

## A REVIEW OF THE SERRANIDÆ OR SEA BASS OF JAPAN.

By DAVID STARR JORDAN and ROBERT EARL RICHARDSON,  
*Of Stanford University, California.*

In this paper is given an account of the species of Serranidæ, the sea bass and related forms, found in the waters of Japan.

The material examined was obtained in Japan by Messrs. Jordan and Snyder in 1900, and belongs to Stanford University and to the U. S. National Museum. The drawings, with one exception, were made by Mr. William S. Atkinson.

### Family SERRANIDÆ.

#### THE SEA BASS.

Body oblong, more or less compressed, covered with adherent scales of moderate or small size, which are usually ctenoid; dorsal and ventral outlines not perfectly corresponding. Mouth moderate or large, not very oblique, the premaxillary protractile and the broad maxillary usually not slipping for its whole length into a sheath formed by the preorbital, which is usually narrow. Supplemental maxillary present or absent. Teeth all conical or pointed, in bands, present on jaws, vomer, and palatines. Gill rakers long or short, usually stiff, armed with teeth. Gills 4, a long slit behind the fourth. Pseudobranchiæ present, large. Lower pharyngeals rather narrow, with pointed teeth, separate (united in *Centrogenys*). Gill membranes separate, free from the isthmus. Branchiostegals normally 7 (occasionally 6). Cheeks and opercles always scaly; preopercle with its margin more less serrate, rarely entire; the opercles usually ending in one or two flat spine-like points. Nostrils double. Lateral line single, not extending on the caudal fin. Skull without cranial spines and usually without well-developed cavernous structure. No suborbital stay. Post-temporal normal. Second suborbital with an internal lamina supporting the globe of the eye; entopterygoid present; all or most of the ribs inserted on the transverse processes when these are developed; anterior vertebræ without transverse processes. Dorsal spines usually stiff, 2 to 15 in number; soft dorsal with 10 to 30 rays; anal fin rather short, its soft rays 7 to 12, its spines, if present, always 3, in certain genera (*Grammistinæ*, *Rypticinæ*) altogether

wanting. Ventrals thoracic, usually I, 5 (I, 4, in *Pharopteryginæ*), normally developed, without distinct axillary scale. Pectorals well developed, with narrow base. Caudal peduncle stout, the fin variously formed. Vertebrae typically 10+14=24, the number sometimes increased, never more than 35. Air bladder present, usually small, and adherent to the wall of the abdomen. Stomach caecal, with few or many pyloric appendages; intestines short. Carnivorous fishes, chiefly marine, and found in all warm seas; several found in fresh waters.

## ANALYTICAL KEY OF JAPANESE GENERA OF SERRANIDÆ.

*a*<sup>1</sup>. Anal spines 3; well developed.

*b*<sup>1</sup>. Dorsal fins 2, slightly connected at base; dorsal spines 9, 11, or 12 in number, never 10.

*c*<sup>1</sup>. MALAKICHTHYINÆ. First dorsal with 9 spines; scales large, about 45; chin with a bifid tip; maxillary with a supplemental bone.....*Malakichthys*, 1.

*c*<sup>2</sup>. DIPLOPRIONINÆ. First dorsal with 8 spines; scales small; body deep; opercle subentire; maxillary with a large supplemental bone; caudal rounded; no canines; tongue smooth.....*Diploprion*, 2.

*c*<sup>3</sup>. MORONINÆ. First dorsal with 11 or 12 spines; teeth villiform, on jaws, vomer and palatines; scales moderate or rather small; preopercle serrate; ventrals inserted before pectorals.

*d*<sup>1</sup>. Tongue toothless; vertebrae 30 to 35.

*e*<sup>1</sup>. Preopercle without spine; maxillary with supplemental bone; body elongate; scales moderate.....*Latolabrax*, 3.

*e*<sup>2</sup>. Preopercle with a strong spine at the angle; maxillary without supplemental bone; scales very small.....*Nippon*, 4.

*b*<sup>2</sup>. Dorsal fin single, occasionally deeply divided, sometimes to the base.

*f*<sup>1</sup>. Lateral line single, complete; ventral rays I, 5.

*g*<sup>1</sup>. Maxillary with a distinct supplemental bone.

*h*<sup>1</sup>. Inner teeth of jaws not depressible and hinged.

*i*<sup>1</sup>. Dorsal spines normally 11 or 12; dorsal deeply notched; no distinct canines; tongue toothless.

*j*<sup>1</sup>. SINIPERCINÆ. Scales cycloid; dorsal spines 12.

*k*<sup>1</sup>. Scales large, about 45 in lateral line.....*Bryttosus*, 5.

*j*<sup>2</sup>. POLYPRIONINÆ. Scales small, rough, nearly 100 in lateral line; soft dorsal shorter than spinous part, of 10 to 12 rays.

*l*<sup>1</sup>. Head not armed with spinigerous ridges; preopercle moderately serrate, sometimes becoming entire with age; dorsal fin deeply notched, the last spines much shorter than the middle ones; scales rugose; soft dorsal scaly; forehead broad, flattish; snout, preorbital and jaws naked; caudal subtruncate; preopercle finely serrate, becoming entire with age; gill rakers very strong; pyloric caeca few (about 7); pectoral obtusely pointed; ventral inserted a little before axil of pectoral; vertebrae 26,

*Stercolepis*, 6.

*i*<sup>2</sup>. LIOPROPOMINÆ. Dorsal spines less than 10, the spinous part shorter than the soft part, which has 12 rays; preopercle weakly serrate or entire.

*m*<sup>1</sup>. Head rough above; dorsal spines 9; vertebrae 24,

*Aulacocephalus*, 7.

*m*<sup>2</sup>. Head smooth above; dorsal spines 8.....*Pikea*, 8.

- h*<sup>2</sup>. EPINEPHELINÆ. Inner teeth of jaws depressible or hinged; canine teeth more or less distinct, in front of each jaw; scales small, firm, the top of head more or less scaly; lateral line running low (except in *Gonioplectrus*, etc.); supraoccipital crest usually more or less encroaching on the top of the skull, so as to leave no distinct smooth area at the vertex (except in *Variola*); temporal crests usually distinct; gill rakers various. Dorsal rays VI to XIV, 12 to 20, the number of spines usually not 10; anal rays III, 7 to III, 12; ventral fins inserted more or less behind axil of pectorals; soft dorsal scaly; scales of lateral line usually triangular and cycloid; vertebræ almost always 10+14=24, rarely 26 or 27.
- n*<sup>1</sup>. Dorsal spines 6 to 8; preopercle with strong recurved teeth below; anal spines weak. . . . *Plectropomus*, 9.
- n*<sup>2</sup>. Dorsal spines 11 (rarely 10, never 9).
- o*<sup>1</sup>. Parietal crests not produced forward on the frontals; frontals with a process or knob on each side, behind interorbital area; premaxillary processes fitting into a cavity or emargination at the anterior extremity of the frontals; anal rays III, 8, or III, 9. Scales of the lateral line normal, marked by radiating ridges. Cranium narrow above the interorbital space, deeply concave in cross section; occipital crest meeting interorbital region; vertebræ 24. . . . . *Epinephelus*, 10.
- o*<sup>2</sup>. Parietal crests produced forward on the frontals. Frontals without processes on the upper surface; parietal crests extending to between orbits; premaxillary processes not extending to the frontals. Anal fin elongate, its rays III, 10 to III, 12; caudal fin lunate or truncate; spines slender, those of the anal fin graduated; lower jaw strongly projecting; cranium rather broad, transversely concave between the eyes, its lateral crests very strong, nearly parallel with the supraoccipital crest and extending farther forward than the latter, joining the supraocular crest above the eye; scales small, largely cycloid, those of the lateral line simple; pyloric cæca few (12 to 20); dorsal rays XI, 16 to 18.
- p*<sup>1</sup>. Nostrils close together, the posterior scarcely enlarged. . . . . *Trisotropis*, 11.
- g*<sup>2</sup>. Maxillary without supplemental bone; canine teeth, if present, usually developed on the side of the lower jaw as well as in front; depressible teeth few or none; scales mostly ctenoid, including those of the lateral line; tubes of lateral line straight or with an ascending tubule, covering most of the length of scale. Temporal crests on cranium almost obsolete.
- q*<sup>1</sup>. SERRANINÆ. Gill rakers comparatively short and wide apart; lateral line not running very close to the back; dorsal rays X, 11 to 15; anal rays usually III, 7; supraoccipital crest not extending far forward on top of the

skull, a more or less distinct convex smooth area being left on the vertex between the supraoccipital and the interorbital area; no angle in lateral line, vertebræ 24.

*r*<sup>1</sup>. Ventral fins anterior, inserted more or less in advance of axil of pectoral, well separated; preopercle evenly serrate.

*s*<sup>1</sup>. Dorsal fin continuous; a few hinged teeth in upper jaw; caudal lunate, the upper rays produced; snout and jaws naked,

*Chelidoperca*, 12.

*s*<sup>2</sup>. Dorsal fin notched to base; teeth all small, none hinged; caudal rounded; snout and jaws scaled.....*Sayonara*, 13.

*q*<sup>2</sup>. ANTHINÆ. Gill rakers usually very long, slender, and close set; lateral line running close to the back, often angulated; supraoccipital crest high; occiput with a short, convex, smooth area; canines present; no depressible teeth; preorbital narrow; vertebræ usually 26.

*t*<sup>1</sup>. Dorsal spines 10; maxillary scaly.

*u*<sup>1</sup>. Pectoral rays mostly branched; jaws with small canines.

*v*<sup>1</sup>. Entopterygoids with teeth; teeth on the tongue; dorsal rays X, 20; scales small; caudal truncate; pectoral long, unsymmetrical; ventrals inserted below them,

*Caprodon*, 14.

*v*<sup>2</sup>. Entopterygoids toothless; few if any teeth on tongue; scales large; dorsal rays less than X, 20.

*w*<sup>1</sup>. Caudal fin lunate, its outer rays produced; ventral fins inserted below pectorals.

*x*<sup>1</sup>. Lateral line with a distinct angle below last rays of soft dorsal; ventral fins long; preopercle strongly serrate. *Anthias*, 15.

*x*<sup>2</sup>. Lateral line without angle below last rays of soft dorsal; ventral fins not produced,

*Pseudanthias*, 16.

*u*<sup>2</sup>. Pectoral rays all simple; canines strong; body elongate; tongue smooth; scales large; caudal lunate .....*Tosana*, 17.

## 1. Genus MALAKICHTHYS Döderlein.

*Malakichthys* DÖDERLEIN, in Steindachner and Döderlein, Denkschr. Akad. Wien, vol. 47, 1883, p. 240 (*griseus*).

*Satsuma* SMITH and POPE, Proc. U. S. Nat. Mus., vol. 31, 1906, p. 472 (*macrops*).

Form oblong, compressed, head pointed; mouth and eye large; a supplemental maxillary present; villiform teeth in bands, in jaws, and on vomer and palatines; tongue smooth; no canines; a double forward-pointing tooth-like projection at symphysis of lower jaw; preopercle thin toward margin, with evident, but rather weak, serratures both above and below the angle; opercle with 2 thin, flat, short spines; gill membranes free; gill rakers long and slender; branchiostegals 7; scales moderate, finely ctenoid, thin, and easily deciduous; opercles, cheeks, and upper portion of head scaly; snout and jaws naked; lateral line complete, high, and about parallel with back; tube occupying middle third of scale; two dorsals, connected at the base, anterior with 9 rather slender spines; anal III, 7. Caudal emarginate; ventrals close together, slightly behind base of pectorals, the spine long; pectorals long and pointed, the upper rays longest.

Known at present only from the shore waters of Japan; one species.

The affinities of this genus are not certainly known. It has a superficial resemblance to *Amia* and to *Ambassis*, but the armature of the opercle is that of the Serranidæ. The genus *Satsuma* was based on a young example of the type of *Malakichthys*.

(μαλακός, soft; ἰχθύς, fish).

## 1. MALAKICHTHYS GRISEUS Döderlein.

*Malakichthys griseus* DÖDERLEIN, in Steindachner and Döderlein, Denkschr. Akad. Wien, vol. 47, 1883, p. 240; fig. 1, in vol. 48, pl. 2, fig. 1. ("Tokyo," probably Sagami Bay).—JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 353 (Tokyo).—ISHIKAWA, Prel. Cat., 1897, p. 57 (Kagoshima; Miyakoshima).

*Satsuma macrops* SMITH and POPE, Proc. U. S. Nat. Mus., vol. 31, 1906, p. 472, fig. 5 (Kagoshima).

Head 2.60 in length; depth 2.65; depth caudal peduncle 3.5 in head; eye 2.6 in head; snout 4; interorbital space 4.3; maxillary 2.1; width of its extremity 2.5 in eye; dorsal IX—I, 10; anal III, 7; scales 4–41–10 or 11; pores 46, the last 6 borne by scales extending on caudal rays. Form oblong, compressed; back moderately elevated, the dorsal and ventral outlines nearly symmetrical; head pointed; the profile slightly angled behind eye; mouth large, very oblique; maxillary short of a vertical from anterior edge of pupil; lower jaw projecting, the symphysis with two closely set, forward-pointing, tooth-like processes. Jaws, vomer, and palatines with bands of villiform teeth; tongue toothless; nostrils subequal; preoperculum rounded, thin toward margin, with rather weak serratures both

above and below the angle; operculum with 2 thin, flat, short spines; gill rakers long and slender, 23 or 24 on lower limb of outer arch, the longest exceeding in length the corresponding filaments. Scales moderate, finely ctenoid, thin, and easily deciduous; entire head scaled, except mandibles and snout. Spinous dorsal inserted almost directly over base of ventrals; dorsal spines slender, sharp, the fourth longest, its length little more than diameter of eye; soft dorsal lower than spinous; caudal deeply emarginate, the middle rays about three-fifths length of outer; first anal spine extremely short, seven or eight times in length of second, which is about seven-eighths of third; ventrals inserted a trace behind pectorals, falling short of vent, 2 in head, the spine long and slender; pectoral long and pointed, about 1.3 in head, reaching past vent, but not to base of anal.

Color in spirits silvery, olivaceous above; in 1 specimen are to be seen on the sides traces of 2 or 3 longitudinal crimson stripes; a

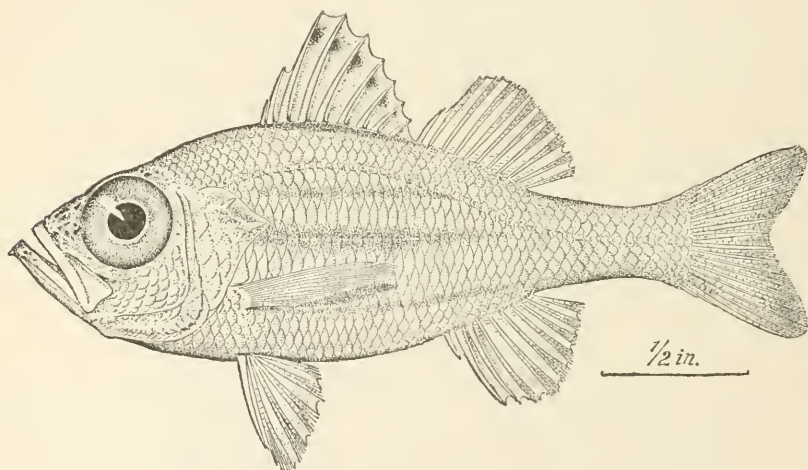


FIG. 1.—MALAKICHTHYS GRISEUS, TYPE OF SATSUMA MACROPS.

small black blotch near margin of each membrane of spinous dorsal back of third spine.

The above description is taken from 5 specimens 6 to 8 inches (to tip of caudal), from different localities on Sagami Bay; Yodomi, Misaki, and Odawara. It lives in rather deep water. It is recorded by Smith and Pope from Kagoshima, in the province of Satsuma.

In spite of certain discrepancies between the descriptions of Smith and Pope and Döderlein in the matter of number of scales, length of dorsal spines, length of pectoral, depth of notch between dorsals, and in the account of the coloration, we do not feel justified in regarding the species *macrops* and *griseus* as distinct. Our specimens show considerable variation both in the length of the pectoral and in the depth of the cleft between the dorsals. In all but a single

specimen all traces of the crimson side stripes have disappeared, and in 1 specimen traces of the blotches in the dorsal membranes are all but obliterated. Thus is probably to be explained Doctor Döderlein's failure to figure any color pattern. As compared with our specimens, the length of the pectorals in the figure of *Malakichthys griseus* Döderlein are about as much too long as those of *Satsuma macrops* Smith and Pope are too short.

(*griseus*, gray.)

## 2. Genus DIPLOPRION Kuhl and Van Hasselt.

*Diploprion* KUHL and VAN HASSELT, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 2, 1828, p. 137 (*bifasciatum*).

Body short and deep, much compressed, back elevated; mouth large, protractile; maxillary with a large supplemental bone; jaws, vomer, and palatines with bands of villiform teeth, no canines; tongue smooth; upper limb of preopercle without conspicuous serratures; angle obtuse; lower limb with 8 or 10 strong teeth; operculum with 3 strong spines; gill rakers moderate, with knob-like tips; scales very small, ctenoid; lateral line complete; cheeks and opercles scaly; rest of head, jaws, and chin bare; parts of operculum, preoperculum, infraorbital, and suborbital regions rugose; 2 dorsals, connected at the base, anterior with 8 strong spines; anal III, 13; caudal rounded; ventrals below base of pectorals, close together, with a short but strong spine; pectorals rounded.

East Indies, China and Japan; probably but one species. The affinities of this genus are rather obscure, but it is doubtless a member of the family of Serranidae.

(διπλόος, double; πρίων, saw.)

## 2. DIPLOPRION BIFASCIATUS Kuhl and Van Hasselt.

### OKIMADO (off-shore window-shutter).

*Diploprion bifasciatum* KUHL and VAN HASSELT, in Cuvier and Valenciennes, Hist. Nat. Poiss., vol. 2, 1828, p. 137, pl. 21 (Java).—TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 2, pl. 2 (Nagasaki).—RICHARDSON, Ichthyol. Chin., 1846, p. 221 (Canton, insect boxes).—BLEEKER, Nieuwe Nalez. Japan., 1857, p. 59 (Nagasaki; Simabara Bay).—NYSTRÖM, Svensk. Vet. Akad. Handl., vol. 13, pt. 4, No. 4, 1887, p. 8 (Nagasaki).—ISHIKAWA, Prel. Cat., 1897, p. 56 (Kagoshima).—STEINDACHNER and DÖDERLEIN, Denkschr. Akad. Wien, vol. 47, 1883, p. 234 (Kagoshima).—JORDAN and SEALE, Proc. U. S. Nat. Mus., vol. 29, 1905, p. 521 (Hongkong); Proc. Davenport Acad. Sci., vol. 10, 1905, p. 9 (Hongkong).

