

- Mullus auriflamma* Forskål, Descript. Animal., 30, 1775, Djidda, Arabia.  
*Mullus flavolineatus* Lacépède, Hist. Nat. Poiss., III, 406, 1801, Ile de France.  
*Mullus aurovittatus* Shaw, General Zool., IV, 618, 1805, Indian Seas.  
*Upeneus flavolineatus*, Cuvier & Valenciennes, Hist. Nat. Poiss., III, 456, 1829 (Ile de France, Bourbon, Bouron, Borabora, Mussuah).  
*Upeneus zeylonicus* Cuvier & Valenciennes, Hist. Nat. Poiss., III, 459, 1829, Trinquemalo, Ceylon.  
*Upeneus auriflamma*, Cuvier & Valenciennes, Hist. Nat. Poiss., III, 461, 1829 (Red Sea).  
*Hypeneus flavolineatus*, Cantor, Cat. Malay. Fish., 36, 1850 (Sea of Pinang).  
*Mulloidides flavolineatus*, Bleeker, Nat. Tijds. Ned. Ind., III, 1852, 697 (Wahia).  
*Mulloidides zeylonicus*, Bleeker, Act. Soc. Sci. Ind. Neerl., VI, 1859, 8.  
*Mulloidides auriflamma*, Klunzinger, Verh. Zool. Bot. Ges. Wien, 1870, 742; Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 485 (Laysan; Honolulu); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 454 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 527 (Honolulu).

### 192. *Mulloidides erythrinus* Klunzinger.

Head 3.5 in length; depth 3.75; eye 3.33 in head; scales 42 or 43; eye large, .66 of snout, equaling the length of postorbital part of head and somewhat more than the width of interorbital; barbel reaching to under posterior edge of preopercle; first and second dorsal spines of equal length, flexible, .75 as high as head. Color in life, deep rose-red, back darker; a broad golden band from eye along middle of body to caudal; oblique yellow lines; fins scarlet to orange-red. Recorded from Laysan Island by Steindachner; not seen by us.

- Mulloidides ruber*, Klunzinger, Verh. Zool. Bot. Ges. Wien, 1870, 743 (Red Sea); not of Lacépède.  
 ?*Mulloidides flavolineatus*, Kner, Reis. Novara, Zool. in Zoologischer, I, 1869, 69 (Australia); not of Lacépède.  
*Mulloidides erythrinus* Klunzinger, Fische des rothen Meeres, I, 60, 1884, Red Sea; Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 485 (Laysan).

### 193. *Mulloidides pflugeri* Steindachner.

Head 3.6 in length; depth 3.6; eye 6 in head; snout 1.9; maxillary 2.6; interorbital 2.9; preorbital 3.8; D. VII-1, 8; A. 1, 6; scales 3-40-7.

Body moderately slender, not greatly arched; head large; snout long, slightly decurved; mouth moderate, slightly convex; maxillary not reaching front of orbit; teeth on jaws in villiform bands, none on palatines; eye small, high up; interorbital space broad, convex; preorbital oblique; scales deeper than long, moderately firm; lateral line following contour of back, the pores with few branches; origin of spinous dorsal posterior to base of pectoral, length of longest dorsal ray 1.6 in head; base of spinous dorsal 1.25 in longest ray, and slightly greater than interdorsal space, the latter being equal to base of soft dorsal.

Color in life, body, head, and barbels uniform bright red; dorsals, ventrals, and pectoral red, with tinge of yellow; caudal red but with yellow predominating; no yellow lateral band and no blue spot on side below spinous dorsal. Color in spirits, uniform dusky olivaceous and yellowish, with blotchings of rosy on head and lower part of side.

This species does not appear to be common, as only 2 examples were secured by us, No. 03529, 23 inches long, on August 4, 1901, and No. 04113, 21 inches long, both from the market at Honolulu.

These specimens seem close to what we have called *M. samoensis*, but differ in having 40 instead of 35 scales in the lateral line, and in the uniform red coloration, there being no evidence of a yellowish lateral band as in the other species. These specimens can not be *M. samoensis* because of the absence of a black lateral spot. They do not seem to be *M. preorbitalis* because of the smaller scales and different coloration. They are not *M. ruber (erythrinus)* as described by Günther in Fische der Südsee, because of the much larger eye and the presence of yellow bands in the latter species, which is also said to have no yellow on the fins.

*Mulloidides pflugeri* Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 485, plate 3, fig. 4, Honolulu.

### 194. *Mulloidides flammeus* Jordan & Evermann. "Weke ula ula." Fig. 104.

Head 3.6 in length; depth 4; eye 4.3 in head; snout 2.25; interorbital 3.5; maxillary 2.6; mandible 2.1; shortest distance from eye to upper edge of maxillary 1 in eye; D. VII-9, longest dorsal spine 1.75 in head, longest dorsal ray 2.6; A. 7, longest ray 2.7; scales 3-41-6; pectoral 1.5; ventral 1.4.

Body oblong, not much compressed; head heavy, broad, the interorbital space broad and slightly convex; snout rather long and pointed, not abruptly decurved; mouth rather large, somewhat oblique, the lower jaw but slightly included; maxillary broad, slipping for most of its length under the thin preorbital, its tip not reaching orbit by diameter of pupil; eye rather large, high, slightly posterior; gillrakers  $18 + 7$ , the longest about 2 in eye, serrate; opercular spine obscure in adult, more plainly developed in the young; origin of dorsal a little nearer posterior base of soft dorsal than tip of snout; distance between dorsals considerably less than snout, about 2.6 in head; anal similar to soft dorsal, its origin somewhat more posterior; ventrals rather long, reaching slightly beyond tip of pectoral; caudal deeply forked, the lobes equal, about 1.2 in head.

Color in life (field No. 03459), bright rose-red, with 5 broad crossbands of darker clear rose, which vanishes very soon after death; a very faint yellow lateral streak, with yellow shades on scales below; lower side of head rose, snout and lips very red; 2 wavy golden streaks from below eye to angle of mouth, lower conspicuous; first dorsal clear red; second dorsal deep red on the lower half, fading above; caudal deep red at base, fading outward; anal pink, pectoral light yellow; ventral creamy red; barbels red, paler toward tip; iris silvery.

A color note on specimens bearing field Nos. 03054 and 03055 says that they were rosy in life.

Color in alcohol, pale dirty olivaceous above, yellowish white on sides and belly; head yellowish olive above, pale on cheek and below; a yellowish band from snout under eye; fins all colorless, the

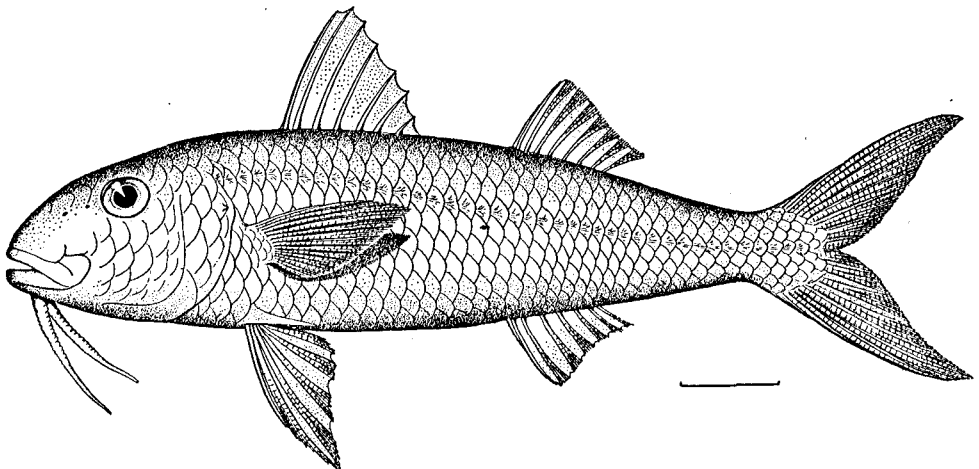


FIG. 104.—*Mulloides flammeus* Jordan & Evermann; from the type.

spinous dorsal slightly dusky, all with slight yellowish tinge; ventrals with the middle membranes blackish. Smaller examples show considerable rosy on the sides, indicating that the fish in life was probably red or rosy in color.

This species somewhat resembles *Mulloides auriflamma*, from which it differs in the smaller eye, larger, more oblique mouth, longer maxillary, the longer less decurved, more pointed snout, and fewer gillrakers. It bears some resemblance to *M. pflugeri*, but has the eye larger and the snout longer and more pointed. Compared with *M. samoensis*, it has a much larger and more oblique mouth, and a considerably longer maxillary, as well as a different coloration. It does not agree with any of the plates of Day, Günther, or Bleeker, nor with any current descriptions. In life its banded coloration gives it a very handsome appearance. It is found in deeper water than most of the other species.

*M. flammeus* seems to be fairly abundant, and is represented in our collections by 9 specimens from Honolulu, Hilo, and Kailua, ranging from 6 to 11.25 inches long.

*Mulloides flammeus* Jordan & Evermann, Bull. U. S. Fish Comm., XXII, 1902 (Apr. 11, 1903), 186, Kailua; Snyder, op. cit. (Jan. 19, 1904), 527 (Puako Bay, Hawaii).

195. *Mulloidés samoensis* Günther. "Weke;" "Weke a'a." Fig. 105.

Head 3.5 in length; depth 4; eye 4 in head; snout 2.35; interorbital 3.2; maxillary 3.4, shortest distance between maxillary and edge of eye 1.25 or less in eye; D. VII-9, longest spine 1.5 in head; A. 7, longest ray 2.5 in head; pectoral 1.5; ventral 1.6; scales 3-35-6, 37 pores; gillrakers 18+7.

Body oblong, compressed, deepest through anterior base of spinous dorsal; head moderate, compressed, the profile evenly arched from anterior base of spinous dorsal to tip of snout; snout bluntly pointed; lower jaw included; mouth small, slightly oblique; tongue short, rounded anteriorly, not broad or thick and not free anteriorly; teeth in a villiform band in each jaw, no teeth on vomer or palatines; maxillary short, 1.5 in snout, maxillary broad, slipping under a sheath for more than half its length; eye moderate, high, slightly posterior, adipose lid somewhat developed; barbels reaching gill-opening, 1.5 in head; pseudobranchiae well developed; longest gillrakers nearly equal to diameter of pupil, finely serrate, the last 5 or 6 on longer limb very blunt and short; spinous dorsal high, posterior edge nearly truncate, its base equal to highest spine; origin of spinous dorsal midway between tip of snout and origin of anal measured across body; distance between dorsals 1.25 in snout or slightly less than base of soft dorsal; dorsal slightly concave; caudal deeply forked; anal similar to soft dorsal, inserted slightly behind it; ventrals reaching slightly beyond pectorals, the rays equal in length, these slightly less than longest spinous dorsal; lateral line concurrent with dorsal outline; scales large, finely ctenoid; entire body and head scaly.

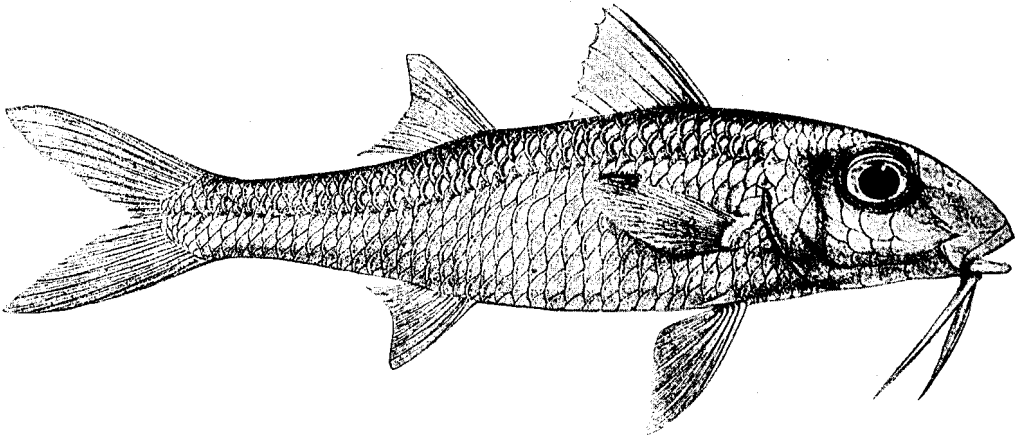


FIG. 105.—*Mulloidés samoensis* Günther: after Günther.

Color in alcohol, above bluish-olivaceous, the sides becoming yellowish white; borders of the scales dusky; under parts white, a yellowish line under eye; preopercular edge yellowish; an obscure darkish blotch sometimes present on middle of side under spinous dorsal; fins all pale, colorless.

Color in life (No. 02987), back greenish olive; middle of side with a broad (one scale) pale yellow band from eye to caudal peduncle, where it gradually fades out; cheek with 2 or 3 faint yellow lines; side below yellow band white with 2 very faint yellow lines, belly white; fins all whitish, the spinous dorsal yellow on anterior part; soft dorsal and caudal washed with yellow.

A young example from Hilo had body greenish olive, with a broad golden stripe which is blackish in life; a quadrate black spot under first dorsal; lower fins and barbels white like belly; upper fins pale olive; no trace of red on body in life.

This species is very abundant inside the reefs of Oahu, and in bays between the rocky promontories about Hilo, being often taken for bait, but it is known only from the Hawaiian Islands and Samoa. Our collections contain a fine series of 152 specimens, from 3 to 13 inches long.

*Mulloidés samoensis* Günther, Fische der Südsee, III, 57, pl. 43, fig. B, 1874, Apia; Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 453 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 527 (Honolulu).

196. *Mulloidés vanicolensis* (Cuvier & Valenciennes).

Head 3.8 (4.75) in length; depth 4.33 (5.25); D. VIII-1, 8; A. 11, 6; scales 2.5-36-6.

Body rather slender; ventral outline almost as much curved as dorsal; profile gently and nearly evenly curved from snout to first dorsal fin; caudal peduncle tapering evenly from dorsal and anal to the caudal fin, and nearly equalling length of head, its least depth 2.33 in its length; snout short, bluntish, 2.75 in head; mouth small, maxillary reaching posterior nostril, 2.8 in head; the bands of villiform teeth very narrow; in front 2 series in each jaw, on the sides only one; eye large, 1.25 in snout, 3.5 in head; interorbital space moderately convex, 3 in head; upright limb of preopercle straight; opercular spine small; gillrakers slender, 2.5 in maxillary, 7 in head, about 25 on lower limb of arch; barbels 1.66 in head, extending beyond posterior margin of eye; scales moderate, ctenoid; preorbital smooth; dorsal fins moderate; spines of first dorsal rather weak, depressible into a groove; first spine very minute, second and third longest, 1.33 in head, those following evenly decreasing in height to the eighth spine, which is 3 in head; first ray of second dorsal fin unbranched, showing no articulations, having the appearance of a true spine, slightly shorter than last soft ray, 4 in head; second articulate ray contained 1.8 times in the highest dorsal spine; caudal well forked, its longest rays 1.25 in head; anal with 2 spines, the first of which is very minute, otherwise similar to soft dorsal, though a very little higher; pectorals 1.6 in head; ventrals 1.33 in head; air-bladder moderate; peritoneum black.

Color in spirits, grayish green above lateral line, lighter below, with yellow metallic luster; minute black punctulations on scales above lateral line, none below.

*Upeneus vanicolensis* Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 521, 1831, *Vanicolo*: Smith & Swain, Proc. U. S. Nat. Mus., V, 1882, 131 (Johnston Island).

*Mulloidés vanicolensis*, Bleeker, Nat. Tijds. Ned. Ind., IV, 1853, 601 (Ternate); Günther, Cat., I, 404, 1859 (seas of Ternate and Vanicolo); Bleeker, Entom. Spec. Pisc. Archip. Indic., 39, 1859 (name only); Bleeker, Conspect. Spec. Pisc., 6 (Hal-mahera, Ternate, Archip. Mollucca; name only); Bleeker, Revision Mulloides, 14, 1874 (Ternate; Sangir).

Genus 140. *PSEUDUPENEUS* Bleeker. The Goat-Fishes.

Body oblong, compressed; mouth moderate, nearly horizontal, low, the jaws subequal; eye large, high, posterior; opercle short, deep, with a posterior spine; both jaws with rather strong unequal teeth, in 1 or 2 series in each jaw; no teeth on vomer or palatines; lips well developed; the bone which forms a hook over the maxillary less developed than in *Mullus*; interorbital space concave and narrow; opercle ending in 1 spine; barbels nearly as long as head; scales very large, somewhat ctenoid; lateral line continuous, its tubes ramifying on each scale; head covered with large scales; first dorsal with about 7 spines; anal with 2, the first very short; caudal fin forked. Species numerous in the tropical seas.

*Pseudupeneus* Bleeker, Poiss. Cote de Guinée, Jan., 1862, in Verh. Hollandsch. Maats. Wet. Haar., XVIII, 56, 1863 (*pragensis*).

*Parupeneus* Bleeker, Ned. Tijds. Dierk., I, 1863, 234 (*Upeneus barberinus*); Bleeker, Verh. Kon. Ak. Wet., XV, 1875, Revision Mulloides, 17 (*barberinus*).

*Upeneus* Bleeker, first restricted to *bifasciatus*; not of Cuvier.

*Multhypeneus* Poey, Synopsis, II, 307, 1868 (*maculatus*).

*Brachymullus* Bleeker, Archiv. Neerl., XI, 333, 1875 (*tetraspilus*).

a. Eye small, 6 or more in head.

b. Body long, tapering, back considerably elevated, without alternating bands of pale rosy and darker red; pectoral purplish red or dull rosy.....*chryscrydros*, p. 255

bb. Body rather short and deep, much compressed, with alternating bands of pale rosy and darker red; pectorals yellow.....*multifasciatus*, p. 256

aa. Eye larger, less than 6 in head.

c. Eye moderate, 5 or more in head.

d. Barbels long, reaching to or beyond gill-openings.

e. Body slender, not greatly compressed, depth about 3.4; barbels golden.....*chrysonemus*, p. 258

ee. Body short and stout, considerably compressed, depth about 3; barbels blackish.....*bifasciatus*, p. 258

dd. Barbels not reaching gill-openings.

f. Body robust, depth about 3.66 in total length.

g. Head comparatively short, about 3.35 in length to base of caudal; scales 31.....*crassilabris*, p. 259

gg. Head longer, 3 in length to base of caudal; scales 28.....*pleurostigma*, p. 260

ff. Body rather slender, 4.75 to 5 in total length.....*fraterculus*, p. 261

cc. Eye less than 5 in head.

h. Body rather short and stout, depth about 3.5 in length to base of caudal; eye 4.7 in head.....*porphyreus*, p. 262

hh. Body rather slender, about 4.33 in length to base of caudal; eye larger, 3.5 in head.....*preorbitalis*, p. 263

197. *Pseudupeneus chryserydros* (Lacépède). "*Moamo kea*." Fig. 106.

Head 3.25 in length; depth 3.7; eye 6.5 in head, in snout 3.5; snout 1.9; interorbital 3.5; maxillary 2.4, maxillary to eye 4.3, or 1.75 times eye; D. VIII-9; A. 7; scales 3-30-6; longest dorsal spine 1.5 in head, longest ray 2.6; longest anal ray 2.3; pectoral 1.5; ventral 1.4; distance between dorsals 4.4 in head or 2 in base of spinous dorsal or 1.9 in that of soft dorsal.

Body long, tapering posteriorly; back considerably elevated, the profile rising in a straight line from snout to occiput, thence gently curved to origin of spinous dorsal, from which point it descends in an approximately straight line to caudal peduncle; ventral outline nearly straight, the axis of the body much below median line; head rather large, compressed; interorbital space moderately broad, very convex; snout long and bluntly pointed; mouth very low, moderate in size, somewhat oblique; lower jaw slightly included; maxillary very broad at tip, the upper edge curved upward; eye small, in posterior half of head; teeth on both jaws, rather large, none on vomer or palatines; barbels long, nearly equaling head and just reaching base of ventrals; fins moderate, origin of spinous dorsal a little nearer posterior base of soft dorsal than tip of snout; distance between origins of dorsals equal to distance from snout to edge of preopercle; caudal moderately forked, lobes equal, length slightly less than distance between origins of dorsals; gillrakers 20 + 7, serrate, longest two-thirds diameter of eye, last few on each limb short and blunt, merely rudiments; scales large, firm, deeper than broad, the mar-

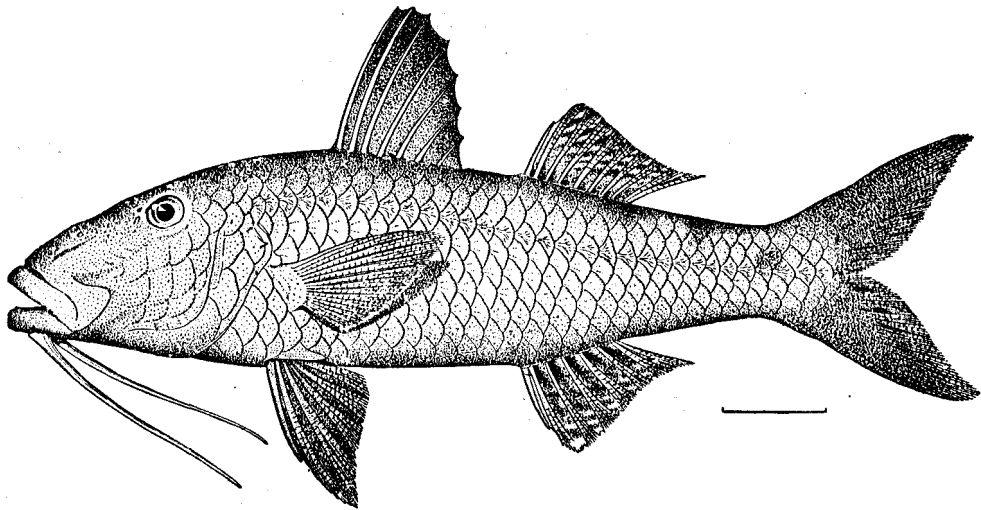


FIG. 106.—*Pseudupeneus chryserydros* (Lacépède).

gins finely toothed; lateral line following curve of back, the pores each with 3 to 6 branches; 3 scales between dorsal fins, 3 rows on cheek; a series of long mucous canals extending downward from eye and forward across snout to maxillary, these profusely branched anteriorly. The above description based chiefly on a specimen (No. 03850) 12 inches long, from Honolulu.

Color in life (No. 02920) dark leaden purple shaded with red on side; nape yellowish; a large conspicuous orange-yellow blotch on caudal peduncle above; violet stripes radiating from eye, with orange and olive-yellow interspaces; cheek with bluish and yellowish stripes, iris red with yellow ring; barbels grayish, dusky at base, the tips yellow; fins all blue-black; soft dorsal and anal with sky-blue streaks between rays, then turning obliquely upward and backward, olive shades between the blue streaks; first dorsal blackish blue, with violet between the rays; pectoral blackish at the base, the tip purplish-red; ventrals blue-black, paler than caudal. Specimen No. 03425 was in life very dark brown; each scale dark blue at base, golden on posterior portion; blue lines radiating from eye, with golden interspaces; side of head with blue and golden lines; dorsals and ventrals very dark, with golden markings on membranes; pectoral light rosy; anal crossed by golden bands parallel with body; caudal nearly black, an orange saddle on upper side of caudal peduncle.

No. 03356 (somewhat faded), from Honolulu, 7 inches long, in life was purplish olivaceous; upper parts darker, lower parts palest; 2 short blue lines above eye, 3 paler blue ones extending backward from eye to posterior edge of opercle, 3 similar lines extending forward from eye, the lower one longest, all these separated by brassy yellow lines of similar width and length, a brassy yellow line from upper end of premaxillary to lower edge of eye, where it is slightly interrupted by blue, then continuing across opercle; below this a broader bluish stripe, below which is another brassy yellow one, followed by an indistinct blue stripe and that by a faint yellow one on middle of cheek; tip of premaxillary brassy; side above lateral line with 2 series of small blue spots; below lateral line 2 or 3 indistinct series of yellowish spots, these plainest above pectoral; rich reddish orange saddle on anterior portion of caudal peduncle reaching lateral line on each side, the lower series of blue spots faintly evident through its base; opercle mixed purplish, brassy, bluish, and brownish, edge bluish below, brownish above; spinous dorsal with rays purplish, membranes pale dusky; soft dorsal dark purplish at base, the outer third with about 5 curved narrow brassy lines, separated by similar purplish ones; caudal dark purplish; anal pale purplish with about 4 greenish yellow stripes; pectoral dull rosy; ventrals with rays pale purplish or bluish, membranes slightly yellowish; barbels grayish, tips yellow; iris yellow. A specimen (No. 03466) from Hilo had in life the ground-color purplish rose inclining to red rather than to the usual livid purplish lead-color; about 9 faint violet crimson streaks along the rows of scales, these streaks separated by orange radiating from eye; barbels flesh-color, then livid bluish, then whitish; back of tail bright golden shaded with orange; dorsal livid purplish, rays violet; second dorsal blackish purple at base with oblique stripes of golden olive on violet above; caudal dirty violet, the membranes olive, the rays violet; anal pale violet with oblique streaks of golden olive; ventrals light violet and olive; pectoral reddish flesh-color, a curved darker bar at base; iris red. Another large specimen from Hilo in life was very bright violet gray blue; the caudal brilliant blackish violet.

Color in spirits (No. 3850), dirty white or light olivaceous on back and upper part of side; lower part of side and belly clearer white; head rusty, evidence of a dark bar across caudal peduncle and one under soft dorsal; top of caudal peduncle with a large white area; spinous dorsal, pectoral and ventrals, uniform pale; soft dorsal pale, crossed by about 5 narrow oblique darker bands; anal similar, the markings more obscure; caudal somewhat yellowish.

Color in spirits of another example (No. 02920), head and body rather uniform olivaceous brown, darkest on back, palest on belly; tip of snout dark, cheeks somewhat lighter; caudal peduncle anteriorly with a large white saddle; dorsal, caudal, and anal fins all blue-black; ventrals somewhat paler; pectorals pale.

Our collection contains 18 specimens of this species 3 to 15 inches long, and we have examined 6 specimens collected by Dr. Jenkins and Dr. Wood. This species is generally abundant in the markets, where its livid purplish colors contrast strongly with those of the other species.

*Mullus chryserydros* Lacépède, Hist. Nat. Poiss., III, 406, 1801, Ile de France.

? *Sciaena ciliata* Lacépède, Hist. Nat. Poiss., IV, 308, 1802, no locality.

? *Mullus radiatus* Shaw, General Zool., 618, 1803, after *M. chryserydros*, Indian seas.

*Upeneus chryserydros*, Cuvier & Valenciennes, Hist. Nat. Poiss., III, 470, 1829 (Ile de France; Hawaiian Islands; Bourbon; Coromandel).

*Upeneus immaculatus* Bennett, Proc. Committee Zool. Soc. London for 1830, 60, Mauritius.

*Upeneus tubus* Guérin-Meneville, Iconog. Règne Animal, IV, pl. 10, fig. 4, 1830-1841.

*Upeneus oxycephalus* Bleeker, Act. Soc. Sci. Ind. Néerl., I, 1856, 45, Manado; Günther, Cat., I, 409, 1859 (Sea of Manado.)

*Mullus oxycephalus*, Playfair, Fishes of Zanzibar, 41, 1866 (Zanzibar; Mauritius; Sea of Manado).

*Upeneus chryserylhrus*, Günther, Fische der Südsee, III, 60, pl. 45, fig. A, 1875 (Polynesia).

*Parupeneus cyclostomus*, Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 486 (Honolulu); not of Lacépède.

*Pseudupeneus chryserydros*, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 454 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 527 (Honolulu).

### 198. *Pseudupeneus multifasciatus* (Quoy & Gaimard). "Mouno." Plate XXII.

Head 3.2 in length; depth 3.5; eye 6.25 in head; snout 1.8; interorbital 3.75; maxillary 2.4, maxillary to eye 4.4; D. VIII-9; A. 7; scales 3-29-5.

Body rather short and deep, much compressed; the back little elevated, the ventral outline comparatively straight; head rather large; snout long and projecting; mouth large, slightly oblique, lower jaw included; maxillary very broad at tip; teeth rather large, wide-set in a single row in each jaw, none on vomer or palatines; eye small, in posterior half of head; barbels long, reaching nearly to

base of ventrals, 1.25 in head; interorbital space high and very convex; opercular spine small, flat; fins large, interspace between dorsals .3 greater than diameter of eye; origin of spinous dorsal nearer last dorsal ray than snout by a distance equal to two-thirds diameter of eye; longest dorsal spine 1.4 in head; base of spinous dorsal 1.5 in longest ray; third dorsal ray 2 in longest spine; last dorsal ray much produced, nearly reaching base of caudal, 1.3 in longest dorsal spine; caudal peduncle rather short, scarcely exceeding snout; anal similar to soft dorsal, its origin somewhat posterior, its third ray 2 in longest dorsal spine, last anal ray produced, its length half greater than that of third ray; caudal moderately forked, the lobes a little greater than longest dorsal spine; pectoral short, about 1.5 in head, not reaching tips of ventrals; ventrals longer, 1.2 in head, their tips not reaching origin of anal by a distance slightly greater than diameter of eye; scales large, not very firm, the edges finely and obscurely ctenoid, lateral line parallel with the back, the pores not numerous branched, the branches numbering 5 to 8.

