

SCARUS DUBIUS BENNETT.

interrupted under last dorsal ray, to reappear again 2 rows farther down, 18 pores in the first part and 7 in the last; tubes of lateral line with very short branches.

Dorsal spines soft and flexible, their length scarcely equaling snout; soft dorsal not elevated, the border of the entire fin uniformly rounded; anal similar to soft dorsal, its rays equaling snout; caudal truncate or very slightly lunate, the outer rays scarcely produced, their length 1.6 in head; pectoral longer, reaching origin of anal, 1.3 in head.

Color of a nearly fresh specimen in formalin, deep lead-color, body and fins uniform, a leaden band across caudal; pectoral light yellowish, yellow at tip; terminal band of caudal pale lead-color; center of each scale darker lead-color; ventral pale; tip of opercle with a large blackish spot.

Color in spirits, dark brownish, the edges of the scales paler; dorsal and anal dark brownish; caudal dusky; ventrals and pectoral pale dusky.

The collection contains but a single example (No. 03405), 6.5 inches long, obtained at Honolulu. This species occurs also in Samoa.

Scarus dubius Bennett, Zool. Journ., IV, 828, No. XIII, Art. III, 37, Oahu.

Pseudoscarus dubius, Günther, Cat., IV, 229, 1862 (Sandwich Islands; Fiji Islands).

279. *Callyodon ahula* (Jenkins). "*Ahuula*;" "*Panuhānuhā*." Fig. 152.

Head 2.8 in length; depth 2.34; eye 6 in head; snout 2.7; preorbital 5; interorbital 3; D. ix, 10; A. iii, 10; P. 14; V. i, 5; scales 2-24-6.

Body short, deep, strongly compressed; dorsal profile rather strongly arched, slightly depressed in front of eyes; head rather deep; snout prominent, the lower jaw included; mouth small, entirely

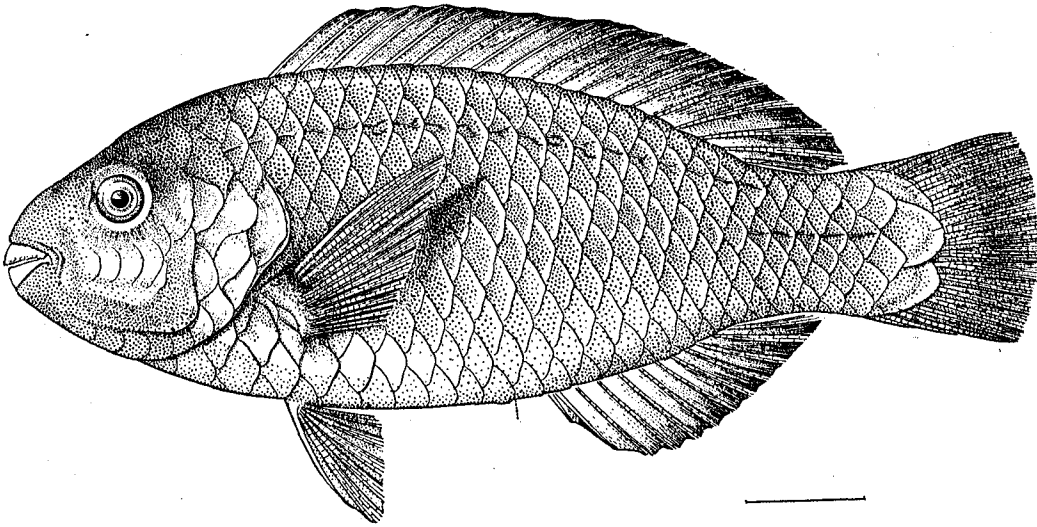


FIG. 152.—*Callyodon ahula* (Jenkins); from the type.

below axis of body; dental plates white, yellowish at base; no posterior canines; upper lip double its entire length, covering about half the upper dental plate; lower lip short, covering less than half lower dental plate; eye small, lower edge of orbit on body axis; caudal peduncle compressed, its depth 2.2 in head.

Scales large, 4 rows in front of dorsal, a single row of 4 scales on cheek, behind which are 2 scales placed one above the other; posterior limb of opercle with 2 series, the anterior with 1 series of scales; lateral line interrupted under last dorsal ray and continued to base of caudal 2 rows lower down, the tubes somewhat wavy and little branched.

Dorsal fin rather high, the spines soft and flexible, their length about equal to that of snout; soft dorsal scarcely higher; anal similar to soft dorsal; caudal fin slightly convex, the lobes rounded, 1.8 in head; pectoral 1.4 in head; ventrals not reaching vent, 1.8 in head.

Head, body, and fins uniformly brown, with reddish tinges brightest on fins and throat; base of caudal paler; no distinct markings anywhere.

This species reaches a length of about 9 or 10 inches, and is known only from the 5 specimens recorded by Dr. Jenkins and others obtained by the *Albatross* at Honolulu.

Scarus ahulu Jenkins, Bull. U. S. Fish Comm., XIX, 1899 (Aug. 30, 1900), 61, fig. 19, Honolulu (Type, No. 6142, Stanford Univ., Coll. O. P. Jenkins); *ibid.*, XXII, 1902 (Sept. 23, 1903), 470 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 531 (Honolulu).

280. *Callyodon bennetti* (Cuvier & Valenciennes). Plate 45. ^a

Head 2.8 in length; depth 3.25; eye 5.2 in head; snout 2.6; preorbital 6; interorbital 3.2; D. ix, 10; A. iii, 9; P. 13; scales 2-24-6.

Body rather short, moderately deep, not greatly compressed; head longer than deep, compressed; snout subconic, lower jaw included; lips covering about half of each jaw; dental plates white; no posterior canine teeth; eye high, entirely above upper base of pectoral, slightly anterior; caudal peduncle 2.5 in head.

Origin of dorsal a little posterior to upper base of pectoral, spines flexible, of about equal length and equal to rays, the longest spine 2.5 in head; longest anal ray 2.75 in head; caudal slightly rounded; ventrals 2 in head, not reaching vent by 0.75 of their length; pectoral broad, 1.6 in head.

Scales large, smooth; scales on cheek in 3 rows, upper with 6 scales, next with 6, lower with 2; 2 rows of scales on opercle, its lower edge with a single row; lateral line interrupted, 17 pores in upper part, which ends on the first row of scales beyond the last dorsal ray, then drops 2 rows and continues along middle of caudal peduncle to base, there being 7 pores in the shorter part.

Color in alcohol, brownish olivaceous, edges of scales darker; 2 rather distinct white stripes from near base of pectoral along lower part of side, disappearing before reaching vertical of anal origin; fins all plain olivaceous, scarcely mottled; tip of caudal not white.

This species was originally described from the Hawaiian Islands. The collection made by Dr. Wood at Honolulu in 1898 contains a single specimen, No. 2081, 5.25 inches long. Also found in Samoa.

Scarus bennetti Cuvier & Valenciennes, Hist. Nat. Poiss., XIV, 270, 1839, Sandwich Islands; Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 470 (Honolulu).

281. *Callyodon paluca* (Jenkins). "*Palūkālūka*." Fig. 153.

Head 3 in length; depth 2.8; eye 5.5 in head; snout 2.75; interorbital 2.9; D. ix, 10; A. iii, 9; P. 14; scales, 2-24-6.

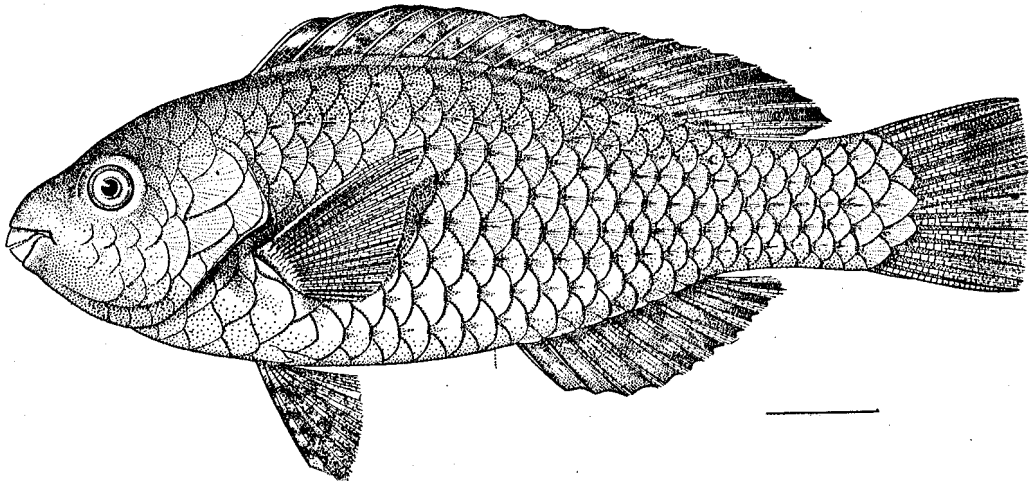
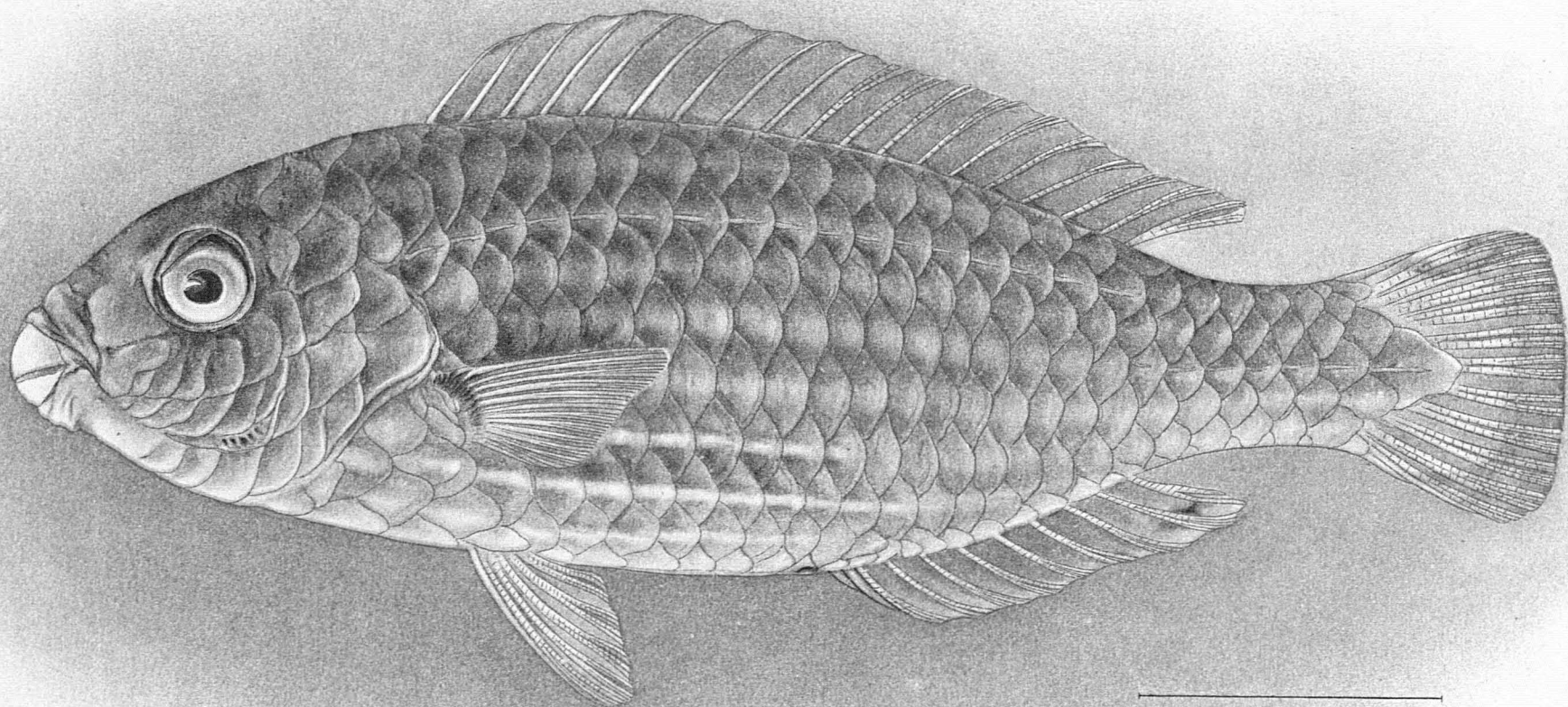


FIG. 153.—*Callyodon paluca* (Jenkins); from the type.

Body deep, compressed; dorsal and ventral outline evenly arched; head longer than deep, compressed, bluntly conic; lower jaw included; teeth white, no posterior canine, upper lip double, its entire length and covering little more than half the dental plate, lower lip covering half of lower plate; lower edge of eye slightly above upper base of pectoral.



SCARUS BENNETTI CUVIER & VALENCIENNES.

Origin of dorsal over upper base of pectoral, its distance from tip of snout equal to head; dorsal spines flexible, all except first and second of about equal length, longest 2.75 in head, longest ray 2.4 in head; longest anal ray 2.4 in head; caudal truncate, lobes not produced; ventrals 1.85 in head, not reaching vent by two-thirds its own length; pectoral 1.6 in head.

Scales large and thin, very slightly roughened by radiating lines of granulations extending to margin of scales; cheek with 3 rows of scales, 6 scales in upper row, 4 or 5 in middle, 2 in lower, which extends upon anterior limb of preopercle; posterior limb of opercle with 2 rows of large scales; anterior limb with a single series; 6 scales in median series before dorsal; lateral line interrupted at 1 row of scales beyond posterior base of dorsal, pores on 19 scales, lateral line dropping down 1 row and beginning on row in which long part ends, 6 pores being in the shorter part, pores being on the 2 different but adjoining scales in the same upward and backward row; many pores branched, a few single.

Color in life, upper portion reddish-brown, lower parts, including ventrals and anal, a brighter red; vertical fins and ventrals somewhat mottled; body and head without distinct markings.

Color in alcohol, grayish-brown, upper parts darker, edges of scales dark brown; fins all a similar color, the vertical fins and ventrals being mottled with light and brown.

The above description from the type, 7 inches long, obtained by Dr. Jenkins at Honolulu in 1889, the only known specimen until the *Albatross* obtained others in 1902.

Scarus paluca Jenkins, Bull. U. S. Fish Comm., XIX, 1899 (Aug. 30, 1900), 60, fig. 18, Honolulu (type, No. 6141, Stanford Univ., Coll. O. P. Jenkins); *ibid.*, XXII, 1902 (Sept. 23, 1903), 471 (Honolulu; same specimen); Snyder, op. cit. (Jan. 19, 1904), 531 (Honolulu).

282. *Callyodon jenkinsi* (Jordan & Evermann).

Head 3 in length; depth 2.5; eye 6.5 in head; snout 2.6; preorbital 4.7; interorbital 3; D. ix, 10; A. iii, 9; P. 13; scales 2-24-7.

Body short, very deep and greatly compressed; head short, nearly as deep as long, snout short and blunt; mouth small; each jaw with 1 or 2 blunt canines; dorsal and ventral outlines about equally convex; anterior profile rising rather irregularly from tip of snout to origin of dorsal; caudal peduncle deep, its least depth 2 in head. Scales large, deeper than long; 2 rows of large scales on cheek and 1 row on subopercle; a row of thin modified scales at base of dorsal and anal; a few very large thin scales on base of caudal; lateral line ceasing under last dorsal ray, reappearing 2 rows lower down and continuing to base of caudal, the pores with 2 or 3 irregular branches; dorsal rays soft and flexible, not pungent; dorsal spines somewhat elevated posteriorly, longest a little more than 2 in head; first ventral spine obscure, the others soft and flexible; anal rays somewhat shorter than those of dorsal; caudal shallowly lunate, the outer rays not greatly produced; ventrals moderate, 1.6 in head, not reaching to origin of anal by a distance equal to two-fifths their length; pectoral broad, 1.2 in head.

Color of a nearly fresh specimen, bright blue-green, brightest on posterior half of body, each scale broadly edged with reddish brown; lower anterior part of body reddish brown, with traces of blue-green; top of head brownish red or coppery, a broad deep blue-green band on the upper lip, extending on side of head to below eye; lower lip with a narrow brighter blue-green band connecting at angle of mouth with the one from upper lip; chin with a broad coppery-red bar, followed by a broader bright blue-green one; caudal green, median part pale, banded with green spots; dorsal bright green at base and tip, the middle pale greenish, translucent; anal similar, the distal band broader; pectorals and ventrals deep vitriol-green with whitish markings.

Color in alcohol, dirty greenish, side with about 8 longitudinal series of greenish blotches; head olivaceous above, paler on cheeks; upper lip broadly pea-green at edge, this color continued backward to under eye; edge of lower lip pale green, continued around angle of mouth uniting with the same color from upper lip; chin with a broad, pale crossbar, behind which is a broader, pale-green one which extends up on cheek nearly to orbit; back of this is a still broader, white crossbar interrupted in the middle by greenish; subopercle and lower edge of preopercle with a large, irregular, green patch; a median green line on breast to base of ventrals; dorsal green at base and along edge, the middle portion paler; anal similar to dorsal, the green border broader; caudal bright pea-green on the outer rays, the inner ones pale with 4 or 5 cross series of green spots, tips of rays darker; ventrals pale green, the edges dark pea-green; pectoral pale green, darker green on the upper rays.

This species is related to *Scarus gilberti*, from which it differs in the greater depth and the somewhat

different coloration. It is also related to *Callyodon lawia*, but differs in the much greater depth, the less produced caudal lobes, the greater width of the green head markings, and the color of the fins.

Only one specimen was obtained, type No. 50647, U. S. N. M. (field No. 02944), 14 inches long, taken at Honolulu June 6.

Scarus jenkinsi Jordan & Evermann, Bull. U. S. Fish Comm., XXII, 1902 (April 11, 1903), 195, Honolulu.

283. *Callyodon gilberti* (Jenkins). "*Panuhānuhū*." Fig. 154.

Head 2.75 in length; depth 2.44; eye 6.6 in head; snout 2.8; preorbital 5; interorbital 3; D. ix, 10; A. iii, 9; P. 14; scales 2-24-6.

Body moderately deep and compressed; dorsal and ventral outlines about equally convex; head short, scarcely longer than deep; mouth small, horizontal, on axis of body; teeth whitish, lower jaw included; 2 short but strong canines at posterior angle of upper jaw, a similar 1 on lower jaw; upper lip broad, covering whole of dental plate, lower lip covering about half of lower plate; eyes small, entirely above axis of body; interorbital space broad, high.

Scales large and thin, a row of modified scales along base of dorsal and anal; scales on base of caudal very large and thin; 2 rows of scales on cheek, the upper with 7, the lower with 4 or 5 scales; a series of scales along margin of opercle and on subopercle. 4 scales along median line in front of

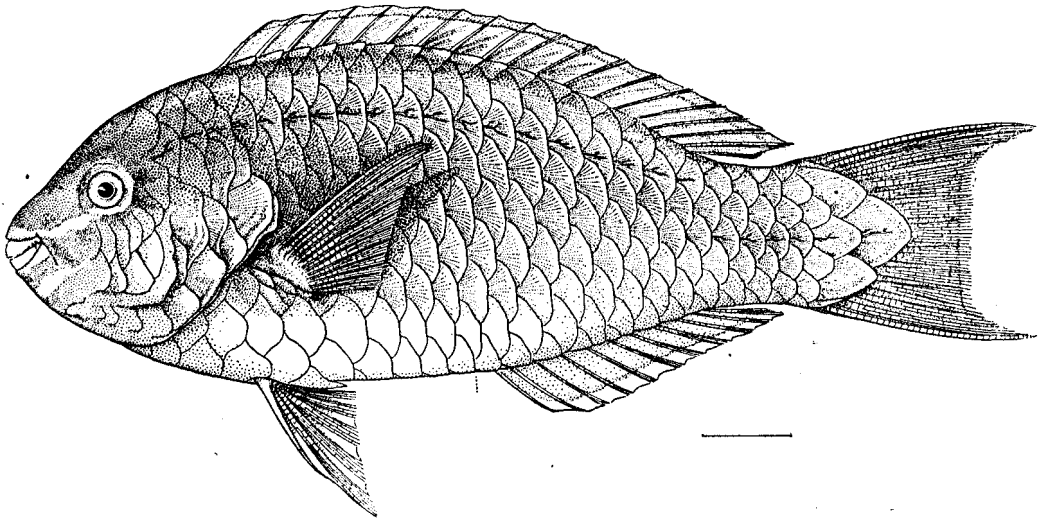


FIG. 154.—*Callyodon gilberti* (Jenkins); from the type.

dorsal; lateral line interrupted under the last dorsal rays, reappearing 2 rows farther down and continuing to caudal fin, the tubes with 1 to 3 or 4 short branches.

Dorsal spines short and flexible, not pungent, their length about 3.5 in head; soft dorsal higher, the last rays longest, about 2.4 in head; first anal spine obscure, the others soft and flexible; soft anal similar to soft dorsal but less high, the last rays 3 in head; caudal moderately lunate, the outer rays moderately produced, about one-half longer than middle rays, ventrals rather long, their length not reaching origin of anal by a distance equal to half distance from tip of snout to middle of pupil; pectorals broad, the free edge oblique, length of upper rays 1.3 in head.

Color in spirits, upper part of head and body greenish or bluish purple; side bluish green on the edges of the scales, underparts paler; upper lip with a broad blue-green line extending on side of head across lower border of orbit to middle of preopercle; 2 short blue-green lines on postocular region; snout above lip with a broad paler band extending back to eye; edge of lower lip bluish green, connecting at angle of mouth with the blue line from upper lip, back of this a broad pale purplish crossbar concolor with the cheek, this bounded posteriorly by a broad, bright-blue crossbar reaching to lower edge of postorbital; middle of lower jaw with a broad white crossbar, behind which is an oblong blue area; median line of throat and breast bright blue, this extending backward between ventrals to origin of anal; dorsal bright greenish-blue at base and on border, these 2 lines separated by a much

broader dusky whitish band; last ray of dorsal greenish to tip; anal same color as soft dorsal; caudal greenish blue on the outer rays, spotted with blue and green on basal two-thirds, the middle rays narrowly tipped with blue green with a narrow subterminal purplish black line, rest of middle rays whitish; ventrals pale blue on the inner rays, white on middle rays, and bright blue on the outer rays; pectoral bluish on base and anterior part, pale dusky otherwise.

Color description based upon a specimen (No. 05758), 9.5 inches long, which had been in formalin about 2 weeks. Older specimens are of course more faded and the colors correspondingly less distinct.

This is one of the most abundant species of the genus among the Hawaiian Islands. We have examined 13 specimens, all from Honolulu, 2 collected by the *Albatross* in 1891, 7 by Dr. Jenkins, and 4 by us. Length, 8 to 14 inches. It is doubtfully distinct from *C. bataviensis* (Steindachner).

Scarus gilberti Jenkins, Bull. U. S. Fish Comm., XIX, 1899 (Aug. 30, 1900), 59, fig. 17, Honolulu (type, No. 6140, Stanford Univ.; coll. O. P. Jenkins); *ibid*, XXII, 1902 (Sept. 23, 1903), 471 (Honolulu).

284. *Callyodon formosus* (Cuvier & Valenciennes).

This species is thus described: Jaws smooth; a small posterior canine; head flat; nape a little elevated; eye placed high; lateral line simple.

The fish in a faded condition shows traces of green streaks under the throat, and near the eyes an area with scattered spots, apparently red. Dorsal and anal green, striped with an undulating band of blue. Caudal green with a violet line above and below which joins a vertical line of the same color at the end of each ray, thus limiting on the base and on the 2 outer rays of the caudal an area probably red in life. Pectorals bordered with blue, the ventrals apparently not.

Two specimens, 7 inches long, obtained at the Sandwich Islands by Eydoux & Souleyet.

To this Guichenot adds, from the same specimens, body rather elongate; posterior canine teeth present or absent; suborbital scales in 2 rows, the lower covering a large part of preopercular limb. Caudal truncate, the angles moderately produced. Color grayish blue, sides yellowish green spotted with reddish. Head with a large yellow spot crossed by a horizontal streak of green and bounded above by a stripe of the same color. Caudal bounded by a red stripe, otherwise green like the dorsal and anal, which are crossed by a blue stripe with wavy edges; pectorals and ventrals yellow, edged with blue.

This species appear to be close to *Callyodon lauia* and *C. gilberti*. No specimens have been seen by us.

Scarus formosus Cuvier & Valenciennes, Hist. Nat. Poiss., XIV, 283, 1839, Sandwich Islands; Eydoux & Souleyet, Voyage Bonite, Zool., II, 191, pl. 6, fig. 3, Sandwich Islands, same type.

Pseudoscarus formosus, Guichenot, Mem. Soc. Imp. Cherbourg, 1865, 57 (Eydoux & Souleyet's specimen).

285. *Callyodon lauia* (Jordan & Evermann). "*Lauia*." Plate XLIII.

Head 2.8 in length; depth 2.7; eye 6.75 in head; snout 2.6; preorbital 4.8; interorbital 2.8; D. IX, 10; A. III, 9; P. 13 on one side, 14 on other; scales 2-25-6.

Body short, stout, and compressed; head heavy; snout rather short, bluntly rounded; dorsal and ventral outlines about equally arched, anterior profile slightly concave before the eyes; nape strongly convex; mouth small, nearly horizontal, in axis of body; upper jaw with 1 or 2 moderately strong backwardly directed canines; a similar but smaller canine sometimes present on lower jaw; cutting edge of upper jaw fitting outside that of lower; teeth white; eye small, entirely above axis of body; opercle with a broad short flap. Scales large, their surface with fine lines and granulations; nape and breast with large scales; cheek with 2 rows of large scales, about 7 in each; subopercle and lower limb of preopercle each with a row of scales; opercle with large scales; lateral line broken under last dorsal ray, reappearing 1 row lower down and continuing to caudal fin, the pores with 2 to 4 branches; a series of these oblong scales along base of dorsal and anal; base of caudal with 3 or 4 very long, thin scales. Dorsal spines soft and flexible, not pungent, the longest about 2.7 in head; soft portion of dorsal somewhat higher, especially posteriorly where the rays are about 2.4 in head; anal spines soft and flexible, the first obscure, the third about 4.3 in head; anal rays higher, the last but one longest, 3 in head; caudal deeply lunate, the 3 or 4 outer rays above and below produced, length of middle rays 2.3 in head, or 2 in outer rays; ventrals moderate, not reaching vent, 1.9 in head; pectoral broad, the free margin oblique, length of longest rays 1.3 in head.

Color in life, head brownish yellow before eyes, the jaws lighter yellow; cheek washed with brownish and blue, throat greenish; nuchal and opercular regions brownish orange; body salmon-color above, the belly lighter yellow, most of the scales with an edging of greenish blue; a deep blue line from nostril before and behind upper part of eye; upper lip deep blue, the streak forming an interrupted line before eye; lower jaw with 2 blue cross lines, 1 marginal; a dark-blue spot behind angle of mouth; deep blue blotches on interopercle; dorsal deep blue with a peculiar jagged stripe of light brownish yellow; anal with blue spots at base, then light yellow, then deep blue, then green with blue edge; caudal brownish yellow, with bright blue edgings and a median area of bright golden green; ventrals golden, trimmed with bright blue; pectoral golden with deep blue above and greenish blue on lower rays, a salmon streak across base with greenish blue behind it.

Another example (No. 03040, 10 inches long) was in life pale coppery rosy, darker on first 3 rows of scales; the center of each scale in the first 5 rows greenish blue; under parts pale rosy, with orange wash; head pale rosy, a small postocular blue spot, a short blue line forward from eye, and a second of same color on upper lip and across cheek to eye, where it has a slight break, then continues under eye as a greenish-blue bar; under lip with narrow blue edge; chin faded salmon, with a double blue crescent; space from chin to isthmus bright blue; an oblong bright blue spot on subopercle, behind which is a smaller irregular one bordered above by a broad greenish-blue space; dorsal greenish blue, with a broad submedian orange band, the lower greenish-blue band made up of large, scarcely connected, bluish spots, the upper half continuous with a narrow bright blue border; a small orange blotch on base of last dorsal ray; caudal pale rosy at base, then with a greenish bar, followed by a broad rosy bar, then by a broad terminal greenish-blue bar, dark blue in front, greenish in middle and pale blue on outer third; upper and lower edges of caudal blue, below which is a broad rosy orange stripe; anal greenish blue at base, then a broad orange stripe, the outer half greenish blue with narrow bright blue edge; pectoral orange anteriorly, pale bluish behind, the anterior border blue; ventrals orange, anterior edge and tip blue; iris pale orange.

Color in spirits, light dirty grayish white, lighter below; a narrow pea-green stripe on edge of upper lip, breaking up into irregular spots from angle of mouth to lower edge of orbit, a similar stripe from nostril to eye and slightly beyond upper posterior border of eye, these lines sometimes continuous and unbroken; lower jaw edged with green, a broader pea-green cross-stripe at anterior edge of branchiostegal opening; subopercles each with a broad green stripe; line of union of gill-membranes broadly green; dorsal with a series of large olive-green spots at base and a broad band of similar color on distal half, these separated by a paler band and cut by intrusions from it both above and below; dorsal fin with a very narrow paler border; and with a series of greenish spots at base, then a broad pale yellowish white line, bounded distally by an indefinite, wavy, black line shading off into the greenish of the distal half; last ray of anal dusky on its outer third; caudal greenish-olive at base and on produced outer rays, edges of fin above and below green; middle rays with a broad lunate area of pale green, scalloped proximally by dark green, separated from the lighter green base by a broad whitish interspace, the upper and lower edge also darker green; ventrals creamy white, the outer edge pale greenish; pectoral whitish, the upper edge dusky.

There is some variation in the width of the green markings on the head, sometimes the stripes on the lower part of the head being very broad.

This species is related to *C. gilberti*, from which it differs in the more strongly produced caudal lobes, in the narrower lines on the snout, the broader green lines on the throat, the absence of a green median line on the breast, and in the very different coloration of the fins. It is also near to *Callyodon formosus*, a species we have as yet failed to recognize. Besides the type obtained at Hilo, we have 4 examples from Honolulu collected by us and 1 by Dr. Wood.

