In the original description of the type it was not mentioned that the teeth in the upper jaw form a villiform band posteriorly.

235. *Sebastodes inermis* (Cuvier & Valenciennes).

Osaka, No. 6264a.

We do not find any permanent differences by which *Sebastodes güntheri* Jordan & Starks (Mem. Carn. Mus., Vol. VI, fig. 43, p. 49) can be separated from *S. inermis*.

236. *Sebastodes tokionis* Jordan & Starks. (See Fig. 40, p. 272).

Misaki, No. 6198a-d.

237. *Sebastodes joyneri* (Günther). (Plate XXXII, fig. 2).

Tsushima Straits; Osaka Market, No. 6037a-g; Miyako.

This species is rather common in Southern Japan. Our specimens are like those called *S. joyneri* by Jordan & Starks. But they differ considerably in color

from Günther's plate. This was possibly drawn from a different and otherwise unknown species, but more likely the plate, if correct, represents the young. We present a figure of a specimen from Tsushima straits.

238. *Sebastodes matsubaræ* (Hilgendorf).

Uraga channel (Coll. Owston).

239. *Thysanichthys evides* sp. nov. (Plate XXXII, fig. 3).

We base the accompanying description upon six specimens from Misaki, the type, the longest, 95 mm. in total length, being No. 6019a, Carnegie Museum Catalog of Fishes:

Head 2.5 in body-length; depth equal to head; eye 3.33 in head; snout 4; interorbital space 3; maxillary 1.8; pores in lateral line 22; scales, counting vertical

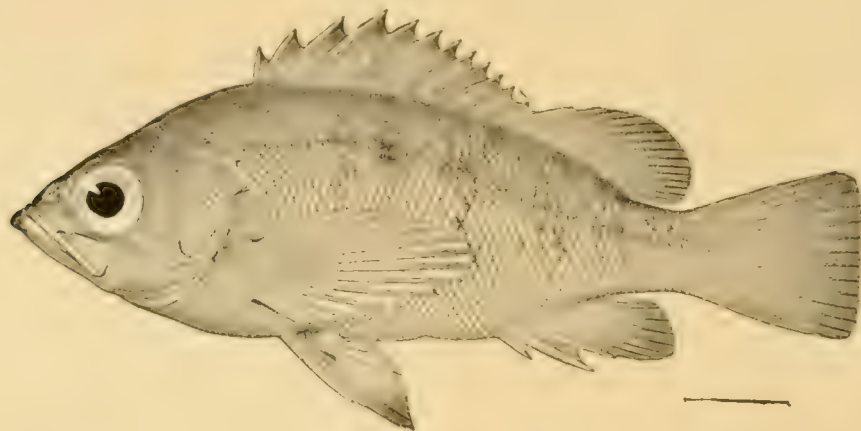


FIG. 40. *Sebastodes tokionis* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXVII, p. 104).

rows above lateral line, 45; in transverse series, from insertion of anal to last dorsal spines, 5/11; D. XIII., 10; A. III., 6.

Armature of head more developed than in *Sebastichthys elegans*; nasal, pre-ocular, supra-ocular, post-ocular, tympanic, parietal, nuchal and coronal spines present, the latter small, all very acute and all prominent; pre-orbital with three prominent triangular, blunt points, overlapping the maxillary; suborbital stay prominent, forming a naked sharp ridge below eye, ending at level of upper opercular spine in a small spine, the ridge with two small posteriorly directed spines (much less prominent than in *Thysaninchthys crossotus*). Pre-opercle with a double upper spine, another immediately below, and a third more distant. Opercle with two sharp, somewhat dorsally directed, spines of equal strength; a similar one on clavicle, on post-temporal, and a smaller one immediately before the latter. Interorbital space deeply concave, a pair of ridges separated by a sharply marked

channel, and ending occasionally in a spine. Maxillary ending below posterior margin of orbit (not below middle, as in *Thysanichthys crossotus* Jordan & Starks). Lower jaw not projecting. Gill-rakers short, 10 on anterior limb of arch.

Scales ctenoid, not present on snout and maxillary, between interorbital regions, present on cheeks and opercles; fins naked, save base of pectoral and soft fins; lateral line without series of filaments; which are present on spines of head in part, none as long as in *Thysanichthys crossotus*.

Pectoral reaching to first anal spine; ventrals nearly to anus; dorsal and anal spines with channels. Fifth dorsal spine highest, 2.6 in head, thirteenth 3.166 in head, twelfth slightly more than half of thirteenth; second anal spine longest and strongest, 2 in head. Peritoneum white.

Color in spirits dark olivaceous, vaguely mottled.

240. *Sebastichthys pachycephalus* (Temminck & Schlegel).

Misaki, No. 6224a-b.

Color very dark. D. XIII., 12; A. III., 7; pores 27.

241. *Sebastichthys elegans* (Steindachner & Döderlein).

(Mem. Carn. Mus., Vol. VI, fig. 45, p. 51).

Idzu Sea, No. 4325a-b; from Owston Collection, Yokohama; Shimonoseki.

242. *Sebastichthys mitsukurii* (Cramer).

Shimonoseki, No. 6213a-c.

243. *Sebastiscus albofasciatus* (Lacépède).

(*Sebastes marmoratus* Cuvier & Valenciennes).

A. Osaka, No. 6343a, 6346a-l. Comparison of numerous specimens fails to show any distinction, except in color, between the common shore-form of *Sebastiscus*, called *marmoratus*, and the form *albofasciatus*, taken in deeper water. The former is dull olive and brownish in color, the latter of vivid shades of red and pink. Both forms are very common and some specimens seem to intergrade.

B. Tsushima Straits: the bright red form called *albofasciatus* common in the trawlers' catches. None of these has the spine below the eye, supposed to distinguish the red form from *marmoratus* of the shore. The eye varies greatly in size.

C. Shimonoseki, Nos. 6204, 6345a-e. Both the orange deep sea form (*albofasciatus*) and the brown shore form (*marmoratus*).

D. Misaki, No. 6148a.

244. *Helicolenus emblemarius* Jordan & Starks. (See Fig. 41, p. 274).

Misaki, No. 6236a, young (Coll. Aoki).

245. *Helicolenus hilgendorfi* (Döderlein).

Misaki, No. 6241a.

Compared with *H. dactylopterus* from the coast of Delaware, it has a slightly smaller eye, and fewer transverse scales above the lateral line.

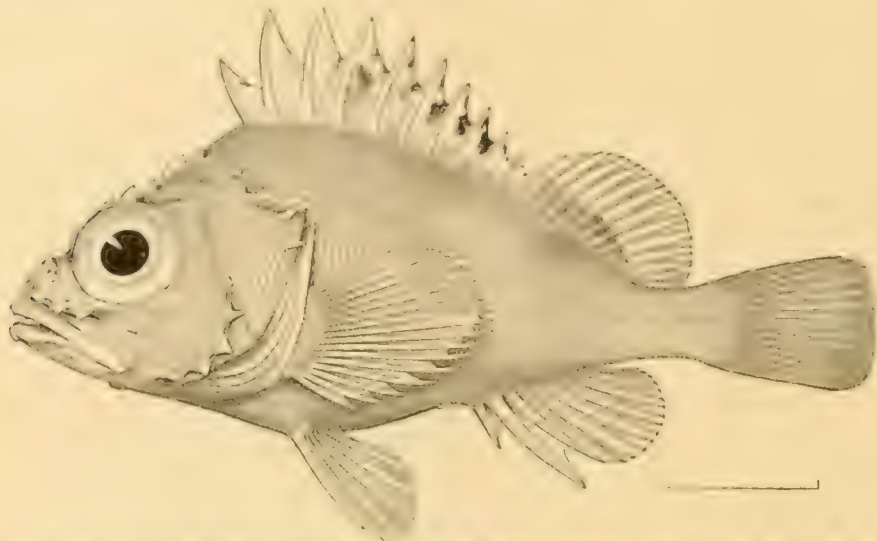


FIG. 41. *Helicolenus emblemarius* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXVII, p. 130).

For the present we may regard the Japanese species as distinct.

246. *Scorpaena izensis* Jordan & Starks.

Straits of Tsushima in rather deep water, No. 6370a-f. (Osaka market).
Hitherto known only by the types from Izu.

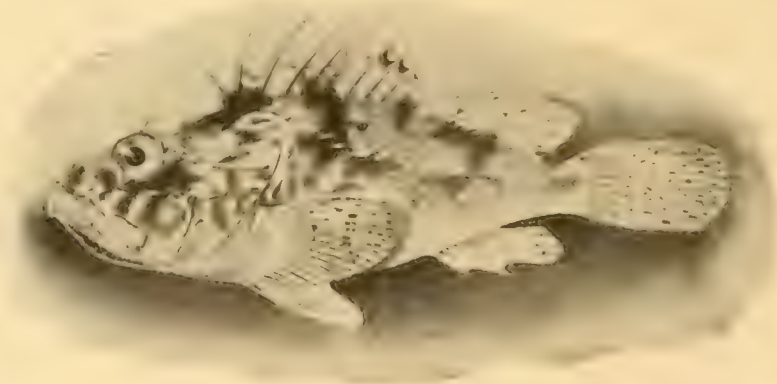


FIG. 42. *Scorpaena izensis* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXVII, p. 134).

247. *Pterois lunulata* Temminck & Schlegel.

Misaki, No. 6165a-g; Yawatahama.

248. *Dendrochirus jordani* (Regan).

Misaki, No. 6211a-b.

Two specimens one hundred and forty millimeters long; D. XIII., 10; A. III., 7, P. 20; Scales 27. Head 2.75 in length; depth 3. Eye 3.5 in head; snout 2.5. Second ray of caudal filamentous. This is evidently the adult of the species named *Pterois jordani* by Regan.

249. *Paracentropogon rubripinnis* (Temminck & Schlegel).

Kobe, No. 6057a (Coll. Manabe); Misaki, No. 6253 many.



FIG. 43. *Paracentropogon rubripinnis* (Temminck & Schlegel). (From Proc. U. S. N. M., Vol. XXVII, p. 168).

250. *Apistus evolans* Jordan & Starks.

Misaki, No. 6417a.

Apistus venenans Jordan & Starks is not different from this specimen.



FIG. 44. *Apistus evolans* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXVII, p. 147).

251. *Aploactis aspera* Richardson.
Misaki, No. 6120a (Coll. Aoki).



FIG. 45. *Aploactis aspera* Richardson. (From Proc. U. S. N. M., Vol. XXVIII, p. 172).

Head 3 in body; depth at ventrals 4. Eye 3.5 in head. D. III., X, 13; A. 14.
Body everywhere very densely papillate.

252. *Erosa erosa* (Langsdorf).
Misaki, No. 6121a.



FIG. 46. *Erosa erosa* (Langsdorf). (From Proc. U. S. N. M., Vol. XXVII, p. 157).

253. *Minous monodactylus* (Bloch & Schneider). (See Fig. 47, p. 277).
(*Minous adamsi* Richardson).
Kobe, No. 6050 (Coll. Manabe).

The Japanese form called *Minous adamsi* is probably not different from the species found further south.

254. *Inimicus japonicus* (Cuvier & Valenciennes).
Misaki, No. 6341a-b.

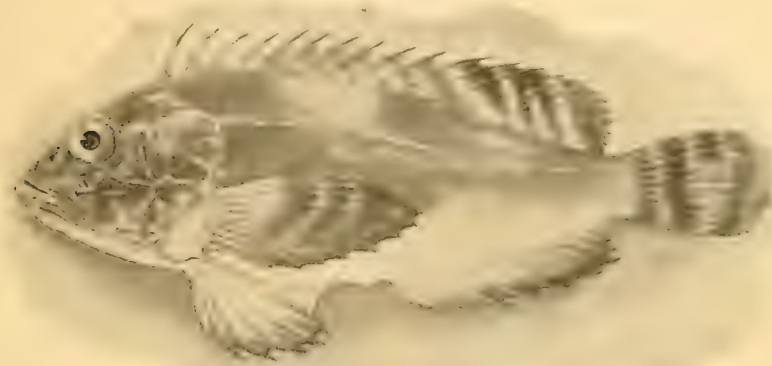


FIG. 47. *Minous monodactylus* (Bloch & Schneider). (From Proc. U. S. N. M., Vol. XXVII, p. 153).

Family HEXAGRAMMIDÆ.

255. *Hexagrammos otakii* Jordan & Starks.

Osaka, No. 6314.

256. *Agrammus agrammus* (Temminck & Schlegel).

Kobe, No. 6156a (Coll. Manabe); Osaka, No. 6302; Shimonoseki, No. 6199a.

Family COTTIDÆ.

257. *Cottus pollux* Günther.

Misaki, No. 6200a; Lake Biwa at Matsubara, No. 6220a-i.

258. *Furcina osimæ* Jordan & Starks.

Misaki, No. 6117 (Coll. Aoki).



FIG. 48. *Furcina osimæ* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXVII, p. 305).

Dorsal spines rather higher than in type; notch in spinous dorsal deeper; two stripes on soft dorsal.

259. *Pseudoblennius marmoratus* (Döderlein).

Misaki, No. 6244a-d.

260. *Pseudoblennius percoides* Günther.
Misaki, No. 6251a-c.
261. *Pseudoblennius cottoides* (Richardson).
Misaki, No. 6252a-f.
262. *Vellitor centropomus* (Richardson).
Misaki, No. 6072a-b.



FIG. 49. *Vellitor centropomus* (Richardson). (From Proc. U. S. N. M., Vol. XXVII, p. 320).

Family PLATYCEPHALIDÆ.

263. *Platycephalus indicus* (Linnæus).
Misaki, No. 6303a.
264. *Onigocia macrolepis* (Bleeker).
Misaki, No. 6069a-b; Yawatahama, in Iyo (Coll. Manabe).
265. *Onigocia spinosa* (Temminck & Schlegel).
Misaki, 6398a-d.

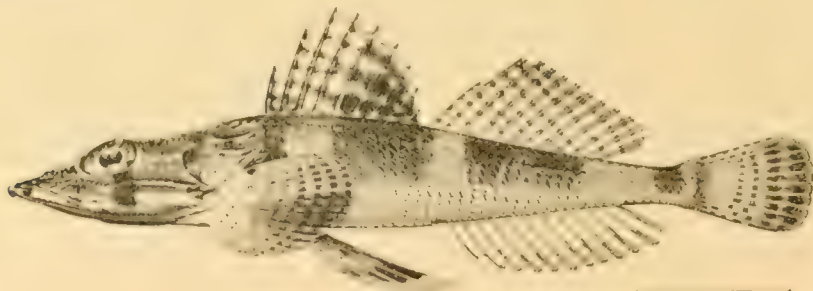


FIG. 50. *Onigocia spinosa* (Temminck & Schlegel). (From Proc. U. S. N. M., Vol. XXXIII, p. 633).

266. *Inegocia japonica* (Tilesius).
Misaki, No. 6188a, 6289a-b.

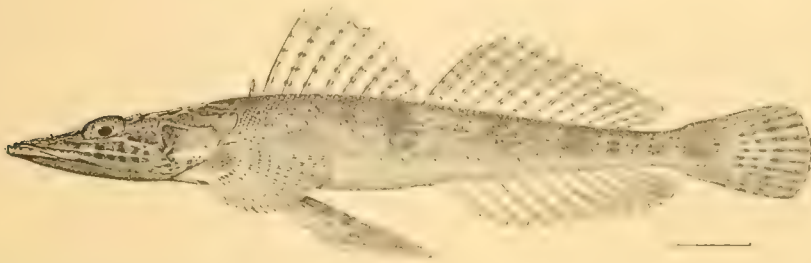


FIG. 51. *Inegocia japonica* (Tilesius). (From Proc. U. S. N. M., Vol. XXXIII, p. 637).

267. *Inegocia crocodilus* (Tilesius).

(Mem. Carn. Mus., Vol. VI, p. 54, fig. 49, as *Thysanophrys*).

Osaka, No. 6351a-l.

Family HOPLICHTHYIDÆ.

268. *Hoplichthys gilberti* Jordan & Richardson.

Misaki, No. 6078a, identical with the types.

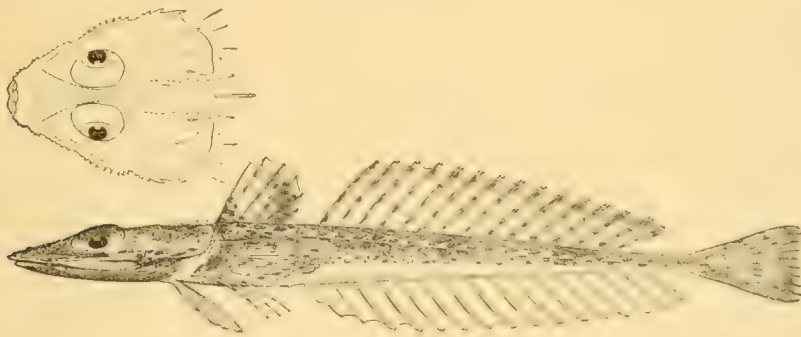


FIG. 52. *Hoplichthys gilberti* Jordan & Richardson. (From Proc. U. S. N. M., Vol. XXXIII, p. 648).

269. *Hoplichthys langsdorfi* Cuvier & Valenciennes.

Yawatahama, in Iyo; Misaki, No. 6017a.

We have elsewhere stated that this is not the *Hoplichthys langsdorfi* of Jordan & Richardson, which is a third species, *Hoplichthys regani* Jordan. These specimens agree with the plate of *H. langsdorfi* of Cuvier & Valenciennes, except that the number of anal rays is seventeen. *H. langsdorfi* differs from the other two species in having two well-developed spines on each body-scute, instead of one, as in *H. gilberti*, *H. regani*, and the Hawaiian species, *H. citrinus*.

Scutes 27; D. VI.-15; A. 17. Eye 4.5 in head, pectoral appendages not reaching tip of pectoral by 1.25 diameter of eye. Height of spinous dorsal 3.66 in head.

Family BEMBRIDÆ.

270. *Bembras japonicus* Cuvier & Valenciennes.

Nagasaki, one example, No. 4167a.

Family AGONIDÆ.

271. *Tilesina gibbosa* Schmidt. (Plate XXXIII, fig. 1).

Hokkaido, Japan, No. 6022a-f. An adult and a number of young.

This species is described in Russian in Schmidt's *Pisces Marium Orientalium* and beautifully figured. In order to provide a description for those unable to read Russian our adult specimen is here described, length 29 cm.

Head 4.5 in body without caudal, 5.2 in total length; depth 2.33 in head; D. XVIII-9; A. 26; P. 15; V. I, 2; body-plates 51, transverse 5; eye 5.5 in head; snout 3; maxillary 3.66; interorbital space 8; breadth at opercles 2.

Head conical; snout somewhat elongate; lower jaw strongly projecting; maxillary just failing to reach anterior border of eye; pre-orbital swollen, where it covers maxillary; each plate on sides of head and temporal region with a blunt apex or a sharp spine, those on opercles and cheek highest; a rough ridge forming upper posterior border of eye; each plate of body with a posteriorly directed sharp spine, rows converging on breast, with blunter spines in this region; lateral line with a small series of spinate plates half the breadth of those above them; three plates on base of pectoral; line of back between occiput and dorsal with small spinules in an irregular row, belly similar in posterior half; anterior half of median line of belly soft, not armed; anus midway between insertion of anal and isthmus.

Spinous dorsal inserted over seventh body-plate; first spine highest, 1.75 in head, last adnate to back; insertion of second dorsal three plates posterior to tip of last spine, over thirty-second body-plate, first ray 2.5 in head; caudal 1.66 in head; anal inserted opposite sixteenth body-plate, its termination two plates posterior to that of soft dorsal; pectoral reaching insertion, first ten rays of nearly equal length; ventrals under pectoral base, reaching half-way to anal.

Color nearly uniform on body, a narrow dark stripe through eye from snout, continued as a row of spots along lateral line, more distant posteriorly; two upper pectoral rays dark, two indistinct transverse rows of spots in upper half of pectoral; dorsal, anal, and caudal uniformly dark-hued, nearly black.

272. *Brachyopsis rostratus* (Tilesius). (Plate XXXIII, fig. 2).

Taruku Island, Nemuro, Hokkaido, No. 6032 (Coll. Owston).

This agrees with specimens from the Kuriles. D. varying from VII-8 to IX-8. Body-plates 45.

Family CYCLOGASTERIDÆ.

273. *Cyclogaster tanakæ* Gilbert & Burke.

Three large specimens, No. 6350a-c, from Aomori, the two smaller lacking "thumb-tack" prickles; two from Misaki, No. 6355a-b, and two from Oshima, with prickles well developed. The longest is three hundred and seventy-five millimeters in total length.

274. *Cyclogaster Agassizii* (Putnam).

Hokkaido, No. 6301a (Coll. Owston).

D. 42; A. 34; P. 36.

275. *Cyclogaster frenatum* Gilbert & Burke.

Misaki, No. 6093a (Coll. Owston).

One example 90 cm. long, differing from the type in having the vertical fins largely black; otherwise the same.

276. *Careproctus burkei* sp. nov. (Plate XXXIV, figs. 2 and 2a).

Described from the type, No. 6457, Carnegie Museum Catalog of Fishes, a female 92 mm. in total length, and a female cotype, 83 mm. long, both from Yokohama Market, doubtless from outside the heads of Awa and Boshu. The measurements are given in hundredths of body-length to base of caudal, those of the cotype in parenthesis.

Length of head .245 (.235); depth .25; width of head .20; eye .05; snout .75; maxillary .07 (.08); longitudinal diameter of disk .10; distance snout to disk .15 (.13); disk to vent .18 (.14); snout to vent .40 (.35); depth of caudal peduncle .04; length of upper pectoral lobe .16; of lower pectoral lobe .125; gill-slit .07; interocular space .075; distance vent to insertion of anal .135; snout to dorsal .30; D. 37; A. 30; C. 14; P. 33.

Body deep, not quite as wide as deep at opercle; tail strongly compressed; mouth nearly transverse; tip of maxillary not reaching eye; snout slightly overhanging premaxillaries, rounded in profile; nostrils tubular, without flap, situated at level of pupil; teeth simple, in broad bands, blunt. Gill-opening not extending below first pectoral ray, set somewhat obliquely.

Dorsal not notched, first rays low, increasing in height until middle of fin; anal similar; dorsal and anal joined to caudal by its basal third, last rays not shortened in either; pectoral notch shallow, lower lobe extending just beyond posterior margin of disk, its rays but half an eye-diameter longer than those of notch.

Color in alcohol reddish; distal half of pectoral dusky; dorsal and anal somewhat darker than pectoral, anal much more deeply colored than dorsal; caudal dusky, peritoneum colorless, as is buccal cavity.

Named for Dr. Charles Victor Burke who has specially studied the *Cyclogasteridæ*.

277. *Careproctus gilberti* sp. nov. (Plate XXXIV, figs. 7 & 7a).

Described from the type, No. 6456, a specimen much shrunken by strong alcohol, from Misaki, Sagami Bay, Japan, 16 cm. in total length. The measurements are given in hundredths of body-length to correspond with the comprehensive paper recently published by Gilbert and Burke on the Japanese *Cyclogasteridæ*.