Head 3; depth 2.2; depth caudal peduncle 2.2 in head; eye in head 4.3 to 4.4; dorsal VIII, 15; anal III, 13; scales 110 to 115; nose 2.7 to 2.9 in head; maxillary 1.6, equal to pectoral, width of its extremity about equal to diameter of eye; interorbital space arched, equal to eye. Back elevated, its highest point at front of

spinous dorsal; profile steep, slightly angled over eye; mouth large, oblique; lower jaw scarcely projecting. Jaws, vomer, and palatines with bands of villiform teeth; tongue without teeth; posterior nostril enlarged; angle of preoperculum obtuse, its upper limb without conspicuous serratures, lower with about 8 strong teeth; opercular spines moderate, the middle one strongest; middle and upper spines often bluntish or bi- or tri-furcate; gill rakers 21, 2 or 3 rudiments, with knob-like tips. Cheeks scaled; opercles with a few scales posteriorly; much of operculum, preoperculum, infraorbital, and supra-orbital regions bare and rugose. Second dorsal spine longest, 1.6 in head; longest soft ray 1.75; caudal rounded; pectoral broadly

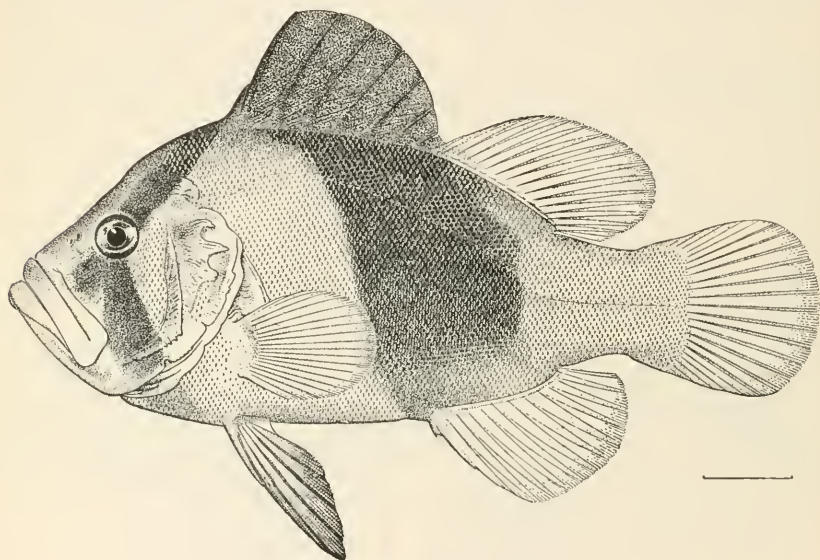


FIG. 2.—DIPLOPRION BIFASCIATUS.

rounded, 1.6 in head; ventrals long, reaching past vent, 1 to 1.2 in head.

Color in spirits yellow, with two broad cross-bands of blackish brown; first cross-band as wide as eye, passing across nape in front of dorsal, through eye, and to lower border of preopercle; second about four times width of eye, originating between sixth dorsal spine and fifth soft ray and passing obliquely downward, striking the ventral line between tips of reflexed pectorals and middle of anal; spinous dorsal blackish, paler forward; ventrals dusky, blackish toward tips; other fins plain yellow.

Here described from specimens as follows: Hakata 1,  $8\frac{1}{2}$  inches; Wakanoura 2, 7 to  $8\frac{1}{2}$  inches; Nagasaki 2, 6 inches.

This species is occasionally taken on the shores of Kiusiu and Shikoku in southern Japan and southward to China and India. Doctor Döderlein got numbers in Kagoshima.



Specimens from Hongkong have the back slightly less elevated and the depth less and the opercular spines on the average a little longer and more slender. Probably all belong to one species.

(*bis*, two; *fascia*, band.)

### 3. Genus LATEOLABRAX Bleeker.

*Lateolabrax* BLEEKER, Nieuwe Nalez., Japan, 1857, p. 53 (*japonicus*).—BOULENGER, Cat. Fishes, vol. 1, 1895, p. 122.

*Percalabrax* GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 70 (*japonicus*). (After *Percalabrax* <sup>a</sup> of Temminck and Schlegel.)

Body compressed, elongate; mouth large, protractile; maxillary with supplemental bone; villiform teeth in jaws and on vomer and palatines; tongue smooth; no canines; preopercle serrated behind, its lower border with a few strong antrorse spines; opercle with a single spine; gill rakers long and slender; seven branchiostegals; scales small, ctenoid; head, except jaws and chin, scaled; lateral line complete, the tube straight, extending nearly the length of the scale; two dorsals, connected at the base, anterior with 11 or 12 strong spines; anal III, 8 or 9; caudal emarginate; ventrals behind base of pectorals, close together, with a strong spine; pectorals obtusely pointed. "Posterior processes of premaxillaries not extending to frontals; parietal and supraoccipital bones not extending to between post-frontal processes; supraoccipital and parietal crests strong, not produced on the frontal; vertebræ 35 (17+18)." (Boulenger.)

Coasts of China and Japan; one species. The genus is allied to the bass (*Dicentrarchus*) of Europe, and to the American genera *Morone* and *Roccus*.

#### 3. LATEOLABRAX JAPONICUS (Cuvier and Valenciennes).

##### SUZUKI.

*Labrax japonicus* CUVIER and VALENCIENNES, Hist. Nat. Poiss., vol. 2, 1828, p. 85 (Sea of Japan).—BLEEKER, Verh. Batav. Gen., vol. 25, 1853, p. 23 (Japan).—RICHARDSON, Ichthyol. Chin., 1846, p. 222 (Hongkong; Canton).

*Perca-labrax japonicus* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 2, pl. 2, fig. 1 (Nagasaki).

*Percalabrax japonicus* GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 71 (China; Japan).—STEINDACHNER and DÖDERLEIN, Beitr. Kennt. Fische Japan, vol. 1, 1883, p. 20, pl. 4, fig. 3 (Tokyo).—NYSTRÖM, Svensk. Vet. Akad. Handl., vol. 13,

<sup>a</sup> We follow Gill and Boulenger in retaining for this genus the name *Lateolabrax* instead of the earlier term, *Perca-labrax*, used by Temminck and Schlegel. It is evident that the Fauna Japonica used the name *Perca-labrax japonicus* as the equivalent of *Perca* (*Labrax*) *Japonicus* suggested by Cuvier and Valenciennes. Temminck and Schlegel use the French name "Bars" as the equivalent of *Perca-labrax*. The "Bars" comprise Cuvier's subgenus *Labrax*, or, as suggested in a footnote, his *Perca* (*Labrax*). Evidently in the Fauna Japonica the hyphen replaces the bracket. As the type of the "Bars" is the European, *Perca labrax*, the name *Perca-labrax* has the same type. If regarded as tenable, *Perca-labrax* might replace *Dicentrarchus* for the species now called *Dicentrarchus labrax*.

pt. 4, No. 4, 1887, p. 5 (Nagasaki).—NAMIYE, Class. Cat., 1881, p. 92 (Tokyo).—ISHIKAWA, Prel. Cat., 1897, p. 57 (Hokkaido).

*Lateolabrax japonicus* BLEEKER, Nieuwe Nalez., Japan, 1857, p. 53 (Japan).—BOULENGER, Cat. Fishes, vol. 1, 1895, p. 123 (China; Japan; Formosa, etc).—JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 353 (Tokyo).—JORDAN and SEALE, Proc. U. S. Nat. Mus., vol. 29, 1905, p. 521 (Shanghai).—JORDAN and STARKS, Proc. U. S. Nat. Mus., vol. 31, 1906, p. 517 (Port Arthur).

Head 3.3; depth 4 to 4.4; depth caudal peduncle 3.3 in head; eye 5.2 to 5.4; nose 3.75; dorsal XII—I or II, 12; anal III, 8; scales 14 to 17—103 to 106—24 to 26; pores 97; maxillary extending nearly to back of eye, 2.2 in head; width of its extremity about three-fifths of eye; interorbital space little elevated, flattish, 1.1 times eye. Form slender, moderately compressed, greatest thickness of body one-half depth; back little elevated, highest under third dorsal spine; profile straight from occiput; muzzle sharp; lower jaw projecting for a distance equal to width of pupil. Jaws, vomer, and palatines with bands of villiform teeth; tongue toothless; nostrils subequal; preoperculum with a salient angle; above the angle 2 or 3 strong points, directed backward and downward; below it 2 or 3 antrorse teeth; operculum ending in a moderate, flattish spine, above which is a second short bluntish point; gill rakers 14 to 16+2 or 3 rudiments. Top of head, cheeks, opercles, and suborbitals scaled; maxillary and lower jaw smooth. Origin of spinous dorsal midway between pectorals and ventrals; longest dorsal spine the fifth, 2 in head; longest soft ray 2.6 in head; caudal emarginate, its corners rounded; pectoral 2 in head; ventral 1.8.

Color in spirits silvery, olive to purplish on upper parts; an interrupted black line or row of spots along each side of base of spinous dorsal; an irregular row of small black spots midway between dorsal and lateral line, and a third irregular row extending along or slightly above lateral line; these spots are faint or absent in many specimens; membranes of spinous dorsal edged with dusky and with two to four longitudinal rows of irregular dark blotches; soft dorsal similarly marked, but with the blotches less diffuse.

Specimens from Port Arthur have the spots on sides larger and plainer than in Japanese specimens.

Here described from specimens as follows: Yokohama, 1 specimen, 12 inches; Tokyo, 14, 3 to 10 inches; same, 2, 8 to 9 inches; Wakanoura, 3, 4 to 11 inches; Kurume, 49, 3 to 6 inches; Chikugo River, Kurume, 1, 11 inches; Matsushima, 3, 6 to 8 inches; Kagoshima, 1, 8 inches. It was also seen at Nagasaki, Hiroshima, Onomichi, Tsuruga, Hakata, and Kobe. It is common along the whole coast of Japan, being one of the most highly valued food fish, like its ally, the striped bass of America. It is known everywhere as Suzuki. The young enter the streams.

## 4. Genus NIPHON Cuvier and Valenciennes.

*Nippon* CUVIER and VALENCIENNES, Hist. Nat. Poiss., vol. 2, 1828, p. 131 (*spinus*).

Body elongate, compressed; mouth large, protractile; maxillary without supplemental bone; villiform teeth in jaws and on vomer and palatines; tongue smooth; no canines; preopercle serrated behind, with a very strong backward pointing spine at the angle; a few short spines on lower border; opercle with three strong spines; gill rakers long and slender; seven branchiostegals; scales very small, ctenoid; head scaly; maxillary bare, except for a narrow median patch of scales; lateral line complete, the tube straight, extending the length of the scale; two dorsals, connected at the base, anterior with 11 strong spines; anal III, 7; caudal emarginate; ventral below base of pectorals, close together, with a strong spine; pectorals rounded, the upper rays longest. "Posterior processes of premaxillaries not extending to frontals, parietal and supraoccipital bones not extending to between postfrontal processes; no parietal crests; supraoccipital crest feeble, not extending to anterior extremity of the bone; vertebræ 31 (14 + 17)." (Boulenger.)

Coasts of Japan to Philippines; one species. Size large.

(*Nip-hon* or *Nippón*, the name of the Eastern Kingdom, corrupted by early travelers into Japon or Japan.)

## 4. NIPHON SPINOSUS Cuvier and Valenciennes.

ARA (bass), ARA-ARA (rough or violent).

*Nippon spinosus* CUVIER and VALENCIENNES, Hist. Nat. Poiss., vol. 2, 1828, p. 131, pl. 19 (Sea of Japan).—TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 1, pl. 1 (Nagasaki).—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 80 (Japan).—STEINDACHNER and DÖDERLEIN, Denkschr. Akad. Wien., vol. 47, 1883, p. 228 (Tokyo).—BOULENGER, Cat. Fishes, vol. 1, 1895, p. 124 (Yokohama).—NYSTRÖM, Svensk. Vet. Akad. Handl., vol. 13, pt. 4, No. 4, 1887, p. 5 (Nagasaki).—RICHARDSON, Ichthyol. Chin., 1846, p. 222 (Japan).—NAMIYE, Class. Cat., 1881, p. 92 (Tokyo).—ISHIKAWA, Prel. Cat., 1897, p. 57 (Tokyo; Hizen; Boshu).—JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 353 (Tokyo); p. 750 (Yokohama).—SMITH and POPE, Proc. U. S. Nat. Mus., vol. 31, 1906, p. 468 (Kochi).

Head 2.8; depth 3.5; depth caudal peduncle 4.1 in head; eye 6.4; dorsal XII—I, 10; anal III, 7; scales 24–163–56; nose 2.75 in head; maxillary 2.25, nearly to middle of eye, width of its extremity five-sixths of eye; interorbital space 4.4 in head, nearly flat, with two slightly raised central ridges. Back moderately elevated, highest under third dorsal spine; profile straight; muzzle long, sharp, lower jaw strongly projecting. Villiform teeth in jaws and on vomer and palatines; nostrils unequal, the posterior much larger, elongated; a single strong sharp backwardly directed spine at the angle of the pre-

operculum, and a number of short points along the margin above it; lower face with 3 strong backwardly directed spines; middle spine of operculum much the longest, longer than the preopercular spine; gill rakers 16. Cheeks, opercles, suborbitals, and occiput scaled. Longest dorsal spine 3.5 in head; longest soft ray 3.4; caudal emarginate; pectoral 2.4 in head; ventral 2.5.

Color in spirits light yellowish brown, paler below; fins dusky toward tips; caudal with a narrow pale edge on lower and upper lobes, the edge broadest on lower lobe. The young have also a longitudinal dark stripe on body, extending forward through eye, and a black blotch on soft dorsal.

Here described from a large specimen, about 28 inches, from Misaki. We have also a young specimen in good color from the Philippines. The species is not common in Japan, but is valued as food. It reaches a large size, and is known as *ara*.

(*spinusus*, spiny.)

### 3. Genus BRYTTOSUS Jordan and Snyder.

*Bryttosus* JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 354 (*kawamebari*).

Body oblong, compressed; mouth large, protractile; maxillary with a large supplemental bone; jaws, vomer, and palatines with bands of villiform teeth; no true canines; tongue smooth; preopercle serrated; opercle with two flat spines; gill rakers long and slender; branchiostegals 7; scales moderate, thin, flexible, cycloid, not easily deciduous; cheeks and opercles scaled; rest of head naked; lateral line continuous, the tubes straight; dorsal fins confluent, the anterior with 12 spines, its base longer than that of second; anal rays III, 9; caudal rounded; ventrals scarcely behind pectorals, close together, each with a short strong spine; pectorals rounded.

Fresh waters of Japan; one species. This genus in its external characters bears a very close resemblance to the American sunfishes or Centrarchidæ, notably to the genus *Chænobryttus*. This resemblance is heightened by the presence of a small black flap or tip to the opercle, as in *Lepomis* and related genera. The skeleton has not been compared with that of *Lepomis* or *Chænobryttus*, but it would not be strange if *Bryttosus* should prove allied to the ancestral Serranidæ from which the Centrarchidæ are developed. Related to *Bryttosus* are *Siniperca* and *Coreoperca*, fishes of the rivers of China and Korea, not found in Japan. From *Siniperca*, *Bryttosus* differs in its large scales.

(*Βρύττος*, *Bryttus*, a name given by Cuvier and Valenciennes to *Apomotis*, an American sunfish.)

5. *BRYTTOSUS KAWAMEBARI* (Temminck and Schlegel).

**MIDZUKURI** (water chestnut burr); **KAWAMEBARU** (river big-eye); **YOTSUME** (four eyes); a  
**OYANIRAMI** (parent scorer).<sup>b</sup>

*Serranus kawamebari* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 5 (Japan).—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 107 (after Temminck and Schlegel).

*Siniperca? kawamebari* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 138 (notes on type-specimen in Leyden Museum furnished by Doctor Reuvens).

*Bryttosus kawamebari* JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 354, pl. 12 (Yamagawa, above Bay of Shimabara).

Head 2.5; depth 2.45; depth caudal peduncle 2.5 in head; eye 3.8 to 4.5; dorsal XII, 12; anal III, 9; scales 10–44 to 46–18; nose 3.4 to 3.7; maxillary past eye in largest specimens, slightly short of back of eye in smaller, 1.9 to 2.2 in head; width of extremity of maxillary nearly equal to eye; interorbital space little elevated, slightly convex, equal to eye. Body short, robust, moderately compressed; back moderately elevated, highest under front of spinous dorsal; profile nearly straight; muzzle pointed; lower jaw slightly shorter than upper; villiform teeth in bands in jaws and on vomer and palatines; some of the anterior teeth in both jaws slightly enlarged; no true canines; posterior nostril slightly smaller; preopercle without marked angle, broadly rounded, the upper limb rather finely serrate, lower margin sinuous; opercle with 2 flat spines, the lower longest; the flap emarginate behind; gill rakers short, about half length of corresponding filaments, 7 besides 3 rudiments on lower limb of outer arch; scales moderate, cycloid; opercles and cheeks scaled, rest of head without scales; lateral line complete, the tubes straight. Dorsal origin halfway between gill opening and base of pectoral; longest dorsal spine (fifth) 3 to 3.5 in head; longest soft ray 2.2; caudal broadly rounded; first anal spine less than half of second, second and third more than half longest soft rays; pectorals rounded, 1.9 to 2.1 in head; ventrals rounded, short of vent, 1.75 to 1.9 in head.

Color in spirits dark bluish brown, with traces (plain in very young) of 5 or 6 dusky cross-bands on posterior two-thirds of body and caudal peduncle. Cheeks crossed by 3 wavy lines of dusky radiating from eye; a conspicuous round black blotch on margin of opercular flap between the spines; spinous dorsal, anal, and ventrals dusky; soft dorsal, caudal, and anal paler, with light spots in rows or in mottling; pectorals pale; edges of branchiostegals dusky.

Here described from 11 specimens, 1½ to 4½ inches long, from the following localities: Yama River (Yamagawa) near Funayado, 10;

<sup>a</sup> Referring to the black opercular spot.

<sup>b</sup> From *oya*, parents and *nirami*, to stare offensively. This four-eyed fish is supposed to be guilty of this provoking offense intolerable in Japanese customs.

Yabe River at Funayado on the island of Kiusiu, 1. The species is abundant in clear streams and mountain springs of the Southern Island. It reaches but a small size.

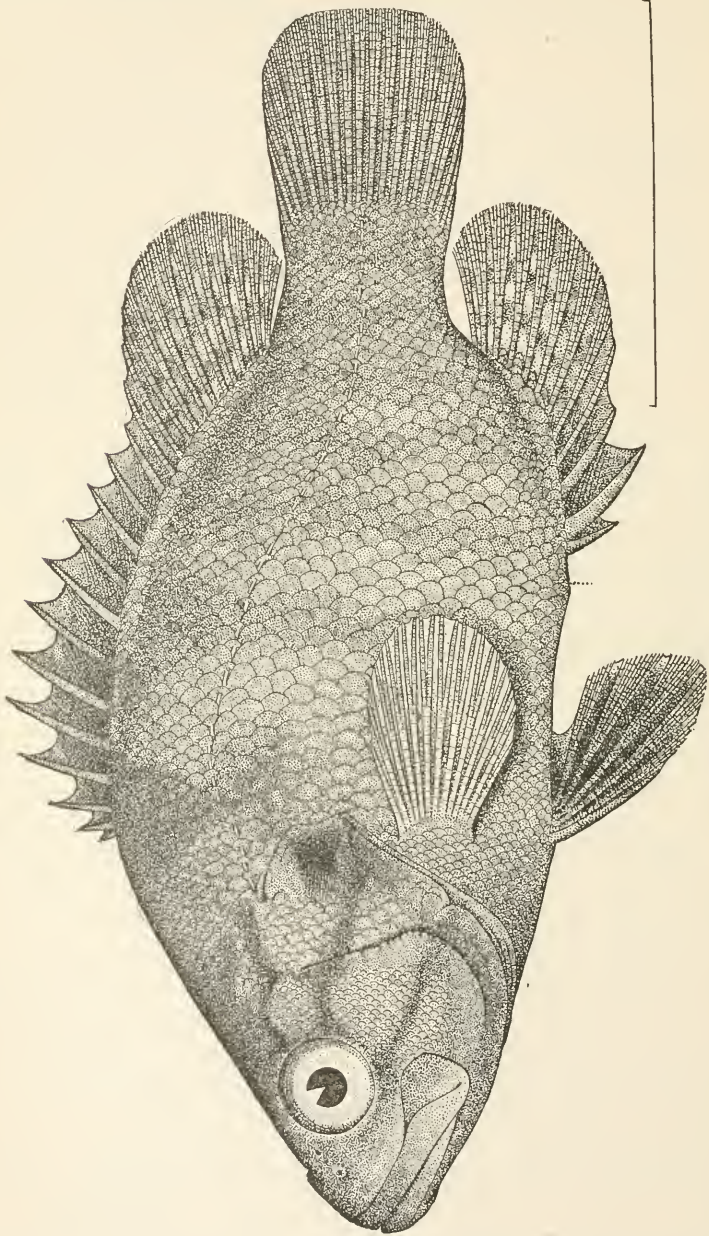


FIG. 3.—BRYTTOSUS KAWAMEBARI.