Scarus lauia Jordan & Evermann, Bull. U. S. Fish Comm., XXII, 1902 (April 11, 1903), 196, Hilo. (Type, No. 50648, U. S. Nat. Mus.)

286. *Callyodon bataviensis* (Bleeker). Fig. 155.

Two series of scales on the cheek, the lower preopercular limb being entirely naked; the lower series composed of 6 scales; upper lip broad; jaws rosy, the upper with 1 or 2 conical teeth at the angle, none at the lower; dorsal spines subequal in length; 14 pectoral rays; caudal rounded, with the angles produced.

Color green; lips red, blue anteriorly and green posteriorly; the green band of the upper lip and

the blue band of the lower lip passing behind the angle of the mouth into a green band running to the lower angle of the orbit; 2 short green streaks behind the orbit; dorsal fin red, with a blue margin, and with a green band along the middle; anal similarly colored; caudal rosy, with the upper and lower margins blue, and with 3 or 4 slightly curved blue cross-bands.

Known from the Hawaiian Islands only from Steindachner's record.

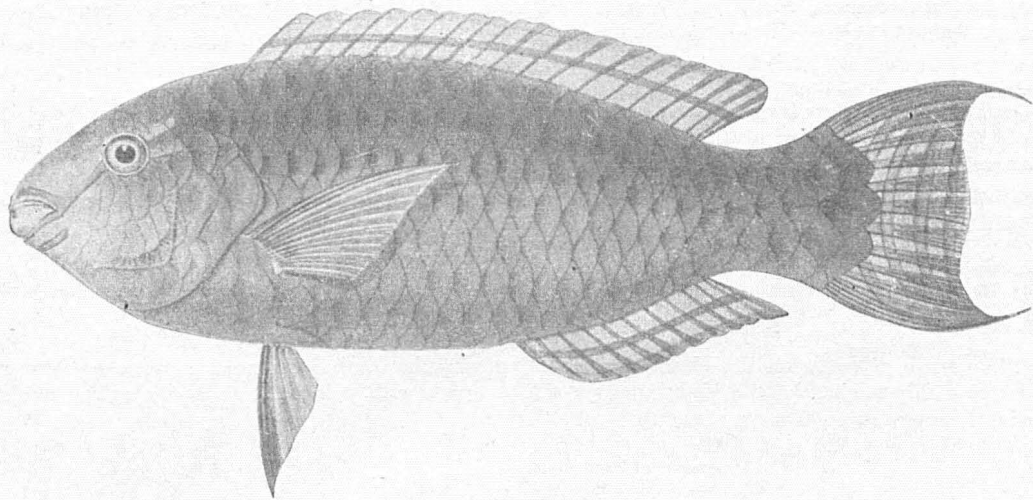


FIG. 155.—*Callyodon bataviensis* (Bleeker); after Bleeker.

? *Scarus collana* Rüppell, Neue Wirbelt., Fische, 25 taf. 8, fig. 2, 1838, Massawah, Red Sea.

? *Scarus forskali* Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 349, 1839, Red Sea.

Scarus bataviensis Bleeker, Nat. T. Ned. Ind., XIII, 1857, 342, Batavia.

Pseudoscarus bataviensis, Bleeker, Atlas Ichth., I, 48, taf. 12, fig. 3, 1862; Günther, Cat., IV, 231, 1862 (from Bleeker); (Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 508 (Honolulu).

Scarus collaris Cuvier & Valenciennes, op. cit., XIV, 265, 1839, Massawah, Red Sea.

Pseudoscarus collana, Günther, Cat., IV, 230, 1862 (Red Sea).

287. *Callyodon erythron* (Cuvier & Valenciennes). Fig. 156.

Two series of scales on the cheek, the lower preopercular limb being entirely naked; upper lip broad; jaws rosy, with a conical tooth at the angle (in adult state); dorsal spines subequal in length; 15 pectoral rays; caudal rounded.

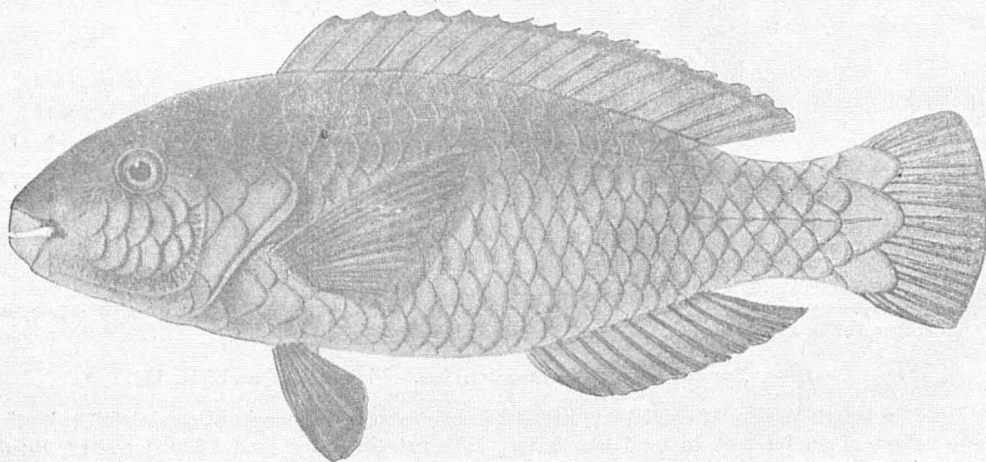


FIG. 156.—*Callyodon erythron* (Cuvier & Valenciennes); after Bleeker.

Color, violet-olive, vertical fins darker.

Laysan Island. Known from the Hawaiian Islands only from Steindachner's record. Common in Samoa.

Scarus erythrodon Cuvier & Valenciennes, Hist. Nat. Poiss., XIV, 255, 1839, Ile de France.

Scarus sumbawensis Bleeker, Contrib. Ichth. Fauna Sumbawa, in Journ. Ind. Archipel., II, 1848, 638, Sumbawa; Bleeker, Nat. Tijds. Neder. Ind., XI, 1856, 104 (Banda).

Pseudoscarus sumbawensis, Bleeker, Atlas Ichth., I, 47, taf. 15, fig. 4, 1862; Günther, Cat., IV, 232, 1862 (East Indies); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 509 (Laysan Island).

Genus 171. PSEUDOSCARUS Bleeker.

This genus differs from *Scarus*, as here understood, chiefly in the deep green or blue color of its highly modified jaws and teeth. The species are mostly of large size and robust form. This genus is scarcely distinct from *Callyodon*.

Pseudoscarus Bleeker, Versl. Akad. Wet. Amsterdam, Scaroiden, XII, 1861, 230 (*microrrhinos*); (teeth blue; posterior canines present).

Loro Jordan & Evermann, Check-List, 418, 1896 (*guacamaiia*).

a. Cheek with 2 rows of scales. Color green.....*trotschellii*, p. 358

aa. Cheek with 3 rows of scales. Color blue, the side of body and head with pink or rosy.....*jordani*, p. 359

288. *Pseudoscarus trotschellii* Bleeker. Fig. 157.

Two series of scales on the cheek, the lower preopercular limb being naked; lips very narrow, covering only the base of the jaws; jaws green, the upper with pointed teeth at the angle; caudal slightly emarginate; 15 pectoral rays.

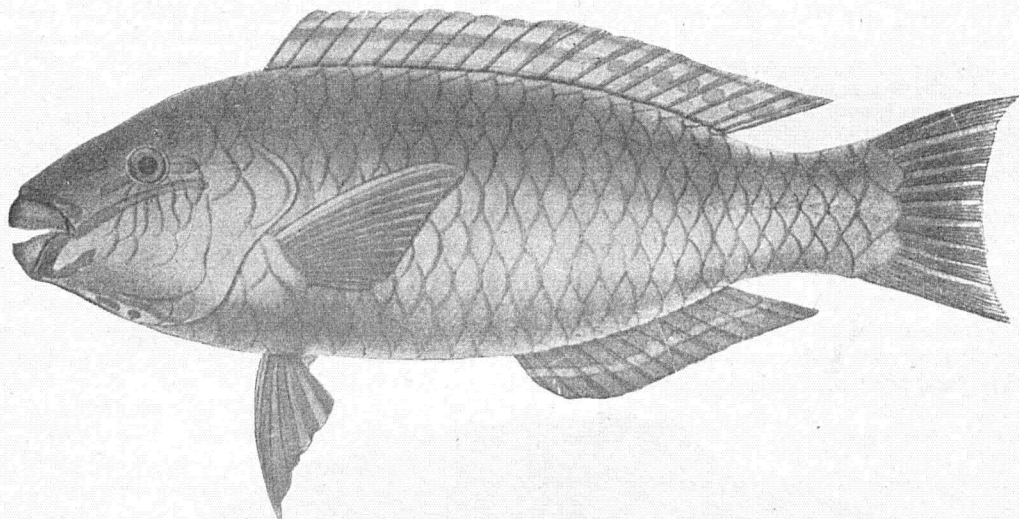


FIG. 157.—*Pseudoscarus trotschellii* Bleeker; after Bleeker.

Body green, each scale with reddish margin; lips red; a short red band through the eye, and another from angle of mouth below eye toward the opercle; chin with red transverse and longitudinal streaks; dorsal red, edged with blue, and with a green band along the middle; anal yellowish, with a similar red band; caudal greenish.

Scarustrotschellii Bleeker, Nat. Tijds. Neder. Ind., IV, 1853, 498, Java.

Pseudoscarus trotschellii, Bleeker, Atlas Ichth., I, 25, taf. 7, fig. 2, 1862; Günther, Cat., IV, 237, 1862 (from Bleeker); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 508 (Laysan Island).

289. *Pseudoscarus jordani* Jenkins. Plate XLIV and Fig. 158.

Head in length to base of caudal 2.7, in total length to middle margin of caudal 3.37; depth in length to base of caudal 2.64, in total length to middle margin of the caudal 3.3; dorsal ix, 10; anal iii, 9; pectoral 14; scales 24; lateral line interrupted. In this specimen 2 scales at the inter-

rupted portion out of the series bear tubes. They are located one over each first 2 scales in the series following interruption. Tubes much branched; surfaces of scales, except at posterior margin of each, much roughened over the whole body by striations composed of rows of minute tubercles; body robust and greatly compressed; an adipose lump over snout; teeth green, lower jaw included; a strong tooth at each angle of upper jaw; upper lip double only posteriorly, covering more than half of dental plate; lower lip covering less than half of dental plate; cheek with 3 rows of scales, upper of 7 scales, middle row of 7, the lower row of 2 scales, which extend on lower preopercular limb; a series of scales along entire margin of opercle; a series of 6 scales on median line before first dorsal spine; lobes of caudal fin much produced, being longer than body of the fin; height of caudal peduncle in head 2.54; pectoral 1.5 in head, its breadth being less than half of its own length; ventral 1.75 in head, not reaching vent by one-half its own length, inserted on a vertical from about middle of base of pectoral; dorsal spines flexible; membrane of first few spines of dorsal, anal, and ventral somewhat fleshy on outer margin.

Coloration in life: General color blue, the sides of body and head rosy or pink; region of body just below posterior two-thirds of dorsal and the caudal peduncle green; iris orange; margin of upper

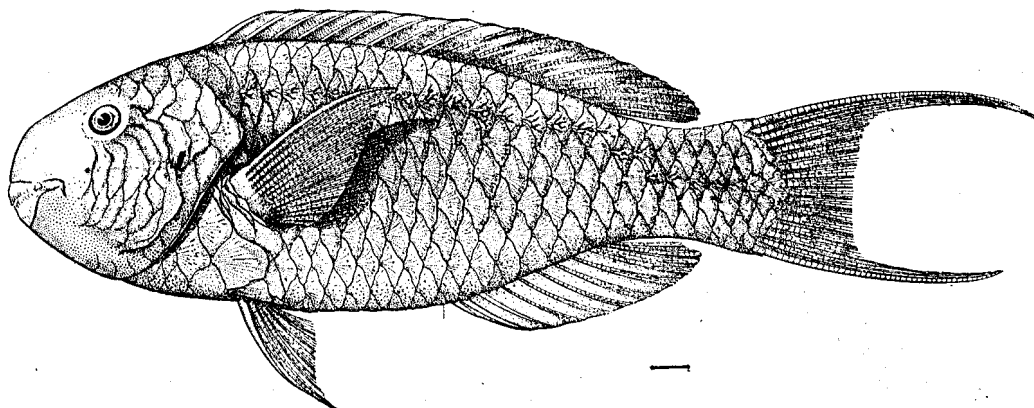


FIG. 158.—*Pseudoscarus jordani* Jenkins; from the type.

lip orange, above which it is bright blue; margin of lower lip blue, below which is an orange area; below this again bright blue which changes to a lighter blue; posterior to this a pink area; a pink wavy line from angle of mouth to eye; dorsal fin pink with upper and anterior border blue, and with a blue bar along each spine; anal yellowish with bright blue anterior outer and posterior margins; ventral blue anteriorly and pink posteriorly; caudal, upper and lower borders bright blue, interior portions with reticulations of pink and blue, colors almost wholly disappearing in alcohol; there remains the green below the posterior two-thirds of dorsal and on caudal peduncle as a pigment on the scales.

One specimen of this brilliant fish was obtained by Dr. Jenkins at Honolulu in 1889. Another has been taken at Apia, Samoa, the latter represented in our plate. The measurements of Dr. Jenkins's specimen are as follows:

<i>Pseudoscarus jordani</i> .	Milli- meters.	<i>Pseudoscarus jordani</i> .	Milli- meters.
Total length to middle of margin of caudal.....	600	Snout.....	85
Length of upper caudal lobe.....	100	Height of first dorsal spine.....	30
Length to base of caudal.....	480	Height of soft dorsal.....	53
Head.....	178	Ventral.....	100
Depth.....	182	Pectoral.....	120
Eye.....	20	Breadth of narrowest portion of caudal peduncle.....	70

Pseudoscarus jordani Jenkins, Bull. U. S. Fish Comm., XIX, 1899 (Aug. 30, 1900), 63, fig. 21, Honolulu (Type, no. 12148, Stanford Univ.; coll. O. P. Jenkins); Jenkins, op. cit., XXII, 1902 (Sept. 23, 1903), 471 (Honolulu).

Suborder SQUAMIPINNES.—The Scaly-fins.

Body compressed, covered with small or minute ctenoid scales; lateral line unarmed, concurrent with the back; mouth small, with slender or brush-like teeth; opercles armed or not; nostrils double; gills 4, a slit behind the fourth; gill-membranes united to the broad scaly isthmus; pseudobranchiae present; air-bladder present; dorsal fin long, the spines usually well developed, the soft part usually more or less scaly; caudal usually truncate or double concave; anal similar to soft dorsal; ventrals thoracic, sometimes rudimentary, sometimes with 2 spines, the pubic bone becoming progressively elongate; vertebrae $10+14=24$, but sometimes still further reduced. Basis of cranium double, with a double muscular tube; post-temporal trifurcate or bifurcate in *Ephippidae* and the other transitional forms, as in the scombroids and percoids; in other species firmly united to the skull, its structure showing the usual 3 forks, the space between them filled by bone, so that only a foramen is left; second, third, and fourth upper pharyngeals small, usually reduced to vertical transverse laminae. Hypercoracoid with median foramen; pectoral with 4 short basal bones. This group comprises a large number of fishes, some of them showing analogies with the *Carangidae* on the one hand and with certain percoid fishes on the other; the typical forms specialized in directions leading toward the *Plectognathi*. The limits of the group are uncertain, although there is no doubt about the relationship of any of the genera here treated. Perhaps several of the families currently recognized as scombroid belong here. The *Plectognathi* are certainly descended from the *Squamipinnes*. The close relation of *Balistes* to *Hepatus* admits of no doubt. This relationship is shown in the osteology, in the reduced post-temporal and coalesced bones of jaws, in the great development of the public bone, in the restriction of the gill-openings, and in the character of the scales, especially the armature of the tail. In a natural system the *Balistidae* would follow the *Teuthidae* and *Sigunidae*. The *Teuthidae* and the *Balistidae* are as nearly related to each other as the *Ephippidae* are to the *Chaetodontidae*.

- a. Teeth small, not brush-like nor incisor-like; gill-membranes separate, free from isthmus.
 b. Ventrals I, 5 *Antigonidae*, p. 360
 bb. Ventrals I, 6 to I, 8 *Zeidae*, p. 361
 aa. Teeth elongate, brush-like or incisor-like; gill-membranes united to isthmus.
 c. Maxillary distinct; teeth brush-like, setiform, thick-set; post-temporal fully perforated by a foramen; pubic bone not greatly developed; caudal peduncle unarmed. Carnivorous fishes with short intestine.
 d. Scales well developed *Chaetodontidae*, p. 362
 dd. Scales reduced to minute asperities *Zanclidae*, p. 381
 cc. Maxillary and premaxillary immovably united; teeth incisor-like, in a single series; post-temporal not fully perforated by the foramen; pubic bones well developed; caudal peduncle usually armed with spines or tubercles. Herbivorous fishes with elongate intestine *Acanthuridae*, p. 383

Family LXXI. ANTIGONIDÆ.—Boar-fishes.

Body compressed and elevated, covered with small, ctenoid scales; sides of head scaly; preorbital and preopercle more or less serrate or armed; opercle small; gills normal; gill-membranes separate, free from isthmus; top of head bony; premaxillaries very protractile, the posterior process very long; mouth moderate, lower jaw projecting; teeth very small; lateral line not extending on caudal; dorsal fin long, the stout spines separated from the soft rays by a deep notch; dorsal spines not graduated; anal fin with 3 spines separated by a notch from the soft rays, the first spine longest; soft part of anal as long as soft dorsal; ventrals 1, 5, the spine strong, inserted below pectorals; caudal fin rounded, on a moderate peduncle; upper limb of post-temporal widened at its distal end, which affords a very firm attachment; lower limb short and thick; supraclavicle long and slender, its posterior edge sharply serrate, the serrations standing out above the surface of the skin; vertebrae in normal number, $10+13=23$ (in *Capros*). Species few, arranged in 2 genera, living in rather deep water. *Capros aper*, the boarfish, superficially resembles the John Dory, *Zeus faber*, and is common on the coasts of southern Europe. This family, like the preceding, is of doubtful affinities. It is only remotely allied to the *Zeidae*, and it has no relationship to the *Carangidae* or other scombroid forms. *Antigonia* bears much superficial resemblance to the *Ephippidae*, a resemblance doubtless arising from real affinity, as is shown by the form and attachment of the post-temporal. An extinct genus, *Proantigonia*, is said to connect *Antigonia* with *Capros*.

Genus 172. *ANTIGONIA* Lowe.

Body very deep, the depth much greater than the length of body, which is excessively compressed and covered with moderate-sized, firm, rough ctenoid scales; profile from nape to dorsal very steep and nearly straight; surface of head above with rough bony striae; preopercle and suborbital bones armed with slender antrorse spines; mouth small, its cleft nearly verticle; premaxillary with a very long process, extremely protractile, perhaps less so than in *Capros*; lower jaw projecting; upper jaw somewhat protractile; maxillary broad, scaly; small, very slender teeth on jaws in 1 row, none on palate; chin rough; preopercle with rough striae, becoming antrorse spines below; cheek deep, covered with rough scales, opercle short, scaly; branchiostegals 6; gill-membranes separate, free from the isthmus; lateral line concurrent with the back; fin spines stiff and strong; dorsals united, the third spine stout and elevated, the sixth or last spine shortest, lower than the soft rays, the fin thus distinctly notched; soft dorsal and anal similar, long and low, none of the rays produced; anal spines 3, joined to the fin, the first longest; base of dorsal and anal with a sheath of small rough scales extending on the fin spines and slightly on the rays, not on the membranes; caudal peduncle short and deep, deeper than long; caudal short, squarely truncate; ventrals strong, of moderate length, at lowest point of ventral outline, well behind pectorals and directly below spinous dorsal, which is at highest point of dorsal outline; ventral spine large, roughened anteriorly; pectoral moderate, not falcate. Species few, in waters of moderate depth.

Antigonia Lowe, Proc. Zool. Soc. Lond. 1843, 85 (*capros*).

Caprophonus Müller & Troschel, Horae Ichthyologie, III, 1845, 28 (*aurora*).

Hypsinoctes Schlegel, Fauna Japonien, Poiss., 84, pl. XLII, fig. 2, 1844, (*rubescens*).

• 290. *Antigonia steindachneri* Jordan & Evermann. Plate XLV.

Head 3.35 in length; depth equal to length; eye 3 in head; snout 3.2; maxillary 4.2; interorbital 3.3; D. VIII, 36; A. III, 33; scales 16-71-40.

Body very deep, compressed; back elevated, trenchant; abdomen deep, trenchant; upper profile concave in front of eye above to occipital process, then convex to spinous dorsal; snout short, blunt, rounded; mouth small, nearly vertical; jaws small, lower protruding; teeth small, pointed, uniserial; eye large, superior, nearly in middle of length of head; preorbital and interopercle spiny along margins; anterior nostril with valve, the posterior larger, circular; gill-opening large, gillrakers small; pseudo-branchiae and gill-laminae large; dorsal spines sharp, third longest, 1.5 in head, others graduated to last, which is about 2 in snout; anterior dorsal rays longest, 3.5 in head; first anal spine longest, 2.8, others graduated to last; caudal small, truncate, 1.7; pectoral 1.2, upper rays longest, and posterior margin straight; ventrals 1.6, spine very large, strong, front margin asperous, and nearly as long as fin; caudal peduncle compressed, its depth 2.7; scales small, roughly ctenoid; head roughened, especially above; basal scales of soft dorsal and anal rough; lateral line arched, nearly conforming with upper profile, running along middle of side of caudal peduncle.

Color in life (No. 03492) bright light salmon-pink, nape, back of head, and down to ventrals deeper red, behind the bar from dorsal to ventral a pale shade; fins pale crimson, caudal paler with darker red tip; iris red.

Color in alcohol very pale brown, almost uniform.

Described from an example (No. 03701), 7.6 inches long, from Kailua. We have 2 other examples (Nos. 03492 and 03702), each about 6.8 inches long, taken by us at Hilo. The species is taken with hook and line occasionally in rather deep water off Hawaii; otherwise known from Japan only.

Antigonia capros Steindachner, Denks. Ak. Wiss. Wien, XLIX, 1885, 187, taf. v (off Tokyo); not of Lowe.

Antigonia steindachneri Jordan & Evermann in Jordan & Fowler, Proc. U. S. Nat. Mus., XXV, 1903, 522, Kailua.

Family LXXII. ZEIDÆ.—The John Dories.

Body short, deep, much compressed and elevated, naked or covered with minute smooth scales, or with bony protuberances. Mouth large, terminal, the upper jaw protractile. Teeth small, in narrow bands or single series on the jaws and vomer and sometimes on the palatines. Eyes lateral, placed high; opercle much reduced; some of the bones of head usually with spines; preopercle not serrate; post-temporal very firmly attached to the skull; lower limb adnate for its whole length, the

distal end only of upper limb attached. The supra-clavicle short and triangular, bearing a short spine near its anterior angle, its posterior edge divided into 3 spines, 2 or 3 of which stand out above the surface of the skin. Ventral edge often serrate, with strong bony plates; lateral line well developed, concurrent with the back; branchiostegals 7 or 8; gill-openings wide, the membranes little united, free from the isthmus; pseudobranchiæ large; air bladder large; gillrakers usually short; gills 4, a slit behind the fourth; dorsal fin emarginate or divided, the anterior part with spines, which are often strong, the posterior part longer, its highest rays behind the middle; soft anal entirely similar to soft dorsal, usually preceded by 1 to 4 spines, which are not graduated and which often form a separate fin; ventral fins thoracic, well developed, their rays usually 1, 6 to 1, 8; pectorals small; caudal fin rounded, on a moderate peduncle. Lateral line obscure, unarmed. Pyloric cæca exceedingly numerous. Vertebrae about 32 (*Zeus*). Genera 8; species about 15; fishes of singular appearance, inhabiting warm seas, often at considerable depth. The species undergo great changes in the course of development.

The single Hawaiian genus and species is fully described in Section II.

Family LXXIII. CHÆTODONTIDÆ.—Butterfly-Fishes.

Body strongly compressed, elevated, suborbicular in outline, covered with moderate-sized or small scales, which are finely ciliated or nearly smooth; lateral line present, concurrent with the back, not extending on the caudal fin; mouth small, protractile, terminal; maxillary very short, irregular in form, divided in 2 by a longitudinal suture; upper part of skull solid, occipital crest strong; post-temporal firmly joined to the skull, its form really trifurcate, though appearing simple, the spaces between the forks filled in by bone so that only a foramen is left; last bone of the suborbital ring firmly joined to the preopercle; teeth brush-like or setiform, often extremely long, in narrow bands on the jaws; no teeth on vomer or palatines; no canines, molars or incisors; eyes lateral, of moderate size; branchiostegals 6 or 7; pseudobranchiæ very large; air-bladder present; gill-membranes more or less attached to the isthmus; gillrakers very small; dorsal fin single, continuous, its rays sometimes filamentous, its soft part as well as the soft part of anal densely covered with small scales; anal similar to soft dorsal with 3 or 4 spines; ventrals thoracic, I, 5; caudal usually truncate; vertebrae 10+14=24, the anterior abbreviated; insertion of ribs inferior; post-temporal usually reduced, and not bifurcate.

Carnivorous fishes of the tropical seas, noted for their bright colors and great activity. Their excessive quickness of sense and motion enables them to maintain themselves in the struggle for existence in the close competition of the coral reefs, notwithstanding their bright colors. The young are very different from the adult and pass through a stage termed *Tholichthys*, in which the membranes are greatly developed, forming collars and sheaths about the head and neck.

Chatodontina:

- a. Preopercle unarmed; scales comparatively large (young with the *Tholichthys* form).
- b. Snout (nasals, palatines, etc.) with premaxillaries, articular, and dentary bones much produced, very long, beak-like; scales small, about 75 in horizontal series; dorsal spines 2.....*Forcipiger*, p. 362
- bb. Snout little, if at all, produced; scales larger, about 35 to 60.
- c. Dorsal fin with none of the spines elevated or filiform.
- d. Scales large, usually 35 to 50 in lateral line; dorsal spines 12 to 14; teeth moderate.....*Chatodon*, p. 363
- dd. Scales rather small, about 60 in lateral line; dorsal spines 10 or 12.....*Microcanthus*, p. 376
- cc. Dorsal fin with the fourth spine much elevated and filiform.....*Heniochus*, p. 376

Pomocanthina:

- aa. Preopercle armed at its angle with a very strong spine, which is sometimes grooved; preopercle serrate or spinous, with 10 to 30 small teeth; dorsal spines about 14, graduated, the last one longest.....*Holacanthus*, p. 377

Genus 173. FORCIPIGER Jordan & McGregor.

This genus differs from *Prognathodes* Gill in having smaller scales, about 75 in a lateral series instead of 40. *Chelmo* Cuvier is also closely related, having the same forceps-like mouth; but in the latter genus the spinous dorsal is much less developed, containing about 9 spines.

Forcipiger Jordan & McGregor, Rept. U. S. Fish Comm., xxiv, 1898, 279 (*Chelmo longirostris* Cuvier & Valenciennes).

291. *Forcipiger longirostris* (Broussonet). Plate XLVI.

Head with beak 2.2, without beak 2.8; depth 2.2 with beak, 1.75 without beak; beak 1.6 in rest of head; eye 3.75; mouth 7; interorbital 4.75; D. XII, 25; A. III, 18; scales 12-78-30.

Body very deep, compressed, back trenchant; head low, upper profile concave; snout nearly horizontal, jaws produced in a long pointed beak, mouth small, at extremity; teeth minute, in villiform bands in jaws; eye nearly in middle of length of head without beak; anterior nostril in short fleshy tube, posterior a short oblique slit before eye; fourth spine 1.5 in head without beak; anal spines graduated to last, which is longest, strong, 1.35; caudal small, slightly emarginate, its upper ray slightly produced; pectoral long, pointed, upper rays much longer than others; ventrals long, sharply pointed, spine 1.6; caudal peduncle small, compressed, its least depth 3.7; scales ctenoid; lateral line strongly arched, not concurrent with profile of back. Described from an example (No. 04537) 7 inches long from Honolulu.

Color in life of a specimen (field No. 327) collected by Jordan & Kellogg at Apia in 1902, brilliant yellow, deeper and orange-shaded behind, a black triangle on head, livid white below; ventrals and pectorals yellow; caudal colorless: a large jet-black spot on anal.

Color in alcohol, pale brown or whitish; head above, back in front of spinous dorsal, interorbital space, and opercles above, deep brown; snout, beak above, and band on each side to front of eye, blackish-brown; posterior margin of soft dorsal and anal with narrow grayish line; anal with a squarish black spot on distal part of last rays; last half of soft dorsal and anal with a narrow submarginal black line; caudal grayish, the pectoral orange; under parts of head and breast whitish.

We have 9 specimens from Honolulu, (4 collected by Doctor Jenkins, 1 by the *Albatross* in 1896, and 4 by us), ranging in length from 5.2 to 6.75 inches. The *Albatross* also obtained specimens at Honolulu in 1902.

This is the first species of fish ever described from the Hawaiian Islands.

Chætodon longirostris Broussonet, Desc. Ichth., I, 23, plate 7, 1782, Society and Sandwich islands. (Coll. Capt. Cook.)

Chelmon longirostris, Cuvier, Règne Animal, Ed. I, 334, 1817; after Broussonet.

Chelmo longirostris, Günther, Cat., II, 38, 1860 (Amboyna); Günther, Fische der Südsee, II, 48, 1874 (Sandwich, Society, Paumotu, Friendly, and Kingsmill islands).

Prognathodus longirostris, Bleeker, Verh. Kon. Ak. Wet., XVII, 1877, 33 (Ternate; Amboyna; Ceram; Nussalaut; Banda); Bleeker, Atlas, IX, 23, taf. 366, fig. 5, 1879.

Forcipiger flavissimus Jordan & McGregor, Rept. U. S. Fish Comm., XXIV, 1898, 279, Clarion Island (type, No. 5709, Stanford Univ. Mus.).

Chelmon (Forcipiger) longirostris, Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 489 (Honolulu).

Forcipiger longirostris, Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 512 (Sandwich Islands); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 471 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 531 (Honolulu).