Color in life, body with alternating bands of pale rosy red and darker red; the snout and head to beyond eye smoky red, then a broad dark red band covering body from eye to origin of spinous dorsal, this with some black blotches, 3 or 4 in front of dorsal, one on humeral region, and one on salient angle of opercle, a pale red band as broad as base of spinous dorsal around the body under the base of spinous dorsal, behind this a double dark red band around body from last dorsal spine to eighth dorsal ray, this band with much black above, but scarcely any below lateral line; next a pale band around anterior end of caudal peduncle and under last dorsal ray, followed by a dark band around middle of caudal peduncle; posterior part of caudal peduncle with a pale ring; spinous dorsal rosy at base, black on distal portion, a little yellowish in center; soft dorsal greenish yellow at base, the outer three-fourths blackish, with 5 or 6 narrow pink lines parallel with the border; anal similar, the pink lines brighter and separated by olivaceous lines; pectoral always yellow, rosy on base and in axil; ventrals rosy with cross lines of whitish, the anterior border blackish; caudal dull rosy, edges black.

Other examples from Hilo were, in life, deep rose red, the old ones becoming darker or dark purplish cherry-red; dark bands of black with red over the black; pale band under first dorsal whitish and shaded with golden; the one under soft dorsal similar but fainter; scales of all upper parts veined with deeper red, first some bright red shaded with orange; second dorsal black, the rays red with longitudinal red streaks above; anal blackish above with longitudinal streaks above and irregular broad lines of violet; caudal violet red, the outer ray violet black with a slight pale edging; pectoral golden crimson at base; ventrals dark red, with wavy streaks of olive and violet; barbels pink with cream colored tips; iris scarlet; young with the tips of barbels bright yellow.

No. 02988, a young individual 6.5 inches long, differs markedly in color. It showed in life a general color of dirty white with scarcely a trace of rosy; body with 6 half-bars of black, the first across nape and down to lower edge of eye on each side; the second at origin of dorsal and down to base of pectoral; the third indistinct from under spinous dorsal to pectoral; fourth across back between dorsals and reaching two-thirds down side; the next from anterior half of soft dorsal; the last and blackest across caudal peduncle and down side; none of these makes a complete ring; fins resembling those of adult in color, but paler; iris pinkish.

The above description based upon a specimen (No. 02985) 10.25 inches long, from Honolulu. Some of the specimens are shorter and deeper. The species is one of the most abundant of the Hawaiian fishes, always found in the markets and conspicuous for its bright color. Our collections contain 85 specimens, ranging in length from 4.5 to 10.25 inches, from Honolulu, Hilo, Kailua, Laysan Island, and Puako Bay, Hawaii.

*Mullus multifasciatus* Quoy & Gaimard, Voy. Uranie, Zool., 330, pl. 59, fig. 1, 1824, Oahu; Maui.

*Upeneus trifasciatus*, Cuvier & Valenciennes, Hist. Nat. Poiss., III, 468, 1829 (Sandwich and Caroline islands); Streets, Bull. U. S. Nat. Mus., No. 7, 71, 1877 (Honolulu); Günther, Rep. Shore Fishes, Challenger, Zool., I, part VI, 59, 1880 (Honolulu); not of Lacépède.

*Upeneus velifer* Smith & Swain, Proc. U. S. Nat. Mus. 1882, 130, Johnston Island.

*Parupeneus trifasciatus*, Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 486 (Honolulu; Laysan).

*Pseudupeneus multifasciatus*, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 456 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 527 (Puako Bay, Hawaii; Laysan).

199. *Pseudupeneus chrysonemus* Jordan & Evermann. Plate XXI.

Head 2.8 in length; depth 3.4; eye 5.3 in head; snout 1.7; interorbital 3.5; maxillary 2.3; D. VIII-9; A. I, 7; scales 3-30-7.

Body slender, not greatly compressed, the back gently and rather uniformly elevated from tip of snout to dorsal; ventral outline slightly convex; head moderate; snout long, bluntly pointed; mouth moderate, slightly oblique, the lower jaw included; maxillary broad at tip, falling short of vertical of orbit by diameter of pupil; interorbital space convex; eye small, in posterior half of head; teeth rather large, in a single band in each jaw; barbels long, 1.2 in head, reaching nearly to base of ventrals; opercular spine small; fins rather large; third dorsal spine longest, 1.5 in head, or equal to distance from tip of snout to middle of pupil, third ray longest, 3.2 in head; base of spinous dorsal 1.4 in third spine; base of soft dorsal 1.4 in longest spine; origin of spinous dorsal nearer last dorsal ray than tip of snout by longitudinal diameter of pupil; distance between dorsals 1.5 in eye; length of caudal peduncle 1.5 in head; pectoral long, pointed, slightly falcate, 1.4; ventrals slightly longer, 1.3; last anal ray 2.9, equal to base of fin; caudal shallowly forked, lobes 1.3 in head, middle rays 2.75 in upper lobe; scales finely ctenoid and obscurely dendritic; lateral line concurrent with the back, the pores with few branches, the number usually not exceeding 5 or 6; 2 scales between the dorsals, 8 on dorsal side of caudal peduncle; peritoneum somewhat silvery.

Color when fresh, deep scarlet red, especially a shade from snout through eye toward tail; first dorsal plain scarlet, second paler golden with oblique stripes of scarlet and yellow edge; caudal orange, reddish at base, yellowish at tip; anal like second dorsal; pectoral pale orange; ventrals deep red; barbels bright yellow; iris red. In life, a pale streak backward from eye to middle of side parallel with back; side with 2 blotches of deep red; a row of dark spots along bases of both dorsals; young of 3 inches, from the rock pools, in life, dark olive-green above with a dark olive streak along lateral line and 3 dark shades under first dorsal, second dorsal, and back of caudal peduncle; tip of first dorsal cherry-red, edged with white; second dorsal and caudal translucent, scarcely reddish; ventrals and anal bright cherry-red, former mesially dusky; barbels golden.

Color in alcohol, pale yellowish; each scale below dorsal with brownish edgings, generally most distinct in young and often entirely disappearing with age; a series of smaller obscure spots along median line from opercle to tip of pectoral; sides and under parts with faint traces of rosy.

This species may be known by the series of dusky blotches along each side of the dorsal fin and by the simple structure of the lateral line. In life it is at once known by its golden barbels.

The above description based upon a specimen (field No. 03929) 8 inches long, obtained at Honolulu, in 1898, by Dr. Wood. We have examined 4 other specimens of approximately the same size obtained at the same time, and numerous examples collected by us at Honolulu and Hilo, which range in length from 4 to 8.5 inches.

*Pseudupeneus chrysonemus* Jordan & Evermann, Bull. U. S. Fish Comm., XXII, 1902 (April 11, 1903), 186, Hilo; Jenkins, op. cit. (Sept. 23, 1903), 454 (Honolulu).

200. *Pseudupeneus bifasciatus* (Lacépède). "Munu." Fig. 107.

Head 3.2 in length; depth 3; eye 5 in head; snout 1.9; interorbital 3.25; maxillary 2.5; D. VIII-8; A. 7; scales 3-31-6; gillrakers 29 + 8, serrate, longest 1.5 in eye, no blunt rudiments, but all fairly well developed.

Body short, stout, considerably compressed, back elevated; profile concave before the eye, strongly arched thence to spinous dorsal; ventral profile comparatively straight; head moderate, much compressed; snout moderate, somewhat projecting, bluntly rounded; mouth low, nearly horizontal, lower jaw included; maxillary very broad at tip, not reaching orbit; eye small, high up, in posterior part of head; interorbital very convex; teeth rather large, unequal, in a single series in each jaw, none on vomer or palatines; cheek deep; opercular spine moderate, flat; barbels moderate, reaching gill-opening, a little shorter than snout; fins rather large; spinous dorsal slightly nearer last dorsal ray than tip of snout; longest dorsal spine 1.5 in head, slightly greater than snout and pupil; base of spinous dorsal 1.2 in longest spines; longest dorsal ray 1.65 in longest dorsal spine, or 1.25 in base of soft dorsal; interspace between dorsals greater than eye or 2.6 in longest dorsal spine; length of caudal peduncle equal to longest dorsal spine; origin of anal slightly posterior to that of soft dorsal, its longest ray about equal to that of soft dorsal, its base 1.6 in that of soft dorsal; caudal broad, not deeply forked,



its lobes 1.6 in head; pectoral rather short, equaling longest dorsal spine; ventrals considerably longer, 1.2 in head; scales large, moderately firm, slightly rivulate, the edges weakly ctenoid; pores of lateral line profusely branched, the branches usually about 10 to 12 in number, fewer posteriorly, the number as low as 5 or 6.

Color in alcohol, rusty black; body crossed by 2 broad dark bars, the first under anterior half of spinous dorsal, second under posterior half of soft dorsal, each of these bars about equal to snout and eye in width and separated by a broader pale interspace; head dark; caudal peduncle pale; vertical fins dark; the spinous dorsal darkest on its anterior portion; soft dorsal and anal dark, crossed by numerous narrow wavy pale streaks; caudal yellowish white, dark edged; ventrals pale, dark on inner surface and on edge; pectoral pale; in larger specimens the caudal fin shows somewhat the markings of soft dorsal and anal.

A large specimen, No. 03465, 12 inches long, from Hilo, had in life body purplish cherry-red, rather dull and dusky, with obscure dark cross bands (one at nape, one under first dorsal, one under front of second, one under last rays, and one at base of tail); snout darker than body; barbels blackish; no

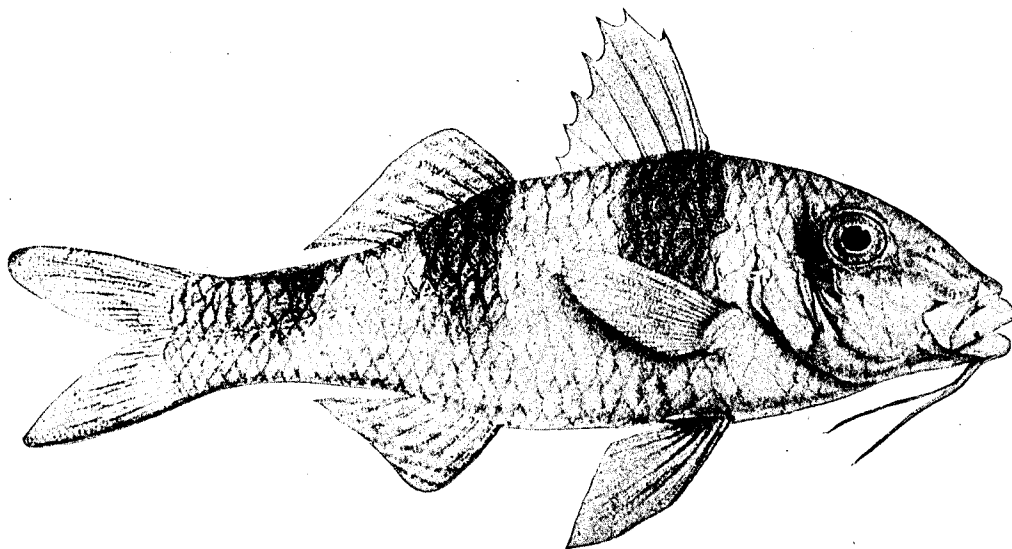


FIG. 107.—*Pseudupeneus bifasciatus* (Lacépède); after Günther.

golden or clear red anywhere; first dorsal deep dull red; second red olive, mottled and streaked with crimson, edge blackish; caudal deep dull red, finely spotted with crimson, edge blackish with a faint pale edging; anal like soft dorsal; ventrals purplish black, with pale edge; pectoral light purplish red; iris red.

The above description based chiefly upon a specimen (No. 03911) 11 inches long, from Honolulu.

This is an excellent food-fish of fine, delicate flesh. The collection contains other specimens from Honolulu, Hilo, and Kailua.

*Mullus bifasciatus* Lacépède, Hist. Nat. Poiss., III, 404, pl. 14, fig. 2, 1801, no locality.

*Mullus trifasciatus* Lacépède, Hist. Nat. Poiss., III, 404, pl. 15, fig. 1, 1801, Pacific Ocean.

*Upeneus bifasciatus*, Cuvier & Valenciennes, Hist. Nat. Poiss., III, 468, 1829 (Bourbon, Hawaiian, and Caroline islands).

*Pseudupeneus bifasciatus*, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 456 (Honolulu).

#### 201. *Pseudupeneus crassilabris* (Cuvier & Valenciennes).

Head 3 (3.66) in length; depth 3 (3.66); D. VII-9; A. 1, 7; scales 2-31-6.

Body oblong, compressed, robust; head and anterior part of body heavy; profile concave from snout to a point midway between the nostrils, thence regularly curved to first dorsal; snout long, blunt, 1.66 in length of head; ventral outline little curved; caudal peduncle two-thirds length of head, its least depth almost twice in its length; mouth moderate, little oblique, the lower jaw

included; maxillary 2.33 in head, terminating between the nostrils; strong, blunt, but conical teeth in one series in each jaw, the teeth more or less widely separated; eye 2.75 in snout and 5 in head; interorbital space very convex, 3.66 in head; preopercle with upright limb slanting obliquely forwards; opercular spine strong; gillrakers 2 in eye, 4.5 in maxillary, about 28 on lower limb of arch; barbels two-thirds length of head, reaching posterior margin of subopercle; scales large, ctenoid; dorsal fins well developed, third and fourth spines longest, 1.33 in head, twice the height of soft dorsal, the last rays of which are scarcely longer than the first; soft dorsal two-thirds as high as long, its length 2 in head; caudal moderate, well forked, upper lobe more rounding, 1.37 in head; anal differs from soft dorsal in having its first branched rays one-fourth longer than the last, the unbranched ray also slightly exceeding the last ray; the greatest height of the fin 2.6 in head; the membrane of the first soft ray envelops a small spine, which, being thus covered, might easily be overlooked; the first articulate ray of anal, as in soft dorsal, not branched; ventral fins large, 1.33 in head, about reaching tip of pectoral; air-bladder large.

Color in spirits, olivaceous, lighter below, the fish as a whole having a smutty appearance; exposed part of each scale punctulate with brown; first dorsal and caudal dusky; base of soft dorsal dusky, upper half irregularly light and dark; anal with irregular dusky bars; soft dorsal, caudal, and anal tipped with black; ventrals yellowish, spine and connecting membrane smutty; pectorals yellow, their base, the preorbital, and upper part of head purple; barbels very dark; branchiostegal membrane purple; peritoneum light. Known from Johnston Island, but not found among the Hawaiian Islands.

*Upeneus crassilabris* Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 523, 1831, New Guinea; Bleeker, Enum. Spec. Pisc. Archip. Indic., 38, 1859 (name only); Günther, Cat., I, 411, 1859 (taken from Cuvier & Valenciennes); Bleeker, Fischfauna Neue-Guinea, 8 (name only) in Ac. Soc. Sc. Indo. Neer., VI, 1859; Smith & Swain, Proc. U. S. Nat. Mus., V, 1882, 129 (Johnston Island).

*Parupeneus crassilabris*, Bleeker, Quatrième Mém. Faune Ichthyologique Nouvelle Guinée; Bleeker, Revision Mulloides, in Verh. Kon. Ak. Wet., XV, 1875, 33 (from Cuvier & Valenciennes) (New Guinea).

## 202. *Pseudupeneus pleurostigma* (Bennett). Fig. 108.

Head 3.35 in length; depth 3.6; eye 5 in head; snout 1.9; interorbital 3.6; maxillary 2.65; D. VIII-9; A. 7; scales 3-28-5.

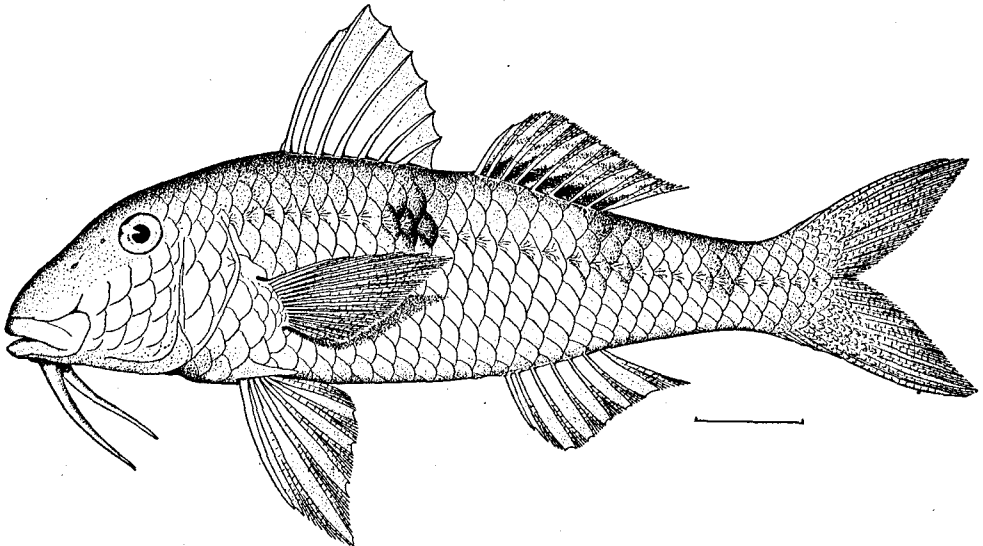


FIG. 108.—*Pseudupeneus pleurostigma* (Bennett).

Body oblong, compressed, profile evenly arched from origin of spinous dorsal to tip of snout, except a slight depression on snout; snout bluntly rounded, lower jaw included; mouth moderate, horizontal; a single row of wide-set, small, conic teeth in each jaw, none on vomer or palatines; maxillary not reaching vertical from eye by a distance equal to three-fourths diameter of eye; barbels

reaching slightly beyond posterior edge of preopercle; longest dorsal spine 1.3 in head or from posterior base of spinous to posterior base of soft dorsal, last soft dorsal ray equal to second, each 2.5 in head; distance between dorsals equal to 3 rows of scales or one-fourth of head; second anal ray equal to last, each equal to base; origin of soft dorsal slightly in advance of anal, tips of last rays of each extending to same line posteriorly, the spinous dorsal extending nearly an eye diameter beyond tip of pectoral; pectoral not reaching quite as far posteriorly as ventrals, which are 1.2 in head; pectoral 1.3; caudal peduncle 1.3, its least depth 2.7; scales large, finely and distinctly ctenoid and strongly rivulate; lateral line parallel with back, pores usually with 8 to 12 branches anteriorly, fewer posteriorly.

*Color in life, dirty whitish, darkest on back; scales narrowly edged with yellowish olive; under parts white, with slight rosy wash; head obscure rosy, snout and maxillary clearer olive; side with some olive; a large black blotch on lateral line just under and behind last dorsal spine; spinous dorsal greenish on membranes, the spines rosy; soft dorsal greenish, with a few small dark spots crossed by about 7 narrow pale streaks; caudal pale yellowish, edge of lower lobe red; anal pale with 3 pale yellowish green streaks; pectoral pale; ventrals pale rosy.*

A fresh specimen from Hilo had the body bright rose-red with a little yellow shading, more crimson on opercle; a black spot on side opposite space between dorsals, behind this spot a large paler oblong area of pink; first dorsal red, with yellow olive on membranes; second with basal half blood red (black washed with red), above this 5 oblique violet lines alternating with olive-yellow; caudal with outer rays crimson, the fin mottled red and reddish olive; anal with 4 oblique violet stripes alternating with golden; pectoral light reddish; ventral deeper red; barbels white; iris scarlet.

*Color in alcohol, side and upper parts dull plumbeous, an irregular broad pale bar across side under anterior portion of soft dorsal, this usually appearing as a large white blotch; a broad darker area under posterior portion of soft dorsal; a large black spot, 2 or 3 scales in diameter, on lateral line under last dorsal spines; under parts yellowish white; dorsal, caudal, anal, pectoral, and ventrals pale yellowish white; the caudal and spinous dorsal somewhat dusky; soft dorsal black at base, paler on distal portion, the color made up of a number of closely placed black bars, obscure at the base.*

The above description based chiefly upon a specimen (No. 02984) 10.25 inches long, from Honolulu.

We have 27 specimens 5 to 11.25 inches long, from Honolulu and Hilo.

*Upeneus pleurostigma* Bennett, Proc. Committee Zool. Soc. London for 1830, 59, Mauritius.

*Upeneus brandessii* Bleeker, Naturh. Tijds. Ned. Ind., II, 1851, 236, Banda Neira.

*Mullus pleurostigma*, Playfair, Fishes of Zanzibar, 40, 1866 (Zanzibar; Mauritius).

*Parupeneus pleurostigma*, Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 486 (Laysan).

*Pseudupeneus pleurostigma*, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 456 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 527 (Honolulu).

### 203. *Pseudupeneus fraterculus* (Cuvier & Valenciennes). Fig. 109.

Head 3.75 to 4 in total; depth 4.75 to 5; eye 5 in head, 1.35 to 1.5 in interorbital portion of head, 2.35 to 2.5 from end of snout, 1.25 in interorbital space; D. viii-9; A. i, 7; scales 2 or 3-31-7.

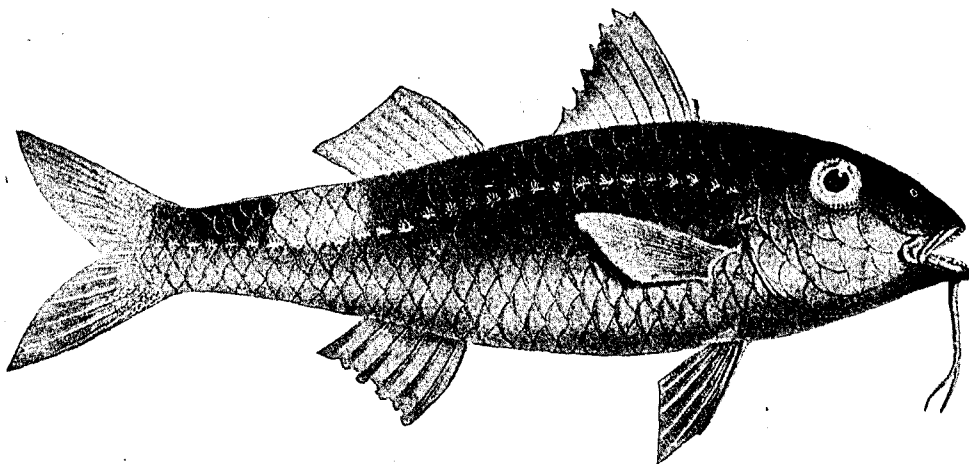


FIG. 109.—*Pseudupeneus fraterculus* (Cuvier & Valenciennes); after Playfair.

Snout pointed, compressed, maxillary reaching rather more than halfway below front edge of orbit; barbels reaching below hind margin of preopercle; interorbital width slightly convex; opercular spine of moderate strength; fourth dorsal spine rather the longest, equal to three-fourths the height of body below it; 3 rows of scales between 2 dorsals; front portion of second dorsal equal to two-thirds height of first dorsal; pectoral as long as head, anterior to hind edge of orbit, anal commencing slightly behind origin of second dorsal; caudal deeply forked, lobes pointed; scales on snout and head, including most of preorbital bone, and uncovered portion with some rather large pores.

Color reddish, the edges of the scales slightly darkest; a broad purplish band, having a light silvery edge, passes from in front of eye to snout; 2 more narrow silvery lines, formed of short oblong spots, proceed from hind edge of orbit for a short distance; 2 rows above lateral line, and generally 3 below, have a golden yellow spot in the center of each scale; a light golden band over free portion of tail; first dorsal marbled with brown, second with 4 and the anal with 3 reddish bands; caudal reticulated with light-gray markings. Length 8.5 inches. (Day.)

This species is recorded from Honolulu by Steindachner. It was not recognized by us.

*Upeneus fraterculus* Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 524, 1831, Seychelles.

*Mullus dispilurus* Playfair, Fishes of Zanzibar, 41, pl. 5, fig. 3, 1866, Zanzibar.

*Mullus pleurotonia* Playfair, Fishes of Zanzibar, 41, pl. 5, fig. 4, 1866, Zanzibar.

*Upeneus spilurus*, Klunzinger, Verh. Zool. Bot. Ges. Wien, 1870, 747; not of Bleeker.

*Upeneus dispilurus*, Day, Fishes of India, I, 125, pl. 31, fig. 3, 1878.

*Parupeneus notospilus* Klunzinger, Fische des rothen Meeres, 51, pl. 5, fig. 3, 1884.

*Parupeneus dispilurus*, Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 486 (Honolulu).

204. *Pseudupeneus porphyreus* Jenkins. "Kumu." Fig. 110.

Head 3.2 in length; depth 3.5; eye 4.7 in head, slightly nearer tip of snout than edge of opercle; snout 2.2; interorbital 3.5; maxillary 2.6; orbit to maxillary equal to eye; D. VIII-9; A. 7; scales 3-31-5.

Body rather short, stout and somewhat compressed, the back gently elevated, the ventral outline comparatively straight; profile from snout to eye very slightly concave, thence gently convex to origin

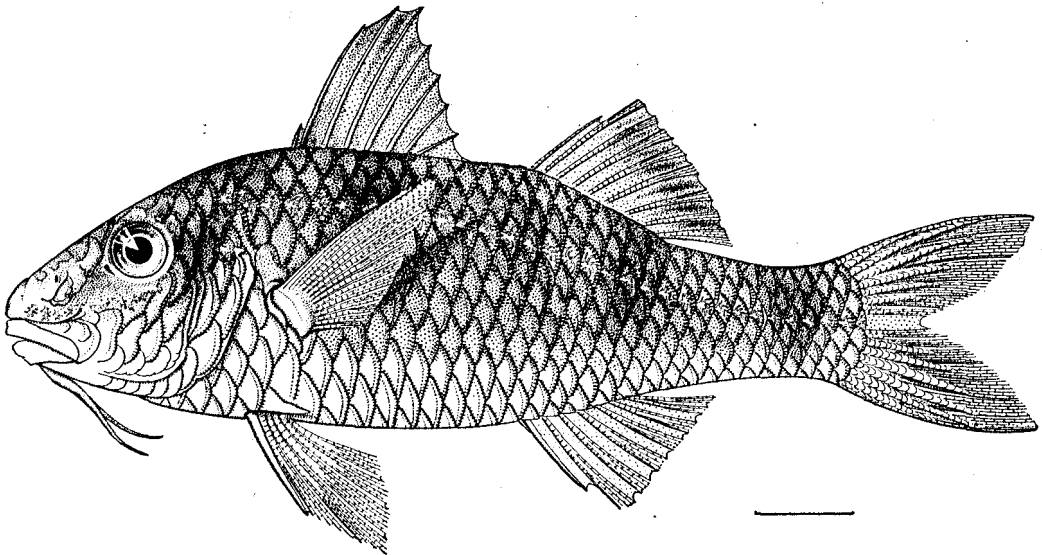


FIG. 110.—*Pseudupeneus porphyreus* Jenkins; from the type.

of spinous dorsal; head moderate; snout moderate, blunt at tip; mouth small, low and horizontal; maxillary somewhat curved upward at extremity; lower jaw included; no teeth on vomer or palatines, those on jaws moderate, in a single row; eye moderate, slightly anterior; caudal peduncle somewhat compressed, the least depth 2.5 in head; fins moderate; longest dorsal spine equal to snout and pupil,

the longest ray slightly shorter than snout; origin of spinous dorsal exactly midway between tip of snout and base of last soft dorsal ray; base of spinous dorsal slightly less than longest spine or equal to distance from tip of snout to middle of pupil; base of soft dorsal equal to longest dorsal ray; space between dorsals less than half longest dorsal spine, or 3.6 in head; length of caudal peduncle equal to snout and eye; pectoral slightly greater than snout and eye, about 1.4 in head; ventral pointed, slightly longer than pectoral, not reaching anal opening, about 1.25 in head; anal somewhat posterior to soft dorsal, its base 1.25 in its longest ray, which is 2.6 in head; caudal moderately forked, the lobes equal, and equal to eye and snout; scales large, firm, very finely ctenoid; most of the scales obscurely dendritic; lateral line concurrent with the back, the pores very profusely and widely branched, the number of branches usually about 10 to 12, sometimes as few as 6 or 7; two and a half scales between dorsal fins and 7 on dorsal edge of caudal peduncle; suborbital and side of snout with numerous branched pores; peritoneum pale; gillrakers 25+7, serrate, the longest about 2.2 in eye.

Another specimen (No. 03851), 14.5 inches long, gives the following description:

Head 3.1 in length; depth 3.4; eye 4.6 in head; snout 2.3; interorbital 3.5; maxillary 2.45, maxillary to eye 4 in head or 1.25 times eye; D. VIII-9; A. 7; scales 3-30-6; longest dorsal spine 2 in head, longest ray 2.25; longest anal ray 2.3; pectoral 1.65; ventral 1.65.

Body stout, back elevated anteriorly, sloping gradually posteriorly to caudal peduncle; anterior profile slightly concave between snout and eye, convex from eye to origin of dorsal; ventral outline nearly straight; head large; interorbital broad, convex; snout long, somewhat projecting, blunt at tip; mouth low, nearly horizontal; lower jaw short, decidedly included; maxillary somewhat expanded at tip, not quite reaching vertical of orbit; teeth strong, in a single series in each jaw, none on vomer or palatines; eye large, in posterior half of head; barbels short, not reaching vertical of preopercular edge, 2.5 in head; preopercular spine broad, flat, not strong; caudal peduncle somewhat compressed, slender, its least depth 2.8 in head; fins moderate; origin of spinous dorsal midway between snout and posterior base of soft dorsal; interspace between dorsals slightly greater than eye, 1.75 in base of spinous dorsal, nearly 2 in base of soft dorsal; anal similar to soft dorsal, its origin somewhat posterior to that of the latter, its base a little more than 3 in head; caudal not widely forked, lobes somewhat rounded, about 1.8 in head; scales large, finely ctenoid, some of them faintly dendritic, 2.5 scales between dorsals and 3 rows on cheek; lateral line concurrent with the back, the pores profusely branched.