(*kawa*, river; *mebaru*, pop-eye—a name applied to the green species of *Sebastodes*.)

## 6. Genus STEREOLEPIS Ayres.

*Stereolepis* AYRES, Proc. Cal. Acad., vol. 2, 1859, p. 28 (*gigas*).

*Megaperca* HILGENDORF, Sitzb. Ges. Nat. Freund. Berlin, 1878, p. 155 (*ischinagi*).

Body robust, moderately compressed; mouth rather large, protractile; maxillary with supplemental bone; jaws, vomer, and palatines with bands of villiform teeth; no canines; tongue smooth; preopercle serrated, some antrorse spines on its lower border in young (up to 14 inches; absent in full-grown specimens); opercle with 2 flat spines; gill rakers stoutish, of moderate length; branchiostegals 7; scales small, ctenoid on posterior portion of body; cheeks and opercles scaled; lateral line complete; dorsal fins confluent, with a deep notch between spinous and soft dorsal; anterior dorsal with 11 or 12 spines, its base much longer than that of soft dorsal, which has no spine; anal III, 8; caudal truncate or slightly emarginate; ventrals a little in front of pectorals, close together, with a strong spine; pectorals obtusely pointed.

"Vertebrae 26 (12 + 14)."

Coasts of California and Japan; two species. Both reach an enormous size, being among the largest of the perch-like fish.

(στειρόεις, thick; λεπίζ, scale.)

## 6. STEREOLEPIS ISCHINAGI (Hilgendorf).

ISHINAGI (rock bass); OIWO (huge-fish).

*Megaperca ischinagi* HILGENDORF, Sitzb. Ges. nat. Freund. Berlin, 1878, p. 156 (Tokyo and Yokohama).—STEINDACHNER and DÖDERLEIN, Denkschr. Akad. Wien, vol. 27, 1883, p. 228, pl. 3, fig. 3 (young).—JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 354 (Tokyo).

*Stereolepis gigas* (part, not of Ayres) BOULENGER, Cat. Fishes, vol. 1, 1895, p. 153; Proc. Zool. Soc. London, 1897, p. 917, pl. 52, lower figure (from photograph of type of *Megaperca ischinagi*); Ann. and Mag. Nat. Hist., ser. 7, vol. 19, 1907, pp. 489, 491.

*Stereolepis ischinagi* JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 30, 1906, p. 841, fig. 1 (young) (Hakodate; Tokyo; Yokohama; Misaki).

Having had no additional materials, we here reproduce the description of a 14-inch specimen from Hakodate, by Jordan and Snyder:<sup>a</sup>

Head 2.90 in length to base of caudal; depth 2.6; depth of caudal peduncle 8.5; snout 3.4 in head; maxillary 2.25; eye 5; width of interorbital space 4; dorsal XII, 11; anal III, 7; scales 14-87-31. Interorbital space flat; lower jaw projecting; preorbital and suborbital with strong ridges, the suborbital ridges uniting to form a single crest, which extends upward behind the eye; lips thick; maxillary extending to a point below posterior edge of orbit, its upper edge covered anteriorly by the preorbital; supplemental maxillary distinct, its lower edge with a pronounced ridge. Teeth in broad villi-

<sup>a</sup> Proc. U. S. Nat. Mus., vol. 30, 1906, p. 841.

form bands on jaws, vomer, and palatines; tongue smooth; large pseudobranchiæ present; gill-rakers 3 + 8, large and strong; opercle with 2 spines, the upper short and broad, the lower longer and more pointed; preopercle strongly serrate; subopercle with a few serrations; edge of interopercle rough; throat, snout, and top of head naked; occipital and parietals with a few strong radiating ridges, which show through the naked skin; cheeks and opercles scaly; scales of head and body cycloid, growing slightly ctenoid posteriorly; each scale with a vertical tuberculate ridge, imparting a characteristic roughness to the covering of the body; fins with minute scales; lateral line following the contour of back; first dorsal spine very short, almost entirely concealed; the fifth ray longest, 1.8 in head; membrane of spinous dorsal deeply incised between spines, the attached portion of the membrane extending halfway up anterior edge of spine; longest

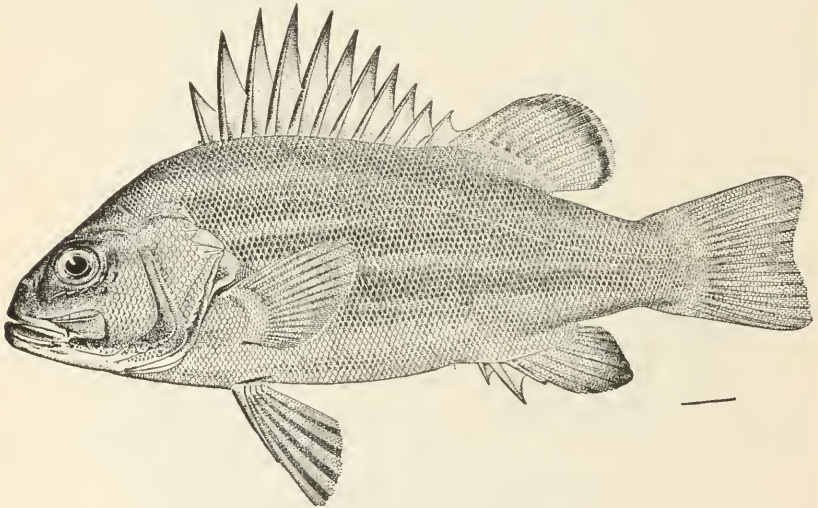


FIG. 4.—STEREOLEPIS ISCHINAGI (YOUNG, FROM MISAKI).

dorsal ray 2.8 in head; edge of fin rounded; origin of anal below base of third dorsal ray; the spines strong and prominent, the second 4.5 in head; margin of fin rather pointed in outline; pectoral unsymmetrical, its upper rays longest, 2.3 in head; ventral 1.6; caudal 6.5, lunate. Body olivaceous, with 6 broad, dusky lateral stripes, the first extending along base of dorsal; the second following lateral line to caudal peduncle, where it joins the third; the fourth passing from base of pectoral to caudal; the fifth and sixth rather indistinct, merging near base of anal; head dusky above; soft dorsal, anal, and pectorals strongly edged with dusky, the soft dorsal narrowly tipped with whitish. Adult nearly plain dark olive.

We have a specimen 14 inches long, and several smaller ones, from Hakodate. Jordan and Snyder saw specimens in 1900 at Hakodate,



Tokyo, Yokohama, and Misaki. Snyder obtained small specimens in 1906 at Otaru in Hokkaido. The species is common about rocks in middle and northern Japan, especially about Hakodate.

Doctor Boulenger is convinced of the identity of this species with the Californian species, *Stereolepis gigas* Ayres. We have not had a large Japanese specimen for comparison with adult specimens from the California coast. Doctor Hilgendorf's type of *Megaperca ischinagi* from Tokyo was over a meter in length, and the drawing from a photograph of it published by Doctor Boulenger<sup>a</sup> shows a fish with larger scales and higher dorsal spines than in *Stereolepis gigas*. We here reproduce a drawing published by Jordan and Snyder of a young specimen 14 inches long of the Japanese fish, *Stereolepis ischinagi*. For comparison with this we present a figure, rather crudely executed but substantially correct, of the American species *Stereolepis gigas*. This is based on a specimen, the only young one ever preserved,

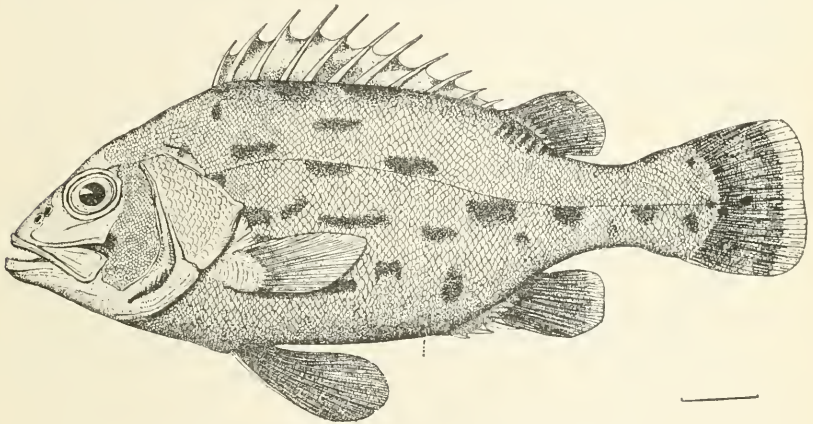


FIG. 5.—STEREOLEPIS GIGAS (YOUNG, FROM SANTA BARBARA).

about 10 inches long, of the American species. The specimen was taken off Santa Barbara in California in 1880, by Jordan and Gilbert. We adhere to the opinion originally expressed by Jordan and Snyder that the two species are distinct although very closely related. The Japanese species is separated by the larger scales, 80 to 90 instead of 100 to 115, and by the form of the dorsal fin, the spines in the first dorsal being much higher in specimens of the same size. In the Japanese species there are 12 dorsal spines, the first being minute. This spine seems to be wanting in *Stereolepis gigas*. The young of *Stereolepis ischinagi* is striped with dark. The young of *Stereolepis gigas* is marked by obscure oblong blotches.

(*ishinagi*, the local name, from *ishi*, rock.)

<sup>a</sup> Proc. Zool. Soc. London, 1897, p. 917, pl. 52, lower figure.

## 7. Genus AULACOCEPHALUS Temminck and Schlegel.

*Aulacocephalus* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 15.

Body oblong, compressed; mouth large, maxillary with supplemental bone; villiform teeth in jaws and on vomer and palatines; tongue smooth; preopercle serrate; opercle with 3 strong spines; gill-rakers long and slender; branchiostegals 7; scales very small, strongly ciliated, separated by naked skin. Cheeks and opercles scaled; top of head and sides of snout with strong bony rugosities showing through the thin skin; lateral line continuous, the tubes long and straight; dorsal fins confluent, the anterior with 9 spines, its base longer than that of second; anal III, 9; caudal subtruncate; ventrals below pectorals, close together, each with a short, strong spine; pectorals rounded. "Premaxillary processes not extending to frontals; parietals and supraoccipital short, latter with a feeble crest not extending on to cranium; vertebræ 24 (10+14)." (Boulenger.)

Japan to India. One species.

( $\alpha\delta\lambda\alpha\xi$  furrow;  $\kappa\epsilon\phi\alpha\lambda\eta$  head.)

## 7. AULACOCEPHALUS TEMMINCKI Bleeker.

KURIHATA (emerald flag or emerald bass).

*Aulacocephalus* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 15, pl. 5, fig. 2 (Nagasaki).

*Aulacocephalus temmincki* BLEEKER, Verh. Bat. Gen., vol. 26, 1857, p. 12 (Japan).—BOULENGER, Cat. Fishes, vol. 1, 1895, p. 158 (Siam; Mauritius).

*Aulacocephalus schlegeli* GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 173 (Isle de France).—STEINDACHNER and DÜDERLEIN, Denkschr. Akad. Wien, vol. 47, 1883, p. 233 (Tokyo).—NAMIYE, Class. Cat., 1881, p. 93 (Tokyo).—ISHIKAWA, Prel. Cat., 1897, p. 56 (Tokyo).

Head 2.6; depth 2.8; depth of caudal peduncle 2.7 in head; eye 5.5; dorsal IX, 12; anal III, 8; scales about 85 in a longitudinal series; pores 70; nose 2.8 in head; maxillary to middle of eye, 2 in head, the width of its extremity eight-tenths diameter of eye; interorbital space very little elevated, flattish, 1.3 in eye. Form oblong, compressed, greatest thickness of body about one-third its depth; back moderately elevated, the profile straight from nape to the rather low, bluntly pointed muzzle; jaws subequal. Jaws, vomer, and palatines with bands of villiform teeth, the outer anterior teeth of upper jaws rather more enlarged than corresponding ones of lower; no canines; tongue smooth; free at end, which is slender and pointed; nostrils small, subequal; preopercular angle obtuse, the margin serrate above and below the angle; opercle with three strong spines, the middle one longest, the others subequal; gill-rakers longer than the filaments, 17 or 18, on lower limb of outer arch. Cheeks and

opercles scaled; rest of head, including jaws and chin, without scales; top of head and suborbital region with strong bony rugosities, showing through the thin skin; lateral line continuous, high, and strongly curved under back of dorsal. Spinous dorsal low, the longest spine (3d or 4th) 2.8 in head; longest soft ray 2.5; caudal subtruncate, slightly rounded; anal spines short, the second and third spines less than half length of first ray; ventrals below pectorals, close together, short of vent, 1.8 to 2 in head; pectorals rounded, 2.2 in head.

Color in spirits purplish brown, somewhat paler below; a yellow mid-dorsal stripe, including lower half of spinous dorsal and base of soft dorsal, extending backward on top of caudal peduncle to its end, and forward, after bifurcating under front of spinous dorsal, on each side of head, through eye, to end of snout; tips of ventral spines and outer half of ventrals blackish; other fins dusky.

Here described from two specimens 6 and 7 inches long, the first from the sea off Okinose (presented by the Imperial University), the second from Misaki, both fishing towns being on Sagami Bay. This handsome fish is rare in Japan, being taken occasionally in the Kuro Shiwo from Tokyo southward.

(Named for C. J. Temminck, of Leyden, the colleague of Professor Schlegel.)

#### 8. Genus PIKEA Steindachner.

*Pikea* STEINDACHNER, Sitzb. Akad. Wien, vol. 71, 1874, p. 375 (*lunulata*).

*Labracopsis* DÖDERLEIN, in Steindachner and Döderlein, Denkschr. Akad. Wien, vol. 47, 1883, p. 235 (*japonicus*).

Body elongate, compressed; mouth large, protractile; maxillary with supplemental bone; jaws with broad bands of villiform teeth, some of the inner ones longer and depressible; vomer and palatines with villiform teeth; tongue smooth; preopercle ciliated or denticulated; opercle with three flat points; gill-rakers rather long (*japonica*); branchiostegals 7; scales rather small, ctenoid, striated; head entirely covered with cycloid scales; lateral line complete; dorsal fins confluent, with a broad shallow notch of variable depth; dorsal spines 8; spinous and soft dorsals subequal in length; anal III, 8; caudal emarginate; ventrals a little before base of pectorals, close together, each with a slender spine; pectorals pointed, the upper rays longest; base of dorsal, caudal, and anal scaly.

“Vertebrae 24 (10+14).”

Coasts of Japan, South Seas, and Hawaii; 3 species known. Size small.

The subgenus *Labracopsis* Döderlein (*japonicus*) differs slightly from *Pikea maculata*, *Pikea lunulata* (Mauritius) and *Pikea aurora* Jordan and Evermann (Hawaii) in the finer and more regular dentic-

ulation of the preopercle, and in the lesser depth of the notch between the dorsals. The genus *Liopropoma* Gill (*aberrans*) differs from *Pikea*, according to Poey, in having one more dorsal spine, the preopercular border smooth, and the opercle ending in a single spine.

(Named for Col. Nicholas Pike, United States consul at Mauritius, a naturalist who left many paintings of tropical fishes.)

a<sup>1</sup>. PIKEA: Last dorsal spine less than half as long as the longest soft rays; border of preopercle almost entire.....*maculata*, 8.

a<sup>2</sup>. LABRACOPSIS: Last dorsal spine at least half as long as the longest soft rays; border of preopercle finely toothed.....*japonica*, 9.

#### 8. PIKEA MACULATA Steindachner and Döderlein.

*Pikea maculata* STEINDACHNER and DÖDERLEIN, Denkschr. Akad. Wien, vol. 47, 1883, p. 234, pl. 6, fig. 1 (Tokyo).

*Liopropoma maculatum* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 156.

Head 3 in length; depth 4.25; eye 5 in head; dorsal VIII, 12; anal III, 8; scales 6-70-30; nose longer than eye; maxillary reaching beyond center of eye; interorbital space flattish. Body elongate, back little elevated, profile nearly straight, from front of dorsal; muzzle moderately sharp; cleft of mouth high; top of head flattish; lower jaw projecting; villiform teeth in bands, on jaws, and on vomer and palatines; tongue toothless; border of preopercle rounded;<sup>a</sup> opercle with 3 flat points; gill-rakers not described; head entirely scaled, the scales largely cycloid; lateral line complete. Origin of dorsal slightly behind base of pectoral; longest dorsal spine (third) about 3 in head; longest soft ray 2; caudal weakly emarginate, the lobes rounded; pectoral 1.33 in head; ventrals shorter than pectorals. Color reddish yellow, with roundish brown spots along back and upper part of sides and on basal portion of spinous and soft dorsals and caudal. (Steindachner and Döderlein.)

We have seen no specimens of this species. The type, 25 cm. in length, was obtained by Doctor Döderlein from Tokyo, doubtless from Sagami Bay.

(*maculatus*, spotted.)

<sup>a</sup> In the original description of this species Doctor Döderlein states that the border of the preopercle is "nur mit zarten Cilien besetzt," and in the description of *Pikea (Labracopsis) japonicus* it is said that the bone is "dicht und zart gesäht." These statements are used by Boulenger (Cat. Fishes, vol. 1) in the key and descriptions of these species. The original figure of *Pikea maculata* shows a smooth preopercle, that of *Pikea lunulata* shows one rather coarsely denticulated. The original figure of *Labracopsis japonicus* shows what might well be called a very finely and regularly denticulated, or even "ciliated" preopercle. Our specimen from Tokyo agrees well with the figure; and as further evidence that there has been confusion in the description of this character of the two species, we have the statement (in the definition of the new subgenus *Labracopsis*) that *Labracopsis (japonicus)* differs from *Pikea (maculata* and *lunulata*) "nur durch das Vorkommen zahlreicher, spitzer Zähnen am Vordeckel." In *Pikea aurora*, the preopercle is very finely denticulate.

## 9. PIKEA JAPONICA Döderlein.

*Pikea (Labracopsis) japonica* DÖDERLEIN, in Steindachner and Döderlein, Denkschr. Akad. Wien, vol. 47, 1883, p. 235, pl. 6, fig. 3 (Tokyo).

*Liopropoma japonicum* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 156.

*Labracopsis japonicus* JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 354 (Tokyo); p. 751 (Yokohama).

Head, 2.9 in length; depth, 3.4; depth caudal peduncle, 2.4; eye, 4.7 in head; dorsal VIII, 14; anal III, 10; scales, 4–57–23; nose, 3.6 in head; maxillary, 2.1; interorbital space, 1.2 in eye, slightly convex. Form elongate, back little elevated; profile slightly convex behind occiput, thence nearly straight to muzzle; mouth large, maxillary extending nearly to back of orbit; lower jaw slightly projecting; jaws with bands of fine villiform teeth; vomer and palatines toothed; tongue smooth; nostrils subequal; preopercle rounded, without prominent angle, its posterior border finely ciliated; opercle with 3 flat points; gill-rakers 8, with 1 or 2 rudiments, the longest longer than the corresponding filaments. Scales feebly ctenoid, becoming more or less cycloid anteriorly; head entirely covered with cycloid scales; lateral line complete. Longest dorsal spine (third), 3.25 in head; longest soft ray, 2; caudal very feebly emarginate; pectoral, 1.4; ventral, 1.8, short of vent.

Color in spirits uniform straw, tinged with olive; borders of soft dorsal, caudal, and anal whitish. Doctor Steindachner states that the fish is reddish golden, with a dark lateral stripe from the eye to the base of the caudal. In our specimen there are faint traces of this dark stripe on opercle and anterior part of side.

Here described from a specimen  $8\frac{1}{2}$  inches long, taken in the Tokyo market by Prof. Keinosuke Otaki. It is doubtless from Sagami Bay. The species must be rare in Japan.

## 9. Genus PLECTROPOMUS (Cuvier) Oken.

*Plectropomus* CUVIER, Règne Anim., vol. 2, 1817, p. 277 (*calcarifer*; *maculatus*; *cyclostome*).

*Plectropomus* OKEN, Isis, 1817, p. 1782, misprint for p. 1182 (after Cuvier).