Head .25; width of same .17; interocular width .10; width at angles of mouth .12; length of snout .09; eye .06; maxillary .12; width of gill-slit .06; depth of body .19; distance from snout to disk .19; from snout to anus .34; snout to anal fin .42; snout to dorsal insertion .28; transverse diameter of disk .08; distance disk to anus 7; longest ray in upper pectoral lobe 17, in lower 12. D. 45; A. 38; P. 32.

Body elongate, compressed; head deeper than wide; dorsal profile most strongly curved on snout; jaws subequal; maxillary extending to below anterior border of pupil; eyes high, reaching dorsal profile as in *Careproctus curilanus*; nostril at level of upper edge of pupil; teeth coarse, in bands in both jaws, simple, not trilobed, depressible. Gill-opening extending to second pectoral ray. Pectorals not deeply notched, rays of lower lobe slightly produced as filaments. Anterior dorsal rays half length of posterior rays, latter .10 of body-length; former with tips slightly produced; first anal rays .07, last .10; dorsal and anal adnate to caudal by one-fourth its length, last ray in each slightly shorter than preceding rays. Disk beginning under, or slightly behind, posterior margin of eye and reaching to below point of opercle, separated by its own transverse diameter from anus, which resembles that of *Careproctus pycnosoma* in position.

Color faded or lacking. Peritoneum jet-black.

This is named for Dr. Charles Henry Gilbert.

Family TRIGLIDÆ.

278. *Chelidonichthys kumu* (Lesson & Carnot).

Osaka, No. 6325a-b; Misaki, No. 6282a-c; Misaki, No. 6282a-c; Matsushima

279. *Chelidonichthys ischyryus* sp. nov. (Plate XXXV, fig. 1).

Described from the type, No. 6459 Carnegie Museum Catalog of Fishes, a specimen one hundred and fifty millimeters in total length, coming from Sagami Bay, Japan, and collected by Mr. Alan Owston.

Head 2.5 in body-length to base of caudal; depth 3.66; eye 3.66 in head; snout 2.166; interorbital space two-thirds of eye; dorsal rays X-16 (last spine rudimentary); anal rays 15; scales 67 in lateral line, 8/5 in transverse series; gill-rakers 1+10.

Body subcylindrical, deep, and relatively shorter than in *Chelidonichthys kumu*; snout with two low lobes, each with four very short spines or serrations; maxillary reaching to anterior border of orbit. Two prominent preocular spines, and one blunt postocular present; a prominent transverse furrow behind the latter. Nuchal region rough.

Dorsal inserted between tips of nuchal spines; third spine 2 in head; third ray 2.66; first anal rays 3.33 in head; pectoral 1.9 in body length, reaching to base of last ray; ventrals extending to fifth anal ray; upper pectoral appendage 3.33 in body.

Scales minute, imbricate, but partially imbedded, those of lateral line slightly enlarged; shields along dorsals twenty-five in number, their edges smooth throughout, spinous projections well-marked and sharp.

Color of alcoholic specimens dark, without silvery reflections; an indefinite dark space between orbit and corner of mouth, also on lower edge of opercle; two dark spots below spinous dorsal opposite third and tenth scutes and one on lateral line, one opposite sixteenth dorsal scute, and at end of dorsal, an indefinite one below each on lateral line. Spinous dorsal black on distal half; soft dorsal colorless; pectorals black inside; ventrals tipped with dark; caudal dusky at tip; anal clear.

This species differs from *Chelidonichthys kumu* in its larger scales, larger eye, larger head, and extent of pectoral. Its scales are much smaller than those of *Lepidotrigla*. From *L. japonica*, which it resembles, it may be easily distinguished by the scales, by the lesser depth of the postocular furrow, and shorter nasal processes.

280. *Lepidotrigla alata* (Houttuyn).

Misaki, No. 6099a.

281. *Lepidotrigla güntheri* Hilgendorf.

Misaki, No. 6242a-b; Osaka, 6379a-e.

282. *Lepidotrigla strauchii* Steindachner.

Lepidotrigla microptera Jordan & Richardson, not of Günther, which is a Chinese species.

Osaka, from Matsushima Bay, No. 6328a-b; Sendai, No. 6305a; Sagami Bay; Misaki, No. 6434a-e.

Spinous dorsal blotch present in young.

283. *Lepidotrigla japonica* (Bleeker). (See Fig. 53, p. 284).

Misaki, No. 6270a-l.



FIG. 53. *Lepidotrigla japonica* (Bleeker). (From Bull. U. S. Fish Comm., Vol. XXIII, p. 596).

284. *Lepidotrigla abyssalis* Jordan & Starks.

Tsushima Straits, obtained in the Osaka Market, No. 6262a-g.



FIG. 54. *Lepidotrigla abyssalis* Jordan & Starks. (From Bull. U. S. Fish Comm., Vol. XXII, p. 595).

Some specimens have a red spot on the dorsal, placed as the black spot in other species. Serrations of second dorsal spine variable.

Family PERISTEDIIDÆ.

285. *Peristedion orientale* Temminck & Schlegel. (See Fig. 55, p. 285).
Misaki, No. 6300a-c.

Family CEPHALACANTHIDÆ.

286. *Dactyloptena orientalis* (Cuvier & Valenciennes).
Sodokatsu, Yokohama, No. 6307a, Misaki, No. 6100a.



FIG. 55. *Peristedion orientale* Temminck & Schlegel. (From Bull. U. S. Fish Comm., Vol. XXII, p. 593).

We have before us a young example of *Dactyloptena orientalis* (No. 6307a) sixty-eight millimeters long, with a black spot on pectoral as in *D. cheirophthalmus* (Bleeker).

One small specimen, fifty-six millimeters in total length, from Misaki, (No. 6100a) is with slight hesitation identified as *D. orientalis*, because of the very much greater proportionate length of the head and spines, large eye, and long dorsal spine. An examination of a series of individuals shows that in this species this is a character of the young. The following table illustrates the changes with age and the peculiarities of the specimen before us. The fin and scale-counts are typical.

	Hilo, Hawaii.	Queens- land, Australia.	Wakanoura, Kii, Japan.				Misaki, Japan.
Length ⁶	215 mm.	148	122	115	95	82	56
Head.....	24	25	26	25	26	28	32
Snout to tip of scapular spine.....	37	38	38	39	41	43	52
Eye.....	8.5	9.0	8.5	9.0	10.0	11.0	14.0
Pectoral.....	95	87	90	92	84	91	81
Dorsal spine.....	35	33	35	36	36	37	44
Interorbital space.....	13	13	14	13.5	15	16	19
Distance from snout to occiput.....	20	21	20	21	22	24	82

By Jordan and Richardson⁷ it is stated that *Dactyloptena orientalis* lacks a lateral line, but a close examination shows its presence in fully functional condition with developed tube and pores. The distinction raised between this genus and

⁶ Body-length, to base of caudal, in terms of hundredths of which the other measurements are given.

⁷ Proc. U. S. N. Mus., Vol. XXXIII, p. 664, 1908.

Ebisinus Jordan and Richardson, does not exist, and *Ebisinus cheirophthalmus* (Bleeker) is generically identical with *Dactyloptena orientalis* (Cuvier and Valenciennes), and *D. gilberti* Snyder. The statement made by the same authors as to the absence of the lateral line in *Cephalacanthus*, *Dactyloptena*, and *Daicocus* is incorrect, as the pores are invariably present, although obscured by great development of the scale process which lies at right angles to the keel, and slightly oblique to the surface of the body. It is very indistinct in *Cephalacanthus*, but by clearing a piece of the skin in glycerin and observing it under the microscope the presence of pores is easily demonstrated in all these forms.

Family GOBIIDÆ.

287. *Eviota abax* (Jordan & Snyder).

Misaki, No. 6413a-j, numerous specimens.

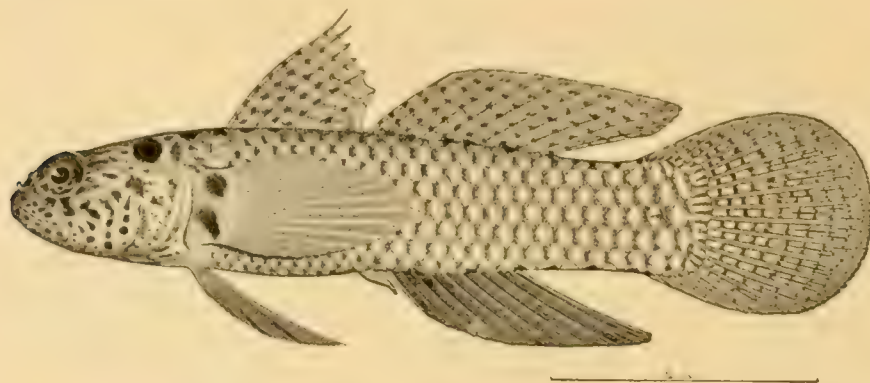


FIG. 56. *Eviota abax* (Jordan & Snyder). (From Proc. U. S. N. M., Vol. XXIV, p. 40).

As compared with the types, the males have the first spine of the dorsal much elongated, reaching fourth or fifth ray of second dorsal; ventrals nearly black, with a white margin; anal much darker; scale-markings much more decided.

288. *Odontobutis obscurus* (Temminck and Schlegel).

Lake Biwa, at Matsubara, No. 6243a-1; Okayama, No. 6429a-b.

The reference of this species to the East Indian genus *Mogurnda* is premature.

289. *Periophthalmus cantonensis* (Osbeck).

Nagoya, No. 6054a.

290. *Ctenogobius similis* (Gill).

(Mem. Carn. Mus., Vol. VI, Plate X, fig. 3).

Lake Biwa at Matsubara, No. 6079a-d.

291. *Ctenogobius virgatulus* Jordan & Snyder.

Kobe, No. 6092a (Coll. Manabe); Misaki, 6126 many.

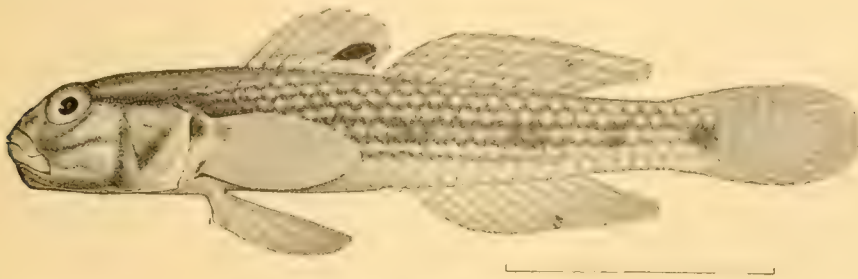


FIG. 57. *Ctenogobius virgatulus* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIV, p. 64).

292. *Ctenogobius pflaumi* (Bleeker).

Misaki, No. 6123a.

293. *Ctenogobius atriceps* Regan.

Nagoya, No. 6133a-d (Coll. Kingsbury).

D. VI-12; A. 11. Scales 36-14. Last dorsal rays not quite reaching caudal. This species, which is near *C. similis*, has been known hitherto only from the type, which came from Kobe.

294. *Mugilogobius abei* (Jordan & Snyder).

Nagoya, No. 6135a, Shimbara.

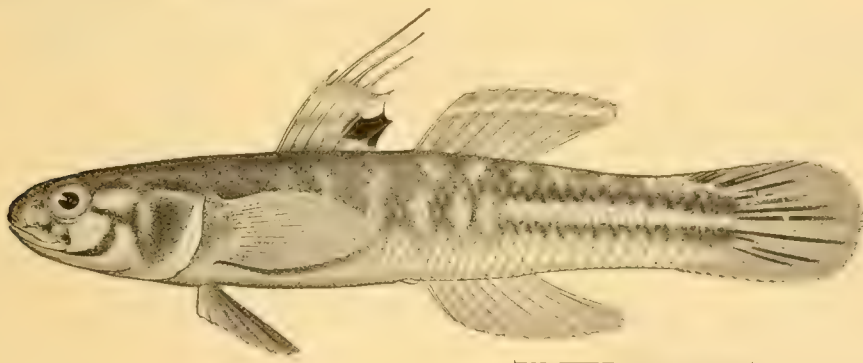


FIG. 58. *Mugilogobius abei* (Jordan and Snyder). (From Proc. U. S. N. M., Vol. XXIV, p. 55).

This species is the type of Smitt's genus *Mugilogobius*, which seems to be the same as *Vaimosa* of Jordan & Seale.

295. *Aboma snyderi* Jordan & Fowler.

Nagoya, No. 6124a-c.

Head 3.33; depth 5.33; scales 53. D. VIII-14; A. 12. Opercle partly scaled above. In the original types as figured, the color, being faded, is not well shown.

Each dorsal spine has four spots, making four parallel lines, save on the last three spines, which have two larger spots. Four lines on the soft dorsal are parallel with the line of the back.

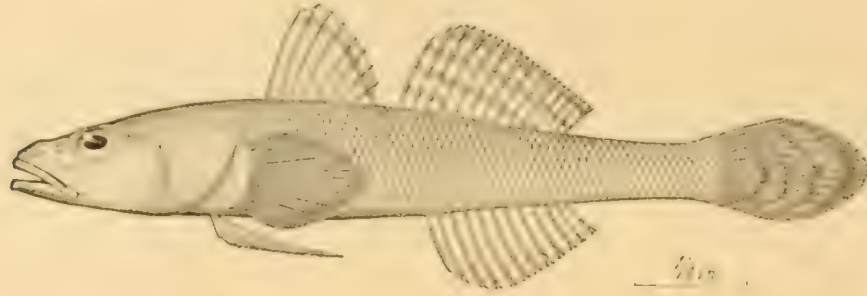


FIG. 59. *Aboma snyderi* Jordan & Fowler. (From Proc. U. S. N. M., Vol. XXV, p. 575).

296. **Cryptocentrus filifer** (Cuvier & Valenciennes).
Kobe, No. 6089a (Coll. Manabe).



FIG. 60. *Cryptocentrus filifer* (Cuvier & Valenciennes). (From Proc. U. S. N. M., Vol. XXIV, p. 73).

297. **Glossogobius brunneus** (Temminck & Schlegel).
Nagoya, No. 6062a; Kobe, No. 6431a (Coll. Manabe).
298. **Chænogobius macrognathus** (Bleeker).
(Mem. Carn. Mus., Vol. VI, p. 56, fig. 53).
A. Misaki, 6104a-b, 6426 a-i.
No dark blotch on first dorsal; sides without spots; cheeks finely and evenly punctate with small brown dots. Caudal peduncle 2 in head.
B. Yokohama.
D. VI-13; A. 11. Scales 73.

299. *Chloea sarchynnus* Jordan & Snyder.
 (Mem. Carn. Mus., Vol. VI, p. 56, fig. 53).
 Misaki, No. 6129a.
300. *Chasmichthys gulosus* (Sauvage).
 (*Saccostoma gulosus* Sauvage; *Chasmias misakius* Jordan & Snyder).
 (Mem. Carn. Mus., Vol. VI, Pl. X, fig. 2).
 Kobe, No. 6403a-b (Coll. Manabe); Goto Islands (Owston); Misaki, No. 6313
 many.
301. *Chasmichthys dolichognathus* (Hilgendorf).
 (Mem. Carn. Mus., Vol. VI, p. 56, fig. 55).
 Misaki, No. 6255 many.
302. *Pterogobius daimio* Jordan and Snyder.
 Misaki, No. 6107a-d.
 As elsewhere stated, there are both males and females among the specimens referred to this species. It is not therefore the male of *Pterogobius elapoides*.
 The latter species ranges farther to the northward. It is less brightly colored, and has one more cross-bar at the base of the caudal.
303. *Pterogobius elapoides* (Günther).
 (Mem. Carn. Mus., Vol. VI, p. 56, fig. 54).
 Misaki, Iyo.
304. *Pterogobius zacalles* Jordan & Snyder.
 Misaki, No. 6233a.

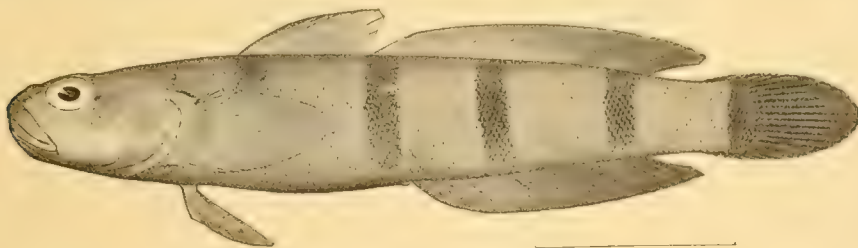


FIG. 61. *Pterogobius zacalles* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIV, p. 94).

Larger than the types, one hundred and fifty-five millimeters.

305. *Acanthogobius flavimanus* (Temminck & Schlegel).
 Shimonoseki, No. 6201a; Osaka, No. 6256a-f; Kobe, No. 6213a-b (Coll. Manabe); Misaki, No. 6095a; Matsushima, No. 6261a; Nagoya, No. 6445a-h.
306. *Parachæturichthys polynemus* (Bleeker).
 Shimonoseki, No. 6071a.

307. *Chæturichthys sciistius* Jordan & Snyder.

Shinabara, No. 6041a, No. 4257a.

FIG. 62. *Chæturichthys sciistius* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIV, p. 108).308. *Chæturichthys hexanemus* Bleeker.

Kobe, No. 6111a; Shimonoseki, No. 6159a-g.

309. *Aionosus geneionemus* (Hilgendorf). (Plate XXXV, fig. 2).

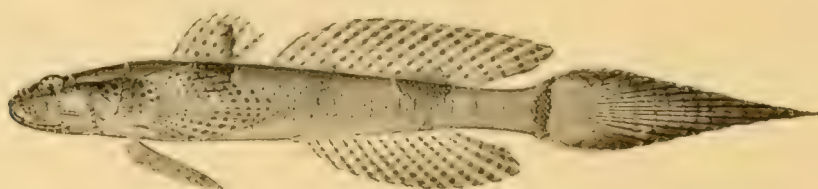
Misaki, No. 6005.

The largest specimen is ninety millimeters long. This example we figure.

The maxillary reaches anterior edge of pupil; membrane of first and second, dorsal spine with a dark blotch on its distal half. A dark spot at base of caudal.

310. *Doryptena tanegashimæ* Snyder.

One specimen from Yawatahama, Iyo.

FIG. 63. *Doryptena tanegashimæ* Snyder. (From Proc. U. S. N. M., Vol. XLII, Pl. 59, fig. 2).

Dorsals more darkly colored, otherwise like Snyder's types.

311. *Tridentiger obscurus* (Temminck & Schlegel).

Misaki, No. 6053a.

312. *Tridentiger bifasciatus* Steindachner.

(Mem. Carn. Mus., Vol. VI., p. 56, fig. 58).

Nagoya, No. 6130.

313. *Sicyopterus japonicus* (Tanaka). (Plate XXXV, fig. 3).

Misaki, No. 6427a-h; Hiyuga in Kiusiu.

Numerous specimens, the longest, one hundred and twenty-five millimeters, figured in Plate XXXV.

Schlegel's *Sicydium obscurum* is probably the same as *Tridentiger squami-strigatus* of Hilgendorf, with which Jordan and Snyder have identified it. The description fits the *Sicyopterus* almost equally well, and the drawing diverges from both.

314. *Clariger cosmurus* Jordan & Snyder.

Misaki, No. 6075a-b.

A double row of papillæ below eye, continuous anteriorly with a row along upper orbital edge. Two sharp dermal ridges extending posteriorly from tip of snout as far as eye. Double serrated folds diverging from tip of lower jaw. Nasal tubules prominent. Two pairs of longitudinally set dermal flaps on tip of lower

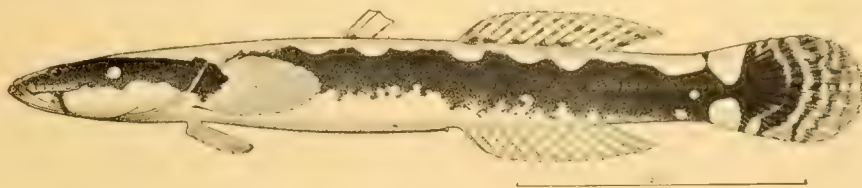


FIG. 64. *Clariger cosmurus* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIV, p. 121).

jaw, one behind the other, these not true barbels, but parts of the dermal folds. Median line of body with about twenty-five pores. Scales in four or five rows on caudal peduncle, one row extending forward to middle of dorsal. Second and third dorsal spines wide-set.

This rare species is one of the most peculiar among the gobies. Its color-pattern is variable, the opposed saddles on caudal peduncle very shallow in young; lateral stripes along body much narrowed; caudal nearly plain dark; eight spots along upper edge of stripes in one adult, in the other represented by a ragged edge; white areas coarsely punctate, with small brown dots.

315. *Leucopsarion petersi* Hilgendorf.

Kobe, No. 6068a-b (Coll. Manabe).



FIG. 65. *Leucopsarion petersi* Hilgendorf. (From Proc. U. S. N. M., Vol. XXIV, p. 126).

316. *Luciogobus elongatus* Regan. (See Fig. 66, p. 292).

Misaki, No. 6052a; Lake Biwa, No. 6226a-g.

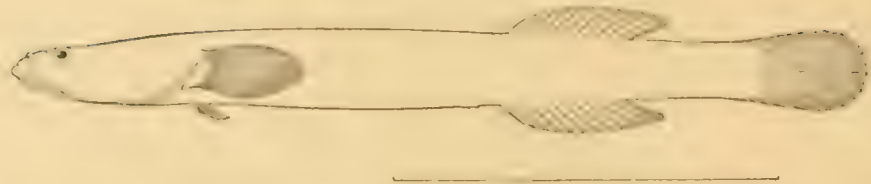


FIG. 66. *Luciogobius clongatus* Regan. (From Proc. U. S. N. M., Vol. XXIV, p. 124).

This elongate form, as noted by Jordan and Snyder, seems scarcely different from *Luciogobius guttatus*. It is slenderer, has a slightly longer mouth, and a paler color than the latter.

317. *Trypauchen wakæ* Jordan & Snyder.
Kobe, No. 6234a-b (Coll. Manabe).

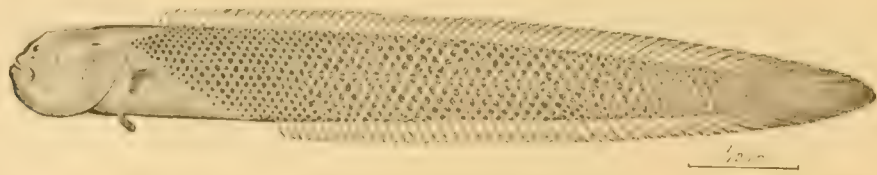


FIG. 67. *Trypauchen wakæ* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIV, p. 127).

Family CHAMPSODONTIDÆ.

318. *Champsodon vorax* Günther.
Misaki, No. 6108a; Iyo.

Family PTEROPSARIDÆ.