Color in life (No. 02983), rich rosy on back and top of head, paler on side; about 5 rather distinct lines, made up of broken marks along center of scales; lower part of side and underparts whitish, with slight rosy wash; edges of scales on upper half of body yellowish olive; opercles rosy; fins all rosy, the dorsal and anal brightest, outer edge of ventral white; lips white; iris silvery, rosy above.

A fresh example from Hilo had body very bright rose-red; back olive; a whitish streak from eye backward to front of second dorsal; a broader pinkish white band from tip of snout below eye to below middle of spinous dorsal; a faint darker red cross shade below spinous dorsal; another narrower one between dorsals and a broad one under second dorsal, most distinct under its posterior part; a blackish shade on caudal peduncle, before which is a quadrate blotch of pinkish white. The most distinct marks are the olive of back and its 2 pale streaks and the pink and olive on tail; fins all clear red; the dorsals paler edged; ventrals and anal broadly pale edged; barbels white; iris silvery.

Color in alcohol, dirty yellowish white, pale olivaceous on back, head with some traces of orange; fins all uniform white or whitish, probably yellowish in life; anterior upper part of caudal peduncle with a large whitish blotch.

This species is abundant at Honolulu and Hilo, whence we have 38 specimens 5 to 14.5 inches long. It is one of the best food-fishes, ranking with the surmullet of Europe.

*Pseudupeneus porphyreus* Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 454, fig. 22, Honolulu (Type, No. 50705, U. S. N. M.; coll. O. P. Jenkins); Snyder, op. cit. (Jan. 19, 1904), 527 (Hanalei Bay, Kauai; Honolulu).

### 205. *Pseudupeneus preorbitalis* (Smith & Swain). Fig. 111.

Head 3.4 (4.16) in length; depth 4.16 (5.12); D. VIII-9; A. I, 7; scales 2-37-5.

Body more slender than in *Mulloidés vanicolensis* (Cuvier & Valenciennes); ventral outline almost straight, dorsal outline well curved; profile from snout to dorsal regularly curved; caudal peduncle 1.33 in head, its least height 3.25 in head; mouth nearly horizontal, maxillary 3 in head, terminating behind

anterior nostril; lower jaw produced; the band of villiform teeth moderate in both jaws, in a patch in front, narrowing posteriorly; eye moderate, 2.5 in snout, 4.33 in head; interorbital space slightly concave, 4.25 in head; preorbital very deep, 2.25 in head; gillrakers short and rather slender, 4.5 in maxillary; 19 on lower limb of arch; barbels 1.5 in head, reaching posterior margin of preopercle; scales large, ctenoid; dorsal fins medium; spinous dorsal depressible into a groove, first spine rudimentary, scarcely perceptible, second and third spines longest, 1.66 in head, eighth spine 4 in second; first ray of soft dorsal unbranched but evidently articulate, shorter than the first branched ray, which is 2.33 in head, the rays thence about regularly decreasing in height; caudal well forked, its longest

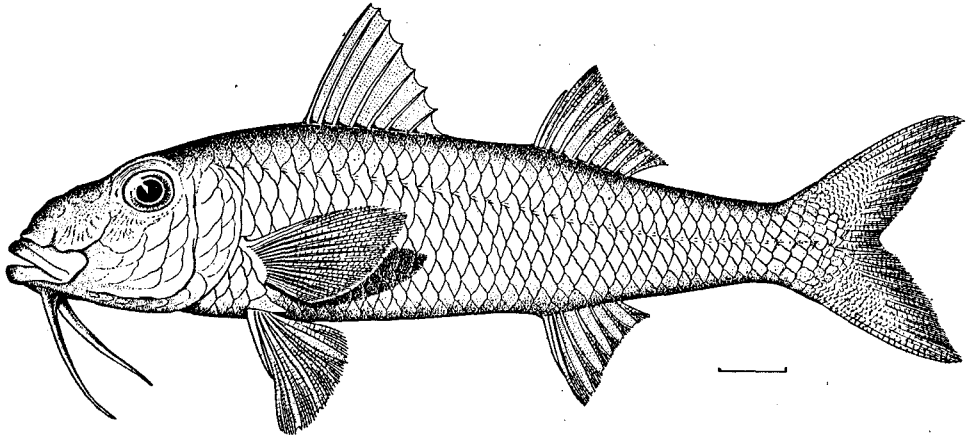


FIG. 111.—*Pseudupeneus preorbitalis* (Smith & Swain); from the type.

rays 1.33 in head; anal similar to soft dorsal, its spine very minute and first ray unbranched but plainly articulate; ventrals 2 in head; pectorals 1.66 in head; air-bladder moderate.

Color in spirits, nearly uniform yellowish; snout dusky, fins plain; peritoneum dark.

Known only from Johnston Island.

*Upeneus preorbitalis* Smith & Swain, Proc. U. S. Nat. Mus., V. 1882, 132, Johnston Island. (Type, No. 29662, U. S. N. M.)

#### Genus 141. UPENEUS Cuvier.

This genus differs from *Mulloidides* and *Pseudupeneus* in having teeth in both jaws and on the vomer and palatines.

*Upeneus* Cuvier, Règne Animal, ed. 2, II, 157, 1829 (*vittatus*).

*Upenoides* Bleeker, Verh. Bat. Gen., XXII, 1849, *Percoides*, 64 (*bivittatus*).

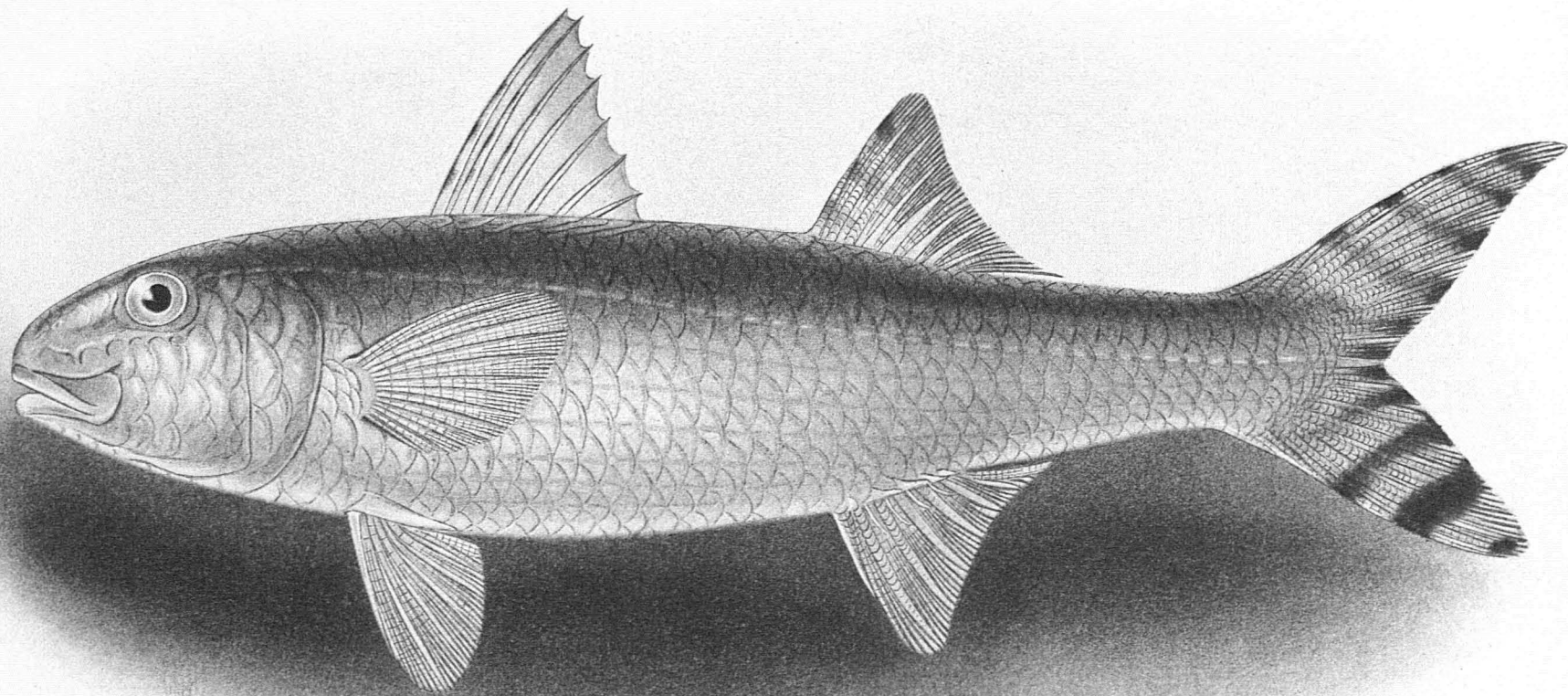
a. Head long, 3.75 in length; barbel reaching anterior edge of orbit; dorsal VIII-9; anal II, 6; scales 40 .....*arge*, p. 264

aa. Head shorter, 5 in length; barbel reaching first third of orbit; dorsal VIII-1, 7; anal 7; scales 38 .....*teniopterus*, p. 265

#### 206. *Upeneus arge* Jordan & Evermann. "Weke" or "Weke Pu'ó;" "Weke puhúla." Plate 39.

Head 3.75 in length; depth 4.1; eye 5 in head; snout 2.25; interorbital 3; maxillary 2.3; shortest distance between maxillary and eye 1.25 in longitudinal diameter of eye; D. VIII-9, second spine 1.5 in head; A. II, 6, longest anal ray 1.9 in head; pectoral 1.5; ventrals 1.45; scales 3-40-7.

Body oblong, compressed, deepest through the anterior base of the spinous dorsal; head moderate, compressed, profile arched from origin of the spinous dorsal to tip of snout, steepest on snout; snout bluntly rounded; lower jaw included; mouth moderate, slightly oblique; tongue short, rounded anteriorly, not broad nor thick, and not free; teeth in villiform bands on each jaw and on vomer and palatines; maxillary moderate, reaching anterior edge of eye, moderately broad and sheathed for more than half of its length; eye rather small, high, median, adipose eyelid well developed; barbels not



UPENEUS ARGE JORDAN & EVERMANN. TYPE.

reaching edge of gill-opening; pseudobranchiae well developed; gillrakers 16+6, finely serrate, last 5 or 6 on longer limb very blunt and short, pupil of eye contained 1.5 in longest; spinous dorsal 1.5 in depth, first 2 spines even, longer than the others and longer than base; distance from snout to origin of spinous dorsal one-third distance from snout to last scale on caudal; distance between dorsals slightly less than base of soft dorsal; soft dorsal slightly concave; caudal deeply forked, upper lobe longer; anal similar to soft dorsal, inserted slightly behind the latter; ventrals reaching slightly beyond pectoral, rays of pectoral slightly the longer; lateral line concurrent with dorsal outline; scales large, finely ctenoid; entire body and head scaly.

Color in life, pale green, changing to white below; edges of scales on back and down to lateral line purplish brown, giving the appearance of 3 rather distinct stripes of purplish brown, with greenish centers on the scales; side with 2 broad yellow stripes, the upper beginning on opercle at level of eye and running to caudal just above lateral line, which it crosses under soft dorsal; second beginning on base of pectoral and running to base of caudal just below lateral line, this stripe less distinct and narrowing posteriorly; opercle bright rosy; top of head dusky; cheek white with some rosy; lower jaw white; barbels yellow; dorsal fins pale, each crossed by 2 or 3 brownish rosy bars; caudal white, upper lobe with 4 broad brownish red bars running downward and backward, 1 at base narrow; lower lobe with similar but much broader black bars running upward and backward, 2 of them more distinct than the others, 2 longish dark spots on inner rays; anal, ventrals, and pectoral pale, ventrals rather pale yellowish; iris yellowish, pink above.

Color in alcohol, above bluish olivaceous, the side becoming lighter, almost white on belly; borders of scales dusky; first dorsal spine with 3 or 4 dark spots, and the upper posterior edge of membranes with dark spots; soft dorsal with 3 dark spots on anterior edge and similar spots on upper part of fin; caudal fin with dark bands, upper lobe with about 6, those on lower lobe 4, much broader, other fins pale.

This species resembles *Upeneus vittatus* (Forskål), described from Djidda, Arabia, but the latter has the belly abruptly deep yellow in life. It is an abundant and important food-fish at Honolulu, where we obtained 10 specimens and where 4 others were collected by Dr. Jenkins in 1889. It is equally common at Hilo and in Pearl Harbor, living in shallow water along quiet shores.

Our specimens are 8 to 12.5 inches long.

*Upeneoides vittatus*, Streets, Bull. U. S. Nat. Mus., No. 7, 71, 1877 (Honolulu); not of Forskål.

*Upeneus arge* Jordan & Evermann, Bull. U. S. Fish Comm., XXII, 1902 (April 11, 1903), 187, Honolulu; Jenkins, op. cit. (Sept. 23, 1903), 456 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 527 (Honolulu).

### 207. *Upeneus tæniopterus* Cuvier & Valenciennes. "Weke."

Head 5 in total length; depth 5; eye 5 in head, 1.65 in snout, 1.5 in interorbital space; D. VII-1, 7; A. 7; scales 3-38-7.

Interorbital space flat, a very slight rise from snout to base of first dorsal, a slight swelling over the snout in front of eye; barbels reaching to first third of orbit; teeth villiform in jaws, vomer, and palatines; first spine of dorsal fin the highest, and equal to two-thirds height of body, the second very nearly as long; 6 rows of scales between bases of dorsal fins; pectoral equal in length to first dorsal spine; caudal deeply forked; tubes of lateral line very arborescent posteriorly; air-bladder large; branchiostegals 4; pyloric coeca 2.

Color, back reddish, becoming white on the abdomen; a large reddish spot said to have existed on the free portion of tail, but not now apparent; first dorsal fin with 3 brownish longitudinal bands, second dorsal likewise banded; caudal with 6 oblique streaks across either lobe. Length 12 inches. (Day.)

The above description was taken from Cuvier and Valenciennes's type in the Paris Museum.

We know of no record of this species from the Hawaiian Islands other than that of Steindachner, who refers 2 examples, obtained at Honolulu, to this species. It was not seen by us and it is probable that *Upeneus arge* has been mistaken for it.

*Upeneus tæniopterus* Cuvier & Valenciennes, Hist. Nat. Poiss., III, 451, 1829, coast of Trinquemalao, Ceylon.

*Upeneoides tæniopterus*, Day, Fishes of India, I, 122, 1876; Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 487 (Honolulu).



## Family LXVII. POMACENTRIDÆ.—The Demoiselles.

Body short, deep, compressed, covered with ctenoid scales of varying size; lateral line wanting posteriorly; mouth small, usually with rather strong teeth, either conic or incisor-like; vomer and palatines toothless; nostril single on each side, nearly round; preopercle with its posterior edge largely free, serrate, or entire; preorbital sheathing the small maxillary; dorsal fin single, with numerous strong spines, the spinous portion longer than the soft, which is similar to the soft anal, both fins scaly at base; anal spines 2; ventral fins thoracic, 1, 5, the anterior rays longest, usually filamentous; a scaly appendage at base of ventral; lower pharyngeals fully united; branchiostegals 5 to 7; gills 3.5, the slit behind the last gill very small or obsolete; gillrakers rather long and slender; no labyrinthiform appendage; air-bladder and pseudobranchiæ present, well developed; pyloric cæca 2 or 3; gill-membranes free from the isthmus; vertebrae 12+14=26. Fishes of the tropical seas, similar in mode of life to the *Chætodontidæ*, feeding on small marine animals and plants in the coral reefs. Most of them are too small to be used as food. They are very active in life, and the coloration is usually brilliant, sometimes changing much with age. The family shows strong affinities with the *Labridæ* in gill-structures and pharyngeals. In other respects it approaches the *Kyphosidæ*, while the unique character of the simple nostril is shared with the *Cichlidæ* only, from ancestors of which group the *Pomacentridæ* are probably descended.

a. Teeth conical, or villiform, not compressed.

b. Body deep; outer series of teeth conical and sharp; preopercle finely serrate.....*Dascyllus*, p. 266

bb. Body oblong; outer series of teeth bluntish; preopercle entire.....*Chromis*, p. 267

aa. Teeth not conical or villiform, somewhat compressed.

c. Preopercle and preorbital serrate; teeth truncate or rounded.....*Pomacentrus*, p. 270

cc. Preopercle and preorbital entire; teeth usually more or less emarginate.....*Abudedefduf*, p. 271

## Genus 142. DASCYLLUS Cuvier.

Preopercle and sometimes preorbital serrated; teeth small, villiform, in a narrow band, with an outer series of somewhat larger ones; dorsal fin with 12 or 13 spines, anal with 2; scales of moderate size, in fewer than 30 transverse series; lateral line ceasing below the soft dorsal fin; branchiostegals 5; gills 3.5; pseudobranchiæ present; air-bladder large; pyloric appendages 2 or 3. Coral reefs of the Pacific.

*Dascyllus* Cuvier, Règne Animal, Ed. II, 91, 1829 (*aruanus*); not *Dascyllus* Latreille, Coleoptera, 1796.

*Tetradrachmum* Cantor, Cat. Malay. Fishes, 241, 1850 (*aruanus*); substitute for *Dascyllus*, regarded as preoccupied.

208. *Dascyllus albisella* Gill. Fig. 112.

Head 3.35 in length; depth 1.5; eye 2.3 in head; snout 3.35; maxillary 3; interorbital 2.75; D. XII, 16; A. II, 15; scales 6-27-12.

Body deep, short, greatest depth over base of pectoral; head much deeper than long, the anterior profile nearly vertical; snout short, vertical; mouth small, oblique; jaws subequal, protruding very little beyond anterior profile of head; teeth in jaws with an enlarged outer series, conic, pointed; behind these several series of small teeth in each jaw; maxillary small, reaching little beyond anterior margin of orbit; interorbital width broad, convex; nostril circular, small; margins of preopercle and preorbital finely serrate; second dorsal spine longest, 1.4 in head; base of soft dorsal 2 in spinous dorsal, fourth ray longest, 1.2 in head; second anal spine 1.35 in head; seventh anal ray longest, 1.2 in head; caudal slightly emarginate, lobes rounded and upper longer than lower; pectoral pointed, upper rays longest, 2.1 in base of dorsal; ventrals large, pointed, 2.6 in body; caudal peduncle deep, 1.65 in head; scales large, ctenoid. The above description chiefly from an example (No. 543), obtained at Honolulu in 1889, by Dr. Jenkins.

Color in life (Nos. 03445 and 03549), each scale with a blackish border and whitish base, except in the white area in middle of dorsal part of body, where dark borders of each scale are almost absent; nuchal spot blue when present; all fins dark, almost black, except the whitish scales on dorsal fin.

One example (No. 03355) shows general color whitish, blue darkest on head and breast; scales enveloping bases of dorsal and anal whitish blue; snout and anterior part of head dark brownish blue; dorsal pale bluish, blackish toward tip; caudal, anal, and ventrals bluish black; pectoral pale blue; iris bluish brown.

Color in alcohol, uniform brown, margin of each scale with darker; a large white blotch on middle of back above; lips, margins of vertical fins, base of pectoral above, and ventrals, dusky blackish. Young examples are very deep brownish black with pearly white blotch extending down on side of body pronounced, the pectoral pale, and soft dorsal whitish above. Some also show margins of anal and caudal whitish and a white nuchal spot.

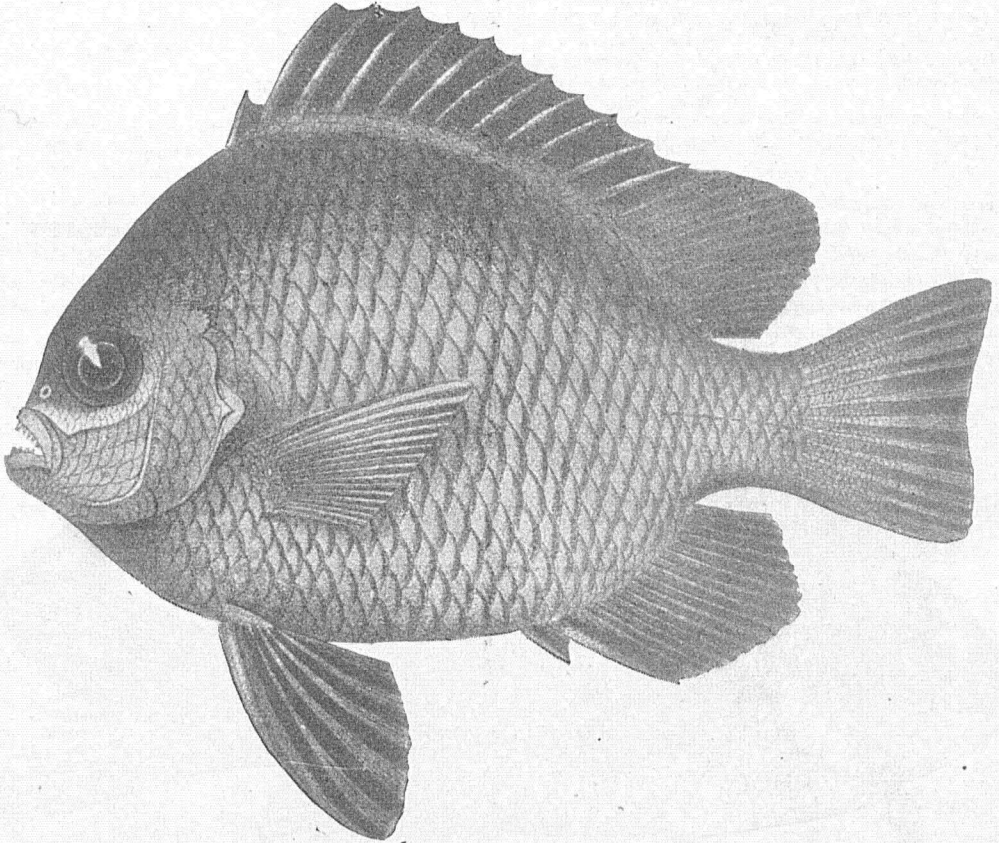


FIG. 112.—*Dascyllus albisella* Gill; after Bleeker.

Our collections contain 40 specimens ranging in length from less than half an inch to 4.75 inches, all from Honolulu except one, which was collected at Waikiki Beach. This pretty little fish is rather common in crevices of the coral reefs. Apparently the Hawaiian species, *albisella*, is different from the common *trimaculatus* of the South Seas.

*Dascyllus albisella* Gill, Proc. Ac. Nat. Sci. Phila. 1862, 149, Sandwich Islands; Günther, Shore Fishes, Challenger, Zool., I, part VI, 61, 1879 (1880) (Honolulu); Günther, Fische der Südsee, VII, 236, 1881 (Honolulu); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 457 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 527 (Honolulu; Albatross Station 3968).

*Dascyllus trimaculatus*, Günther, Fische der Südsee, IV, 13, 1875 (Sandwich Islands); Günther, Fische der Südsee, VII, 236, 1881 (Society, Kingsmill, Pelew, Yap, Loisiade, New Hebrides, and Sandwich Islands); Steindachner, Denks. Ak. Wiss. Wien, LXX, 503, 1900 (Honolulu); not of Rüppell.

*Tetradrachmum trimaculatum*, Bleeker, Atlas, IX, taf. 409, fig. 8, 1879; Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 503 (Sandwich Islands).

#### Genus 143. CHROMIS Cuvier.

Body oblong or ovate, the depth two-fifths to two-thirds the length of body without caudal; preopercle entire, or nearly so; lateral line wanting on tail; mouth small; teeth conical, in 2 or more series, the outer series enlarged and blunt; scales rather large, 24 to 30 in a longitudinal series; sub-

orbital and lower jaw scaly; dorsal fin with 12 to 14 spines and 9 to 14 soft rays; caudal more or less forked, the lobes rounded or acute; branchiostegals normally 5; pyloric caeca 2; gillrakers long and slender. Tropical seas; species numerous, varying considerably in form, perhaps divisible into smaller genera.

*Chromis* Cuvier, Memoires du Mus. d'Hist. Nat., Paris, I, 1815, 353 (*chromis*).

*Melias* Cuvier & Valenciennes, Hist. Nat. Poiss., V, 1830, 495 (*insolatus*).

*Furcaria* Poey, Memorias Cuba, II, 194, 1860 (*puncta*).

*Helicastes* Günther, Cat., IV, 60, 1862 (*chromis*); corrected spelling.

*Ayresia* Cooper, Proc. Cal. Ac. Sci. 1863, 73 (*punctipinnis*).

a. Opercle ending in 2 small flat spines, the upper obscure; body short obvate; dorsal spines XII.....*elaphrus*, p. 268  
aa. Opercle without spine; body oblong ovate; dorsal spines XIV.....*ovatis*, p. 269

### 209. *Chromis elaphrus* Jenkins. Fig. 113.

Head 3.4 in length; depth 2.25; eye 3 in head; snout 3.75; maxillary 3.75; interorbital 2.5; D. XII, 15 or 16; A. II, 12; P. 18; scales 4-27-9, 20 pores.

Body short, deep, ovate and compressed, the dorsal outline of body more convex than ventral outline; snout short and bluntly conic; anterior outline a little more convex in interorbital region than on nape; caudal peduncle about 2 in head; snout shorter than eye; suborbital, preopercle, and opercle entire, the preopercle somewhat crenulate; opercle ending in 2 small flat spines, the upper

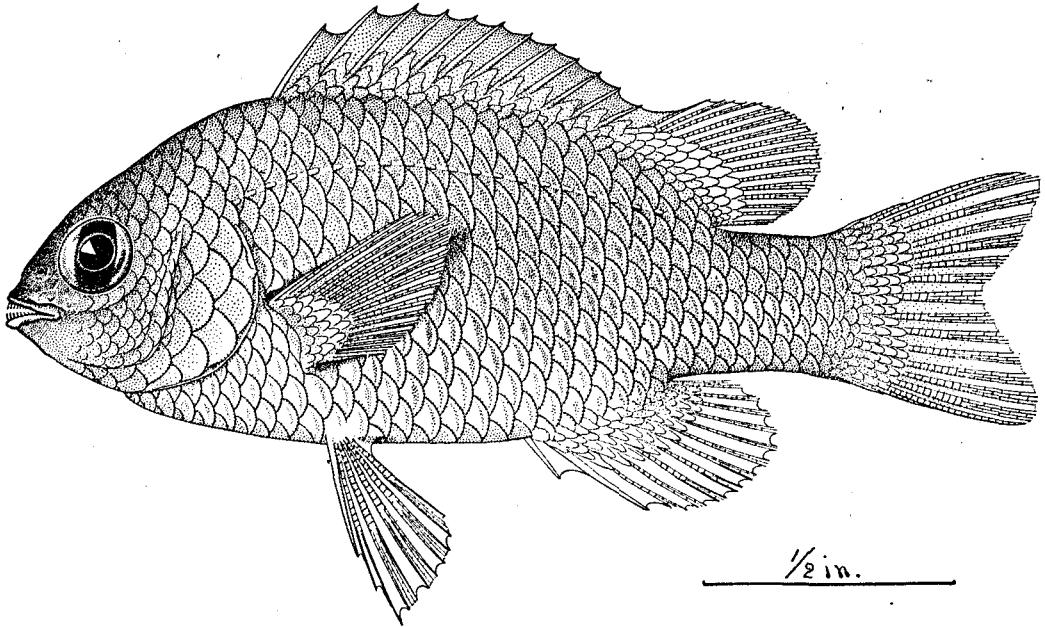


FIG. 113.—*Chromis elaphrus* Jenkins; from the type.

obscure; teeth conic, close-set in a single series in each jaw; third dorsal spine longest, 1.8 in head; soft dorsal somewhat higher than spinous portion, slightly rounded, longest rays about 1.7; anal rounded, similar to soft dorsal, 1.4; caudal deeply emarginate, the upper lobe slightly the longer, about equaling head; ventrals nearly reaching vent, 1.3; pectoral broad, rather truncate, 1.3; scales large, regular, slightly ctenoid, densely covering entire body and head except snout anterior to nostril and tip of lower jaw; lateral line well developed, beginning at upper edge of gill-opening, gently arched, following contour of back to within 3 scales of base of last dorsal ray, where it ceases; bases of all the fins scaled, those on spinous dorsal largest.

Color in alcohol, brown above and on top of head, paler below; opercle dusky; fins all plain or dusky, without markings; no black spot or blotch upon anterior portion of spinous dorsal, and none at base of pectoral.

The above description based chiefly upon a specimen 2.25 inches long from Hilo, where several specimens were obtained in Henshaw's pool, in lava rocks 2 miles to the southward of Hilo. The species seems to be fairly common, though it was obtained by us only at Hilo, where we secured 9 specimens. Nine specimens, including the type, were obtained by Dr. Jenkins from among the coral rocks at Honolulu in 1889. This is one of the most agile of fishes.

*Chromis claphrus* Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 457, fig. 23, Honolulu. (Type, No. 50703, U. S. N. M., Coll. O. P. Jenkins.)

210. *Chromis ovalis* (Steindachner). Fig. 114.

Head 3.5 in length; depth 2.3; eye 3.2 in head; snout 4.2; maxillary 3; interorbital 3; D. xiv, 11; A. 11, 13; scales 3-28-8.