Genus 174. *CHÆTODON* (Artedi) Linneus.

Body short, deep, very strongly compressed, especially above and behind; head small, compressed, almost everywhere scaly; mouth very small, terminal, the jaws provided with long, slender, flexible, bristle-like teeth; vomer sometimes with teeth; preopercle entire or nearly so, without spine; dorsal fin single, continuous, not notched, the spinous part longer than the soft part, of 12 or 13 spines, the spines not graduated, some of the middle ones being longer than the last; last rays of soft dorsal usually rapidly shortened, some of them occasionally filamentous; caudal peduncle short, the caudal fin fan-shaped; anal similar to soft dorsal, with 3 strong spines; body covered with rather large ctenoid scales, somewhat irregular in their arrangement; lateral line curved, high, parallel with the back; gill-openings rather narrow, the membranes narrowly joined to the isthmus; branchiostegals 6. A very large genus of singular and beautiful fishes, abounding in the tropical seas, especially about volcanic rocks and coral reefs; body usually crossed by transverse black bars; all very active fishes, feeding on small animals.

Chætodon Artedi, Genera, 51, 1738 (numerous species, the first one mentioned belonging to *Pomacanthus*; nonbinomial).

Tetragonopterus Klein, Historia Piscium, 37, 1744 (many species; *striatus*, etc.; nonbinomial).

Chætodon Linneus, Systema Nature, 10th ed. 272, 1758 (includes all known *Chætodontidae*).

Chætodon Cuvier, Règne Animal, 2d ed., 189, 1829 (*striatus*, *capistratus*; first restriction of the name to the present group).

Rabdophorus Swainson, Class'n Fishes, II, 211, 1839 (*ephippium*; scales on lower half of body in nearly horizontal series; scales about 45).

Citharædus Kaup, Wiegmann's Archiv, XXVI, part 1, 141, 1860 (*meyeri*; scales on the lower half of body in horizontal series; scales small, about 50).

- Linophora* Kaup, l. c., (*auriga*; scales in series running downward and backward).
- Sarothrodus* Gill, Proc. Ac. Nat. Sci. Phila. 1862, 238 (*Chatodon* Cuvier, not Artedi; offered as a substitute for *Chatodon*, the latter name being transferred to *Pomacanthus*).
- Thotichthys* Günther, Ann. Mag. Nat. Hist. 1868, 457 (*osseus*; larval form).
- Tetragonopterus* Bleeker, Rev. Famille Chatodontoides, in Verh. Kon. Ak. Wet., XVII, 52, 1877 (*striatus*; scales below in horizontal series; spinous dorsal not more than half longer than soft).
- Chatodontops* Bleeker, op. cit., 53 (scales on lower part in ascending series).
- Hemichatodon* Bleeker, l. c. (*capistratus*; scales below running downward and backward, forming an angle with those above).
- Lepidochatodon* Bleeker, op. cit., 54 (*unimaculatus*; scales anteriorly much enlarged).
- Gonochatodon* Bleeker, l. c., (*triangulum*; body very deep; the base of posterior half of soft dorsal and anal vertical).
- Orychatodon* Bleeker, Atlas Ichth., IX, 51, 1877-78 (*lineolatus*; scales very large, snout pointed).
- Chatodon* Jordan & Gilbert, Synopsis, 614, 1883 (restriction to *capistratus*).
- Anisochatodon* Klunzinger, Fische Rothen Meeres, 54, 1884 (*auriga*).

KEY TO HAWAIIAN SPECIES OF CHÆTODON.

- a. Rows of scales of anterior part of body running upward and backward, each marked by a dark line, those of posterior part of body running downward and backward almost at right angles with the first; snout acute; dorsal fin with the first ray prolonged in a whip, a black ocellus below it; ocular band broad; ventrals pale; two black lines across caudal.....*setifer*, p. 364
- aa. Rows of scales not arranged as above indicated, or at least not marked by lines, meeting at an angle.
- b. Scales unequal, those on the middle parts of body larger than the others.
- c. Series of scales extending upward and backward, at least posteriorly; teeth very small; snout acute, concave in upper profile; yellow; a broad, black ocular band, as broad as eye.
- d. Black area at base of soft dorsal broad, sending oblique streaks downward and forward across the body; no black area on shoulder.....*lineolatus*, p. 365
- dd. Black area at base of soft dorsal narrow; oblique cross streaks along rows of scales orange; shoulder region black with a median triangular orange area on each side.....*lucula*, p. 366
- cc. Series of scales nearly horizontal; teeth much larger than in related species; snout moderate, the profile projecting above eye; sides of back with a large black ocellus, often produced downward in a wedge-shaped blotch; ocular band broad, meeting its fellow on breast; a black band on margin of dorsal and anal across caudal peduncle.....*unimaculatus*, p. 368
- bb. Scales subequal, the series extending horizontally or slightly ascending posteriorly; snout obtuse or moderately acute, not convex above.
- e. Body with crossbands or streaks.
- f. Body with about six transverse crossbands; ocular band narrow, faint; a black spot above it; a reddish bump on caudal peduncle.....*punctatofasciatus*, p. 369
- ff. Body with about ten narrow dark cross streaks, each a row of small spots; ocular band narrow; anal with a narrow dark edge.....*militaris*, p. 371
- ee. Body without crossbands or vertical streaks.
- g. Ocular band present; snout obtuse.
- h. Ocular band preceded by a black bar.
- i. Black bar before eye covering snout; a black bar behind ocular band; body with dark streaks along the rows of scales; a black area surrounded by golden on dorsal and anal and caudal; a black spot on breast.....*trifasciatus*, p. 372
- ii. Black bar before eye not covering upper lip, which is pale; a black area above eye; three black bands behind eye, the first one extending backward to last ray of soft dorsal; body with six oblique orange stripes; caudal with two black stripes; anal with one.....*ornatissimus*, p. 373
- hh. Ocular band not preceded by a black bar.
- j. Back blackish, with two whitish blotches; ocular band orange, with dark edges; fins pale, with dark lines.....*quadrimaculatus*, p. 373
- jj. Back with diffuse dark spots; ocular band broad, diffuse; snout black, ventrals black; no yellow.....*corallivola*, p. 374
- gg. Ocular band none; body with about nine oblique stripes of clear blue; caudal peduncle and posterior part of dorsal black; caudal with a broad black band; snout rather acute.....*fremblii*, p. 375

292. *Chatodon setifer* Bloch. Plate XLVII.

Head 3.1 in length; depth 1.75; eye 4 in head; snout 2.5; mouth 7.25; maxillary 3.9; interorbital 4; D. XIII, 24; A. III, 21; scales 7-40-11.

Body very deep, compressed; back elevated, very trenchant; head deep; snout short, nearly horizontal; mouth very small; jaws produced, rather pointed, equal; lips thin, fleshy; teeth broad, brush-like in bands in jaws; eye superior, midway in head; interorbital width broad, convex, nostrils close together, with raised fleshy edge, posterior an oblique slit in front of eye; dorsal spines graduated to last, which is longest, 2 in head; fifth and sixth dorsal rays longest, produced in a point; third anal spine longest, 1.5; median anal rays longest, ninth, 1.25; caudal small, truncate; pectoral small, 1.3;

ventral pointed, 1.3; spine strong, 1.9; caudal peduncle compressed, its least depth 2.9; scales very large on middle of side; thin, finely ctenoid; scales on vertical fins, head, and belly, small, very small on outer portions of vertical fins; series of scales on side disposed in very oblique series; lateral line very strongly arched, not continued behind base of last dorsal rays.

Color in life (field No. 03435), general color in front and below, including paired fins, light violet, lighter on snout and below; dorsal, excepting first 2 spines and membranes, which are violet, caudal, anal, and upper posterior part of side, chrome yellow; lips pinkish; a broad black ocular bar becoming narrower above, narrowly edged on each side with white, extending from interopercle almost to origin of dorsal; about 6 narrow yellow lines across interorbital area; a series of 8 narrow dark bars running forward and downward from base of dorsal, the first 5 extending down to humeral region, the last 3 meeting at right angles, the last 3 bars of a similar series of 12 bars on lower part of body, the first 9 bars of which meet the fifth bar of upper series about at right angles; soft dorsal edged with black, an oval black spot on its center; lower edge of anal with a narrow black stripe outside of which the edge is light yellow; caudal broadly tipped with light violet, two narrow brownish bars across its center.

Color in alcohol, very pale or whitish, greater portion of side pale olive gray; about 8 dark-gray lines running obliquely up from head to dorsal, and others posteriorly above lateral line; side with about 11 oblique dark-gray lines running to anal; a broad dark-brown band beginning on nape before dorsal and running down to eye, continued below wider and blackish, with narrow whitish border in front; margin of dorsal to angle on soft fin, narrowly blackish; longest dorsal rays with black spot on distal portion; margin of soft anal with narrow black line running parallel with lower margin; margin of caudal grayish with a narrow dark-gray submarginal line; pectoral and ventrals grayish.

Described from an example (No. 04562) 6.25 inches long, from Honolulu.

We have 28 specimens, 4 to 8.2 inches long, from Honolulu, where the fish is common. Others were secured at that place by the *Albatross*. The species occurs also at Johnston Island and Samoa.

Chaetodon setifer Bloch, Ichth., VI, pl. 426, fig. 1, 1788, **Coromandel**; Günther, *Fische der Südsee*, 1, 36, taf. XXVI, fig. B, 1873 (Sandwich Islands); Smith & Swain, Proc. U. S. Nat. Mus., V, 1882, 137 (Johnston Island); Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 512 (Sandwich Islands); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 471 (Honolulu); Snyder, I. c. (Jan. 19, 1904), 531 (Honolulu).

Pomacentrus filamentosus Lacépède, Hist. Nat. Poiss., IV, 506, 511, 1803, **no locality**.

Chaetodon nesogallicus Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 63, 1831, **Isle of France**.

Chaetodon schanus Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 74, 1831, **Indian seas**.

Tetragonopterus nesogallicus, Bleeker, Ned. Tyds. Dierk., I, 259, 1863 (Wahia, Isle of Ceram).

Chaetodon lunaris Gronow, Syst., Ed. Gray, 70, 1854, **India**.

Chaetodon auriga, Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 488 (Honolulu); not of Forskål.

293. *Chaetodon lineolatus* Cuvier & Valenciennes. Fig. 159.

Head 3.25 in length; depth 1.5; eye 4.5 in head; snout 2.25; maxillary 3.5; interorbital 3.25; D. XII, 26; A. III, 22; scales 7-36-14.

Body deep, compressed, back elevated; head very deep, upper profile very concave, so that occiput is obliquely vertical; snout rather long, nearly horizontal; jaws produced, equal; mouth small, nearly horizontal; thirteenth anal ray longest, 1.5; caudal broad, margin slightly rounded; caudal peduncle compressed, its least depth 2.8; pectoral 1.3; ventrals pointed, 1.5; scales very large on side, smaller on head, breast, at bases of soft dorsal and anal, and on side of caudal peduncle; scales on vertical fins very small; series of scales very oblique above lateral line in front, becoming slightly oblique on sides; teeth in rather broad brush-like bands in jaws; eye small, posterior; edge of preopercle rough below; interorbital space broad, convex; nostrils small, close together, anterior with elevated fleshy rim and flap, posterior a nearly horizontal slit; dorsal spines graduated to last, which is longest, 1.8 in head; dorsal rays longest just behind middle, twelfth 1.35; third anal spine longest; lateral line running up high toward soft dorsal but not continued behind spinous dorsal.

Color in alcohol very pale brown, upper surface tinged with very pale olive; side above with narrow blackish vertical lines, one along the margin of each series of scales; head with a broad black band down from occiput over side of head above, below eye, including preopercle, and across interopercle; a round brown spot on forehead; base of soft dorsal with broad blackish band running down across caudal peduncle in front, and on basal portion of anal posteriorly; soft dorsal with a median brown line longitudinally; caudal with gray margin bounded in front with narrow blackish submarginal line; pectoral and ventral whitish.

Described from an example (No. 04535) taken at Honolulu.

We have examined only 3 Hawaiian specimens, 4.75 to 9.2 inches long, all from Honolulu, where the species is not very common, and many specimens from Samoa. The species is of wide distribution in the Pacific and Indian oceans.

Chaetodon lineolatus Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 40, 1831, Isle of France; Günther, Fische der Südsee, II, 45, taf. XXXIV, fig. A, 1874 (Paumotu, Society, Navigator, Kingsmill, and Sandwich islands); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 489 (Honolulu); Snyder, Bull. U. S. Fish Comm., XXII, 1902 (Jan. 19, 1904), 531 (Honolulu).

Chaetodon lunatus Ehrenberg in Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 57, 1831, Red Sea.

Tetragonopterus lineolatus, Bleeker, Poiss. Madagascar, 95, 1874 (Mauritius).

Tetragonopterus (Oxychaetodon) lineolatus, Bleeker, Verh. Kon. Ak. Wet., XVII, 1877, 102 (Cocos; Sumbawa; Flores; Ternate; Amboyna; Banda).

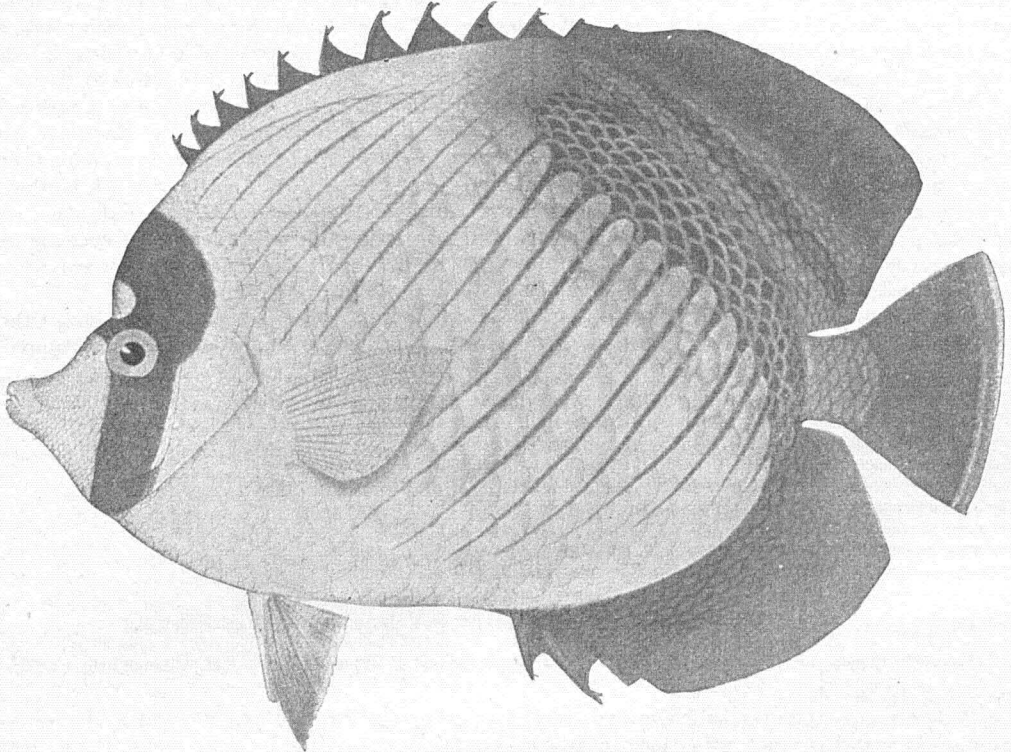


FIG. 159.—*Chaetodon lineolatus* Cuvier & Valenciennes; after Günther.

294. *Chaetodon lunula* (Lacépède). “Kikakápu.” Plate LIV and Fig. 160.

Head 3 in length; depth 1.6; eye 4 in head; snout 3.25; maxillary 3.9; interorbital 3.4; D. XII, 24; A. III, 19; scales 9–36–18.

Body very deep, compressed, back elevated; head deep; upper profile from interorbital space obliquely straight; jaws produced, subequal; mouth small; teeth fine, brushlike in jaws; eye median in length of head; margin of preopercle very finely serrate; interorbital space broad, convex; anterior nostril with thin fleshy rim and flap; posterior nostril a short oblique slit; anterior dorsal spines strong, enlarged, posterior slender, equal from middle posteriorly, last 1.8 in head; tenth dorsal ray 1.4; third anal spine longest, 1.7; eleventh dorsal ray 1.5; pectoral 1.2, rather broad; ventral pointed, 1.25; ventral spine 1.65; scales large on middle of side, those on vertical fins becoming very small; scales in slightly oblique series on side; ventrals with scaly flap at base; caudal broad, deep, margin slightly rounded; least depth of caudal peduncle 3 in head; lateral line arched, not continued beyond base of soft dorsal.

Described from an example (No. 04540) taken at Honolulu.

Color in life (No. 03036) yellowish olive, crossed by a series of brownish-orange lines from pectoral region backward and upward; snout pale orange; a broad black saddle over nape and downward over eye to upper edge of subopercle, narrowing at lower end, and bordered anteriorly by a narrow white line; following this is a broad white saddle extending down over humeral region, opercle and edge of shoulder-girdle to lower part of opercular openings; a black blotch at origin of dorsal separated from the white saddle by orange yellow; beneath this a light brown or olive space bounded below by a broad yellow line extending from humeral region upward and backward to base of seventh dorsal spine; below this a broad triangular black space with its base at shoulder-girdle and extending backward and upward to base of sixth to eighth dorsal spine, bounded below or behind by a narrow yellow line; a curved yellow line beginning on dorsal at base of seventh spine, following base of dorsal to caudal peduncle, which it crosses, then widening out upon base of anal; dorsal dusky olive, a broad black band parallel with the yellow, widening on soft portion and connecting with black caudal peduncle; above this a broad pale orange stripe, bounded on soft dorsal by white; edge of dorsal

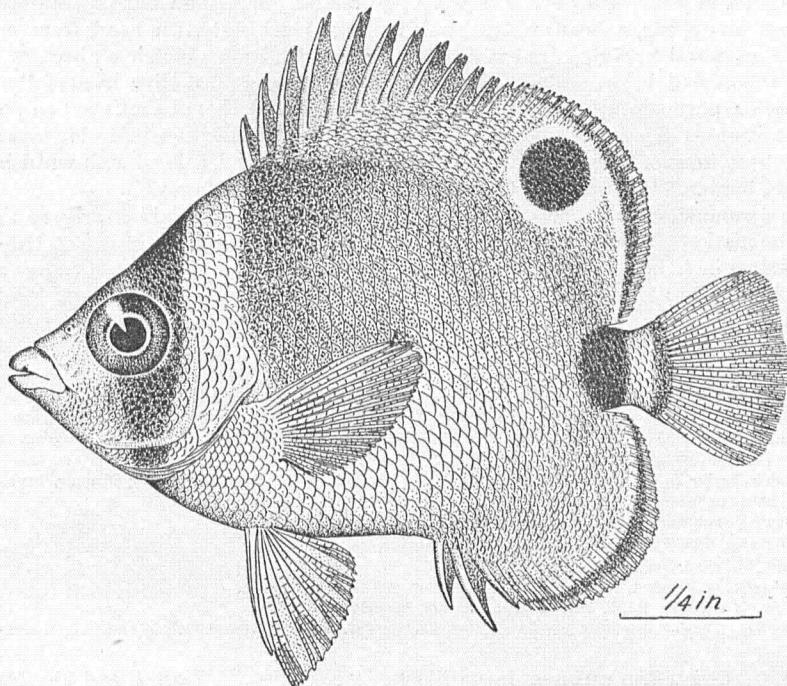


FIG. 160.—*Chetodon lunula* (Lacépède); from the young.

membranes black, forming a broad black border on soft dorsal; caudal yellow at base, a narrow black bar at middle, beyond which the fin is white; anal yellowish orange, bordered by brownish, and with a narrow dark orange band near margin; pectoral pale; ventrals pale orange, slightly dusky at tips; iris pale bluish.

Another example (No. 03313) has upper part of side rich greenish olive, crossed by about 9 or 10 reddish-brown bars; lower part of side rich lemon-yellow crossed by about 5 reddish-orange bars, the 2 under pectoral breaking up into reddish-orange spots; tip of snout pale rosy, rest of snout pale yellow; a broad black saddle over head and through eye to upper edge of subopercle, about one-half broader than orbit; back of this a broad white saddle of about same width extending to near lower part of opercle and enveloping part of shoulder-girdle; back of this a yellowish-green space, then a black saddle at anterior base of dorsal extending along base of dorsal to near fifth spine; a large oblong black spot beginning on humeral region and curving upward and backward to base of sixth and seventh spines, this bounded by rather broad yellow borders; belly pale yellow; a jet-black spot on caudal

peduncle; dorsal pale yellow at base, tips of spines and enveloping membranes black; soft dorsal with a pale orange band at base, next a narrow greenish olive one, then a broader yellow one, a very broad orange one broadening behind, a narrow yellow one, and finally a narrow black border; basal half of anal fin pale yellow, a median bar of reddish-orange spots, next a broad yellow bar, a narrow black bar, then tip broadly white; pectoral and ventrals pale yellow; iris black.

Color in life of a specimen (field No. 261) obtained by Jordan and Kellogg at Apia in 1902, deep golden, a little orange tinged and more dusky on back; chin gray; patch behind ocular stripe clear gray; oblique black band bordered before and behind by clear golden brown, a blackish blotch at first dorsal spine with golden brown behind it; spot on caudal peduncle and stripe on dorsal golden, a brown shade across dorsal and anal, besides black tips and dark-brown bands; ventral golden with some dusky; pectoral and edge of caudal colorless.

Color in alcohol, very pale brown, back above with a very pale olivaceous tinge; a blackish brown band across interorbital space, including eye, running behind down on preopercle, not continued below, narrowly bordered in front below eye with white; adjoining interorbital band, continued on side of head and down on opercle, a broad white band; a broad blackish-brown band from opercle up to middle of spinous dorsal broadly edged with white; a blackish-brown blotch on back at base of first 5 dorsal spines, bordered below with whitish; side with oblique golden olive bands following courses of scales; marginal portion of spinous and soft dorsal broadly blackish, not continued on posterior rays; a dusky streak running along basal portion of soft dorsal broadens out on posterior rays and forms a blackish blotch at front of caudal peduncle, bordered in front and behind with whitish; margin of caudal whitish, bordered in front with a broad blackish bar; pectoral grayish.

We have examined 29 examples from Honolulu (9 collected by Jenkins), where the species is common in the markets, 4 from Kailua, 5 from Hilo, and 10 from Cocoanut Island at Hilo. They are from less than an inch to 7.2 inches long. Specimens were obtained by the *Albatross* at Honolulu and Waialua Bay, Oahu; Hilo and Puako Bay, Hawaii; common at Samoa.

Pomacentrus lunula Lacépède, Hist. Nat. Poiss., IV, 507, 510, 513, 1802, no locality given.

Chaetodon lunulatus Quoy & Gaimard, Voy. Uranie, 381, 1824, Sandwich Islands.

Chaetodon tax-nigrum, Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 513 (Sandwich Islands); not of Cuvier & Valenciennes.

Chaetodon lunula, Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 59, pl. 173, 1831; Günther, Fische der Südsee, II, 42, taf. XXXIII, 1874 (Tahiti, Sandwich Islands, Society Islands); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 489 (Honolulu); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 473 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 531 (Honolulu); Waialua Bay, Oahu; Hilo; Puako Bay, Hawaii).

Chaetodon biocellatus Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 62, 1831, Oualan, young; Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 512 (Sandwich Islands).

Chaetodon ocellatus Bleeker Nat. Tyds. Ned. Ind., VI, 1854, 212, Isle of Timor.

Chaetodon wibelii Kaup, Nat. Tyds. Dierk., I, 1863, 126, Canton.

Sarothrodus lunula, Bleeker, Ned. Tyds. Dierk., I, 1863, 156.

Tetragonoptrus biocellatus, Bleeker, Ned. Tyds. Dierk., I, 1863, 269 (Isle of Timor).

Tetragonoptrus lunula, Bleeker, Poiss. Madagascar, 95, 1874, Mauritius.

Tetragonoptrus (Chaetodontops) fasciatus, Bleeker, Atlas, IX, 41, Taf. 374, fig. 2 (Sandwich Islands, etc.); not of Forskål.

295. *Chaetodon unimaculatus* Bloch. "Kikakápu." Plate L and Fig. 161.

Head 3.4 in length; depth 1.7; eye 3.35 in head; snout 3; maxillary 3.35; interorbital 3; D. XIII, 23; A. III, 20; scales 9-45-25.

Body deep, compressed, back elevated; head very short, upper profile obliquely concave; snout short, blunt, rounded; jaws equal, slightly produced; mouth small, gape short; teeth coarse, brush-like, in rather broad bands; eye small, midway in length of head; marginal portion of preopercle finely serrate; interorbital space broad, slightly convex; nostrils close together, anterior with fleshy flap, posterior rounded; anterior dorsal spines strong, enlarged, posterior spines slender, longest, and about equal, last 1.5; seventh dorsal ray 1.3; second and third anal spines about equal, third 1.7; sixth anal ray 1.4; pectoral 1.1, pointed; ventral pointed, 1.2, spine sharp 1.6; caudal peduncle compressed, its least depth 2.8; scales large on front of side above, otherwise small, very small on ventral fins, arranged in nearly horizontal series.

Color in life of a specimen (field No. 388) obtained by Jordan and Kellogg at Apia in 1902, light golden above, gray beneath, shoulders and front of sides with angled (>>>-shaped) vertical bars of deep yellow; ocular band very broad from front of dorsal, meeting its fellow across breast; snout and forehead gray; a large, round black spot on middle of side of back surrounded by gray; dorsal and

anal clear light yellow, each with a narrow subterminal black bar posteriorly, the edge whitish; caudal peduncle with a similar black bar at base, followed by a white or whitish bar; a pale yellowish bar at base of caudal rays; caudal fin whitish with dusky dots; ventral yellow.

Color in alcohol, pale brown; a blackish band from occiput down through eye across side of breast; posterior margin of soft dorsal and anal broadly blackish above, edge very narrowly grayish; back above with large blackish blotch fading above and below in grayish; a dark or blackish band on front of caudal peduncle; 7 or 8 oblique dusky streaks along margin of large scales on front of side above; snout grayish above.

The above general description is based chiefly upon a specimen from Honolulu, from which place we have 17 examples, the species being rather common about the reefs. The younger examples show the wedge-shaped form of the lateral spot which suggested the name *sphenospilus*, but these intergrade fully with the ordinary form both in Hawaii and Samoa.

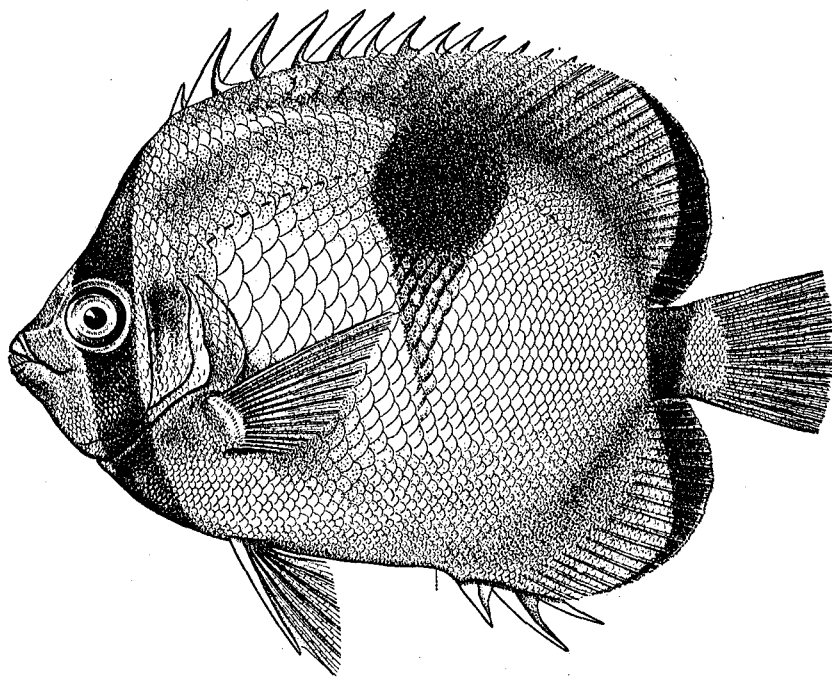


FIG. 161.—*Chætodon unimaculatus* Bloch. Type of *C. sphenospilus* Jenkins.

Chætodon unimaculatus Bloch, Ichth., VI, 54, pl. 201, fig. 1, 1788, East Indies; Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 512 (Sandwich Islands); Snyder, op. cit. (Jan. 19, 1904), 531 (Honolulu).

Tetragonopterus (Lepidochætodon) unimaculatus, Bleeker, Verh. Kon. Ak. Wet., XVII, 1877, 87 (Java; Solor; Timor; Ternate; Buro; Amboyna; Ceram; Banda).

Chætodon sphenospilus Jenkins, Bull. U. S. Fish Comm., XIX, 1899 (June 8, 1901), 395, fig. 8, Honolulu (Type, No. 49705, U. S. Nat. Mus.); op. cit., XXII, 1902 (Sept. 23, 1903), 473 (Honolulu, type and cotypes).

296. *Chætodon punctatofasciatus* Cuvier & Valenciennes. Fig. 162.

Head 3.5 in length; depth 1.5; eye 3.25 in head; snout 3; maxillary 5; interorbital 3.6; D. XIII, 25; A. III, 18; scales 7–50–18.

Body oblong, deep, compressed, back elevated; head deep, compressed, bluntly pointed; upper profile oblique undulate from snout to origin of dorsal; jaws small, bluntly produced, snout a little longer than eye, blunt, rounded above; mouth small; teeth thin, in rather narrow brush-like bands in jaws; eye small, high, anterior; nostrils close together, circular, anterior with elevated fleshy rim, posterior larger; interorbital space rather narrow, convex; dorsal spines enlarged at first, strong,

posterior slender; eighteenth dorsal ray 1.7 in head; second and third anal spines longest, of about equal length, 1.6; pectoral rather long, a little longer than head; ventrals equal to pectorals; depth of caudal peduncle about 3; scales moderately large on middle of side, small on head and caudal peduncle, becoming very small on vertical fins; lateral line arched, running down to below base of last dorsal ray.