*Plectropoma* CUVIER and VALENCIENNES, Hist. Nat. Poiss., vol. 2, 1828, p. 387 (*melanoleucus*=*cyclostomus*; *maculatus*; restricted to *maculatus*).

*Plectropoma* GILL, Proc. Acad. Sci. Phila., 1862, p. 236 (name only).

*Paracanthistius* BLEEKER, Verh. Akad. Amst., vol. 14, 1873, no. 2, p. 13 (*maculatus*; *Lates calcarifer*, the first species named by Cuvier under "*Plectropomes*," being taken as type of *Plectropoma*).

Body elongate, compressed; scales very small, roughish. Lateral line feebly marked, the tubes very short and straight, the scales ciliated. Mouth large, protractile; maxillary exposed, with supplemental bone; teeth in jaws in several series, the inner movable, depressible, hinged at the base; very strong canine teeth in front of both jaws and on the side of the mandible; teeth on vomer and

palatines; tongue smooth. Head partly scaled, snout naked; preopercle entire or finely serrate behind, with antrorse spines on the lower border; opercle with three spines. Gill membranes separate; pseudobranchiæ present; gill-rakers moderate. Dorsal fin single, with VI or VIII, 11–12 rays, the spinous portion nearly as long as the soft. Anal short, with III, 8 rays, the spines very feeble, flexible. Caudal truncate or emarginate. Pectorals symmetrical, rounded, with 16 to 18 rays. Ventrals below the pectorals, close together, with a feeble, flexible spine. Posterior processes of premaxillaries extending nearly to between the frontals; parietal and supraoccipital bones extending to between postfrontal processes, with short, feeble crests. Vertebrae 24 (10 + 14).

This genus is abundant in the South Seas and tropical Pacific. It is close to *Epinephelus*, from which it differs in the presence of but 6 to 8 dorsal spines and in the recurved hooks on the lower part of the preorbital. This character appears in several other genera, some of them not closely related to *Plectropomus*.

The genus as originally formed included two species, the one the type of *Lates*, the other chosen by subsequent writers as type of *Plectropoma*. As *calcarifer* is the species first mentioned by Cuvier, Bleeker has chosen it as type, framing the new name *Paracanthistius* for the present group. Earlier usage has, however, chosen *maculatus* as the type of the group. The earliest spelling in Latin form is *Plectropomus*, not *Plectropoma*.

(πλήκτρον, spur; πῶμα, opercle).

#### 10. PLECTROPOMUS MACULATUS (Bloch).

*Bodianus maculatus* BLOCH, Ichthy., vol. 4, 1790, p. 48, pl. 228 ("Japan," probably Isle de France).

*Plectropoma maculatum* CUVIER and VALENCIENNES, Hist. Nat. Poiss., vol. 2, 1828, p. 393 (Isle de France, based on the *Bodianus maculatus* of Bloch).—GÜNTHER, Cat., vol. 1, 1859, p. 156 (Red Sea).—BOULENGER, Cat. Fishes, vol. 1, 1895, p. 160 (Indian and Western Pacific oceans to Cape York and Mauritius).

*Paracanthistius maculatus* JORDAN and SEALE, Fishes Samoa, 1906, p. 256 (Samoa, Faté).

*Holocentrus leopardus* LACÉPÈDE, Poiss., vol. 4, 1802, pp. 332, 367 (Indian Ocean).

*Plectropoma leopardinum* CUVIER and VALENCIENNES, Hist. Nat. Poiss., vol. 2, 1828, p. 392, pl. 36 (Indian Ocean, based on the *Holocentrus leopardus* of Lacépède).—TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 12 (Nagasaki).—and of authors.

*Labrus lavis* LACÉPÈDE, *Bodianus cyclostomus* and *melanoleucus* LACÉPÈDE, *Plectropoma punctatum* QUOY and GAINARD, *melanoleucum* CUVIER and VALENCIENNES, *areolatum* RÜPPELL, *cyanostigma* BLEEKER, *P. leopardus* RICHARDSON, *Paracanthistius leopardinus* BLEEKER, *Paracanthistius maculatus* BLEEKER, etc.

D. VII or VIII, 11–12. A. III, 8. Scales 16 to 20–120 to 145–60 to 80; scales in lateral line 80 to 106. Depth of body equal to or

a little less than length of head,  $3\frac{1}{4}$  to 4 times in total length to base of caudal. Snout  $1\frac{1}{2}$  (young) to 3 times (adult) diameter of eye, which is 5 to  $7\frac{1}{2}$  times in length of head; interorbital width  $4\frac{1}{2}$  to  $6\frac{1}{2}$  times in length of head; lower jaw projecting; maxillary extending to below center or posterior border of eye, the width of its distal extremity at least two-thirds diameter of eye; preopercle rounded, with 3 or 4 strong antrorse spines on its lower border (less distinct in old specimens); opercle with 3 spines, median nearer lower than upper; cheeks and opercles covered with small scales. Gill-rakers moderately long, 9 or 10 (and some rudiments) on lower part of anterior arch. Dorsal spines rather slender, increasing in length to the third or fourth, which is nearly one-third length of head and shorter than longest (anterior) soft rays. Pectoral one-half to three-fifths length of head, as long as or slightly longer than ventrals. First anal spine rudimentary, often indistinct, third longest, bound to first soft ray. Caudal truncate or feebly emarginate, sometimes slightly produced at the angles. Coloration very variable; several varieties are distinguished, which, however, completely pass into one another.

This species is abundant in the tropical Pacific. Our description is taken from Boulenger, as there is one record from Japan, that from Nagasaki of Temminck and Schlegel, but no specimens have been taken there since. This specimen is said to have been brown with numerous small blue spots. It corresponds to variety B of Boulenger = *Holocentrus leopardus* Lacépède = *Plectropoma leopardinum* Cuvier and Valenciennes. We have the same form from Samoa. It is apparently only a variant with smaller spots.

(*maculatus*, spotted.)

#### 10. Genus EPINEPHELUS Bloch.

*Epinephelus* BLOCH, Ichthyologia, vol. 7, 1793, p. 14 (*marginalis*).

*Cynichthys* SWAINSON, Nat. Hist. Classn. Fishes, vol. 2, 1839, p. 201 (*flavopurpuratus*).

*Cerna* BONAPARTE, Icon. Fauna Italica, vol. 3., 1841 (*gigas-guaza*).

*Hyporthodus* GILL, Proc. Acad. Nat. Sci. Phila., 1861, p. 98 (*flavicauda-niveatus*).

*Schistorus* GILL, Proc. Acad. Nat. Sci. Phila., 1862, p. 237 (*mystacinus*).

*Labroperea* GILL, Proc. Acad. Nat. Sci. Phila., 1863, p. 80 (*labriiformis*).

*Merus* POEY, Ann. Lyc. Nat. Hist. N. Y., vol. 10, 1871, p. 39 (*gigas*).

*Priacanthichthys* DAY, Proc. Zool. Soc. London, 1868, p. 193 (*madrasspatensis*).

*Cerna* DODERLEIN, Revista delle Specie del genere Epiniphelus o Cerna, 1873 (*gigas*).

*Homalogrystes* ALLEYNE and MACLEAY, Proc. Linn. Soc. New South Wales, vol. 1, 1876, p. 268, pl. 6, fig. 3 (*güntheri*).

*Hyposeranus* KLUNZIGER, Fische des Rothen Meeres, 1884, p. 3 (*morhua*).

Body stout, compressed, covered with small, etenoid scales, which are often somewhat embedded in the skin; scales of the lateral line triangular, cycloid; soft parts of the vertical fins generally more or

less scaly. Cranium narrow above. Parietal crests not produced on frontals, which are without transverse ridge posteriorly; frontals with a process or knob on each side behind interorbital area; premaxillary processes fitting into a notch or cavity on the anterior end of the frontals. Preopercle moderately serrate behind, its lower limb entire, without distinct antrorse spine; opercle with 2 strong spines. Nostrils well separated. Mouth large; maxillary large, with a well-developed supplemental bone, its surface usually with small scales. Canine teeth few, large in the front of the jaws; enlarged teeth of the inner series of each jaw depressable. Gill rakers short and rather few. Dorsal spines usually 11, rarely 10, not filamentous, the last ones somewhat shorter than the middle ones. Anal spines 3, the second usually the larger; the number of soft rays 7 to 9. Caudal fin rounded or lunate. Pyloric cæca few (usually 10-20). Pectorals rounded, shortish, nearly symmetrical, of 15 to 20 rays. Ventrals moderate, inserted below pectorals, close together, each with a strong spine. Species very numerous, most of them of large size, abounding in all the tropical seas, where they are valuable food fishes. This is the largest and most important genus of the Serranidæ, and its species are most widely distributed. Although numerous species are found in Japan, they are relatively few in individuals and form an insignificant part of the food supply.

(ἐπιπέφελος, clouded over, in allusion to the membrane supposed to cover the eye in the typical species.)

ANALYTICAL KEY OF JAPANESE SPECIES OF EPINEPHELUS.

- a*<sup>1</sup>. Dorsal fin with 11 spines and 14 to 18 soft rays; anal with 8 or 9 soft rays.
- b*<sup>1</sup>. Teeth in sides of mandibles in 2 rows.
- c*<sup>1</sup>. Caudal fin subtruncate or slightly emarginate.
- d*<sup>1</sup>. Caudal fin subtruncate, slightly concave when stretched, or very broadly rounded with squarish corners; dorsal XI, 17 or 18; scales 14-110-40; body and fins covered everywhere with very numerous roundish or hexagonal brownish spots, less than size of pupil in adults, separated by very narrow line-like intervals of the paler ground color. . . . *chlorostigma*, 11.
- d*<sup>2</sup>. Caudal distinctly though not strongly emarginate; dorsal XI, 16 or 17; scales 15-114-44; color in spirits brown; head, body, and fins alike marked with roundish or hexagonal darker areas not much smaller than eye and separated by narrow paler interspaces; caudal with a conspicuous white edge. . . . *craspedurus*, 12.
- c*<sup>2</sup>. Tail rounded.
- e*<sup>1</sup>. Nostrils subequal.
- f*<sup>1</sup>. Pectorals noticeably longer than head behind eye; dorsal XI, 16 or 17; scales 13-98-42; eye unusually large, 2 in maxillary; nose short, 4.5 in head; body with large unequal polygonal brown spots, about 10 or 12 in a row from gill-opening to base of caudal; pectorals, ventrals, and anal dark toward ends; other fins marked as body. . . . *megachir*, 13.
- f*<sup>2</sup>. Pectorals noticeably shorter than head behind eye.
- g*<sup>1</sup>. Body without stripes or crossbars.



- h*<sup>1</sup>. Body and vertical fins brown, with round bright red spots (pale in spirits); a single large blackish blotch under last dorsal spines; dorsal XI, 15 or 16; scales 16-103-40. . . . . *akaara*, 14.
- h*<sup>2</sup>. Body and vertical fins brown, with round dark spots; a large blackish blotch at base of last dorsal spines, one or two along base of soft dorsal, and one on top of caudal peduncle; dorsal XI, 16 or 17; scales 13-98-40. . . . . *fario*, 15.
- g*<sup>2</sup>. Body with stripes, rows of spots, or crossbars.
- i*<sup>1</sup>. Sides with oblique longitudinal stripes or rows of spots.
- j*<sup>1</sup>. Rays of soft dorsal 12 or 13; color brown, on each side three narrow black longitudinal stripes (rows of spots in young), originating behind eye; upper stripe ending under back of spinous dorsal, middle one under middle of soft dorsal, lower stripe ending on base of caudal peduncle, slightly above its middle; soft dorsal and caudal spotted with black; scales 10 to 12-100 to 115-35 to 42 (after Boulenger). *latifasciatus*, 16.
- j*<sup>2</sup>. Rays of soft dorsal 14 or 15.
- k*<sup>1</sup>. Brown, each side with three rows of round black spots, beginning behind eye, first row ending under middle of dorsal; median row (of larger spots) ending on base of caudal, lower row coursing lower portion of side toward caudal peduncle to a point over middle of back of anal; a row of about 10 small round black spots on back along base of dorsal; membranes of soft dorsal, caudal, and anal with many small round black spots; dorsal XI, 14 or 15; scales 13-108 to 119-44. . . . . *epistictus*, 17.
- k*<sup>2</sup>. Body with a large dark blotch on occiput, and with several obliquish bands downward and forward from mid-dorsal line to opercle; sides of head with 3 or 4 dark streaks; fins unspotted; dorsal, XI, 14; scales 17-108-48. *morrhua*, 18.
- i*<sup>2</sup>. Sides with transverse or obliquish crossbars (may be broken up more or less in *E. moara*).
- l*<sup>1</sup>. Body reddish brown, crossed by 6 broad obliquish bars of darker, the bars usually broken up more or less, so as to produce the effect of a marbled pattern; dorsal XI, 14 or 15; scales 12-105-40. . . . . *moara*, 19.
- l*<sup>2</sup>. Body gray with yellow spots on head and body, and with fins broadly edged with yellow; preserved specimens showing on each side 5 obliquely transverse bars of dark color; dorsal XI, 15 or 16; scales 18-94-38; point of opercular flap nearer lateral line than base of pectoral. *avoara*, 20.
- e*<sup>2</sup>. Posterior nostrils conspicuously larger than anterior; inferior margin of preopercle with one or two downwardly directed points, set at some distance from the teeth of the angle; interorbital bridge more elevated than in other Japanese species of *Epinephelus*, sides with 7 or 8 vertical cross bands, the last one (on caudal peduncle) very dark above; a dark mustache-like streak under back of maxillary; dorsal XI, 14 or 15; scales 18-110-44. Pyloric caeca in increased number (*Schistorus* Gill). *septemfasciatus*, 21.
- b*<sup>2</sup>. Teeth in sides of mandibles in 3 rows; color red (straw in spirits), each side with 4 or 5 indistinct dark red vertical bands, and with 2 longitudinal rows of elongate whitish or silvery blotches (each blotch within the corresponding transverse band); each of the membranes of spinous dorsal tipped with a conspicuous triangular patch of black; dorsal XI, 15 or 16; scales 14-108-38. *tsirimenara*, 22.

## 11. EPINEPHELUS CHLOROSTIGMA (Cuvier and Valenciennes).

*Serranus chlorostigma* CUVIER and VALENCIENNES, Hist. Nat. Poiss., vol. 2, 1828, p. 352 (Seychelles).—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 151 (after Cuvier and Valenciennes).

*Epinephelus chlorostigma* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 203 (Red Sea, Indian Ocean, China Sea).—SAUVAGE, Poiss. Madagascar, 1891, p. 73 (Madagascar).

*Serranus waandersii* BLEEKER, Nat. Tijd. Ned. Ind., vol. 17, 1858, p. 152 (Bali); Atl. Ichth., vol. 7, 1876, p. 47, pl. 281, fig. 1.

*Serranus areolatus* KLUNZINGER, Synop. Fisch. Roth. Meer., 1870, p. 675 (Red Sea) (not *S. areolatus* Klunzinger, 1884).

*Serranus geoffroyi* KLUNZINGER, Fisch. Roth. Meer., 1884, p. 3 (Red Sea).

*Serranus celebicus* var. *multipunctatus* KOSSMANN and RAUBER, Fisch. Roth. Meer., p. 6 (Red Sea).

*Epinephelus chlorostigma* JORDAN and RICHARDSON Mem. Carnegie Museum, vol. 4, 1909, p. 183 (Takao, Keerun, Formosa).

(East Indian fauna; north to southern Japan.)

Head 2.5; depth 3.25; eye 7.3 in head, 3.25 in maxillary; dorsal XI, 17 or 18; anal III, 8; scales 14–110–40; nose 4.2 in head; maxil-

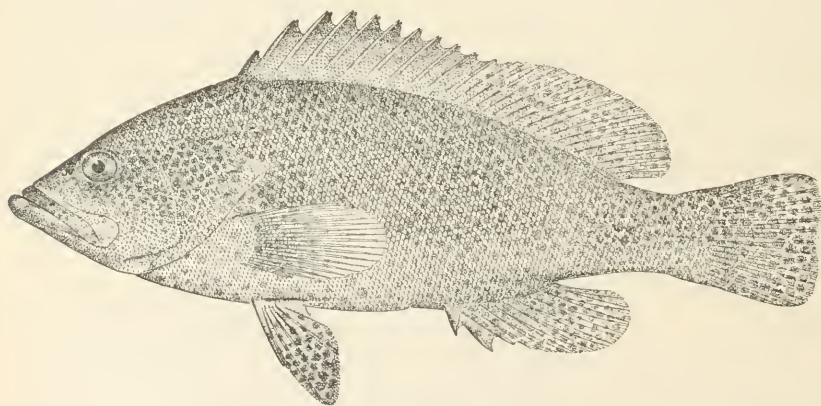


FIG. 6.—EPINEPHELUS CHLOROSTIGMA.

lary a little short of back of eye, 2.3 in head, 1.16 in pectoral; inter-orbital space strongly convex, about 1.3 times diameter of eye in specimen 15 inches long; 1.2 in eye in one 5 inches. Back moderately elevated, the dorsal and ventral outlines not greatly dissimilar; profile straight, muzzle sharp, lower jaw projecting. Teeth in sides of lower jaw in 2 rows; canines moderate; nostrils unequal; preopercle with a salient angle, with 6 to 8 enlarged points; margin of lower preopercular limb without serratures; free edge of upper portion of posterior limb finely serrated; opercular spines about equidistant; opercular flap pointed, the point directed straight backward; gill-rakers 13 + 4 or 5 rudiments. Cheeks and opercles covered with small scales; occiput with fine imbedded scales; maxillary and lower jaw with numerous extremely fine scales, those on the maxillary more

or less confined to a patch about its middle; scales on body rather weakly ctenoid. Spinous dorsal beginning over insertion of pectoral; longest dorsal spine 2.5 in head; longest ray of soft dorsal 1.8 in base of the fin; caudal subtruncate; pectoral 1.8 in head; ventral 2.

Color in spirits reddish brown, head, body and fins, except pectorals, everywhere covered with small roundish or irregularly polygonal dark spots, separated by narrow line-like paler areas, giving the effect of a reticulated pattern; pectorals more faintly marked, but in same way; in a specimen 15 inches long the dark areas are about one-half diameter of the pupil; in a young specimen 5.5 inches, the largest spots exceed the diameter of the pupil.

Of this species we have three specimens: one 15.5 inches long, from Misaki; one 14 inches, from Nagasaki; one 5.5 inches, from Wakamura. There is no other record from Japan, but it is relatively common in the East Indies.

(*χλωρός*, green; *στίγμα*, spot.)

12. *EPINEPHELUS CRASPEDURUS* Jordan and Richardson, new species.

*Serranus angularis* STEINDACHNER and DÖDERLEIN, Denkschr. Akad. Wien., vol. 47, 1883, p. 232 (Oshima and Kagoshima, Japan). (Not of Cuvier and Valenciennes or of Bleeker, = *S. celebicus* Bleeker.)

*Epinephelus areolatus* SMITH and POPE, Proc. U. S. Nat. Mus., vol. 31, 1906, p. 468 (Susaki and Yamagawa, Japan). (Not *Perca areolata* of Forskål.)

(Coasts of southern Japan; not common.)

Head 2.85; depth 3.25; eye in head 4.8, in maxillary 2.50; dorsal XI, 16 or 17; anal III, 8; scales 15–114–44. Nose 3.40; maxillary slightly short of back of orbit, 2 in head, 1.3 in pectoral; interorbital space 1.2 in eye, moderately convex. Back moderately elevated; profile gently arched, no angle at nape; muzzle moderately sharp; lower jaw projecting less than width of lip. Teeth in sides of lower jaw in 2 rows; canines moderate; nostrils subequal; angle of preopercle moderately salient, with 3 or 4 stronger points; opercular spines equidistant; point of opercular flap directed backward, midway between lateral line and base of pectoral; gill-rakers 12+2. Top of head, cheeks and opercles with small scales; chin and lower jaws smooth or nearly so. Dorsal fin beginning slightly in front of pectorals; longest dorsal spine (4th) 2.4 in head; longest soft ray 1.4 in base of fin; caudal evidently emarginate when closed, nearly square when stretched; pectoral 1.5 in head; ventral 1.6.