Body oblong-ovate, deepest through base of ventrals, compressed; dorsal outline steepest from origin of dorsal fin to tip of snout, slightly concave over interorbital region; head deeper than long, compressed; snout subconic; lower jaw slightly included; maxillary reaching anterior edge of eye; mouth small, nearly horizontal; a single row of small distinct conic teeth in each jaw, 1 or 2 short indistinct rows back of the outer row in the anterior part of jaws; opercle and preopercle entire, no opercular

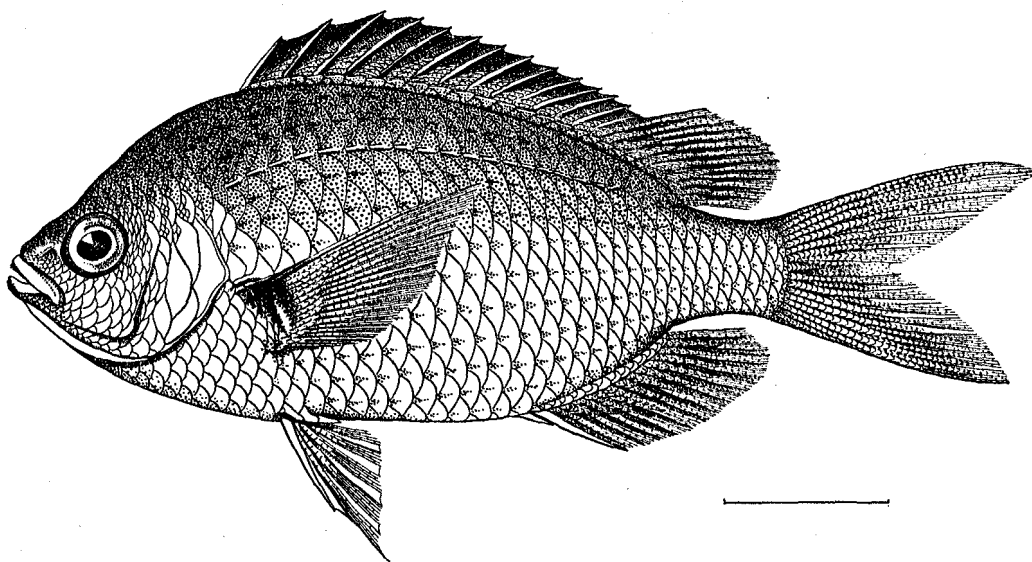


FIG. 114.—*Chromis ovalis* (Steindachner). Type of *C. velox* Jenkins.

spine; eye anterior, its lower edge on line with upper base of pectoral; interorbital slightly convex, almost flat in some examples; fins rather large, origin of dorsal slightly anterior to origin of pectoral, fourth to eighth spines about equal and the longest 1.85 in head; first spine slightly shorter than last; middle rays of dorsal longest, 1.8, the soft part being rounded; anal rays nearly all equal, the last 2 or 3 slightly the shorter, longest 1.9; second spine rather stout and strong, 2; first spine very short; caudal deeply forked, upper lobe slightly the longer, longest ray about 3 in body; ventrals reaching vent, 1.25 in head; pectoral large, pointed, upper rays longest, 3 in body; scales large, very finely ctenoid, covering entire body and head except lips, small scales at bases of all the fins, those on soft dorsal and anal and caudal small and covering most of the fin; lateral line concurrent with dorsal outline, on first 20 rows of scales, then dropping 3 rows and very obscurely extending on middle of caudal peduncle to base of dorsal fin.

Color in alcohol, brownish or dusky olive above, below silvery yellowish; base of pectoral black, color not extending to axil; about 8 indistinct longitudinal dusky streaks along side of body below dorsal region, following rows of scales; membranes of spinous dorsal black; soft anal and dorsal dusky; caudal dusky brown.

We have seen only 4 specimens, all from Honolulu, 3 obtained by Dr. Jenkins and one by Dr. Wood. Each is 6 inches long.

*Heliastes ovalis* Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 502, Honolulu.

*Chromis velox* Jenkins, Bull. U. S. Fish Comm., XIX, 1899 (June 8, 1901), 393, fig. 6, Honolulu. (Type, No. 49698, U. S. N. M., Coll. O. P. Jenkins.)

*Chromis ovalis*, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 458 (Honolulu).

#### Genus 144. POMACENTRUS Lacépède.

Body ovate, or oblong, compressed, the profile steep, usually rounded; head moderate, nearly as deep as long, the snout scaly, the lower jaw scaly or naked; mouth quite small, terminal, the jaws equal; each jaw armed with 1 or 2 close-set series of compressed, immovable teeth, which are truncate or rounded at tip, sometimes a few small teeth behind these; gillrakers long; preopercle more or less serrate; preorbital serrate; scales large, strongly ctenoid, the lateral line running parallel with the back to near end of dorsal fin, at which point it ceases; dorsal fin continuous, with 12 or 13 low stout spines; membrane of spinous dorsal usually not deeply incised nor lobed, the soft part more or less elevated, its last rays gradually shortened; lower limb of preopercle usually more or less scaly; preorbital narrow, without deep notch; anal fin similar to soft dorsal, with 2 spines, of which the second is much the larger; soft rays 12 to 16; dorsal spines with a sheath of large scales, the membranes of both dorsal and anal covered high up with small scales; caudal fin more or less forked, the lobes rounded; lower pharyngeals triangular; branchiostegals 5 or 6. Species numerous in the tropical seas; extremely variable in form and color, the brilliant coloration apparently dependent on surroundings.

*Pomacentrus* Lacépède, Hist. Nat. Poiss., IV, 508, 1802 (*parvo*); teeth biserial, soft dorsal short, often elevated; caudal deeply forked, teeth truncate.

*Pristotis* Rüppell, Neue Wirbelthiere, Fische, 128, 1838 (*cyanostigma*).

*Pseudopomacentrus* Bleeker, Verh. Holl. Maats. Weten., II, 1877, 40 (*littoralis*); teeth rounded; preorbital notched; caudal lunate.

*Parapomacentrus* Bleeker, Nat. Verh. Holl. Maats. Weten., II, 1877, 65 (*polynema*); teeth uniserial; lower jaw scaly; snout scaly; spinous dorsal with membrane incised and lobed.

*Amblypomacentrus* Bleeker, Nat. Verh. Holl. Maats. Weten., II, 1877, 68 (*breviceps*); snout and lower jaw naked.

*Eupomacentrus* Bleeker, Nat. Verh. Holl. Maats. Weten., II, 1877, 73 (*lividus*); snout scaly; lower jaw naked; membranes of spinous dorsal not notched; teeth uniserial.

*Brachypomacentrus* Bleeker, Nat. Verh. Holl. Maats. Weten., II, 1877, 73 (*albifasciatus*); as above; membrane of spinous dorsal deeply notched.

#### 211. *Pomacentrus jenkinsi* Jordan & Evermann. Fig. 115.

Head 3.4 in length; depth 1.8; eye 3.3 in head; snout 4; maxillary 3.2; interorbital 2.75; D. XIII, 16; A. II, 13; scales 4-29-11; Br. 4.

Body ovate, deep, compressed, dorsal outline rather steep, evenly curved from tip of snout to soft dorsal, following edge of scales on spinous dorsal; head deeper than long, compressed, subconic; snout bluntly conic, jaws equal; maxillary reaching anterior edge of eye; mouth small, horizontal; a single row of close-set, incisor teeth in each jaw; posterior edge of preopercle roughly serrate; opercle ending in 2 short flat spines, the upper very obscure; interorbital wide, strongly convex; fins rather large; origin of dorsal over ventral, origin of each equally distant from tip of snout; first 2 or 3 dorsal spines shorter than others; others about of equal length, shorter than the longest dorsal rays, the median rays being longest, 1.5 in head; caudal forked, lobes rounded, upper the longer; anal rounded, longest ray 1.5 in head, second spine rather stout and strong, 2.2 in head; ventrals long, reaching vent, 1.1 in head; pectoral broad, upper rays the longer, 1.2 in head; scales large, finely ctenoid; body and head, except lower jaw and snout, scaled, scales on top of head small; bases of all the fins except ventrals well covered with fine scales, those on spinous dorsal larger; lateral line concurrent with dorsal outline to a line under base of third or fourth dorsal ray, where it drops 3 rows of scales to middle of caudal peduncle, thence continuing to base of caudal fin, the detached portion little developed.

Color in life, ground dark drab; central portion of scales olivaceous, each one with black on lower part of posterior edge forming vertical bands on body; axil black; outer border of dorsal fin, above scaled part, black; pectoral dusky olivaceous, black at base; ventral and anal black; caudal dusky with posterior border lighter; iris bright yellow.

Color in alcohol, dark brown, edges of scales darker; a dark stripe on upper edge of membranes of spinous dorsal, broadest and most distinct anteriorly; rest of dorsal, and caudal and pectoral dark brownish; ventrals and anal dark, almost black; a black blotch at upper base of pectoral, continuous with the black axil.

This is a very abundant species among the Hawaiian Islands. Numerous specimens were obtained at Honolulu in 1889 by Dr. Jenkins, and others by Dr. Wood in 1898 and Dr. Jordan in 1900. Our own collections, made in 1901, contain numerous specimens, the localities represented being Honolulu,

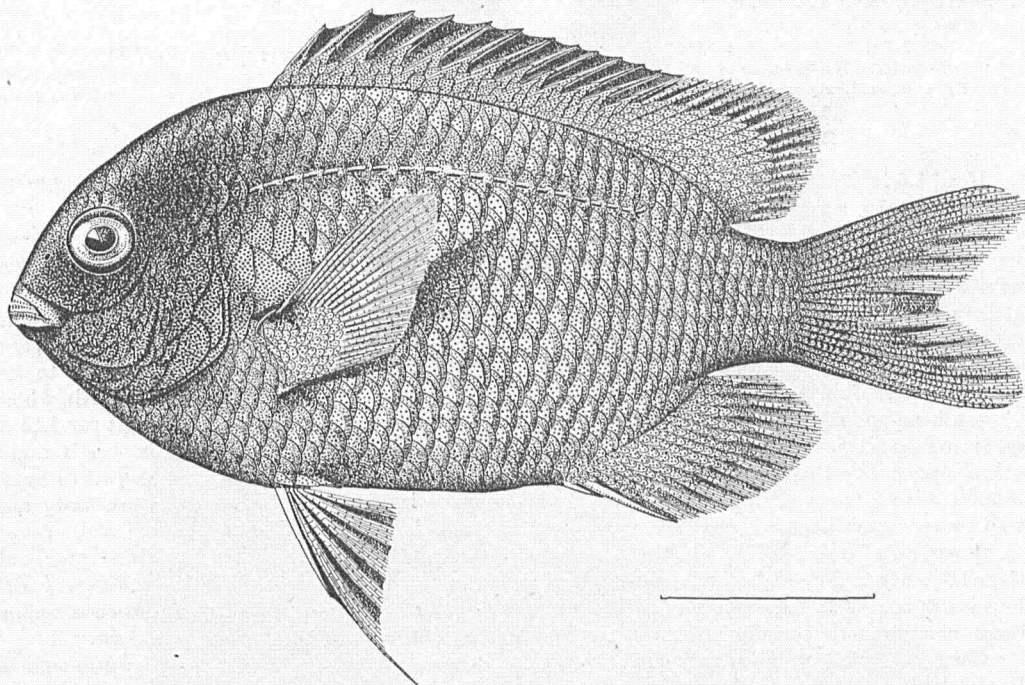


FIG. 115.—*Pomacentrus jenkinsi* Jordan & Evermann. Type of *Eupomacentrus marginatus* Jenkins.

Hilo, and Kailua, and specimens were taken by the *Albatross* in 1902 at many different places among the Hawaiian Islands.

The above description is based chiefly upon a specimen (field No. 04526) 4.8 inches long, obtained by us at Honolulu. The length varies from 3.75 to 5.25 inches.

*Pomacentrus nigricans*, Quoy & Gaimard, Voyage Uranie, Zool., 399, 1824 (Sandwich Islands, not of Lacépède); Cuvier & Valenciennes, Hist. Nat. Poiss., v, 425, 1830; Günther, Cat., iv, 34, 1862 (Sandwich Islands); not *Holocentrus nigricans* Lacépède, Hist. Nat. Poiss., iv, 332 and 367, 1803, locality unknown, collected by Commerson.

*Eupomacentrus marginatus* Jenkins, Bull. U. S. Fish Comm. for 1899 (June 8, 1901), 391, fig. 5, Honolulu. (Type, No. 49700 U. S. N. M., Coll. O. P. Jenkins); not *Pomacentrus marginatus* Rüppell.

*Eupomacentrus nigricans*, Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 503 (Honolulu).

*Pomacentrus jenkinsi* Jordan & Evermann, Bull. U. S. Fish Comm., xxii, 1902 (April 11, 1903), 189, Honolulu; Snyder, l. c., (Jan. 19, 1904), 527 (Hawaiian Islands; Laysan Island).

#### Genus 145. ABUDEFDUF Forskål.

Body deep, compressed, covered with large ctenoid scales; snout without scales; preopercle and preorbital entire, the lower limb of preopercle scaleless; 3 to 4 rows of scales between lateral line and dorsal; teeth compressed, fixed, more or less distinctly emarginate, in one series in each jaw, those below occupying most of the free edge of the jaw; jaws subequal. Dorsal usually with 13 spines, the last slightly shorter than the medium ones; branchiostegals 5 or 6; pyloric caeca 3; lower pharyngeals triangular. Species numerous, often brightly colored, found about coral reefs in the tropical seas. We exclude from this genus all species with rounded, biserial teeth.

*Abudefduf* Forskål, Deser. Anim., etc., 59, 1775 (*sordidus*).

*Glyphisodon* Lacépède, Hist. Nat. Poiss., IV, 542, 1802 (*moucharra*).

*Stegastes* Jenyns, Voy. Beagle, 63, 1842 (*imbricatus*); dorsal spines 12; snout scaly.

*Euschistodus* Gill, Proc. Ac. Nat. Sci. Phila. 1862, 145 (*declivifrons*).

*Hemiglyphidodon* Bleeker, Holl. Maatsch. Wetens., II, 1877, 91 (*ptegiomctapon*); lower pharyngeals quadrate.

*Amblyglyphidodon* Bleeker, op. cit., 92 (*aurcus*); scales above lateral lines in 1 or 2 rows.

*Glyphidodon*, corrected spelling.

a. Teeth scarcely compressed.

b. Dorsal XII, 19; anal II, 15.....*sinonis*, p. 272

aa. Teeth considerably compressed.

c. Eye comparatively large, less than 4 in head.

d. Dorsal XIII, 14, spines shorter than soft rays; anal II, 14.....*abdominalis*, p. 272

dd. Dorsal XII, 16, the spines as long as soft rays; anal II, 11.....*imparipennis*, p. 274

cc. Eye comparatively small, more than 4 in head (4.6).....*sordidus*, p. 274

## 212. *Abudefduf sinonis* (Jordan & Evermann). Plate 40,<sup>a</sup>

Head 3.5 in length; depth 1.75; eye 3.4 in head; snout 3.5; maxillary 3.4; interorbital 2.8; D. XII, 19; A. II, 15; scales 4-28-9, 22 pores.

Body short and deep, dorsal outline evenly arched from tip of snout to soft dorsal; head deeper than long, compressed; snout short and conic; mouth small, horizontal, lower jaw slightly shorter; maxillary reaching to anterior edge of orbit; a single row of small, rather blunt, slightly compressed teeth on each jaw; preopercle entire, opercle ending in 2 small flat spines, upper very small and obscure; eye anterior, high, its lower edge above upper base of pectoral; interorbital broad, steep, and convex; fins large, origin of dorsal over base of ventrals, its distance from tip of snout equal to distance from base of last ray to tip of upper caudal lobe; spines strong and long, first 0.7 of fourth, which is 1.9 in head and of same length as following spines; middle dorsal rays produced, longest ray 1.25 in head; anal similar to soft dorsal, longest ray 1.25 in head, second spine longest, 2 in head; caudal forked, upper lobe the longer; ventrals reaching past vent, outer rays longest, about equal to head; pectoral broad, upper rays longest, equal to head; scales large, ctenoid, covering entire body and head except lower jaw and snout anterior to eye; lower limb of preopercle scaled; large scales covering nearly all of dorsal spines, smaller scales covering as much of soft dorsal and anal and nearly all of caudal; very minute scales on base of pectoral, none on rays of ventrals; lateral line concurrent with dorsal outline, on 22 scales, ending 3 rows of scales short of posterior base of dorsal, then dropping 3 rows of scales and continuing obscurely on middle of caudal peduncle to base of caudal fin.

Color in alcohol, uniform very dark brown, nearly black; 2 narrow wavy bands of white on side, first beginning about under fourth dorsal spine and extending under about middle of pectoral, thence curving slightly backward toward vent, rather indistinct below pectoral; second band beginning under last dorsal spine and first ray, extending toward middle of anal, rather obscure, indistinct for 2 or 3 scales before reaching anal; fins all black, pectoral slightly lighter than others; a large black ocellated spot with a narrow white border on back and lower part of soft dorsal, larger than eye, just back of last white bar.

The above description based on the type, No. 50669, U. S. N. M. (field No. 04524), a specimen 3.75 inches long, from Honolulu. One other specimen obtained and taken as a cotype, No. 2727, Bureau of Fisheries reserve series (field No. 03732). It is 2.75 inches long, and was taken at Kailua where the species was first discovered by Mr. Michitaro Sindo, for whom it is named.

This species agrees with typical *Abudefduf* in all respects except that none of the teeth appears to be emarginate. It agrees with *Chrysiptera* in the entire preopercle and preorbital and naked snout, but differs from the type of that genus in having the teeth in a single series.

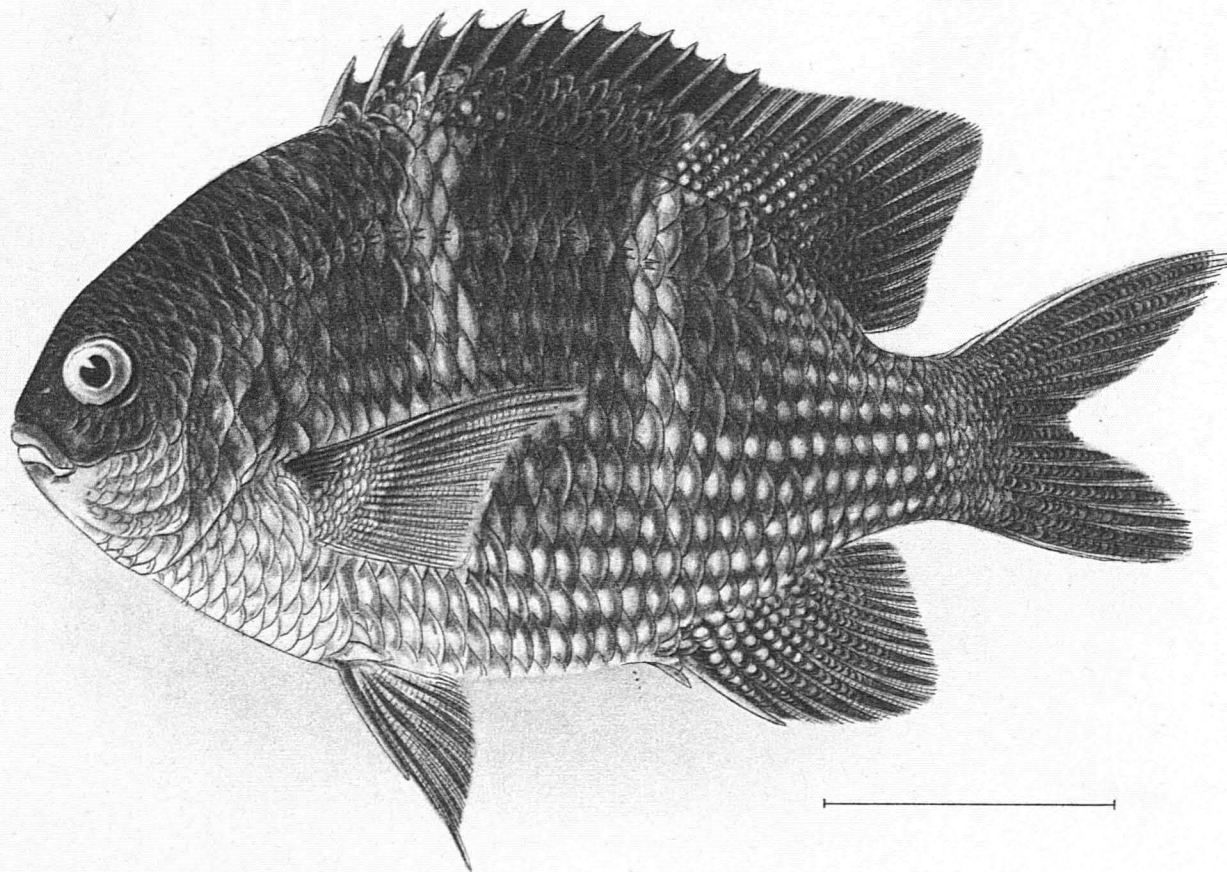
*Glyphisodon sinonis* Jordan & Evermann, Bull. U. S. Fish Comm., XXII, 1902 (April 11, 1903), 188, Honolulu.

## 213. *Abudefduf abdominalis* (Quoy & Gaimard). "*Muomao*." Fig. 116.

Head 3.5 in length; depth 2; eye 3.75 in head; snout 3.4; maxillary 3.5; interorbital 2.8; D. XIII, 14; A. II, 14; scales 5-30-11.

Body oblong, deep, compressed, much longer in adult than in young; head small, its depth equal to its length; upper profile concave over eyes; snout short, obtuse, rounded; mouth small, oblique,

<sup>a</sup> *Glyphisodon sinonis* on plate.



GLYPHISODON SINDONIS JORDAN & EVERMANN. TYPE.



jaws equal; lips fleshy; teeth in jaws small, uniserial, compressed, incisor-like, their margins notched; no teeth on vomer, palatines, or tongue; tongue elongate, pointed, free in front; eye anterior, superior, less than snout; preopercle oblique, its margin smooth; interorbital width broad, convex; nostril small, circular; third dorsal spine 2 in head; longest dorsal ray 1.4; fourth anal ray 1.5; pectoral long, pointed, 3.1 in body; ventrals pointed 3.6, the spine 1.4 in first ray; scales large, rounded, ctenoid; lateral line arched, not continued beyond soft dorsal; tubes of lateral line arborescent; no scales on snout, in front of eye, or on lips and chin; scales on infraorbital, vertical fins, and base of pectoral minute.

Color in life (No. 3007), body, pale brassy green, with 5 narrow bluish black vertical bars, the first from front of dorsal to base of pectoral, the second from third to fifth dorsal spines to beneath middle of pectoral, the third from eighth or ninth spine toward origin of anal; the fourth from last spines to middle of anal and the last, which is faint, from last dorsal rays across caudal peduncle; head dusky; belly white; black spot on base of pectoral above, axil black; dorsal brassy, mottled with

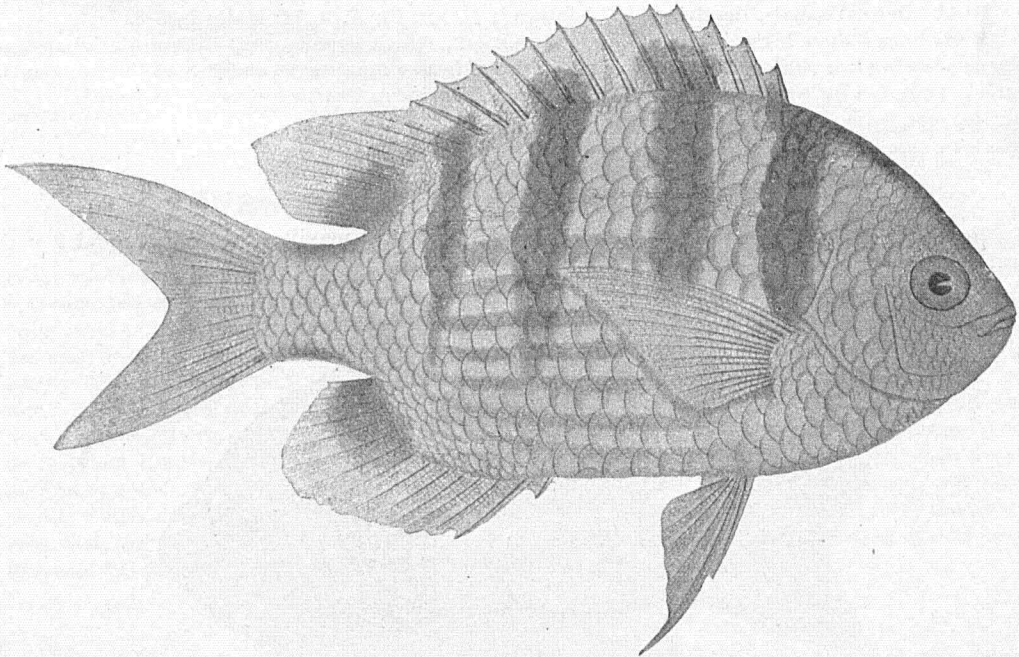


FIG. 116.—*Abudedefduf abdominalis* (Quoy & Gaimard); after Günther.

dark, the edge of membrane black, the projecting spines white; black blotch on base of last dorsal rays; caudal and anal dusky yellowish; ventrals white, dusky at tips; pectoral pale yellowish; breast dusky; iris silvery, black above and below. Another example was steel-blue when fresh, olive-green on back with 4 broad cross bars; spinous dorsal, base of soft dorsal, caudal and base of anal black; a black spot at base of pectoral; ventral black; soft dorsal, caudal and anal pale, except base.

Color in alcohol, purplish brown above; side below lateral line with dull light green longitudinal bands; lower surface of body whitish; 5 blackish vertical bands on side of back, indistinct on lower half of body, and extending up on fin; first band begins at origin of spinous dorsal, second at fourth and fifth dorsal spines, third at ninth and tenth spines, and fourth at last dorsal spine and first 2 rays; dark brown blotch on caudal peduncle above; a deep black blotch on basal portion of posterior rays of soft dorsal and anal; vertical fins dusky grayish; pectoral and ventrals grayish, the latter with whitish streaks between rays; blackish spots at base of median caudal rays.

Described from an example (No. 4488), from Honolulu.

This species is close to *Abudedefduf saratilis* of India, from which it is distinguished by the large black spots at bases of posterior dorsal and anal rays, and the fourth blackish vertical bar beginning at

last dorsal spine and first 2 or 3 soft rays. The Atlantic form, *Abudefduf marginatus*, is distinguished by the shorter, more orbicular body and the absence of black blotches on soft dorsal and anal.

We have examined 55 specimens of this species, all from Honolulu except 1 from Hilo and 4 from Kailua. They range in length from 3.4 to 9 inches. Specimens were also found by the *Albatross* at numerous places among the Hawaiian Islands.

*Glyphisodon abdominalis* Quoy & Gaimard, Voy. Uranie, Zool., 390, 1824, Sandwich Islands; Cuvier & Valenciennes, Hist. Nat. Poiss., V, 457, 1830 (Hawaiian Islands); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 458 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 527 (Hawaiian Islands and Laysan Island).

*Glyphidodon cœlestinus*, Günther, Cat., IV, 38, 1862 (Hawaiian Islands); not of Cuvier & Valenciennes.

*Glyphidodon saxatilis*, Streets, Bull. U. S. Nat. Mus., No. 7, 66, 1877 (Honolulu); not of Linnæus; Günther, Fische der Südsee, VII, 229, pl. 126, 1881 (Hawaiian Islands; Tahiti); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 502 (Honolulu; Laysan).

*Abudefduf sexfasciatus*, Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 504 (Hawaiian Islands); not of Lacépède.

#### 214. *Abudefduf imparipennis* (Sauvage).

Head 4 in total length; depth 3; eye 3.5 in head; D. XII, 16; A. II, 11; scales 2-28-8.

Head longer than high; interorbital equaling snout, which equals orbit; infraorbital almost as long as preorbital; teeth long and compressed; scales of head extending on snout nearly to tip; caudal scarcely forked, a little shorter than head; second dorsal spine as long as soft rays. Honolulu.

Not seen by us; known only from the description by Sauvage.

*Glyphisodon imparipennis* Sauvage in Vaillant & Sauvage, Rev. Mag. Zool., III, 1875, 279, Honolulu.

#### 215. *Abudefduf sordidus* (Forskål). "*Kupipi*." Fig. 117.

Head 3.2 in length; depth 1.75; eye 4.6 in head; snout 2.8; maxillary 3.2; interorbital 2.5; D. XIII, 16; A. II, 15; scales 6-29-12.

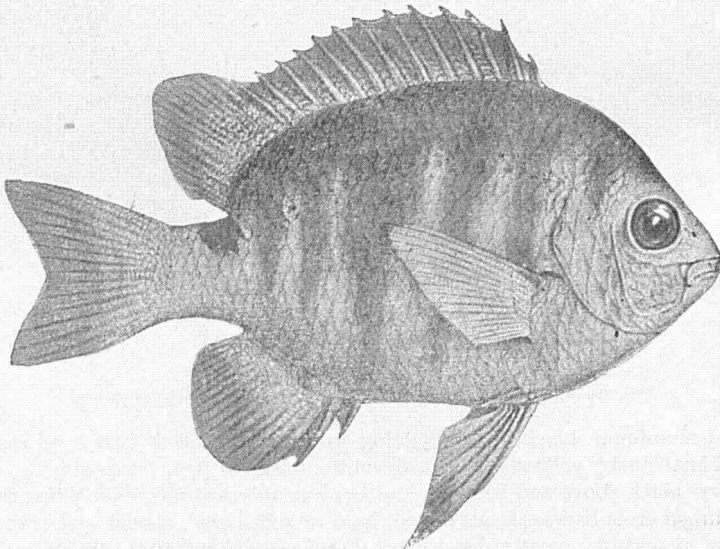


FIG. 117.—*Abudefduf sordidus* (Forskål); after Rüppell.