Color in alcohol, very pale brown tinged with dull brassy olivaceous; a dark brown spot above occiput before spinous dorsal; below this a brown band running down through eye to edge of preopercle; side with 7 nearly vertical olivaceous bands, last 2 rather indistinct; each scale with a dusky spot, becoming smaller as the scales become smaller toward the soft dorsal and anal, those of these fins being small and crowded; outer portion of dorsal with 2 submarginal longitudinal lines, the outer very pale, the 2 close together; anal with a blackish brown submarginal longitudinal line; caudal

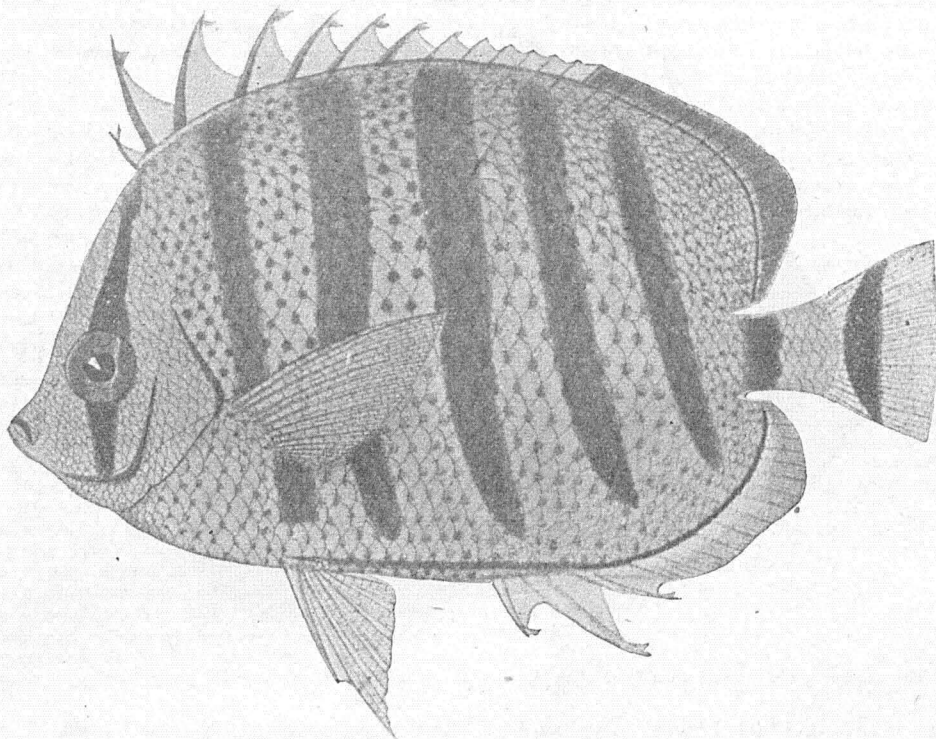


FIG. 162.—*Chatodon punctatofasciatus* Cuvier & Valenciennes; after Günther.

peduncle with a deep brown band; base of caudal dull orange-brown; a median black lunate cross bar on caudal; pectoral and ventrals pale.

Described from an example 3.9 inches long taken at Honolulu by the Fur Seal Commission. Another example 3.75 inches long was collected by Dr. Jenkins, and others, by the *Albatross* in 1902. The species was described by Garrett from the Hawaiian Islands.

Chatodon punctatofasciatus Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 28, 1831, no locality given, but probably Hawaiian Islands.

Chatodon punctatolineatus Gronow, Cat. Fish., ed. Gray, 70, 1854, no locality.

Tetragonopterus punctatofasciatus, Bleeker, Atlas, IX, 40, tab. 374, fig. 3; (Buro; Obi Major; Solor; Amboyna; Banda; Aneityum; Sandwich Islands).

Chatodon multinctus Garrett, Proc. Cal. Ac. Sci., III, 1863, 65, Sandwich Islands; Günther, Fische der Südsee, II, 44, taf. XXXIV, fig. B, 1874 (Sandwich Islands, after Garrett's drawing); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 472 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 53 (Honolulu).

297. *Chaetodon miliaris* Quoy & Gaimard. Plate XLVIII and Fig. 163.

Head 3.6 in length; depth 1.8; eye 3.4 in head; snout 2.8; maxillary 4.5; interorbital 3.8; D. XIII, 23; A. III, 20; scales 6-50-20.

Body deep, compressed, back elevated; head deep, upper profile very slightly convex above eye to origin of dorsal; mouth small, maxillary reaching below anterior nostril; interorbital space broad, convex; teeth in broad bands, brush-like; eye midway in head, rather high; margin of preopercle entire; nostrils close together, first round, rim elevated and with fleshy flap; posterior nostril elongate; anterior dorsal spines strong, enlarged, sixth 1.5 in head; eleventh dorsal ray 1.6; third anal spine 1.6; third anal ray 1.2, elongate; caudal broad, margin obliquely straight, upper rays longer; pectoral 1.2; ventral 1.2, pointed; ventral spine 1.6; depth of caudal peduncle 3; scales rather large on middle of side, those on vertical fins, head and breast, small; lateral line running to below base of posterior dorsal rays.

Color in life (No. 03035), pale cadmium-yellow, richest posteriorly, and on soft dorsal and anal about a dozen series of small round pale blue spots extending upward and a little backward across

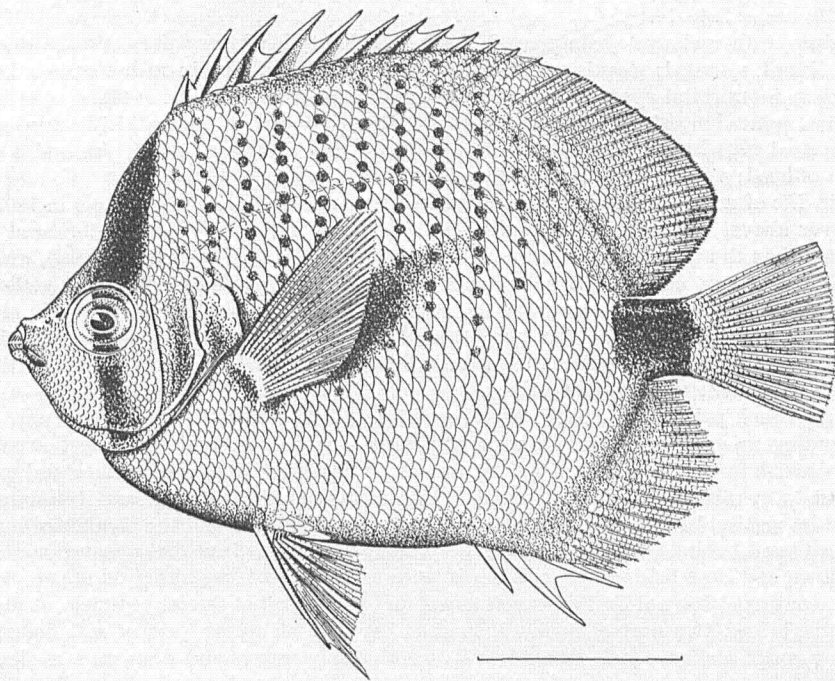


FIG. 163.—*Chaetodon miliaris* Quoy & Gaimard. Type of *C. mantelliger* Jenkins.

upper two-thirds of body; between these a series of smaller yellow spots a little darker than body color; a broad black bar from edge of subopercle under eye vertically through eye, thence broadening upward and backward to near origin of dorsal, where it meets its fellow, a pale bluish border behind; interocular area yellow; rest of head bluish gray; a jet-black ring covering entire caudal peduncle; 3 or 4 irregular bluish-white blotches on posterior part of side; sheathing membrane of dorsal and anal cadmium-yellow, the spines white; soft dorsal and anal yellow, then white, narrowly edged with black; caudal pale yellow, outer part white; pectoral pale; ventrals pale yellow, outer parts white; iris dull silvery, crossed by a vertical black line.

Color in alcohol, pale brown or whitish; a deep brown broad band from before spinous dorsal to eye, margined posteriorly with whitish, continued below eye down on interopercle, but much narrower; caudal peduncle blackish brown, last rays of dorsal broadly blackish-brown; margin of soft dorsal and anal narrowly brownish; side with 10 nearly vertical series of large deep brown round spots a little

smaller than pupil of eye and with many smaller spots of more or less equal size distributed in oblique rows above, becoming straight on side below; fins all pale.

Described chiefly from example No. 04556, from Honolulu.

Our collection contains 37 excellent specimens from Honolulu, where it is common about the coral reefs, and 4 from Hilo, ranging in length from 1.5 to 6.25 inches. Of those from Honolulu 1 was collected by Jordan and Snyder in 1900 and 8 by Doctor Jenkins.

Chaetodon miliaris Quoy & Gaimard, Voyage de l'Uranie, Zool., 380, pl. 62, fig. 6, 1824, Sandwich Islands; Eydoux & Souleyet, Voy. Bonite, I, 163, pl. 2, fig. 2, 1841 (Sandwich Islands); Günther, Fische der Südsee, 46, 1871 (Sandwich Islands); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 489 (Honolulu; Laysan); Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 512 (Sandwich Islands; not of Bleeker); Jenkins, Bull. U. S. Fish. Comm., XXII, 1902 (Sept. 23, 1903), 472 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 531 (Honolulu; Hanalei Bay, Kauai; Laysan Island).

Chaetodon mantelliger Jenkins, Bull. U. S. Fish Comm. 1899 (June 8, 1901), 394, fig. 7, Honolulu (Type, No. 49699, U. S. Nat. Mus.)

298. *Chaetodon trifasciatus* Mungo Park. Plate LII.

Head 3.75 in length; depth 1.75; eye 3.5 in head; snout 3.25; maxillary 4; interorbital 3; D. XIII, 22; A. III, 20; scales 7-40-14.

Body deep, rather elongate, compressed; back trenchant; head very deep, profile steep above; snout short, blunt, rounded; mouth small, horizontal; teeth brush-like, in rather narrow bands; eye high, anterior; interorbital space broad, convex; nostrils close together in front of eye; sixth and seventh dorsal spines longest, former 1.6 in head; fourteenth dorsal ray longest, 1.75; third anal spine longest, 1.6; anal rays long, thirteenth ray 1.7; caudal small, margin rounded; pectoral a trifle less than length of head; ventral 1.2; caudal peduncle compressed, its least depth 2.8.

Color in life of a specimen (field No. 260), taken by Jordan and Kellogg at Apia in 1902, creamy orange, grayer above, with many streaks of violet-blue; head and jaws blackish, forehead brown, a golden streak, then the ocular band, then a whitish streak, yellow below, then brownish, whitish, and purplish black; spinous dorsal light yellow, with a purplish line below; soft dorsal yellow, black, yellow, violet, gray, purplish, violet-gray, the outside creamy brown; caudal peduncle slaty, then whitish, golden, black, golden, and transparent; anal with a golden stripe at base, then black, becoming rich brown on spines, then golden, then dark brown, then golden; breast golden, with a black blotch; ventrals golden; pectoral pale yellow.

Color in alcohol, pale brown above, lower surface whitish; side with longitudinal narrow brown bands extending up on spinous dorsal, where they are very narrow and close together; snout and lower jaw blackish brown, fading to a lighter brown on interorbital space; a blackish-brown band from occiput to eye, bordered narrowly with white continued through eye and below to front of throat; a white vertical band from below nostrils separating brown of snout and band below eye; broad white vertical band behind dark band below eye; a narrow dark line from below anterior dorsal spine obliquely down and close behind eye; soft dorsal with a black band beginning on upper part of first dorsal rays, continued down along base of soft dorsal and upper part of caudal peduncle, at first narrow then widening below; two narrow dusky lines close together on upper part of soft dorsal running down farther apart and at equal distance; soft dorsal, anal, and caudal grayish, a median vertical blackish band on caudal; anal with a long blackish longitudinal band edged with pale yellow broadening posteriorly, running along basal portion at first, then extending out on median part of soft anal posteriorly; margin of anal narrowly light gray below, above this a broad area of dark gray, edges above and below deeper; pectoral and ventrals pale or whitish. Described chiefly from example No. 04549, taken at Honolulu.

The collection contains but 5 specimens, 4.75 to 6 inches long, all from Honolulu. Of these, 1 was obtained by the *Albatross* in 1896, and 2 were collected by Doctor Jenkins. The species is widely distributed throughout Polynesia, but is rare about the coral reefs at Honolulu.

Chaetodon trifasciatus Mungo Park, Trans. Linn. Soc., III, 1797, 34, Shores of Sumatra; Lacépède, Hist. Nat. Poiss., IV, 462, 494, and 498, 1802; Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 474 (Honolulu).

Chaetodon vittatus Bloch & Schneider, Syst. Ichth., 227, 1801, Sumatra; Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 34, 1831; Bleeker, Verh. Batav. Genootsch., XXIII, 1850, Chatod., 18 (Amboyna); Bleeker, Enum. Spec. Arch. India, 49, 1859 (East Indian Archipelago); Günther, Cat., II, 23, 1860 (Ceram; Amboyna); Günther, Fische der Südsee, II, 41, 1874.

Chaetodon tau-nigrum Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 38, 1831, Guam.

299. *Chaetodon ornatissimus* Solander. "Kikakāpu." Plate LIII.

Head 3.3 in length; depth 1.4; eye 4 in head; snout 3; maxillary 3.5; interorbital 3.1; D. xxii, 28; A. iii, 23; scales 12-58-25.

Body very deep, compressed; head deep, upper profile from snout to origin of dorsal almost straight; snout very short, bluntly rounded; mouth small; terminal jaws a little produced; lips rather thin, broad; teeth in broad brush-like bands; eye high, a little anterior; preopercle very finely serrate; interorbital space broad, convex; nostrils close together, anterior with rim elevated, with fleshy flap, posterior circular; dorsal spines graduated to last, which is 1.6 in head; seventeenth dorsal ray 1.2; fourteenth anal ray 1.3, longest; caudal with slightly rounded margin, 1.2; pectoral short, 1.1; ventrals inserted a little before pectoral, 1.2; ventral spine 1.35 in length of fin; depth of caudal peduncle 2.4; scales ctenoid, in nearly horizontal series becoming very small on vertical fins; lateral line strongly arched, not continuous beyond base of last dorsal rays.

Described from example No. 04560, from Honolulu.

Color in life of a specimen (field No. 383), obtained by Jordan and Kellogg at Apia in 1902, gray; head and belly golden; 6 black stripes across head, the interspaces yellow; 3 orange bars before pectoral; 6 rich orange-brown oblique stripes upward and backward; a seventh stripe on anal dark brown, this edged with a narrow black streak, then clear yellow; dorsal black, with a yellow and 2 black stripes; caudal with 2 black stripes and a dull yellowish one, its base gray; ventral golden; pectoral dull orange; breast anteriorly black.

Color of a nearly fresh example white; head and belly light yellow; side with 7 oblique bands of orange-brown; 6 bands and blotches on head black; dorsal white with 2 black stripes and a yellowish one; anal with 2 black stripes and a yellow one; caudal white with 2 black stripes; pectorals yellowish; ventrals golden.

Color in alcohol, pale brown ground-color tinged with yellow; side with 6 rather broad oblique creamy brown bands with gray edges; head with blackish vertical bands, 2 of which are broad, 1 running from snout down on side of lower jaw, the other from above occiput down to eye, continued below and down to breast; lower lip broadly blackish; 2 narrow blackish vertical lines behind eye, first continued from behind eye up along margin of dorsal to last dorsal rays; a broad band of gray-brown between eyes; spaces between black bands and lines on head yellowish; margins of soft dorsal and anal narrowly blackish; anal with a broad black marginal band parallel with margin of fin; caudal with margin white, a blackish terminal band; a black median cross band; pectoral and ventrals pale, former with white bar across base.

The collection contains 6 specimens obtained by ourselves, 2 by the Fur Seal Commission and 2 by Doctor Jenkins, all from Honolulu, where the species is frequently taken among the coral reefs. The length varies from 4.5 to 7.25 inches. Other specimens were obtained at Honolulu by the *Albatross*.

Chaetodon ornatissimus Solander in Cuvier & Valenciennes, *Hist. Nat. Poiss.*, VII, 22, 1831, Tahiti; Günther, *Cat.*, II, 15, 1860 (Sandwich Islands; Amboyna); Günther, *Fische der Südsee*, II, 38, taf. XXX, fig. B, 1874 (Sandwich Islands); Fowler, *Proc. Ac. Nat. Sci. Phila.*, 1900, 513 (Sandwich Islands); Jenkins, *Bull. U. S. Fish Comm.*, XXII, 1902 (Sept. 23, 1903), 472 (Honolulu); Snyder, *op. cit.* (Jan. 19, 1904), 581 (Honolulu).

Chaetodon ornatus Gray, *Zool. Miscell.*, 33, 1831, Sandwich Islands.

Citharædus ornatissimus, Kaup, *Arch. Naturgesch.*, XXVI, 1860, 141.

Tetragonopterus ornatissimus, Bleeker, *Ned. Tyds. Dierk.* II, 282, 1865.

Tetragonopterus (Citharædus) ornatissimus, Bleeker, *Verh. Kon. Ak. Wet.* XVII, 1877, 57 (Amboyna; New Guinea).

300. *Chaetodon quadrimaculatus* Gray. Plate XLIX.

Head 3.5 in length; depth 1.6; eye 3.5 in head; snout 2.9; maxillary 4.4; interorbital 3.4; D. xiv, 24; A. iii, 18; scales 8-42-20.

Body deep, compressed, back elevated; head very deep, upper profile oblique; snout long, oblique; jaws produced, blunt, equal; mouth small, nearly horizontal; teeth brush-like, in broad bands in jaws; eye small, anterior; marginal portion of preopercle crenulate below; interorbital space broad, convex; nostrils small, close together, circular, anterior with small fleshy flap; anterior dorsal spines strong, somewhat enlarged, fourth longest, 1.5 in head; second anal spine longest, 1.4; thirteenth anal ray longest, 1.5; caudal broad, slightly rounded; pectoral pointed, a little longer than head; ventrals

sharply pointed, 1.1; spine 1.6; scales large on side, small on head, caudal peduncle, and chest, and becoming very small on vertical fins; scales in oblique series at first above lateral line, in horizontal series below, lateral line running to caudal peduncle above at base of last dorsal rays. Described from example No. 04544, taken at Honolulu.

Color in life (field No. 03406): Ground-color of lower half of body, head, spinous dorsal and pectoral, citron-yellow; of caudal, anal, and ventrals chrome-yellow; interorbital orange; a chrome-yellow ocular bar deepening into orange above, edged on each side by a narrow black line, outside of which is a narrow light blue line extending from lower margin of interopercle to origin of dorsal; upper half of body, scaly sheath of dorsal, and caudal peduncle sooty gray, excepting 2 elongate white spots on lateral line, one below center of spinous dorsal, the other below origin of soft dorsal, the latter spot connected with the general yellow below by a short, broad yellow stripe; a narrow light blue band edged outwardly with a narrow black line along edge of dorsal and anal sheath; upper edge of soft dorsal and lower edge of soft anal black; caudal edged with light blue; base of each scale on anterior of side with a round reddish brown spot.

Color in alcohol, upper surface deep blackish-brown; a brown band from occiput to eye edged with darker, which is continued below eye on interopercle as 2 dark brown lines; white band from first 2 dorsal spines separating dark band above eye and blackish-brown of back; a large white blotch on middle of side above and another below base of soft dorsal on back; a dusky band across caudal peduncle; basal portion of dorsal fin blackish-brown; margin of soft dorsal above with a narrow black line, another submarginal black line beginning on last half of spinous dorsal and running to posterior rays; below this and closer to it than it is to edge of fin, a gray line; caudal with a submarginal gray line; anal with a black line along edge of lower rays; edge of soft anal below narrowly blackish; a narrow black line from origin of spinous anal running out submarginally to posterior rays; above this a narrow gray line; middle of side, just below dark color of back, yellowish; each scale on side below with a dusky spot in middle; lower surface of body, head (except dark band), margin of dorsal, anal, caudal, pectoral and ventral, whitish.

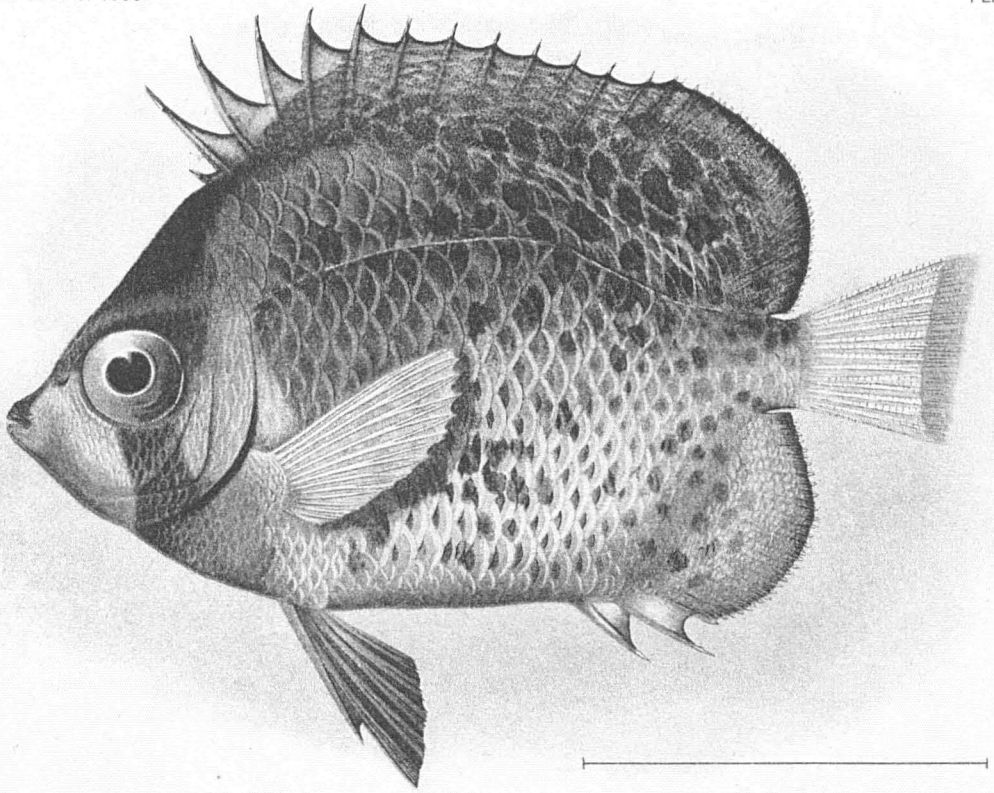
We have examined 19 examples obtained by Doctor Jenkins and 10 collected by us, all from Honolulu; length 3 to 5.5 inches. The *Albatross* also obtained examples at Honolulu, where the species is moderately common about the coral reefs.

Chaetodon quadrimaculatus Gray, Zool. Miscell., 33, 1831-42, Sandwich Islands; Günther Cat., II, 13, 1860 (Gray's Type); Günther, Fische der Südsee, II, 38, taf. XXX, fig. A, 1874 (Sandwich Islands; Upolu); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 489 (Honolulu; Laysan); Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 512 (Sandwich Islands); Jenkins, Bull. U. S. Fish. Comm., XXII, 1902 (Sept. 23, 1903), 474 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 531 (Honolulu).

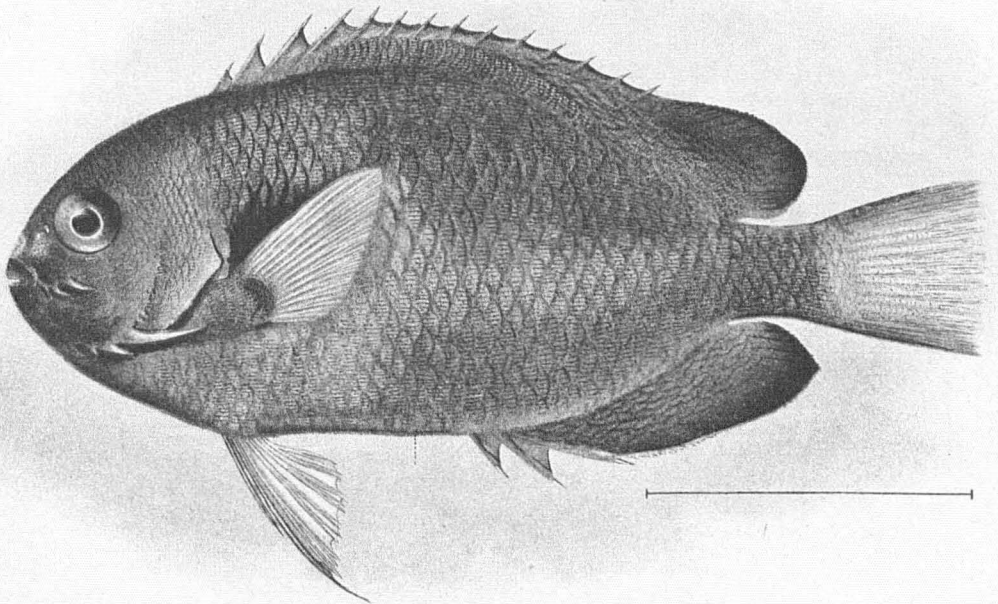
301. *Chaetodon corallicola* Snyder. Plate 46, fig. 1.

Head, measured to edge of opercle 3 in length to base of caudal fin; depth 1.7; depth of caudal peduncle 3 in head; eye 2.4; snout 2.3; interorbital space 3. D. XIII, 21; A. III, 18; scales 4-30-12. Anterior profile between snout and dorsal almost straight, with a slight convexity over eye; snout short, its length somewhat less than diameter of eye; jaws equal; teeth fine and brush-like; pseudo-branchiæ very large; gillrakers on first arch 5+14, short and pointed; scales on top of head and on snout very minute, those on cheeks, opercles, and breast larger; width of scales near middle of body about equal to diameter of pupil, those on caudal peduncle greatly reduced in size; rayed portions of dorsal and anal closely scaled, the scaled area extending forward on spinous portion of dorsal fin, decreasing in height from near tip of eighth spine to base of first, leaving the membranes of the anterior spines largely naked; lateral line curved upward and constantly approaching the back until it disappears near end of dorsal fin, not extending on caudal peduncle, with 36 pores, scales very small. Except the first the dorsal spines are high anteriorly; height of second to sixth equal to distance between tip of snout and center of eye; height of first spine about equal to diameter of pupil; length of longest rays about equal to that of longest spines; membrane deeply notched between anterior spines, the notches growing shallow posteriorly as the scales approach edge of fin; second anal spine

^a *Chaetodon humeralis* Günther, Cat., II, 19, 1860, and Günther, Fische der Südsee, II, 40, 1874 (west coast of Central America; Sandwich Islands), is a species common on the west coast of Mexico, which has been, by error, recorded, with 2 other species of the same region, as from the Sandwich Islands.



1. CHÆTODON CORALLICOLA SNYDER.



2. HOLACANTHUS FISHERI SNYDER.

longest, about equal to highest dorsal spine; membrane deeply notched between first and third spines, the latter closely connected with rayed portion of fin; border of anal fin extending a little farther posteriorly than that of dorsal; caudal truncate, upper rays slightly longer than lower, 1.27 in head; pectoral 1.17 in head; ventrals not quite reaching vent.

Color in alcohol, dull silvery, brownish along the back, the dark color extending downward in region of pectoral fin; scales on greater part of body with darker centers and lighter edges; posterior part of body with many dark spots about half as large as pupil; head with a vertical brownish-black band, the posterior border of which passes from insertion of dorsal through posterior border of eye, thence curving backward to origin of ventrals; width of band somewhat less than diameter of eye; interorbital area, snout, and upper lip dark brown; dorsal and anal narrowly bordered with dusky, rays tipped with white; scaled portion of dorsal with large irregular dusky spots separated by narrow light spaces, which take the form of a network; caudal light, broadly bordered with dusky; pectoral plain; ventrals blackish toward the free margins.

Described from the type, No. 50880, U. S. Nat. Mus., 2.3 inches long, from station 4032. Other specimens, among which are cotypes, No. 7732, Stanford Univ. Mus., differ little from the type. Specimens were taken off the southern coast of Oahu at station 4032, depth 27 to 29 fathoms; station 4031, depth 27 to 28 fathoms; station 4034, depth 28 fathoms.

Chaetodon corallicola Snyder, Bull. U. S. Fish Comm., XXII, 1902 (Jan. 19, 1904), 531, pl. 11, fig. 20, Albatross Station 4032, off southern coast of Oahu.

302. *Chaetodon fremblii* Bennett. Plate LI.

Head 3.4 in length; depth 1.8; eye 3.5 in head; snout 3; maxillary 4.4; interorbital 3.5; D. xiv, 21; A. iii, 18; scales 10-50-27.

Body deep, compressed, back elevated; head deep, upper profile oblique; snout long, blunt, rounded; mouth small, jaws produced, equal; teeth small, in brush-like bands in jaws; eye small, superior, midway in length of head; margin of preopercle very finely serrate; interorbital space broad, convex; nostrils circular, close together, anterior elevated rim with fleshy flap; anterior dorsal spines enlarged, strong, sixth 1.6 in head, longer than posterior spines; eighth dorsal ray 1.6; eighth anal ray 1.6; caudal with upper rays longest, margin obliquely straight; pectoral 1.1; ventral pointed, nearly reaching anal, 1.2; scales small, very small on vertical fins and head; scales forming slightly oblique series.

Color in life, pale yellow, lighter below, edges of scales darker; no ocular bar; a black saddle, narrowly edged with blue, in front of dorsal; a large black spot edged with blue extending over the posterior half of soft dorsal, the caudal peduncle and the last 2 rays of soft anal; side with 8 longitudinal (slightly oblique) narrow blue lines edged with black, 3 of which converge to the eye and 1 passes to the angle of the mouth; above these an interrupted blue line on the dorsal, and below them a continuous blue line on the anal; pectoral translucent white, ventrals yellow; dorsal and anal yellow; soft dorsal narrowly edged with a submarginal line of black below and above white; lower edge of soft anal edged with black; caudal white, in its center a broad bar of yellow with its hind edge crescentic, narrowly edged above, below, and behind with black.

