

Three New Butterflyfishes (Chaetodontidae) from Southeast Oceania

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For a period of seven months beginning early December, 1970, the author collected and photographed marine fishes at 28 islands in SE Oceania aboard the 30-meter schooner "Westward", with support of a grant from the National Geographic Society to the Bishop Museum. At most of these islands few species of fishes or none at all had been collected previously. Three new butterflyfishes were among the more exciting discoveries of the expedition, two in the genus *Chaetodon* and one in *Hemitaurichthys*.

One of the participants of the cruise on the "Westward", Dennis M. DEVANEY, marine invertebrate biologist with the Bishop Museum, visited Pitcairn (25°04'S, 130°05'W) in 1967. While diving at the island he observed a striking half-black, half-yellow *Chaetodon*. When he informed me of this fish, I knew it must represent a new species, which reinforced the plans to go to this remote island.

On April 11-17, 1970, more than eight months before the "Westward" was to stop at Pitcairn and other islands of the South Pacific, C. Lavett SMITH of the American Museum of Natural History made a significant collection of fishes at the island of Rapa (27°36'S, 114°18'W). Among the 82 species he obtained were eight specimens of the black and yellow *Chaetodon*. He has kindly made this material available to supplement the specimens later taken by the author and associates at Pitcairn and Rapa.

The new *Hemitaurichthys* was also collected at Pitcairn. In contrast to the bicolored *Chaetodon*, which was observed in as little as 3 m, the *Hemitaurichthys* was encountered only at depths of 40 to 44 m.

The second undescribed *Chaetodon*, a species related to *C. tinkeri* Schultz of the Hawaiian Islands, was collected at Fatu Hiva, Marquesas Islands, in the depth range of 23 to 30.5 m.

The holotypes and some paratypes of the new species are in the Bernice P. Bishop Museum (BPBM). Other paratypes have been deposited in the

American Museum of Natural History, New York (AMNH), Australian Museum, Sydney (AM), British Museum (Natural History), London [BM(NH)], California Academy of Sciences, San Francisco (CAS), Muséum National d'Histoire Naturelle, Paris (MNHN), and National Museum of Natural History, Washington, D. C. (USNM).

Warren E. Burgess assisted in the analysis of the specimens.

Chaetodon smithi, new species

Bicolored Butterflyfish

Pl. II, figs. 1 & 2

Holotype.—BPBM 13220, 129.8 mm SL, male, Pitcairn, off Young's Rock, 9 m, spear, J. RANDALL, 22 December 1970.

Paratypes.—AMNH 32455-6, 8: 32.9-88 mm SL, Rapa, rotenone, C. L. SMITH and associates, 12-15 April 1970; USNM 214673, 138 mm SL, Pitcairn, wreck of "Cornwallis", spear, D. CANNOY, 20 December 1970; BM(NH) 1975.8.13.2, 140 mm SL, same data as preceding; BPBM 13216, 128.7 mm SL, same data as holotype; BPBM 13217, 123.2 mm SL, Pitcairn, off the Rope, 27.5-30.5 m, rotenone, J. RANDALL, D. CANNOY and S. CHRISTIAN, 23 December 1970; BPBM 13218, 126.1 mm SL, Pitcairn, off West Harbor, 12-15 m, rotenone, J. RANDALL, D. CANNOY, C. & S. CHRISTIAN, and N. YOUNG, 27 December 1970; BPBM 13221, 142 mm SL, Pitcairn, off West Harbor, spear, J. HAYWOOD, 29 December 1970; AM I. 17916-001, 92 mm SL, Rapa, east side of Tematapu Point, 3-6 m, rotenone and spear, D. CANNOY, R. COSTELLO, and A. SINOTO, 31 January 1971; CAS 33466, 112 mm SL, and MNHN 1975-696, 83.5 mm SL, same data as preceding; BPBM 13058, 2: 98 and 102.4 mm SL, Îlots de Bass (Marotiri), southeast isle, 14 m, spear, J. RANDALL, 20 February 1971.