Body short, deep, compressed, back rather trenchant in front; head small, deep; snout round, blunt, a little longer than eye, mouth small, slightly oblique, the jaws equal; lips fleshy; teeth compressed, uniserial in jaws; eye small, anterior and superior; preopercle very oblique, its margin entire; interorbital width broad, strongly convex; nostril small, circular, in front of middle of eye; longest dorsal spine 2 in head; longest dorsal ray 1.5; second anal spine 2.1; longest anal ray 1.4; caudal broad, forked, lobes rounded; pectoral 1 in head; ventrals 1.2, reaching origin of anal; caudal peduncle broad, 1.75 in head; scales large, ctenoid, except those on fins which are very small; snout, preorbital, and jaws naked.

Color in alcohol, dull brown, a little darker on back; side with 6 broad dark brown vertical bands, deep on back; scales over and behind eye, a row over nape with black centers; a black spot on caudal peduncle above, at base of last dorsal rays; vertical fins blackish; pectoral pale brown; ventrals blackish.

Described from an example (No. 04511) taken at Honolulu.

This species is easily distinguished by the presence of the black spot on caudal peduncle, which is present at all ages. The young have also a black spot at base of pectoral.

We have examined 39 specimens of this common species, 6 collected by us at Kailua, 5 at Hilo, 10 at Waianae, 1 at Moanalua, and 8 at Honolulu; 1 obtained by McGregor at Lahaina, Maui, and 8 by Dr. Jenkins at Honolulu. Specimens were also collected by the *Albatross* at Honolulu; Puako Bay, Hawaii; Napili Bay, Molokai; Necker Island, and Laysan Island. Our examples are one-half to 8.25 inches long.

*Chaetodon sordidus* Forskål, Descript. Animal., 62, 1776, Djidda, Red Sea.

*Glyphisodon sordidus*, Rüppell, Atl. Reis. Nord. Af., 34, Pl. VIII, fig. 1, 1828; Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 458 (Honolulu; Lahaina, Maui); Snyder, op. cit. (Jan. 19, 1904), 527 (Hawaiian Islands, Laysan Island).

*Glyphisodon gigas* Lienard, Dix. Rapp. Hist. Nap. Maur., 35, 1840, Mauritius.

*Glyphisodon notatus* Day, Proc. Zool. Soc. London 1869, 521, Andaman Islands.

*Glyphisodon sordidus*, Günther, Fische der Südsee, VII, 231, 1881 (Red Sea, east coast of Africa, East Indian Archipelago, Tahiti, Raiatea, Samoa, and Bonham Island).

*Abudefduf sordidus*, Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 504 (Hawaiian Islands).

*Glyphisodon (Paraglyphisodon) melas*, Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 502 (*Laysan*); not of Kuhl & van Hassel?

#### Family LXVIII. MALACANTHIDÆ.—The Blanquillos.

Body more or less elongate, fusiform, or compressed; head subconical, the anterior profile usually convex; suborbital without bony stay; the bones not greatly developed; cranial bones not cavernous; opercular bones mostly unarmed; mouth rather terminal, little oblique; teeth rather strong; no teeth on vomer or palatines; premaxillary usually with a blunt posterior canine, somewhat as in the *Labridæ*; premaxillaries protractile; maxillary without supplemental bone, not slipping under the edge of the preorbital; gills 4, a long slit behind the fourth; pseudobranchiæ well developed; gill-membranes separate, or more or less united, often adherent to the isthmus; lower pharyngeals separate; scales small, ctenoid; lateral line present, complete, more or less concurrent with the back; dorsal fin long and low, usually continuous, the spinous portion always much less developed than the soft portion, but never obsolete; anal fin very long, its spines feeble and few; caudal fin forked; tail diphycercal; ventrals thoracic or subjugular, 1, 5, close together; pectoral fins not very broad, the rays all branched; vertebrae in normal or slightly increased number (24 to 30); pyloric cœca few or none. Fishes of the temperate and tropical seas, some of them reaching a large size.

#### Genus 146. MALACANTHUS Cuvier.

Body elongate, slightly compressed; cleft of mouth horizontal, with the jaws equal; eyes lateral; scales very small, minutely ciliated; one continuous dorsal, with the first 4 to 6 rays not articulated; dorsal and anal very long; pectoral rays all branched; jaws with villiform teeth; an outer series of stronger teeth, some of them canine-like, and with a canine at the posterior extremity of the intermaxillary; no teeth on the palate; preopercle entire; opercle with a spine; gillrakers little developed; vertebrae in small number,  $10 + 14 = 24$ .

*Malacanthus* Cuvier, Règne Animal, Ed. 2, II, 264, 1829 (*plumieri*).

#### 216. *Malacanthus parvipinnis* Vaillant & Sauvage. "*Maká'a*." Fig. 118.

Head 5 in length; depth 6.8; snout 3 in head; eye 4.7; interorbital 2.9; maxillary 2.6; D. v, 57; A. 53; P. 16; V. 1, 4; scales 8-175-24.

Body very elongate, compressed, greatest depth about middle of belly; head elongate, compressed, its depth 1.7, width 2; upper profile of head evenly convex; snout elongate, convex, rather blunt; jaws nearly equal, rather large; mouth large, slightly inclined, end of maxillary reaching almost to front of pupil; eye small, high, posterior margin of pupil nearly midway in length of head; nostrils formed as horizontal slits in a groove in front of middle of eye, well separated, the anterior placed in about last

third of snout; interorbital space very broad, convex; lips rather broad, fleshy; teeth sharp pointed, somewhat unequal, in broad bands in jaws; opercle with a large strong spine with a fleshy flap; gill-opening rather large, the isthmus broad, gill-membrane forming a broad fold across; scales very small, ctenoid, those in the lateral line very small, and with posterior margin deeply scalloped; head naked except on postocular region, occiput, cheek, and opercle, which are covered with small finely ctenoid scales; dorsal very long, of more or less uniform height; dorsal spines short, flexible; rays flexible, seventh 2.5; anal long, similar to dorsal, twelfth ray 2.5; the fin beginning at tip of pectoral; pectoral broad, 1.35 in head; ventrals small, close together, 2.5; caudal expanded, truncate, 1.6; caudal peduncle short, compressed, its depth 3.75; lateral line slightly irregular, superior at first, then running down on middle of side of trunk at its last third.

Color in life of a specimen 12 inches long, from Honolulu, light olive green; belly silvery; side with about 20 faint short bands of the back color; dorsal flesh-color, a little rosy, a narrow edge of yellow; caudal lobes gray; iris deep blue, a little golden above.

Color in alcohol, pale brown on upper surface and forming about 20 pale slightly inclined cross bars along side, fading out in the pale color beneath; side and lower surface very pale straw-color washed with silvery; fins, with the exception of caudal, pale straw-color; caudal pale straw-color,

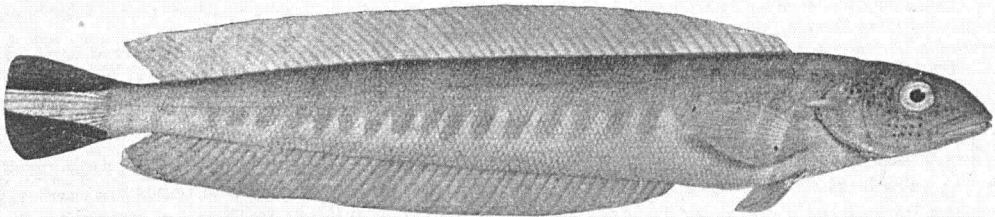


FIG. 118.—*Malacanthus parvipinnis* Vaillant & Sauvage; after Günther.

middle rays whitish, 2 jet-black horizontal bands beginning on the upper and lower rudimentary caudal rays and running to edge of fin; a spot on lower part of iris.

Described from an example (No. 04128) taken at Honolulu.

We have from Honolulu 20 examples 7.25 to 11.75 inches long and 1 from Hilo 8.75 inches long.

Specimens were obtained by Dr. Wood at Honolulu and by the *Albatross* at Honolulu and at Lahaina, Maui.

*Malacanthus parvipinnis* Vaillant & Sauvage, Rev. Mag. Zool. (3), III, 1875, 283, Sandwich Islands; Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 499 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 536 (Honolulu, Lahaina, Maui).

*Malacanthus hoodlii*, Günther, Fische der Südsee, V, 160, taf. XCVIII, fig. B, 1876 (Tahiti, Yap, and Sandwich islands); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 497 (Honolulu); not of Bleeker.

#### Suborder PHARYNGOGNATHI.—The Labroid Fishes.

Lower pharyngeals fully united; nostrils double; gills 3.5, with no slit behind the last; ventral fins thoracic, each with 1 spine and 5 rays; dorsal and anal spines not very strong; scales weakly ctenoid or cycloid; in other respects essentially as in the *Percoidea*. Species mostly of the tropical shores; most of them large fishes of strong dentition and bright colors.

- a.* Lower pharyngeals T-shaped or Y-shaped, their teeth conical or tubercular; teeth in jaws usually not confluent. Species carnivorous; the sexes often dissimilar.....*Labridae*, p. 277
- aa.* Lower pharyngeals more or less spoon-shaped or basin-shaped, their teeth broadest transversely and truncate, arranged in mosaic; teeth in jaws more or less perfectly confluent, forming a sort of beak; anal spines 2; dorsal spines 9; scales very large, 22 to 25 in lateral line; vertebrae 10 or 11 + 14 = 24 or 25. Species herbivorous; the sexes colored alike.....*Scaridae*, p. 338

## Family LXIX. LABRIDÆ.—The Wrasse-Fishes.

Body oblong or elongate, covered with cycloid scales, lateral line well developed, continuous or interrupted, often angularly bent; mouth moderate, terminal; premaxillaries protractile; maxillaries without supplemental bone, slipping under membranaceous edge of the preorbital; anterior teeth in jaws usually very strong and canine-like; teeth of jaws separate or soldered together at base, not forming a continuous plate; no teeth on vomer or palatines; lower pharyngeals completely united into one bone, without median suture, this bone T-shaped or Y-shaped, its teeth conical or tubercular; lips thick, longitudinally plicate; nostrils round, with 2 openings on each side; dorsal fin continuous, the spinous portion usually long, its spines rather slender, 3 to 20 in number; anal similar to soft dorsal, with 2 to 6 spines; ventrals thoracic, 1, 5, inserted below the pectorals or slightly in advance of them; branchiostegals 5 or 6; pseudobranchiæ well developed; gills  $3\frac{1}{2}$ , the slit behind the last arch small or obsolete; gill-membranes somewhat connected, sometimes joined to the narrow isthmus; air-bladder absent; no pyloric cœca. Species chiefly of the tropical seas, living among rocks, coral reefs, or kelp. Many of them are brilliantly colored, and some are valued as food-fishes. Most of them feed upon mollusks, the dentition being adapted for crushing shells.

- a. Lateral line continuous.
- b. Scales rather large, not more than 40 in lengthwise series.
- c. Posterior canines present.
- d. Head with scales; dorsal spines XII.
- e. Teeth of jaws in single series.
- f. Preopercle usually finely serrate; caudal lunate..... *Lepidaplois*, p. 278
- ff. Preopercle entire; caudal rounded..... *Verriculus*, p. 280
- cc. Teeth of jaws in 2 series..... *Verrea*, p. 281
- dd. Head scaleless; dorsal spines IX.
- g. Body oblong, not deep.
- h. Canines in front of upper jaw very small, close set; those of lower jaw forming a cutting edge.
- Stethojulis*, p. 283
- hh. Canines in front of jaws strong, not forming a cutting edge..... *Halichares*, p. 285
- gg. Body rather short and deep..... *Macropharyngodon*, p. 288
- cc. Posterior canines not present.
- i. Snout much produced..... *Gomphosus*, p. 289
- ii. Snout not much produced.
- j. Dorsal spines IX.
- k. Body rather deep..... *Anampses*, p. 291
- kk. Body elongate..... *Pseudojulis*, p. 294
- jj. Dorsal spines VIII..... *Thalassoma*, p. 295
- bb. Scales smaller, more than 40 in lengthwise series.
- l. Posterior canines present.
- m. Scales small, more than 70 in lengthwise series..... *Julis*, p. 304
- mm. Scales larger, 50 to 60 in lengthwise series..... *Coris*, p. 310
- ll. Posterior canines not present..... *Cheilio*, p. 314
- aa. Lateral line interrupted.
- n. First 2 dorsal spines not conspicuously removed from the third.
- o. Scales large, about 20 to 30 in lengthwise series.
- p. Preopercle serrate; dorsal spines XI..... *Cirrhitlabrus*, p. 315
- pp. Preopercle entire; dorsal spines IX (rarely X).
- q. Teeth in jaws in one series.
- r. Canines of upper jaw bent outward and backward..... *Pseudocheilinus*, p. 316
- rr. Canines not bent outward and backward..... *Cheilinus*, p. 319
- qq. Teeth in jaws in many series..... *Novaculichthys*, p. 322
- oo. Scales small, more than 70 in lengthwise series..... *Cymolutes*, p. 327
- nn. First 2 dorsal spines more or less conspicuously removed from the third.
- s. Two anterior spines of dorsal separate from others and placed as a separate fin on nape..... *Iniistius*, p. 328
- ss. Two anterior spines of dorsal removed, but not wholly detached, there being more or less of membranous connection.
- t. Cheeks with small scales..... *Hemipteronotus*, p. 331
- tt. Cheeks scaleless..... *Xyrichtys*, p. 333

## Genus 147. LEPIDAPLOIS Gill.

Body compressed, oblong, covered with large scales, 30 to 35 in the lateral line; snout pointed; mouth large, the lateral teeth in both jaws in a single series coalescent at base; 4 canine teeth in front and a posterior canine tooth; cheeks and opercles with imbricated scales; dorsal and anal scaly at base; lateral line not interrupted; preopercle usually finely serrated; soft dorsal and anal not falcate anteriorly; caudal fin lunate. Dorsal rays usually XII, 10; anal rays III, 12. Tropical parts of the western Pacific from Hawaii through Polynesia to Japan and Africa.

*Lepidaplois* Gill, Proc. Ac. Nat. Sci. Phila. 1862, 140 (*axillaris*).

a. Eye small, about 6 in head.

b. Maxillary reaching front margin of eye; caudal truncate ..... *albotæniatus*, p. 278

bb. Maxillary reaching middle of eye; outer caudal rays prolonged..... *modestus*, p. 279

aa. Eye larger, 4.65 in head..... *strophodes*, p. 280

**217. *Lepidaplois albotæniatus* (Cuvier & Valenciennes). "A'awa." Plate XXIV.<sup>a</sup>**

Head 2.9 in length; depth 2.9; snout 3 in head; eye 6; mouth 3; interorbital 3.5; D. XII, 10; A. III, 12; scales 8-34-13.

Body oblong, compressed; head longer than deep, upper and lower profiles evenly weakly convex; snout rather long, pointed, rounded above; jaws produced, pointed, about equal; mouth rather large, maxillary reaching front of eye; teeth strong, conic; 4 large canines in front of each jaw, the outer on each side of mandible enlarged; lips rather thin, fleshy; eye moderately large, its posterior margin about middle of length of head; posterior margin of preopercle finely serrated; interorbital width broad, convex; nostrils in front of eye, anterior in short fleshy tube; last dorsal spine 2.7 in head; seventh dorsal ray 2.25; third anal spine 2.5; fifth anal ray longest, 2.2; dorsal and anal rather broad, rounded; caudal truncate, broad at base; pectoral small, 1.7 in head; ventrals pointed, 1.5; caudal peduncle broad, compressed, 1.75; scales large, thin, small upon back in front of dorsal fin and along base of dorsal and anal; scales smaller on chest than on sides of body; interorbital width, snout, space in front of eye, and mandibles without scales, head otherwise scaly; scales on cheeks very small; lateral line concurrent with back and running posteriorly along middle of side of caudal peduncle. Described chiefly from an example (No. 04288) from Hilo.

Color in life (No. 122 O. P. J.), pinkish shades on white ground-color; numerous horizontal brown stripes crowded together along top of head and back; a brown stripe from angle of mouth to angle of preopercle; chin and throat white, covered with red spots; colors of body posteriorly gradually give way to yellow, which becomes bright yellow on caudal fin; a black blotch at base of posterior part of soft dorsal extending on caudal peduncle; a black spot nearly as large as eye on first dorsal between first and third spines; iris black, with red inner margin; tips of dorsal spines yellow, the soft dorsal and anal bright yellow; pectoral rosy; ventrals white, with rosy and yellow shadings.

Specimen No. 02976 in life had upper half of head and anterior portion of upper part of side dull rosy; side mostly dirty yellowish, with about 10 pale bands made by pale areas on centers of scales; caudal peduncle fading gradually into rosy anteriorly; a broad dark reddish band from snout through eye to gill-opening, below this pale rosy, with small blotches of brown and pale red; a bluish wash from angle of mouth to gill-opening; lower jaw and throat pale rosy; a large deep black blotch on side under last dorsal rays, connecting with its fellow across caudal peduncle; spinous dorsal with rosy spines, membranes bluish-black, and a large blue-black blotch on membrane between second and third spines; soft dorsal bright yellow; caudal and anal bright yellow, the latter somewhat smoky anteriorly; pectoral rosy; ventrals pale bluish, rosy on margin.

Specimen No. 02977 was in life dark purplish red, becoming ashy below; upper parts of head rosy; cheek ashy, washed with rosy; 2 or 3 obscure dark blotches on preorbital; a dark postocular bar ending in a rather distinct opercular spot; 2 or 3 black blotches at angle of preopercle; subopercle also with several black blotches; lower jaw bluish gray, blotched with rosy and dusky; a very pale reddish blotch under last rays of soft dorsal, in center of which is a black spot covering 1 scale; spinous dorsal bluish gray, a large black blotch on membrane between second and third spines; soft dorsal pale red with a yellow border, the last rays orange near tips, which are yellow, a more or less distinct patch of pale pinkish brown below them; caudal pale rosy, membranes smoky blue, outer rays darker, and with a narrow pale yellow border; anal very pale rosy, the border pale yellow, narrowly bordered with bluish; pectoral rosy, base darkest; ventrals pale smoky bluish; iris red.

<sup>a</sup> *Lepidoplois bitumulatus* on plate.

Another example in life was deep purple red, fading to livid purplish. Old examples were distinctly striped, caudal dull purplish red, not yellow, besides pale blotch below dorsal.

Color in alcohol pale brown; back a little darker, lower surface whitish; head with dark-brown lines above, lowest 2 broadest, running from snout to eye and back along side of head; streak from corner of mouth and several spots at same place dark brown; narrow brown lines along back and broader ones on side; a black blotch on spinous dorsal in front between second and third spines; a large black blotch below last dorsal rays on back; fins all pale or whitish, except ventrals, which are grayish in middle.

We have several small examples (the smallest 4.2 inches in length) which are marked exactly like the adults.

This species is very common about Hawaii, appearing daily in the markets. Our collections contain 33 examples (31 from Honolulu and 2 from Hilo), 4.4 to 14 inches in length. Specimens were obtained at Honolulu also by Dr. Jenkins, the Fur Seal Commission, and by the *Albatross*.

*Cossyphus aboteniatus* Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 141, 1839, Sandwich Islands; Günther, Cat., IV, 105, 1862 (Sandwich Islands).

*Cossyphus bilunulatus*, Günther, Fische der Südsee, VII, 240, pl. CXXX, 1881 (Sandwich Islands); in part.

*Labroides dimidiatus*, Günther, Südsee, 243, 1881 (Sandwich Islands).

*Harpe bilunulata*, Smith & Swain, Proc. U. S. Nat. Mus., V, 1882, 137 (Johnston Island); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 503 (Honolulu).

*Lepidoplois<sup>a</sup> bilunulatus*, Jenkins, Bull. U. S. Fish. Comm., XXII, 1902 (Sept. 23, 1903), 468 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 528 (Honolulu).

**218. *Lepidaplois modestus* (Garrett). Fig. 119.**

Head nearly 4 in total length; depth 4; eye nearly 6 in head; scales 7-33-12; Br. 6; D. XII, 10; A. III, 12; V. I, 5; P. 17; C. 2, 1, 6, 6, 1, 2. Head presents a slight concave depression above eyes; preopercular serrations very small; eyes subcircular; maxillary reaching to center of eye; scales of lateral line slightly branched.

Dorsal fin extends over a base equal to half length of fish without caudal, base of soft portion

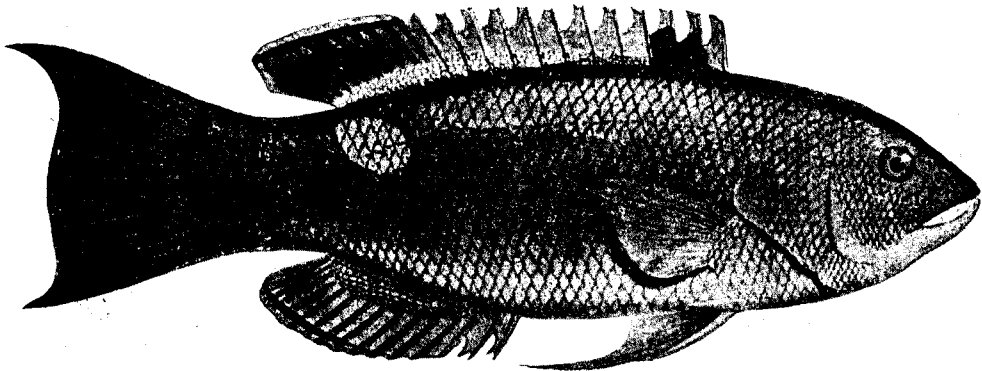


FIG. 119.—*Lepidaplois modestus* (Garrett); after Günther.

slightly less than one-third the fin; anal nearly half as long as dorsal, its posterior base slightly posterior to dorsal; ventrals nearly reaching anal; edges of caudal fin pointed and prolonged.

Color, purplish brown, passing into bluish gray beneath, and obsoletely lineated longitudinally with darker; a large oblong pale diffuse spot beneath the posterior end of the dorsal fin, which is directed obliquely downward and forward; irides silvery, tinged with yellow; dorsal fin pale grayish, marked anteriorly with a large diffuse bluish-black spot, its soft portion tinged with reddish and margined above with yellow; anal, ventral, and caudal bluish gray, the former posteriorly tinged with faded red and edged with yellow; pectorals nearly colorless. (Garrett.)

*Crenilabrus modestus* Garrett, Proc. Cal. Ac. Sci., III, 1863-1868 (Jan., 1864), 106, Sandwich Islands.

*Cossyphus modestus*, Günther, Fische der Südsee, 241, taf. 129, fig. B, 1881 (Honolulu).

<sup>a</sup> Misprinted *Lepidoplois*.

219. *Lepidaplois strophodes* Jordan & Evermann. "*A'awa*." Plate XXIII.

Head 2.75 in length; depth 2.75; eye 4.65 in head; snout 3.25; mouth 3.1; interorbital 4; D. XII, 10; A. III, 12; scales 7-34-13.

Body oblong, compressed; head longer than deep; upper and lower profiles evenly and slightly convex; snout long, pointed, rounded above; jaws produced, pointed, about equal; mouth large, maxillary reaching beyond front of eye; teeth strong, forming a sharp cutting edge on sides of jaws, front of each jaw with 4 large canines; eye rather large, anterior, high in head; posterior margin of preopercle very finely emarginate; interorbital space rather broad, convex; nostrils small, anterior in short tube; dorsal spines pungent, longest 3 in head, last 3.5; third anal spine longest, 2.8; third anal ray 1.9 in head; pectoral rounded, 1.7; ventrals pointed, 1.4; caudal broad at base, truncate; caudal peduncle broad, compressed, its depth 2; scales large, thin, those on front of dorsal, along its base and that of anal, small; lateral line concurrent with back, sloping down at caudal, then running straight to its base.

Color in life, pale rosy white; upper parts of the snout, nape, and side to base of about ninth dorsal spine, lemon-yellow, extending down on side to level of upper edge of pupil; side of head very pale rosy, 2 irregular broken lines of wine-colored spots across snout and through eye to posterior edge of opercle, a similar row of 4 oblong spots from angle of mouth downward and backward to edge of opercle; cheek and side of lower jaw with numerous small irregularly placed orange spots; side with about 16 brighter rosy longitudinal lines, those above less distinct on account of the deeper rosy ground color, those below more distinct, the ground color being more white; side between anal and soft dorsal fins with a broad sooty black spot extending irregularly upon both fins and fading out upon body anteriorly, the posterior edge being nearly vertical and well defined; caudal peduncle and base of the caudal fin whitish, with a slight tinge of rosy, a pale rosy band separating this from the black lateral area; region in front and below the pectoral with about 4 series of small reddish-brown spots; pectoral region and the under parts somewhat bluish; dorsal fin rich lemon-yellow, the tips of the soft rays whitish, and a small, round, black spot on middle of membrane of second spine; base of soft rays and last dorsal spines rosy from intrusion of the rosy wash on side of body; last dorsal rays sooty black at the base from extension of the black spot on the side; caudal pale lemon-yellow; anal pale rosy in center, lemon on spines and along tip of fin, base of fin sooty black from intrusion of black spot on side of the body, the black extending farthest down on the interradial membranes; pectoral very pale rosy; ventrals pale rosy, the membranes bluish, the tip of second ray blackish.

Color in alcohol (field No. 04291), gray-brown, gradually darker posteriorly; space between soft dorsal and anal abruptly black, the color extending forward in darker streaks along the rows of scales and forming a large black blotch on soft dorsal and anal; top of head and space before dorsal abruptly pale; posterior part of caudal peduncle also abruptly pale; a black blotch on dorsal between second and third spines, not involving third and fourth, as in *L. bitumulatus*; dorsal and caudal otherwise pale; a pale blotch at base of posterior dorsal rays; side with narrow dark brown longitudinal lines, coalescing posteriorly with the black blotch; 2 narrow brown streaks from lip to front of eye, then back across side of head above, edged with narrow, darker, wavy lines; a wavy streak from corner of mouth toward base of pectoral; lower side of head with small brown spots or blotches; ventral fin mostly dusky.

This species is very close to *Lepidaplois bitumulatus*, differing chiefly in the dark zone on posterior part of body and in the smaller size of the dorsal spot. Our specimens are all young, but we have the young of *L. bitumulatus* scarcely larger and showing the markings of the adult.

Our collection contains 5 specimens 3.75 to 4.7 inches long, all from Honolulu.

*Lepidaplois strophodes* Jordan & Evermann, Bull. U. S. Fish Comm., XXII, 1902 (April 11, 1903), 190, Honolulu. (Type, No. 50672, U. S. N. M.)

Genus 148. *VERRICULUS* Jordan & Evermann.

Body elongate, subfusiform, compressed, with rather long pointed snout; mouth rather large, with anterior canines strong,  $\frac{1}{4}$  to  $\frac{1}{3}$ ; posterior canines present; lateral teeth short, confluent in a serrated cutting edge; cheeks and opercles scaly; preopercle entire, both limbs more or less scaly; scales mod-

<sup>a</sup>By typographic error spelled *Lepidoplois*.



erate, about 40 in lateral line; lateral line continuous; D. XII, 10; A. III, 10; dorsal spines low, pungent; soft dorsal and anal not elevated, their bases without scales; caudal subtruncate; pectoral short. This genus is allied to *Verreo* and *Nesiotes*. From its nearest relative, *Nesiotes*, it differs in the presence of a posterior canine tooth. The single species is brilliantly colored.

*Verriculus* Jordan & Evermann, Bull. U. S. Fish Comm., XXII, 1902 (April 11, 1903), 191 (*sanguineus*).

## 220. *Verriculus sanguineus* Jordan & Evermann. Plate XXV.

Head 2.9 in length; depth 3.5; eye 6.2 in head; snout 3.1; mouth 2.8; interorbital 4.75; D. XII, 10; A. III, 12; scales 5-40-13.

Body elongate, compressed oblong; head long, pointed, conic, its depth 1.7 in its length; eye small, its posterior margin in middle of length of head; snout long, pointed, rounded; jaws produced, equal; mouth large, nearly horizontal, corner reaching below front rim of eye; lips thick, fleshy; teeth strong, those on sides short, close-set, forming a sharp cutting edge on side of jaw; 5 canines in front of upper jaw, 4 in front of lower, a posterior canine on each side of upper jaw; tongue long, pointed, free in front; preopercle not serrate; interorbital space broad, convex; nostrils small, anterior in short tube; dorsal spines strong, sharp-pointed, longest in middle and posteriorly; last dorsal spine 4 in head; anal spines strong, last spine longest, 3.75; seventh anal ray 3; caudal rounded; dorsal and anal fins scaled at base; pectoral rounded, 1.9 in head; ventrals short, spine strong, pointed, two-thirds longest ray, which is 2 in head; caudal peduncle broad, deep, 2.2 in head; scales small, thin, cycloid; head with very small thin cycloid scales on occiput, cheek, greater part of opercle, behind eye, and on opercles, otherwise naked; lateral line slightly curved in front, then obliquely down to base of caudal.

Color in life, deep red, edge of upper jaw and lower lip golden; a long stripe below eye pure golden; a long stripe from eye along back to base of caudal golden, with a red shade, a vertical black bar edged with golden above, on opercular region; a long blackish area covering it from eye to above pectoral, with some blackish before, behind, and above; a black spot at base of caudal; dorsal and caudal golden, first dorsal edged with violet and with the lower half violet; anal entirely deep blood-red; ventrals golden; pectoral reddish, golden at base.

Color in alcohol, very pale brown; a dusky band from snout across back of head and on side, fading out indistinctly posteriorly; a blackish spot at middle of base of caudal; opercle posteriorly with black vertical blotch; fins all pale or light brown.

Described from the type, No. 50677, U. S. N. M. (field No. 03489), an example 7.5 inches long, taken at Hilo with hook and line, in deep water with *Etelis evurus*, *Eteliscus marshi*, *Erythrichtlys schlegeli*, *Antigonia steindachneri*, and *Anthias fuscipinnis*. Only the type thus far known.