319. *Parapercis pulchella* (Temminck & Schlegel).
Misaki, No. 6432a.
320. *Parapercis ommatura* Jordan & Snyder.
Kobe, No. 6113a-b (Coll. Manabe).

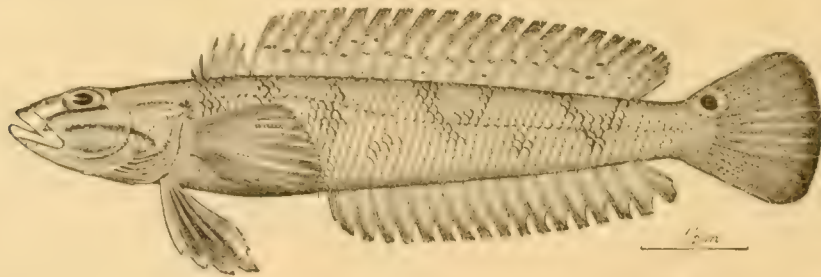


FIG. 68. *Parapercis ommatura* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIV, p. 465).

321. *Neopercis multifasciata* (Döderlein).
Misaki, No. 6246a.

Agreeing well with Döderlein's account. There are eleven black cross-bars and a dark blotch.

322. *Neopercis sexfasciata* (Temminck & Schlegel).
Shimonoseki, No. 6217a.

Family OPISTHOGNATHIDÆ.

323. *Owstonia totomiensis* Tanaka.
Coll. Owston. Totomi Bay (original cotypes).
This remarkable fish is apparently an ally of *Opisthognathus* and *Gnathypops*.
324. *Gnathypops iyonis* Jordan & Thomson.
Yawatahama, in Iyo; Kiusiu (Coll. Manabe).

Family URANOSCOPIDÆ.

325. *Uranoscopus japonicus* Houttuyn.
Misaki, No. 6279a; Osaka, No. 6265a-c.
326. *Uranoscopus oligolepis* Bleeker.
Misaki, No. 6319a-b (Coll. Aoki).
Lower jaw broader in front than in *U. japonicus*, and with a prominent fringe; head rougher; eyes much closer to premaxillary; pectoral much longer; ventrals longer. Caudal not dusky.
327. *Ichthyscopus lebeck* (Schneider).
Osaka, No. 6364a.
328. *Ariscopus iburius* Jordan & Snyder.
Kobe, No. 6084a (Coll. Manabe).



FIG. 69. *Ariscopus iburius* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXIV, p. 479).

Hitherto known only from Iburi in the Hokkaido, in the north of Japan.

Family CALLIONYMIDÆ.

329. *Callionymus valenciennesi* Temminck & Schlegel.
(Mem. Carn. Mus., Vol. VI, p. 59, fig. 59).

Misaki, No. 6190a-b; Shimonoseki, No. 6299a; The longest specimen is 10.5 inches in length.

330. *Callionymus lunatus* Temminck & Schlegel.

Misaki, No. 6443a.



FIG. 70. *Callionymus lunatus* Temminck & Schlegel. (From Proc. U. S. N. M., Vol. XXV, p. 949).

331. *Calliurichthys japonicus* (Houttuyn).

Misaki, No. 6285a-d.

Preopercular spine on one side, with two hooks, but typical on the other.



FIG. 71. *Calliurichthys japonicus* (Houttuyn). (From Proc. U. S. N. M., Vol. XXV, p. 942).

332. *Calliurichthys doryssus* Jordan & Fowler.

Misaki, No. 6402a-c (Coll. Aoki).



FIG. 72. *Calliurichthys doryssus* Jordan & Fowler. (From Proc. U. S. N. M., Vol. XXV, p. 946).

333. *Synchiropus ijimæ* sp. nov. (Plate XXXVI, fig. 1).

The type described, No. 6015a Carnegie Museum Cat. of Fishes, is a specimen which came from Misaki and is sixty-five millimeters in total length.

Head 3.16 in length to base of caudal; depth 5; eye 4 in head; snout 3.66; width of body at opercles 1.5 in head, 1.16 times in depth; D. IV-8; A. 7; P. 18; V I-5; eighteen or twenty pores in lateral line.

Body but little depressed, nearly as deep as wide at head, more so posteriorly; its form quite unlike that of the Japanese species of *Callionymus*; eyes large, obliquely set, projecting above profile of head; bone of interorbital space very narrow, 3.33 in pupil of eye; suborbital space 6.5 in head; maxillary reaching anterior edge of eye; pre-opercular spine with two hooks, one at its tip, and another, as strong above; gill-opening circular, small, at upper angle of opercle; latter with a loose, fold of skin below forming a flap-like lower edge above ventrals, this not free at tip of opercle; teeth of both narrow jaws anteriorly in broad bands, which posteriorly diminish in breadth.

Insertion of spinous dorsal over point of pre-opercular spine; all its rays filiform, membrane extending along three-fifths of first spine, one-half of third spine and two-fifths of fourth spine; first spine slightly longer than head, second somewhat longer, 2.5 in head; second dorsal of equal height save for last somewhat elongate rays; anterior rays 1.6 in head; last ray reaching to base of upper rudimentary caudal rays, as does last of anal; caudal rounded; anal rays 2 in head, insertion below first and second rays of soft dorsal; pectoral reaching beyond anal insertion; ventrals of like extent, their bases in large part anterior to those of pectorals; membrane from inner ray attached to middle of pectoral base.

Color in alcohol light, with brown spots arranged across body in seven bands as wide as eye, these bands tending to coalesce extensively on lower side of flanks before being lost in colorless lower surface of body; cheeks and suborbitals with similar or slightly smaller brown spots more clearly defined than those of body; a brown blotch as large as pupil below pre-opercular spine; spinous dorsal with narrow sinuous streaks and shadings of brown; soft dorsal broadly banded with brown; bands running downward and backward to base of fin as they pass backward; membrane between last rays dark brown; caudal with four or five cross-bands, plainest on upper and lower rays; pectoral with five or six brown cross-bands; ventrals with inner rays dark brown at tip; body indefinitely clouded elsewhere, with a number of small clear spots on membrane connecting with mid-pectoral base; anal rays tipped with white, their membranes darkened in margin.

This species is named for Mr. Isao Ijima, Professor of Zoölogy in the Imperial University of Tokyo.

We refer it with some doubt to the genus *Synchiropus* Gill. It is very close to *Synchiropus lili* described by Jordan and Seale from Samoa, but it may not be congeneric with *Synchiropus opercularis*, the type of the genus. Except for the compressed head, the species are very much like *Callionymus*.

334. *Calymmichthys xenicus* gen. et sp. nov. (Plate XXXVI, fig. 2).

We give description of the type, No. 6027, Carnegie Museum Catalog of Fishes, one hundred and thirty-five millimeters in total length, which came from Sagami Bay.

Head 3.5 in body-length to base of caudal; depth 7.5; eye 5 in head (including opercular flap); snout 3; interorbital space 5 in snout; maxillary 3.2 in head; D. IV-8; A. 7; C. 11; P. 19; twenty-two pores in lateral line.

Body cylindrical, tapering evenly to caudal; breadth of depressed head behind pre-opercular spines equal to distance from anterior border of eye to tip of opercular flap; interorbital space narrow, its width 3 in eye; snout long, straight in profile, as is dorsal surface of head; profile arched over eye; interorbital space and dorsal surface of snout flat, forming an angle with sloping sides of head and snout; maxillary of peculiar shape, its angle forming a prominent knob at angle of mouth under anterior border of eye; depth of space between snout and premaxillaries two-thirds length of eye; teeth in upper jaw in broad, villiform, semicircular patch, not extending beyond apex of arch in sides of jaw; teeth in lower jaws along whole length of mandibular rami anteriorly, of breadth and shape to correspond to those in upper jaw; vomer and palatines toothless; pre-opercular spine as long as eye, with seven spinules as long as width of spine on dorsal edge, all antrorse but last two; a strong tooth at base pointing forward; opercle with distinct free flap, as in *Synchiropus opercularis*, its tip free, its length equal to diameter of eye; gill-opening small, not as large as pupil, at upper angle of opercle; upper surface of head with slightly roughened patch on bony surface, larger than eye.

First dorsal spine elongate, 3.25 in body-length, second 7.5, last two-thirds length of second, all when supine reaching approximately base of first ray of second dorsal; first ray of latter 6.33 in body-length; last double ray elongate, 4 in body; extending to base of caudal rays; latter slightly less than length of head; tips of rays slightly exerted; first anal ray 10 in body, last 6; latter not reaching caudal; anal membranes strongly incised; pectorals 1.5 in head; ventrals 4.33; upper membrane beginning at level of fourth pectoral ray, extending beyond anal insertion.

Lateral line with long, low arch anteriorly, as long as head and two-thirds diameter of eye from dorsal base at its end. A thin but prominent fold of skin extending from pectoral tips to base of caudal, flexed upward.

Color in alcohol dark brown, five indistinct cross-bars of darker brown as wide or wider than eye on upper part of body, first under spinous dorsal second under insertion of second, last on middle of caudal peduncle; between these cross-bars indefinite reticulations of darker brown; cheeks, side of snout, and opercular membranes with narrow sinuous lines margined differently with white, five or six present on lower membrane of eye; a dark blotch above and behind pre-opercular spine; spinous dorsal without striking coloration; indefinite large whitish spots in reticulations of darker color present; soft dorsal with two rows of indefinite, fused spots throughout; one or more on first rays and two more on last; soft dorsal and upper half of caudal with three narrow lines of dark along margin; caudal with three cross-bars of dark, intervening lighter areas set with minute, oblong, sharply defined spots of brown, with lighter centers; some of these also found on last dorsal ray; anal spots uniformly dark brown; pectoral with four or five irregular rows of these spots, on basal half ocellated with white, and a distal cross-stripe of white on upper half; ventrals uniformly dark, save for occasional darker spots on basal portion.

The peculiar form of the maxillary, the fold of skin along the side of the body, the opercular flap, and many-hooked spine of the pre-opercle, distinguishes this new genus, *Calymmichthys* from all other Japanese *Callionymidæ*. The opercular flap is found in *Synchiropus opercularis* (Cuvier and Valenciennes) from India. The hooked spine is found in *Calliurichthys* but in that genus these hooks are so small as to be called serrations.

Family GOBIESOCIDÆ.

335. *Aspasma minimum* (Döderlein).

Misaki, No. 6076a.

According to Tanaka (Journ. Coll. Sci., Tokyo, XXVII; 1909, p. 25) *Aspasma laticephalum* Tanaka differs from this species in having several rows of villiform teeth. It then stands alone among Japanese species and is apparently referable rather to the European genus *Mirbella* Canestrini.

The dorsal rays in *A. minimum* are 7, the anal 6. In *A. ciconiæ* we have D. 12; A. 8. In *A. misakium*, D. 14; A. 12.

336. *Aspasma misakium* Tanaka.

Misaki, No. 6128a. Longest specimen 5.8 cm. in length.

A shade of pink still left in spirits. This species differs from *A. ciconiæ* in the lesser breadth, much smaller disk, and in the greater number of rays in the dorsal and anal fins, as well as in the character, given by Tanaka, of the shorter maxillary and coalescent vertical fins. Teeth in both jaws in one row.

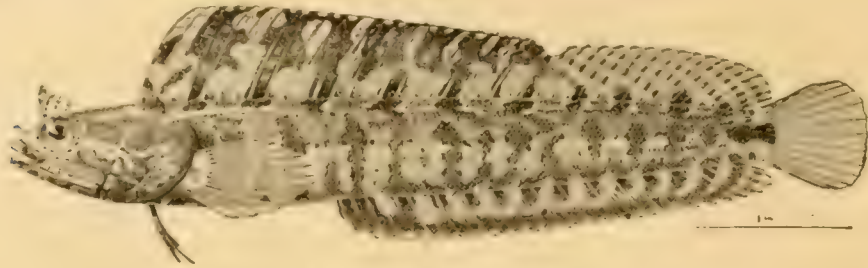
Family CLINIDÆ.

- 337.
- Enneapterygius etheostoma*
- (Jordan & Snyder).

Misaki, No. 6237a.

- 338.
- Zacalles bryope*
- Jordan & Snyder.

Misaki, No. 6102a-h.

FIG. 73. *Zacalles bryope* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXV, p. 449).

Family BLENNIIDÆ.

- 339.
- Aspidontus elegans*
- (Steindaehner).

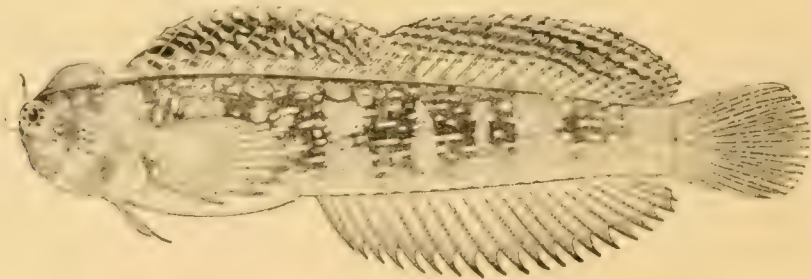
Misaki, No. 6229 many.

- 340.
- Scartichthys enosimæ*
- Jordan & Snyder.

Misaki, No. 6416a-d.

- 341.
- Salarias andersoni*
- Jordan & Starks.

Okinawa, Riu Kiu Islands, No. 6127a.

FIG. 74. *Salarias andersoni* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXX, p. 703).

Family XIPHIDIIDÆ.

- 342.
- Bryostemma otohime*
- Jordan & Snyder. (See Fig. 75, p. 299).

Nanba, No. 6272a (Coll. Owston).

A very large example, two hundred and sixty millimeters long, the color pattern indistinct.

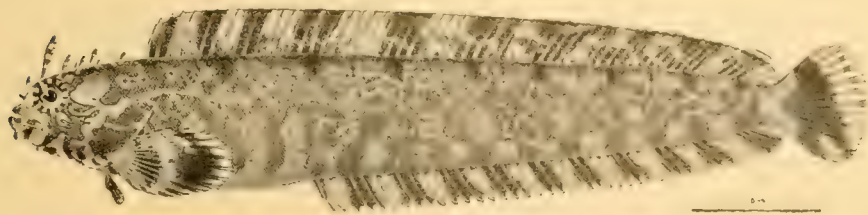


FIG. 75. *Bryostemma otohime* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXV, p. 466).

343. *Enedrias nebulosus* (Temminck & Schlegel).

(Mem. Carn. Mus., Vol. VI, p. 64, fig. 64.)

Shimonoseki, Misaki, No. 6208.

344. *Zoarchias veneficus* Jordan & Snyder.

Misaki.

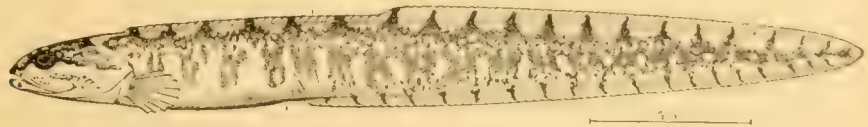


FIG. 76. *Zoarchias veneficus* Jordan & Snyder. (From Proc. U. S. N. M., Vol. XXV, p. 481).

345. *Dictyosoma burgeri* Van der Hoeven.

Misaki, No. 6277 many; Goto Islands, No. 6401a (Coll. Owston).

346. *Ernogrammus hexagrammus* (Temminck & Schlegel).

Kobe, No. 6098a (Coll. Manabe).



FIG. 77. *Ernogrammus hexagrammus* (Temminck & Schlegel). (From Proc. U. S. N. M., Vol. XXV, p. 490).

Family ATELEOPODIDÆ.

347. *Ateleopus japonicus* Bleeker. (Plate XXXVII, fig. 1).

Misaki, No. 6389a-b; Sagami Bay, No. 6001a-b.

The longest specimen is sixty-five centimeters in length. The anal varies in depth of color.

Family LYCODIDÆ.

348. *Zoarces elongatus* Kner.

Tretiapodi, Saghalin, No. 6330a-c (Coll. Owston).

349. *Lycodes tanakæ* sp. nov. (Plate XXXVII, fig. 2).

The type is a specimen four hundred and sixty millimeters in total length, from Noto, in Hondo, Japan, No. 6004 Carnegie Museum Catalog of Fishes.

Head 4.4 in length; depth 8.75 (2 in head); maxillary 2.6 in head; eye 8; snout 3.5; pectoral 1.6; ventral 1.33 in eye; D. 97; A. 76; P. 20; V. 3.

Lower jaw included, teeth of upper exposed; maxillary ending under center of eye; snout vertical at tip; skin of maxillaries continued as a prominent flap forward half the length of mandible; free inner edge of mandibular rami produced as flaps of greatest height (1.66 in eye) anteriorly, forming there a right-angled projection immediately below symphysis of lower jaw; teeth in upper jaw extending but half distance from snout to end of maxillary, in a single row, coarse and large, slightly hooked; teeth in lower jaw closing between those of upper jaw and palatines; a single series posteriorly, large and strong, most so at middle of lower jaw, where it is replaced by two well-separated rows of much smaller teeth; palatine teeth similar to those in upper jaw; in a single row on each side; vomer with two larger and stronger canine teeth pointing backwards. Anus half diameter of eye further from flap of opercle than is tip of snout.

Dorsal inserted over middle of pectoral, nearly the length of the snout behind the upper angles of the gill-openings, its longest rays posteriorly, where they are half again as long as anteriorly; dorsal and anal united and continuous with caudal; anal similar to dorsal, its insertion under the twenty-fourth ray of dorsal; length of pectoral 1.5 in head; ventrals 1.33 in eye.

Scales scattered sparsely over tail and sides of body as far forward as diameter of eye in front of dorsal insertion; none on head, belly, or pectorals; dorsal and anal scaled posteriorly nearly to margin, anteriorly more and more in base alone until the first rays are scaleless.

Color in general formed by brown reticulations around vague white blotches, latter best developed near base of dorsal, on its lower half and on dorsal surface of head, brown, becoming nearly uniform on flanks; belly white, as is ventral surface of head; dorsal and anal margined with brownish black, narrowly anteriorly, but so broad posteriorly and on caudal as to color half of fins; frequently a white oblique streak interrupting the marginal color; twelve or thirteen of these on dorsal, arranged in pairs; one or two on anal; pectorals margined with dusky, with a colorless edge.

This species is very near *Lycodes palearis* and *L. brevipes*. In color it resembles to some degree *L. reticulatus* of the Atlantic.

Family CARAPIDÆ.

*(Fierasferidæ).*350. *Jordanicus sagamianus* (Tanaka).

Misaki, No. 6070a.

This specimen corresponds to the account of *Carapus sagamianus*, except that the anal is under the base of the pectorals. It corresponds closely to the figure given by Franz. The maxillary being bound in the skin of the head, the species should be referred to *Jordanicus* Gilbert (*J. umbratilis* from Hawaii), and not to *Carapus* (*Fierasfer*).

Family OPHIDIIDÆ.

351. *Otophidium asiro* Jordan & Fowler.

Several specimens from Misaki, No. 6189a-b. Only the original type hitherto has been known.

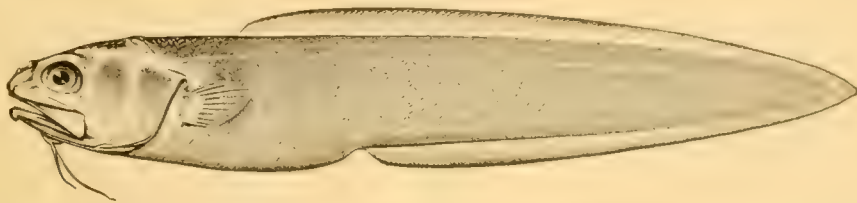


FIG. 78. *Otophidium asiro* Jordan & Fowler. (From Proc. U. S. N. M., Vol. XXV, p. 752).

Snout 2.2 to 2.5 in maxillary, which is 2.25 in head; longest ventral filament 2 in head. Tip of caudal colorless in all cases, although the dorsal and anal are broadly margined with black.

Family AMMODYTIDÆ.

352. *Ammodytes alascanus* Cope.

Yokohama, No. 6164a, not before known save from Bering Sea.

One specimen, larger in size than any of the common *A. personatus*.

D. 57, A. 30. Body-folds 160. Head 4.5; depth 11. It is slenderer than the type of *A. alascanus*, which was from Unalaska.

Family BROTULIDÆ.

353. *Spectrunculus radcliffei* gen. et sp. nov. (Plate XXXVII, fig. 3).The new genus, *Spectrunculus*, may be thus defined:

Ventrals 2-rayed; caudal present, continuous with dorsal and anal; pectorals short, entire; ventrals each of two rays, fully joined, inserted under isthmus; mouth terminal, inclined toward vertical; no barbel; snout with strong dorsal convexity, leaving profile of head concave; teeth on premaxillaries and mandibles very minute;

eight branchiostegals; opercle with a strong straight spine; head otherwise unarmed. Scales obsolete; five lateral lines. Gill-filaments of first arch much reduced in size and coarseness, those remaining forming a "fluffy" mass. Pseudobranchiæ present, consisting of two well-developed, free filaments. Four gills, a slit behind fourth. The nearest ally of *Spectrunculus*, so far as known to us, is *Penopus* Goode and Bean.

The type of *Spectrunculus radcliffei* is No. 6061, Carnegie Museum, from Misaki (Coll. Owston) sixty-four millimeters in total length.

Head 5.8 in length to base of caudal, 6.2 in total; depth 4; snout 2.66 (measuring from anterior edge of eyeball); maxillary 2.5; distance from snout to anus 2.4; distance from snout to dorsal insertion 5.25 in body-length; D. 140; A. 110; P. 30; V. 2; C. 9 or 10; branchiostegals 8; gill-rakers short, 2+8 (with two or more rudiments).

Body compressed, its width just posterior to anus, contained 3.25 times in depth at the same place; body-cavity in type greatly distended, with viscera showing plainly through the skin; mouth turned sharply toward vertical, lower jaw strongly projecting; tip of snout at level of eye; a prominent knob-like convexity on its dorsal surface, reaching back to anterior edge of orbit; diameter of eye-ball half the length of oval orbit; maxillary extending midway between anterior edge of orbit and eye-ball; teeth on lower jaw only anteriorly, very minute, in a single row; a few microscopic ones on edge of premaxillary, besides minute serrations; no teeth could be distinguished on the projecting vomer; opercle with a single strong straight spine at upper angle, not extending beyond opercular flap; gill-openings extending forward below, not attached to isthmus. Gill-filaments on first arch delicate and much reduced, those on remaining arches large and curled, forming a tangled bunch without regular order.

Scales obsolete; side with five lateral ridges or lateral lines.

Dorsal inserted over pectoral; dorsal and anal continuous with caudal; pectorals short, rounded, on a base which is slightly pedunculate, or narrowed at its junction with body; ventrals inserted under eye, their length contained 1.5 in head, composed of two rays, fully united by membrane.

Body translucent, flesh-colored, with no pigment save in eye-ball.

Measurements in hundredths of body-length are as follows:—Head .17; depth .25; snout .05; eye-ball .05; maxillary .065; distance from snout to anus .43; from snout to dorsal insertion, .19.