Diagnosis.—Dorsal fin rays XIII, 23 or 24; anal fin rays III, 19 or 20; pectoral fin rays 15 or 16; pored lateral-line scales 37-46; depth of body 1.7-1.9 in SL; snout very slightly produced, 2.7 to 3.3 in head; fourth to sixth dorsal spines the longest, 4.4-6.3 in SL; dorsal and anal fins broadly rounded posteriorly with no prolonged rays; caudal fin slightly emarginate; anterior half of fish black, posterior half yellow; a submarginal black line in yellow portion of dorsal and anal fins.

Description (data in parentheses apply to paratypes when different from

holotype).—Dorsal fin rays XIII, 23 (23-24); anal fin rays III, 19 (18-20); pectoral fin rays 16 (15) (including upper rudimentary ray), the upper two and lowermost unbranched; pelvic rays I, 5; principal caudal rays 17 (median 15 branched); pored lateral-line scales 39 (37-46); near-vertical scale rows from upper end of gill opening to caudal base 57 (57-62); scales above lateral line to origin of dorsal fin 11 (10-11); scales below lateral line to origin of anal fin 26 (24-30); about 7 irregular vertical rows of scales on opercle; circumpeduncular scales 28 (28-30); gill rakers 16 (17-20); vertebrae 23.

Body moderately deep, the maximum depth (from extreme base of D spines) 1.8 (1.7-1.9) in SL, and compressed, the width 4.0 (3.8-4.3) in depth; head 3.5 (3.2 to 3.8) in SL; snout very slightly produced, 3.0 (2.7-3.3) in head; dorsal profile of head slightly concave with a minor convexity above front of eye, the overall angle about 53° to the horizontal; eye 3.2 (2.7-3.2) in head; interorbital width 3.0 (2.7-3.2) in head; least depth of caudal peduncle 10.9 (10.2-11.8) in SL; length of caudal peduncle (measured from rear base of anal fin to mid-base of caudal fin) about equal to depth of caudal peduncle; predorsal length 2.7 (2.5-2.9) in SL; prepelvic length 2.6 (2.3-2.7) in SL.

Mouth small, slightly oblique, the lower jaw slightly projecting, the maxillary reaching a vertical at anterior nostril; teeth setiform, in 5 to 7 rows at front of jaws, the longest about 5 in eye; a small bony prominence on each side at front of snout in alignment with nostrils; nostrils close-set, the posterior elliptical, about a nostril diameter (greatest) from edge of orbit; anterior nostril with a fleshy rim, usually prolonged to a flap posteriorly.

Posterior margin of opercle above pectoral base obtusely angular but the tip rounded; margins of opercular bones smooth except for some slight crenulations and/or tiny weak serrae on preopercle; edge of lacrymal and supraorbital smooth.

Origin of dorsal fin above posterior edge of opercle; first dorsal spine 10.2 (9.2-13.4) in SL, about 1.4 to 2 in length of second spine; fourth to sixth dorsal spines the longest, 4.9 (4.4-6.3) in SL; base of spinous portion of dorsal fin longer than soft portion, the spinous 2.2 (2.1-2.2) in SL; interspinous membranes of anterior dorsal and anal fins deeply incised; posterior part of dorsal and anal fins broadly rounded with no prolonged rays, the

seventh or eighth dorsal soft rays the longest, 5.6 (4.9-5.4) in SL; second anal spine the longest, 4.4 (3.6-5.5) in SL; first anal soft ray the longest, 4.8 (4.1-4.7) in SL; pectoral fins pointed, the third and fourth rays the longest, 3.9 (3.3-4.1) in SL, origin of pelvic fin slightly posterior to lower base of pectorals; pelvic fins 4.2 (3.7-4.2) in SL, relatively longer on smaller individuals, falling short of or extending slightly beyond anus; pelvic spine 5.5 (4.8-5.4) in SL; caudal fin slightly emarginate, the longest rays 4.4 (4.0-4.4) in SL.