*Verriculus sanguineus* Jordan & Evermann, Bull. U. S. Fish Comm., XXII, 1902 (April 11, 1903), 191, Hilo.

## Genus 149. *VERREO* Jordan & Snyder.

This genus differs from *Lepidaplois* in having the teeth in 2 series, the outer ones canine-like, growing smaller posteriorly, the inner ones coalesced into a narrow, blunt-edged plate; a large straight posterior canine projecting forward from hinder part of upper jaw. Large fishes, similar in appearance to *Lepidaplois*.

*Verreo* Jordan & Snyder, Proc. U. S. Nat. Mus., XXIV, 1902, 619 (*oxycephalus*).

## 221. *Verreo oxycephalus* (Bleeker). Fig. 120.

Head 2.9 in length; depth 3.35; eye 7 in head; snout 2; mouth 3.75; interorbital 4.1; D. XII, 11; A. III, 12; scales 6-35-13.

Body elongate, compressed, oblong; head elongate, compressed, pointed, its depth 1.5 in its length; snout and jaws produced, pointed, the latter about equal; lips very thick, broad, fleshy, plicate; maxillary not reaching anterior rim of orbit; nostrils small, close together, anterior in very short tube; mouth rather large, nearly horizontal; teeth in 2 series in jaws, the outer canine-like growing smaller posteriorly, the inner coalesced into a narrow blunt-edged plate; 2 enlarged canines in front of each jaw, those in lower with 2 small teeth between them at symphysis; posterior margin of preopercle very finely serrate; a posterior canine; interorbital width broad, slightly convex; gill-opening large; gillrakers short, thick, conic; dorsal spines strong, thick, pointed, the membranes

deeply incised between; seventh spine longest, 3.4 in head; seventh dorsal ray longest, 2.3; anal spines stout, strong, third longest, 2.75; ninth anal ray longest, 3; pectoral rather short, broad, rounded, 1.9; ventral spine strong, 3.4 in head, fin 2; depth of caudal peduncle 2.75; scales large, thin, cycloid; lateral line concurrent with back, running along to base of caudal; head with small scales on top, on cheeks, and on opercles, otherwise naked.

Color in life, 2 straight longitudinal stripes from eye, lower one continuous to root of caudal, but becoming somewhat faint at places, the upper breaking up into 3 elongated blotches over the lateral line; 5 red blotches on back, first 2 under spinous dorsal, third under anterior part of soft dorsal, fourth at posterior end of soft dorsal, fifth forming a saddle above end of tail; ground color above lateral line faintly pinkish; 4 faint reddish streaks from nape to caudal, the upper 2 running through the red blotches on back; body below dirty white with a purplish tinge; 13 faint, dirty reddish-yellow stripes from axil and throat to caudal, the uppermost running together at a point above vent, the 5 lowermost ones terminating at base of anal, fourth and fifth from above border red stripe; head and snout faint reddish; a cluster of yellowish spots on a red ground on interorbital; a yellow patch on each scale on head, except those on subopercle; cheek and jaw paler; frenum and throat faintly purplish; a jet-black blotch covering the lower half of sixth to ninth spinous dorsal membranes; a small blotch at root of tenth spine; anterior half of soft dorsal yellow, reddish at root and tip, membrane of posterior half pale, rays orange, lower half of last 4 red; caudal yellow, middle of membrane and rays

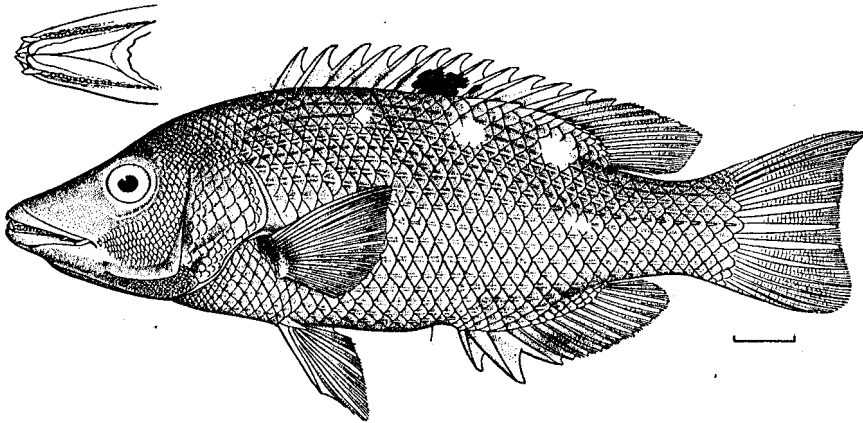


FIG. 120.—*Verreo oxycephalus* (Bleeker): after Jordan and Snyder.

reddish orange, edges reddish, a red spot at upper and lower base of fin; a small red blotch at ventral side of tail, another above posterior end of anal; anal spines and membranes faintly purplish; soft anal yellow, root and margin reddish, tip white, faint purplish streaks on membrane; ventral pale, faintly tinged with purple, spine tinged with red; membrane of pectoral very faintly purplish, rays faint orange, root reddish, axil faintly purplish, a reddish yellow bar at base of fin; the outer edge of iris red, inner yellowish.

Color in alcohol, very pale brown with longitudinal pale lines; basal portion of dorsal fin from sixth to tenth spines black.

Described from one example (No. 04134) from Kailua, which agrees fairly well with specimens from Japan described and figured by Jordan and Snyder (Proc. U. S. Nat. Mus. 1902, 619), and doubtless belongs to the same species. The identity of the Australian pig-fish (*Verreo unimaculatus*) with this species is not proved, but it is not unlikely. Apparently the species is subject to considerable variation in the number and position of the pinkish spots.

*Cossyphus oxycephalus* Bleeker, Notices, Ichth. Vers. K. Ak. Weten. Natur. Amsterd., XIV, 1862, 129, specimen in Museum of Leyden, supposed to be from Japan; Günther, Cat., IV, 109, 1862 (Australia).

? *Cossyphus unimaculatus* Macleay, Fishes Australia, Proc. Linnæan Soc. N. S. Wales, VI, 77, 1881, Port Jackson.

*Cossyphus unimaculatus*, Steindachner & Döderlein, Fische Japans, in Denks. Ak. Wiss. Wien, LIII, 1887, 271 (Tokyo); Ishikawa, Prel. Cat., 30, 1893 (Tokyo; perhaps not of Günther).

*Diastodon unimaculatus*, Jordan & Snyder, Proc. U. S. Nat. Mus., XXIII, 1901 (December 10, 1900), 359 (Tokyo).

*Verreo oxycephalus*, Jordan & Snyder, Proc. U. S. Nat. Mus., XXIV, 1902, 619, fig. 3 (Tokyo).

Genus 150. *STETHOJULIS* Günther.

Body oblong, compressed, covered with large scales, 25 to 30 in lateral line, those of the thorax enlarged, larger than those of rest of body; head scaleless; lateral line not interrupted; mouth small; canines small, close set, those of upper jaw very short, those of lower jaw forming a cutting edge; large posterior canines present; fins low; D. IX, 11; A. III, 11, the spines short and pungent. Small fishes of the coral reefs allied to *Habicheres*, but the anterior canines much less developed and the posterior canine wanting. Coloration always exquisite.

*Stethojulis* Günther, Cat., IV, 140, 1862 (*strigiventer*).

a. Side without longitudinal stripes; olivaceous, thickly covered with small bright green dots ..... *axillaris*, p. 283  
 aa. Side with 4 longitudinal blue-red stripes; upper half of side grayish olive, lower half grayish white with purplish wash..... *albovittata*, p. 284

222. *Stethojulis axillaris* (Quoy & Gaimard). "Omaka." Fig. 121.

Head 3 in length; depth 3.2; eye 5.4 in head; snout 2.6; preorbital 5; interorbital 5; D. IX, 11; A. III, 11; scales 3-26-8.

Body rather short, deep and moderately compressed; head longer than deep and pointed; snout sharp pointed; jaws each with a series of close-set bluntly conic teeth; no enlarged anterior canines, posterior canine not developed in any specimen examined; preorbital oblique; opercle ending in a broad thin flap; eye small, the lower edge of orbit in axis of body; dorsal and ventral outlines about equally curved; caudal peduncle moderate, its depth about 2.2 in head; fins moderate; dorsal spines short, the rays slightly longer; caudal slightly rounded; ventrals short; pectoral longer, 1.5 in head;

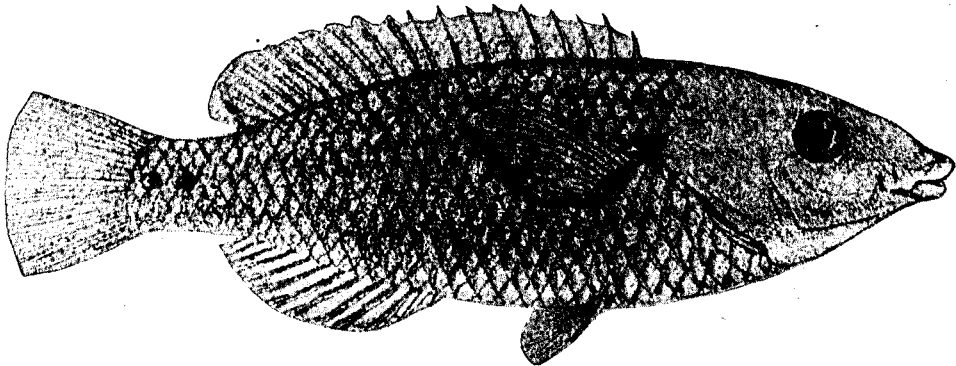


FIG. 121.—*Stethojulis axillaris* (Quoy & Gaimard); after Günther.

scales large, those on breast and nape not reduced in size; head entirely naked; lateral line complete, curving downward; 3 rows of scales under posterior portion of dorsal.

Color in life of example (No. 03441) taken in coral rocks, olive, with irregular white areas irregularly placed over body; dorsal and anal fins golden with series of pink dots on rays; on one side of caudal peduncle 2, on other side 3 black spots; black spot with yellow margin at bases of last 2 rays of soft dorsal, similar one in same position on anal; golden spot just above axil of pectoral; yellow from tip of snout following horizontal straight line backward just below eye to preopercle; yellow below this line to ventral aspect of head, fading to a light color in alcohol.

A young example 2.5 inches long when fresh, clear olive-green, sanded above with very faint gray points; lower half of head from snout abruptly golden, the upper lip orange; axil orange; a black streak across base of pectoral; 3 indigo-blue spots bordered with paler blue on caudal peduncle, the middle one largest, the third not ocellate and above median line; dorsal orange, finely barred with darker and with olive at base, its edge whitish; anal orange with whitish edge, obscurely green at base; a large ocellus on last rays of dorsal and anal; caudal plain reddish; pectoral and ventrals greenish gray.

Example No. 3077, somewhat faded; back greenish brown with very fine white sand-like specks; head violet brown, dotted above; belly and lower half of side abruptly purplish red, with traces of 4 red streaks along rows of scales; 2 very small black ocelli surrounded with blue on tail, the second

larger, both on lateral line; a large yellowish white spot in axil of pectoral, base blackish; dorsal brown, everywhere finely speckled, edge darker; caudal plain dusky; anal same color, yellowish at base; ventrals dirty white; pectoral pale.

Another example, in life was olivaceous, thickly covered with very small bright green dots; throat and belly greenish silvery; base and axil of pectoral with brown spot; a bright orange spot just above pectoral, fading to white in alcohol; 2 or 3 small black spots on lateral line on posterior part of caudal peduncle, the last, if present, on base of caudal fin; dorsal fin olivaceous, with brownish spots, a black spot at the base of last 2 rays; anal olivaceous, the base green.

In alcohol the small green specks become white. In the very young there is a small black spot on the last rays of anal; spots on caudal peduncle almost invariably 3 or 4, the black dorsal spot nearly always present; in examples a little larger the anal spot has disappeared and the number on the caudal peduncle is reduced to 2, rarely 3; in still larger examples the spots on caudal peduncle are reduced to 1 or 2; the anal spot is absent, and that on the dorsal is usually absent. In young examples the yellow or white axillary spot is not evident. Our collection contains a good series of specimens exhibiting these characters, and consists of a fine series of 64 specimens, one-half to 4.7 inches long, 18 from Hilo, the others from Honolulu. Of the latter, 3 were secured by Dr. Wood and 14 by Dr. Jenkins. Specimens were also obtained by the *Albatross* at Honolulu, Puako Bay and Hilo, Hawaii; off the southern coast of Molokai at stations 3829, 3834, and 3837 in 20, 8, and 13 fathoms, respectively. This species, originally described from Maui, is known also from Pelew, Solomon, Fiji, Navigator, Society, New Hebrides, Ponape, and Bandao islands. Individuals were frequently attracted by an electric light of the *Albatross* hung just below the surface of the water.

*Julis axillaris* Quoy & Gaimard, Voyage de l'Uranie, Zool., 272, 1824, Maui, Hawaiian Islands.

*Stethojulis acillaris*, Streets, Bull. U. S. Nat. Mus., No. 7, 65, 1877 (Honolulu); Günther, Fische der Südsee, VII, 254, Taf. cxxxvi, Fig. C, 1881 (Hawaiian Islands); Fowler, Proc. Ac. Nat. Sci. Phila. 1930, 508 (Hawaiian Islands); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 459 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 528 (Hawaiian Islands).

### 223. *Stethojulis albovittata* (Kölreuter). Plate XXVI.

Head 3 in length; depth 3; eye 6 in head; snout 2.7; premaxillary 4; interorbital 4; D. ix, 11; A. iii, 11; scales 4-27-9.

Body rather short, stout and moderately compressed; head longer than deep; snout moderately long, conic; dorsal profile rising in a regular gentle curve from tip of snout to caudal peduncle; ventral outline somewhat less convex; mouth small, each jaw with a series of close-set, bluntly conic teeth, decreasing regularly in size posteriorly; no canines; eye small, slightly anterior, lower border of orbit in line with axis of body; interorbital space rather broad, gently convex; caudal peduncle not deep, its depth equal to snout; lower posterior edge of opercle very oblique, extending upward and backward; opercular flap high, broadly rounded; scales large, those on breast and nape not reduced; a series of smaller scales at base of dorsal and anal and on base of caudal; lateral line complete, following curvature of back to middle of soft dorsal, where it curves downward 3 scales and continues to base of caudal; fins low, longest spines of dorsal about 2 in snout; dorsal rays a little longer; anal similar to soft dorsal; caudal slightly rounded; ventrals short, reaching halfway to origin of anal, their length less than snout; pectoral longer, 1.4 in head, reaching base of anal.

Color in life, upper half of side grayish olive, lower grayish white with purplish wash; a purplish blue-red line along body at base of dorsal, beginning on snout, curving downward to include upper margin of eye, then upward to occiput, thence along base of dorsal to last dorsal ray; a similar line from eye backward under lateral line to vertical from base of third dorsal spine; a third from snout under eye to middle of base of caudal, curving upward over base of pectoral and then broadly down on middle of side; a fourth beginning on lower jaw, curving upward across cheek, then running upward and backward on shoulder-girdle, passing over base of pectoral, thence parallel with third line to base of caudal; these lines at first bright purple-red but soon fading to white; dorsal pale orange, slightly dusky along border; caudal orange, dusky at base and along margins; anal pale bluish; pectoral pale yellow at base, dusky toward tip; ventrals smoky; iris yellow.

Color in alcohol, bluish purple above, paler below; a narrow white line from tip of snout to base of caudal; below this a similar line beginning on lower jaw, curving upward across cheek to edge of opercle, then ascending margin of shoulder-girdle to base of pectoral, then across base of pectoral and

along lower part of side to lower base of caudal fin; a similar line backward from eye under lateral line, ceasing above pectoral, another from forehead across upper edge of eye, crossing upward to nape, thence along base of dorsal to caudal peduncle; side of head washed with bluish, the under part with bluish and Chinese white; breast pale bluish with brighter bluish spots; fins all pale or dusky white.

Above description based upon a specimen (No. 05748) 4.6 inches long, obtained at Honolulu; life color taken from specimen (No. 03031) 4.25 inches long, obtained at Honolulu, June 7. Our collection contains one other specimen (No. 03231) 4.1 inches long, obtained at the same time and place. In addition to these, we have examined 21 specimens collected by Dr. Jenkins, and others obtained by the *Albatross* at Honolulu, where the fish appears to be common. The length varies from 4 to 5 inches.

Original type locality unknown. The species has been recorded from Maui and Honolulu.

*Labrus albonotatus* Kölreuter, Nov. Comm. Petrop., IX, 458; Bonnaterre, Ichthyol., 108, pl. 98, fig. 399, 1788, locality unknown.

*Julis ballatus* Quoy & Gaimard, Voyage de l'Uranie, Zool., 267, pl. 56, fig. 1, 1824, Maui, Hawaiian Islands.

*Stethojulis albonotata*, Günther, Ann. & Mag. Nat. Hist., VIII, 1861, 386; Günther, Fische der Südsee, VII, 256, Taf. cxli, Fig. B, 1861 (Hawaiian Islands); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 504 (Honolulu); Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 508 (Hawaiian Islands); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 459 (Honolulu); Snyder, op. cit. (Jan. 19, 1904) 528 (Honolulu).

#### Genus 151. HALICHERES Rüppell.

Body oblong, compressed, not elevated, covered with large scales, 25 to 30 in the lateral line, which is not interrupted, but bent abruptly behind; scales on breast a little smaller; head scaleless, compressed conic; preopercle entire; teeth large, 2 to 4 strong canines in front of each jaw, a posterior canine tooth; fin rays usually D. IX, 11; A. III, 11; fins low; caudal lunate, truncate or rounded; ventrals inserted under axil of pectoral; gillrakers short and feeble; gill-membranes slightly joined to the narrow isthmus; no scaly sheath at base of dorsal; vertebrae 10 + 15 = 25. Species numerous, of rather small size and gay coloration, the typical species (with canines 4) all belonging to the East Indies and Polynesia, those with canines 2 (*Ichthycallus*) being all American.

*Halicæres* Rüppell, Neue Wirbelthiere, Fische, 10, 17, 1837 (*bimaculatus*); not *Halicærus* Nilsson, 1820, a genus of seals.

*Ichthycallus* Swainson, Nat. Hist. Class. Fishes, II, 232, 1839 (*dimidiatus*).

*Chærojulis* Gill, Proc. Ac. Nat. Sci. Phila. 1862, 142 (substitute for *Halicæres*, regarded as preoccupied).

*Parajulis* Bleeker, Enum. Poiss. de Japan, in Verh. Kon. Ak. Wet., XVIII, 1879, 5 (*pacillopterus*); no definition.

*Iridio* Jordan & Evermann, Check List Am. Fishes, 412, 1896 (*radiatus*).

a. Side brick-red, with about 6 series of green spots; belly pale blue ..... *lao*, p. 285  
aa. Each scale with a dark red crescent spot, convex anteriorly, bordered posteriorly with blue. .... *ornatissimus* p. 285

#### 224. *Halicæres lao* Jenkins. "Lao." Fig. 122.

Head 3.4 in length; depth 3.4; eye 5.5 in head; snout 3; preorbital 5; interorbital 4.25; D. IX, 12; A. III, 12; scales 4-28-8.

Body short, slender and greatly compressed; dorsal outline rather straight from tip of snout to occiput, thence gently arched in a long curve to base of caudal; ventral outline a longer lower curve; head small, much longer than deep; snout long, sharply conic, jaws each with a pair of strong canine teeth anteriorly, and a row of close-set shorter teeth on the sides; eye small, lower edge of orbit on axis of body; interorbital convex, the nape trenchant; caudal peduncle moderately deep, 2 in head; preorbital oblique; preopercle and opercle smooth, the latter ending in a long pointed flap; scales large, thin, their edges soft, surface delicately striate; scales on breast and nape much reduced; head entirely naked; lateral line complete, following curvature of back for 20 scales, then descending 3 rows and continuing to base of caudal; spinous dorsal low, its spines weak, about equal to snout, dorsal rays somewhat longer and about equal to distance from tip of snout to posterior edge of pupil; anal similar to soft dorsal; caudal slightly rounded, the outer rays slightly produced; ventrals long, the outer rays produced, reaching vent, 1.6 in head; pectoral small, slender, as long as ventrals.

Color of a fresh example, side brick-red, with about 6 series of green spots, the upper 3 brightest; belly pale blue; the upper blue stripe continued anteriorly, running across humeral region and above eye to just above nostril, a broad green stripe across opercles and below eye to mouth, this narrowly bordered by blue, and on anterior part of opercle, broadening and running downward, somewhat

yellowish and bordered by blue; opercular flap green, purplish above; an oblong triangular purple area bordered anteriorly by blue, below opercular flap; a broad, oblong purple spot on lower part of cheek from lower jaw to posterior edge of preopercle; a broad, brick-red stripe from eye to upper lip, where it is broken by blue, then ending in a red spot on upper lip; above this is a narrow green stripe, then a broader brick-red one, connecting with this a broad brick-red stripe running across head and along side at base of dorsal; median line of head with a narrow green stripe, bluish on snout; chin, throat and belly pale blue, some rosy at base of ventrals; a blood-red crescent in front of pectoral, with a rosy wash in front and on side behind it; dorsal with a series of round bright green spots along base, separated by reddish brown connecting with a broad median band of dark reddish brown, above which is a narrow bright olive-green stripe, then a broader deep-red stripe, the extreme edge of the fin whitish blue; a black or dusky spot on membrane between first and second spines, a similar but larger black spot on membrane between second and third rays; anal brownish red at base, then a narrower greenish-yellow band with zig-zag upper edge, next a broad brownish-red band narrowly bordered with white; caudal brownish red, crossed by 3 irregular series of green spots, bordered by blue, the posterior series yellowish green, bordered by bluish white, the fin tipped with bluish white; pectoral pale rosy, greenish yellow at base; ventrals bright green, dusky on outer ray; iris pale blue.

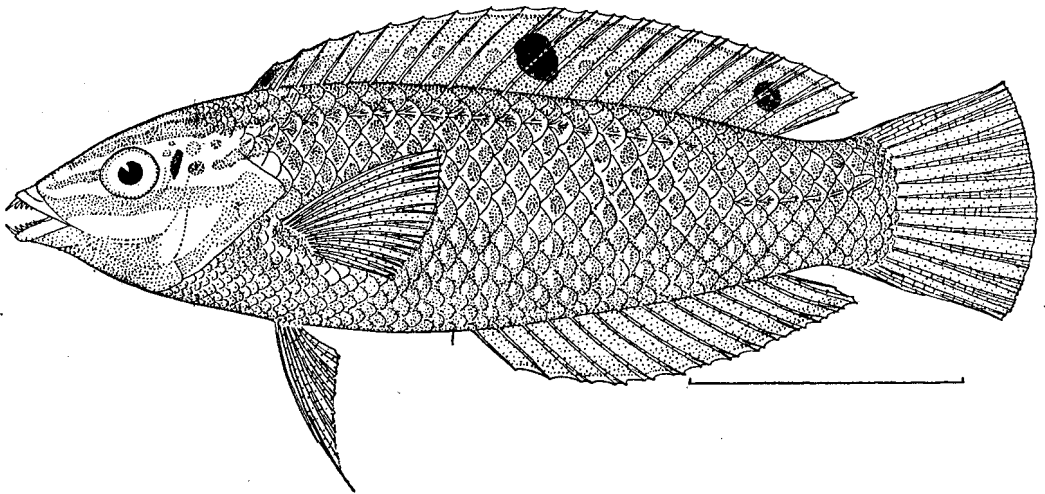


FIG. 122.—*Halichoeres lao* Jenkins; from the type.

Color in alcohol, pale dusky greenish, paler below, the green stripes on head faded to brownish green, the purplish and red stripes now pale green; dorsal and anal purplish and bluish green; dark spot on first dorsal membranes and a larger one between second and third rays; dark spot on last dorsal rays obscure; base of caudal blue green, the tip whitish, with a thin subterminal black line; a small black postocular spot.

The above description is based upon a single specimen (No. 03314) 5 inches long, obtained by us at Honolulu, June 13. Two specimens were obtained by Dr. Jenkins, 3.8, and 4.25 inches long.

*Halichoeres lao* Jenkins, Bull. U. S. Fish Comm., XIX, 1899 (Aug. 30, 1900), 48, fig. 3, Honolulu (type, No. 6132, L. S. Jr. Univ. Mus., coll. O. P. Jenkins); Jenkins, op. cit., XXII, 1902 (Sept. 23, 1903), 460.

**225. *Halichoeres ornatissimus* (Garrett). "*Ohua paawela*." Fig. 123.**

Head 3.5 in length; depth 3.16; eye 5 in head; snout 3.2; preorbital 4.9; interorbital 4.1; D. ix, 12; A. iii, 12 or 11; scales 4-27-8.

Body elliptical, compressed, the dorsal and ventral outlines about equally curved; head longer than deep; mouth small, each jaw with 2 strong canines in front, followed by a series of smaller conic teeth laterally; a strong posterior canine on each side in upper jaw; eye small; its lower edge on axis of body; opercular flap long and narrowly rounded; caudal peduncle compressed; its depth at middle

2 in head; vertical fins high; dorsal spines about 2.5 in head, the rays a little longer, about 1.8 in head; anal similar to soft dorsal but somewhat lower, the rays 2.4 in head; caudal slightly rounded, the rays 1.5 in head; ventral long, the outer ray produced, nearly reaching origin of anal, 1.4 in head; pectoral moderate, reaching vertical at vent, 1.4 in head; scales large, their edges soft, the surface finely striate, scales of nape and breast much reduced; head naked; lateral line complete, following contour of back to line of fourth dorsal ray from last, where it curves downward 3 rows of scales and continues to base of caudal; pores of lateral line with 3 to 7 or 8 branches.

Color in life, each scale with a dark red crescent spot, convex anteriorly, bordered posteriorly with blue; head bright red, with a bright green stripe on median line from snout to base of caudal, another of same color along upper margin of eye on to the body, where it continues more or less distinctly just above lateral line about half length of body; a narrow green line from snout to middle of anterior margin of eye; a bright green stripe from near angle of mouth along lower margin of lower limb of preopercle and on subopercle and opercle, this green gradually shading into blue on throat and belly; a black spot behind eye surrounded by bright green, with red spots in some specimens; dorsal fin dark red, with a row of dark green oblong spots on proximal border, one spot on each interspinous

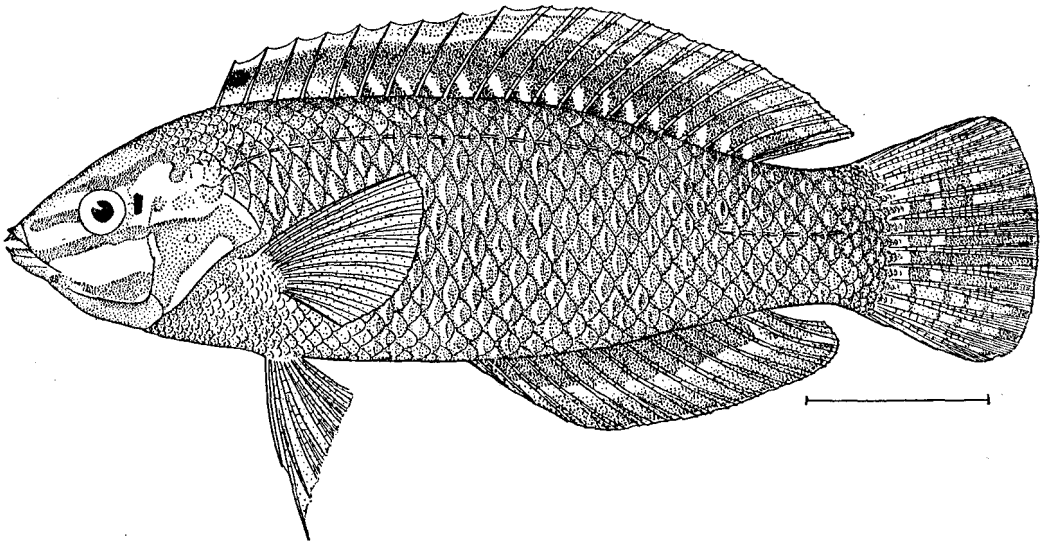


FIG. 123.—*Halichares ornatissimus* (Garrett). Type of *H. iridescens* Jenkins.

membrane, a green longitudinal band on outer portion, with a very narrow outer margin of light blue; a black spot on membrane between first and second spines; in one example a double blotch between first and third soft rays, and a median row of green spots, the detail of markings of this fin varying in each specimen examined; anal dark red with a green band along central portion, outer margin with narrow blue line; caudal dark red, with a cross band of bluish green at the base, and 2 or 3 other cross bands often broken up into spots of green with orange centers; ventrals blue with a dark line on anterior portion; pectoral pale red, with base and axil bright green.

A very brilliant little fish taken from the coral reefs, apparently not very common. It was not obtained by us and is known only from the 3 examples collected by Dr. Jenkins in 1889, the earlier description of Garrett, and from examples taken at Honolulu by the *Albatross*. These specimens vary in length from 5 to 6 inches.

*Julis ornatissimus* Garrett, Proc. Cal. Ac. Nat. Sci., III, 1868, 63, Hawaii.

*Halichares iridescens* Jenkins, Bull. U. S. Fish Comm., XIX, 1899 (Aug. 30, 1900), 47, fig. 2, Honolulu (type, No. 6131, L. S.

Jr. Univ. Mus., coll. O. P. Jenkins); Jenkins, op. cit., XXII, 1902 (Sept. 23, 1903), 460.

*Halichares ornatissimus*, Snyder, op. cit., XXII, 1902 (Jan. 19, 1904), 528 (Honolulu).