This species is named for Mr. Lewis Radcliffe of the U. S. Bureau of Fisheries, in recognition of his work on the *Brotulidæ*.

354. *Neobythites sivicola* (Jordan & Snyder). (Plate XLII, fig. 2).

(*Watasea sivicola* Jordan & Snyder, not of Jordan & Starks).

Misaki (Coll. Owston).

The genus *Watasea*, based on this species, differs from *Neobythites* only in the presence of two weak spines on the pre-opercle, instead of three as in *Neobythites gilli*. Most of the species referred to *Neobythites* belong to the subgenus *Watasea*, as Radcliffe has lately shown.

This specimen, No. 6170a, C. M. Cat. Fishes, smaller than the type, is plainly identical with it. Body nearly uniformly gray, not banded as in *N. fasciatus*. Dorsal and anal broadly edged with black. This color has faded in the original types, both long exposed to sunlight.

In our young specimen the body is indistinctly covered with irregular faint whitish blotches, a row of these being along the dorsal base. The dorsal aside from these has no pattern anteriorly, being simply somewhat dusky, gradually becoming very black in the last quarter, save for a narrow white margin. This is continued on the caudal and anal, the latter being black with a white margin on the posterior three-fifths of its length, without other pattern. Specimens identified by Jordan & Starks as the young of *Watasea sivicola* are not the young of this species, as may be seen in the accompanying table of measurements. We refer these to Radcliffe's species, *N. fasciatus*.

TABLE OF COMPARATIVE MEASUREMENTS.

Locality.	<i>Neobythites fasciatus.</i>		<i>Neobythites Sivicola.</i>	
	Misaki.	Sagami.	Misaki.	Misaki (Type).
Body length.....	145	132	140	216
Head ^s	19	20	20	21
Depth.....	16	18	18	18
Snout.....	4.5	5	5	4.5
Maxillary.....	9	9	11	11
Pectoral.....	13.5	12	14	14
Ventral.....	12	11	15	14
Snout-vent.....	36	36	44	43
Snout-dorsal.....	22	23	25	25
Snout-ventrals.....	14.5	14.5	16.5	16
Dorsal rays.....	99	105	90	94
Anal rays.....	90	88	75	74
Scales (longitudinal).....	125	120	130	120
Scales (mid-dorsal to lateral line).....	8	8	8	8

Besides the differences in color, the present specimen of *Neobythites sivicola* shows a longer maxillary, lesser number of rays in both dorsal and anal, longer pectoral, longer distance from snout to vent, from ventrals to vent, and snout to ventrals. In these differences it is in full agreement with the type.

^s Measurements given in hundredths of length without caudal.

The specimens recorded by Franz⁹ as *Watasea macrops* (Günther) are undoubtedly the same as our *N. fasciatus*. As to the differences between this species and *N. macrops*, the coloration is not the same. We are unable, however, to find other differences, and it may be that the two forms are identical, the more so as Radcliffe¹⁰ finds the two differing in nearly the same way from *N. fasciatus*. He however states that the fin-ray counts in *N. macrops* Günther are:—D. 96; A. 83, which is greater than that of our specimen.

355. *Neobythites fasciatus* Radcliffe.

One specimen, No. 6206a, one hundred and forty-eight millimeters in total length, from Misaki, very poorly preserved. The measurements are given in the comparative table under *N. sivicola*, and are the same as those of the specimen from Sagami Bay, which was described as the young of *N. sivicola* by Jordan and Starks.¹¹ As remarked above, the latter is plainly distinct, however, from *N. sivicola*. Radcliffe¹² (comparing specimens) regards these as probably the same as his *N. fasciatus*, and we are unable to find any differences which would justify questioning this decision, save that of color, as noted by Radcliffe. The spots on the fins of our specimen correspond to those on the fins of *N. fasciatus*, and there are indistinct traces of cross-bands present. We do not, however, find the vomerine teeth differing from those of *N. sivicola* as stated, those of the latter not being in a Y-shaped patch. According to Radcliffe, the vomerine patches of the teeth of *N. macrops* and *N. sivicola* are both Y-shaped, but Günther distinctly states them to be in a Δ -shaped patch in the type of *N. macrops*. Our observations on *N. sivicola* show a similar form, but somewhat more triangular.

Family BREGMACEROTIDÆ.

356. *Bregmaceros japonicus* (Tanaka).

Misaki, No. 6118a-b.

The usual Lernæan parasite with long egg-capsules is found on the side of the body. This species may be the same as *B. atripinnis* Tickell from off New Zealand.

Family GADIDÆ.

357. *Lotella phycis* (Temminck & Schlegel).

Sagami Bay, No. 4144a (Coll. Owston).

⁹ Abh. d. Math.-phys. Klasse der K. Bayer, Akad. d. Wiss. IV., Suppl. Bd. 1., Abhandlg., 1910, p. 30.

¹⁰ Proc. U. S. N. Mus., Vol. 44, 1913, p. 144.

¹¹ Bull. U. S. Fish. Comm., XXII, 1902, p. 601.

¹² Proc. U. S. Nat. Mus., Vol. 44, 1913, p. 144.

Family MACROURIDÆ.

358. *Coryphænoides bona-nox* sp. nov. (Plate XXXVIII, figs. 1 & 1a).

The type is a single large example from Sagami Bay, three hundred millimeters long, No. 6462 Carnegie Museum Catalog of Fishes.

Head 4 in length without caudal; depth 5 (1.2 in head); snout 3.6 in head; eye 4; maxillary 2.4; D. II, 9, 84; A. 78; P. 19; scales 125, between first dorsal spine and lateral line 8.

Snout slightly longer than eye, firm in texture, especially at apex and lateral angles; maxillary reaching almost to below posterior margin of eye; profile of head evenly arched from dorsal, save slight flat area above eyes; interorbital space nearly as wide as eye, flat; pre-orbital convex, forming a low, rounded ridge with side of snout, not, however, sharply dividing head into upper and lower parts; snout projecting over premaxillaries a distance equal to two-thirds diameter of eye; teeth in narrow bands in both jaws; two or three series of small, rather blunt teeth anteriorly, dwindling to a single one posteriorly, outer teeth not enlarged; mandibular barbel half diameter of eye; first branchial arch with fold of membrane crossing it, attaching it to opercular wall; anterior gill-slit two-thirds of diameter of eye in length; five gill-rakers, tubercle-like; anus as far behind ventral base as postorbital length of head.

Dorsal inserted over pectoral base, which is over that of ventrals; second spine not filamentous, its length contained twice in head, its lower half smooth, its upper half with six or seven coarse spinules; second dorsal inserted behind first, a distance equal to length of base of latter and before anus; first ray of second dorsal 3.5 in base of first; anal inserted under fifth ray of second dorsal, anus immediately preceding; ventrals filamentous, longest ray 1.75 in head, reaching anus; pectorals 1.75 in head, not filamentous.

Scales hard to the touch, with six to eight strong radiating ridges, their spinules closely imbricate and each closely applied to that following, the last spinule projecting beyond scale-border in each ridge; scales on suborbital and snout with greatly thickened, bony ridges, frequently but one or two in number; scales present everywhere on head and body save lips and throat; no scaleless area between ventrals.

Color uniformly dark brown; all fins very dark.

The dentition and scales of this species distinguish it from previously known forms.

The senior author has studied the fishes of America and of the world for over forty years. His attention is now turning from Ichthyology and Taxonomy to larger but less charming studies in the relations of nations. This is, no doubt, the

last of his long array of new species of fishes. He follows the precedent of Linnaeus¹³ in closing his work with "Good-night!"

359. *Coryphænoides garmani* Jordan & Gilbert.

Boshu, No. 6184a; Misaki, No. 6325a.

360. *Coryphænoides misakius* Jordan & Gilbert.

Misaki, No. 6029a-b.

D. II, 11, 150 to 160; A. 160 to 170; P. 21; V. I, 7; Scales 220 to 240, in transverse series 11/30. Identical with the type.

361. *Macrourus nasutus* (Günther).

Misaki, No. 6322a-b; Sagami Bay, No. 4107a-c; in deep water.

362. *Macrourus asper* Günther. (Plate XXXVIII, fig. 2).

Misaki in deep water. We refer our example, which we figure, to *Macrourus asper*.

363. *Cœlorhynchus japonicus* (Temminck & Schlegel).

Misaki, No. 6207a (Coll. Owston).

D. II, 8.

364. *Cœlorhynchus anagirostris* Jordan & Gilbert.

Misaki, No. 6155a (Coll. Owston).

This specimen (21 cm. long) is smaller than the type, with larger eye and shorter snout.

Family PLEURONECTIDÆ.

365. *Pseudorhombus misakius* Jordan & Starks.

Osaka, No. 6374a-b.

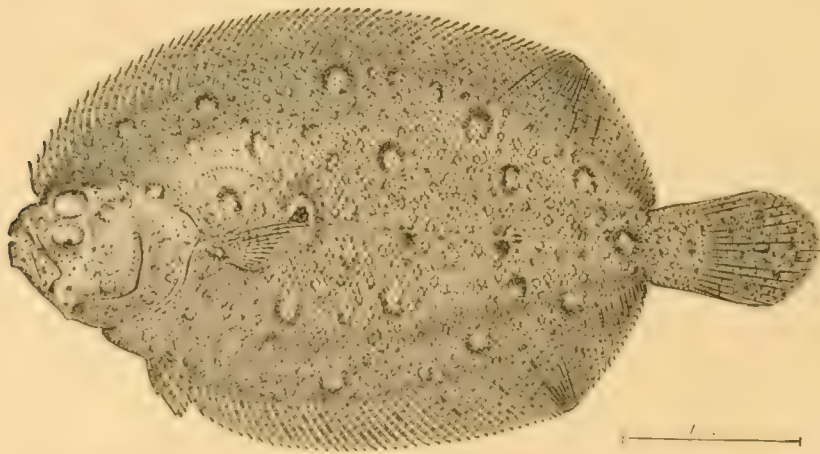


FIG. 79. *Pseudorhombus misakius* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXXI, p. 175).

¹³ *Convolvulus bona-nox* Linnæus.

366. *Pseudorhombus cinnamomeus* (Temminck & Schlegel).

Shimonoseki, No. 6405a.

367. *Pseudorhombus ocellifer* Regan.

Shinabara, Misaki, No. 6192a-c.

D. 74; A. 54. Scales 64.

368. *Tarphops oligolepis* (Bleeker) gen. nov. (Plate XXXIX).

The genus *Tarphops*, based on *Pseudorhombus oligolepis* Bleeker, is closely allied to *Pseudorhombus* Bleeker, differing in its much larger scales, these being about forty in a lateral series instead of from sixty to eighty. The lateral line, as in *Pseudorhombus*, has an accessory branch and an arch; eyes close together on the left side; species only attaining a very small size.

We here describe two small specimens, the longest seventy-four millimeters in total length, from Misaki, No. 6010a, and 6455a. The description given by Günther is not complete, nor is the generally inaccessible original description by Bleeker. The species has not been found since the original specimen, sixty-four millimeters in length, was described.

Head 3.5 in body-length, without caudal; depth 1.9; lower eye 4 in head; snout equal to eye; maxillary 2.5 in head; dorsal rays, sixty-two; anal, forty-eight; scales in lateral series, forty; pores in lateral line, forty-two; scales in transverse series in deepest part of body 13/14.

Eyes very close together, on left side; interorbital ridge very narrow, and but slightly elevated; upper eye slightly in advance of lower; maxillary nearly vertical; premaxillary processes forming a marked convexity, or knob, in the profile of the snout; teeth very small, in a single row, those on the lower jaw slightly curved; on blind side of upper jaw, thirty; on eyed side, thirty-four; on blind side of lower jaw, eighteen, on eyed side, twenty-six; none on vomer or palatines; gill-rakers 7+16, long and slender, longest equal to half diameter of eye; anterior nostril of both sides with a flap.

Dorsal fin inserted opposite anterior edge of eye, highest at about thirty-fifth ray, which is 2 in head; all the rays simple; anal similar in form and height; caudal rounded, middle rays equal to length of head; pectoral slightly shorter, with ten rays; ventral of eyed side along edge of abdomen, as long as diameter of eye; ventral of blind side removed from edge, slightly longer than other; pectoral of blind side 2.2 in head.

Scales ctenoid on both sides of body, present everywhere save on snout and tips of jaws; those on interorbital space in one row, extending along front of upper eye; wide-set scales on each ray of dorsal and anal fins, other fins naked.

Lateral line strongly arched above pectoral, height of curve two-fifths of its chord; an accessory line running to seventh dorsal ray.

Color olivaceous, with irregular brownish spots, two rows on vertical fins and three irregular transverse rows on caudal; peritoneum pigmented.

This species is thus far known only from three small specimens, one from Nagasaki (Bleeker) and the present two from Misaki. One of our specimens has large, nearly ripe ova, and cannot be termed young.

369. *Scæops kobensis* Jordan & Starks.

Of this species we have four examples from Misaki, two of which are in the Carnegie Museum, No. 6086a-b. They are respectively sixty, sixty-two, sixty-three, and seventy-five millimeters in total length. Of these three are females, two of them with large ova in well developed gonads, and one a male. The

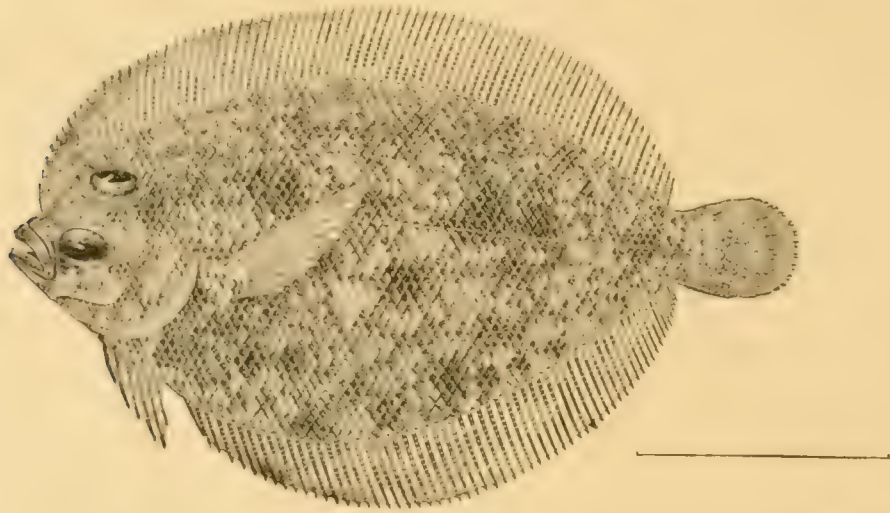


FIG. 80. *Scæops kobensis* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXXI, p. 171).

latter is distinguished externally by the very broad interorbital space and much deeper head, the first being contained 3.8 in the length of the head, whereas in the case of the female it is contained seven or eight times in the head. The pectoral of the male is likewise longer. The depth of the head in the male equals the length of the head, while in the females it is decidedly less. Dorsal rays, 76-80; anal, 61-63; scales, 49-52. The type of the species (No. 9822, Stanford University Collection) is a large female, corresponding to our specimens, save for somewhat wider interorbital space, due to roe.

370. *Paralichthys olivaceus* (Temminck & Schlegel).

Shimonoseki, No. 6311a; Osaka; Misaki, No. 6395a.

D. 79; Scales 110.

371. *Xystrias grigorjewi* (Herzenstein).

(*Verasper itakii* Jordan & Snyder).

Straits of Tsushima, found in Osaka market. (No. 6281a-i).

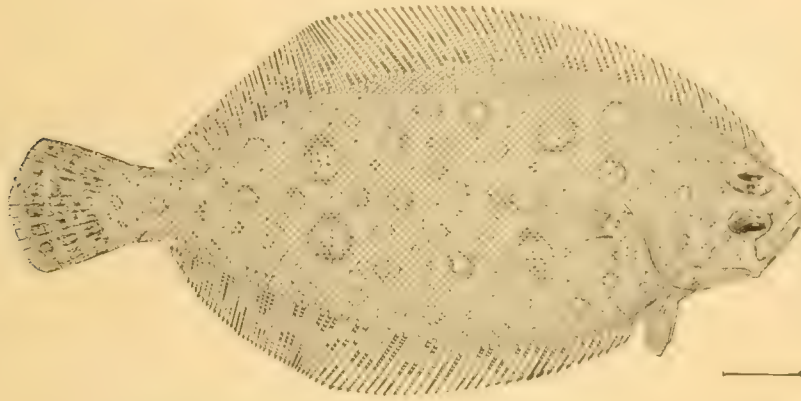


FIG. 81. *Xystrias grigorjewi* (Herzenstein). (From Proc. U. S. N. M., Vol. XXXI, p. 183).

Much faded, but not different from examples from Hakodate.

372. *Pleuronichthys cornutus* (Temminck & Schlegel).

Osaka, No. 6372a-b; Misaki, No. 6338a.

373. *Lepidopsetta bilineata* (Ayres).

(Mem. Carn. Mus., Vol. VI, fig. 62, p. 61).

Shinabara.

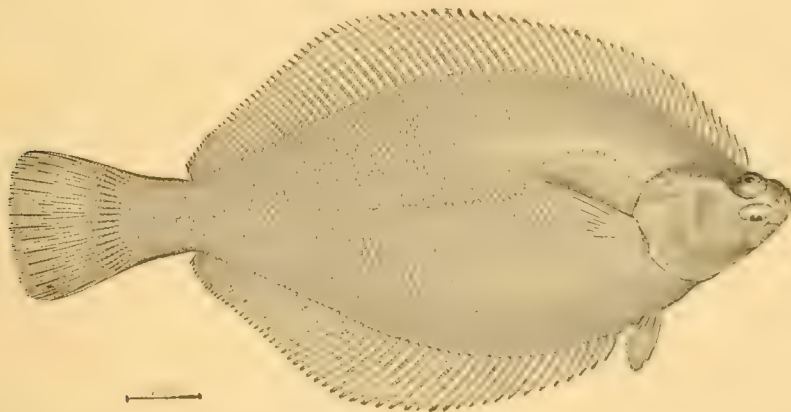


FIG. 82. *Limanda angustirostris* Kitahara. (From Proc. U. S. N. M., Vol. XXXI, p. 208).

374. *Limanda angustirostris* Kitahara.

Matsushima Bay, No. 6317.

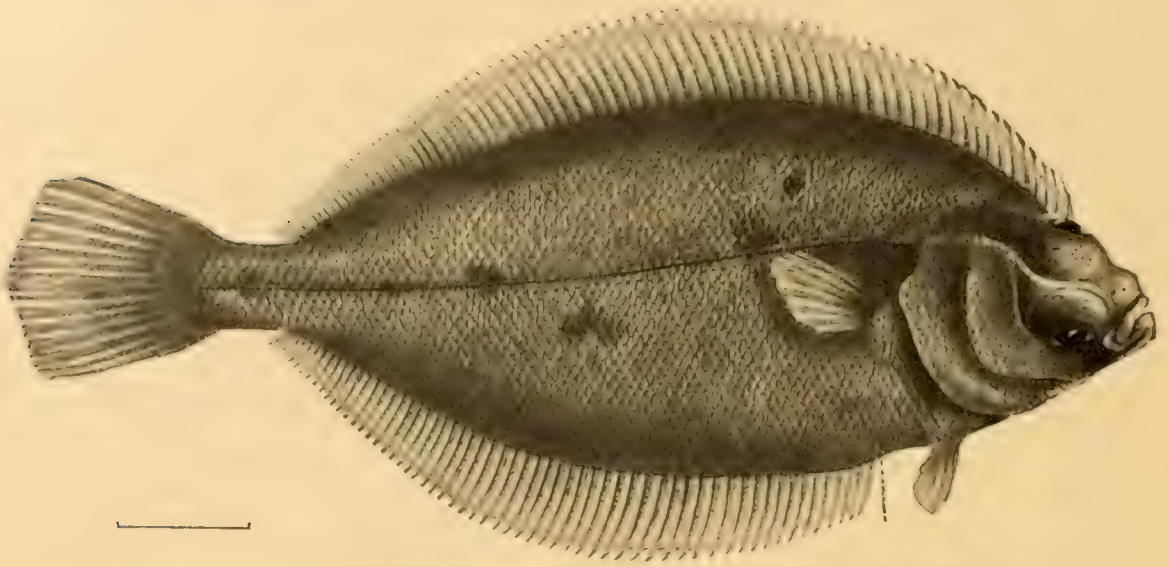
D. 73; A. 54. Scales 76.

375. *Limanda yokohamæ* (Günther).

Shinabara, near Tokyo, No. 6160a.

376. *Kareius bicoloratus* (Basilewsky).

Osaka, No. 6066a.

FIG. 83. *Dexistes rikuzenius* Jordan & Starks. (From Proc. U. S. N. M., Vol. XXXI, p. 213).377. *Dexistes rikuzenius* Jordan & Starks.(*Araias ariommus* Jordan & Starks).

Two specimens of this deep-water flounder from Tsushima Straits were taken in the market of Osaka. One, No. 6342a, is in the Carnegie Museum.

Eyeball scaly above. Head 4.16 in length; dorsal rays, sixty-nine and seventy-three, anal rays, fifty-seven and fifty-nine. Scales, sixty-five and sixty-seven (pores), gill-rakers $x+7$.

In the type of *Araias ariommus*, the eyeball is also scaly above and the two are identical.

378. *Platichthys stellatus* (Pallas).

(Mem. Carn. Mus., Vol. VI, p. 60, fig. 61).

Matsushima Bay, No. 6339a, a subarctic species, rare thus far to the southward.

Family SOLEIDÆ.

379. *Aseraggodes kobensis* (Steindachner).

Misaki, No. 6114.

380. *Amate japonica* (Temminck & Schlegel).

Shimonoseki, No. 6225a-d; Misaki, No. 6396a-j.

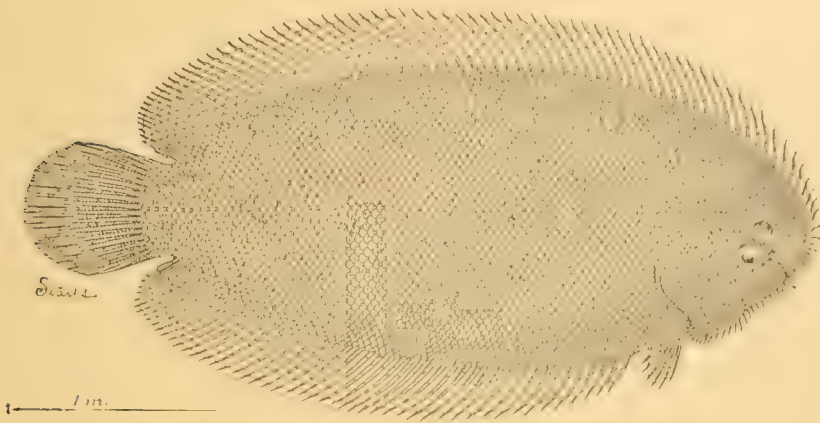


FIG. 84. *Aseraggodes kobensis* (Steindachner). (From Proc. U. S. N. M., Vol. XXXI, p. 230).