Color in spirits palish brown, the darker color on body, head and fins in the form of irregular shaped roundish or hexagonal spots, in size somewhat smaller or nearly as large as eye, and separated from each other by narrow, line-like pale interspaces, whose width is about one-fifth to one-fourth the diameter of the dark areas; caudal with a conspicuous white edge, as wide as one-half pupil on middle of mar-

gin; soft dorsal with a very narrow edging of white; pectoral spots and interspaces paler than those of other fins.

Of this species we have six specimens, 6 to 7 inches long, from Kagoshima, collected by Prof. John O. Snyder. The type is No. 64154 U.S.N.M. A co-type is No. 21180 Stanford University. This species is distinguished from specimens of *Epinephelus angularis* (Bleeker) from Sumatra by having the dark areas on body and fins separated by much narrower "linear" intervals; and by having the fins, including soft dorsal, marked as body, the soft dorsal of the specimen from Sumatra having a black longitudinal bar on outer fourth of soft dorsal. A specimen from Keerun, Formosa (*Epinephelus areolatus*?) differs from both Japanese and Sumatran specimens in having its caudal slightly rounded (stretched or closed) and in lacking the white border on caudal, while it has all fins spotted like body, as in the

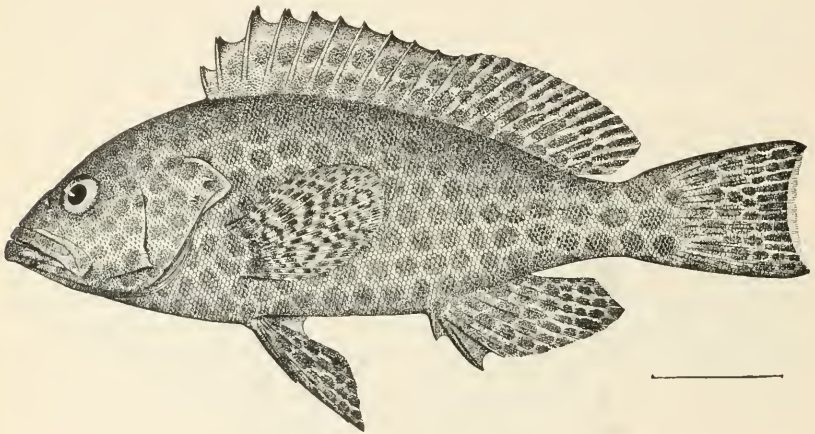


FIG. 7.—EPINEPHELUS CRASPEDURUS.

Japanese species, and has the dark areas separated by wide pale intervals as in *Epinephelus angularis* from Sumatra. The *Perca areolata* of Forskål, of which *S. angularis* Cuvier and Valenciennes and *E. celebicus* Bleeker are made synonyms by Doctor Boulenger is apparently best regarded as a distinct species (= *S. areolatus* of Cuvier and Valenciennes, Günther and Day = *E. areolatus* Sauvage = *S. areolatus* Klunzinger 1884 (not 1870) = *S. celebicus* Klunzinger 1870). This species (*Epinephelus areolatus*) has not been found in Japan.

(κράσπεδων, border; οἶρά, tail.)

### 13. EPINEPHELUS MEGACHIR (Richardson).

*Serranus areolatus japonicus* TEMMINCK and SCHLEGEL, Faun. Japan., Pisc., 1842, p. 8 (Japan). (Not *Epinephelus japonicus* Krusenstern.)

*Serranus megachir* RICHARDSON, Ichth. China, 1846, p. 230 (Canton, China).

*Serranus merra* (not Bloch) DAY, Fish. India, 1875, p. 13, pl. 2, fig. 2 (Andamans). (Though so stated by Day, this is certainly not the *Epinephelus*

*merra* of Bloch, which has dorsal XI, 15, and pectorals shorter than head and spotted like caudal.)

*Serranus hexagonatus* STEINDACHNER and DÖDERLEIN, Beitr. Japan, vol. 1, 1883, p. 232 (Tokyo Bay). (Not *Perea hexagonata* of Forster, which is *Serranus stellans* of Richardson.)

(Coasts of China and southern Japan.)

Head 2.60; depth 3; eye noticeably large, in head 4.40, in maxillary 2; dorsal XI, 17; anal III, 8; scales 13-98-42. Nose very short, 4.52 in head; maxillary to back of orbit, 2.1 in head, 1.65 in pectoral. Interorbital space slightly convex, 1.8 in eye. Back low; profile nearly straight to occiput, thence slightly steeper to muzzle; muzzle short and blunt; lower jaw scarcely projecting. Teeth in sides of lower jaws in 2 rows; canines moderate; posterior nostril slightly the larger; preopercular angle scarcely produced, armed with 3 or 4 moderately strong serratures; opercular spines

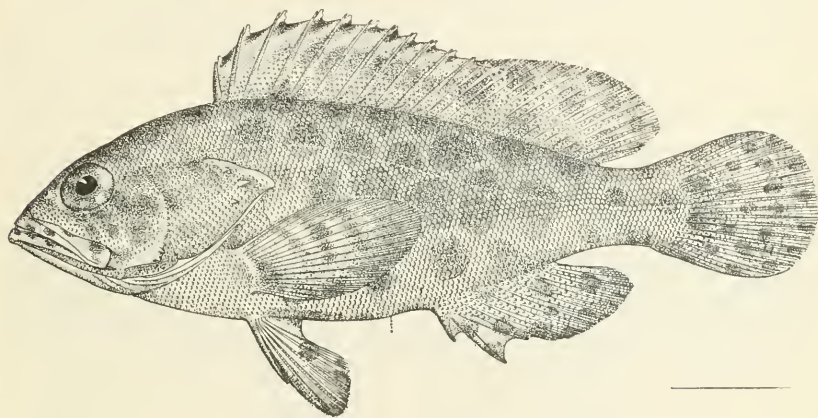


FIG. 8.—EPINEPHELUS MEGACHIR.

equidistant; point of flap directed a little upward, nearer lateral line than pectoral; gill-rakers 10+4 or 5 rudiments. Top of head, cheeks, opercles, and chin covered with small scales; maxillary smooth. Dorsal origin slightly behind pectorals; longest dorsal spine (3d) 2.45 in head; longest soft ray 1.5 in base of fin; caudal rounded; pectoral unusually large and long, 1.2 in head, much exceeding length of portion of head behind eye; ventral 1.75.

Color in spirits brown, with large darker hexagonal or roundish spots, or unequal size, separated by narrow, almost linear, paler intervals; largest of the dark spots nearly as large as eye, the number in a row between gill opening and base of caudal 11 or 12; dorsal, anal, and caudal fins marked as body; pectorals dusky, darkest behind, the upper-anterior two-thirds with scattering small pale spots; chin and lower jaw with 4 or 5 narrow dusky cross-bars; breast with 3 somewhat wider bars.

This species is here described from a specimen 6 inches long from Keerun, Formosa. We have no specimens from Japan, where the species is apparently rare. It may be known from other spotted species by the long pectorals. It is widely diffused in the South Seas and East Indies.

(μέγας, large, χέρο, hand.)

14. EPINEPHELUS AKAARA (Temminck and Schlegel).

AKAARA (red bass); ADSUKIHATA (red-pea-bass).<sup>a</sup>

*Serranus akaara* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 9, pl. 3, fig. 1 (Nagasaki).—RICHARDSON, Ichth. China, 1846, p. 231.—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 140 (Japan, India <sup>b</sup>).—NAMIYE, Class. Cat., 1881, p. 93 (Tokyo).—ISHIKAWA, Prel. Cat., 1897, p. 56 (Tokyo).

*Epinephelus akaara* JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 354 (Tokyo).—BOULENGER, Cat. Fishes, vol. 1, 1895, p. 216 (Japan, China, ? India).

*Serranus shihpan* RICHARDSON, Ichth. China, 1846, p. 231 (Hongkong).

*Serranus variegatus* RICHARDSON, Ichth. China, 1846, p. 231 (Hongkong).

*Serranus awoara* STEINDACHNER and DÖDERLEIN, Beitr. Japan, vol. 1, 1883, p. 23 (Tokyo; China Sea). (Not *Serranus awoara* Temminck and Schlegel.)

(Coasts of China and Japan, common north to Tokyo.)

Head 2.6; depth 3 to 3.15; eye 5.2 in head, 2.5 in maxillary; dorsal XI, 15 or 16; anal III, 8; scales 16–103–40; nose 3.7; maxillary extending fully to back of orbit or a little beyond, 2.1 in head, 1.3 in pectoral; interorbital space slightly convex, 1.3 in eye. Dorsal outline more arched than ventral, the highest point under the second or third dorsal spine; profile even, slightly convex, tapering gradually to a sharp muzzle; lower jaw projecting less than width of lip. Teeth in sides of lower jaw in 2 rows; canines moderate; posterior nostril slightly the larger; preopercular angle very little salient, the angle with conspicuously enlarged points; opercular spines nearly equidistant, the lower spine slightly nearer middle than the upper; flap bluntly pointed; gill-rakers 12 or 13+4 or 5 rudiments. Top of head, cheeks, opercles, and suborbitals covered with small scales; maxillary and premaxillary smooth; lower jaw with fine embedded scales. Dorsal beginning over origin of pectoral; longest dorsal spine 2.75 in head; height of longest soft ray 1.5 in length of fin's base; caudal rounded, with slightly squarish corners in a few specimens; pectoral 1.5 in head; ventral 2.

Color in spirits light brownish, both head and body of typical specimens covered thickly with roundish pale spots (bright scarlet in life) a little larger than the pupil; these spots as a rule extend on dorsal and anal; caudal and pectoral more faintly spotted; a large dark blotch, larger than eye, on the back, under last rays of

<sup>a</sup> *Adsuki*, a small red pea, from the scarlet spots. *Hata* and *ara* are general names for fishes of this group.

<sup>b</sup> Locality questioned by Boulenger.

spinous dorsal, and extending on its membranes. Specimens from Kobe, Onomichi, and one from Nagasaki have the light spots faint or absent and have the ventrals and anal dusky to blackish.

Of this species we have fifteen specimens, two 9.5 inches long from Nagasaki; nine 5 to 9 inches, from Onomichi; one 8.5 inches, from Kobe; two 7 to 8 inches, from Wakanoura; two 6 inches, from Hiroshima; one 7.5 inches, from Shimonoseki. It was recorded also from Tsuruga and Hakata.

It is the most abundant Japanese species of *Epinephelus*, being found almost every day in the markets from Tokyo southward.

(*aka*, red; *ara*, bass.)

15. EPINEPHELUS FARIO (Thunberg).

*Perca fario* THUNBERG, Nya Handl., vol. 14, 1792, p. 296, pl. 9 (Nagasaki).—BLOCH and SCHNEIDER, Syst. Ichth., 1801, p. 323.

*Epinephelus japonicus* ("Epinephelus du Japon") KRUSENSTERN, Reise, 1810, pl. 64, fig. 2 (Japan).

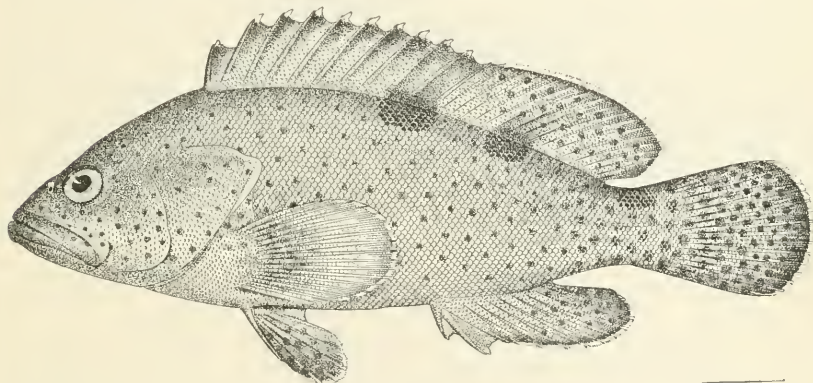


FIG. 9.—EPINEPHELUS FARIO.

*Serranus trimaculatus* CUVIER and VALENCIENNES, Hist. Nat. Poiss., vol. 2, 1828, p. 331 (after Krusenstern).—TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 8 (Japan).—RICHARDSON, Ichth. China, 1846, p. 232 (Japan, from Bürger).—PETERS, Monatsber. Akad. Berlin, 1865, p. 110 (synonymical note based on examination of type-specimen).—KNER, Novara, Fische, vol. 1, 1865, p. 18 (Hongkong and Java).—BLEEKER, Bijdr. Japan, vol. 4, p. 8.—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 109 (part) (China and Japan).

*Epinephelus trimaculatus* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 221 (China).—JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 354 (Tokyo).

*Serranus fasciatus* PETERS, Monatsber. Akad. Berlin, 1865, p. 111 (Japan, based on Bleeker's *S. trimaculatus*, Bijdr. Japan, vol. 4, p. 8).

*Serranus ura* CUVIER and VALENCIENNES, Hist. Nat. Poiss., vol. 2, 1828, p. 332 (Nagasaki). (*ura*, misspelling of *ara*, according to Peters, 1865.)

*Serranus ara* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 8 (Nagasaki).

(Coasts of China and southern Japan.)

Head 2.6; depth 2.8; eye 5.8 in head, 1.37 in pectoral; dorsal XI, 16 or 17; anal III, 8; scales 13–98–40; nose 4.25 in head; maxillary

reaching a pupil's width behind orbit, 2.2 in head, 1.37 in pectoral; interorbital space flattish, 1.2 in eye. Dorsal outline symmetrical, more curved than ventral, highest point of back between first and fourth dorsal spines; profile nearly straight, scarcely convex; muzzle sharp, but less so and more upturned than in *E. akaara*: lower jaw projecting less than width of lip. Teeth in sides of lower jaw in 2 rows; canines moderate; posterior nostril scarcely enlarged; preopercular angle scarcely salient, with no conspicuous points at angle; opercular spines equidistant; opercular flap bluntly pointed; gill-rakers 11 or 12+3 or 4 rudiments. Cheeks and opercles covered with small scales; top of head, suborbitals, and lower jaws with small embedded scales; maxillary and premaxillary smooth. Dorsal origin slightly in front of insertion of pectorals; longest dorsal spine 2.8 in head; height of longest soft dorsal ray 1.75 to 2 in length of base of fin; caudal rounded; pectoral 1.6 in head; ventral 2.

Color in spirits reddish brown, both body and head with numerous small blackish spots, less than half diameter of pupil; back with three saddle-like black blotches, extending into the fin membranes, the first blotch at the back of the spinous dorsal, the second midway of length of soft dorsal, and the third crossing the top of the caudal peduncle; soft dorsal, caudal, and anal with small black spots as body; all fins except spinous dorsal narrowly edged with white.

Of this species we have three specimens, two 9 to 10 inches, from Wakanoura; one 8.5 inches, from Nagasaki. It is generally common in southern Japan, not reaching a large size.

(*fario*, trout, in low Latin.)

16. *EPINEPHELUS LATIFASCIATUS* (Temminck and Schlegel).

*Serranus latifasciatus* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 6 (Nagasaki).—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 154 (after Temminck and Schlegel).—DAY, Fish. India, Suppl., 1888, p. 780, figs. (Madras). (D. XI, 12.)

*Serranus grammicus* DAY, Proc. Zool. Soc., 1867, p. 700 (Madras); Fish. India, 1875, p. 281, pl. 5, fig. 4 (Madras). (D. XI, 12.)

*Priacanthichthys maderaspatensis* DAY, Proc. Zool. Soc., 1868, p. 193 (Madras). (D. XI, 12.)

*Epinephelus latifasciatus* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 206 (Shanghai, Madras, Bombay, Museat). (D. XI, 12-13.)

(East Indian fauna, north to Japan.)

This fish seems to differ from *E. epistictus* in having fewer dorsal rays (12 or 13 instead of 15, as in *E. epistictus*) and in details of coloration; lacking row of spots on side below median row and row of spots along base of dorsal fin. (Boulenger.)

We have no specimens of this species, which may prove identical with *Epinephelus epistictus*. The exact agreement between the color



pattern in Schlegel's account with Day's description of *Serranus grammicus* leaves little doubt of the identity of their specimens.

(*latus*, broad; *fascia*, band.)

17. *EPINEPHELUS EPISTICTUS* (Temminck and Schlegel).

*Serranus epistictus* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 8 (Nagasaki).—BLEEKER, Verh. Batav. Gen., vol. 26, no. 4, 1855, p. 60, pl. 2, fig. 1.

*Serranus epistictus* BLEEKER, Nieuwe Nalez. Japan, 1857, p. 60 (Nagasaki). (D. XI, 14 or 15.)

*Epinephelus epistictus* SMITH and POPE, Proc. U. S. Nat. Mus., vol. 31, 1906, p. 468 (Kochi).

(Coasts of southern Japan.)

Head 2.6; depth 3.2; eye 4 in head, 2.2 in maxillary; dorsal XI, 15; anal III, 8; scales 13–108 to 120–44; nose 4 in head; maxillary scarcely to back of orbit, 1.95 in head, 1.2 in pectoral; interorbital

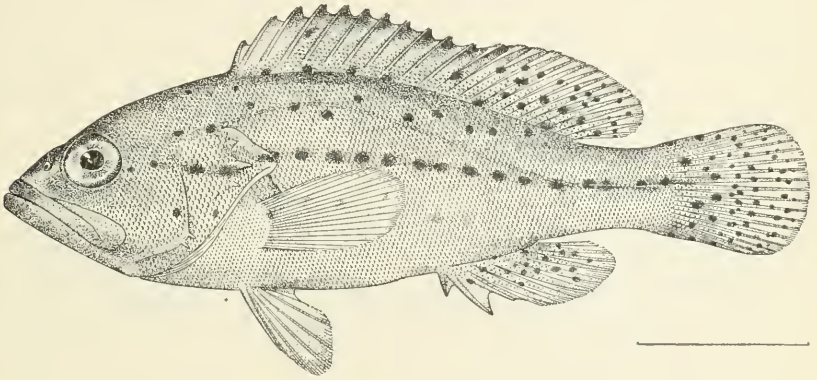


FIG. 10.—*EPINEPHELUS EPISTICTUS*.

space nearly flat, slightly convex, 1.25 in eye. Back moderately elevated, profile convex, a slight depression over eye; snout moderately pointed; lower jaw scarcely projecting. Teeth in sides of lower jaw in two rows; canines moderate; posterior nostril not enlarged; angle of preoperculum moderately salient, armed with two conspicuous points, directed backward and downward (=half width of pupil in specimen  $4\frac{1}{2}$  inches long); opercular spines nearly equidistant, upper spine noticeably shorter and blunter than lower; gill-rakers 10+4 rudiments. Top of head, cheeks, opercles, and suborbitals covered with fine scales. Dorsal beginning over origin of pectoral; longest dorsal spine 3 in head; longest soft ray 1.4 in base of soft fin; caudal rounded; pectorals 1.6 in head; ventrals 2.

Color in spirits purplish brown, each side with three rows of black spots; a median row which consists of spots broader than those in upper and lower rows, extending from lower edge of orbit across

opercle and along middle of side to a point slightly above middle of base of caudal; an upper row, more or less irregular, originating at the upper angle of the gill-opening and extending across lateral line toward middle of soft dorsal; a lower row crossing cheek and opercle below eye and extending along lower part of side to a point over or back of anal fin; membranes of spinous dorsal with a median row of small elongate black spots, continued for some distance on soft dorsal; a row of about 10 or 12 distinct roundish black spots along base of dorsal spines and rays (in a specimen 6 inches long there are 6 under spinous dorsal and 4 under soft dorsal); upper half of soft dorsal with numerous small round spots; caudal and anal marked as soft dorsal; pectorals plain, except for a small spot or two about base; ventrals plain, tinged behind with dusky.

This fish is apparently distinguished from *Epinephelus latifasciatus* of Temminck and Schlegel, Boulenger, and Day by having 15 soft dorsal rays instead of 12 or 13, and by its color pattern.