Lateral line describing a moderate arc, the peak at base of last dorsal spines, ending below base of last few dorsal rays.

Ctenoid scales over all of head and body except lips, chin, and most anterior part of snout; median fins scaled nearly to margins except anterior incised spinous portions of dorsal and anal fins; paired fins scaled only basally; scaly axillary process of pelvic fins about equal to eye diameter.

Color in alcohol: head and body to level of base of ninth dorsal spine black, then abruptly light tan posteriorly; vertical dark-light demarcation usually slightly irregular and angling posteriorly on ventral part of body to origin of anal fin; approximately anterior half of dorsal fin blackish except the outer part of the more posterior interspinous membranes; posterior spinous and all of soft portion of dorsal and anal fins light tan with a submarginal black line; caudal fin light tan except for a crescentic area on about posterior third which has clear membranes and faintly dusky rays; pectoral fins with membranes clear, the rays brownish, the second ray the darkest; pelvic fins blackish.

In life the anterior half is black and the posterior half bright yellow except for a nearly clear crescent posteriorly in the caudal fin, a bluish white margin on the anal fin and posteriorly on the dorsal fin, and a submarginal black line in these fins; outer part of the interspinous membranes of the dorsal fin above the black sector of body yellow (except membrane of first spine).

Juveniles are colored much like adults. They differ in the caudal fin being mostly hyaline and the black submarginal line of the dorsal and anal fins broader.

Remarks.—This species is known only from the islands of Pitcairn, Rapa, and Îlots de Bass (Marotiri), a group of ten rocky islets 50 miles SE

of Rapa. For a chaetodontid it was particularly abundant on the reefs and rocky shores of Rapa (Fig. 2).

Named *smithi* in honor of C. Lavett SMITH who collected the first specimens and recognized that they represented an undescribed species.

The closest relative of *smithi* is *Chaetodon litus* RANDALL & CALDWELL from Easter Island, a drab species which is uniformly brown (the scales paler in centers) except for a pale crescent posteriorly in the caudal fin and white margins on the dorsal and anal fins. Were it not for the color differences, the two species would be difficult to separate.

Chaetodon declivis, new species

Marquesan Butterflyfish

Pl. III, fig. 3

Holotype.—BPBM 11734, 92.4 mm SL, Fatu Hiva, Marquesas Islands, off point at north side of Hanauu Bay, base of vertical rock wall in 23 m, bottom rock and sand, spear, J. RANDALL, 20 April 1971.

Paratypes.—BPBM 11733, 2: 86.9–95 mm SL, same date as holotype; CAS 33467, MNHN 1975–695, and USNM 214674, 3: 85–95 mm SL, same location as holotype, 23–30.5 m, rotenone, J. RANDALL, D. CANNOY, and R. MCNAIR, 21 April 1971.

Diagnosis.—Dorsal fin rays XIII, 20; anal rays III, 15 or 16; pectoral fin rays 15; lateral-line scales 37–41; depth of body 1.7–1.8 in SL; snout very slightly produced, its length 2.9–3.5 in head; eye diameter 2.5–2.8 in head; third or fourth dorsal spines the longest, 3.1–3.5 in SL; dorsal and anal fins broadly rounded posteriorly with no produced rays; caudal fin slightly rounded; scales anteriorly on side of body much larger than posterior scales; head and anterior part of body white to a diagonal demarcation from base of fourth dorsal spine to posterior portion of anal fin; body and dorsal fin posterior to demarcation dirty orange-yellow except ventro-posterior part (including most of caudal peduncle) which is blackish and margin of dorsal which is white; scales on side of white portion of body with a blackish basal spot; an orange-yellow bar through eye; caudal, pelvic fins, and outer part of anal fin yellowish, the anal with a black margin.

Description (data in parentheses apply to paratypes when different from

holotype).—Dorsal fin rays XIII, 20; anal fin rays III, 16 (15 or 16); pectoral fin rays 15, including upper rudimentary ray, the upper two and lowermost unbranched; pelvic rays I, 5; principal caudal rays 17, the median 15 branched; pored lateral-line scales 37-41¹; scales above lateral line to origin of dorsal fin 9 (7-9); scales below lateral line to origin of anal fin 16 (14-16); about 6 irregular vertical rows of scales on opercle; circum-peduncular scales 26; gill rakers 17-19¹; vertebrae 23.