381. *Zebrias zebrinus* (Temminck & Schlegel).

Misaki, No. 6373a; Shimonoseki.

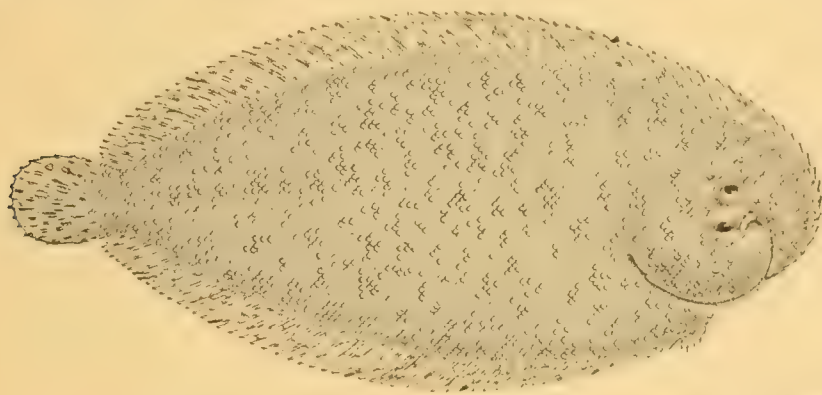


FIG. 85. *Amate japonica* (Temminck & Schlegel). (From Proc. U. S. N. M., Vol. XXXI, p. 228).

382. *Zebrias japonicus* (Bleeker).

Kobe, No. 6215a; Misaki, No. 6180a (Coll. Manabe).

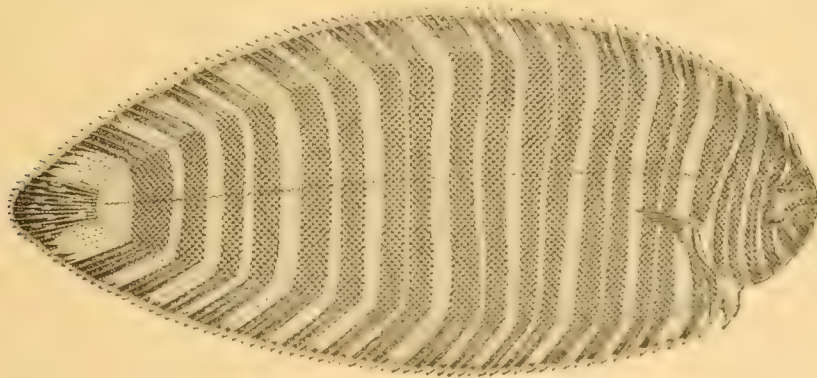


FIG. 86. *Zebrias zebrinus* (Temminck & Schlegel). (From Proc. U. S. N. M., Vol. XXXI, p. 233).

383. *Rhinoplagusia japonica* (Temminck & Schlegel).

Shimonoseki, Misaki, No. 6312.

The name *Rhinoplagusia* of Bleeker has priority over *Usinosita*, based on the same type *japonica*.

384. *Areliscus interruptus* (Günther).

Misaki.

Family TRACHYPTERIDÆ.

385. *Trachypterus ishikawæ* Jordan & Snyder.

A small specimen from Sagami Bay, 86 cm. long, No. 6384a, which has lost a part of the tail and caudal fin, corresponds completely with the description of the type, save that in the latter the pre-orbital is described as "very wide, radiate, rugose." This is a clerical error, the maxillary being meant, as is evident from the large adult example in the Stanford Collection and the illustration of the type. The pre-orbital is about 5 in the eye, not bony, nor prominent. The premaxillaries are greatly protractile and in the type they are fully extended, as is evident from the plate. The premaxillary processes extend to the nape, slightly behind the eye.

The teeth are slightly longer and more prominent than in our large adult example. The vomer has similar teeth.

Family LOPHIIDÆ.

386. *Lophiomus setigerus* (Vahl).

Misaki, No. 6082a-b.

FAMILY ANTENNARIIDÆ.

387. *Antennarius tridens* (Temminck & Schlegel).

Misaki, No. 6383a-b; Kobe.

388. *Antennarius nox* Jordan.

Misaki, No. 6382a.

A large example, with the color-pattern of the type, but the ground-color pale, not jet-black.

Family CERATIIDÆ.

389. *Chaunax fimbriatus* Hilgendorf.

A small specimen, No. 6035a, one hundred and eighty millimeters long from Misaki, together with two specimens from Sagami Bay, collected by the Albatross, differ from an Atlantic specimen of *Chaunax pictus* Lowe in the extension of the rostral tentacle back of the anterior border of the eyes, the coarser character of the skin prickles, and larger eye, as well as in the presence of filaments on the lower side of the body.

The eye in *C. pictus* is .09 of body-length, in *C. fimbriatus* .07-.075 in specimens of same size.

Günther¹⁴ regards these two species as synonymous, but makes no remark on the above mentioned characters.

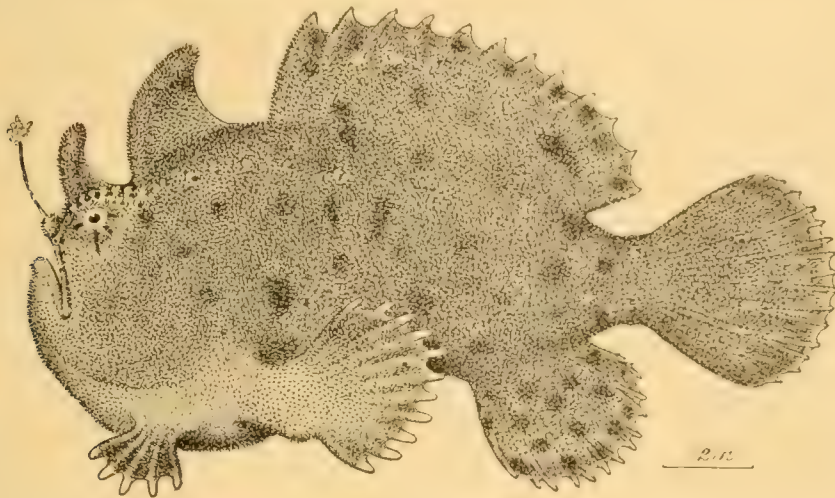


FIG. 87. *Antennarius nox* Jordan. (From Proc. U. S. N. M., Vol. XXIV, p. 376).

Family OGCOCEPHALIDÆ.

390. *Haliutæa stellata* (Vahl).

Boshu; Sagami Bay; Misaki, No. 6142a-b.

The smallest of these specimens shows a much narrower disk than the others, its breadth equal to the distance from the snout to the last of the base of the dorsal fin and an absence of small prickles between the larger spinules of the disk. The larger two show these prickles and a broader disk, equal to the distance from the snout to the pectoral angle. These, however, on comparison with other specimens are shown to be extremes of variations.

¹⁴ Challenger, Deep Sea Fishes, p. 58.

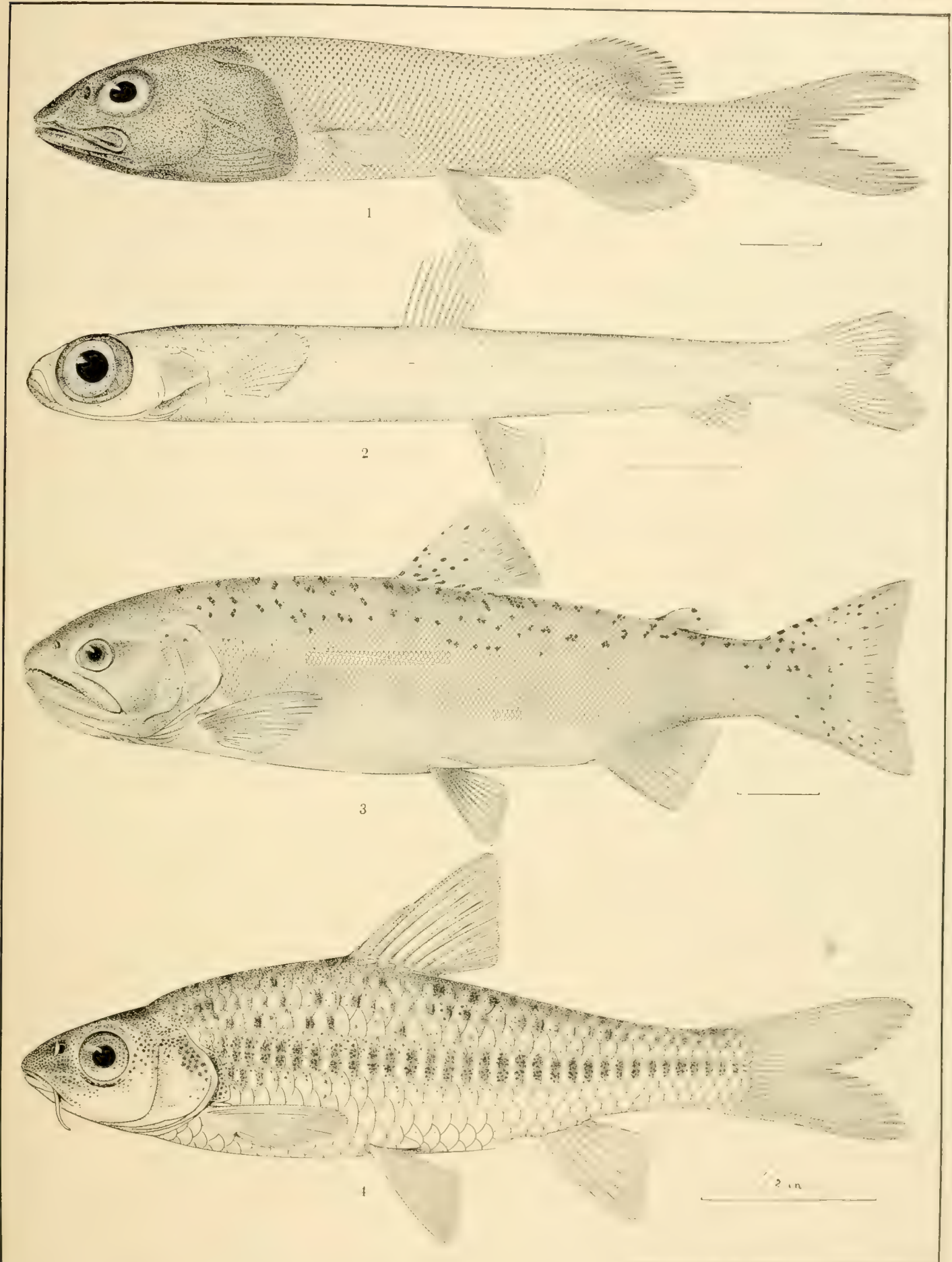


FIG. 1. *Alepocephalus umbriceps* JORDAN & THOMPSON. FIG. 2. *Nansenia ardesiaca* JORDAN & THOMPSON.
FIG. 3. *Oncorhynchus masou* (BREVOORT). FIG. 4. *Gnathopogon ishikawae* JORDAN & THOMPSON.

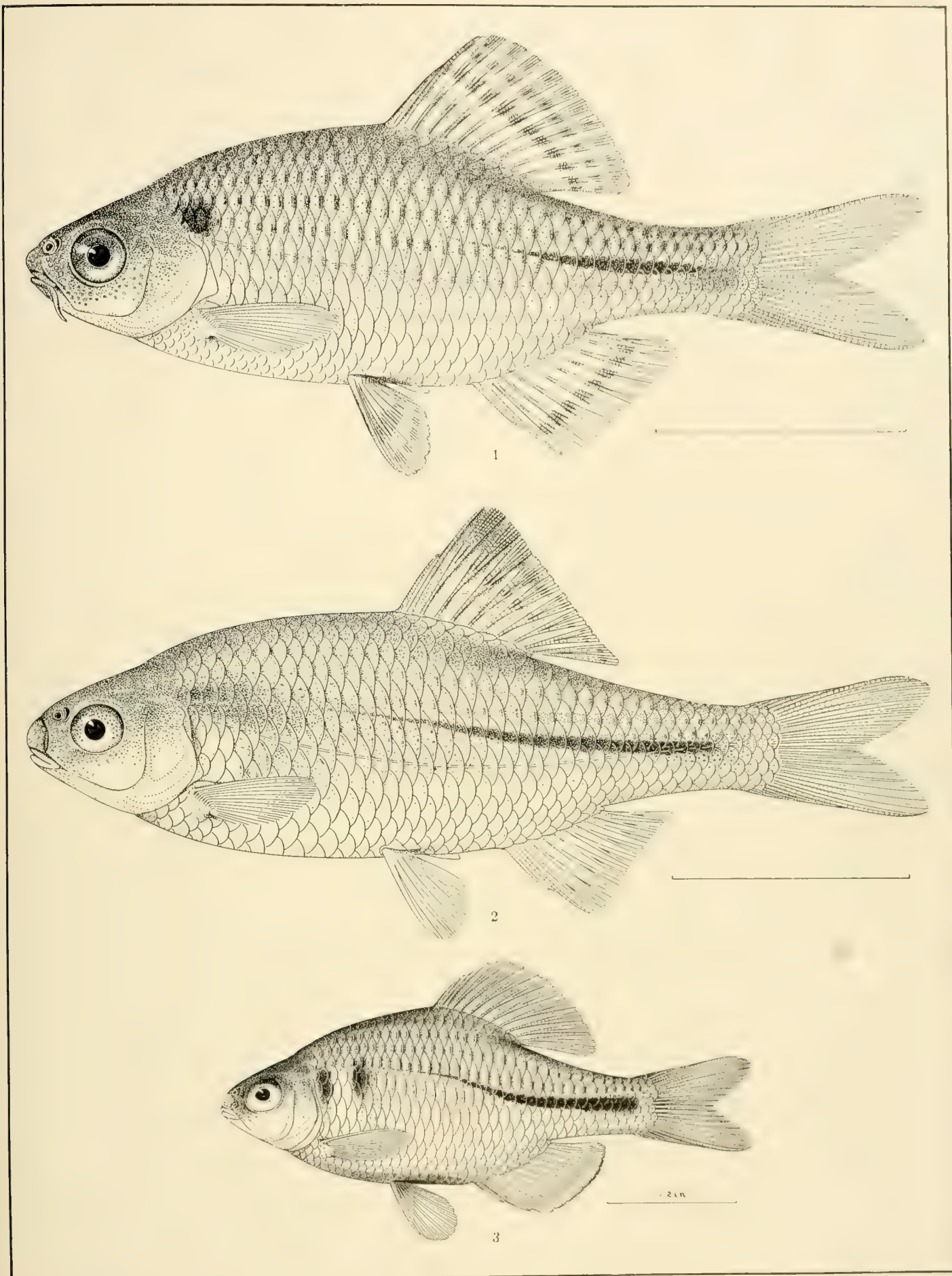


FIG. 1. *Acheilognathus tabira* JORDAN & THOMPSON. FIG. 2. *Acheilognathus morioka* JORDAN & THOMPSON.
FIG. 3. *Acanthorhodus atremius* JORDAN & THOMPSON.

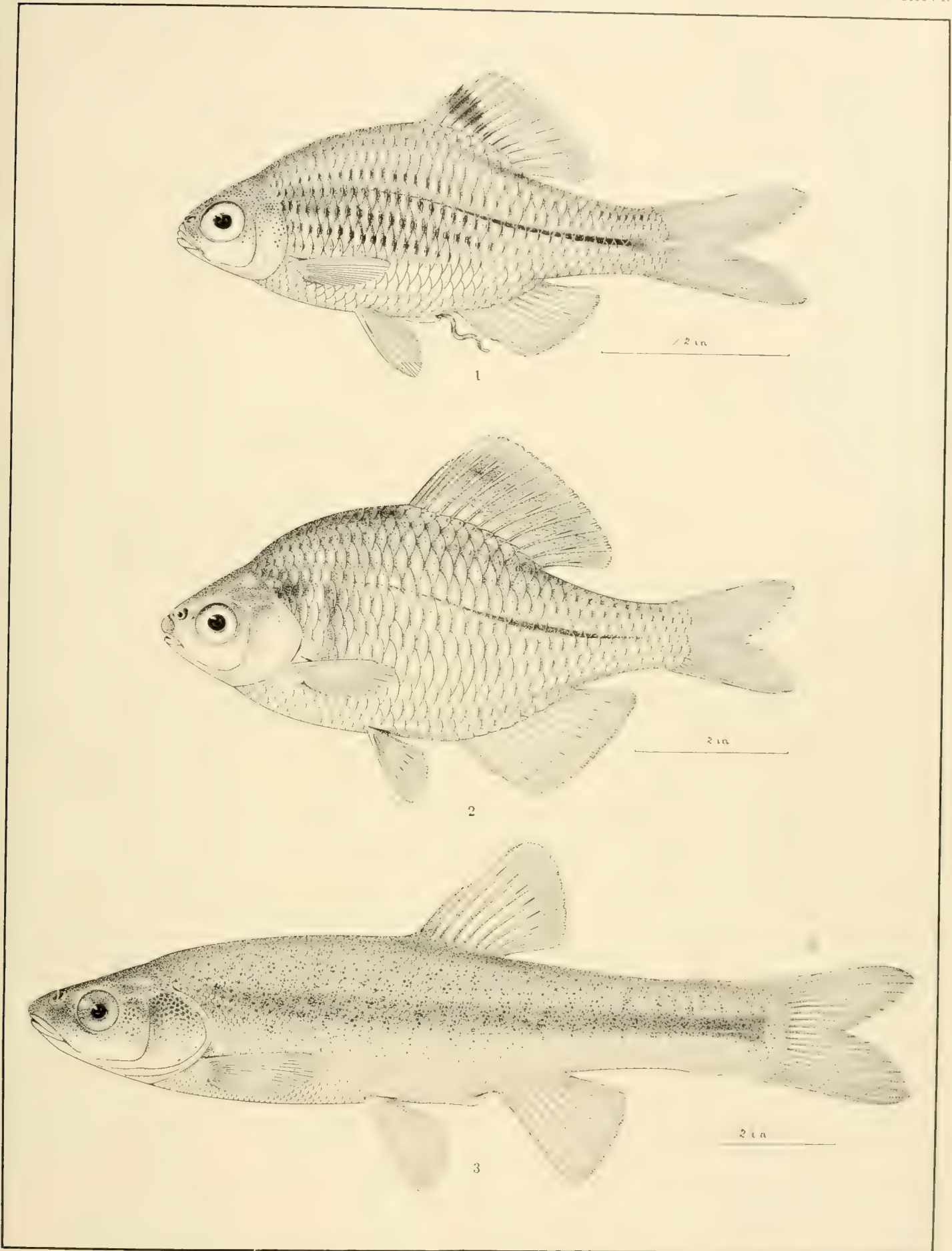


FIG. 1. *Acanthorhcdius sciosemus* JORDAN & THOMPSON. FIG. 2. *Rhodeus kurumcus* JORDAN & THOMPSON.
FIG. 3. *Pseudaspius atrilatus* JORDAN & THOMPSON.

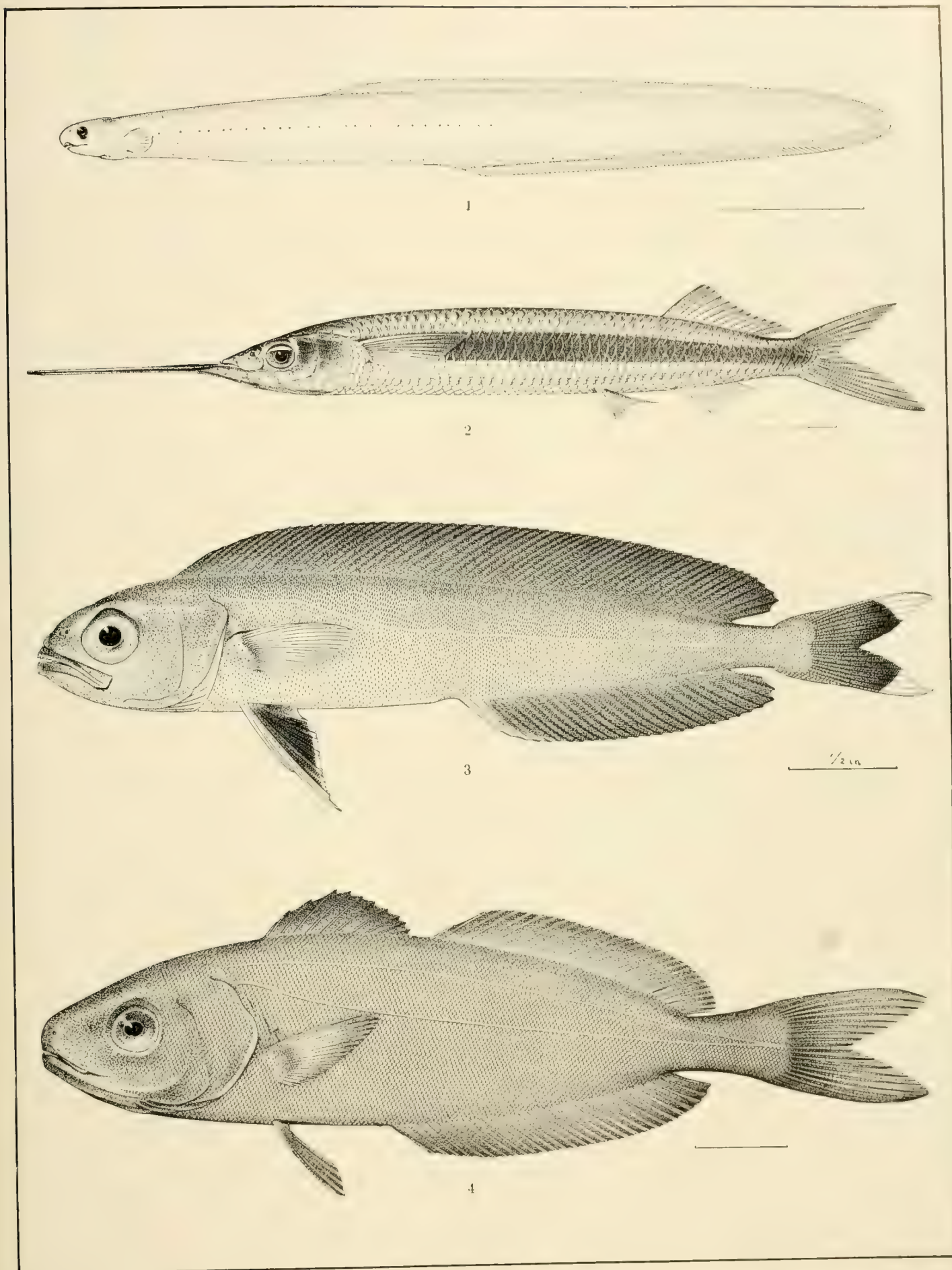


FIG. 1. *Myrus uropterus* TEMMINCK & SCHLEGEL. FIG. 2. *Hemirhamphus japonicus* BREVOORT.
FIG. 3. *Ectenias brunneus* JORDAN & THOMPSON. FIG. 4. *Icticus ischanus* JORDAN & THOMPSON.