Of this species we have two specimens, one 4.5 inches long, from Nagasaki; one 6 inches, from Kagoshima.

It may prove identical with *Epinephelus latifasciatus*, the latter being the earlier name.

(ἐπί, above; σπικτός, spotted.)

#### 18. EPINEPHELUS MORRHUA (Cuvier and Valenciennes).

##### IYAGOBATA (iyago-bass).

*Serranus morrhua* CUVIER and VALENCIENNES, Hist. Nat. Poiss., vol. 9, 1833, p. 434 (Île de France).—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 254 (after Cuvier and Valenciennes).—DAY, Fish. India, vol. 1, 1875, p. 21, pl. 5, fig. 1 (Madras).—KLUNZINGER, Fisch. Roth. Meer, 1884, p. 3, pl. 1, fig. 2 (Red Sea).

*Epinephelus morrhua* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 208 (part only?) (Red Sea, Muscat, Mauritius).

*Serranus pæcilonotus* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 6, pl. 4A, fig. 1 (Nagasaki).—BLEEKER, Nieuwe Nalez. Japan, 1857, p. 61 (Nagasaki).

*Serranus brunneus* STEINDACHNER and DODERLEIN, Beitr. Japan, vol. 1, 1883, p. 230, pl. 5, figs. 1 and 2 (Japan). (Not *Epinephelus brunneus* Bloch).—NYSTRÖM, Svensk. Vet. Akad., vol. 13, Afd. 4, no. 4, 1887, p. 6 (Nagasaki).

*Epinephelus latifasciatus* JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 354 (Yokohama). (Not *Serranus latifasciatus* Temminck and Schlegel).

(East Indian fauna, north to southern Japan.)

Head 2.2; depth 2.8; eye 5.3 in head, 2.66 in maxillary; dorsal XI, 14; anal III, 8; scales 17–108–48; nose 4 in head; maxillary 2.2 in head, 1.12 in pectoral, extending past back of orbit a distance equal to width of nostril; interorbital space nearly flat, 1.1 in eye. Body rather thin, back elevated; profile convex, muzzle pointed; lower jaw strongly projecting. Teeth in sides of lower jaw in two rows; canines moderate; posterior nostril but little enlarged; pre-

opercular angle little salient, armed with 4 or 5 moderate points, directed backwards and downwards; opercular spines nearly equidistant; gill-rakers 11+3 or 4 rudiments. Cheeks, opercles, top of head, suborbitals, lower jaws, and chin covered with fine scales; maxillary smooth. Dorsal origin in front of insertion of pectoral a distance equal to two-thirds diameter of eye; longest dorsal spine 2.9 in head; longest soft ray 1.25 in length of soft dorsal; caudal rounded; pectorals 1.8 in head; ventrals 2.15.

Color in spirits light reddish brown; body marked by 5 or 6 obliquish-longitudinal broken band or blotches of darker color; a V-shaped band on occiput with the limbs of the V directed forward, one to each eye; a saddle-like blotch before dorsal, as wide as eye, extending forward on each side from gill-opening to eye as a narrower band; a wide band originating between fifth and eighth dorsal spines and tapering obliquely forward to flap of opercle; two narrower

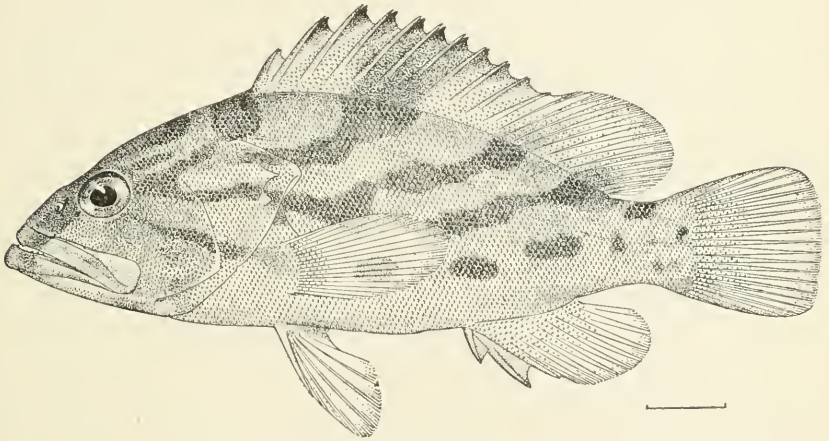


FIG. 11.—EPINEPHELUS MORRHUA.

bands beginning at front and back of soft dorsal and converging forward to meet under the seventh dorsal spine whence a single narrow stripe is continued forward across the opercle to the eye; a narrow broken stripe (or row of spots) extending from caudal peduncle forward across side on level of pectoral to a point below eye; a faint band across lower part of opercle; bands that abut on dorsal fins extending more or less into the fin-membranes; caudal, anal, ventrals, and pectorals plain.

Of this species we have one specimen, 9.5 inches long, from off Tokyo, collected by Professor Otaki. It is evidently the *pacilonotus* of Temminck and Schlegel, but we can not separate the Japanese form from the Indian species called *Epinephelus morrhua*. Should the latter form prove different the present species will stand as *Epinephelus pacilonotus*.

(*morrhua*, the cod-fish.)

## 19. EPINEPHELUS MOARA (Temminck and Schlegel).

## MOARA (kelp-bass).

*Serranus moara* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 10, pl. 4, fig. 2 (Nagasaki).—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 133 (after Temminck and Schlegel).—NAMIYE, Class. Cat., 1881, p. 93 (Tokyo).

*Epinephelus moara* JORDAN and SEALE, Proc. Davenport Acad., vol. 10, 1905, p. 9, pl. 5 (Hongkong).—JORDAN and RICHARDSON, Mem. Carnegie Museum, vol. 4, 1909, p. 183 (Takao, Formosa).

*Epinephelus nebulosus* (part) BOULENGER, Cat. Fishes, vol. 1, 1895, p. 240 (Japan). (Not *Serranus nebulosus* of Cuvier and Valenciennes or of Bleeker.)

(Coasts of southern Japan and China.)

Head 2.25; depth 3.5; eye 6.8 in head, 3.4 in maxillary; dorsal XI, 14 or 15; anal III, 8; scales 12–100 to 105–40; nose 4.2 in head; maxillary extending more than half width of eye behind orbit, 2.12 in head, 1 in pectoral; interorbital space nearly flat, very slightly convex, 1.4 in eye. Form slender, back little elevated, width of body 2 in its greatest depth; profile long, straightish, muzzle sharp; lower jaw projecting width of lip. Teeth in sides of lower jaws in two rows; canines moderate; posterior nostril scarcely enlarged; preopercle with the angle strongly salient, furnished with several obscure points in specimens 14 to 20 inches, with 2 or 3 conspicuous points in young individuals; lower opercular spine a little nearer middle than is upper; gill-rakers 10+4 or 5 rudiments. Top of head, suborbitals, maxillary, and lower jaw with small embedded scales; scales on cheeks and opercles larger. Dorsal originating slightly in front of origin of pectoral; longest dorsal spine 3.3 in head; height of longest soft ray 1.5 in length of base of soft fin; caudal rounded; pectoral 2.15 in head; ventral 2.

Color in spirits reddish brown; back and sides crossed by 6 broad obliquely transverse bars of dusky, the first one crossing in front of spinous dorsal, the second to fifth bars abutting on dorsal fin and thence extending obliquely downward and forward, the sixth bar crossing the caudal peduncle; each bar about  $2\frac{1}{2}$  times width of eye; one or more, sometimes all, bars may be broken up by lighter areas within them, or bars may present irregular branchings below the lateral line, giving the fish a marbled appearance; the four middle bars may extend into the dorsal fin for about half its height; several narrow bars crossing opercle and cheek, converging toward eye; soft dorsal, caudal, and anal narrowly but plainly white-edged; ventrals dusky, with obscure white edges; pectorals plain, with some dusky toward base.

We have ten specimens of this species, one 20 inches long, from Nagasaki; one 13 inches, and two 6 to 8 inches, from Wakanoura; three 2 to 3 inches and three 8 to 12 inches, from Misaki. It was also seen at Hakata. It is not one of the common species.

(*mo*, a sea-weed or kelp; *ara*, bass.)

## 20. EPINEPHELUS AWOARA (Temminck and Schlegel).

## AWOARA (green bass).

*Serranus awoara* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 9, pl. 3, fig. 2 (Nagasaki).—RICHARDSON, Ichth. China, 1846, p. 231 (Nagasaki, specimen of Bürger, British Museum).—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 150 (China).—NYSTRÖM<sup>a</sup> Svensk. Vet. Akad. Handl., vol. 13, Afd. 4, No. 4, 1887, p. 6 (Nagasaki).—NAMIYE, Class. Cat., 1881, p. 93 (Tokyo market).—ISHIKAWA, Prel. Cat., 1897, p. 56 (Tokyo).—KNER, Novara Fische, vol. 1, 1865, p. 26 (Singapore).

*Epinephelus awoara* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 230 (China).—BLEEKER, Atlas, vol. 7, 1876, p. 59 (after Kner, above).—JORDAN and RICHARDSON, Mem. Carnegie Museum, vol. 4, 1909, p. 183 (Takao, Formosa).

*Serranus diacanthus* STEINDACHNER and DODERLEIN, Beitr. Japan, vol. 1, 1883, p. 231 (Tokyo, Nagasaki, Hongkong). (Not *Serranus diacanthus* Cuvier and Valenciennes.) D XI, 15; "hintere Rand der Caudal und obere Rand der Gliederstrahlen der Dorsale breit hell gesäumt, und ähnlich gefärbte (hell blaugraue?) runde Flecken liegen an den Seiten des Kopfes." —5 oblique transversal bands on body; teeth not described. (Steindacher.)

(Coasts of southern Japan and China, not common.)

Head 2.60; depth 3.30; eye in head 4.40, in maxillary 2.30; dorsal XI, 16; anal III, 8; scales 18–94–38. Nose 3.9 in head; maxillary slightly short of back of orbit, 2 in head, 1.25 in pectoral; interorbital space 1.37 in eye, convex. Back low; profile broadly convex as far as forehead, whence the descent becomes steeper; a slight depression over nostrils; muzzle rather blunt; lower jaw projecting width of lip. Teeth in sides of lower jaws in two rows; canines moderate; posterior nostril slightly the larger; preopercular angle scarcely produced, furnished with 2 or 3 moderately strong points; point of opercular flap directed upward, much nearer lateral line than base of pectoral; gill-rakers 12+3. Cheeks, opercles, lower jaw, and chin scaled with fine scales; maxillary smooth. Dorsal originating over pectoral; longest dorsal spine (3rd) 2.8 in head; longest soft ray 1.9 in base; caudal rounded; pectoral 1.65 in head; ventral 1.75.

Color in spirits purplish brown, each side crossed with 5 broad blackish stripes; first stripe descending vertically from between second and fifth dorsal spines; second originating between sixth and tenth spines and descending obliquely backward to middle of side and then swinging obliquely forward, broader than the other stripes and tending to spread apart as a double stripe on lower half of side; third band originating between eleventh spine and middle of soft dorsal and descending in a slightly obliquely backward direction; fourth band beginning behind middle of soft dorsal and descending obliquely backward, becoming broader below; fifth band

<sup>a</sup> Made a synonym of *Epinephelus sexfasciatus* Cuvier and Valenciennes, by Doctor Boulenger.

covering posterior half of caudal peduncle; all bands extending some distance into dorsal membranes; dorsal and caudal indistinctly barred or mottled, with broad paler margins; anal, ventrals, and pectorals blackish.

This species is here described from two specimens  $8\frac{1}{2}$  inches long, and one 15 inches, from Takao, Formosa. We have no specimens from Japan, where it is apparently rare.

The specimens from Takao, Formosa, which are here called *Epinephelus awoara*, are well distinguished from specimens of *Epinephelus sexfasciatus* from Sumatra by the different coloration of the dorsal and caudal. Cross bands are said by Temminck and Schlegel to be present on the body of *S. awoara* after death. Faint light spots are apparent on head and parts of body of our largest specimen from Formosa (15 inches). Dr. Hans Sauter, the collector, states that the color in life is "light brown, under parts suffused

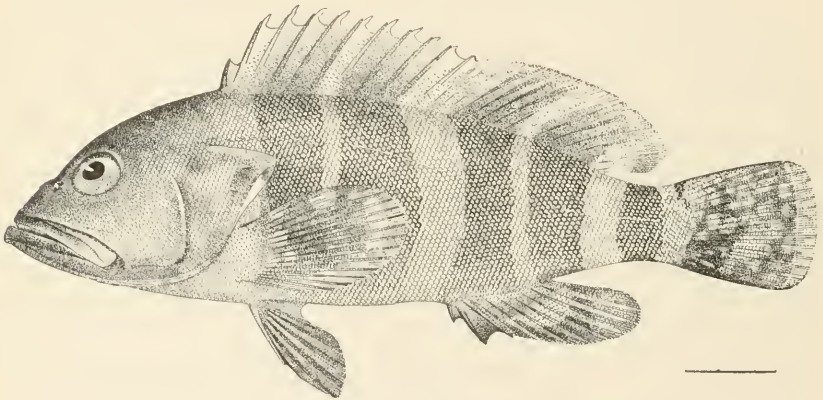


FIG. 12.—EPINEPHELUS AWOARA.

with yellow; fins gray, with yellow borders." We have seen no specimens from Japan or elsewhere which seem to correspond with the *Epinephelus awoara* of Boulenger (skin 38 cm. long, from China) (? *S. awoara* of Kner, specimens from Singapore), a species with the fins yellow edged and with 3 rows of teeth in sides of lower jaws. Body bands are not said by either Kner or Boulenger to be present in the specimens.

(*ao*, blue-green; *ara*, bass.)

21. EPINEPHELUS SEPTEMFASCIATUS (Thunberg).

HAKAMA <sup>a</sup> ARA (coat-skirt bass).

*Perca septemfasciata* THUNBERG, Vet. Acad. Handl. Stockholm, vol. 14, 1793, p. 56, pl. 1 (Nagasaki).

*Plectropoma susuki* CUVIER and VALENCIENNES, Hist. Nat. Poiss., vol. 2, 1828, p. 404 (Japan).—TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 11, pl.

<sup>a</sup> Hakama is the skirt of a garment like a coat, worn by men in Japan.

4, fig. 1 (Nagasaki).—RICHARDSON, Ichth. China, 1846, p. 230 (Coasts of China, authority of Mr. Reeves).—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 160 (after Temminck and Schlegel).—?GÜNTHER, Proc. Zool. Soc., 1867, p. 100 (Sydney, Australia).—NYSTRÖM, Svensk. Vet. Akad. Handl., vol. 13, Afd. 4, no. 4, 1887, p. 5 (Nagasaki).—?MACLEAY, Proc. Linn. Soc. N. S. W., vol. 5, 1880-81, p. 323 (Port Jackson, probably an error).

*Serranus octocinctus* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., p. 7, pl. 4 A., fig. 2, 1842 (Nagasaki).—BLEEKER, Nieuwe Nalez. Japan, 1857, p. 62 (Nagasaki).—GÜNTHER, Shore Fish. Challenger, 1880, p. 63 (Yokohama).

*Serranus susuki* STEINDACHNER and DÖDERLEIN, Beitr. Japan, vol. 1, 1883, p. 230 (Kagoshima, Tokyo, Nagasaki).

*Serranus mystacinus* (not of Poey) NAMIYE, Class. Cat., 1881, p. 93 (Tokyo markets).—ISHIKAWA, Prel. Cat., 1897, p. 56 (Tokyo).

*Epinephelus septemfasciatus* JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 354 (Tokyo); p. 751 (Sasuna, Tsushima).—BOULENGER, Cat. Fishes, vol. 1, 1895, p. 226 (part only) (Yokohama).

(Coasts of southern Japan, generally common.)

Head 2.5; depth 3; eye 5.4 in head, 2.66 in maxillary; dorsal XI, 14 or 15; anal II, 9; scales 18-110-44; nose 3.8 in head; maxillary extending barely to or scarcely past back of orbit, 2.16 in head, 1.16 in pectoral; interorbital space elevated, strongly convex, the top of the eye a pupil's width below level of the bridge; width of bridge 1 to 1.25 times eye. Body comparatively thin and deep; dorsal outline more arched than ventral; profile broadly convex, the descent over eye rather steep. Teeth in sides of lower jaw in two rows; canines moderate; posterior nostril about twice size of anterior; angle of preopercle moderately produced, with several moderate points, some of these often bicuspid; lower face of preopercle with one or two downwardly or antroresely directed points, set at some distance anterior to the teeth of the angle; upper opercular spine much farther from middle spine than is lower; gill-rakers 12+2 or 3 rudiments. Cheeks, opercles, top of head, lower jaws, and chin with fine scales; a small patch of very fine scales near tip of maxillary. Origin of dorsal midway between gill-opening and insertion of pectoral; longest dorsal spine 2.75 in head; longest soft ray 1.4 in length of base of soft dorsal; caudal rounded; pectorals 1.75 in head; ventrals 1.9 to 2.1.

Color in spirits light reddish brown, the body crossed by seven transverse bands of darker color, the width of the bands greater than diameter of orbit; the sixth band (counting backward) presents the appearance of a double or split band, and extends from middle of soft dorsal to middle of anal; the seventh band is broader and darker than the others (twice eye), and covers the top of the caudal peduncle nearly to the caudal fin, and extends a short distance on the membranes of the soft dorsal; all body bands in front of caudal peduncle may extend a short distance into dorsal membranes; soft dorsal, caudal, and anal with narrow pale edges; remainder of anal and

ventrals dusky; pectorals pale; a black mustache-like streak along along lower face of suborbital, partly covered by the folded maxillary.

Of this common species we have 25 specimens—eight, 6 to 11 inches long, from Tokyo; one, 6 inches, from Nagasaki; fourteen, 2 inches, from Misaki; one, 6 inches, from Kobe; one, 3 inches, from Tsuruga. It stands next to *E. akaara* in abundance in Japan.

This species is very close to *Epinephelus mystacinus* of the West Indies.

(*septem*, seven; *fasciatus*, banded.)

22. EPINEPHELUS TSIRIMENARA (Temminck and Schlegel).

AKAHATA (red bass) (red flag); TSIRIMENARA (crape bass).

*Serranus tsirimenara* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 7, pl. 4 A, fig. 3 (Japan).—GÜNTHER, Cat. Fishes, 1859, p. 144 (after Bleeker).—BLEEKER, Nieuwe Nalez., Japan, 1857, p. 62 (Nagasaki).—STEINDACHNER and DÖDERLEIN, Beitr. Japan, vol. 1, 1883, p. 24 (Tokyo, Kochi).—NYSTRÖM, Svensk. Vet. Akad. Handl., vol. 13, Afd. 4, No. 4, p. 6 (Nagasaki).—NAMIYE, Class. Cat., 1881, p. 93 (Tokyo).—ISHIKAWA, Prel. Cat., 1897, p. 56 (Tokyo).  
*Serranus marginalis* RICHARDSON, Ichth. China, 1846, p. 233 (China, Japan, etc.) (Not *S. marginalis* of Cuvier and Valenciennes, a closely related species in the East Indies=*Epinephelus fasciatus* Forskål).

*Epinephelus fasciatus* JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 354 (Tokyo). (Not=*Perea fasciata* Forskål, a species of the East Indian fauna.)

*Epinephelus tsirimenara* SMITH and POPE, Proc. U. S. Nat. Mus., vol. 31, 1906, p. 468 (Kochi).

(Coasts of southern Japan; rather common in open waters.)