Body moderately deep, the maximum depth (from extreme base of D spines) 1.7 (1.7-1.8) in SL and compressed, the width about 3.5 in depth; head 3.3 (3.3-3.5) in SL; snout very slightly produced, its length 3.0 (3.0-3.5) in head; dorsal profile of head from snout to nape slightly concave with a minor convexity centered over front of eye, the average slope forming an angle of about 58° to the horizontal; eye 2.9 (2.5-2.8) in head; interorbital width 3.0-3.4¹ in head; least depth of caudal peduncle 9.9 (9.4-11.0) in SL; length of caudal peduncle (measured from rear base of anal fin to mid-base of caudal fin) about three-fourths least depth of peduncle; pre-dorsal length 2.5 (2.4-2.6) in SL; prepelvic length 2.5 (2.5-2.6) in SL.

Mouth small, slightly oblique, the lower jaw slightly projecting, the maxillary nearly reaching a vertical at anterior nostril; teeth setiform, in 7 rows at front of upper jaw and 9 at front of lower, the longest about 5.5 in eye; a small bony prominence on each side at front of snout in alignment with nostrils; nostrils close-set, the posterior elliptical, within a nostril diameter (greatest diameter) of edge of orbit, the anterior with a fleshy rim and a posterior flap.

Posterior corner of opercle with a slight obtuse angularity; edges of opercular bones smooth except for a slight crenulation of the preopercle; lacrymal and supraorbital margins smooth.

Origin of dorsal fin slightly anterior to upper end of gill opening; first dorsal spine 10.9 in SL (seems abnormally short in holotype, 7.2-9.8 in paratypes), contained about 1.8 in second spine; third or fourth (usually the

¹ Inadvertently, the lateral-line scale and gill-raker counts and width of interorbital space of the holotype were not distinguished from these data for the paratypes. The holotype is presently on loan to Warren E. Burgess who has not responded to the author's request for these counts and measurement.

fourth) dorsal spines the longest, 3.5 (3.1-3.5) in SL; base of spinous portion of dorsal fin longer than soft, the spinous base 2.2 (2.1-2.3) in SL; interspinous membranes of anterior dorsal and anal fins very deeply incised; posterior part of dorsal and anal fins broadly rounded, the rays short in comparison to spinous portion of fins, the first dorsal soft ray the longest, about 5.3 in SL; second anal spine the longest, 3.3 (3.1-3.6) in SL; first anal soft ray the longest, about 3.9 in SL; pectoral fins pointed, the third and fourth rays the longest, 3.8 (3.3-3.8) in SL; origin of pelvic fins below lower base of pectorals; pelvic fins about 3.4 in SL, barely reaching anus; pelvic spine about 4.5 in SL; caudal fin slightly rounded, the longest rays about 5 in SL.

Lateral line describing a moderate arc, the highest point below about the base of the tenth to eleventh dorsal spines, ending beneath base of third-from-last dorsal soft rays.

Ctenoid scales over all of head and body except lips and narrow adjacent parts of snout and chin; scales laterally on anterior part of body extremely large, the largest nearly an eye diameter in height; scales progressively smaller posteriorly, those on caudal peduncle about one-fourth height of larger anterior scales; scales on head abruptly smaller, averaging about one-sixth the height of larger body scales; median fins scaled nearly to margins except anterior spinous portions of dorsal and anal fins; paired fins scaled only basally; scaly axillary process of pelvic fins about three-fourths eye diameter.