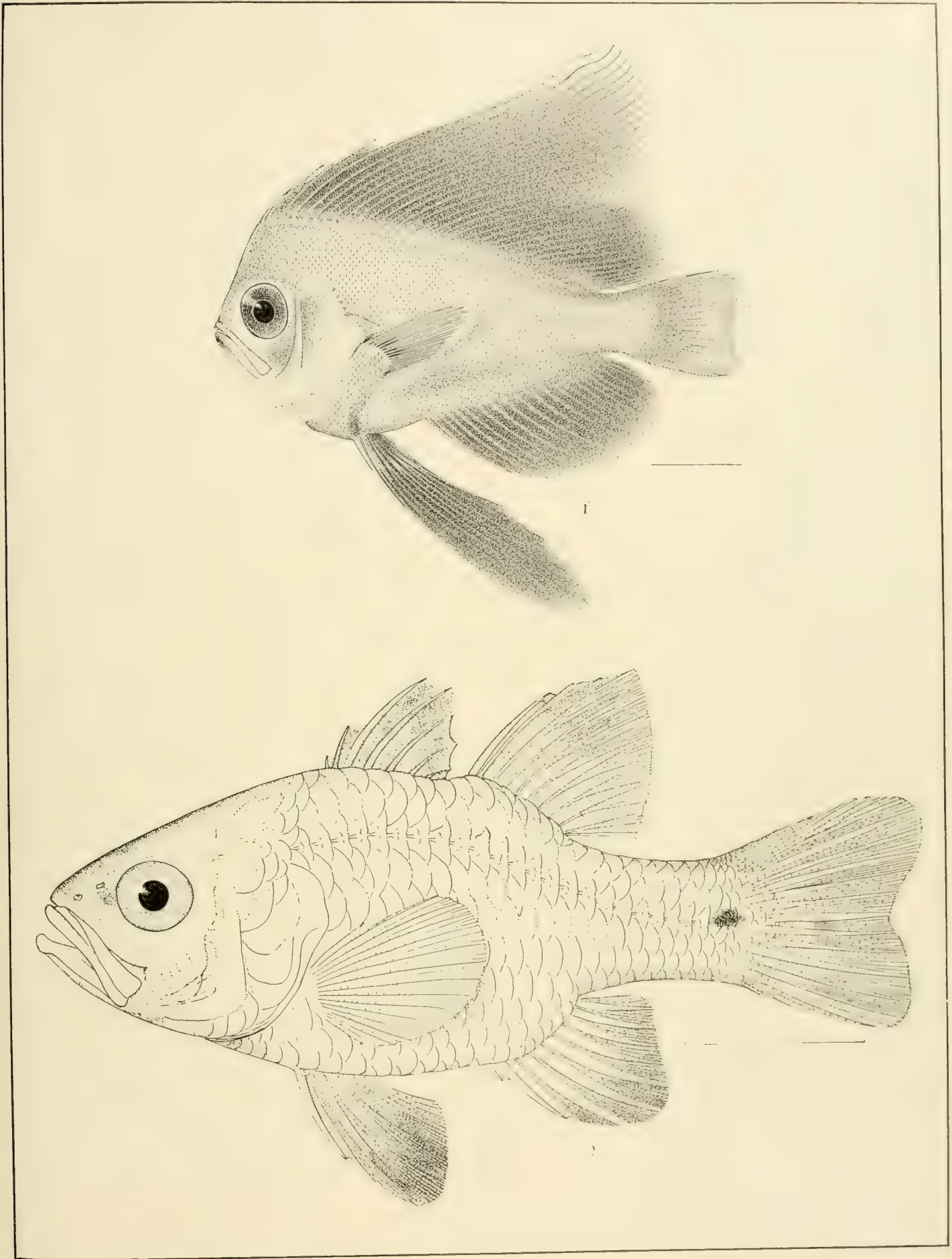


FIG. 1. *Caristiis macropus* (BELLOTTI). FIG. 2. *Amia sialis* JORDAN & THOMPSON.

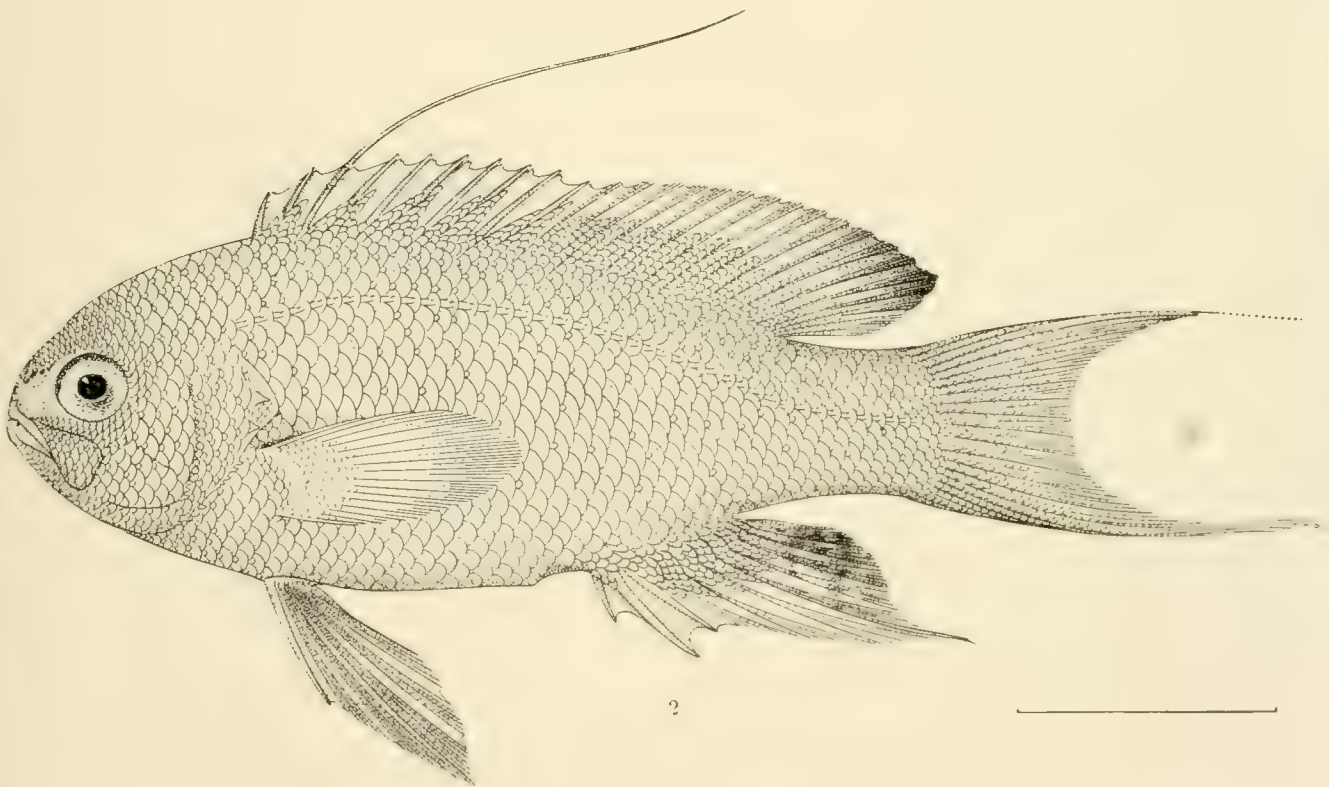
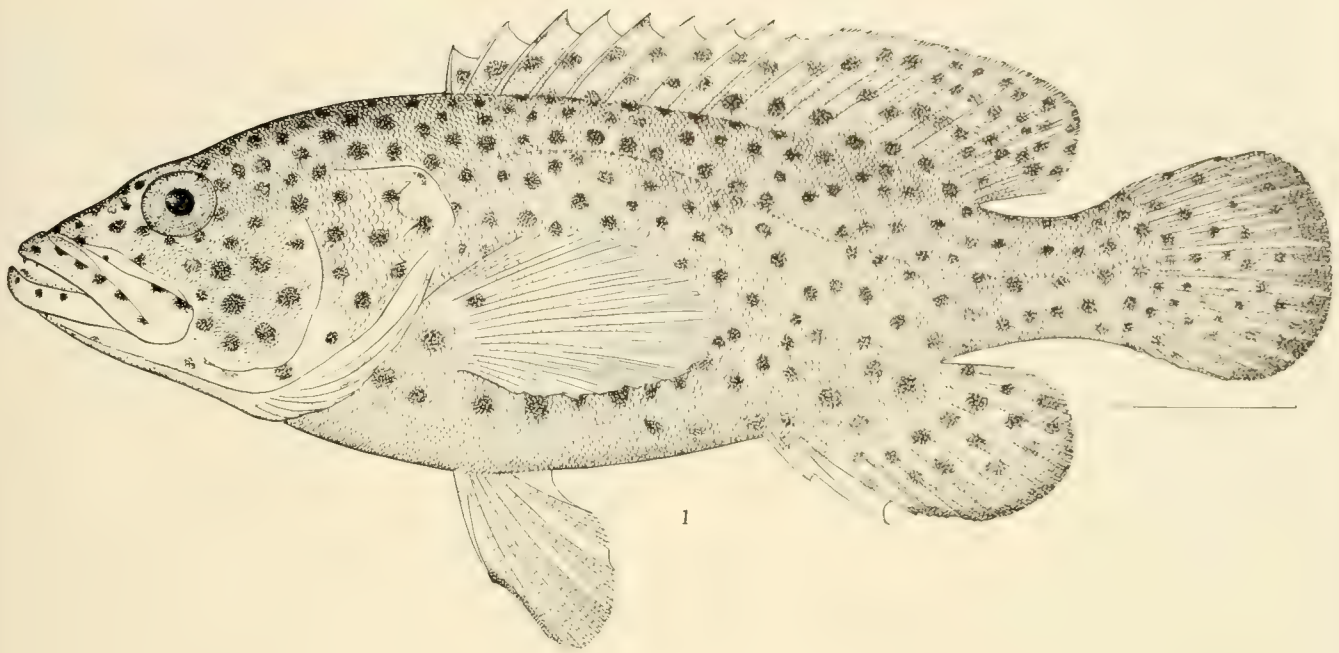


FIG. 1. *Cephalopholis boninius* JORDAN & THOMPSON. FIG. 2. *Franzia nobilis* (FRANZ).

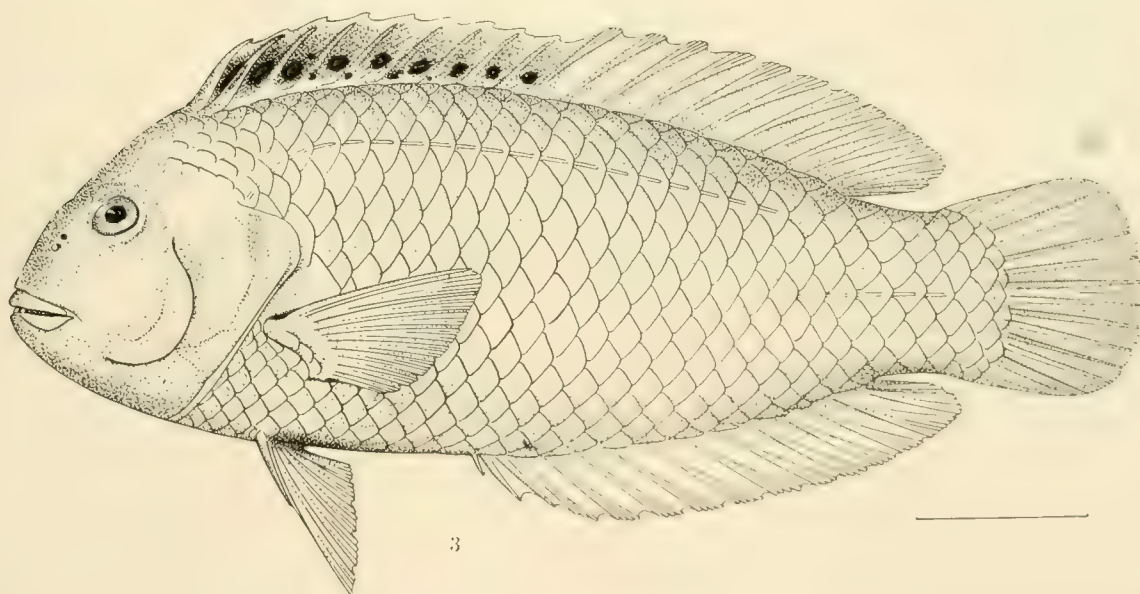
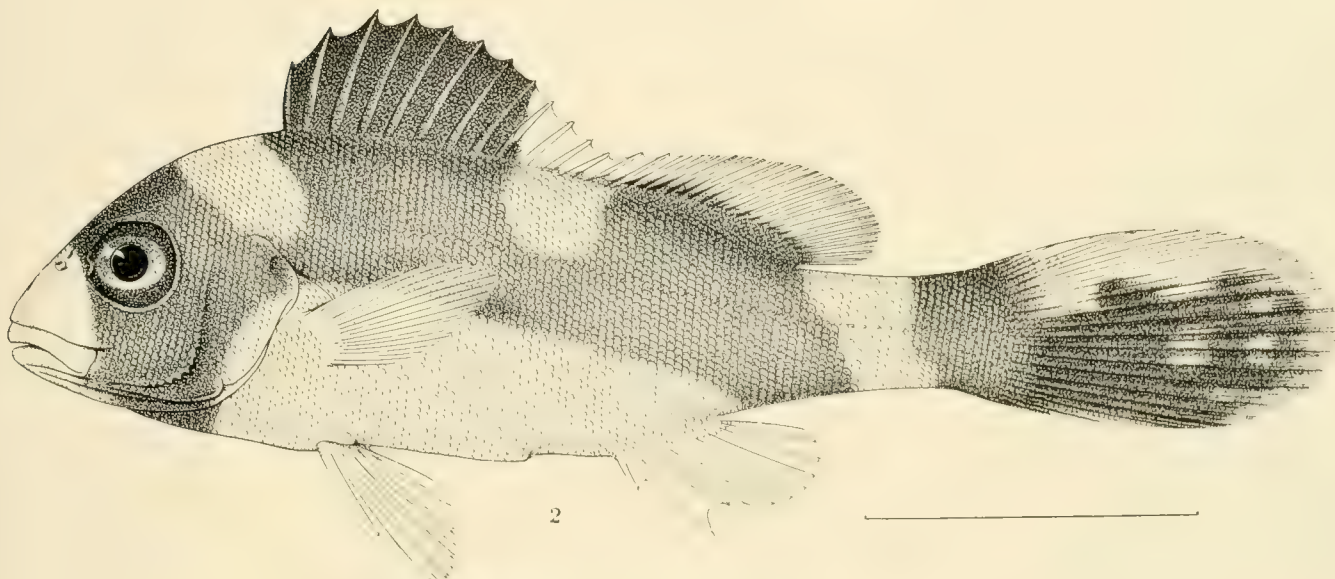
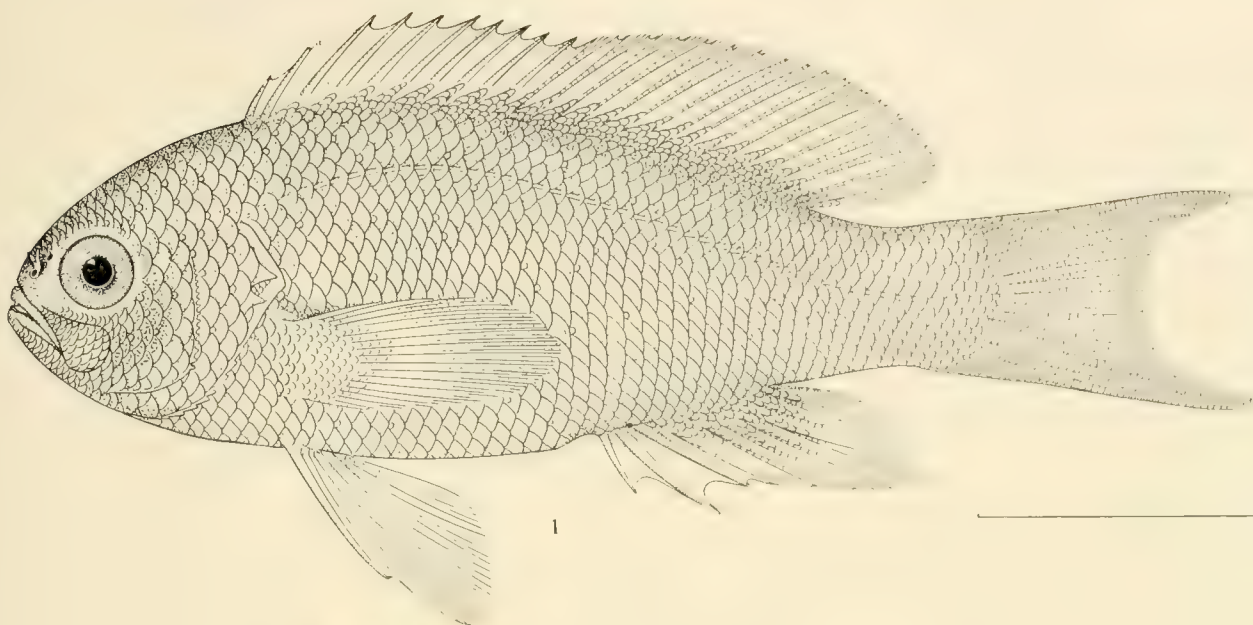


FIG. 1. *Franzia ardens* JORDAN & THOMPSON. FIG. 2. *Plectorhynchus pictus* (CUVIER & VALENCIENNES).
FIG. 3. *Xyrichthys sciistius* JORDAN & THOMPSON.

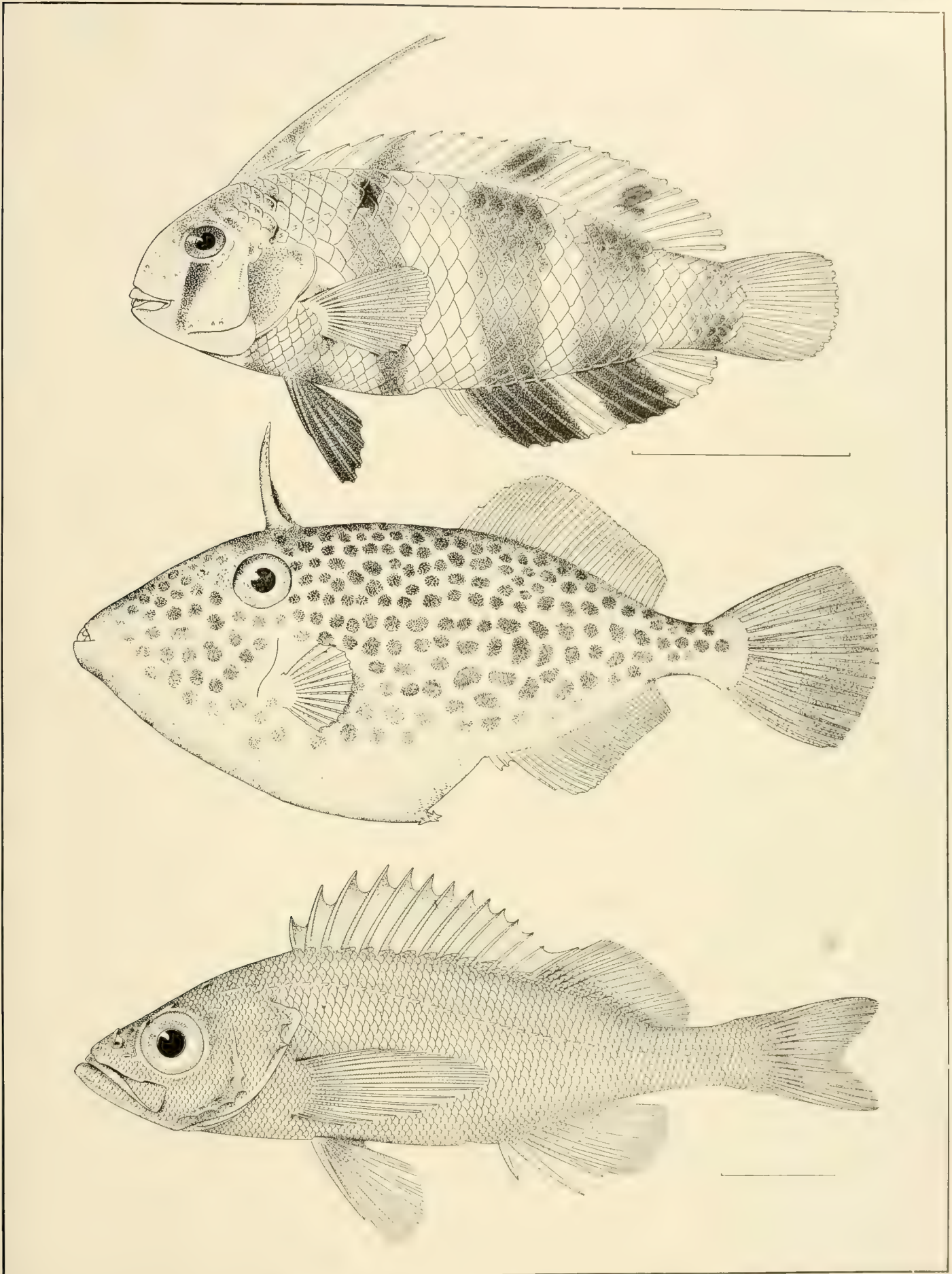


FIG. 1. *Innistius dea* (TEMMINCK & SCHLEGEL). FIG. 2. *Pseudomonocanthus nigromaculatus* (TANAKA).
FIG. 3. *Sebastodes owstoni* JORDAN & THOMPSON.