Genus 152. **MACROPHARYNGODON** Bleeker.

This genus is allied to *Halichares*, differing in the deeper body and in the presence of but few large pharyngeal teeth. Coloration very brilliant and varied. Coral reefs of the Tropics.

*Macropharyngodon* Bleeker, Consp. Gen. Labroids, in Versl. Kon. Ak. Wet., XIII, 1862, 100, 289 (*Julis geoffroyi*); Bleeker, Atlas, I, 129, 1862.

**226. *Macropharyngodon geoffroy*** (Quoy & Gaimard). "*Himaléa aki-lólo.*" Fig. 124.

Head 3.1 in length; depth 2.6; eye 4.6 in head; snout 3.1; preorbital 4.75; interorbital 4; D. ix, 11; A. iii, 11; scales 3-28-10.

Body short, deep and compressed; head short and blunt; snout short, conic; mouth small, horizontal, 4 front teeth in each jaw strong, the second on each side of upper jaw turned backward; a prominent posterior canine on upper jaw near the angle, this sometimes duplicated; caudal peduncle deep, 2 in head; eye small, wholly above axis of body; interorbital space rounded; opercular flap rather long and rounded; fins well developed; origin of dorsal anterior to upper end of gill-opening, its distance from tip of snout equal to length of head; dorsal spines soft and flexible, their length about 2.5 in head, rays about equally high, outline of fin gently rounded; anal rounded, its origin under base of second

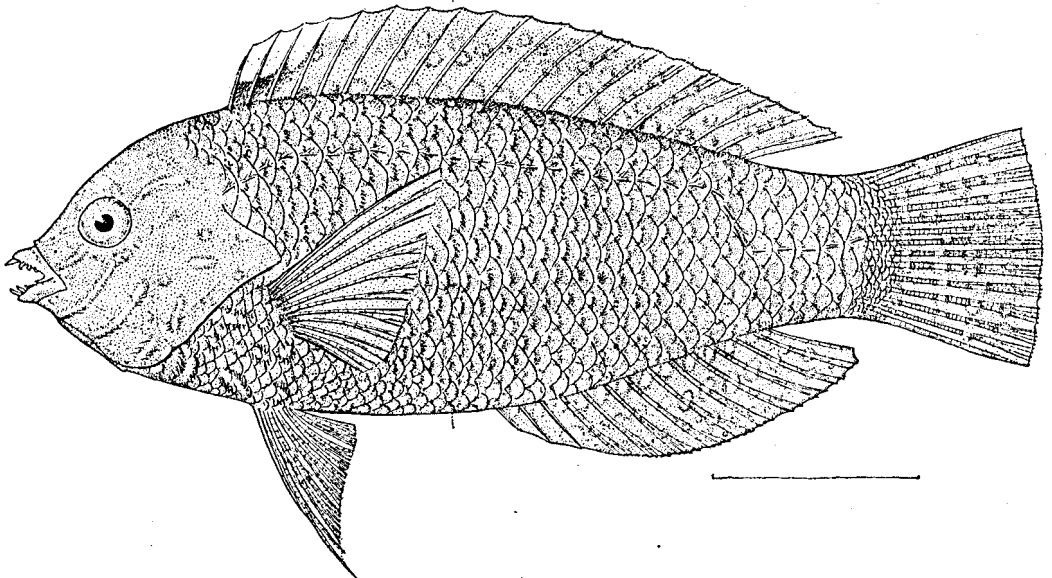


FIG. 124.—*Macropharyngodon geoffroy* (Quoy & Gaimard). Type of *M. aquilolo* Jenkins.

or third dorsal ray, its height equaling that of soft dorsal; caudal truncate or very slightly rounded; outer rays of ventrals produced, reaching origin of anal, their length 1.4 in head; pectoral broad, the upper rays somewhat lengthened, equal to length of ventrals; scales large and firm, the surfaces finely striate; head entirely naked; nape naked; scales of breast scarcely reduced; lateral line following curve of back curving downward 3 rows of scales under last dorsal ray and continuing on 4 scales to base of caudal, the tubes with 2 or 3 branches.

Color in life, olive, with broad stripes along the rows of scales, these made up of a large, bright steel-blue spot on each scale and a black bar behind it, the spots smaller, closer, and brighter on breast; head with many curved blue stripes, throat with similar ones; first 3 dorsal spines tipped with golden, rest of dorsal, anal, caudal and ventrals golden olive with bluish-black edged ocelli; a narrow black edge on dorsal, anal, and caudal, followed by a still narrower whitish one; pectoral light orange, its base deep bluish.

Color in alcohol, grayish brown, side of body with about 10 irregular pale stripes separated by darker ones; cheek and opercles with narrow wavy brownish or bluish lines; breast and belly with



round bluish spots; dorsal brownish, with a median series of large round bluish spots, above which is a similar series of smaller spots; base of membranes of anterior dorsal spines black, white at tip; anal similar to soft dorsal, somewhat darker, a series of blue spots along its base in addition to the second series distally, edge of fin paler, narrowly tipped with dark; caudal grayish, with narrow, vertical darker lines, the fin narrowly tipped with darker; ventrals whitish with 5 or 6 cross series of bluish spots; pectoral pale.

We have examined 7 specimens of this species—one collected by us at Honolulu in 1901, 5 obtained by Dr. Jenkins at the same place in 1889, and one sent us by Mr. Berndt. They are 3.5 to 5.4 inches in length and agree well with the original of *M. geoffroy*, which was described from Maui. Quoy & Gaimard's plate has the body and fins all blue; blue spots on all the fins save pectoral; yellowish on base of pectoral and tip of caudal; spots on ventrals distinct. The species is rare about the reefs. In life it is very handsome.

*Julis geoffroy* Quoy & Gaimard, Voy. Uranie, Zool., 270, pl. 56, fig. 3, 1824, **Maui**; Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 479, 1839 (Hawaiian Islands, Quoy & Gaimard's specimen); Bleeker, Act. Soc. Sci. Indo-nederl., I, 1856, 58 (Manado en Makass).

*Julis melanogris* Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 481, 1839, **Ulea**.

*Macropharyngodon geoffroyi*, Bleeker, Proc. Zool. Soc. 1861, 412, and Atl. Ichth., 129, pl. 37, fig. 5, 1862; Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 460 (Honolulu).

*PlatyGLOSSUS geoffroyi*, Günther, Cat., IV, 145, 1862 (Hawaiian Islands); not of Günther's Südsee.

*Macropharyngodon aquiloto* Jenkins, Bull. U. S. Fish Comm., XIX, 1899 (Aug. 30, 1900), 46, fig. 1, **Honolulu** (type, No. 6130, L. S. Jr. Univ. Mus., coll. O. P. Jenkins).

### Genus 153. GOMPHOSUS Lacépède.

Body rather elongate, compressed, covered with moderate-sized scales, 25 to 30 in the lateral line; lateral line not interrupted; head scaleless; snout abruptly produced, a long tube, which bears the rather long jaws at the end; canines small; no posterior canine; gill-membrane attached to the isthmus; D. VIII, 13; A. III or II, 11.

Small fishes of brilliant colors, allied to *Thalassoma*, but distinguished from all other *Labridæ* by the prolonged snout.

*Gomphosus* Lacépède, Hist. Nat. Poiss., III, 100, 1802 (*ceruleus*).

a. General body color brown, scales margined with darker brown; vertical fins dark, the rays pale-tipped; caudal dark, with pale border at end (in alcohol); upper and lower rays of caudal little produced ..... *varius*, p. 289

aa. General body color green and bluish, scales margined with blue, vertical fins pale; caudal pale, with upper and lower rays dark, somewhat produced ..... *tricolor*, p. 290

#### 227. *Gomphosus varius* Lacépède. "Akiloto." Fig. 125.

Head 2.5 in length; depth 3.5; eye 10 in head; snout 1.8; mouth 4.5; interorbital 5.5; D. VIII, 13; A. II, 11; scales 4-27-9.

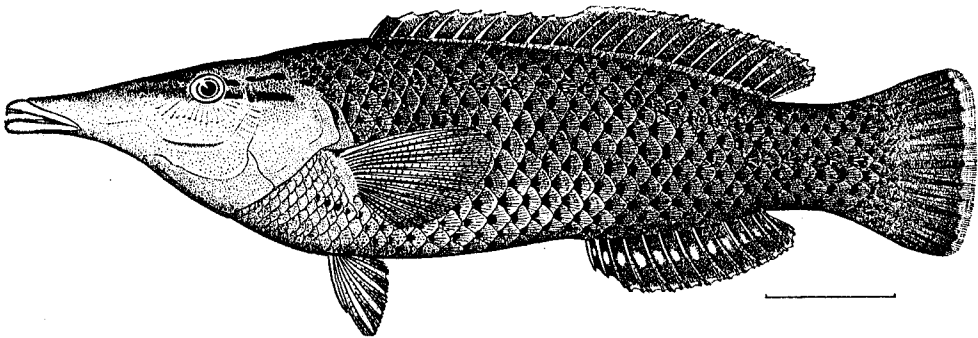


FIG. 125.—*Gomphosus varius* Lacépède.

Body elongate, compressed, deepest about middle of pectoral; head long, upper profile straight; snout very long, upper jaw slightly the longer, and produced into a long beak, its depth equal to eye; lips thick, fleshy; teeth strong, ends rounded, forming a cutting edge in sides of jaws; canines 2 in

front above, 4 on front of mandible, all conic; eye small, anterior margin behind middle of length of head; margin of preopercle undulate; interorbital width broad, convex; nostrils small, posterior nearly over front margin of eye; dorsal spines pungent, much lower than soft rays, the longest of which is 3.75 in head; second anal spine longest, 3.6 in snout; longest anal ray 3.75 in head; caudal obliquely truncate, the lowest rays the longest; pectoral 2 in head; ventrals small, 3.2; scales large, cycloid; lateral line descending abruptly below posterior dorsal rays, tubes branched.

Color in alcohol, anterior half of body below white, shading into deep brown above pectoral; top of head dusky; each scale on trunk with black median spot; blackish streak in front of eye, 2 broken blackish streaks from behind eye; dorsal, anal, and caudal blackish brown, former 2 fins narrowly white, caudal broadly white; anal with median row of rounded pale spots; pectoral and ventrals pale brownish, former with blackish spot at base above. Described from an example (No. 04276) taken at Honolulu.

The species is rather common in the markets of Honolulu and Hilo, and is represented in our collections by 27 specimens—21 from Honolulu, 3 from Kailua, and 3 from Hilo. It is smaller than *G. tricolor*, the length of our specimens ranging from 5 to 9.2 inches.

*Gomphosus varius* Lacépède, Hist. Nat. Poiss., III, 104, pl. 5, fig. 2, 1801, Tahiti; Günther, Cat., IV, 193, 1862 (Aneityum, Tahiti); Ishikawa, Prel. Cat., 28, 1897 (Miyakoshima, Riukiu Islands); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 507 (Honolulu); Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 510 (Sandwich Islands); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 464 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 529 (Honolulu).

*Gomphosus pectoralis* Quoy & Gaimard, Voyage de l'Uranie, Zool., 282, 1824, Maui, Hawaii; Day, Fish. Ind., 406, pl. 86, fig. 6, 1877 (Andamans); Bennett, Fish. Ceylon, 3, pl. III, 1830 (Ceylon; anal with a yellowish cross-band).

*Gomphosus fuscus* Cuvier & Valenciennes, Hist. Nat. Poiss., XIV, 25, 1839, Maui; Brevoort, Exped. Japan, 272, 1856 (Lew Chew).

*Gomphosus melanotus* Bleeker, in Nat. Tijds. Neder. Ind., VIII, 1855, 457, Kokos, Atlas, I, 87, pl. XXI, fig. 3, 1862, Cocos; Java; Günther, Cat., IV, 193, 1862 (East Indies).

#### 228. *Gomphosus tricolor* Quoy & Gaimard. "*Hinalea iivi*." Plate XXXVI.

Head 2.5 in length; depth 3.8; eye 11 in head; snout 1.7; mouth 4.6; interorbital 6; D. VIII, 13; A. II, 11; scales 4-27-9.

Body elongate, compressed, deepest about base of pectoral; head long, upper profile straight; snout very long, jaws equal, produced into a long beak, its depth equal to eye; lips thick, fleshy; teeth forming cutting edge in sides of jaws, 2 curved canines in front of upper jaw, 4 canines at front of mandible; eye small, its anterior margin much nearer gill-opening than tip of snout; margin of preopercle undulate; interorbital width broad, convex; nostrils small, the posterior nearly over front rim of orbit; dorsal spines pungent, the longest much shorter than longest ray, which is 4.8 in head; anal spines pungent, second longest, 4.5 in snout; first anal ray 4.65 in head; caudal emarginate, lobes pointed; pectoral 2.1 in head, reaching above origin of anal; ventrals short, 1.7 in pectoral, sharply pointed; caudal peduncle deep, its depth 4 in head; scales large, cycloid; lateral line descending abruptly below posterior dorsal rays, the tubes branched.

Color in life (No. 03256), indigo-blue with a greenish shade becoming distinctly green on back and belly; edge of each scale dull violet, the violet shades continuous on belly, but restricted on back to a brownish-red spot on each side, the form and shade of violet markings varying considerably; head green above, deep blue on cheeks and opercle, light blue on jaws, indigo-blue at throat, otherwise varying shades of greenish and dark purple; light-red streaks radiating from eye; a bright yellowish-green bar behind gill-opening covering basal fourth of pectoral fin; a jet-black spot in this on base of first rays of pectoral; dorsal reddish brown at base, then bright blue, the upper part golden green; anal similar; caudal light bluish green, its scaly base dull violet; ventrals dull blue, other rays black; pectoral golden green at base, otherwise pale violet washed with blackish above; iris green with a scarlet ring. Another example was dark blue in life, with a golden-green patch behind pectoral; scales of body each with a vertical bar of dull purplish red.

Color in alcohol, blackish shaded with deep blue-green; lips, dorsal, anal, median caudal rays, and blotch above base of pectoral pale blue-green; pectoral blue-green basally; black spot at base of upper caudal rays, outer portion of fin black.

Described from (No. 04192) an example from Hilo. Our collections contain 47 excellent specimens, varying in length from 5.75 to 12.5 inches—39 from Honolulu, the others from Hilo. Of these,

10 were collected by Dr. Jordan, 3 by the *Albatross* in 1896, and 4 by Jordan and Snyder in 1900. Specimens were collected by the *Albatross* in 1902 at Honolulu and Puako Bay, Hawaii.

This handsome species is common in the markets at Honolulu and Hilo, whither it is brought in quantities from its native reefs.

*Gomphosus tricolor* Quoy & Gaimard, Voyage de l'Uranie, Zool., 280, pl. 55, fig. 2, 1824, Maui; Steindaehner, Denks. Ak. Wiss. Wien, LXX, 1900, 506 (Honolulu); Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 510 (Sandwich Islands); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 464 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 529 (Honolulu; Puako Bay, Hawaii).

*Gomphosus cepedianus* Cuvier & Valenciennes, Hist. Nat. Poiss., XIV, 18, pl. 390, 1839, 1 Hawaiian and Caroline islands. *Gomphosus sandwichensis*, Günther, Cat., IV, 194, 1862 (Sandwich Islands).

#### Genus 154. ANAMPSES Cuvier.

Body oblong, rather deep, compressed, covered with moderate or large scales (25 to 30 in the lateral line, about 50 in subgenus *Ampheces*); lateral line continuous; head scaleless; preopercle entire; teeth uniserial; 2 anterior canines in each jaw prominent, turned forward, compressed, with cutting edges; no posterior canines; D. IX, 12; A. III, 12. Species of rather large size and showy colors, of the East Indies and Polynesia. The group is naturally divisible into 2 groups distinguished by the size of the scales. The Japanese species constitute the subgenus or probably distinct genus *Ampheces*, distinguished from *Anampses* by the small scales.

*Anampses* Cuvier, Règne Anim., Ed. II, 259, 1829 (*tetradon*; *cuvier*; the characters taken from the latter species; the former perhaps a *Tilapia*.)

*Ampheces* Jordan & Snyder, Proc. U. S. Nat. Mus., XXIV, 1902, 628 (*geographicus*).

a. Color in life, grayish olive, under parts brick red. About 13 or 14 series of white spots and blotches forming stripes from head to tail.....*cuvier*, p. 291

aa. Color in life, brownish red with more or less blue on each scale.

b. Each scale with a narrow, vertical blue line.....*evermanni*, p. 293

bb. Bluish vertical lines on scales broader and more spot-like in the center, especially on caudal peduncle, where they assume the form of oval spots. Side with about a dozen pale horizontal stripes, made up of the series of spots on the rows of scales.....*godeffroyi*, p. 294

#### 229. *Anampses cuvier* Quoy & Gaimard. "*Opale*;" "*Ifilu*." Fig. 126.

Head 3.3 in length; depth 2.8; eye 8 in head; snout 3.1; preorbital 4.2; interorbital 4; D IX, 12; A. III, 12, scales 4-28-9.

Body oblong, deep, and compressed; dorsal and ventral outlines about equally convex; head short, snout obtusely conic, the anterior profile a little concave in front of eye; mouth small, 2 pairs of flat projecting canines in the jaws anteriorly; eye small, entirely above axis of body; interorbital high, convex, nape trenchant; caudal peduncle compressed, its least depth 2 in head; fins moderate; dorsal spines nearly as long as snout, rays somewhat longer, fully equaling snout; anal similar to soft dorsal and equally high; caudal squarely truncate, rays 2 in head; ventrals short, not reaching vent, 2.4 in head; pectoral longer, 1.9 in head; scales large, deep, the edges soft; scales on nape and breast much reduced; a row of small scales at base of dorsal and anal and some on base of caudal; lateral line normal, following curvature of back until under base of third dorsal ray from last, where it curves downward for 3 rows of scales and continues to base of caudal; head entirely naked.

Color in life, grayish olive, under parts brick-red; edges of scales somewhat darker; back along base of dorsal fin with numerous, irregularly arranged, small round white spots; below these about 13 or 14 series of larger roundish white spots, with smaller white blotches between, forming stripes from head to caudal, these most broken above, the lower 5 or 6 continuous white lines; among these spots are a good many small yellowish or orange specks; the red below pectoral in 5 or 6 definite stripes; small white specks along base of anal; upper half of head pale brownish, with numerous small round white dots, a number of narrow pale blue wavy lines forward and downward from eye and 1 or 2 short ones back of it; lower parts of head bluish white with numerous small round red spots; breast, throat, and lips reddish white, with a few red spots; snout above lip and preorbital region dusky; 2 small bluish spots on side of caudal peduncle and a few smaller bluer ones on under edge; dorsal orange-red, most pronounced in the outer band, mottled with darker and greenish elsewhere, crossed by about 6 narrow irregular or broken greenish blue lines, the lower one broadest anteriorly, the 3 lower ones more or

less broken up into spots posteriorly, the fin with a broad rich blue border; anal rich blood-red, with 6 rich blue lines running full length of fin, the inner and outer ones broadest; caudal dusky orange in center, the outer rays dark blood-red, the edge blackish, green toward tip, extreme tip of fin whitish; pectoral orange on upper half, the lower half pale; ventrals with the rays sky-blue, the membranes blood-red; iris dull orange.

Color in alcohol, dark brownish; side with about 13 or 14 series of round bluish white spots on the centers of the scales, coalescing in the lower 5 or 6 rows so as to form more continuous lines; under parts yellowish-white, with purplish-blue line; top and sides of head to below level of eye profusely covered with small roundish bluish-white specks; lower jaw and lower parts of cheek pale bluish with numerous round pale orange spots; dorsal dusky olive, the spinous portion crossed by wavy lines of blue-green, the soft portion covered with small bluish white specks, the border of the fin dark green; anal yellowish and bluish-green crossed by 5 or 6 wavy deep blue lines; anal dusky; pectoral plain

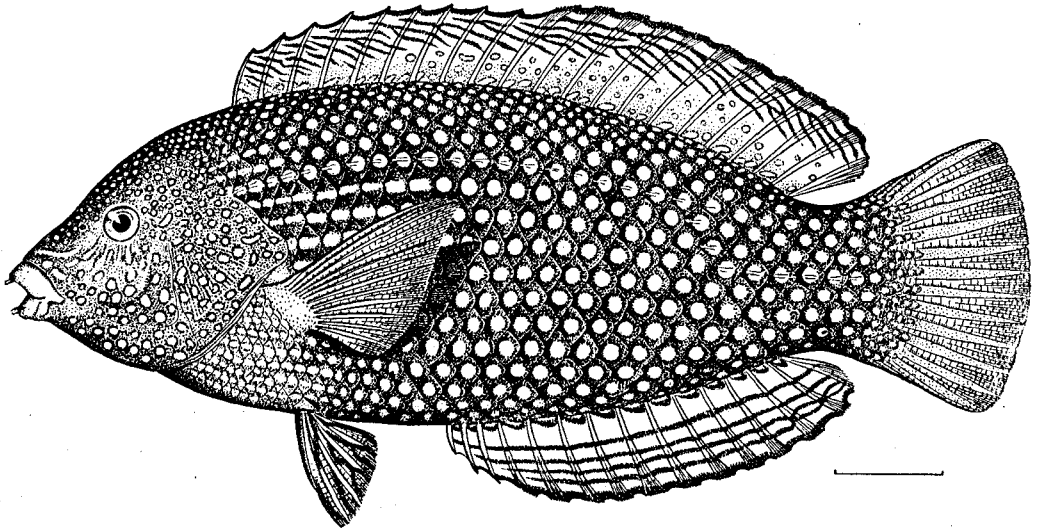


FIG. 126.—*Anampses cuvier* Quoy & Gaimard.

dusky yellowish, ventral rays indigo blue, the membranes yellowish white. Young examples, about 3 inches in length, show in alcohol, a large black spot more or less ocellated, on the last 4 rays of dorsal fin.

This species is common about the reefs at Honolulu and is one of the most brilliantly marked of the many bright-colored fishes seen among the Hawaiian Islands. Our collections contain 29 specimens, all from Honolulu except 1, which is from Hilo. Of those from Honolulu, 8 were collected by Dr. Jenkins, 2 by the *Albatross* in 1891 and 1 in 1896, and 1 by Jordan and Snyder in 1900. It was also obtained at Honolulu by the *Albatross* in 1902.

Our specimens are 3.2 to 11.5 inches long.

*Anampses cuvier* Quoy & Gaimard, Voy. de l'Uranie, Zool., 276, pl. 55, fig. 1, 1824, de l'île Mowî [Maui]; Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 459 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 528 (Honolulu).

*Anampses cuvieri*, Cuvier & Valenciennes, Hist. Nat. Poiss., XIV, 11, 1839; Günther, Cat., IV, 136, 1862 (Hawaiian Islands); ibid., Fische der Südsee, VII, 251, pl. 136, fig. A, 1881 (Hawaiian Islands); Fowler, Proc. Ac. Nat. Sci. Phila. 1900 506 (Honolulu).

*Anampses caeruleopunctatus*, Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 506 (Hawaiian Islands); not of Cuvier & Valenciennes; 2 dried skins.

230. *Anampses evermanni* Jenkins. "*Opule lauli*." Fig. 127.

Head 3.25 in length; depth 2.6; eye 8 in head; snout 2.9; preorbital 4; interorbital 4; D. ix, 12; A. iii, 12; scales 4-27-10.

Body short, oval, deep, and compressed, deepest anteriorly; anterior profile rather straight from tip of snout to nape, thence in a long curve to caudal peduncle; ventral contour evenly curved from tip of snout to origin of anal, thence in a long low curve to base of caudal peduncle; head short, nearly as deep as long; snout short, evenly conic; mouth very small, in line with axis of body; jaws anteriorly each with 2 prominent canines, flattened and curved forward, with cutting edges; eye small, above axis of body; interorbital high, somewhat trenchant; caudal peduncle greatly compressed, its least depth 2 in head; scales large, deep, the edges thin and soft; scales of breast and nape much reduced; scales with a few thin striae or lines; lateral line following contour of back until under fourth dorsal ray from last, where it curves downward 3 rows of scales and continues to base of caudal; a row of small scales at base of dorsal and several series on base of caudal; head entirely naked; fins rather large; origin of dorsal above upper end of gill-opening; longest dorsal spines shorter than snout, the rays a little longer; anal similar to soft dorsal, the rays about equally long; caudal truncate, about 2 in head; ventrals very short, 2.5 in head; pectoral longer, 1.7 in head.

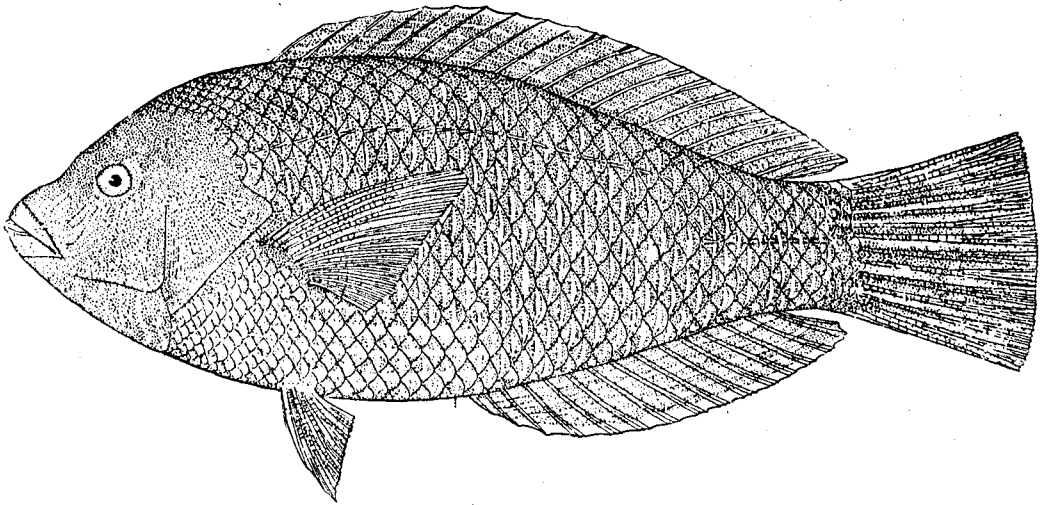


FIG. 127.—*Anampses evermanni* Jenkins; from the type.

Color in life, brownish red, with a narrow vertical blue line on each scale; snout blue; chin, throat, and sides of head with blue reticulations; dorsal fin brownish red, the outer margin blue, the fin with 7 or 8 longitudinal wavy blue lines and rows of dots, some running into each other and making reticulations; ground-color of anal red, the outer margin blue, the fin with 4 or 5 distinct longitudinal lines; ventral fin red with blue lines and dots and blue on anterior margin; pectoral olive, anterior margin blue; caudal red with longitudinal blue lines.

Color in alcohol, bluish brown on head and body, lower jaw blue and green, the sides purplish, breast and belly purplish and bluish; scales of side each with a narrow vertical pale bluish streak, these forming irregular vertical bars; dorsal purplish, the edge bluish green, the membranes with irregular pea-green lines and spots in about 5 series, these sometimes coalescing and reticulate; anal purplish, the edge pea-green, the membranes crossed by 5 narrow blue-green lines, parallel and continuous; caudal brownish at base, paler distally, the membranes with some greenish; ventrals dusky, greenish on anterior margin; pectoral brownish white, dusky at base and anteriorly.

This species appears to be related to *Anampses godeffroyi* Günther, from which it differs markedly in the coloration and in the larger scales. Günther states that his specimen had 30 scales in the lateral

line, but his figure shows 37, and his species is described as bluish gray in color, whereas the present one is brownish red. The markings on the dorsal, anal, and caudal fins are also quite different.

This species was first described by Dr. Jenkins, from Honolulu, where he obtained 4 specimens. Another was obtained by the *Albatross* in 1896, 2 in 1891, and 1 by Jordan and Snyder in 1900. Others were obtained at Honolulu by the *Albatross* in 1902. The specimens examined are 10.5 to 12.5 inches long.

A beautiful and interesting species, moderately common about the coral reefs.

*Anampses evermanni* Jenkins, Bull. U. S. Fish Comm., XIX, 1899 (Aug. 30, 1900), 57, fig. 14, Honolulu (type, No. 6136, L. S. Jr. Univ. Mus., coll. O. P. Jenkins); *ibid.*, XXII, 1902 (Sept. 23, 1903), 459 (Honolulu); Snyder, *op. cit.* (Jan. 19, 1904), 528 (Honolulu).

### 231. *Anampses godeffroyi* Günther.

Head 3.3 in length; depth 2.6; eye 8 in head; snout 2.6; preorbital 3.75; interorbital 3.75; D. ix, 12; A. iii, 12; scales 4-27-10.

Body short, oval, deep, and much compressed; dorsal and ventral outlines about equally curved; head short, but longer than deep; mouth small, each jaw provided with 2 flat, projecting canines; eye small, above axis of body; interorbital space rather narrow and very convex; caudal peduncle deep, 2 in head; fins rather high, the soft portion of dorsal somewhat higher; caudal truncate, 1.9 in head; ventrals short, not reaching vent, 2 in head; pectoral longer, nearly equal to distance from base of ventrals to origin of anal; scales large, thin, much deeper than long, the edges soft; scales on breast and nape much reduced; a row of small scales at base of dorsal and anal and several series on base of caudal; head entirely naked; lateral line following curvature of back until under fourth dorsal ray from last, where it curves downward 3 scales and then continues to base of caudal; pores of lateral line little branched.