Color in alcohol, very pale brown, light on lower surface; posterior half of soft dorsal, caudal peduncle and outer portion of posterior rays blackish; soft dorsal and anal with blackish submarginal lines; spinous dorsal with median dusky line; side with pale slaty slightly oblique longitudinal stripes (clear blue in life) margined narrowly with dusky; caudal with pale submarginal gray line, with basal gray cross band; pectoral and ventrals gray.

Described from an example (No. 04531) 5.8 inches long, taken at Honolulu, where the species is not rare. Doctor Jenkins collected 8 specimens at Honolulu and we have 5 from the same place, as well as 1 from Hilo. Length 3.25 to 6.25 inches. The *Albatross* also secured specimens at Honolulu.

Chaetodon fremblii Bennett, Zool. Journ., iv, 1829, 42, Sandwich Islands; Günther, Cat., II, 16, 1860 (Sandwich Islands; includes type); Günther, *Fische der Südsee*, II, 39, taf. XXIX, fig. B, 1874 (Sandwich Islands); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 488 (Laysan); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 473 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 531 (Honolulu).

Chaetodon fremblii, Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 24, 1831; after Bennett.

Genus 175. **MICROCANTHUS** Swainson.

This genus differs from *Chaetodon* chiefly in the small scales, their being about 60 in the lateral line; the soft dorsal and anal are shorter than is usual in *Chaetodon*, the fin formula of the typical species being D. xi, 17; A. iii, 14; it is in fact doubtful whether the genus contains a second species, as the other species with small scales have the soft fins many-rayed and constitute Bleeker's genus *Hemitaenichthys* (type, *polylepis*), which is apparently valid; in any case it has no close relation to *Microcanthus strigatus*.

Microcanthus Swainson, Class. Anim., II, 215, 1839 (*strigatus*).

303. Microcanthus strigatus (Cuvier & Valenciennes).

Head 3 in length; depth 1.75; eye 2.8 in head; snout 3.5; maxillary 4; interorbital 3.25; D. i, xi, 16; A. iii, 14; scales 10-50?-27.

Body deep, rather short, compressed, back elevated; head rather small, compressed, pointed, upper profile straight from tip of snout to eye, then slightly convex to dorsal fin; teeth sharp, pointed, pungent, in rather broad bands in jaws; jaws rather small, blunt, slightly produced; snout short, pointed; mouth small, terminal, small maxillary expanded distally to below anterior nostril; lips rather fleshy; eye large, anterior to middle of length of head, superior; nostrils close together, anterior with a small flap, posterior a short slit; interorbital space broad, flattened and slightly convex; pre-orbital broad, 2 in eye; dorsal spines longest anteriorly, fourth 1.75 in head, last 2.3; anterior dorsal rays longest, 1.9; second anal spine largest, enlarged, 1.8; anterior anal rays longest, second 2; caudal rather small, emarginate, about equal to head; caudal peduncle compressed, its depth 2.3; pectoral small, 3.8 in body; ventral 1.25 in head; ventral spine 2.25; scales rather weakly ctenoid, small; soft dorsal and anal covered with very small scales, caudal with small scales only at base; pectoral and ventrals with small scales basally; lateral line evenly arched to caudal peduncle, then straight to base of caudal.

Color in alcohol, ground-color creamy white, side with 6 dark olive-brown nearly horizontal broad bands; first along middle of spinous dorsal across anterior rays, second along base of spinous dorsal across middle of soft dorsal, third below this along back and over posterior rays, fourth from occiput to middle of base of caudal, fifth from above eye across last third of anal, and sixth from snout, behind eye to base of pectoral then down to anal spine, running up along anterior soft rays; pectoral and caudal pale brown; ventrals pale brown basally, outer portions grayish.

Described from an example taken by Jordan and Snyder at Honolulu, where the species is scarce. We have 4 specimens from Honolulu, 1 collected by Jordan and Snyder and 3 by Jenkins. Length 3.3 to 4.3 inches. Other specimens were obtained by the *Albatross* at Honolulu. Compared with examples from Nagasaki we find no difference.

Chaetodon strigatus Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 25, pl. 170, 1831, Japan; Günther, Fische der Südsee, II, 47, 1874 (Sandwich Islands).

Microcanthus strigatus, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 474 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 532 (Honolulu).

Genus 176. **HENIOCHUS** Cuvier & Valenciennes.

Body much compressed and elevated; forehead in adult often with bony projections; dorsal spines 11 to 13, the fourth greatly elevated and filiform; muzzle rather short; no teeth on palate; no spine on preopercle; scales moderate.

Allied to *Chaetodon*, but well distinguished by the prolongation of the fourth dorsal spine.

Heniochus Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 92, 1831 (*macrolepidotus*).

Taurichthys Cuvier & Valenciennes, l. c., 146 (*varius*).

Diphreutes Cantor, Malayan Fishes, 159, 1850 (*macrolepidotus*); substitute for *Heniochus*, on account of *Henioche*, a prior genus of *Lepidoptera*.

304. Heniochus acuminatus (Linnæus). Plate LV.

Head 3 in length; depth 1.5; eye 3 in head; snout 3.2; maxillary 5; interorbital 3.75; D. xii, 24; A. iii, 18; scales 7-50-22.

Body very deep, compressed, back very trenchant; head small, deep, upper profile undulate; snout pointed, rounded above; jaws produced, pointed, equal; mouth small, very oblique, maxillary small;

teeth rather firm, forming a narrow brush-like series in each jaw; eye large, round, anterior; inter-orbital broad, convex; nostrils large, close together in front of eye, anterior circular; dorsal spines strong, sharp pointed, fourth very long, produced in a slender filament, longer than entire length of fish; fifth dorsal spine longer than others; middle dorsal rays longest; second anal spine very large, equal to third, which is rather slender, 1.7 in head; fourth anal ray longest, 1.35; caudal small, probably truncate; pectoral pointed, upper rays longest, equal to head; ventral pointed, spine large, strong, long, length of fin equal to head; caudal peduncle small, compressed, its least depth nearly 3 in head; scales long, ctenoid, those on head above and basal portions of vertical fins very small; rows of scales curved up above lateral line in front, those on middle of side nearly horizontal; lateral line strongly arched, then running down on middle of side of caudal peduncle to caudal. Described from an example (No. 03531) taken at Honolulu.

Color in alcohol (No. 03531) 6.5 inches long, ground-color white, head and snout above brownish; a broad blackish-brown vertical band from before and including first 4 dorsal spines, down over side, including also posterior margin of opercle, base of pectoral, belly, and ventrals, then extending on each side of vent out along spinous anal to second anal ray; another broad blackish-brown band beginning at tip of fifth, including next 3 spines, extending down on side obliquely backward till it includes last half of soft anal.

We have examined 4 examples, all from Honolulu, 1 of them collected by Doctor Jenkins. These are 4.5 to 7.25 inches long. Also obtained by the *Albatross* at Honolulu, where the species is rather rare.

Chatodon acuminatus Linnaeus, Syst. Nat., Ed. X, 272, 1758, Indies; after *Chatodon fascia-fusca* Linnaeus, Mus. Ad. Fr.
Chatodon macrolepidotus Linnaeus, Syst. Nat., ed. 10, 274, 1758 (after Artedi); Bloch, Ichth., VI, 60, Pl. CC, fig. 1, 178, (India).

Chatodon bifusciatus Shaw, Genl. Zool., IV, 342, 1803, Indian Seas.

Heniochus macrolepidotus, Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 93, 1831; Schlegel, Fauna Japonica, Poiss., 82, pl. XLIV, fig. 1, 1844 (Nagasaki); Richardson, Ichth. China, 246, 1846 (East Indian Archipelago); Günther, Cat., II, 39, 1860 (Ceylon, Amboyna, Port Essington); Günther, Fische der Südsee, 48, taf. xxxvii, 1874; Day, Fish. India, 110; pl. 28, fig. 3, 1875; Steindachner & Döderlein, Fische Japans, II, in Denks. Ak. Wiss. Wien, XLVIII, 1884 (Kochi); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 475 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 532 (Honolulu).

Heniochus acuminatus, Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 98, 1831.

Chatodon mycteryzans Gronow, Cat. Fish., Ed. Gray, 76, 1854.

Taurichthys macrolepidotus, Bleeker, Atlas, IX, Chet., 29, pl. v, fig. 1, 1877-78 (Sumatra, Pinang, Celebes, Singapore, Java, Sumbawa, Luzon, New Guinea, etc.).

Genus 177. **HOLACANTHUS** Lacépède.

Body oblong or elevated, rather robust; scales rather small, roughish, often mixed with smaller ones; vertical limb of preopercle with serræ, large or small; a strong spine at angle of preopercle, this usually grooved; dorsal fin with 12 to 15 strong spines, which are usually graduated, increasing in height to the last; soft dorsal moderate, with 17 to 20 rays, usually not ending in streamers; coloration usually brilliant and well defined. Species numerous in all tropical seas, abounding about the coral reefs.

Holacanthus Lacépède, Hist. Nat. Poiss., IV, 525, 1803 (*tricolor*; scales large; caudal forked).

Genticanthus Swainson, Class. Fishes, II, 212, 1839 (*tamarcki*; scales large; caudal forked).

Centropyge Kaup, Wiegmann's Archiv, XXVI, 1860, 138 (*libicen*; erroneously said to have 4 anal spines).

Chatodontoplus Bleeker, Archiv Neerl. Sci. Nat., XII, 1877, 19, 20, 26 (*mesoleucus*; isthmus broad).

Acanthocheilichthys Bleeker, op. cit., 19 (*lepidolepis*; isthmus narrow; body elevated).

Angelichthys Jordan & Evermann, Check List Fishes, 420, 1896 (*ciliaris*).

- a. Soft dorsal and anal rounded or with very wide angle, tips of middle rays not reaching much, if any, beyond base of caudal; preopercular spine not nearly reaching posterior base of pectoral.
- b. Suborbital without conspicuous spines; scales comparatively small, about 48 to 50 longitudinally.
- c. A broad dark band running from eye to posterior edge of soft dorsal; no crossbars on body *arcuatus*, p. 378
- cc. No broad band as above; curved dusky crossbars on body, in pairs, separated by coppery or light-colored interspaces *bispinosus*, p. 378
- bb. Suborbital with 3 prominent spines; scales large, about 28 longitudinally *fisheri*, p. 379
- aa. Soft dorsal and anal with middle rays produced, those of dorsal somewhat filamentous, nearly or quite reaching tip of caudal; anal forming a sharp angle; preopercular spine nearly or quite reaching posterior base of pectoral; body black and yellow, the colors massed; scales 45 *bicolor*, p. 380

305. *Holacanthus arcuatus* Gray. Fig. 164.

D. XIII, 18; A. III, 18; scales 8-48-26; preopercular spine reaching posterior margin of opercle; dorsal and anal fins nearly equal in height; a broad, dark-brown band, slightly arched, extending from eye to posterior border of dorsal fin; tips of the caudal and a broad border of the anal fin brown; the brown marking with a bright border, known from the original type only, which came from the Hawaiian Islands; not seen by us.

Holacanthus arcuatus Gray, Zool. Miscell., 33, 1831 Sandwich Islands; Griffith, Animal Kingdom, Fish., 325, pl. 18, Günther, Cat., II, 43, 1860 (Gray's type); Günther, Fische der Südsee, II, 50, taf. xxxii, fig. C, 1874 (Sandwich Islands; Gray's type).

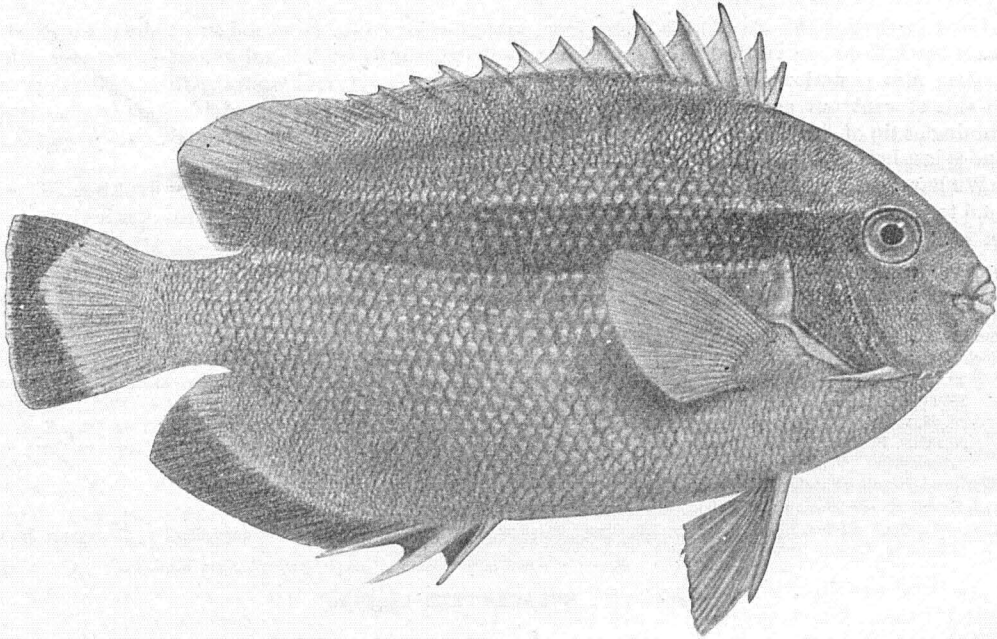


FIG. 164.—*Holacanthus arcuatus* Gray; after Günther.

306. *Holacanthus bispinosus* Günther. Plate LVI.

Total length 8.5 inches; head 3.83 in length; depth 2; eye 4.5 in head; snout 2.5; interorbital 3.6; scales about 5-50-18 or 20, the longitudinal scales counted just below lateral line; D. XIII, 19; A. III, 19.

Body elliptical, compressed, moderately arched from nape to base of first rays of soft dorsal, then more abruptly descending to the straight caudal peduncle; ventral outline more evenly but somewhat more deeply arched; caudal peduncle short, about 3 in head, its depth about 2 in head; scales above lateral line variable in size and shape, smaller and more rounded than those on the sides below, which are mostly much deeper than long; dorsal spines graduated, the last one the longest, about 1.7 in head, soft dorsal and anal with rounded angles, the middle rays of dorsal extending to middle of upper caudal ray, and of anal to end of first third of lower caudal ray; pectoral shorter than head; ventral longer than pectoral about equaling head, its upper rays filamentous, reaching beyond vent nearly to first anal spine, the spine about 1.6 in head; fins all densely scaled with small scales. Head short and deep, deeper than long, closely scaled; profile steep at its junction with preorbital, concave from the protrusion of the muzzle; snout short and bluntly rounded from outward projection of teeth; nostrils small, close together in front of eye, the anterior with a small tube prolonged into a small triangular flap behind; posterior nostril with a slightly raised ridge in front; opercle unarmed; sub-orbital with few nearly concealed sharp teeth, or none; interopercle without teeth, preopercle along its nearly vertical posterior margin with a series of wide-set small sharp teeth, the lowest the longest;

and at its angle a long, stout, somewhat curved spine, reaching nearly to under base of pectoral, at base or in front of which are 1 or 2 short spines or cusps.

Body ground-color in alcohol, yellowish white, crossed by 8 pairs of narrow brown bars, separated by a distance about equal to the interspace between the pairs of bars, the widest bar about 2 in eye, extending on spinous dorsal and anal, the anterior pair beginning immediately in front of spinous dorsal, running downward and forward about halfway to the lateral line, then abruptly bending and running straight to upper end of gill-opening, the anterior brown bar there terminating, or continuing as a bluish brown margin to opercle, the posterior of the pair passing under the membranous prolongation of the opercle to top of base of pectoral, beginning again at lower base of pectoral or axil, and running downward and backward to side of belly, ending before reaching tip of ventral spine, the interspace being bluish white rather than yellowish like the others; the next 5 pairs, beginning as a single bar upon the spinous dorsal, running thereon very obliquely downward and forward, separating and bending abruptly at the base of the fin; second pair extending downward and forward to lateral line, thence nearly vertically to upper pectoral ray, from there curving backward to front of first anal spine; the third pair in a similar manner ending at front of soft anal, the bars coalescing just before reaching the fin; the fourth pair with less forward curve on body, the others almost straight with somewhat backward and downward direction, ending at base of soft anal, the interspace of the seventh beginning on front of soft dorsal as a pale blue bar running downward and backward, the brown bars on anal coalescing and curving forward almost parallel with the body outline; the eighth pair crossing caudal peduncle coalescing above and below; the ninth hardly distinguishable as a pair crossing caudal peduncle at base of caudal fin; soft dorsal black with many small pale blue spots; soft anal with 5 dirty bluish and 6 yellowish olive longitudinal alternating bars, curving and following in a general way the outline of the fins, the fin with a very narrow blackish border; caudal abruptly pale yellow; pectoral and ventral pale, outer ray of latter slightly dusky; breast and belly plain pale yellowish brown; head in front and above eyes black, dark brown on sides, becoming lighter beneath; beginning immediately in front of spinous dorsal a narrow pale blue bar running directly forward along ridge of back, bordered by narrow dusky margins, on one side just before reaching occiput bending somewhat abruptly downward to upper posterior margin of eye, thence becoming brighter with still narrower borders passing around edge of orbit to about the lower middle, then extending a short distance on suborbital; on the other side of head a similar bar beginning with 2 short branches on occiput following the other eye in the same manner; these bars connected by a narrow light blue bar following upper edge of orbit to about its middle, thence arching over frontal region; a single light blue bar between eyes in front extending straight to upper lip on top of snout; margin of preopercle light blue.

Another specimen 8 inches long differs in having a longer preopercular spine and shorter ventral fins, the tips reaching only to vent, and also slightly in the markings; margin of anal bright blue instead of black, and the olive bars on that fin darker; postorbital bars not connected, there being 2 wavy pale blue lines, one beginning on nape and running to upper front of eye, the other beginning on occiput and running to upper front of other eye; besides the median interocular and nasal bar there are several small light blue spots, one above each nostril, and one just above upper end of blue line.

Hawaiian Islands (Günther); not seen by us; the above description and plate from Samoan specimens.

Holacanthus diacanthus, Bleeker, Act. Soc. Sci. Ind. Neerl., II, 1857, 57, (Amboyna); not of Günther.

Holacanthus bispinosus Günther, Cat., II, 48, 1860, Amboyna (after Bleeker); Günther, Fische der Südsee, II, 51, taf. I.VI, fig. C, 1874 (Sandwich Islands).

307. *Holacanthus fisheri* Snyder. Plate 46, fig 2.

Head, measured to end of opercle, 3.4 in length (to base of caudal fin); depth 2.1; depth of caudal peduncle 8.3; eye 3 in head; snout 2.5; interorbital space 3.1; D. xiv, 15; A. 17; scales 28, -21. Suborbital with 3 prominent spines which curve downward and backward; lower or anterior one very small, in some specimens preceded by a fourth minute spine; the upper or posterior 2 about equal in length to diameter of pupil; preopercle with a strong, slightly curved spine at its angle, which extends to a vertical through posterior border of opercle, excluding the flap; length of spine 3 in head; margin of preopercle above spine with sharp denticulations; lower spine with 2 small spines, the upper of which is the larger; opercular spines not grooved; interopercle with denticulations; teeth

fine, brushlike, trilobed, the lateral lobes much shorter than the median, all being sharply pointed; pseudobranchiae large; gillrakers 5+15, slender, pointed.

Scales large, regular, strongly ctenoid, those on snout, chin, and interorbital space minute; dorsal, anal, and caudal densely scaled; lateral line arched over the pectoral, extending along back near base of dorsal, disappearing near end of soft dorsal fin; dorsal spines growing gradually longer from the second to the last, the first half as long as the second, the last equal in length to distance between tip of snout and posterior border of eye; membranes of first 5 spines notched, membrane between first and second spines nearly-cleft to base, the notches growing successively more shallow between the following spines; membranes between first and third spines without scales, the scaled area beginning behind third spine; fin rounded posteriorly, its edge reaching a vertical through base of caudal; third anal spine longest; membranes between spines deeply cleft, without scales except on a narrow area along the base; third spine closely attached to rayed portion of fin; posterior edge of fin pointed, extending nearly to a vertical through middle of caudal; edge of caudal truncate or slightly convex; tips of rays without scales; ventrals sharply pointed, the first ray being filamentous at tip, extending to origin of anal; pectoral when depressed extending to a vertical through vent.

Color in alcohol, light brown with a yellowish tinge; lips, interorbital area, chin, and throat somewhat dusky; membranes covering suborbital and opercular spines dark; scales of body with rather indistinct dusky edgings; a round, brownish black spot somewhat larger than eye, just above base of pectoral; dorsal narrowly edged with black, the border widening on posterior edge to form a well-marked spot; anal narrowly bordered with pearly white, posterior part of fin blackish; spine and first ray of ventral pearly white; caudal with upper and lower borders dusky, the lower part much the darker, the central area yellowish; pectorals immaculate.

Color in life, bright reddish orange, posterior two-thirds suffused with dusky; spot above pectoral brownish black; preopercular spine dark blue; dorsal and anal colored like body, the dorsal narrowly edged with black, the black spot on posterior part with an indistinct boundary; anal with a broad blackish margin narrowly edged with blue on the outside; middle of caudal lemon-yellow; pectorals orange; ventrals orange suffused with dusky near margins, spine and first ray pearly blue.

Different examples vary somewhat in intensity of color. Small specimens have a broad lemon band on the anal edged above and below with blue, the outer blue line narrowly edged with black.

Type, No. 50881, U. S. Nat. Mus., a specimen measuring 3.25 inches; cotype, No. 7738, Stanford Univ. Mus., from station 4032 off Diamond Head, Oahu, depth 27 to 29 fathoms. Other specimens are from station 3847, southern coast of Molokai; stations 3872 and 3876, between Maui and Lanai; stations 4031, 4033, and 4034, southern coast of Oahu, in 14 to 43 fathoms.

The following measurements are recorded in hundredths of the length measured from snout to base of caudal fin:

	Station 4032.			Station 3876.	
Length (in millimeters) to base of caudal fin....	56	58	54	51	44
Head to edge of opercle .....	.30	.28	.29	.29	.30
Opercular spine .....	.11	.125	.11	.105	.10
Fourth dorsal spine .....	.13	.125	.12	.13	.13
Seventh dorsal ray .....	.19	.18	.19	.185	.19
Third anal spine .....	.19	.16	.165	.16	.15
Ninth anal ray .....	.23	.20	.195	.22	.20
Length of caudal .....	.26	.25	.23	.235	.26
Length of pectoral .....	.23	.24	.22	.24	.25
Length of ventral, including filament .....	.32	.26	.27	.29	.30

Holacanthus fisheri Snyder, Bull. U. S. Fish Comm., XXII, 1902 (Jan. 19, 1904), 532, pl. 11, fig. 21, Albatross Station 4032 off Diamond Head, Oahu.

308. *Holacanthus bicolor* (Bloch). Fig. 165.

Head 4 in length without caudal; depth 2; eye about 4 in head; snout 3; interorbital 3; D. xvi, 15; A. iii, 17; scales about 3-45-19, the longitudinal series counted below lateral line.

Body ovoid, deep, compressed, dorsal and ventral outlines evenly arched; dorsal spines graduated, the last longest, about 1.5 in head; third ventral spine long, about 1.2 in head; middle rays of soft dorsal and anal produced, the tips very sharply angulated, the dorsal almost filamentous; caudal

rounded; pectorals somewhat rounded; outer rays of ventrals filamentous, reaching first anal spine; ventral spine long, about 1.33 in head; depth of head about equaling its length; profile steep, slightly depressed or concave at junction of nape and occiput; snout not projecting, concurrent with profile; opercle unarmed; the nearly vertical margin of preopercle finely toothed, the spine at angle long, quite reaching lower base of pectoral, one or more short, sharp spines at its base below; suborbital finely toothed; an anterior scaled lobe of interopercle with several conspicuous teeth or spinules.

Color in alcohol, body sharply divided into 2 colors at a line running irregularly from sixth dorsal spine to ventral region; posteriorly black, with bluish reflections, including dorsal and anal fins, nearly to end of caudal peduncle; tips of middle rays of soft dorsal straw-yellow, extending a short distance on the upper part of the fin as a narrow margin; caudal abruptly straw-yellow; anterior part of body and spinous dorsal, including fifth spine, pectoral, and ventrals, pale yellow or straw; entire head with an irregular tint of purplish brown composed of fine punctulations on background of pale yellow; a broad black band, somewhat V-shaped, the apex up, from upper margin of eye over occiput and nape. The above description from an example 5.62 inches long obtained in Samoa by Dr. Jordan.

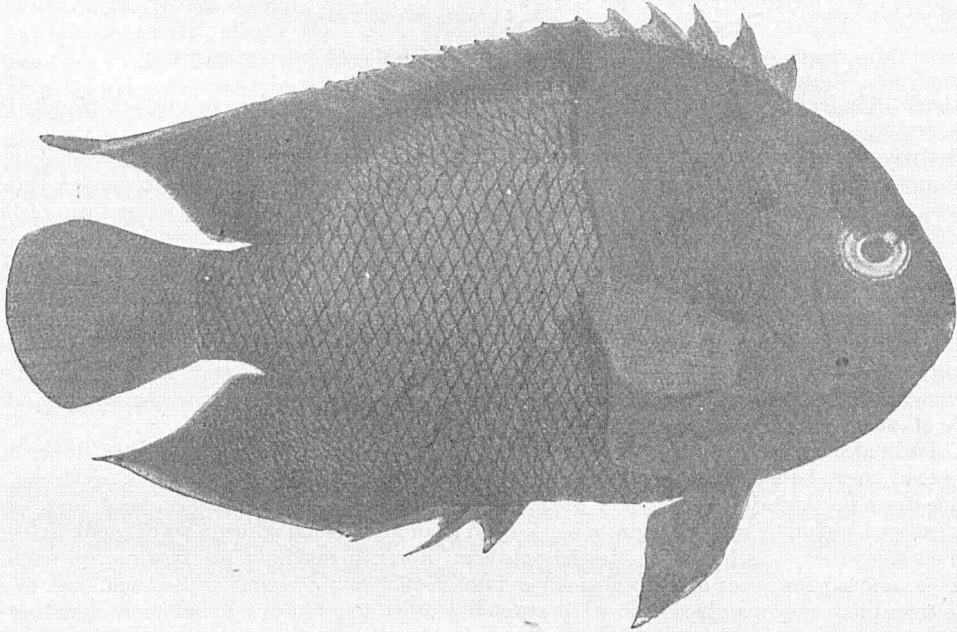


FIG. 165.—*Holacanthus bicolor* (Bloch); after Günther.

Numerous other smaller specimens vary slightly. The dorsal spines run xiv-xv, mostly xv. The ventral fins are not always so long; the preopercular spine in all cases is not quite so long, and there are finer teeth on interopercle and at the base of preopercular spine below. The color does not vary much.

Hawaiian Islands and Polynesia. Not obtained by us, the only Hawaiian reference being that of Günther.

Chetodon bicolor Bloch, Ichth., VI, 70, taf. 206, fig. 1, 1788, no locality; doubtless East Indies.

Holacanthus bicolor, Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 168, 1831; Günther, Fische der Südsee, II, 51, taf. xxxix, fig. B, 1874 (Navigator and Sandwich islands).

Family LXXIV. ZANCLIDÆ.—Moorish Idols.

Body oblong, much compressed and elevated, covered with minute, rough scales; mouth small, with long, slender, brush-like teeth; no teeth on palate; bones of top of head thick and solid, developing with age a conspicuous median horn on the forehead, wanting in the young; preopercle unarmed; dorsal single, with 7 spines, the third and succeeding spines prolonged into long filaments; inter-

spinal bone projecting before dorsal; anal similar to soft dorsal, long, with its anterior rays produced; a small antrorse spine before anal; caudal peduncle unarmed, the fin lunate; pectoral short; ventrals pointed; intestine long; coracoid bones largely developed; vertebrae reduced in number, 9+13=22; air-bladder large; branchiostegals 4; pyloric coeca 14.

One species, widely distributed about the rocky islands of the Pacific.

Genus 178. ZANCLUS Cuvier & Valenciennes.

Characters of the genus included above. The generic name *Pomacanthus* Lacépède belongs properly to this genus, as the first species placed in that composite group by its author is the *Chaetodon canescens* of Linnæus. The name *Zanclus* occurs still earlier in Lacépède's work, though not formally accepted. It is, however, by reason of priority, properly adopted by Bleeker.

Zanclus (Commerson Ms.) Lacépède, Hist. Nat. Poiss., IV, 472, 1803 (*cornutus*).

Pomacanthus Lacépède, l. c., 517 (*canescens*, etc.).

Zanclus Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 102, 1831 (*cornutus*).

Gonopterus Gronow, Cat. Fish., Ed. Gray, 77, 1854 (*marcens*).

Gnathocentrum Guichenot, Ann. Maine et Loire, IX, 1866, 4 (*centrognathum*; young).

309. *Zanclus canescens* (Linnæus). "Kihikihi."^a Plate LVII.

Head 2.6 in length; depth 1.25; eye 4.25 in head; snout 1.5; maxillary 5; interorbital 4.2; D. II, 47; A. III, 35.

Body very deep, rather short, compressed, back elevated; head deep, compressed, pointed; upper profile steep, oblique; jaws long, conic, produced, equal; mouth small, terminal; teeth slender, pointed, pungent in outer series, those inside jaws very fine; eye small, high, above posterior third of head; nostrils small, anterior, with small flap; margin of preopercle finely serrate; interorbital space moderately broad, with short spine in front of each eye above nostrils; dorsal spines very short, strong, second longest; anterior dorsal rays elongate, first very long, enlarged, filamentous, much longer than entire fish; first and second anal spines short, third elongate, 1.30 in head; pectoral 1.25; ventral 1.2, pointed; ventral spine sharp, 2; depth of caudal peduncle 3; caudal rather small, broad, margin nearly straight; scales very small, ctenoid, crowded, extending out on basal portions of dorsal and anal; ventrals roughened on spine and basal portion of rays; lateral line high, arched, running down on middle of side of caudal peduncle to base of caudal.