Head 2.4; depth 3.2; eye 5.7 in head, 2.6 in maxillary; dorsal XI, 15 or 16; anal III, 8; scales 14–108–38; nose 4.1 in head; maxillary extending well past back of orbit, 2.27 in head, 1.25 in pectoral; interorbital space flattish, scarcely elevated above rim of orbit, 1.16 in eye. Dorsal and ventral outlines unsymmetrical; greatest elevation of back in front of first dorsal spine; profile uneven, the depression over eye marked; snout moderately pointed; lower jaw projecting width of lip. Teeth in sides of lower jaw in two rows; canines in upper jaw stoutish; nostrils subequal; preopercular angle little prominent, furnished with 5 or 6 short serratures; opercular spines equidistant; flap bluntly pointed, directed rather downward; gill-rakers 12+3 rudiments. Top of head, cheeks, opercles, and lower jaws covered with very fine scales; maxillary and premaxillary smooth or with extremely fine embedded scales. Dorsal fin originating above base of pectoral; longest dorsal spine 3.25 in head; longest soft ray 1.4 in length of base of fin; caudal rounded, with slightly squarish angles; pectoral 1.75 in head; ventral 2.25.

Color in life bright rose-red, in spirits straw to light brownish, the head and nape inclined to dusky; an irregular blackish rim encircling lower half of orbit; a short black streak on forward edge of cheek; each side with two longitudinal rows of elongate white blotches (4 or



5 in a row); and with as many faint transverse bands of dusky, including within them the white spots, as there are of the latter; membranes of spinous dorsal each with a triangular black blotch, tipping fin; along each side of base of spinous dorsal a row of smaller blackish streaks; caudal, anal, ventrals, and pectorals uniform, yellowish.

Of this abundant species we have thirteen specimens—one, 13.5 inches long, from Nagasaki; three, 2 inches, from Tokyo; nine, 4 to 8 inches, from Wakanoura. It is found in rather deep clear water in the southern bays. It has been identified by most recent writers with *Epinephelus fasciatus* of the South Seas.

As compared with a specimen of *E. fasciatus* 12 inches long from Lord Howe Island, our Japanese specimens differ in having the depth slightly less, the maxillary a very little shorter, gill-rakers fewer (by two rudiments), and in having the anterior triangular

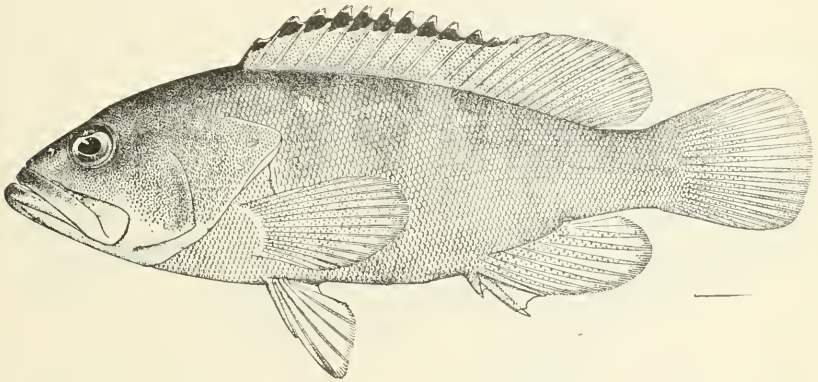


FIG. 13.—EPINEPHELUS TSIRIMENARA.

dorsal blotches as deep as long (the Lord Howe specimen having all the blotches longer than deep). Specimens from Queensland are said by Mr. J. Douglas Ogilby to have the body deeper (2.45-2.90), head longer (2.35-2.60), maxillary longer (beyond eye), and gill-rakers in greater number (18) than specimens from the tropical Pacific.

(*tsirimen*, crape, which may be red; *ara*, bass).

#### 11. Genus TRISOTROPIS Gill.

*Trisotropis* GILL, Proc. Acad. Nat. Sci. Phila., 1865, p. 104 (*guttatus*=*venenosus*).

*Parepincephelus* BLEEKER, Systema Percarum Revisum, 1875, p. 257 (*acutirostris*).

*Archoperca* JORDAN and EVERMANN, Fish. North Middle America, vol. 1, 1898, p. 1169 (*boulengeri*).

Cranium broad and transversely concave between the eyes, its lateral crests very strong, nearly parallel with the supraoccipital crest and extending much farther forward than the latter, joining

the supraocular crest above the eye, the supraoccipital crest not extending on the frontals; premaxillaries not extending backward to the frontals; lower jaw strongly projecting; anal fin elongate, with 10 to 12 soft rays; caudal lunate or rounded; spines of fins slender, none of them much elevated; scales small, mostly cycloid, those on the lateral line simple; pyloric caeca few; gill-rakers various; nostrils small, well separated, subequal. Otherwise essentially as in *Epinephelus*, from which genus *Trisotropis* is well separated by the structure of the skull, and superficially by the longer anal, larger mouth, and more slender fin rays. Food fishes of the Tropics, mostly American.

We here separate *Trisotropis* as a genus distinct from *Mycteroperca*, with which it agrees in general characters, but the posterior nostril in *Mycteroperca* is much larger than the anterior, while in *Trisotropis* the nostrils are essentially as in *Epinephelus*. The single Japanese species belongs to the subgenus, *Archoperca*, defined by the deep,

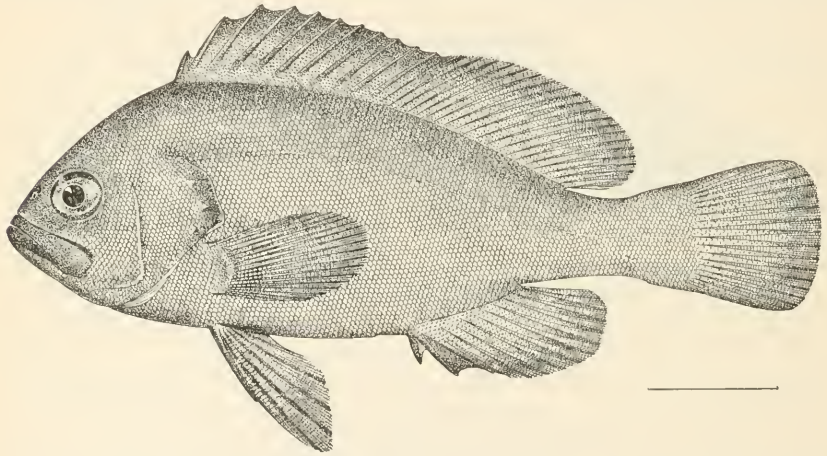


FIG. 14.—TRISOTROPIS DERMOPTERUS.

compressed body and the relatively short and high anal fin. The gill-rakers are few, as in the subgenus *Trisotropis* and in *Epinephelus*. In *Parepinephelus* the gill-rakers are numerous and long.

(τρειςος, three; ισος, equal; τροπιαι, keel, from the three parallel keels on the top of the skull, a character which distinguishes *Trisotropis* from *Epinephelus*.)

### 23. TRISOTROPIS DERMOPTERUS (Temminck and Schlegel).

*Serranus dermopterus* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 10 (Nagasaki).—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 154 (after Temminck and Schlegel).—STEINDACHNER and DÖDERLEIN, Denkschr. Akad. Wien, vol. 59, 1892, p. 359, pl. 2, fig. 1.

*Epinephelus dermopterus* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 269 (China).

Head 3.3 in length; depth 2.65; eye 4 in head, 1.7 in maxillary; dorsal XI, 21; anal III, 10; scales 27–140–66; pores 70; nose 4 in

head; maxillary reaching vertical from back of pupil, 2.25 in head, 1.66 in pectoral; interorbital space strongly convex, 1.2 times diameter of eye. Body strongly compressed; back elevated, highest under first dorsal spine; profile convex; nape prominent; lower jaw longest. Teeth in two series in sides of lower jaw; canines rather small; preopercle with fine serrae on posterior margin, the angle nearly a right angle, with 3 or 4 enlarged points; lower margin without serratures; middle spine of opercle longest, nearer lower spine than upper; opercular flap pointed, the point nearer axil of pectoral than lateral line; gill-rakers 16 to 17. Cheeks and opercles and top of head scaled, those on opercle rather larger than scales on body; lower jaw with some very fine embedded scales; scales ciliated. Spinous dorsal originating far forward, the first spine inserted nearly over upper corner of gill-opening; longest dorsal spine (the fourth) 2.3 in head; fourth spine and those behind it subequal; height of soft dorsal 1.6 in head; caudal subtruncate; anal not angulated; pectoral 1.25 in head; ventral 1.16, barely reaching vent.

Color, in spirits, uniform dark purplish brown; fins blackish, the caudal, anal and pectorals with a faint narrow pale edge.

Of this species we have three specimens from Wakanoura, the largest 6.25 inches in total length. Doctor Boulenger states that it grows to more than 1 foot in length. This species is quite unlike the other Japanese *Epinephelinae*, being closely related to *Trisotropis* (*Archoperca*) *boulengeri* of the west coast of Mexico.

(ὄξρμα, skin; πτερών, fin.)

## 12. Genus CHELIDOPERCA Boulenger.

*Chelidoperca* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 304 (*hirundinacea*).

Body elongate, moderately compressed; mouth large, protractile; maxillary without evident supplemental bone; jaws with broad bands of villiform teeth, some of the inner ones in middle of upper jaw depressible; teeth on vomer and palatines; tongue smooth; preopercle serrate; opercle with two spines; gill-rakers moderate; branchiostegals seven; scales moderate, thin, irregularly ciliate; head partly scaled, the tip of snout, maxillaries, and front of chin naked; lateral line complete; dorsal fins confluent; dorsal spines 10; spinous and soft dorsal subequal in length; anal III, 6; caudal lunate; ventrals anterior to pectorals, close together, with a moderate spine; pectorals pointed.

“Posterior processes of premaxillaries not extending to the frontals; supraoccipital and parietal crests short, smooth area of cranium extending posteriorly to a line connecting the preopercular borders.” (Boulenger.)

Western Pacific and Indian oceans; two species.

(χελιδών, swallow; πέρκη, perch.)

## 24. CHELIDOPERCA HIRUNDINACEA (Cuvier and Valenciennes).

HIMEKODAI:<sup>a</sup> (Princess-perch).

*Centropristis hirundinaceus* CUVIER and VALENCIENNES, vol. 7, 1831, p. 450 (Japan).—TEMMINCK and SCHLEGEL, Faun. Japon., Pisc., 1842, p. 14, pl. 5, fig. 1 (Nagasaki).—GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 87.—BLEEKER, Acta Soc. Ind Neerl., vol. 8, 1860, p. 75 (Japan).—STEINDACHNER and DÖDERLEIN, Denkschr. Akad. Wien, vol. 47, 1883, p. 233 (Tokyo).—NYSTRÖM, Svensk. Vet. Akad. Handl., vol. 13, pt. 4, no. 4, 1887, p. 7 (Nagasaki).—NAMIYE, Class. Cat., 1881, p. 93 (Tokyo).—ISHIKAWA, Prel. Cat., 1897, p. 57 (Tokyo).

*Chelidoperca hirundinacea* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 305.—JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 751 (Yokohama).—SMITH and POPE, Proc. U. S. Nat. Mus., vol. 31, 1906, p. 468 (Kochi; Urado).

*Centropristes pleurospilus* GÜNTHER, Shore Fish, Challenger, 1880, p. 37, pl. 16, fig. 2 (Arafura Sea).

(Coast of southern Japan and southward.)

Head 3; depth 3.75; depth caudal peduncle 2.8 in head; eye 3.5; snout 3.75; interorbital space flat, 2.5 in eye; maxillary 1.9 in head, width of its extremity 2 in eye; dorsal X, 10; anal III, 6; scales 4-47-12. Form elongate, moderately compressed, back little elevated; profile slightly convex; muzzle pointed; mouth large, low, little oblique; maxillary not reaching to opposite back of orbit; lower jaw prominently projecting, the anterior teeth not entirely covered when mouth is closed. Jaws with bands of villiform teeth; tongue smooth; nostrils subequal, the anterior with conspicuous flaps; preopercle rounded, with small sharp, evenly placed serratures behind and below; opercle with two sharp spines; gill-rakers 12, including rudiments, the longest about equal to the corresponding filaments. Scales unevenly ciliate, thin and somewhat deciduous; cheeks and opercles, parietal frontal region and most of chin scaled; nose and maxillaries naked. Spinous dorsal inserted a very little behind base of pectoral; dorsal spines slender and flexible, the fourth or fifth longest, 2.65 in head; caudal emarginate, the upper rays somewhat produced; anal spines feeble, the third little more than half length of first soft ray; ventrals inserted in front of pectorals, their length 1.4 in head, nearly reaching vent (specimen 6 inches); pectorals pointed, 1.3 in head, reaching to vent.

Color in spirits light olive, with tinge of purplish; in life rosy, with a yellow lateral stripe; young specimens are said to have a series of four or five oblong black spots along the side of the body; spinous and soft dorsal spotted.

Of this species we have two specimens, one 6 inches long, from Suruga Bay, and one 5 inches, from Yokohama market, doubtless from Sagami Bay. The species is rather rare in the Kuro Shiwo.

(*hirundinaceus*, like a swallow.)

<sup>a</sup> *Hime*, daughter of a daimio.

## 13. Genus SAYONARA Jordan and Seale.

*Sayonara* JORDAN and SEALE, Proc. U. S. Nat. Mus., vol. 30, 1906, p. 145 (*satsumæ*).

Body robust, moderately elongate; mouth large, protractile; maxillary without supplemental bone; minute teeth in jaws and on vomer and palatines; upper jaw with a few enlarged teeth; tongue and pterygoids toothless; preopercle finely and evenly serrated; opercle with three flat points; gill-rakers moderate; branchiostegals seven; scales rather large, ciliate; entire head scaly; lateral line complete, high, its tubes simple, not angulated at base of caudal peduncle; dorsal deeply notched, its spines 10, all low, first and last short; spinous and soft portions subequal in length, without filamentous rays; anal III, 7; caudal convex; ventrals short, anterior to pectorals, close together, with a rather weak spine; pectorals subsymmetrical, blunted pointed. This genus is evidently allied to *Serranus*, but it differs from other genera of its type by the divided dorsal and the scaly jaws.

(*sayonara*, "if it must be"—the common good-by salutation of the Japanese.)

## 25. SAYONARA SATSUMÆ Jordan and Seale.

*Sayonara satsumæ* JORDAN and SEALE, Proc. U. S. Nat. Mus., vol. 30, 1906, p. 145 with figure (Yamagawa, near Kagoshima).

*Sayonara mitsukurii* SMITH and POPE, Proc. U. S. Nat. Mus., vol. 31, 1906, p. 469 with figure (Kagoshima).

Head 2.3 in length; depth 2.8; depth caudal peduncle 2.8 in head; eye 4.8; snout 4; interorbital space nearly flat, 1.65 in eye; maxillary 1.8 in head, width of its extremity 1.5 in eye; dorsal X, 15; anal III, 7; scales 2-33-12. Body rather short, not greatly compressed; profile convex; mouth large, oblique; maxillary extending to vertical from back of orbit; jaws subequal; minute teeth in bands in both jaws; upper jaw with two of the outer teeth on either side of symphysis enlarged; preopercle and lower margin of interopercle and preopercle finely and evenly serrated, no plectroid spines on preopercle; opercle with three short flat spines; gill-rakers rather short, 11 or 12 on lower limb of outer arch, the 5 lowermost rudimentary, the longest of the others somewhat shorter than the filaments. Scales large, ciliate; head scaly, including snout, maxillaries, and lower jaw; lateral line complete, running high, without angle under last dorsal rays; tubules of first 20 scales short, simple, occupying anterior half of scale only, those of scales farther back longer; soft dorsal scaly at base. Spinous dorsal inserted in advance of pectorals; third to sixth spine longest, third 3.75 in head; remaining spines gradually shorter to the tenth, which is as short as the first; soft dorsal higher, longest

ray 2.1 in head; longest anal ray 2.3 in head; second anal spine 3.3 in head; caudal convex; ventrals inserted in advance of upper axil of pectorals their length 1.7 in head, nearly reaching vent; pectoral long, subsymmetrical, its lower rays reaching to middle of anal.

Color bright red in life. In spirits yellowish white, with about three very indistinct whitish longitudinal streaks on side; fins pale, unmarked.

Known from the type, a specimen 6.25 inches long, taken at Yamagawa, near Kagoshima, above described. A second specimen, apparently of the same species, from the same locality has been named *Sayonara mitsukurii*. The differences seem to us to be due in part to the small size of the specimen of Smith and Pope and in part to errors in the figure of the typical species.

The nominal species, *Sayonara mitsukurii*, is said by the authors to differ from *Sayonara satsumæ*, as figured and described, in its

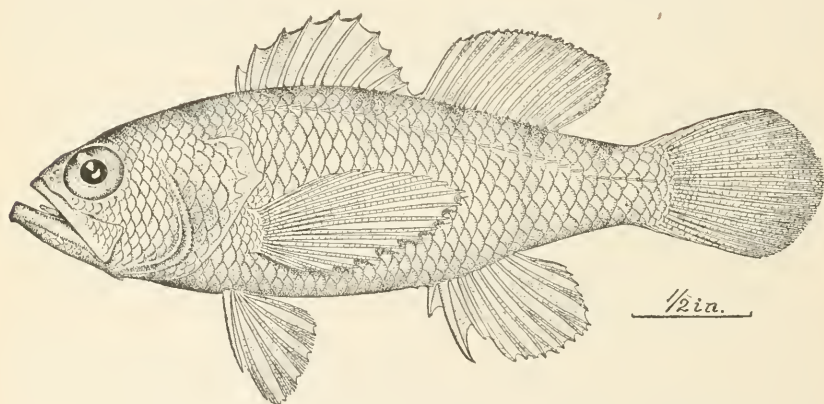


FIG. 15.—*SAYONARA SATSUMÆ* (TYPE OF *SAYONARA MITSUKURII*).

larger eye, longer tubules in lateral line, long and slender gill-rakers, higher dorsal fins, unbranched pectoral rays and color. We note that the youth and small size ( $2\frac{7}{8}$  inches) of Smith and Pope's specimen may explain its slightly larger eye, higher dorsal fins, unbranched pectoral rays, and traces of dark cross bands. The type of *Sayonara satsumæ* has some of the pectoral rays not at all branched and the others branched only very far out toward their ends. The drawing of *Sayonara satsumæ* incorrectly represents the length of the tubules of the scales in the posterior half of the lateral line; shows the opercular spines rather too much concealed; and represents somewhat too small the scales on suborbitals and maxillaries. The statement in the description of *S. satsumæ* that the gill-rakers are "short" is hardly accurate, the longest being nearly equal to the corresponding filaments. Only a careful comparison of the types of the two species will show whether they are really distinct, but the probabilities are in favor of their identity.

(*Satsuma*, a province of southern Japan famous in Japanese history; its chief port is Kagoshima.)

14. Genus CAPRODON Temminck and Schlegel.

*Caprodon* TEMMINCK and SCHLEGEL, Fauna Japonica Pisces, 1842, p. 64 (type afterwards named *schlegelii*).

*Neoanthias* CASTELNAU, Proc. Linn. Soc. N. S. W., vol. 3, 1878, p. 367 (*güntheri*=*longimanus*).

Body strongly compressed covered with moderate, rough scales; lateral line complete, running high, the tube bifurcate; mouth rather large; canines small; teeth on entopterygoids and tongue; head entirely scaly. Preopercle denticulate; opercle with 3 spines; 7 branchiostegals. Dorsal continuous, scaly at base, the rays X, 20, the spinous and soft parts about equal. Anal short, III, 8 or 9. Ventrals below pectorals. Colors brilliant. Tropical Pacific.

(*κάρπος*, boar; *ὀδοός* tooth.)

26. CAPRODON SCHLEGELII (Günther).

AKASAGI (red heron = red bass).

*Caprodon* TEMMINCK and SCHLEGEL, Faun. Japon., Pisc. 1842, p. 64, pl. 30 (Nagasaki).

*Anthias schlegelii* GÜNTHER, Cat. Fishes, vol. 1, 1859, p. 93 (after Temminck and Schlegel).—ISHIKAWA, Prel. Cat., 1897, p. 57 (Izu).

*Anthias (Caprodon) schlegelii* STEINDACHNER and DÖDERLEIN, Denkschr. Akad. Wien, vol. 47, 1883, p. 225 (Tokyo).