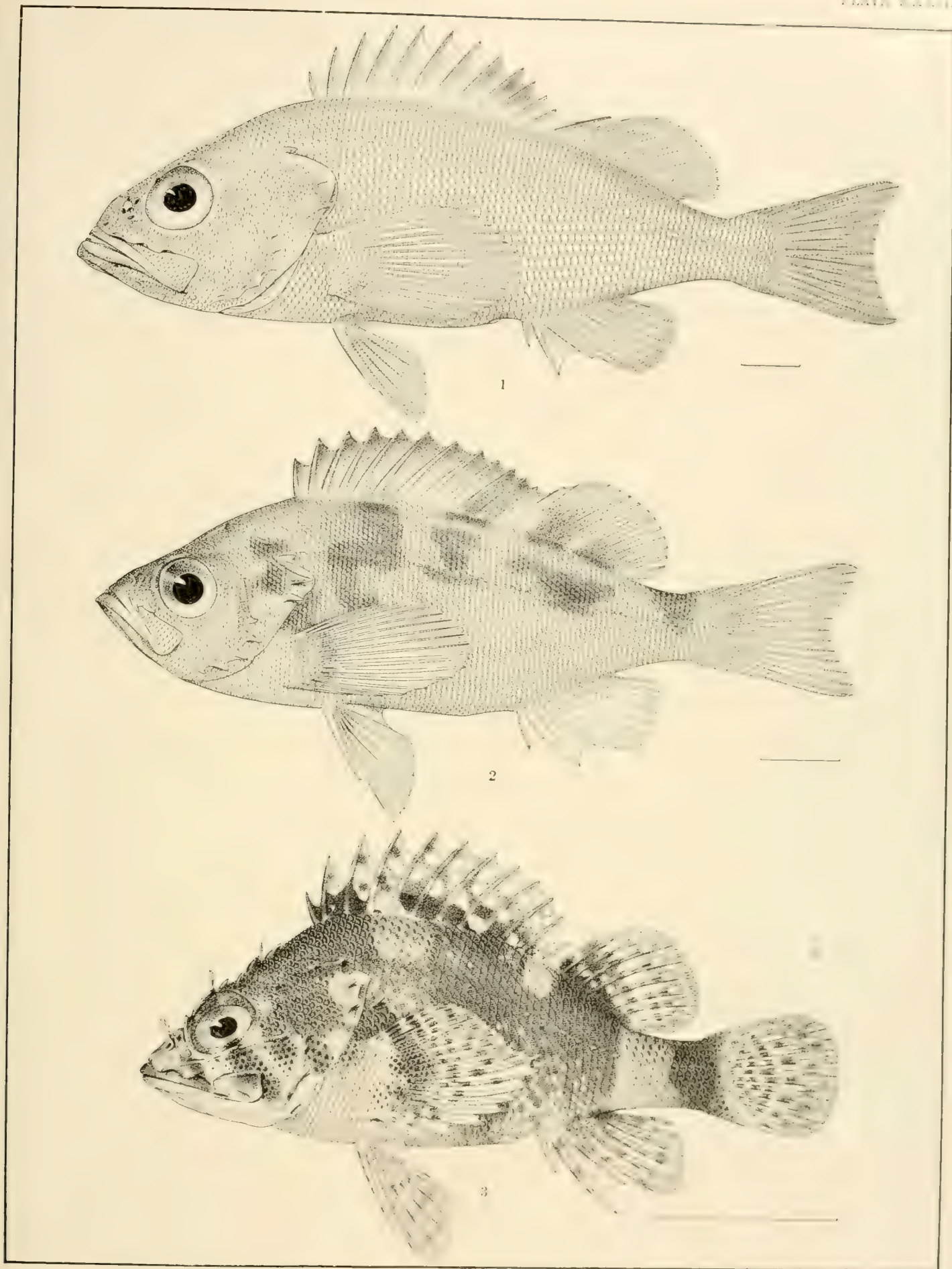


FIG. 1. *Sebastodes flammeus* JORDAN & STARKS. FIG. 2. *Sebastodes joyneri* (GÜNTHER).
FIG. 3. *Thysanichthys evides* JORDAN & THOMPSON.

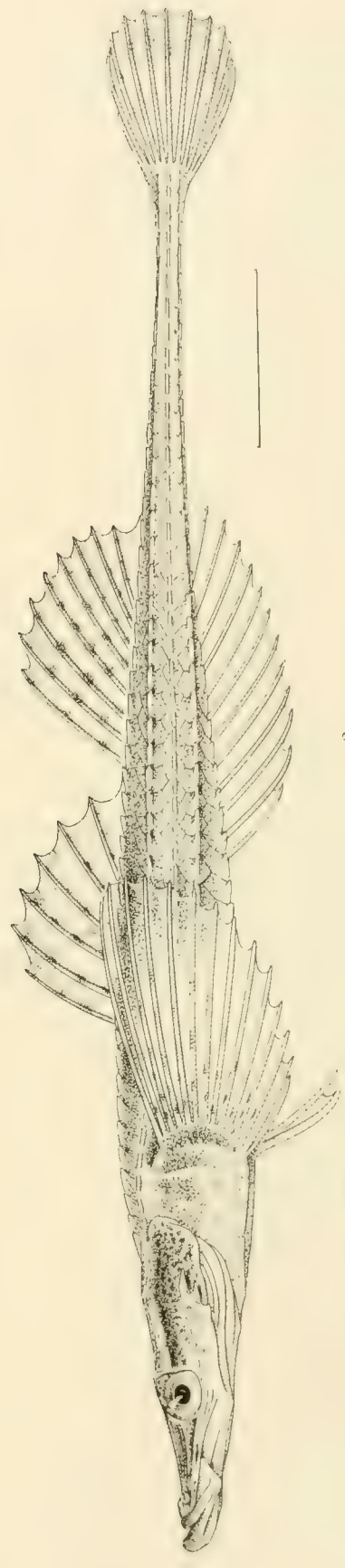
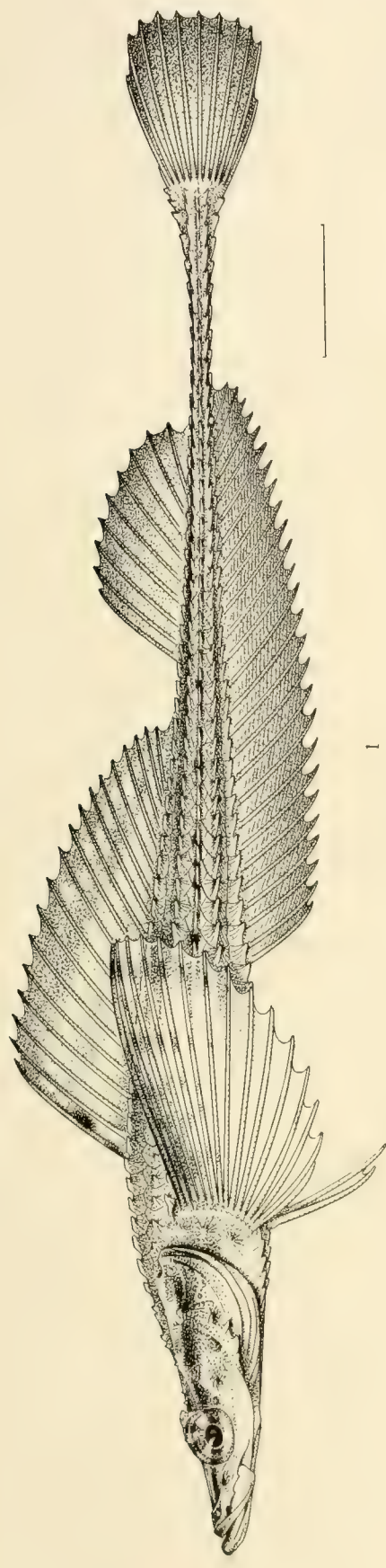
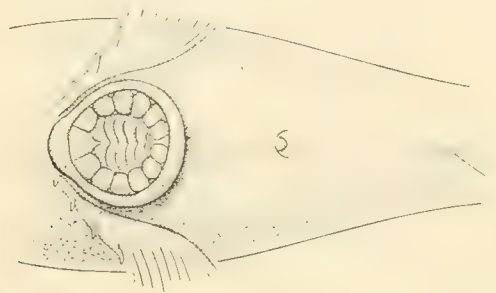


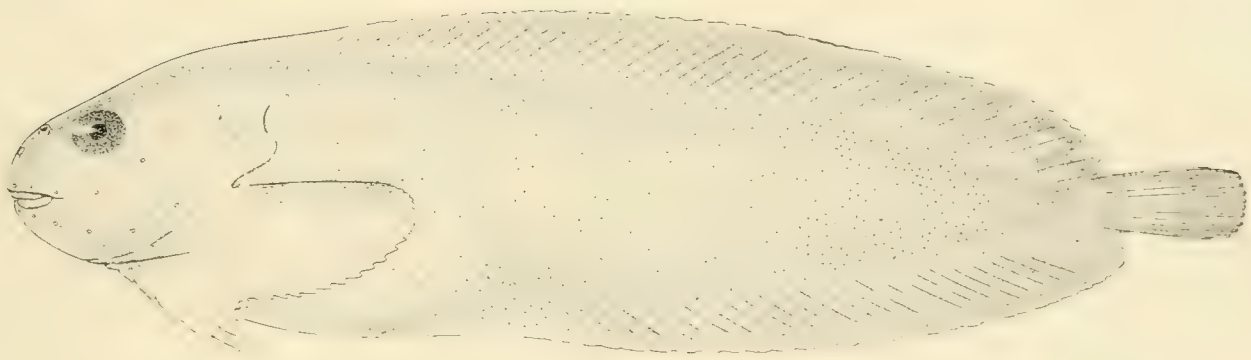
FIG. 1. *Tylesina gibbosa* SCHMIDT. FIG. 2. *Brachyopsis rostratus* (TILESUS).



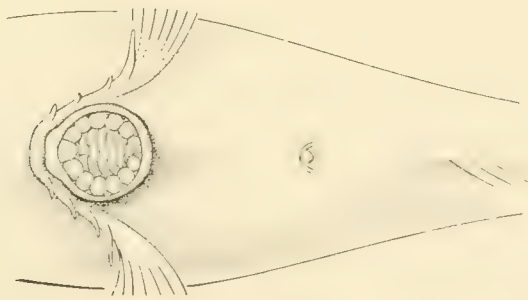
1



1 a



2



2 a

FIG. 1. *Careproctus gilberti* JORDAN & THOMPSON. FIG. 1a. *Careproctus gilberti* JORDAN & THOMPSON.
FIG. 2. *Careproctus burkei* JORDAN & THOMPSON. FIG. 2a. *Careproctus burkei* JORDAN & THOMPSON.

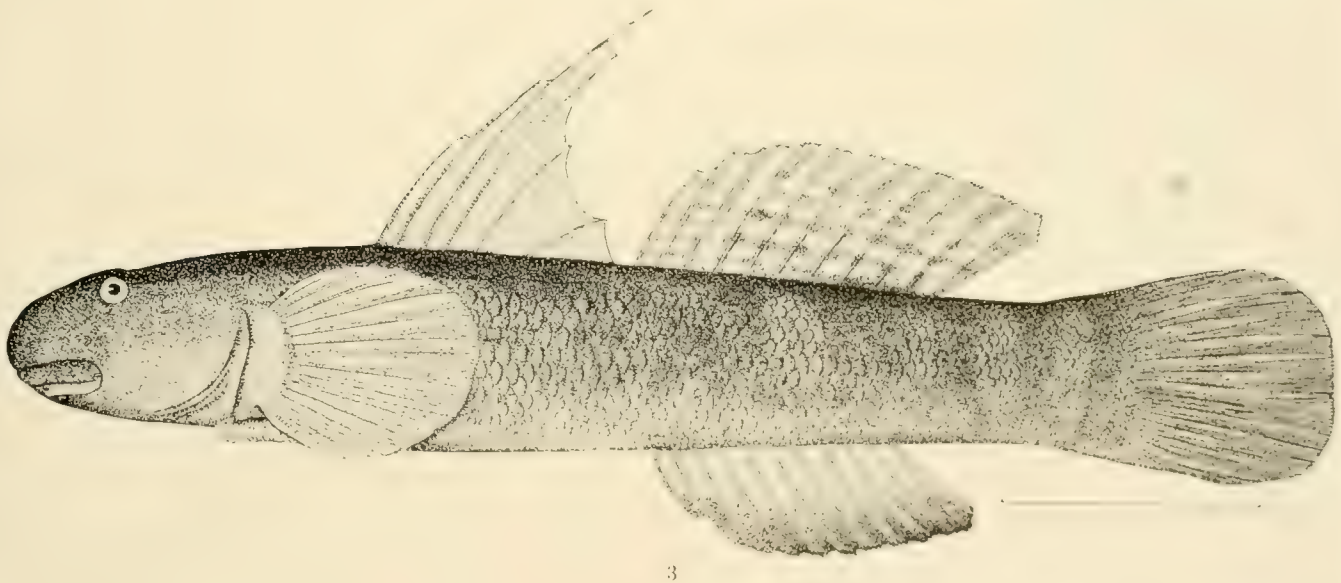
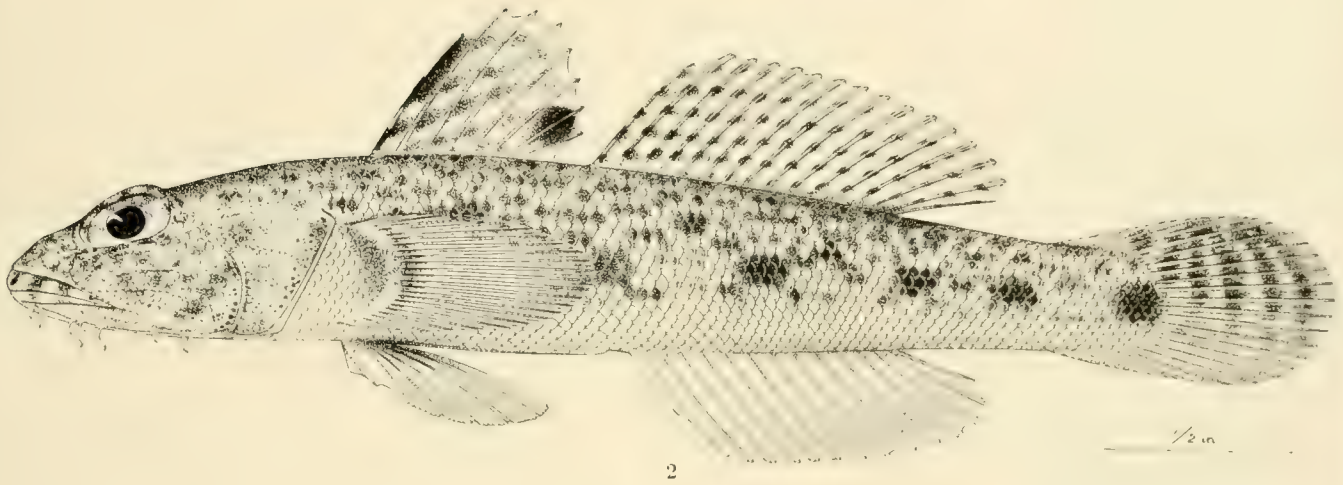
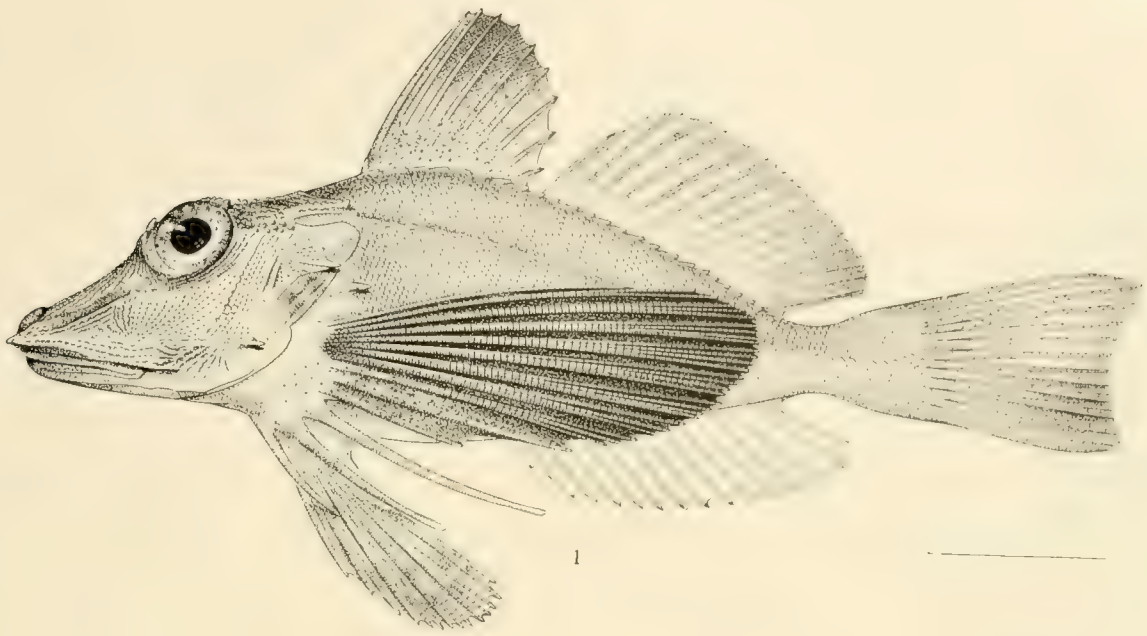


FIG. 1. *Chelidonichthys ischyryus* JORDAN & THOMPSON. FIG. 2. *Aionosus gencionemus* (HILGENDORF).
FIG. 3. *Sicyopterus japonicus* (TANAKA).

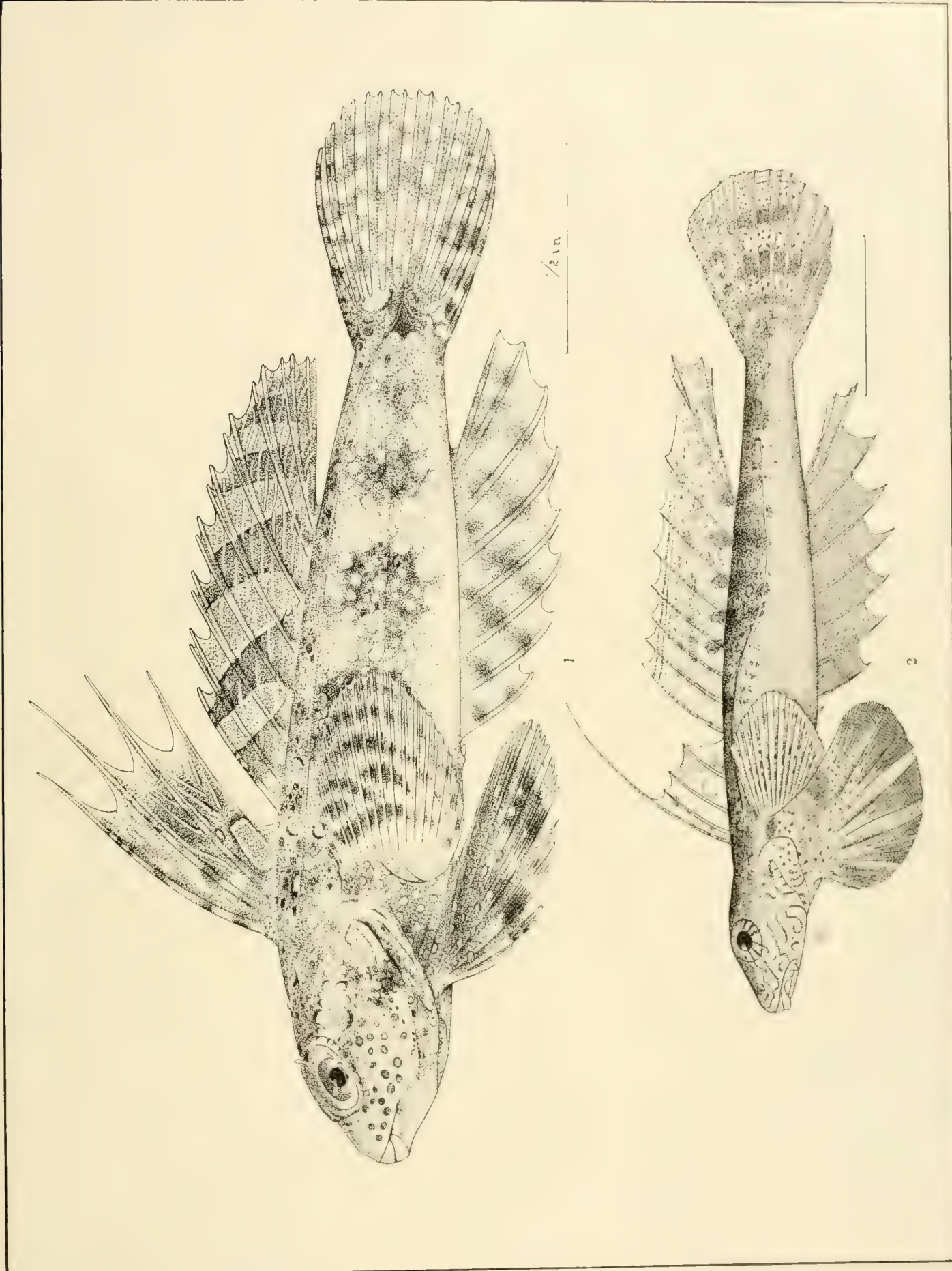
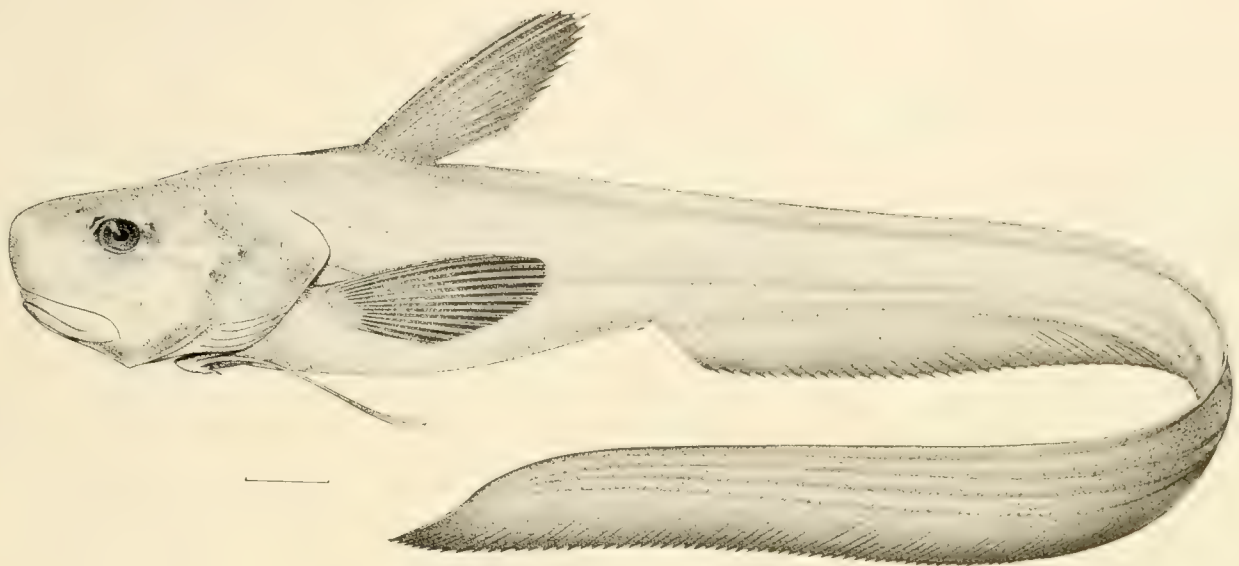
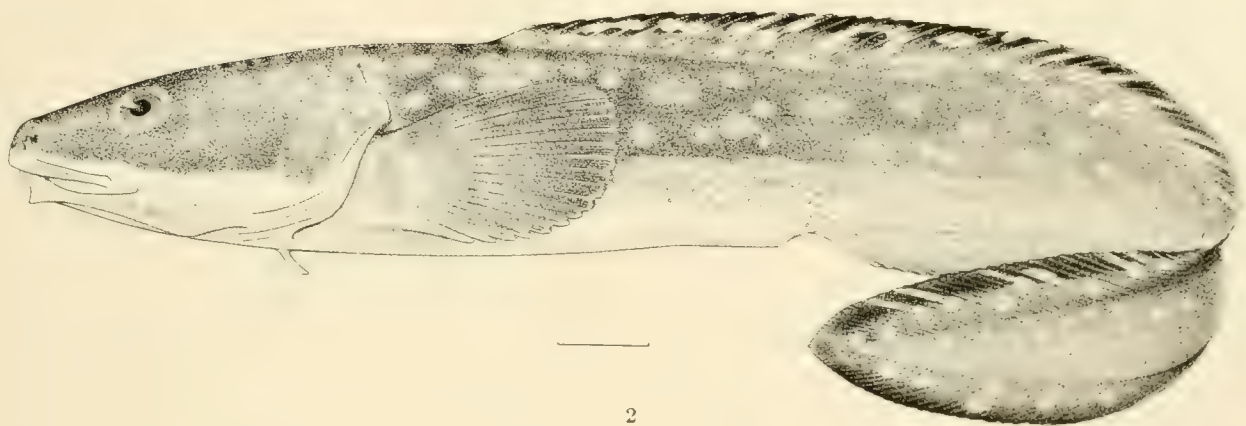


FIG. 1. *Synchiropus tjime* JORDAN & THOMPSON. FIG. 2. *Calymmnichthys xenicus* JORDAN & THOMPSON.