Color in alcohol, creamy white, a broad black band including space to interorbital, down below eye, side of chest, base of pectoral, ventrals, and anus; a black band beginning on upper dorsal ray, running down on posterior part of side, broadening out below, on longest anterior anal rays; caudal black except for a lunate white margin; a black band from interorbital space to tip of snout, extending down on side of snout inclosing a triangular pale area; lower lip and chin black; a narrow white triangle on forehead, its lower base running across interorbital space; a creamy white band from front of eye to throat narrowly margined with white extending down to middle of breast more than half way to ventrals; a curved gray line from below gill-opening bending down and out, nearly to base of ventral; second black transverse band with posterior submarginal white line; black of caudal bordered in front with white; anterior part of soft dorsal grayish, outer portion behind second black band white, narrowly margined with black; anal similar to dorsal; pectoral grayish; ventrals black.

Described from an example 6 inches long taken at Hilo (No. 04548). In smaller examples the anterior line on breast is continued up behind eye forming an angle before spinous dorsal on side of back in front. From below base of pectoral a whitish line down to anus.

This species is very common about the coral reefs, and is often brought into the market. It has been frequently recorded from the Hawaiian Islands, and specimens have recently been obtained by Jenkins, by the Fur Seal Commission, by us, and by the *Albatross* at Honolulu, Puako Bay, and Laysan Island. Our very complete series of 63 specimens contains but 1 from Hilo, all the others being from Honolulu. Length 3 to 7 inches.

Chaetodon canescens Linnæus, Syst. Nat., Ed. X, 272, 1758, *Indes*; after Artedi: young.

Chaetodon cornutus Linnæus, Syst. Nat., Ed. X, 273, 1758, *Indes*; after Artedi: adult.

Zanclus cornutus, Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 102, 1831 (Carolines, Sandwich Islands, Tongatabu, Vanicolo, Celebes); Günther, Cat., II, 493, 1860 (Amboyna, Ceram, Sandwich Islands); Jordan & Evermann, Fish. North

^a The name "Kihikihi" is from "kihi," angle, applied to the horns of the crescent moon.

and Mid. Amer., 11, 1687, 1898 (Honolulu); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 489 (Honolulu); Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 513 (Sandwich Islands).

Chatodon nudus Gray, Cat. Fish., Coll. Gronow, 76, 1854, *Mari Indico*.

Gonopterus marens Gray, Cat. Gronow, 77, 1854, *India*.

Zanclus canescens, Jenkins, Bull. U. S. Fish Comm., XXII, 1902, (Sept. 23, 1903), 475 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 533 (Honolulu; Puako Bay, Hawaii; Laysan Island).

Family LXXV. ACANTHURIDÆ.—Surgeon-fishes.

Body oblong, compressed and usually elevated, covered with very small scales; lateral line continuous; tail armed with one or more spines or bony plates; eye lateral, high up; preorbital very narrow and deep; nostrils double; mouth small, low; each jaw with a single series of narrow incisor-like teeth; vomer and palatines toothless; premaxillaries somewhat movable but not protractile; maxillary short, closely united with the premaxillary; gillrakers obsolete; pseudobranchiæ large; gills 4, a slit behind the fourth; gill-membranes attached to the isthmus, the openings thus restricted to the sides. A single dorsal fin, with strong spines, the spinous part of the fin shorter than the soft part; anal fin similar to soft dorsal; pectorals moderate; ventral fins present, thoracic, 1, 5. Pelvic bones long, narrow, curved, closely connected, evident through the skin, as in *Balistide*. Pyloric cæca rather few; air-bladder large; intestinal canal long. Vertebrae $9 + 13 = 22$. Posterior suborbital bones in close contact with the preopercle; post-temporal immovably united with the skull, apparently simple, but really trifurcate with the interspaces filled in with bone, the foramen not passing through it; interneural bones with transversely expanded buckler-like subcutaneous plates, which intervene between the spines and limit their motion forward; epipleurals developed from the ribs. Herbivorous fishes of the tropical seas, which undergo great changes with age, as do the *Chatodontida*, the young having often been described as distinct genera.

a. Caudal peduncle armed with a single sharp, antrorse, lancet-like, movable spine; ventral 1, 5.

b. Teeth of jaws immovable.

c. Dorsal with about 9 spines *Hepatus*, p. 383

cc. Dorsal with 4 or 5 spines *Zebrasoma*, p. 395

bb. Teeth of jaws movable; dorsal with 8 spines *Ctenochetus*, p. 398

aa. Caudal peduncle with 2 immovable bony plates, with keels or rigid spines; ventral rays 1, 3.

d. Teeth serrulate; adult with long horn above eyes *Acanthurus*, p. 399

dd. Teeth not serrulate; forehead without horns *Callicanthus*, p. 408

Genus 179. HEPATUS Gronow.

This genus includes those *Acanthuridæ* which have the tail armed with a sharp, antrorse, lancet-like, movable spine; strong, fixed, incisor teeth; ventral rays 1, 5, and about 9 spines in the dorsal fin. The numerous species are found in all tropical seas. Herbivorous fishes, living about coral reefs; the adult protected by the murderous caudal spine, which grows larger with age.

Rhombotides Klein, *Historia Piscium*, 37, 1740 (nonbinomial).

Hepatus Gronow, *Zoöphyl.*, 113, 1763 (*hepatus*).

Teuthis Linnæus, *Syst. Nat.*, 12th ed., 507, 1766 (*hepatus*; *javus*; after *Hepatus* Gronow).

Harpurus (Forster) Gmelin, *Syst. Nat.*, I, 1269, 1788 (species "cauda utriusque spina vel squama ossea falcata munite").

Aspisurus Lacépède, *Hist. Nat. Poiss.*, IV, 556, 1802 (*sohar*).

Theuthis Cuvier, *Tab. El. Hist. Nat.*, 371, 1798.

Theuthis Cuvier, *Règne Animal*, 1st ed., II, 330, 1817 (restricted to *Les Acanthures*; allies of *Hepatus hepatus*).

Teuthys Swainson, altered orthography.

Acronurus Günther, *Cat.*, III, 345, 1861 (*orbicularis*; young fishes apparently scaleless).

Rhombotides (Klein) Day, *Fishes India*, I, 202, 1876.

Acanthurus, of authors generally, not of Forskål as here understood.

a. Spine on caudal peduncle in a large ovoid cherry-red blotch becoming yellow in spirits *achilles*, p. 384

aa. Spine on caudal peduncle not as above.

b. Shoulder with a yellow or scarlet horizontal stripe margined with blackish running from gill-opening above pectoral, this becoming yellowish in spirits, merely blackish in young *olivaceus*, p. 385

bb. Shoulder not as above.

c. Head with a white band from before spinous dorsal downward, across opercle, including margin of preopercle *leucopareius*, p. 386

cc. Head without white band.

d. Side of body without longitudinal lines or cross-bands.

e. No black on last rays and axils of dorsal and anal; body comparatively deep, depth 1.7 to 1.9 in length.

- f. Pectoral fin uniformly dusky, without pale or yellow edge; dorsal rays 27; anal 25 *umbra*, p. 387
- ff. Pectoral broadly margined with pale yellowish white; dorsal rays 26; anal 24.
- g. Dorsal and anal blackish, without longitudinal bands; eye small, 5.4 in head *matoides*, p. 387
- gg. Dorsal and anal with 4 broad deep longitudinal bands; eye large, 3.5 in head *guntheri*, p. 388
- ee. Black spot at base and axils of last rays of dorsal and anal; body not so deep, depth 2.8 in length *elongatus*, p. 389
- dd. Side with longitudinal lines or cross-bands.
- h. No black spot at base and axils of last dorsal and anal rays, or no saddle-like blotch on caudal peduncle
- i. Side with many wavy more or less longitudinal lines; no vertical bands and no white spots on posterior part of body and fins; body comparatively shallow (depth 1.9 to 2); interorbital comparatively narrow (2.65 to 3.2 in head).
- j. Head comparatively short, 4 in length; interorbital rather wide (2.65 in head); dorsal rays 25; anal 24 *xanthopterus*, p. 389
- jj. Head longer, 3.35 in length; eye smaller, 4.5 in head; interorbital narrower, 3.2 in head; dorsal rays 27; anal 26; caudal with dark spots *dussumieri*, p. 390
- ii. Side without wavy longitudinal lines, but with pale vertical bands, and white spots posteriorly; body deeper, depth 1.4 in length; interorbital wider, 2.25 in head *guttatus*, p. 392
- hh. Black spot at bases and axils of last dorsal and anal rays, or else a saddle-like blotch on caudal peduncle.
- k. Body without black crossbars; dorsal rays 27; anal 25 *atramentatus*, p. 393
- kk. Body with black crossbars. No black spot on last rays and axils of dorsal and anal, but a black saddle-like blotch on caudal peduncle; dorsal rays 25; anal 22 *sandwicensis*, p. 394

310. *Hepatus achilles* (Shaw). "*Pa kui kui*." Plate LVIII.

Head 3.5 in length; depth 1.8; snout 1.35 in head; eye 4; interorbital 2.65; D. IX, 32; A. III, 27.

Body rather deeply ovoid, greatest depth at middle of pectoral; head deep, compressed, upper profile rather strongly and evenly convex; jaws slightly produced, lower inferior; mouth small; teeth broad, forming sharp, cutting crenulate edge; margin of preopercle very oblique, angle falling below anterior margin of eye; interorbital space moderately elevated, somewhat broad, roundly convex; nostrils round, close together in front of eye, anterior with small fleshy flap; dorsal spines graduated to last, which is longest, 1.8 in head; dorsal rays of uniform height except last few, sixth ray 1.5; third anal spine longest, 2.25 in head; seventh anal ray 1.5; pectoral 3.25 in body; ventral pointed, 1.1 in head; ventral spine small, sharp pointed, 2.8; least depth of caudal peduncle 2.35 in head; caudal broad, upper and lower rays produced in a point, margin of fin straight in middle; scales very small, crowded, ctenoid; lateral line concurrent with dorsal profile of trunk; caudal spine depressible in groove, 3 in head.

Color in life (field No. 03511) dark brown, nearly black, a light blue ring around chin, and spot of same color on opercle at angle of gill-opening; large patch on side including caudal spine rich orange; a narrow line on body, below base of dorsal, and another above base of anal, light blue; dorsal dark brown, nearly black, with an orange tinge, base narrowly scarlet at first, the color widening posteriorly; anal similar to dorsal, base narrowly scarlet for nearly whole length; caudal black on basal portion, upper and lower edge white, margin broadly white posteriorly, a narrow black submarginal crescent, before this a broad scarlet patch; pectoral black; ventrals dusky orange at base, anterior edge and upper portion light blue, posterior lower half dark brown, nearly black; iris blue with yellow inner border.

Color in life of a specimen (field No. 392) collected by Jordan and Kellogg at Apia in 1902, brownish black, paler below; the lateral spot of a vivid scarlet; a bluish white band across lower jaw; front profile bright bluish gray, the preorbital and cheeks clear brown; dorsal brownish, becoming orange behind, the base of soft dorsal scarlet with a whitish line below, the upper parts blackish and suffused with red, the edge narrowly whitish; anal similar, with more black and a much broader edge; caudal dusky at base, with concentric crescents of orange, black, and white; ventrals dusky, edged with bluish white; a black, vertical line across preopercle; opercle black with a whitish edge.

Color in alcohol, blackish brown; gill-flap below, large ovoid patch including caudal spine, bases of soft dorsal and anal with narrow band broadening out to last rays, and median band on middle of caudal creamy yellow; close along bases of soft dorsal and anal a narrow gray white line, deepest behind; caudal with narrow blackish submarginal line following outline of fin and inclosing creamy white band; a narrow pale blue or slaty band from corner of mouth across chin; pectoral pale slaty; ventral with broad slaty blue margin, axil creamy yellow.

Described chiefly from an example (field No. 05387) taken at Honolulu.

This species is abundant at Honolulu, where it was obtained by Jenkins, the *Albatross*, and by us. Steindachner and also Fowler had specimens from Honolulu, and the *Albatross* obtained it at Puako Bay, Hawaii. We have examined 28 specimens, all from Honolulu, ranging in length from 4 to more than 10 inches. Also found in Samoa.

Acanthurus achilles Shaw, Gen. Zool., IV, 383, 1803, no locality; Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 493 (Honolulu).

Teuthis achilles, Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 513 (Sandwich Islands); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 475 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 533 (Honolulu; Puako Bay, Hawaii).

311. *Hepatus olivaceus* (Bloch & Schneider). "Nae-nae." Fig. 166.

Head 3.75 in length; depth 2; eye 4 in head; snout 1.25; interorbital 3.25; D. ix, 24; A. 23.

Body rather deeply ovoid, greatest depth at middle of pectoral; head deep, compressed, upper profile steep, convex; jaws slightly produced, lower inferior; mouth small, oblique; teeth broad, forming sharp cutting crenulate edge; margin of preopercle very oblique, angle below anterior margin of eye; interorbital space moderately elevated, broad, roundly convex; nostrils round, close together in front of eye, anterior a little below posterior, with small fleshy flap; last dorsal spines longest, about equal, eleventh 1.65 in head, seventeenth dorsal ray 1.5; third anal spine 2.1; seventeenth anal ray 1.75; pectoral equal to head, pointed; ventral pointed, 1.2; ventral spine 1.8; depth of caudal peduncle

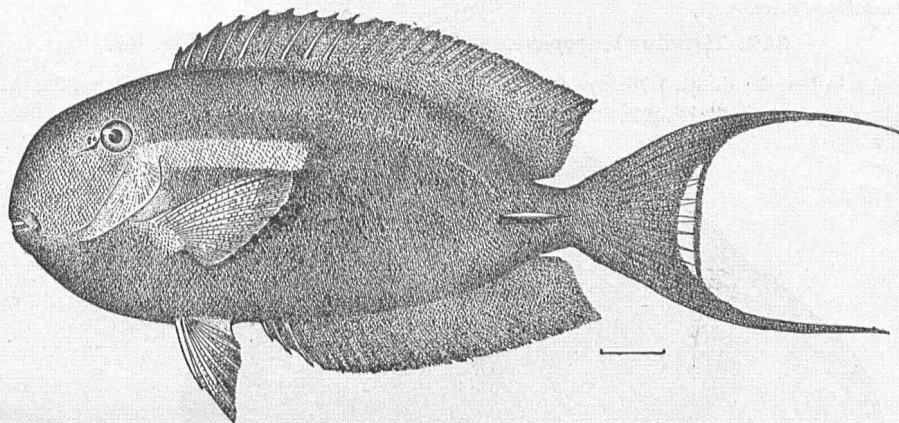


FIG. 166.—*Hepatus olivaceus* (Bloch & Schneider). From a Formosan specimen.

2.5; caudal deep, broad, upper rays long, produced, pointed; caudal spine depressible in a groove, 3.25 in head; scales very small, crowded, ctenoid; lateral line arched, nearly concurrent with dorsal profile of back.

Color in life (field No. 03384), general color olivaceous, breast slightly bluish, a white stripe edged with black running straight back from upper angle of opercle to a point below sixth dorsal spine; dorsal nearly black, membranes slightly bluish; caudal nearly black, same as dorsal, posterior one-third white, edged with black, this white band extending from fourth ray at top to fourth ray at base, forward edge of band crescent-shaped; anal same as dorsal; ventrals edged with black, membranes mottled with blue; pectoral same as ventrals, except posterior third, which is dirty white; iris black, with inside edge of bright yellow.

Another example (field No. 03009) orange olivaceous, a brownish blotch on humeral region inclosing an oblong area of body-color; caudal peduncle more orange, the spine dusky; lips dark; dorsal greenish-olive at base, the margin black; anal similar but colors brighter; caudal yellow at base, a lunate white border on middle rays, tips of lobes dusky; pectoral yellow, dusky at base and on anterior rays; ventrals blackish brown; iris yellow, with black on upper and lower parts.

Field No. 03512 had body, head, and caudal dark brown in life; caudal with pale orange tinge along edge of upper and lower lobes in front, and a large white crescent along the emarginated portion narrowly edged with black.

Still another specimen (field No. 03473) was dusky olive; a scarlet stripe behind upper angle of gill-opening as long as head and very bright, its wide border black, not blending with ground color; a white crescent on caudal; posterior half of pectoral obscurely whitish.

Color in alcohol, blackish brown; a horizontal band of buff equal to length of snout from behind upper margin of opercle bordered with deeper brown; median caudal rays broadly margined with dull buff, edge with narrow blackish marginal line; pectoral with blackish basal portion, outer portion grayish.

Described chiefly from an example (No. 03512) taken at Honolulu.

The species appears to be fairly abundant at Honolulu. Doctor Jenkins obtained 11 examples, Jordan and Snyder 1, and we preserved 9. The *Albatross* obtained it at Honolulu and at Puako Bay, Hawaii. The 21 specimens examined are 6 to 10.6 inches long.

Acanthurus olivaceus Bloch & Schneider, Syst. Ichth., 213, 214, 1801, Tahiti; Günther, Fische der Südsee, IV, 113, 1875 (Society, Paumotu, Navigator, Pelew, and Sandwich islands); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 493 (Honolulu).

Acanthurus eparai Lesson, Voy. Coquille, Zool., II, 147, pl. 27, fig. 1, 1830, Tahiti.

Acanthurus humeralis Cuvier & Valenciennes, Hist. Nat. Poiss., X, 231, 1835, Caroline and Society islands; Eydoux & Souleyet, Voy. Bonite, I, 169, pl. 2, 1841 (Sandwich Islands).

Harpurus paroticus Forster, Descr. Animal., Ed. Lichtenstein, 183, 1844, Tahiti.

Teuthis olivaceus, Jordan & Evermann, Proc. U. S. Nat. Mus., XXV, 1903 (Sept. 24, 1902), 358, fig. 23 (Formosa); Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 476 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 533 (Honolulu; Puako Bay, Hawaii).

312. *Hepatus leucopareius* (Jenkins). "Maikoiko." Fig. 167.

Head 4 in length; depth 1.75; eye 3.25 in head; snout 1.25; interorbital 2.7; D. IX, 26; A. III, 24. Body deep, compressed, upper profile strongly convex, lower shallowly convex; head deep,

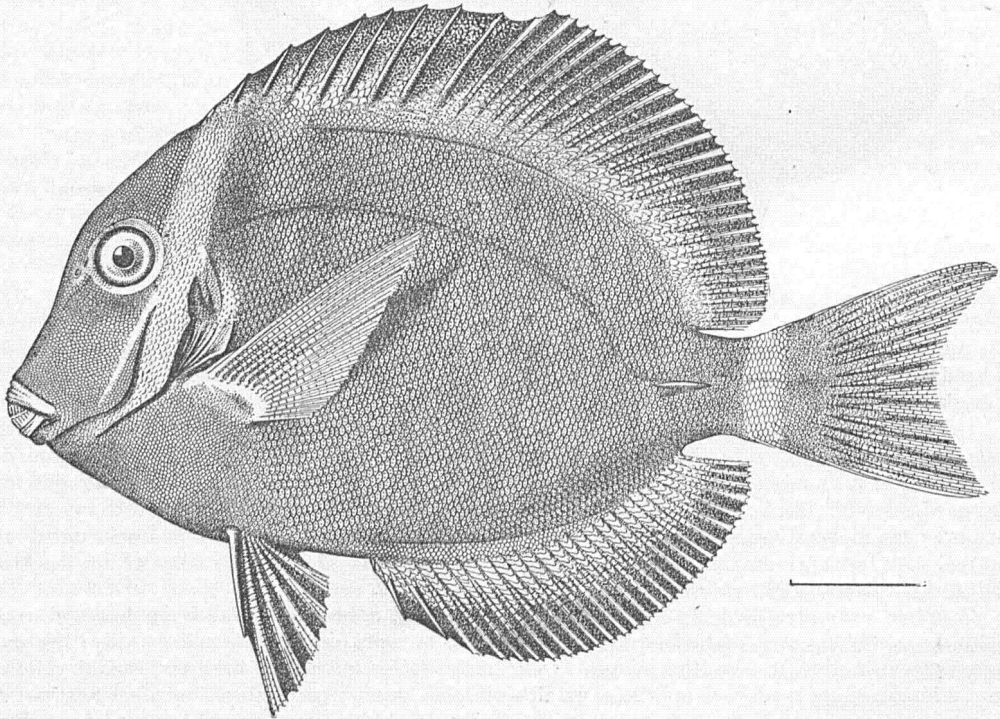
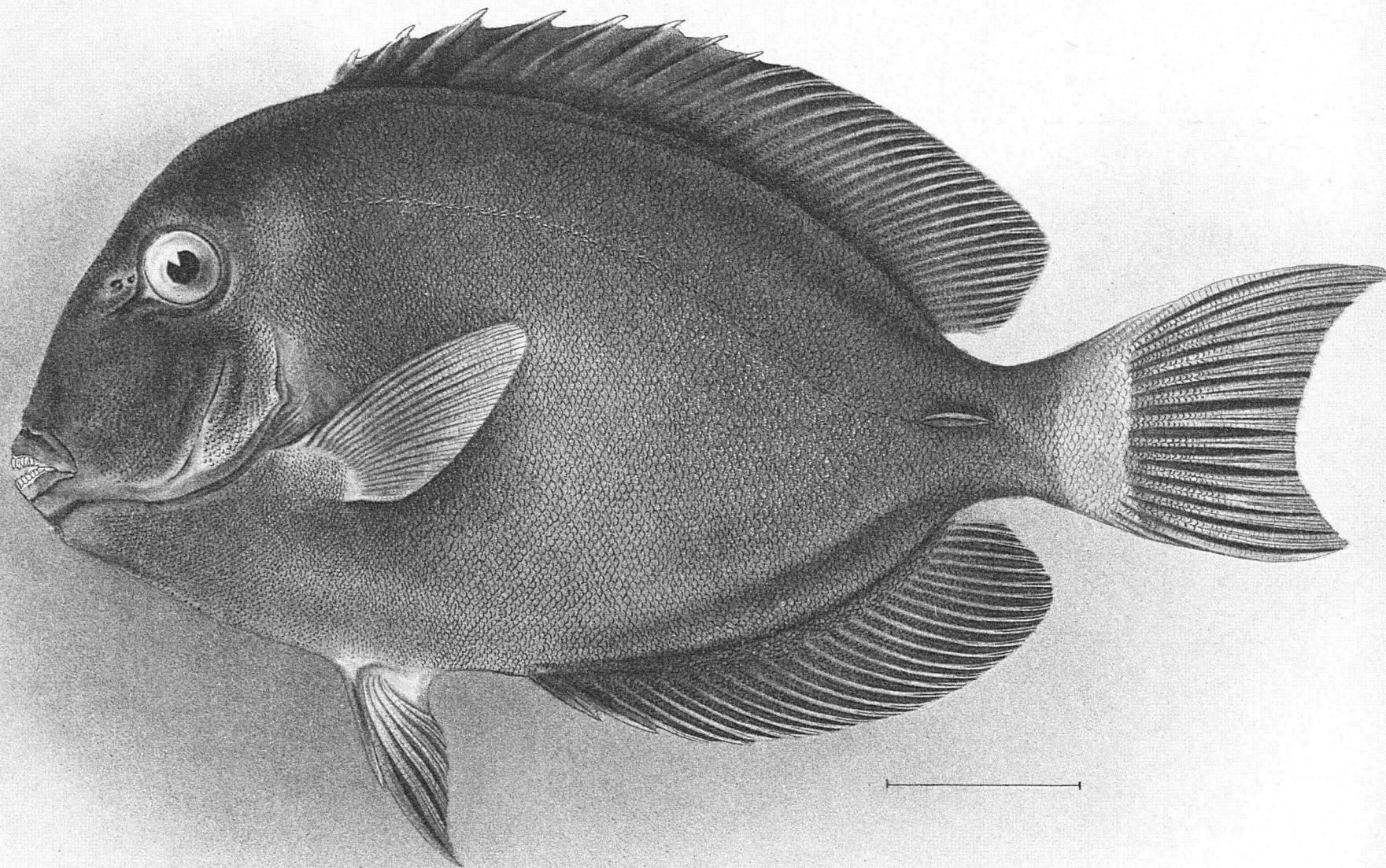


FIG. 167.—*Hepatus leucopareius* (Jenkins); from the type.

compressed, upper profile steep to dorsal, lower profile nearly straight from chin to root of ventrals; jaws large, lower slightly produced; snout long, slightly concave in profile; mouth small, low; teeth broad, edges crenulate, compressed, forming a sharp cutting edge; margin of preopercle very



TEUTHIS UMBRA JENKINS. TYPE.

oblique (blunt angle of which would form below middle of eye); eye rather large, high, in posterior third of length of head; nostrils small, close together, anterior with small thin flap, circular, posterior a small slit; interorbital space broad, convex; dorsal spines strong, graduated to posterior, last 1.3 in head; first anal ray 1.25; anal spines graduated to third, longest 1.65; fourth anal ray 1.25; caudal broad, emarginate; pectoral pointed, 2.8 in body; ventral sharp-pointed, 4 in body; ventral spine, 2 in head; caudal peduncle compressed, its depth 2; caudal spine moderately long, depressible in a groove, 4 in body.

Color in life of the type (No. 50712, U.S.N.M.), a whitish band from base of first 2 dorsal spines downward behind eye, including opercle to its lower margin; also a transverse whitish band at base of caudal.

Color in alcohol deep brown, vertical fins and ventrals darker; top of head and space in front of spinous dorsal pale brown, running down as an oblique band along gill-opening over opercle and margin of preopercle; base of last dorsal rays blackish; base of caudal pale brown.

Described from the type taken at Honolulu by Doctor Jenkins. The species is thus far known only from Honolulu, whence we have 9 specimens, and from Hilo, from which we have 1. These specimens vary in length from 3.7 to 8.75 inches. Seen alive in aquarium at Waikiki.

Teuthis leucopareius Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), fig. 28, 476, Honolulu (type, No. 50712, U.S.N.M. (field No. 324); coll. O. P. Jenkins).

313. *Hepatus umbra* (Jenkins). Plate 47.^a

Head 3.8 in length; depth 1.7; eye 3.75 in head; snout 1.2; interorbital 2.65; D. ix, 27; A. iii, 25.

Body deeply ovoid, greatest depth at pectoral region; head deep; upper profile nearly straight from tip of snout to interorbital space, then convex to origin of dorsal; jaws low, lower inferior; mouth small; interorbital broad, convex; nostrils small, round, close together, anterior larger, with small thin fleshy flap; last dorsal spine 1.7 in head, anterior spines graduated to posterior; fifth dorsal ray 1.25; third anal spine longest, 2; eighth anal ray 1.5; caudal rather broad, emarginate; pectoral broad, a trifle longer than head; ventrals sharply pointed, a trifle shorter than pectoral, or about equal to head; caudal peduncle compressed, 2 in head; caudal spine small, sharp, about 5 in head, depressible in a groove; scales small, finely ctenoid, very small on top of head, breast, and basal portions of vertical fins; lateral line irregular, arched at first, then sloping down to caudal spine, more or less straight from below anterior portion of spinous dorsal to below middle of soft dorsal.

Color in alcohol more or less uniform dark chocolate brown, outer portions of the fins blackish; pectoral pale olivaceous brown; ventrals blackish on outer portion.

The above description is from the type (field No. 05363), a specimen 7.5 inches long, taken at Honolulu by us, where we obtained 1 other example. A single small specimen was obtained by Doctor Jenkins, and the *Albatross* secured others at Puako Bay, Hawaii.

Teuthis umbra Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 477, Honolulu (type, No. 50841, U.S.N.M.); Snyder, op. cit. (Jan. 19, 1904), 533 (Puako Bay, Hawaii).

314. *Hepatus matoides* (Cuvier & Valenciennes). "*Maiii*."

Head 3.8 in length; depth 1.9 in length; snout 1.4 in head; eye 5.4; interorbital 2.5; D. ix, 26; A. iii, 24.⁴

Body deeply ovoid, greatest depth at origin of anal; head deep, compressed, oblique; snout long, compressed, upper profile convex; eye small, high, in last third of head; nostrils small, close together, anterior larger, with small thin flap; mouth small, inferior; jaws not much produced, lower inferior; interorbital space broad, elevated, convex; margin of preopercle forming an angle below anterior nostril; nostrils small, round, close together, anterior larger, with small fleshy flap; dorsal spines rather thin, last 2 in head; dorsal and anal rays produced in short points posteriorly; sixth dorsal ray 1.4 in head; anal spines graduated to third, which is 2.5; thirteenth anal ray 1.5; caudal long, deeply emarginate; pectoral equal to head; ventral sharply pointed, 1.25; ventral spine 2.25; caudal peduncle rather deep, compressed, 2.35; caudal spine small, 5.5 in head; scales small, finely ctenoid, very small on basal portions of vertical fins; lateral line partly concurrent with dorsal profile of back, nearly straight from below anterior dorsal spines to below posterior rays, then running down on caudal peduncle along upper edge of groove of caudal spine to base of caudal.

^a *Teuthis umbra* on the plate.

Color in alcohol, deep brown, dorsal and anal fins blackish; caudal dusky along middle of margin; side without blue or pale lines; margin of gill-opening dusky; pectoral dark brownish, margin broadly pale yellowish-white; ventrals blackish on outer portion, brownish on basal portions of rays, the membranes whitish; lips brown.

Described from an example (No. 05662) taken at Honolulu. This species has been recorded from Oualan, Isle of France, and the Hawaiian Islands. It does not appear to be common, as only 1 small specimen was secured by Jenkins and 3 by us, all from Honolulu. Our examples are 6 to 14.5 inches long.

Acanthurus matoides Cuvier & Valenciennes, Hist. Nat. Poiss., X, 204, 1835, Oualan.

Acanthurus blochi Cuvier & Valenciennes, Hist. Nat. Poiss., X, 209, 1835; after Pl. 203 of Bloch.

Acanthurus annularis Cuvier & Valenciennes, Hist. Nat. Poiss., X, 209, 1835, Isle of France.

Teuthis annularis, Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 513 (Sandwich Islands).

Teuthis matoides, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 478 (Honolulu).

315. *Hepatus guntheri* (Jenkins). "Pualu." Fig. 168.

Head 4 in length; depth 1.8; eye 3.5 in head; snout 1.4; interorbital 2.7; D. ix, 26; A. iii, 24.