Color in life essentially that of *A. evermanni*, except that the bluish vertical lines on the scales are broader and more spot-like in the center, especially on the caudal peduncle, where they assume the form of oval or roundish blue-green spots; side with about a dozen pale horizontal stripes, made up of the series of spots on the rows of scales; anterior part of side under pectoral with 8 or 9 rather distinct bluish horizontal lines composed of a series of spots on the rows of scales, the upper 3 or 4 extending from shoulder-girdle, curving upward and backward to base of pectoral; back along base of dorsal with 3 or 4 irregular series of small bluish-white specks, these usually quite distinct; blue-green stripes on anal broader, more wavy, and more oblique than in *A. evermanni*; dorsal spotted and reticulated with bluish green.

This species is related to *A. evermanni* and *A. cuvier*, differing from the former as already described, and from the latter chiefly in the less spotted coloration. It is possible that these specimens are extreme forms of the common species called *Anampses evermanni* and that the proper name of all is *Anampses godeffroyi*.

We have 3 specimens of this species, 10.25 to 12 inches long, obtained by us at Honolulu.

*Anampses godeffroyi* Günther, Fische der Südsee, Part VII, p. 252, pl. cxi, 1881, Sandwich Islands; from a drawing by Andrew Garrett, evidently incorrect.

### Genus 155. PSEUDOJULIS Bleeker.

Body elongate, compressed, covered with large scales; lateral line continuous; each jaw with 2 strong canines in front, no trace of posterior canines; dorsal with 9 pungent spines, anal with 3.

General characters of *Halichares*, from which genus *Pseudojulis* differs in the absence of posterior canines and in having 3 anal spines. Species of small size occurring about rocky islands of the Pacific. Only 1 species known from the Hawaiian Islands.

*Pseudojulis* Bleeker, Proc. Zool. Soc. Lond. 1861, 412 (*girardi*).

### 232. *Pseudojulis cerasina* Snyder.

Head, measured to end of opercular flap, 3.1 in length; depth 4.3; depth of caudal peduncle 8; length of snout 2.8 in head; eye 5; interorbital space 5.26; D. ix, 11; A. iii, 12; pores in lateral line 28; scales in lateral series 26; between lateral line and dorsal fin 1; between lateral line and anal 7; body notably long and slender, head conical, snout pointed; mouth very small, the cleft smaller than eye;

2 canines in each jaw, the upper pair wide apart, allowing the lower ones to fit between them; canines but little longer than the other teeth, which grow gradually smaller posteriorly; no posterior canines; preopercle not serrated; head naked; scales of breast smaller than those of body; lateral line abruptly bent downward below ninth dorsal ray; dorsal low, the longest (eighth) spine equal in length to snout, the rays about a tenth longer; longest anal ray 3.1 in head; spines slender, the third with a short cutaneous filament; caudal slightly rounded, 1.54 in head; pectoral 2.1 in head; ventral pointed, 2 in head.

Color in spirits (perhaps somewhat similar in life), head pale orange, upper part of opercle with a purple tint, the lower part silvery; nape purple; a narrow dorsal area, reddish orange fading ventrally to light orange; a rather indefinitely outlined, broad, pinkish stripe from opercle to base of caudal; lower part of body light orange; a reddish orange spot somewhat smaller than the pupil at lower edge of base of pectoral; each scale row with a narrow line of a darker shade than the color area on which it occurs; fins orange, the spinous dorsal suffused with red; scaled portion of caudal reddish orange.

One specimen, the type, measuring 3.5 inches long, was collected at Honolulu by Mr. Berndt. No. 50877, U. S. Nat. Mus. No other specimens known.

*Pseudojulis cerasina* Snyder, Bull. U. S. Fish Comm., XXII, 1902 (Jan. 19, 1904), 528, Honolulu.

#### Genus 156. THALASSOMA Swainson.

Body oblong or elongate, moderately compressed, covered with large scales; lateral line continuous; head scaleless; a slight sheath of scales along base of dorsal; no posterior canine; dorsal spines slender, the number always 8; anal spines 3, the first very small; lower pharyngeals essentially as in *Halichoeres*. Beautiful fishes of the coral reefs and warm currents, the coloration largely deep green or blue.

*Thalassoma* Swainson, Nat. Hist. Classif. Fishes, II, 224, 1839 (*purpurea*).

*Chlorichthys* Swainson, Nat. Hist. Classif. Fishes, II, 232, 1839 (*bifasciatus*).

*Julis* Günther, Cat., IV, 179, 1862 (*pavo*); not of Cuvier, Règne Anim., 1st ed., 261, 1317 (*julis*).

- a. Caudal doubly lunate, its middle rays somewhat produced; eye small, 9 in head; color chiefly grass-green and blue, a scarlet dash on cheek ..... *purpureum*, p. 295
- aa. Caudal lunate; eye larger, 4.25 to 6.9 in head.
- b. Canines present in front of lower jaw.
- c. Two pairs of canines in front in lower jaw ..... *ballieui*, p. 297
- cc. One pair of canines in front in lower jaw.
- d. Length of dorsal spines less than length of snout (1.5 to 2 in snout); body without vertical bars.
- e. Body short, moderately deep; interorbital space high; origin of dorsal over middle of base of pectoral; lateral line nearly straight for 19 scales, or under fourth dorsal spine from last, where it curves down 2 rows, continuing to base of caudal on median line of peduncle; red ..... *fuscum*, p. 299
- ee. Body moderately long; interorbital rather long; origin of dorsal slightly posterior to base of pectoral; lateral line parallel with dorsal outline to below fifth dorsal ray from last, where it curves down 3 scales, then continues to base of caudal ..... *umbrostigma*, p. 300
- dd. Dorsal spines equal to snout or longer; body with numerous vertical bars of green or orange.
- f. Head entirely naked; longest dorsal spine about equaling snout in length ..... *duperrey*, p. 302
- ff. A patch of 8 rather large scales on upper end of opercle; longest dorsal spine somewhat longer than snout ..... *lunaris*, p. 303
- bb. No canines present in either jaw ..... *aneitense*, p. 304

#### 233. *Thalassoma purpureum* (Forskål).

“*Olani*,” “*Olale*,” “*Palaea*” (very small); “*Awela*” (small); “*Hou*” (large).

Head 3 in length; depth 3.4; eye 9 in head; snout 2.6; preorbital 3.2; gape 3; interorbital 3.7; D. VII, 12; A. III, 9; scales 3-29-10.

Body short and stout, heavy forward and not greatly compressed in the adult; head heavy, longer than deep; snout short, bluntly conic; mouth small, slightly oblique, the gape not nearly reaching anterior edge of orbit; jaws each with a pair of very strong blunt canines in front and a series of shorter, close-set conic teeth laterally; eye small, slightly anterior, high above axis of body; anterior profile in a gentle uniform curve from tip of snout to origin of dorsal; ventral outline similarly curved from tip of lower jaw to edge of gill-opening; fins low; dorsal beginning over base of pectoral, its distance from tip of snout equaling length of head, or 1.6 in base of dorsal; dorsal spines short and weak, their length 5.5 in head; soft portion of dorsal slightly elevated, the rays 4.5 in head; anal similar to

soft dorsal, its origin under base of third or fourth dorsal ray, its spines obscure, its rays equal to those of dorsal; caudal short, doubly lunate, the outer rays slightly produced, their length equal to distance from tip of snout to middle of pupil, or exceeding the shortest rays by an eye's diameter; middle caudal ray slightly longer than the next one on either side; ventrals short, reaching halfway to vent, their length less than that of snout by a pupil's diameter; pectoral short, broad, rhombic, the upper edge being longest, the free edge but little shorter, the upper rays longest, 1.6 in head, the lowermost ray 3.5 in the upper; scales large, thin and leathery, those on breast considerably reduced; head entirely naked; lateral line nearly straight from origin to vertical of last dorsal ray but 3, where it curves downward and proceeds to the base of caudal on the third series below; pores of lateral line beautifully and numerously branched, the branches ranging from 4 to 8 or 10 in number.

Color, nearly fresh, very brilliant, bright grass-green, the belly abruptly bright blue, top of head livid purplish, lower part of head deep blue, cheeks and opercle green, edged with blue; salmon-scarlet dash across cheek; blotches on side of back livid violet lavender; 2 stripes on side and some odd scales a peculiar dull scarlet red, same as head markings; 2 similar stripes across base, or in front of pectoral, the stripes edged with blue; dorsal lavender at base, the upper half blue; caudal blue, with lavender streaks and blotches; anal like the dorsal, greenish at edge; ventrals plain blue; pectorals blue, blackish above, the axil red; upper lip pale edged; lateral bands not serrated; no black dorsal spot.

Color of same specimen in spirits, pale bluish green; top of head and snout with a broad purplish area extending from nape over interorbital to near tip of snout, and extending down on side of snout in an irregularly pointed angle to near gape, dull purplish; in front of this on snout, a narrow pea-green stripe uniting on sides with the color of the cheeks; in front of this a narrow purplish line, partly upon skin of premaxillaries and extending on side to posterior angle of mouth, rest of skin of premaxillaries pea-green; under parts of head, lower jaw, and a broad band extending upward on the cheek, narrowly enveloping the eye except for a narrow space on the supraorbital and extending in a narrow point toward the occiput, pale pea-green; a large irregular yellowish-white marking from eye broadening downward across cheek and opercle, bifurcating on opercle, the lower branch extending downward to edge of subopercle, the other backward toward base of pectoral and terminating at edge of opercle; above this the opercle and humeral region are unicolor with the cheek and lower parts of head; edge of opercle above pectoral with a narrow dusky yellowish border, dark on anterior line; upper part of side at base of dorsal with a narrow irregular green line, outside of which is a greenish-purple line about 2 scales in width, extending from nape to posterior end of dorsal fin; side below this pale bluish green with broad yellowish-white lines, the upper extending from above base of pectoral to middle of base of caudal, the lower from lower base of pectoral along lower part of side to caudal, these 2 lines approximately parallel and 2 scales apart; a few odd scales of same color; another line of same color from gill-opening under base of pectoral, terminating under tip of short pectoral rays; a more narrow, but similar, bar across base of pectoral; breast and belly bluish green; upper edge of caudal peduncle bluish purple; lower edge of caudal peduncle whitish; basal half of dorsal fin pale slaty olive or bluish purple; lower edge of caudal peduncle whitish; basal half of dorsal fin pale slaty olive or bluish purple; outer half of dorsal bright pea-green, the 2 colors separated by a narrow wavy black line, the lower band increasing abruptly at last dorsal ray, about three-fourths of which it covers; anal same color as dorsal; caudal irregularly bluish and greenish at base, the distal portion dusky yellowish, a bluish mark extending to tip of fin on produced portion above and below; edge of basal portion of outer ray, above and below, pale greenish; ventrals greenish white; pectoral greenish yellow, darker above, especially on outer ray, which is purplish black; axil somewhat dusky.

The above description is based upon a specimen (No. 03390) 16 inches long, obtained at Honolulu July 8.

Another specimen (No. 03731) 16 inches long, obtained at Kailua August 5, was described as follows, as it appeared in life after having been placed in a small pool: Two bright coral-red stripes on body, one along middle of side, the other from lower base of pectoral to lower portion of caudal fin; body below this line bright cobalt-blue; between the 2 stripes, green above and blue below, blending in center, the upper edge of scales in middle of these stripes with a coral-red patch; back emerald green, with 5 deep cardinal blotches on upper part of back, those nearest nape being largest, the size diminishing posteriorly; nape and snout darkish cardinal red, the patch on snout expanding laterally and forming a triangle in front of eye, the ventral angle of which terminates near posterior end of gape; tip of snout blue, with a dark cardinal bar in middle; suborbital region blue, overlaid with



green; a short blue bar dorsally from eye; an irregular darkish cardinal patch downward and backward from eye across cheek and opercle; upper portion of opercle blue, middle of opercle green; jaws and throat bluish green; rest of pectoral with a red bar; upper angular part of opercular flap red; base of scales on back red; lower half of dorsal fin deep coral-red, upper half cobalt-blue; caudal blue, with 8 stripes of darkish cardinal color, only outer 2 of which reach to the end of fin, the others extending about two-thirds length of fin; margin of caudal fin greenish; anal same color as dorsal; ventrals blue; upper half of pectoral deep blue, the lower paler, edge darkish purple; axil coral-red; inner part of lips deep cardinal-red; iris green, with red border. As this fish died the darkish cardinal-red on head, snout, nape, back, and stripes on caudal fin became darkish brown and the bright coral-red on body and fins bright brick-red; the green assumed a darker shade, and the blue faded noticeably. Generally at death that indescribable luster of the fish entirely disappears.

Another specimen (No. 03460) 8 inches long, from Hilo, was in life clear green with various marks of bright creamy red; head green with radiating red stripes of the same shade; fins also red and green, the edge of dorsal and anal purplish black; a deep purple edge to the lower red band of dorsal and upper of anal; caudal tipped with dull yellowish; throat verging on blue.

This latter specimen in spirits shows the dorsal and anal fins each with a broad dusky purplish base, beyond which is a somewhat narrower bright bluish-green band, bordered distally by an equally broad pale yellowish-white band, the fin in each case tipped with thin scallops of purplish, the bluish-green line with a thin wavy black border proximally. While the color of the dorsal and anal fins in this specimen differs considerably from that in our larger examples, it does not differ as greatly from the smaller ones, and we hesitate to regard it as representing a different species.

Although the markings of this species are quite distinct and diagnostic, it has been frequently confused with related species, particularly with *Thalassoma fuscum*. This is evidently the species described by Forskål under the name *Scarus purpuratus*, which was later described by Lesson and by Cuvier & Valenciennes as *Julis quadricolor*, recently by Mr. Fowler as *Thalassoma immanis*, and still more recently by Seale as *Thalassoma berndti*. Bleeker had 4 specimens which he identified as *Julis quadricolor*; one of these possessed irregular markings on the head and was doubtless *T. purpureum*. The 3 other specimens, without distinct markings on the head, and one of which he figured (Pl. 34, fig. 3) as *Julis quadricolor*, were doubtless what we have identified as *T. fuscum*. From *T. fuscum* the present species may be distinguished by the presence of broad, irregular markings on the head; the more distinct wavy blue line separating the 2 colors of the dorsal and anal, as seen in spirits, and the somewhat longer, more pointed snout.

Two specimens of this interesting species were obtained by Dr. Jenkins, 1 by the *Albatross* in 1896, 1 by Jordan and Snyder in 1900, and 7 by us in 1901. It was also obtained at Honolulu by the *Albatross* in 1902. Of the 7 specimens collected by us, 5 are from Honolulu and 1 each from Hilo and Kailua, the length ranging from 8.5 to 16 inches. Not rare in Samoa.

*Scarus purpuratus* Forskål, Descript. Animal., 27, 1775, Red Sea, Djidda, Arabia.

*Julis quadricolor* Lesson, Voy. Coquille, Zool., III, 139, pl. 35, fig. 1, 1826-1830, Otaïti [Tahiti]; Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 443, 1839 (Tahiti); Bleeker, Atlas, I, 93, 1862; not plate XXXIV, fig. 3, which is *T. fuscum*.

*Julis trilobata* Günther, Cat., IV, 187, 1862, in part (var. b.), Aneiteum; China; Red Sea.

*Thalassoma immanis* Fowler, Proc. Ac. Nat. Sci. Phila. 1899, 488, pl. XVIII, fig. 2, Caroline Islands.

*Thalassoma purpurea*, Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 610 (Sandwich Islands).

*Julis purpuratus*, Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 506 (Honolulu and Laysan).

*Thalassoma berndti* <sup>a</sup> Seale, Occasional Papers Bishop Museum, I, No. 4, 15, fig. 7, 1901, Honolulu (Type, No. 681, B. P. B. M.).

*Thalassoma purpureum*, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 462 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 528 (Honolulu).

*Thalassoma quadricolor*, Jenkins, op. cit. (Sept. 23, 1903), 462 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 528 (Honolulu).

### 234. *Thalassoma ballieui* (Vaillant & Sauvage). "*Himalea tuahine*." Fig. 128.

Head 3 in length; depth 3.4; eye 6.9 in head; snout 2.4; preorbital 3.2; interorbital 4.6; D. VII, 13; A. II, 11; scales 3-27-9.

Body long, moderately slender and compressed; head considerably longer than deep, the snout long and bluntly pointed; mouth moderate, horizontal, the gape not nearly reaching eye; jaws equal; lips thick, the lower with a broad loose fold on each side; each jaw with a series of small conic canines

<sup>a</sup>Misprint for *berndti*.

on each side, a longer pair in front of upper jaw and 2 pairs in lower jaw; premaxillary broad and oblique; interorbital moderate, high and convex; anterior profile gently curved from tip of snout to origin of dorsal, thence in a low curve to caudal peduncle; ventral outline less convex than dorsal; caudal peduncle very deep, nearly equal to one-half greatest depth of body; eye small, anterior, entirely above axis of body; origin of dorsal fin over base of pectoral, the spines all low, their length about 4 in head; soft portion of dorsal slightly higher, the rays 3.25 in head; anal similar to soft dorsal, its origin equally distant between tip of snout and tip of produced caudal rays; anal rays as high as those of dorsal; caudal deep, short, the middle rays a little longer than length of snout, the outer rays produced a distance a little greater than diameter of orbit; ventrals short, reaching only half the distance to origin of anal, their length 2.4 in head; pectoral longer, 1.5 in head; scales large and thin, their size quite uniform except on nape, where they are somewhat reduced; head entirely naked; lateral line not strongly developed, the pores often branched, following contour of back until under base of fourth dorsal ray from last, where it drops 2 rows and continues to base of caudal; base of caudal with small scales.

Color in alcohol, dark, purplish brown, each scale on side with a narrow bluish-black vertical stripe, these forming about 45 more or less distinct discontinuous vertical bars; head uniform purplish or olivaceous, paler below and without markings; dorsal, anal, and ventrals purplish or bluish black, the edges lighter; caudal bluish black, the base and produced rays darkest; in some specimens the caudal is throughout uniform bluish black excepting a very narrow paler margin on middle rays, in other cases only the base and produced rays are dark, all the rest of fin being light yellowish white or

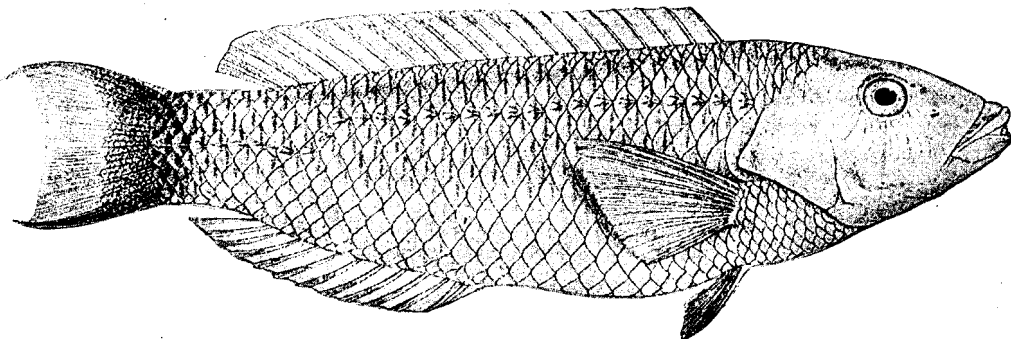


FIG. 128.—*Thalassoma ballieui* (Vaillant & Sauvage); after Günther.

dusky; pectoral uniform bluish black with lighter edge, or more or less yellowish white with dusky at base or middle and dusky on inner side.

There is considerable variation in the extent of prolongation of the outer caudal rays; in the smallest individual they are scarcely produced and the caudal is practically truncate. In the largest individuals the outer rays are produced beyond the tips of inner rays a distance equal to half length of latter. There is also considerable variation in the color of the caudal fin. In some of the larger examples, probably old males, it is uniform bluish black, while in others the large lunate pale area covers most of the fin. We are convinced, however, after an examination of a large series of excellent specimens, that the specimen from Johnston Island described by Smith and Swain as *Julis verticalis* and Günther's *Julis obscura* are identical with *Julis ballieui* Vaillant & Sauvage.

This species is extremely abundant at Honolulu, where it is constantly seen in the market. Of the 63 specimens examined by us, 19 were obtained at Honolulu by Dr. Jenkins, 4 by the *Albatross* in 1896, 5 by Jordan and Snyder in 1900, 32 by us at Honolulu, and 3 at Hilo. In 1902 the *Albatross* obtained specimens at Honolulu and Laysan.

*Julis ballieui* Vaillant & Sauvage, Rev. Mag. Zool., III, 1875, 284, Sandwich Islands.

*Julis obscura* Günther, Rept. Shore Fishes, Challenger, Zool., I, Part VI, 61, pl. 26, figs. A. & B., 1880, Honolulu; Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 506 (Honolulu and Laysan).

*Julis verticalis* Smith & Swain, Proc. U. S. Nat. Mus. 1882 (July 8), 135, Johnston Island.

*Thalassoma obscurum*, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 463 (Honolulu).

*Thalassoma ballieui*, Snyder, Bull. U. S. Fish Comm., XXII, 1902 (Jan. 19, 1904), 529 (Honolulu).

**235. *Thalassoma fuscum* (Lacépède). "Awela." Plate XXXIV. a**

Head 3.4 in length; depth 3.2; eye 6.8 in head; snout 3; preorbital 4.25; interorbital 3.25; D. VIII, 13; A. III, 11; scales 4-27-8.

Body short, moderately deep and compressed; dorsal and ventral outlines about equally convex; head short, slightly longer than deep; snout short and bluntly conic; mouth small, in line with axis of body, little oblique, jaws equal; a pair of strong canines in front in each jaw, and a series of close-set conic teeth on the sides; eye small, scarcely anterior; interorbital space high, broadly convex; caudal peduncle deep, 1.8 in head; fins rather small, origin of dorsal over middle of base of pectoral, its distance from tip of snout one-third distance to base of caudal fin; dorsal spines short, their length 5.2 in head; soft portion of dorsal somewhat higher, the longest rays about 2.9 in head; anal similar to soft dorsal, the rays of about equal length, caudal somewhat lumate, the outer rays produced, their length 1.9 in head or a fourth longer than middle rays; ventrals short, 2 in head or reaching halfway to origin of anal; pectoral longer, broad, 1.3 in head; scales large, thin, and firm, those on breast and belly somewhat reduced; head wholly naked; lateral line nearly straight for 19 scales, or under the fourth dorsal spine from last, where it curves downward 2 rows, continuing to base of caudal on median line of peduncle.

Color in spirits of some specimens, head and nape dusky bluish above; cheek light brownish; opercle blackish; under jaw and throat pale bluish; upper part of side dark brownish and bluish; middle of side with a pale whitish band somewhat dusky, extending from opercular flap to base of caudal; above and below this 2 broad bluish-green bands somewhat greater than a scale in width, made up of oblong or quadrate vertical spots separated by intrusion of the central paler band, these bluish-green areas suggesting the openings in the French harp; under part of side and belly colored like the median line; dorsal bluish green at base, bordered above by a broad purplish band, beyond which is a somewhat narrower blue-green band indistinctly bordered with paler; membranes among first 3 dorsal spines blackish; anal similar to soft dorsal, the blue-green border somewhat wider; lines separating the blue-green and purplish not blackish; ventrals pale at base, light greenish on distal portion; pectoral pale yellowish at base, dusky on outer half, the axil and upper margin black; head without markings.

The above description is based upon a specimen (No. 03526) 9.5 inches long obtained at Honolulu, from which the accompanying colored plate was made.

Another specimen (No. 03021), 8 inches long, from Honolulu, had side with 3 broad pale brick-red stripes separated by 3 bluish or yellowish-blue ones, these extending from opercle to caudal; upper stripe about 3 scales wide, narrowly bordered above at base of dorsal by greenish blue, and crossed by about 6 narrow vertical greenish or yellowish bars connecting with the first yellowish-blue stripe, which is about one scale wide, begins at upper edge of opercle and ends at base of caudal, a narrow saddle of same passing over caudal peduncle at posterior end of dorsal fin, third stripe brick red, running from opercular flap to middle of base of caudal, fourth stripe like the second but better defined, fifth like the first and third, the sixth along side of belly ill-defined, yellowish green; head reddish olive, lower jaw and breast the same; opercular flap bluish olive; dorsal orange red at base, then a narrow bright blue stripe, broadly edged with green on posterior two-thirds, the membranes with faint yellow blotches; anal pale brick red at base, then a broad bright blue border, the outer half of membranes between ninth and eleventh rays white; the last ray brick red to tip, a little blue at base and on tip; caudal dusky orange with reddish wash at base, greenish in center, the outer half with alternating blue and orange lines, the blue lines more or less greenish at anterior end, upper and lower margins bright blue, with some green; pectoral yellow at base, bluish dusky along anterior edge and outer two-thirds; ventrals pale bluish; iris greenish brown.

A specimen (No. 05754) obtained at Hilo had the following colors when fresh:

Body darkish coral-red (modified brick-red); shoulder and belly light yellowish brown; back claret, rather darkish; 2 longitudinal rows of elongated squares of bright emerald-green with cobalt-blue border on body; the upper one beginning on fourth scale and terminating on the upper part of caudal peduncle; the lower one beginning on seventh scale and terminating at base of caudal, where the upper edge of the row touches the lateral line; from the upper row issue 5 green bars dorsally at regular intervals, these connecting with the green stripe at base of dorsal; ventral side of tail slightly

greenish; nape greenish on claret ground; head greenish on dark dirty purple; cheek darkish brown, angle of opercle blackish; chin pale reddish brown, throat same as belly; iris green; lips greenish dark; dorsal light claret, margin cobalt-blue, the latter wider on soft dorsal; caudal emerald-green, edges and half of end cobalt-blue, half of membrane orange-brown; anal same as soft dorsal; ventrals pale cobalt-blue; proximal half of pectoral emerald-green, distal half deep Prussian blue, edge Prussian blue.

This same specimen, in spirits, is dusky purplish brown above and on upper part of sides, the head most purplish; side with 3 irregular greenish lines; dorsal with purplish-black on the first 2 membranes, the basal three-fifths of the fin dusky purplish, a few small bright blue spots on the base; distal two-fifths of the fin bluish green bordered irregularly by pale yellowish white; anal similar to soft dorsal, the blue-green border a little broader, the edge not paler; caudal with the rays dusky at base, blue-green distally, the central membranes whitish, the outer ones more dusky, a dusky purplish stripe extending to tip of outer rays both above and below, upper and lower edges of caudal bluish green; pectoral blue-black, paler at base; ventrals greenish white.

In young individuals the dorsal and anal are more decidedly tricolor, there being a broad blue-green stripe through the middle, above a somewhat broader purplish proximal stripe, and below a narrower but distinct paler stripe, the rays tipped again with greenish blue; the median stripe on side as well as the back more brownish.

This species may be readily distinguished from all others by the absence of distinct markings on head and the presence on the side of 2 series of vertically oblong or quadrate bluish green areas bordered by whitish, suggesting the 2 rows of openings in the harmonica; aptly compared by Lacépède to 2 rows of Chinese characters. Of the 4 specimens possessed by Bleeker and which he identified as *Julis quadricolor*, 3 (including the one which he figured) evidently belonged to this species. They are said to have had no markings on the head, and his figure (pl. 34, fig. 3) clearly shows the harmonica markings. Other species have the unmarked head and still others may possess the peculiar body markings, but we know of none other possessing both.

This species is fairly common about the coral reefs of the Hawaiian Islands, and is not rare in Samoa. Our collection contains a series of 16 specimens: 9 from Honolulu, 3 from Kailua, and 1 each from Honuapo and Hilo. In length they vary from 5.25 to 11.5 inches.

*Labrus fuscus* Lacépède, Hist. Nat. Poiss., III, 437, 1801, no locality.

*Labrus trilobatus* Lacépède, Hist. Nat. Poiss., III, 454 and 526, 1801, tropical Pacific.

*Julis bicatenatus* Bennett, Proc. Committee Zool. Soc., Lond., 1831, 1671, Mauritius.

*Julis trilobatus*, Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 437, 1839 (Ile de France).

*Julis formosus* Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 439, 1839, Ile de France.

*Julis trilobata*, Günther, Cat., IV, 187, 1862, in part, var. a (South Africa, Mauritius, Aneityum).

*Julis quadricolor* Bleeker, Atlas, I, 93, pl. 34, fig. 3, 1862 (in part, 3 of his 4 specimens, including the one figured), Java.

### 236. *Thalassoma umbrostigma* (Rüppell). Fig. 129.

Head 3.6 in length; depth 3.6; eye 6.6 in head; snout 2.8; preorbital 4; gape 3; interorbital 3.5; D. VIII, 13; A. III, 11; scales 4-27-8.

Body moderately long and compressed, the dorsal and ventral outlines moderately convex; head but slightly longer than deep; snout moderate, bluntly conic; preorbital oblique; jaws each with a pair of stout canines in front and smaller close-set conic teeth laterally; eye small, slightly anterior, entirely above axis of body; interorbital rather low, convex, the profile from tip of snout to nape evenly convex; least depth of caudal peduncle slightly greater than half head; origin of dorsal slightly posterior to base of pectoral, its distance from tip of snout greater than head by diameter of orbit; dorsal spines short, their length about 2 in snout; dorsal rays longer, 1.3 in snout; anal similar to soft dorsal, of about equal height; caudal shallowly lunate, the outer rays but slightly longer than middle one, which is equal to snout and eye; ventrals short, reaching somewhat more than half distance to vent, length 2.4 in head; pectoral longer, reaching vertical at vent, its length 1.3 in head; scales large, thin, but firm, those on breast somewhat reduced; head entirely naked; lateral line parallel with dorsal outline to below fifth dorsal ray from last, where it curves downward 3 scales and then continues to base of caudal, the pores with 3 to 6 or 7 branches; small scales on base of caudal.

Color in life (No. 03022, 7 inches long, from Honolulu), side pale greenish with 3 irregular broad rosy stripes, the upper one darkening into Indian red; median dorsal line at base of dorsal fin