1



2



3

FIG. 1. *Ateleopus japonicus* BLEEKER. FIG. 2. *Lycodes tanaka* JORDAN & THOMPSON.
FIG. 3. *Spectrunculus radcliffei* JORDAN & THOMPSON.

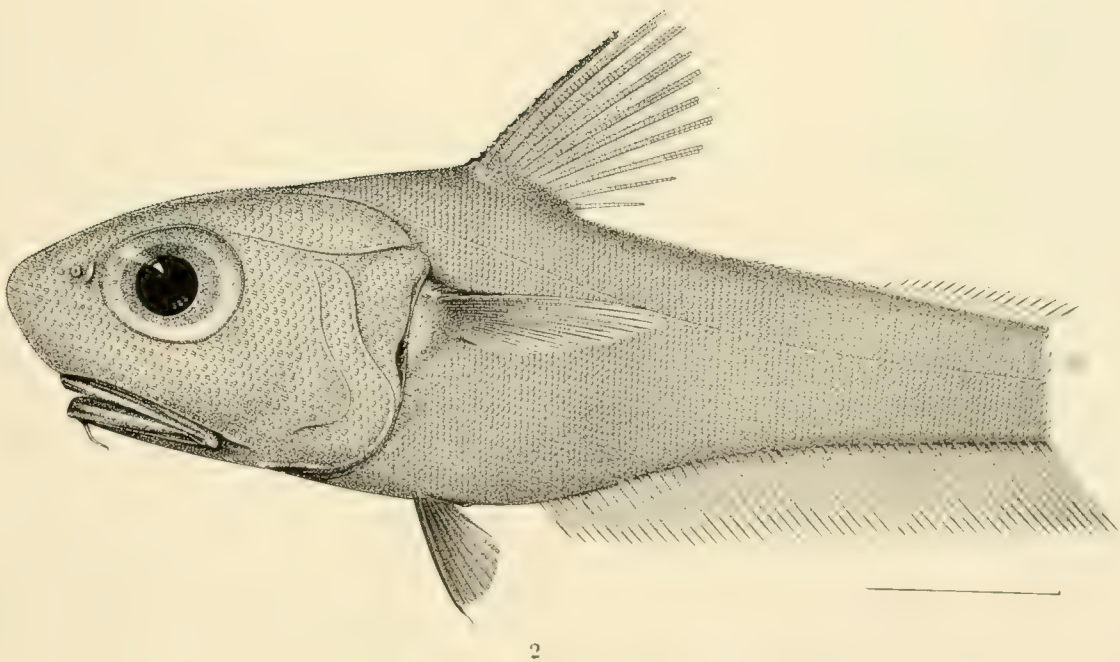
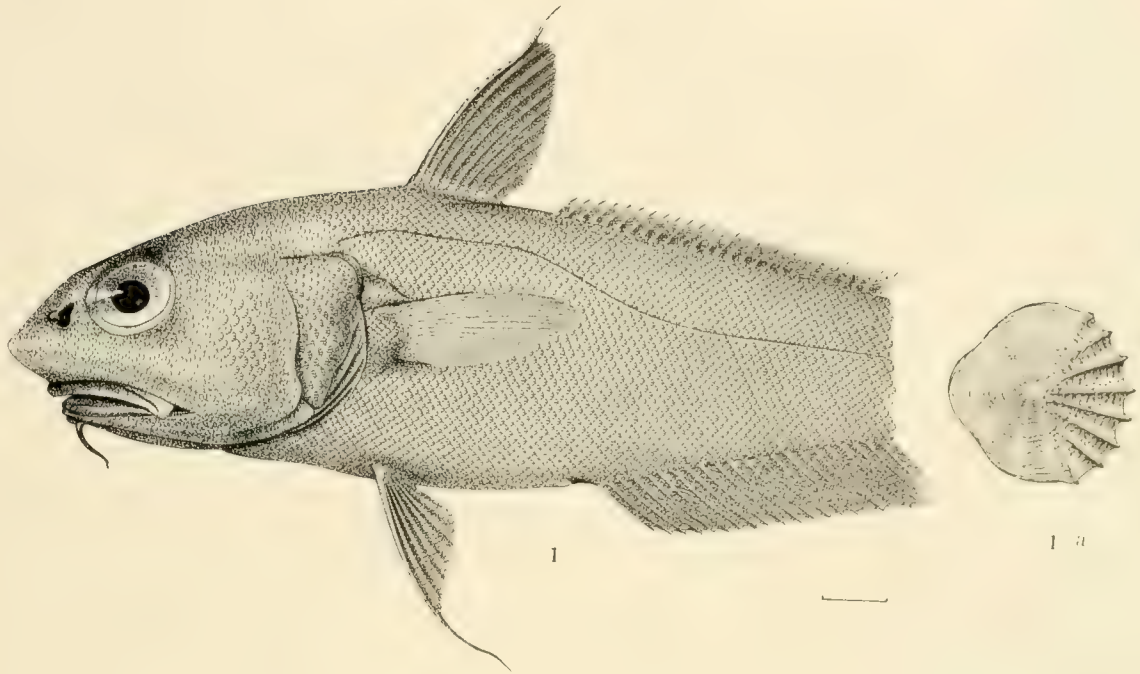
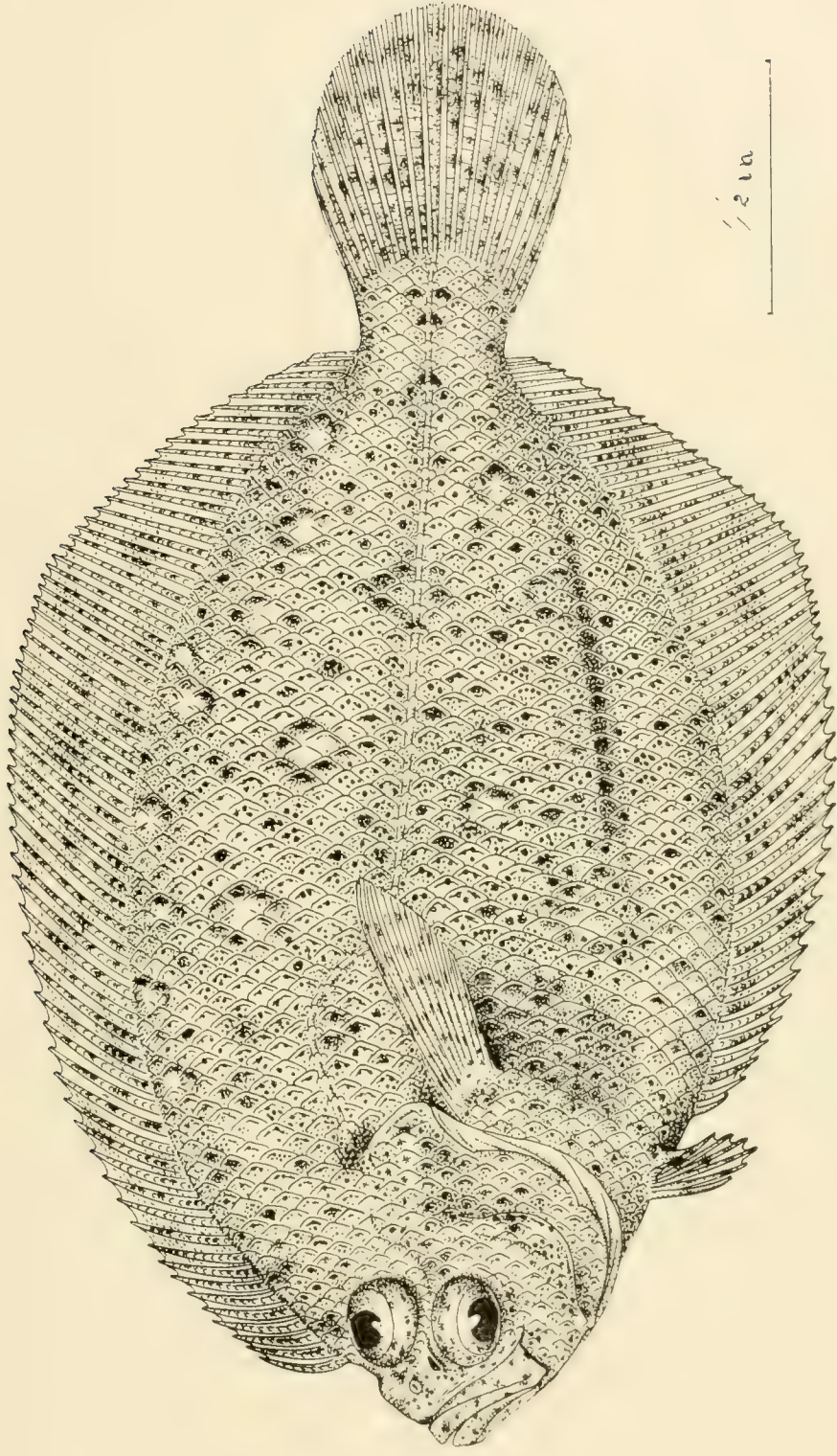


FIG. 1. *Coryphaenoides bona-nox* JORDAN & THOMPSON. FIG. 1a. SCALE OF DO. FIG. 2. *Macrourus asper* GÜNTHER.



Tarphops otigolepis (BLEEKER).

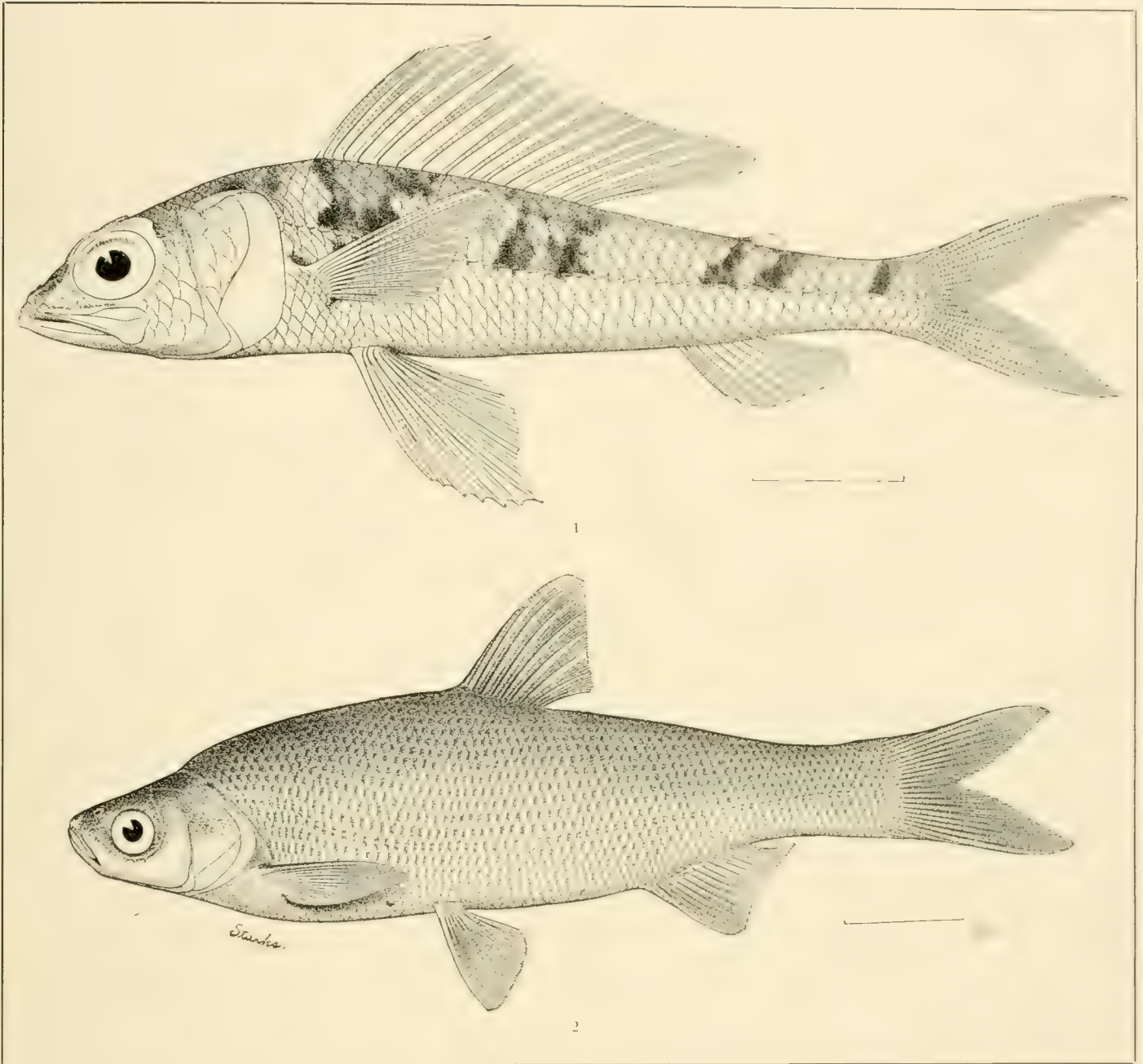


FIG. 1. *Aulopus japonicus* GÜNTHER. (FROM PROC. U. S. N. M., VOL. XXIII, PL. 32.)

FIG. 2. *Ishikauia steenackeri* (SAUVAGE). (FROM PROC. U. S. N. M., VOL. XXIII, PL. 10.)

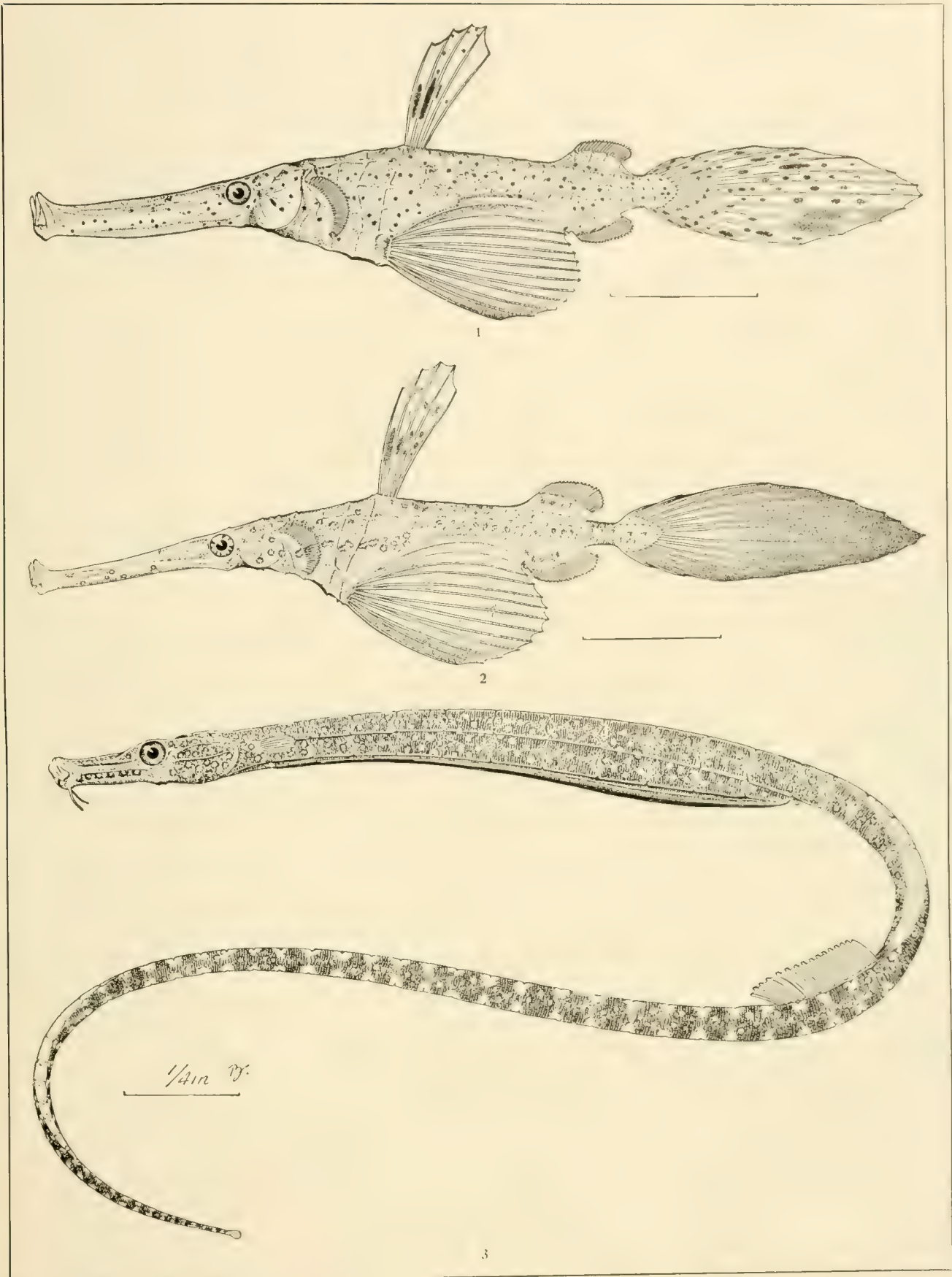


FIG. 1. *Solenostomus cyanopterus* (BLEEKER). (FROM PROC. U. S. N. M., VOL. XXIV, PL. 3.)
FIG. 2. *Solenostomus paradoxus* (PALLAS). (FROM PROC. U. S. N. M., VOL. XXIV, PL. 4.)
FIG. 3. *Urocampus rikuzenius* JORDAN & SNYDER. (FROM PROC. U. S. N. M., VOL. XXIV, PL. 7.)

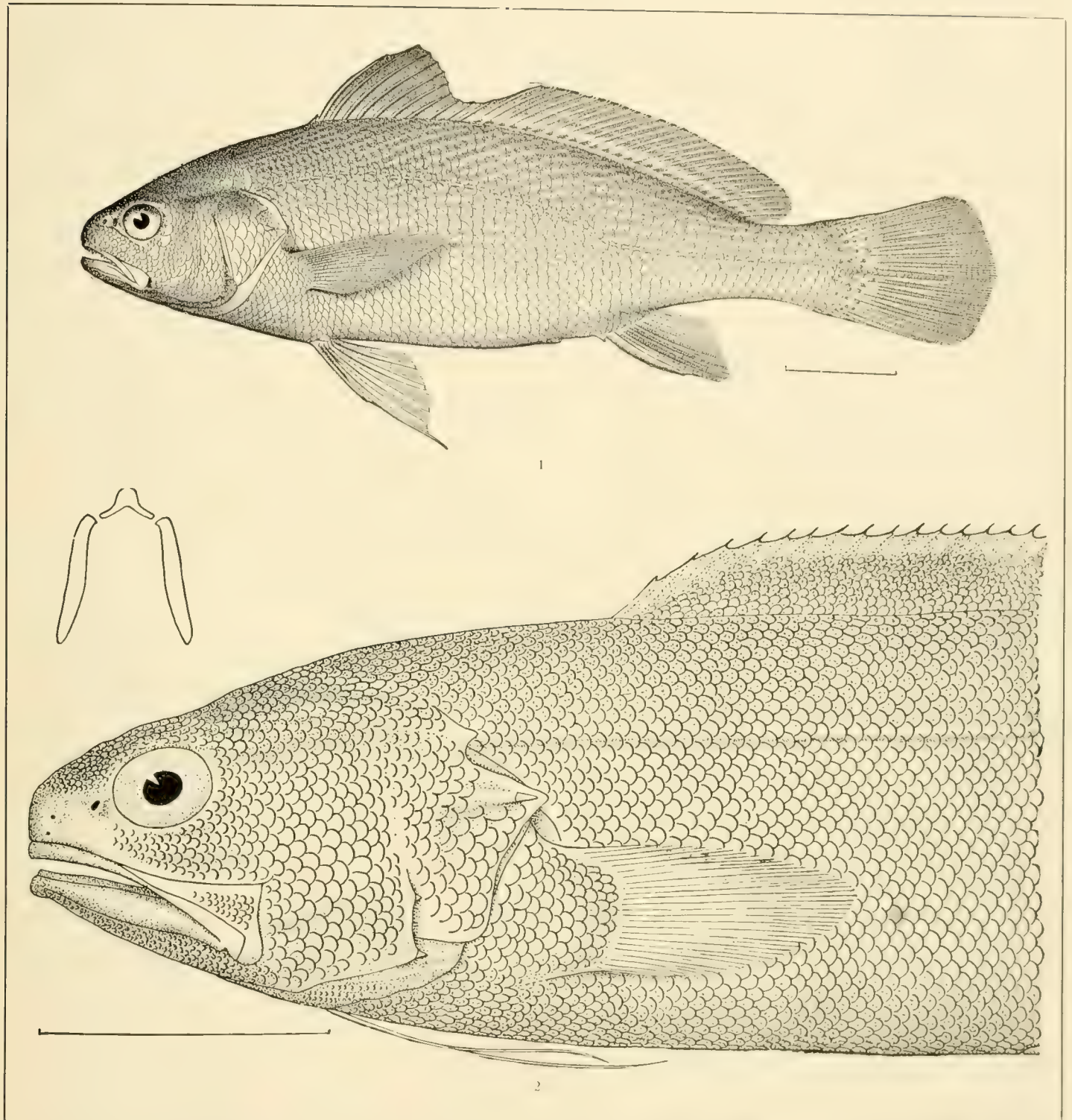


FIG. 1. *Sciænia mitsukurii* (JORDAN & SNYDER). (FROM PROC. U. S. N. M., VOL. XXXIX, P. 248.)
FIG. 2. *Neobythites sivicola* (JORDAN & SNYDER). (FROM PROC. U. S. N. M., VOL. XXIII, PL. 37.)

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