Body deeply ovoid, greatest depth at origin of anal; head deep, compressed, upper profile obliquely convex from tip of snout to spinous dorsal; eye rather large, high, in last third of head; nostrils small,

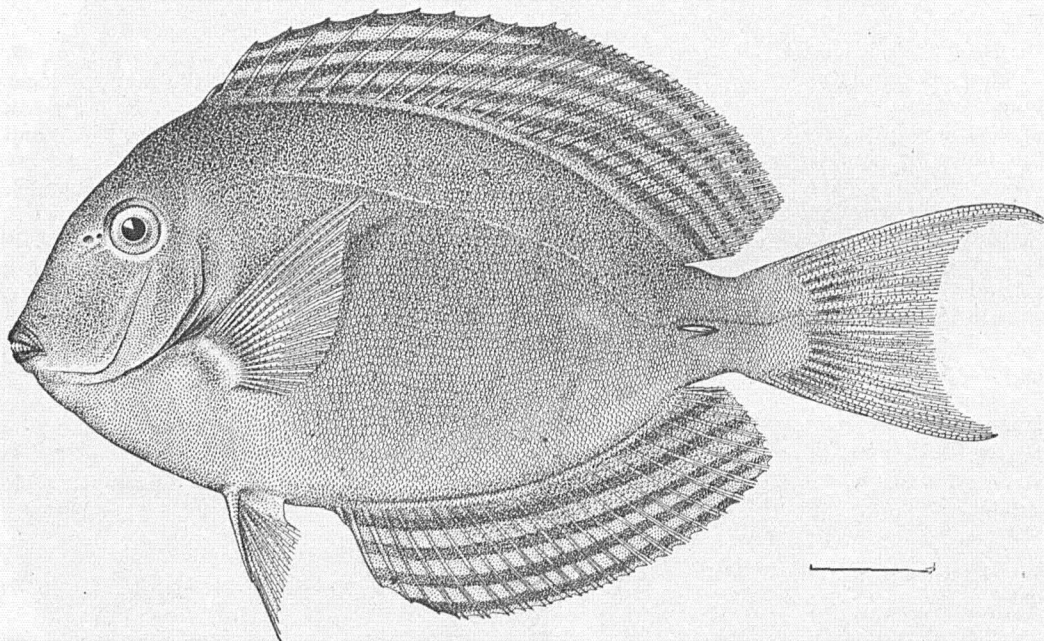


FIG. 168.—*Hepatus guntheri* (Jenkins); from the type.

close together, anterior the larger, rounded, with thin fleshy flap; mouth small, low, inferior; jaws blunt, slightly produced, lower inferior; interorbital space broad, elevated, convex; margin of preopercle forming an angle below anterior rim of orbit; dorsal spines slender, graduated to last, which is 1.25 in head; soft dorsal and anal not pointed behind; eighth dorsal ray 1.2 in head; third anal spine longest, 1.9; eighth anal ray 1.25; caudal long, emarginate; pectoral longer than head, 3.5 in body; ventrals sharp-pointed, 1.2 in head; ventral spine 1.9; caudal peduncle compressed, its least depth 2.2; caudal spine short, 1.5 in eye; scales small, crowded, ctenoid; very minute scales on basal portions of vertical fins; lateral line nearly concurrent with dorsal profile of back, straight from anterior dorsal spines to below middle of soft dorsal, then running down above edge of caudal spine to base of caudal.

Color in life (field No. 199, O. P. J.), general color brown; an orange-yellow band along back just below base of dorsal, just above yellow band a blue line; 4 golden longitudinal bands on dorsal fin,

with an intercalary band which in some examples makes 5 bands; anal with 4 similar ones; pectoral yellow; yellow area through eye; yellow line over snout.

Color in alcohol, dark brown, vertical fins darker; side plain or uniform brown, without any lines; soft dorsal and anal grayish posteriorly; both dorsals and anal with 4 broad deep brown longitudinal bands; caudal deep brown, apparently without spots, base of fin pale; pectoral brown on basal portion, marginal portion broadly yellowish-white.

Described from the type taken by Doctor Jenkins at Honolulu.

This species is of rather wide distribution among the islands of the tropical Pacific, having been recorded by Günther from the Caroline, Society, Navigator, Pelew, and Kingsmill islands, and identified with *Acanthurus blochi* of Cuvier and Valenciennes.

Twelve specimens were obtained at Honolulu by Doctor Jenkins and 2 by us. We also have 3 examples from Hilo. Our specimens are 1.5 to 8.6 inches long. Perhaps identical with *H. matoides*.

Acanthurus blochi, Günther, *Fische der Südsee*, IV, 109, pl. LXIX, fig. B, 1875 (Caroline, Society, Navigator, Pelew, and Kingsmill islands); not of Cuvier and Valenciennes, which is not certainly identifiable; Streets, *Bull. U. S. Nat. Mus.*, No. 7, 68, 1877 (Honolulu); Günther, *Shore Fishes Chall.*, I, VI, 59, 1880 (Honolulu).

Teuthis guntheri Jenkins, *Bull. U. S. Fish Comm.*, XXII, 1902 (Sept. 23, 1903), 477, fig. 29, Honolulu (type, No. 50842, U.S.N.M., 8.6 inches long).

316. *Hepatus elongatus* (Lacépède). "Mai'i."

Head 4 in length; depth 2.8; snout 1.3; eye 3.75 in head; interorbital 2.5; D. IX, 26; A. III, 24.

Body elongate, ovate, greatest depth at middle of pectoral; head deep, upper profile straight from tip of snout to interorbital space, then convex from interorbital space to origin of dorsal; jaws low, lower inferior; mouth small; teeth compressed, crenulate; nostrils close together, anterior larger, with small fleshy flap; last dorsal spine longest, 1.5 in head; twentieth dorsal ray 1.5; third anal spine longest, 3; first anal ray 1.3; caudal long, very deeply emarginate in a crescent, upper and lower rays produced in sharp points, upper the longer; caudal peduncle compressed, its least depth 2.4; pectoral 3.25 in body; ventrals long, pointed, 3 in body; spine a little less than half length of fin; caudal peduncle compressed, its depth 2.25 in head; caudal spine long, depressible in a groove, 2.7 in head; scales very small, cycloid, crowded, finely ctenoid; lateral line arched in front to fifth dorsal spine, then straight to below middle of dorsal, dropping down and running along middle of side of caudal peduncle.

Color in alcohol, uniform dark chocolate brown; lips blackish; vertical fins brown like body-color, margin of caudal narrowly white; axils and bases of posterior dorsal and anal rays black; pectorals brownish; ventrals blackish on outer portion; margin of groove of caudal spine very narrowly blackish.

Description from an example (No. 05354) 7.75 inches long, taken by us at Honolulu. The species is of wide distribution and has been recorded from Fiji Islands, China, Kotosho (Formosa), Miyoko Island, Riukiu, New Hebrides, Pelew and Tahiti islands, as well as from the Hawaiian Islands. It was obtained by Doctor Jenkins at Honolulu and by us at Honolulu and Hookena, Kona; also by the *Albatross* at Puako Bay, Hawaii, and at station 3834, on the southern coast of Molokai, in 8 fathoms. We have examined 28 specimens, which range in length from 4.4 to 8.4 inches.

Chaetodon elongatus Lacépède, *Hist. Nat. Poiss.*, IV, 471, Pl. VI, fig. 2, 1802, Pacific Ocean.

Acanthurus nigroris Cuvier & Valenciennes, *Hist. Nat. Poiss.*, X, 208, 1835, Sandwich Islands.

Acanthurus bipunctatus Günther, *Cat.*, III, 331, 1861, China (Fiji Islands); Steindachner, *Denks. Ak. Wiss. Wien*, LXX, 1900, 494 (Honolulu).

Acanthurus nigrus, Günther, *Cat.*, III, 332, 1861 (New Hebrides); Günther, *Fische der Südsee*, IV, 110, 1875 (Sandwich Islands; New Hebrides; Pelew Islands; Tahiti); Snyder, *op. cit.* (Jan. 19, 1904), 533 (Puako Bay, Hawaii; station 3834 southern coast of Molokai).

Teuthis bipunctatus, Jordan & Evermann, *Proc. U. S. Nat. Mus.* 1902, 358 (Kotosho, Formosa); Jordan & Fowler, *Proc. U. S. Nat. Mus.*, XXV, 1902 (1903), 554 (Kotosho, Formosa; Miyoko Island; Riukiu Islands); Jenkins, *Bull. U. S. Fish Comm.*, XXII, 1902 (Sept. 23, 1903), 479 (Honolulu).

317. *Hepatus xanthopterus* (Cuvier & Valenciennes). "Walu."

Head 4 in length; depth 2; snout 1.35 in head; eye 4; interorbital 2.65; D. IX, 25; A. III, 24.

Body deep, rather long, greatest depth at middle of ventral; head deep, compressed, upper profile rather strongly and evenly convex; jaws low, strong, lower inferior; mouth inferior, low; teeth compressed, broad, edges crenulate; margin of preopercle very oblique, the angle below anterior margin of eye; interorbital space broad, convex, elevated; nostrils close together, anterior large, circular, with small fleshy flap; dorsal spines graduated to last, posterior 1.35 in head; dorsal and anal rays rather

high, rounded, posterior not produced; eighth dorsal ray 1.25 in head, anal spines graduated to third, which is 1.8 in head; ninth anal ray 1.2; caudal long, deeply emarginate, the upper and lower lobes produced in long sharp points; pectoral 3.5 in body; ventrals sharp pointed, 2 in head; caudal peduncle compressed, depth 2.25; caudal spine moderately large, 4 in head, depressible in a groove.

Color in alcohol, deep blackish-brown, side with many dusky brown longitudinal vermiculating lines; dorsal and anal blackish at base, paler on terminal portion, with 4 rather broad brown longitudinal bands; caudal blackish-brown; pectoral blackish-brown, margin broadly dull buff; ventrals blackish on greater portion, innermost basal portion slaty.

Described from an example (No. 05666) taken at Honolulu.

The species is known only from Seychelles (the type locality) and the Hawaiian Islands. One specimen 7.25 inches long was secured by Jenkins and 2 others (13 and 17 inches long) by us at Honolulu. This species may not be distinct from *H. guntheri* or *H. matoides*.

Acanthurus xanthopterus Cuvier & Valenciennes, Hist. Nat. Poiss., X, 215, 1835, Seychelles.

Teuthis xanthopterus, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 477 (Honolulu).

318. *Hepatus dussumieri* (Cuvier & Valenciennes). "Pu'alu," "Palau." Fig. 169.

Head 3.35 in length; depth 1.9; snout 1.4 in head; eye 4.5; interorbital 3.2; D. ix, 27; A. iii, 26. Body deep, upper and lower profiles nearly evenly convex, greatest depth about middle of length

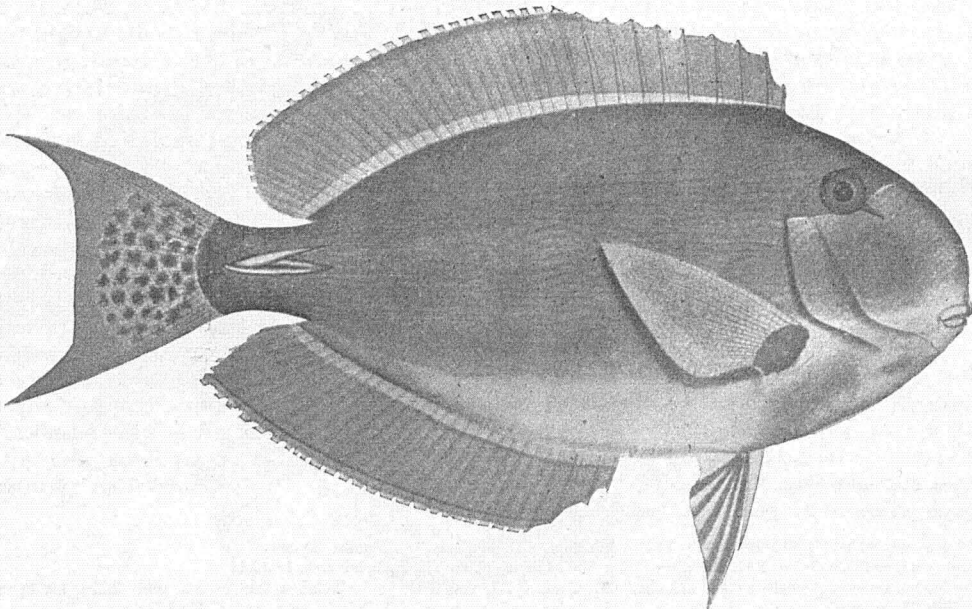


FIG. 169.—*Hepatus dussumieri* (Cuvier & Valenciennes); after Günther.

of trunk; head deep, compressed, upper profile evenly and obliquely convex from tip of snout to origin of dorsal; jaws large; inferior, very slightly produced; mouth small, inferior; teeth broad, compressed, edges crenulate; margin of preopercle very oblique, angle in front of anterior rim of orbit; eye small, high, in posterior third of head; nostrils small, close together, anterior with small fleshy flap, posterior a short oblique slit; interorbital space broad, convex; dorsal spines graduated to posterior, last 1.75 in head; seventh dorsal ray 1.5; posterior dorsal and anal rays rounded, not produced in points; anal spines graduated to last, which is 2.4; seventh anal ray 1.5; pectoral 3.5; ventral sharply pointed, 1.25 in head; spine 2.8; caudal large, emarginate, upper rays produced in a point beyond lower; caudal peduncle compressed, its depth 2.5 in head; caudal spine rather large, depressible in a groove, 3.5 in head; scales very small, ctenoid, crowded, few on soft dorsal, anal, and caudal, minute; lateral line concurrent with the profile of back, more or less running down to caudal spine in front.

Color in life (Field No. 02990) dull bluish olive, upper part more brassy, wavy brassy lines separated by narrower blue one most distinct on upper third of side; head marbled with blue-black and pale yellowish; a broad brassy interocular band; a narrow brassy line extending forward and curving upward from anterior part of eye, this continued around under eye and on to upper end of opercle; a brassy band behind eye and faint lines of same above eye; lips mottled with black and bluish; lower jaw and throat pale bluish; a narrow brassy line along back at base of dorsal fin, and a similar bluish one along base of anal; dorsal fin yellow, somewhat mottled with olivaceous along base anteriorly, and with bluish on last few rays; a narrow blue line along base; caudal bluish, with numerous small blackish olive spots, yellow at base, brightest above; tips of fins black; anal olivaceous with narrow stripes of blue and yellowish, distal portion of fin blackish, narrowly bordered with blue; pectoral smoky below, yellowish above, the anterior edge bluish; ventrals blue-black, paler at base; lance white, surrounded by black; iris brassy, bluish above. (Caudal spots wanting in young.)

Another example (Field No. 03369) olive brown, streaked with faint blue; a yellow area about eye; cheek with light blue lines; edge of opercle black; no shoulder spot; dorsal golden brown with a pale blue and a golden line at base, the margin blackish, last rays with bluish shadings and lines; anal dark brown with very faint bluish streaks, a faint blue and a fainter golden line at base, and a black and a blue line at tip; caudal with blue gray reticulations around golden brown spots, well defined; a golden ring at base of fin, lobes dusky; ventrals with bluish rays, yellowish membranes and blackish edges; pectoral yellowish-brown, upper ray black; no black spot in axil of dorsal and anal.

Field No. 03500, body with numerous narrow wavy longitudinal golden-yellow alternating bluish-gray lines in life; dorsal bright yellow, narrow blue line along base of fin, immediately below this a narrow golden yellow line across base of caudal between spine and base of rays; anal dusky yellowish, with 4 distinguishable and traces of perhaps 2 or 3 other bars of yellow running parallel with outline of body; caudal bluish-gray with many indistinct dusky spots; pectoral golden yellow; ventrals bluish-gray with yellowish tinges; yellow about eyes; yellow bar from eye to eye; front and sides of head covered with yellow wavy lines alternating with blue; chin and breast bluish.

Field No. 03383, in life, general color brownish-ocher, bluish toward belly and lower jaw; lower jaw dirty ultramarine; snout and gill-cover striped with blue and cadmium; a broad yellow stripe running from upper part of gill-opening at opercle through eye, but not joined over frontal region, this stripe outlined with blue; anterior portion of dorsal deep cadmium, 8 to 10 rays of posterior part blue, blending into the cadmium; narrow blue streak running entire length of dorsal at base; caudal deep blue; peduncle cadmium; anal olivaceous, cadmium at anterior 6 or 7 rays, blue posteriorly; narrow blue stripe running entire length of anal, and narrow line of light blue on outside edge; ventral cadmium with stripes of light blue running lengthwise, edged with neutral tint; first pectoral ray blue, next 3 cadmium, others blue, all rays cadmium at base; eye yellow, iris black.

Color in alcohol, dark chocolate brown; side with 35 or more wavy bluish longitudinal lines, those on head also horizontal; front of eye above pale brown; dorsal grayish on spiny portion, becoming dark slaty on soft portion; anal dark slaty; soft dorsal and anal each with 7 or 8 blackish longitudinal lines; caudal dark slaty, marked with many small blackish spots; base of caudal yellowish white; caudal spine with a rather broad blackish margin; pectoral deep olive brown, terminal portion broadly pale brown; margin of gill-opening blackish; margin of the anal narrowly bluish.

This species is very common about Honolulu. We have also a number of larval examples less than an inch long, from Hilo, which correspond perfectly with Quoy and Gaimard's account of *Acanthurus argenteus*, but no specific characters, except the number of fin rays, can be determined. The latter species, from Guam, can never be certainly identified, and the name *argenteus* should not be used, although it was very likely intended for the young of *H. dussumieri* or *H. matoides*. The species is represented in our collection by 59 specimens from Honolulu and 2 from Hilo. Of the specimens from Honolulu 7 were obtained by Doctor Jenkins, 5 by the *Albatross* in 1896, 4 by Doctor Wood, 2 by Jordan and Snyder, and the others by us. Specimens were also secured by the *Albatross* in 1902.

?*Acanthurus argenteus* Quoy & Gaimard, Voy. Uranie, Zool., 372, pl. 63, fig. 2, 1824, Guam; larval form, not identifiable.
Acanthurus dussumieri Cuvier & Valenciennes, Hist. Nat. Poiss., X, 201, 1835, Ile de France; Günther, Fische der Südsee, 112, pl. LXXII, 1875 (Sandwich Islands); Steindachner, Denk. Ak. Wiss. Wien, LXX, 1900, 493 (Honolulu).

a Cuvier & Valenciennes record *Acanthurus argenteus* from the Sandwich Islands, although Quoy & Gaimard, their sole authority, mention the Mariannes only. In the same way they record *Acanthurus striatus* Quoy & Gaimard, from the Sandwich Islands, although the discoverers found it at the Mariannes only. *H. striatus* can not be certainly identified, as 3 species (2 at Samoa and 1 at Tahiti) have striped larvae corresponding to the account given by Quoy and Gaimard. Some of these are evidently the young of *Otinochatus strigosus*, others we can not make out. Probably the records from Guam and Hawaii belong to *Ot. strigosus*, in which case the name *striatus* has priority over *strigosus*.

Acanthurus lineolatus Cuvier & Valenciennes, Hist. Nat. Poiss., X, 207, 1835, Pacific.

?*Acronurus argenteus*, Günther, Cat., III, 346, 1861 (Ascension Island); probably not of Quoy & Gaimard.

Teuthis argenteus, Jordan & Fowler, Proc. U. S. Nat. Mus., XXV, 1903, 553 (Umesawa and Misaki, Japan); Snyder, Bull. U. S. Fish. Comm., XXII, 1902 (Jan. 19, 1904), 533 (Honolulu).

Teuthis dussumieri, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 477 (Honolulu).

319. *Hepatus guttatus* (Bloch & Schneider). Fig. 170.

Head 3.6 in length; depth 1.4; eye 4.5 in head; snout 1.2; interorbital 2.25; D. viii, 27; A. iii, 24.

Body deep, compressed; back elevated, high at spinous dorsal; abdomen and lower part of trunk expanded below, lowest point at origin of anal; head deep, rather small, compressed, upper profile oblique from tip of snout to origin of dorsal; profile of snout nearly straight, jaws large, blunt, slightly produced; mouth low, inferior; mandible inferior, lips rather broad and thin; teeth broad,

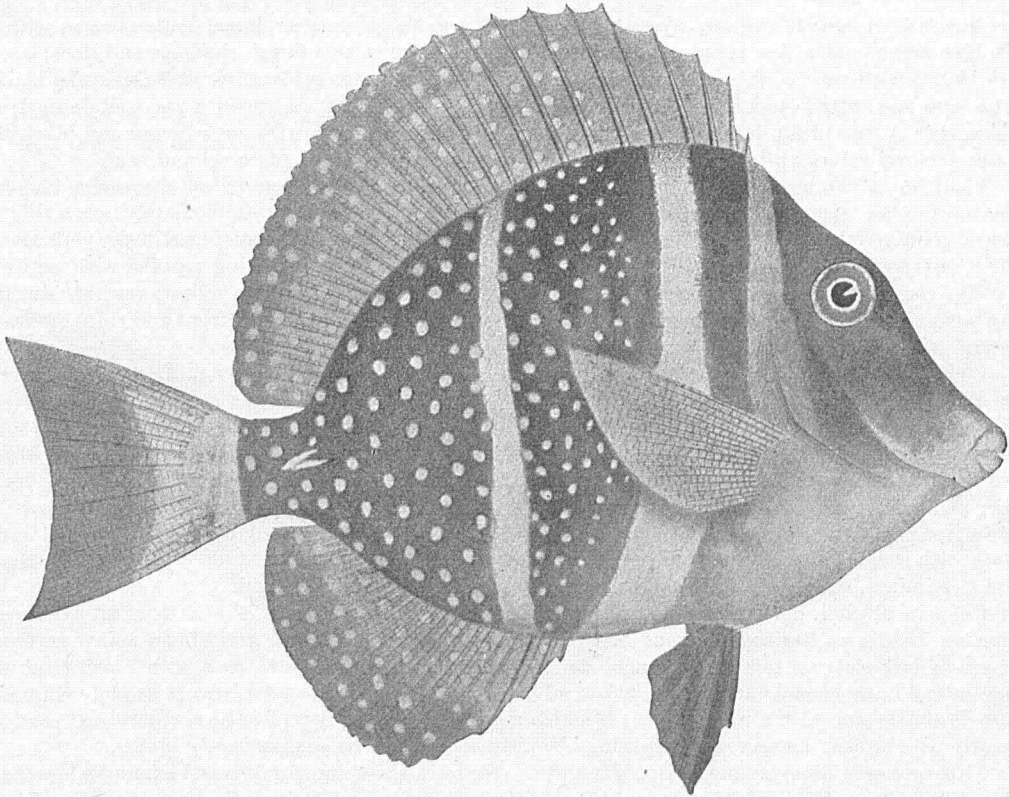


FIG. 170.—*Hepatus guttatus* (Bloch & Schneider); after Günther.

compressed, forming sharp cutting edge, each one with 7 crenulations, the 3 median large, their edges level; nostrils large, close together, anterior larger, with small, fleshy flap; interorbital space broad, convex, not much elevated; dorsal spines graduated to posterior, stiff, last 1.5 in head; anterior dorsal rays longest, others gradually decreasing to last, first 1.5, last 4; fifth anal ray 6.5 in head, last 4.75; caudal broad, margin straight when expanded; caudal peduncle deep, compressed, depth 2 in head; pectoral pointed, 3 in body; ventral 4.25; caudal spine small, short, depressible in a groove, 1.35 in eye; scales small, ctenoid, deeply imbricated on sides, scales on vertical fins very small; lateral line arched, nearly concurrent with profile of back; anus directly behind bases of ventrals, well before anal spines.

Color in alcohol, uniform brown on greater portion, chest and belly somewhat pale; a pale brown band from before spinous dorsal down behind eye, another narrow pale band from base of fourth dorsal spine to belly, and last indistinct from fourth dorsal ray down to third anal ray; basal portion

of caudal pale brown, the outer half deep brown; posterior half of trunk with many small white spots, also extending on soft dorsal and anal fins and over third pale bar on side; pectorals and ventrals pale brown, latter edged with brownish.

Described from an example (No. 646) taken at Honolulu by Doctor Jenkins. The species is rather scarce about Honolulu, living on the outer edge of the reefs. We have examined 5 specimens, 3 collected by us and 2 by Jenkins, all at Honolulu. They range in length from 8 to 11.5 inches. The species was also found by the *Albatross* at Puako Bay; common at Samoa.

Acanthurus guttatus Bloch & Schneider, Syst. Ichth., 215, 1801, Tahiti; Günther, Fische der Südsee, IV, 109, taf. L.XIX, fig. A, 1875 (Mauritius; New Hebrides; Society, Navigator, Kingsmill, Pelew, and Sandwich islands).

Harpurus guttatus, Forster, Descript. Animal., Ed. Lichtenstein, p. 218, 1844 (Tahiti).

Teuthis guttatus, Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 513 (Sandwich Islands).

Teuthis guttatus, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 479 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 533 (Puako Bay, Hawaii).

320. *Hepatus atramentatus* (Jordan & Evermann). "Maikoiko;" "Maiko." Fig. 171.

Head 3.8 in length; depth 1.9; eye 4.2 in head; snout 1.2; interorbital 3; D. ix, 27; A. iii, 25.

Body deep, compressed, ovoid, the upper profile steeper than lower, evenly convex; jaws low, not produced, lower inferior; mouth small, inferior; teeth broad, compressed, edges crenulate; nostrils

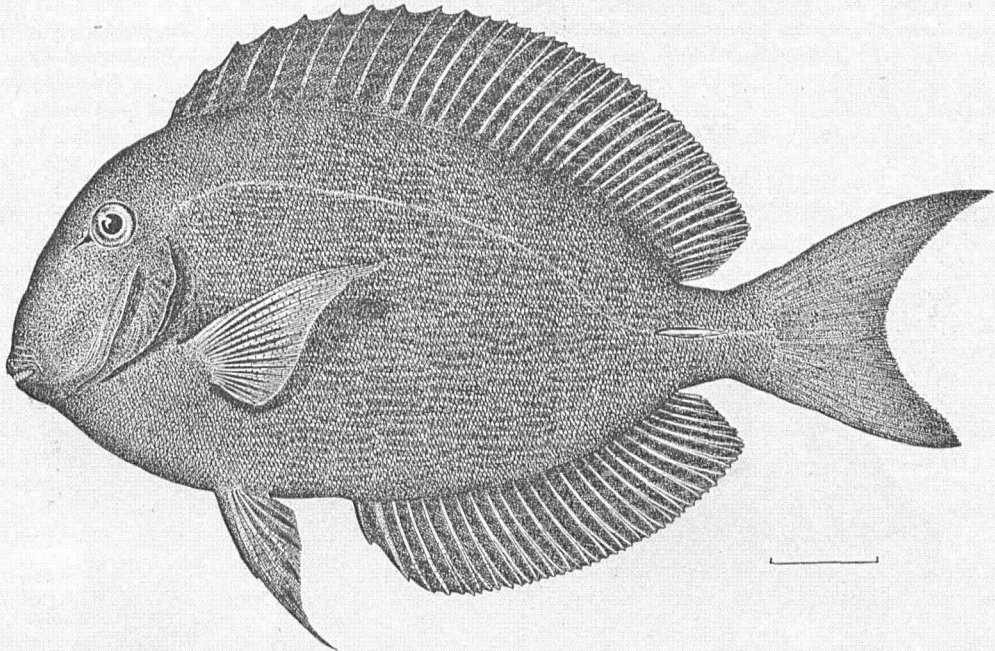


FIG. 171.—*Hepatus atramentatus* (Jordan & Evermann); from the type.

close together, anterior larger, with small fleshy flap; anterior dorsal spines graduated to posterior, the longest 1.5 in head; fourth dorsal ray 1.4; third anal spine longest 1.9; first anal ray 1.5; caudal large, emarginate, upper and lower rays produced in sharp angular points, upper much longer than lower; pectoral about 3.5 in body; ventrals sharp-pointed, 3.6 in body, spine half the length of fin; caudal peduncle compressed, 2 in head; caudal spine large, depressible in a groove, 3.1 in head; scales very small, etenoid, few, and very minute on vertical fins; lateral line high, arched, at first descending under fifth dorsal spine, then straight to below middle of soft dorsal, finally falling down and running along side of caudal peduncle to tail.

Color in life (No. 02996), coppery brown, crossed by numerous very narrow, pale blue lines, those above axis of body running somewhat upward and backward, and with short broken lines of same interspersed, those below more regular but less distinct; cheek brassy, with about 5 narrow pale blue

lines from eye to snout, each of these extending slightly upon pale rusty, and each with 5 or 6 narrow brassy lines parallel with margin, edge of each blackish; last rays of dorsal and anal more brassy; a conspicuous jet-black spot on caudal peduncle at base of last dorsal ray; caudal dark, blackest on outer part of middle rays; pectoral pale lemon; ventrals dusky, blacker toward tips; iris brownish, white on posterior part. Another example (No. 03474) was dull olive-gray, unmarked, save a faint whitish band across nape and back part of head; fins plain dusky gray.

Color in alcohol, very dark chocolate brown; side with about 40 narrow irregular or incomplete series of indistinct dark slaty longitudinal lines; cheek with similarly colored lines running obliquely downward; fins, except pectoral, all more or less blackish or dusky; dorsal with about 5 blackish longitudinal bands; anal with several similar indistinct blackish bands; base and axils of last dorsal and anal rays blackish; pectoral brown.

This common species is well distinguished from *Hepatus dussumieri* and other streaked species by the black ink-like spot in the axil of the dorsal and anal fins. It has several times been recorded under the erroneous name of *Acanthurus lineolatus*, but the species originally called by that name must be something else, probably *H. dussumieri*. Numerous specimens were obtained by us at Honolulu, where it was also secured by Doctor Jenkins and Doctor Wood. Other examples were collected by the *Albatross* at Laysan Island. Our specimens are 3 to 9.5 inches long.

Acanthurus lineolatus, Günther, *Fische der Südsee*, I, 112, taf. LXXIII, fig. A, 1875 (Society Islands); Steindachner, *Denks. Ak. Wiss. Wien*, LXX, 1900, 493 (Honolulu); not of Cuvier & Valenciennes.

Teuthis atrimentatus Jordan & Evermann, *Bull. U. S. Fish Comm.*, XXII, for 1902 (Apr. 11, 1903), 198, Honolulu (type, No. 50673, U. S. N. M.; coll. Jordan & Evermann); Jenkins, *Bull. U. S. Fish Comm.*, XXII, 1902 (Sept. 23, 1903), 478 (Honolulu).