*Caprodon schlegelii* BOULENGER, Cat. Fishes, vol. 1, 1895, p. 314.—JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 354 (Tokyo); Bull. U. S. Bur. Fish., vol. 26, 1906, p. 211, pl. 12, fig. 1 (Honolulu).—REGAN, Ann. Mag. Nat. Hist., 7th ser., vol. 15, 1905, p. 18 (Inland Sea of Japan).

Head 3.3; depth 2.75; depth caudal peduncle 3 in head; eye 3.6; snout 3.8, a little shorter than eye; interorbital space convex 3.2; maxillary 2.2 in head, width of its extremity 1.75 in eye; dorsal X, 19 or 20; anal III, 8 or 9; scales 6 or 8–60 to 65–20 to 23. Form oblong, compressed; back evenly curved and moderately elevated; profile convex; mouth moderate, oblique; maxillary reaching past front of pupil; lower jaw projecting; anterior teeth exposed when mouth is closed; villiform teeth in jaws, and on vomer, palatines, entopterygoids, and tongue; a pair of small anteriorly directed canines in both upper and lower jaw at symphysis; on each side of lower jaw, opposite symphyseal valve, a short row of backwardly pointed canines; posterior nostril larger than anterior; angle of preopercle rounded, its posterior and lower border finely denticulated; opercle with but two evident spines; gill-rakers 22 or 23, the longest about 1.2 in length of corresponding filaments. Scales rough, ciliate, adherent; head entirely scaled, including mandibles and maxillaries; small scales on bases of fins, extending far out on membranes, those of spinous dorsal forming a distinct sheath whose height is more than

half that of the spines. Spinous dorsal inserted slightly in advance of pectoral; dorsal spines strong, the fourth to seventh longest, 2.8 in head; caudal weakly emarginate or truncate; second and third anal spines subequal, very strong, 3.5 in head; ventrals inserted behind pectorals, 1.6 in head; pectorals longer than head, unsymmetrical, the upper rays shortened, the eighth to thirteenth conspicuously elongated, the tip of reflexed pectoral reaching nearly or quite to base of anal.

Our Japanese specimens are plain straw color in spirits, without traces of the original color pattern. The types from Japan were pink, with a yellow stripe above eye, a double yellow stripe through it to tip of snout, and two faint oblique yellow streaks across opercle; upper half of body with numerous round greenish blotches, only slightly darker than the ground color; anal with round yellow spots; back of spinous dorsal with a few irregular blackish blotches; all fins yellow outwardly. A specimen taken by Doctor Jordan at Honolulu in 1905,<sup>a</sup> and figured in color, does not differ in any essential respect from this description.

Of this species we have specimens as follows: Four from Misaki, 10 inches, two 8 inches, and one 6 inches, and one from Awa, 8 inches. A specimen from Honolulu figured in color by Jordan and Snyder agrees with the Japanese fish. The species is rare, and lives in rather deep water.

(Named for Prof. H. Schlegel of Leyden, the accomplished author of a large part of the Fauna Japonica.)

### 15. Genus ANTHIAS Bloch.

*Anthias* BLOCH, *Ausländische Fische*, vol. 6, 1792, p. 97 (*anthias*).

*Aylopon* RAFINESQUE, *Carattere di Alcuni Nuovi Generi*, 1810, p. 52 (*anthias*); the generic name *Anthias* regarded as preoccupied by *Anthia*, a genus of beetles (1801).

*Sacura* JORDAN and RICHARDSON, new subgenus (*margaritaceus*).

Body oblong, strongly compressed; scales moderate or rather large, ciliate; lateral line complete, angulate below last rays of dorsal, the tubes straight or with an ascending tubule, and extending along nearly the entire scale; jaws and front scaly; mouth large; maxillary surface scaly; jaws with villiform teeth, intermixed with curved canines; a small group of teeth on the vomer and a narrow series on each palatine; tongue smooth or with a few teeth; head entirely scaled; preopercle serrate, the teeth near the angle enlarged, without antrorse teeth on the lower border; opercle with 2 or 3 spines; 7 branchiostegals; gill-rakers very long and slender; dorsal fin not notched, with X, 12 to 18 rays, the spinous portion about equal to the soft; third dorsal spine produced; anal short, III, 6 to 8;

<sup>a</sup> Jordan and Snyder, *Bull. U. S. Bur. Fish.*, vol. 26, 1906, pl. 12, fig. 1.



caudal lunate, with filamentous lobes; pectoral obtuse-pointed, sub-symmetrical, rays 17 or 18; ventrals below pectorals, close together, each with a strong spine, the soft rays much produced in the typical species; posterior processes of premaxillaries extending to between the frontals; frontals very convex, with a transverse ridge behind, between the posterior borders of the orbits and in front of the very strong supraoccipital crest; parietal crests feeble; vertebræ 10 + 15 or 16 = 25 or 26. Tropical seas; the typical species (*Anthias anthias*, Linnæus) a well-known inhabitant of the Mediterranean. The Japanese species differs from the type of the genus in having the ventrals not produced in a ribbon-like expansion; in the slender caudal peduncle and more elevated nape and in the production of the second soft ray of the dorsal. It may be regarded as forming a distinct subgenus, *Sacura*, from the Japanese name, *Sakuradai*, *Sakura* being the Japanese cherry.

(*anthias*, ancient name of some large fish, perhaps the Albacore, apparently from *ἄθος*, a flower.)

27. ANTHIAS MARGARITACEUS Hilgendorf.

SAKURADAI (cherry-porgy).

*Anthias margaritaceus* HILGENDORF, Sitzb. Ges. Naturf. Fr., 1879, p. 78 (Japan, probably Sagami Bay).—STEINDACHNER and DÖDERLEIN, Denkschr. Akad. Wien, vol. 47, 1883, p. 225, pl. 3, fig. 1 (Tokyo, exact locality not given, probably Sagami Bay).—NYSTRÖM, Svensk. Vet. Akad. Handl., vol. 13, pt. 4, No. 4, 1887, p. 5 (Nagasaki).—ISHIKAWA, Prel. Cat., 1897, p. 57 (Tokyo, Boshu).—BOULENGER, Cat. Fishes, vol. 1, 1895, p. 327 (Tokyo).

(Coasts of Japan, in rather deep water.)

“Dorsal X, 17 or 18; anal III, 7 or 8; scales 4–42 to 45–15; lateral line 27 to 30. Depth of body  $2\frac{1}{2}$  times in total length; length of head  $2\frac{1}{2}$  to 3 times. Snout scaly, slightly convex, shorter than diameter of eye, which is 3 to  $3\frac{1}{2}$  times in length of head, and equals interorbital width; lower jaw projecting, partly scaled; maxillary scaly, extending to below center of eye, or slightly beyond, the width of its distal extremity three-fifths to two-thirds diameter of eye; two or three strong spines at angle of preopercle; three opercular spines; 23 gill-rakers on lower part of anterior arch. Dorsal originating above post-temporal; first and second spines shortest, third longest in the adult, nearly twice as long as the fourth and ending in a filament; no notch between spinous and soft portions; soft dorsal not deeper than spinous; third ray produced in a long filament. Pectoral nearly as long as head. Ventral as long as or a little shorter than pectoral, reaching anal. Anal spines strong, first shortest, second longest and strongest; anterior soft rays longest. Caudal deeply emarginate, crescentic, with the outer rays much produced and ending in long filaments. Lateral line forming an angle below the last dorsal rays. Color red, with two longitudinal series of mother-of-pearl spots on each side, and a streak

of the same color from below the eye to the base of the pectoral; base of dorsal brown or blackish; a black blotch may be present between the last four dorsal spines." (Boulenger.)

We have no specimens of this beautiful species. It is said to reach a length of 14 to 21 cm.

(*margaritaceus*, pearly.)

#### 16. Genus PSEUDANTHIAS Bleeker.

*Pseudanthias* BLEEKER, Poissons Réunion et Madagascar, Ned. Tijds. Dierk., vol. 4, 1872, p. 156 (*pleurotenia*).

*Zalanthias* JORDAN and RICHARDSON, new subgenus (*kelloggi*).

Body oblong, moderately compressed; mouth large; canines moderate; tongue toothless; snout and maxillary scaly; preopercle serrate, the angle rounded, the teeth at angle enlarged in typical species, obsolete in the Japanese species; scales large ctenoid, lateral line passing gradually to the tail, not forming a sharp angle under the last rays of the dorsal; gill-rakers numerous, slender; third dorsal spine highest, dorsal fin with a slight notch, if any; caudal lunate, or subtruncate with produced lobes; anal short, with three spines; ventral fin not produced, inserted below pectorals; third dorsal spine, first or second soft ray and one or both lobes of caudal sometimes produced in filaments.

This genus differs from *Anthias* chiefly in the lack of distinct angle in the lateral line, and in the short ventral fin. The Japanese species, with the Hawaiian *Pseudanthias kelloggi*, differ from the East Indian species of *Pseudanthias* in having the angle of the preopercle rounded and entire, and in having the dorsal fin notched, the last spine of the dorsal being much shorter than the first ray. They may constitute a distinct subgenus, *Zalanthias*, of which *Pseudanthias kelloggi* may be taken as type.

(*ψευδοῦς*, false; *Anthias*.)

#### 28. PSEUDANTHIAS AZUMANUS Jordan and Richardson, new name.

AKAHATA (red flag).

*Anthias japonicus* DÖDERLEIN, in Steindachner and Döderlein, Denkschr. Akad. Wien, vol. 47, 1883, p. 227, pl. 3, fig. 2 (Tokyo, doubtless Sagami Bay).—NYSTRÖM, Svensk. Vet. Akad. Handl., vol. 13, pt. 4, No. 4, 1887, p. 5 (Nagasaki).—BOULENGER, Cat. Fishes, vol. 1, 1895, p. 328 (Bay of Tokyo). (Name preoccupied by *Anthias japonicus* Bloch, which is *Scolopsis japonica*).

*Pseudanthias japonicus* JORDAN and EVERMANN, Bull. U. S. Fish Comm., vol. 23, 1903, p. 227 (Sagami Bay).

(Coast of Southern Japan.)

Head 2.6; depth 2.5 to 2.6; depth of caudal peduncle 3 in head; eye 3.4; snout 3.6; interorbital space 1.5 in eye, scarcely convex; maxillary 2 in head; width of its extremity 1.6 in eye; dorsal X, 15; anal III, 7; scales 2 or 3-37 to 38-12. Oblong, compressed; back considerably

elevated; profile convex; snout pointed; mouth large, oblique; maxillary reaching vertical from back of pupil; lower jaw slightly projecting; a pair of small canines in upper and lower jaw at symphysis; a strong backwardly directed canine in each side of lower jaw anterior to its middle; tongue and entopterygoids toothless; nostrils subequal; border of preopercle rounded, finely denticulated; opercle with 3 flat points; gill-rakers 14, the longest about equal to the corresponding filaments. Scales ciliate, adherent; head entirely scaled, including mandibles, chin, and maxillaries; scaled encroaching on bases of soft fins but not of spinous dorsal; lateral line normally curved, not forming an angle under last dorsal rays. Dorsal originating very slightly in front of pectoral; dorsal spines strong, the fourth longest, 2 in head, the spines shortening backward, the last being only about half the height of the soft rays, the second of which is elongated and filamentous; caudal weakly emarginate, the upper rays produced, filamentous; anal spines strong, the second longest, 2.1 in head; ventrals inserted under pectorals, 1.5 in head; pectorals subsymmetrical, pointed, as long as head, reaching past base of anal. Color yellowish red, probably scarlet in life.

Of this species we have four specimens, 3 to 4 inches long, dredged in Sagami Bay. It lives in rather deep water.

(*Azuma*, a poetical name for Japan.)

#### 17. Genus TOSANA Smith and Pope.

*Tosana* SMITH and POPE, Proc. U. S. Nat. Mus., vol. 31, 1906, p. 470 (*niwa*).

Body elongate, moderately compressed, with short, blunt head; dorsal single, without notch, the third spine much the longest, no rays filamentous; caudal crescentic, the lobes produced, upper lobe the longer; anal with the third spine longest; pectoral rays all undivided; scales large and strongly toothed, covering all parts of body and head; lateral line high, its tubes simple; no angle at base of caudal peduncle; preopercle with vertical limb evenly serrate, its lower margin entire; opercle with 3 flat spines; jaws with large, prominent, projecting canines; outer row of teeth in upper jaw canine-like, inner ones fine and villiform; teeth in lower jaw canine-like, in a single row; vomer and palatines with villiform teeth; tongue smooth; no supplemental maxillary; gill-rakers very long and slender; gill-membranes free from the narrow carinate isthmus. (Smith and Pope.)

This genus is said by the authors to differ from *Pseudanthias* Bleeker mainly in the unbranched pectoral rays and larger scales, and from *Pronotogrammus* Gill in the more posterior insertion of the ventrals, the closely scaled top of head, absence of preopercular spines, and dentition. It seems to be well separated from both, as also from *Dactylanthias*, which has likewise simple pectoral rays.

(*Tosa*, "brave youth," a province of Japan on the island of Shikoku, which includes Kochi and Urado.)

29. *TOSANA NIWÆ* Smith and Pope.

*Tosana niwæ* SMITH and POPE, Proc. U. S. Nat. Mus., vol. 31, 1906, p. 470, fig. 4  
(Urado Bay, Province of Tosa).

(Coast of southern Japan.)

Head 3.65 in length; depth 3.62; eye 3 in head; snout 5; inter-orbital 3.5; dorsal X, 15; anal III, 7; scales in lateral line 35. Body elongate, compressed, its greatest depth about equal to length of head; dorsal outline but gently arched, the ventral nearly straight; peduncle compressed, its least depth 2 in head; snout short and blunt, its length equal to 0.66 diameter of eye; mouth oblique; maxillary reaching to below middle of pupil, the width of its distal end more than half diameter of eye; mandible projecting; teeth in upper jaw in two series, the outer canine-like, the inner in a villiform band;

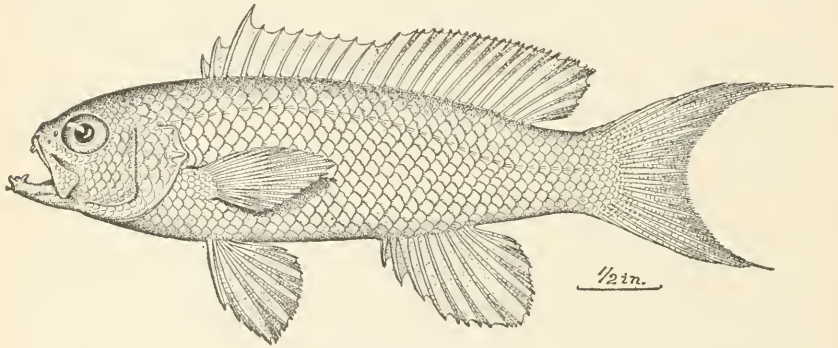


FIG. 16.—*TOSANA NIWÆ*.

on each side of the tip of the upper jaw one pair of long canines directed downward and another pair directed inward and backward; teeth in lower jaw a single row of canines, with 2 pairs of enlarged canines on each side of tip; a narrow band of small teeth on palatines, and a small patch on vomer; tongue smooth, pointed; preopercle with rounded angle, the upper limb serrate, the lower smooth; opercle with 3 flat spines, the middle longest; gill-rakers long and slender, 23 on lower limb of first arch; scales large, strongly toothed, fully covering body and head, about 6 rows on cheeks; lateral line high, concurrent with back, the tubules straight simple, and forming an obtuse angle under posterior end of dorsal fin; dorsal fin continuous, the third spine much the longest, half in head and nearly twice length of second, fourth to tenth subequal; soft rays of nearly equal length except last two, the longest considerably longer than third spine; anal shorter and deeper than soft dorsal; caudal deeply and evenly concave, the outer rays much produced, upper lobe longer;

pectorals and ventrals shorter than head. Color in alcohol rosy pink, lighter below; all fins yellowish. (Smith and Pope.)

At present known only from the type, a specimen 110 mm. long, collected in Urado Bay, in Tosa, in 1903.

(Named for H. Niwa, director of the Fishery Experiment Station at Kochi.)

#### SUMMARY.

##### Family SERRANIDÆ.

##### 1. *Malakichthys* Döderlein, 1883.

1. *griscus* Döderlein, 1883; Sagami Bay.

##### 2. *Diploprion* Kuhl and Van Hasselt, 1828.

2. *bifasciatus* Kuhl and Van Hasselt, 1828; Hakata, Wakanoura, Nagasaki.

##### 3. *Lateolabrax* Bleeker, 1857.

3. *japonicus* (Cuvier and Valenciennes) 1828; Same, Matsushima, Tokyo, Yokohama, Chikugo River, Kagoshima, Nagasaki, Kobe, Hiroshima, Onomichi, Hakata, Tsuruga, Port Arthur.

##### 4. *Nippon* Cuvier and Valenciennes, 1828.

4. *spinus* Cuvier and Valenciennes, 1828; Miaki, Tokyo.

##### 5. *Bryttosus* Jordan and Snyder, 1901.

5. *kawamebari* (Temminck and Schlegel), 1842; Yamagawa River, Funayado, Yobe R., Funayado.

##### 6. *Stereolepis* Ayres, 1859.

6. *ischinagi* (Hilgendorf), 1878; Otaru, Hakodate, Tokyo, Yokohama, Misaki.

##### 7. *Aulacocephalus* Temminck and Schlegel, 1842.

7. *temmincki* Bleeker, 1857; Okinose, Misaki.

##### 8. *Pikea* Steindachner, 1874.

##### § *Pikea*.

8. *maculata* Steindachner and Döderlein, 1883.

##### § *Labracopsis* Döderlein, 1883.

9. *japonica* Döderlein, 1883; Sagami Bay.

##### 9. *Plectropomus* (Cuvier), Oken, 1817.

10. *maculatus* (Bloch), 1790.

##### 10. *Epinephelus* Bloch, 1793.

11. *chlorostigma* (Cuvier and Valenciennes), 1828; Misaki, Wakanoura, Nagasaki.

12. *craspedurus* Jordan and Richardson, 1909; Kagoshima.

13. *megachir* (Richardson), 1846.

14. *akaara* (Temminck and Schlegel), 1842; Tsuruga, Hakata, Shimonoseki, Wakanoura, Hiroshima, Kobe, Onomichi, Nagasaki.

15. *fario* (Thunberg), 1792; Wakanoura, Nagasaki.

16. *latifasciatus* (Temminck and Schlegel), 1842.

17. *epistictus* (Temminck and Schlegel), 1842; Kagoshima, Nagasaki.  
18. *morrhua* (Cuvier and Valenciennes), 1833; Tokyo.  
19. *moara* (Temminck and Schlegel), 1842; Misaki, Wakanoura, Hakata, Nagasaki.  
20. *awoara* (Temminck and Schlegel), 1842.  
21. *septemfasciatus* (Thunberg), 1793; Misaki, Tokyo, Kobe, Tsuruga, Nagasaki.  
22. *tsirimenara* (Temminck and Schlegel), 1842; Tokyo, Wakanoura, Nagasaki.
11. *Trisotropis* Gill, 1865.  
§ *Archoperca* Jordan and Evermann, 1898.
23. *dermopterus* (Temminck and Schlegel) 1842; Wakanoura.  
12. *Chelidoperca* Boulenger, 1895.
24. *hirundinacea* (Cuvier and Valenciennes), 1831; Suruga Bay, Sagami Bay.  
13. *Sayonara* Jordan and Seale, 1906.
25. *satsumæ* Jordan and Seale, 1906; Kagoshima.  
14. *Caprodon* Temminck and Schlegel, 1842.
26. *schlegelii* Günther, 1859; Misaki, Awa.  
15. *Anthias* Bloch, 1792.  
§ *Sacura* Jordan and Richardson, 1909.
27. *margaritaceus* Hilgendorf, 1879.  
16. *Pseudanthias* Bleeker, 1872.  
§ *Zalanthias* Jordan and Richardson, 1909.
28. *azumanus* Jordan and Richardson, 1909; Sagami Bay.  
17. *Tosana* Smith and Pope, 1906.
29. *niwæ* Smith and Pope, 1906.