Teuthis atrimentatus, Snyder, *Bull. U. S. Fish Comm.*, XXII, 1902 (Jan. 19, 1904), 533 (Laysan Island).

321. *Hepatus sandvicensis* (Streets). "Manini." Fig. 172.

Head 3.75 in length; depth 1.9; snout 1.4 in head; eye 3.5; interorbital 3; D. IX, 25; A. III, 22.

Body deep, compressed, ovoid, the lower profile from mandible to anus very weakly convex; head

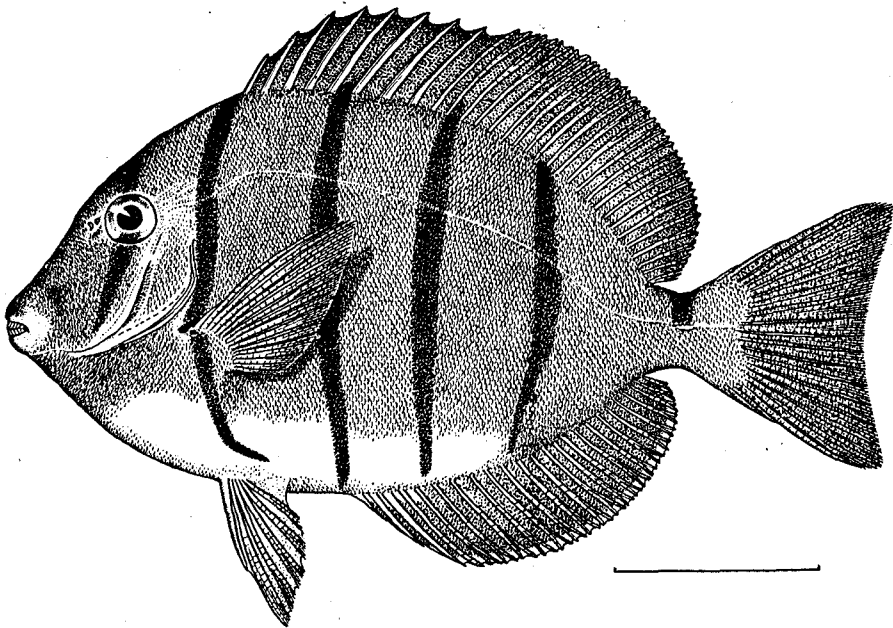


FIG. 172.—*Hepatus sandvicensis* (Streets).

deep, the upper profile concave from tip of snout to interorbital space, then straight to origin of dorsal; jaws low, produced, the lower inferior; mouth small; teeth compressed, crenulate; nostrils close

together in front of eye, anterior larger, with small fleshy flap; last dorsal spine 1.5 in head, anterior spines graduated to last; fourth dorsal ray 1.5; caudal rather deep, emarginate, upper rays longer; pectoral a little longer than head; ventral sharp-pointed, 1.2; caudal peduncle compressed, its least depth 2.5; caudal spine very small, short, strong, 3 in head; scales very small, ctenoid, very few on vertical fins; lateral line high, arched at first below first dorsal spines, then very slightly convex to below middle of soft dorsal and along middle of side of caudal peduncle.

Color in alcohol, dull purplish gray, darker on back above; chin, breast, belly and lower surface of caudal peduncle creamy white; side with 5 narrow blackish vertical lines; first from occiput to eye, passing down below to anterior lower edge of preopercle; second from first dorsal spine to pectoral, continued down and back toward spinous anal; third beginning at sixth dorsal spine, running down to a little in front of spinous anal; fourth beginning at base of first dorsal rays and running down to first anal rays; fifth beginning at first third of soft dorsal, running down to first third of soft anal; upper portion of caudal peduncle with a short narrow blackish saddle; brown longitudinal line separating creamy area of lower surface from dark color above, running along side of throat and abdomen backwards; vertical fins dusky brown; pectoral brownish; ventrals grayish on outer portion, basally white. Described from an example (No. 03347) taken at Honolulu.

A series of specimens showing all stages of growth from the larval to the adult form was secured. In the young measuring about 20 mm. the body is perfectly transparent except a broad, vertical silvery band extending across the head and visceral region. Anterior edge of band passes obliquely downward and backward, just in front of orbit, to a point a little in advance of insertion of anal fins. The posterior boundary extends from nape, behind axil of pectoral, to insertion of anal. Between the lateral line and the pectoral is a posterior prolongation of the silvery band, about as large as eye. Nape, interorbital space, and a narrow band at base of caudal dusky; a row of dark dots along base of anal and a dusky spot on tip of caudal. The dusky, vertical bands of adult are first seen faintly outlined in the young of 31 mm. length; in others, no larger, the color pattern of the adult is perfectly developed. In the young the snout is shorter, anterior profile more rounded, and body deeper than in adult; head and body covered with long, narrow, vertically placed, scale-like plates; first dorsal spine serrated on anterior edge. Shortly after assuming the adult color, the length being about 32 mm., the serrations of the spine disappear and the plates are replaced by minute scales.

Teuthis elegans Garman is the young of this species. Living examples of the larval form are almost perfectly transparent except the silvery area and dusky spots, there being no blue or red tints.

This species is excessively abundant among the Hawaiian Islands about the reefs and in rocky pools. On comparison with examples of *Hepatus triostegus* from Okinawa, Japan, and from Samoa, it differs in all the salient characters pointed out by Streets. To the Hawaiian species, *Hepatus sandvicensis*, belong the specimens recorded by Jordan and Evermann from Clarion and Socorro islands. Those of Samoa and Polynesia generally are *Hepatus triostegus*.

Our very large series of specimens contains 88 from Honolulu, 82 from Hilo, 109 from Kailua, and 4 from Waianae. Specimens were obtained by the *Albatross* at Honolulu; Waialua Bay, Oahu; Hanalei Bay, Kauai; Puako Bay, Hawaii; Hilo; Necker Island; and Laysan Island.

Acanthurus triostegus, Günther (in part), Cat., III, 327, 1861; *Fische der Südsee*, IV, 108, 1875 (Sandwich Islands); Smith & Swain, Proc. U. S. Nat. Mus., V, 1882, 138 (Johnston Island); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 493 (Honolulu; Laysan); not of Linnaeus.

Acanthurus triostegus var. *sandvicensis* Streets, Bull. U. S. Nat. Mus., No. 7, 1877, 67, Honolulu (Type, No. 15398, U. S. N. M.). *Teuthis triostegus*, Jordan & Evermann, Fish North & Mid. Amer., II, 1690, 1898 (Clarion and Socorro islands); Fowler, Proc. Ac. Nat. Sci. Phila. 1900, 513 (Oahu, Sandwich Islands).

Teuthis elegans Garman, Deep Sea Fishes, 70, plate L, fig. 2, 1899, off Cocos Islands at the surface; larval form.

Teuthis sandvicensis, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 479 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 533 (Honolulu; Waialua Bay, Oahu; Hanalei Bay, Kauai; Puako Bay, Hawaii; Hilo; Necker Island; Laysan Island).

Genus 180. ZEBRASOMA Swainson.

This genus differs from *Hepatus* in the short spinous dorsal of 4 or 5 graduated spines; soft dorsal high; snout short, projecting at an angle.

Zebrosoma Swainson, Nat. Hist. Anim., II, 256, 1839 (*velifer*).

Scopas Kner, Novara Fische, 212, 1865 (*scopas*).

- a.* Body deep, depth less than 2 in length; no spots on head.
b. Snout comparatively short, 1.5 in head; dorsal IV, 32; anal III, 24. Color, nearly black, with pale bands on head and body *veliferum*, p. 396
bb. Snout longer, 1 in head; dorsal V, 24; anal III, 19. Color, nearly uniform chrome-yellow; or else dark olive, often with small blue spots. *flavescens*, p. 397
aa. Body not so deep, depth 2.33 in length; fine blue spots on head. Color, yellowish brown with darker bands *virgatus*, p. 398

322. *Zebrasoma veliferum* (Bloch). "Kilikiki." Fig. 173.

Head 3.35 in length; depth 1.7; snout 1.5 in head; eye 3.35; interorbital 3.25; D. IV, 32; A. III, 24.

Body deep, rather elongate, upper profile of back slightly convex from occiput to caudal peduncle, lower profile evenly and rather strongly convex from throat to caudal peduncle; head deep, com-

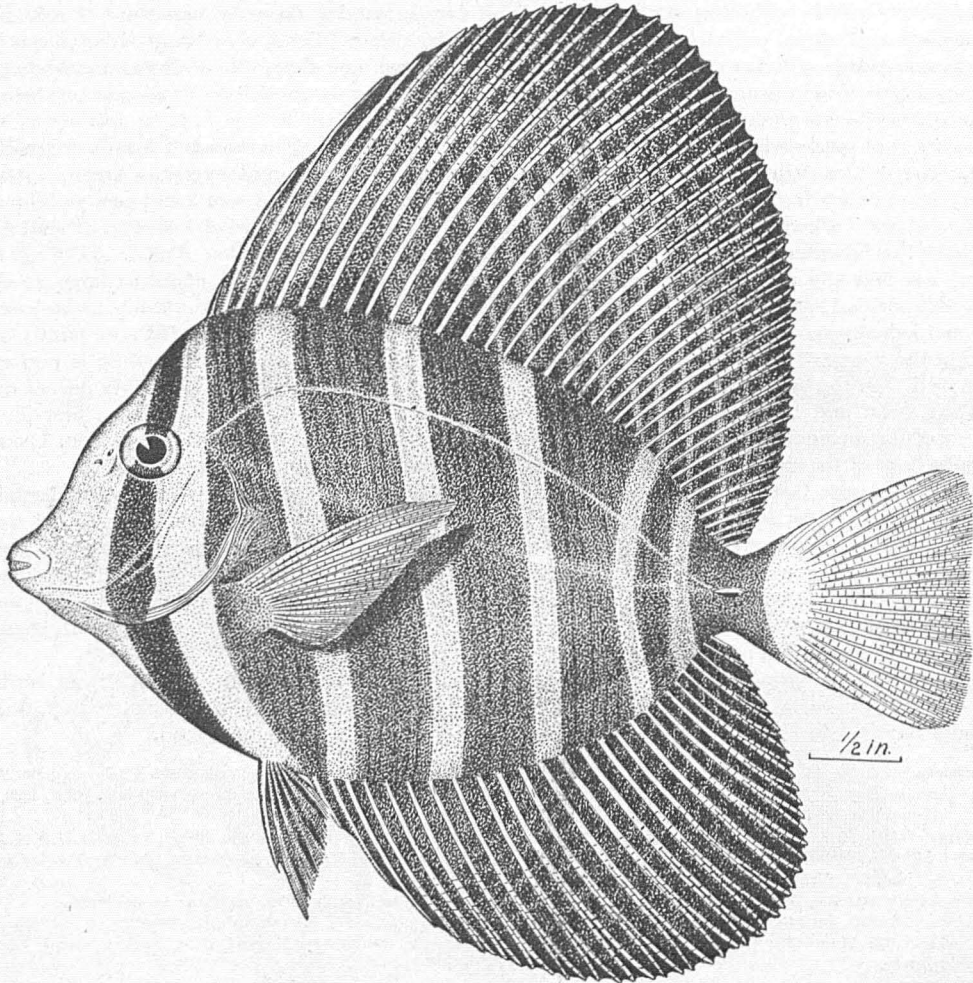


FIG. 173.—*Zebrasoma veliferum* (Bloch).

pressed, upper profile steep, undulate, that of snout concave; jaws produced, low, the lower inferior; lips rather thin, fleshy; teeth broad, compressed, the edges crenulate; mouth small, inferior; nostrils close together, anterior rounded with small flap, posterior a short oblique slit; interorbital space convex; dorsal fin very high; spines thin, slender, graduated to the last, 2.5 in body; anterior dorsal rays very high, the others gradually decreasing to last, fifth 1.8 in body; anal spines graduated to last, second 1.5 in head, third 1.25; median anal rays elongate, eighth 2.7 in body; caudal rather broad, its

margin straight; pectoral pointed 3.35 in body; ventral 1.25 in head; caudal peduncle small, compressed, its least depth 3.25; caudal spine short, stout, 2 in interorbital space, depressible, not in a groove, the space about somewhat concave; scales exceedingly small, ctenoid, those about pectoral region more or less smooth; lateral line nearly concurrent with dorsal profile below base of soft dorsal.

Color in life (No. 03389), nearly black, with 6 bands of dirty white, first band beginning on lower jaw and continuing back to anterior edge of opercle and down as far as ventrals; a stripe of general body-color as wide as chin, beginning at chin and growing narrower until it ends on a line at anterior edge of gill-opening; second band including posterior portion of eye and just behind base of ventral; third band containing 2 small yellow bands; fourth, fifth, and sixth each with 1 yellow band, each of the 6 darker bands between the lighter bands also banded with yellow ones; the third and fourth with 4 bands, the fifth 3, and the sixth 2; dorsal nearly black, first 3 white bands continuing up on the dorsal; caudal same as dorsal, but slightly olivaceous toward base; other fins same as dorsal; snout and front of head with small whitish spots, the dark color forming a network around them; iris yellow; tail growing darker with age.

Another example (No. 03416), dark brown in life; transverse bands of bright lemon-yellow bordered on each side by a narrow violet band, which is more distinct on forward part of body, the sixth anal ray yellow; dorsal and anal dark, nearly black; dorsal with narrow transverse bands of violet; pectoral with yellow toward base; ventrals dark.

Color in alcohol, blackish brown, anterior half of head, throat and chest, and 6 narrow pale vertical bands on side, whitish, one behind eye silvery; first band running from just before first dorsal spine down side of head and chest including posterior margin of eye, to root of ventral, second beginning at last dorsal spine and first 2 dorsal rays, and running to spinous anal; the others run from the sixth and seventh, eleventh and twelfth, nineteenth and twentieth, and twenty-fifth and twenty-sixth dorsal rays, to the base of anal; last lateral vertical bar ill defined; dorsal and anal blackish brown, with about 12 vertical narrow gray lines on posterior half of dorsal, the second and third vertical bands extending a very short distance on basal part of dorsal parallel with spines and rays; anal with a few indistinct gray lines similar to those on posterior part of dorsal; caudal whitish; pectorals grayish; ventrals blackish.

In adult examples the side has 4 or 5 blackish vertical lines running down each dark band; anterior part of head with dark brown reticulations, the anterior, pale bars with dark brown vertical lines on reticulations; caudal dark brown; dorsal and anal blackish. Described chiefly from an example (No. 03416) taken at Honolulu.

This species is fairly common at Honolulu, where specimens were obtained by Jenkins, by the *Albatross*, and by us. The 16 examples which we have examined range from 3.1 to 11.5 inches in length. This species, common at Samoa, is doubtless Bloch's *A. velifer*.

Acanthurus velifer Bloch, Auslind. Fische, IX, 106, taf. 427, fig. 1, 1785-95; Bleeker, Nat. Tijds. Ned. Ind., VII, 1855 (Batoo Island).

Acanthurus blochi Bennett, Proc. Zool. Soc. London, 207, 1835, about Tranquebariam.

Acanthurus hypsopleterus Bleeker, Nat. Tijds. Ned. Ind., VI, 1854, 313, Sea of Larantuka, Flores.

Acanthurus (Harpurus) hypsopleterus, Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 494, taf. iv, fig. 1 (Honolulu).

Zebrasoma hypsopleterus, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 479 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 533 (Honolulu).

323. *Zebrasoma flavescens* (Bennett). "*Laipala*." Plate LIX.

Head 3.75 in length; depth 1.75; eye 4 in head; snout 1; interorbital 3.25; D. v, 24; A. III, 19.

Body deep, compressed; head deep, compressed, pointed, the upper profile very concave in front of eye; snout long, produced, pointed; jaws produced, the lower inferior; lips rather thin; mouth small, inferior; teeth compressed, rather broad, edges crenulate; nostrils close together, anterior a little lower and larger, with a small fleshy flap; dorsal spines graduated to the last, which is longest, 1.25 in head, anterior dorsal rays longest, the fourth 1.1; third anal spine longest, 1.75; caudal rather broad, its margin straight; pectoral equal to head; ventral sharply pointed, 1.2; ventral spine sharp pointed; caudal peduncle compressed, its least depth 2.5; side of caudal peduncle in front and posterior portion of side with a large tract of hooked villiform prickles; caudal spine strong, depressible in a furrow between prickles, 4 in head; scales small, forming a finely roughened surface; lateral line nearly concurrent with profile of back at first, running closer to it posteriorly and disappearing at patch of villiform

bristles below posterior dorsal rays. Description based on an example (No. 05034) 7.3 inches long from Honolulu.

Color in life (No. 03504), body and fins everywhere uniformly chrome-yellow; iris same color; pectoral sometimes with a tinge of golden over the yellow and the middle of side of body sometimes lighter yellow; spine on caudal peduncle white. Another example (No. 03537) had edge of spinous dorsal and anterior part of anal fin with a line of bright cadmium. Color in alcohol very pale yellowish white. This species is often dark olive in color, but from Hawaii we have yellow examples only.

We have 3 examples from Kailua and 8 from Honolulu, 1 of which is from the collection of Doctor Jenkins. These examples are 3.2 to 7.3 inches long.

The young (*Zabrasoma virgatum*), is thus described:

Depth 2.33; D. iv, 31, its height 1.25 in depth; A. iii, 24; 14 teeth in upper jaw, 16 in lower; edges of upper teeth conspicuously lobed; lower teeth each with a strong median point, on each side of which are 2 conspicuous notches; eye situated well back.

Coloration of body brownish yellow crossed by about 25 straight bands of deeper color reaching the ventral region; head speckled with little blue spots, the end of snout being of a deeper color than rest of head; a more deeply colored band extending from nape across eye; 4 moderate bands extending to lower part of body and touching posterior edge of eye, continuing to base of ventrals, the second band reaching to base of anal; dorsal and anal deeply colored with clearer portions and yellowish bands obliquely parallel posteriorly; caudal brownish yellow, with the posterior part more deeply colored. Hawaii.

Acanthurus flavescens Bennett, Zool. Journ., IV, No. XIII, Art. III, 1828, 40, Oahu; Günther Fische der Südsee, IV, 116, taf. LXXVI, 1876 (Society and Sandwich islands; New Hebrides); Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 498 (Honolulu).

Acanthurus rhombicus, Günther, Cat., III, 342, 1861 (Sandwich Islands).

Zabrasoma agaña Seale, Oc. Papers Bishop Mus. I, No. 3, 1900 (1901) 110, Guam.

Scopas flavescens, Jenkins, Bull. U. S. Fish Comm., XXII, 1902 (Sept. 23, 1903), 480 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 533 (Honolulu, Puako Bay, Hawaii).

Acanthurus virgatus Vaillant & Sauvage, Rev. Mag. Zool., III, 1875, 283, Sandwich Islands.

Genus 181. CTENOCHÆTUS Gill.

Teeth movable, strongly serrate; otherwise essentially as in *Hepatus*. Herbivorous species of dull coloration; 8 dorsal spines.

Ctenodon Swainson, Class. Fish., II, 255, 1839 (*strigosus*); preoccupied.

Ctenochætus Gill, Proc. U. S. Nat. Mus., VII, 1884, 277, 279 (*strigosus*).

325. *Ctenochætus striatus* (Quoy & Gaimard). "Kale." Fig. 171.

Head 3.5 in length; depth 1.8; snout 1.8 in head; eye 4; interorbital 2.75; D. VIII, 27; A. III, 25.

Body deep, short, compressed; upper and lower profiles evenly convex; head deep, compressed, upper profile evenly convex from tip of snout to occiput; snout long, jaws low, very slightly produced; lips thin, teeth slender, dilated, compressed at end, the outer side crenulate; margin of preopercle very oblique, angle below anterior margin of eye; interorbital space broad, elevated, convex; nostrils small, close together, anterior circular, with small, thin, fleshy flap, posterior short, slit-like; dorsal spines graduated to last, which is 1.65 in head; soft dorsal with rays of last third produced in a sharp point, sixteenth ray 1.25; anal spines graduated to last, which is 2; posterior anal rays produced in a point, thirteenth 1.2; caudal rather large, broad, deeply emarginate, upper and lower rays produced in points; pectoral broad, 3.25 in body; ventrals long, sharply pointed, 3.2 in body; ventral spine sharply pointed, 2 in head; caudal peduncle compressed, its depth 2.35; caudal spine long, depressible in a groove, 3; scales very small, ctenoid; lateral line nearly concurrent with dorsal profile, running down behind to caudal spine; very minute scales on basal portions of vertical fins.

Color in life (No. 03300), side coppery red with about 30 narrow pale blue, somewhat wavy, irregular longitudinal lines; head dark brown; dorsal much like side; anal solid bluish-black; cauda

coppery black; ventrals rosy, black at tips; pectoral orange, paler below; iris blue surrounded by orange.

Color of an example from Hilo when fresh, darkish black, faintly streaked with dark reddish.

Color in alcohol, deep chocolate brown; snout, jaws, ridge of the head, ventrals and vertical fins, blackish; side with about 40 narrow grayish horizontal lines, those above running up vertically on dorsal, those below running down vertically on anal; pectorals dilute grayish-green. Described chiefly from an example (No. 03728) from Honolulu.

This species, described originally from Guam, is rather common at Honolulu, from which place we have 11 specimens, 7 collected by Doctor Jenkins. It was also obtained at Honolulu by the *Albatross*, and we have 3 examples from Kailua, 1 from Hilo, and 5 from Napoopoo, Hawaii. Our specimens are 4.4 to 7.6 inches long.

The original description of this species was doubtless based on very young examples. *Acanthurus strigosus*, described by Bennett, from Honolulu, is the adult of the same species.

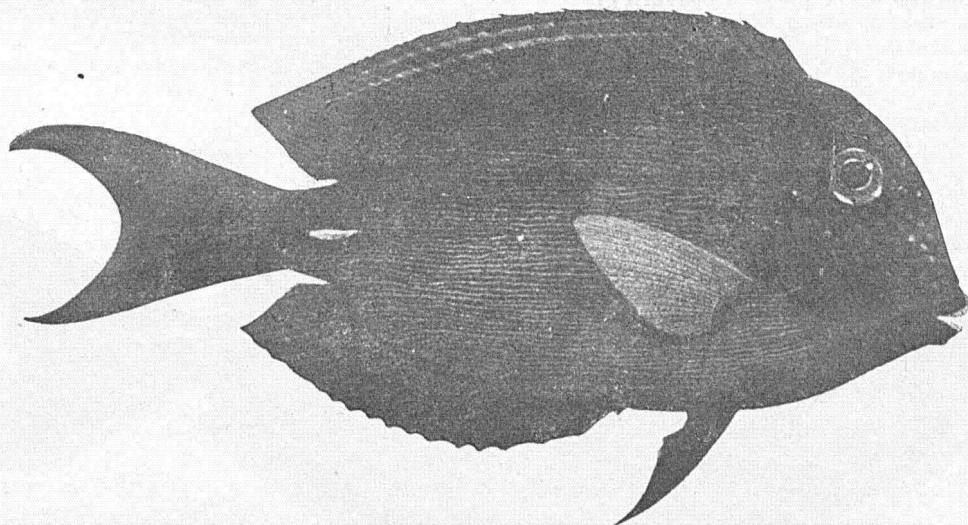


FIG. 174.—*Ctenochatus striatus* (Quoy & Gaimard); after Günther.

Acanthurus striatus Quoy & Gaimard, Voyage l'Uranie, Zool., 373, pl. 63, fig. 3, 1824, young, Guam; Cuvier & Valenciennes, Hist. Nat. Poiss., x, 229, 1835 (Sandwich Islands).^a

Acanthurus strigosus Bennett, Zool. Journ., IV, Nô. XIII, Art. III, 1828, 41, adult, Honolulu; Günther, Cat., III, 342, 1861 (Bennett's type); Günther, Fische der Südsee, IV, 116, taf. LXXIX, figs. B & C, 1875 (Sandwich Islands).

Acanthurus ctenodon Cuvier & Valenciennes Hist. Nat. Poiss., x, 241, pl. 289, 1835, Carolines and New Guinea.

Acanthurus (Ctenodon) strigosus, Steindachner, Denks. Ak. Wiss. Wien, LXX, 1900, 494 (Honolulu).

Ctenochatus strigosus, Jenkins, Bull. U. S. Fish Comm. XXII, 1902 (Sept. 23, 1903), 480 (Honolulu); Snyder, op. cit. (Jan. 19, 1904), 534 (Honolulu); Seale, Occ. Papers Bishop Museum, vol. 1, No. 3, 109, 1901 (Guam).

Genus 182. ACANTHURUS Forskål.

Body oblong, compressed, covered with small roughish scales; tail with 2 large immovable, bony, keeled plates, these entirely wanting in very young individuals; head in the adult with the forehead prominent, developing a very long horn above the eyes, this wanting in the young; teeth small, in one series, slightly compressed incisors, usually with serrate edges; ventral fins incomplete, the rays 1, 3; dorsal with 5 or 6 spines; anal with 2 spines; intestinal canal elongate.

Herbivorous fishes of the East Indian and Polynesian seas, some of them remarkable for the bony frontal projection and for the large ornate caudal spines.

Acanthurus Forskål, Deser. Anim., 59, 1775 (*unicornis*).

Monoceros Schneider, Syst. Ichth., 180, 1801 (*biaculeatus*).

Naso Lacépède, Hist. Nat. Poiss., III, 106, 1801 (*fronticornis*).

^aQuoted from Quoy and Gaimard, who recorded the species from Guam only.

Nasomus Rafinesque, Anal. Nature, 83, 1815; substitute for *Naso*.
Priodon (Cuvier) Quoy & Gaimard, Voy. Uranie, Zool., 377, 1824 (*annulatus*).
Naseus Cuvier, Règne Animal, 2d ed., II, 225, 1829 (*fronticornis*).
Priodontichthys Bonaparte, Describ. Metod. Anim. Vest., 34, 1833 (*annulatus*).
Keris Cuvier & Valenciennes, Hist. Nat. Poiss., X, 304, 1835 (*anginosus*).

- a. Caudal spines gray; forehead with a rounded protuberance.
 b. Color nearly plain; D. v, 28 *incipiens*, p. 400
 bb. Color usually mottled; D. vi, 27 *brevirostris*, p. 401
 aa. Caudal spines blue; forehead in adult with a long horn; D. vi, 30 *unicornis*, p. 402

326. *Acanthurus incipiens* Jenkins. Fig. 175.

Head 2.75 in length; depth 2.2; eye 3.4 in head; snout 1.4; interorbital space 3; D. v, 28; A. ii, 27; P. 18.

Body oblong-ovate, compressed, the greatest depth under third dorsal spine; head short; anterior profile from tip of snout to front of eye concave, a distinct prominence in front of eye at level of its

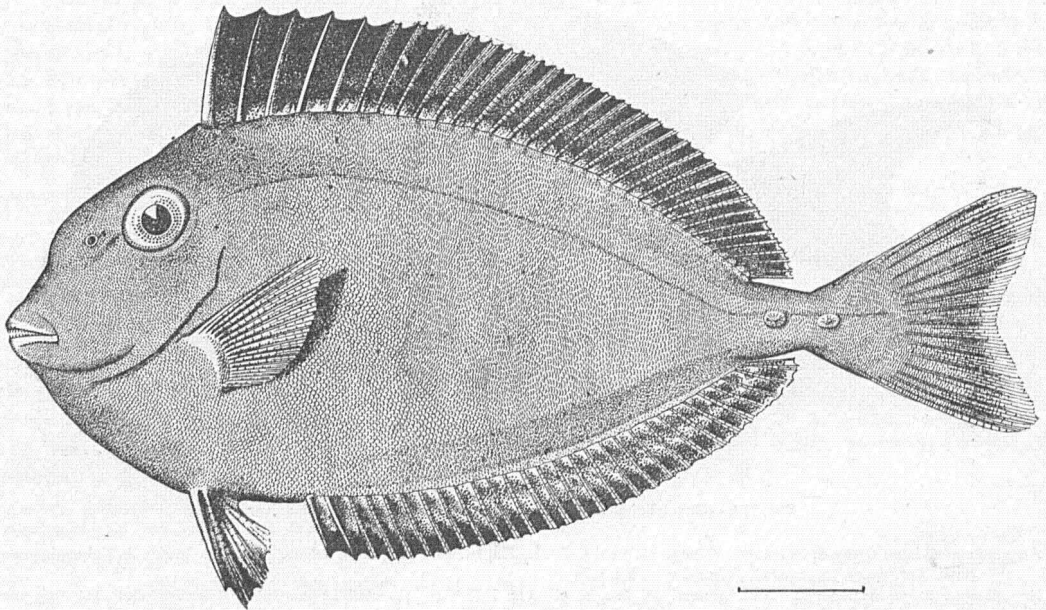


FIG. 175.—*Acanthurus incipiens* Jenkins; from the type.

lower border, from which the profile is nearly straight to origin of dorsal; ventral outline strongly convex from tip of snout to base of ventrals; dorsal and ventral outlines from origin of dorsal and ventral fins to base of caudal peduncle each in a long low curve, most convex anteriorly; head short; snout blunt; mouth small, horizontal, below axis of body; jaws each with a single series of fine, sharp, close-set, finely serrulate canine teeth; a short-curved groove in front of eye below nostrils, its length 2 in eye; gill-opening long and oblique, extending far anteriorly, the upper end at vertical of first dorsal spine; interorbital space not strongly convex, the median ridge low. Body rough velvety; each side of caudal peduncle with 2 very low weak horny plates, without spines, the distance between them 1.5 to 2 in eye; first dorsal spine rather strong, moderately rough, its length 1.7 in head; other dorsal spines smoother and more slender, the fifth 2 in head; soft dorsal not high, the rays of about uniform length, the longest about 2.5 in head; anal spines rather short and slender, the second equal to diameter of orbit, soft anal similar to dorsal, equally high; caudal deeply emarginate, the free edge of the 2 lobes forming a broad angle; upper lobe of the caudal somewhat the longer, its length nearly equaling head; ventral spines moderate, reaching base of first anal spine, their length 2 in head; pectoral short, its length a little less than snout.