Color in alcohol: head light brown with a faintly dark-edged pale bar through eye, the upper end pointed and not reaching mid-dorsal line; nape, thorax, and body to a diagonal blackish line between base of third dorsal spine and fifth-from-last anal soft ray light gray with a dark basal spot on scales below lateral line; body and scaled portion of dorsal fin dorso-posterior to demarcation brown except ventro-posteriorly where shading to black; all of caudal peduncle black except narrow upper part which links diagonally to pale caudal fin; interspinous membranes of dorsal fin and distal soft portion of fin pale with a black submarginal line (black is marginal on fourth and fifth interspinous membranes and absent on first to third); anal fin pale except for a black margin posteriorly and a continuation into rear base of fin of black posterior part of body; paired fins pale.

In life the front pale part of the body is white, the ocular bar yellow-orange, the upper section of bar edged in dusky, the front of the snout dusky yellow, and the spots on the body scales blackish; posterior to the blackish demarcation, the back and dorsal fin are deep yellow-orange suffused with dusky; a large black area posteriorly including most of caudal peduncle; all but most anterior dorsal spines tipped with white under which there is a black line; soft portion of fin with a distinct white margin and submarginal black line; anal fin white with a broad border of yellow on soft portion shading posteriorly or yellow orange; a narrow black margin posteriorly on fin; caudal fin dull light yellow; pectoral fins pale with a yellow-orange streak at base (broader dorsally); pelvic fins dirty yellow.

Remarks.—Observed and collected only at the island of Fatu Hiva in the Marquesas in the depth range of 23 to 30.5 meters. No juveniles were seen.

Named *declivis* from the Latin for sloping, in reference to the abrupt diagonal demarcation in color pattern.

C. declivis belongs in a distinctive complex of deeper-dwelling *Chaetodon* which in the Indo-Pacific includes *C. tinkeri* SCHULTZ from the Hawaiian Islands, *C. mitratus* GÜNTHER from Mauritius and Réunion and *C. burgessi* ALLEN and STARCK from the Palau Islands. All have a very characteristic configuration with the third and fourth dorsal spines the longest and the posterior part of the fin shortened, and all have a highly contrasting color pattern in which the demarcation of dark and light is diagonal. Of these, *declivis* seems most closely related to *tinkeri*. The latter has the upper posterior part of the body and dorsal fin entirely black except for a marginal band of white, black, and orange on the dorsal; also *tinkeri* has a smaller eye (2.9-3.0 in SL, in contrast to 2.5-2.9 for *declivis*).

Hemitaurichthys multispinosus, new species

Spiny Butterflyfish

Pl. III, fig. 4

Holotype.—BPBM 13225, 144.1 mm SL, male, Pitcairn, north side off Gannet Ridge, patch reef called "The Bear", 40-44 m, rotenone, J. RANDALL, D. CANNON, J. HAYWOOD, R. COSTELLO, J. BRYANT, and S. CHRISTIAN, 6

January 1971.

Paratypes.—BPBM 13222, 2: 136.2 and 159 mm SL, same location as holotype, spear, J. RANDALL and D. CANNOY, 28 December 1970; BPBM 13327, AM I. 18430-001, BM(NH) 1975.8.13.2, CAS 33468, USNM 214675, 6: 136-162 mm SL, same data as holotype.

Diagnosis.—Dorsal fin rays XV-XVI, 18-20; anal fin rays V, 15; pectoral fin rays 18 or 19; lateral line complete, the pored scales 80-91; depth of body 2.1-2.3 in SL; caudal fin emarginate, the caudal concavity about 2.8 in head; ventral profile of snout distinctly concave; color in alcohol uniform brown; in life brown with a bluish cast.

Description (data in parentheses apply to paratypes when different from holotype).—Dorsal fin rays XVI, 19 (XV-XVI, 18-20), anal fin rays V, 15; pectoral fin rays 19 (18 or 19), including upper rudimentary ray (upper two and lower two unbranched); pelvic fins I, 5; principal caudal rays 17 (median 15 branched); lateral-line scales 84 (80-91); scales above lateral line to origin of dorsal fin 19 (16-19); scales below lateral line to origin of anal fin 37 (34-41); about 13 irregular vertical rows of scales on opercle; circumpeduncular scales 36 (34-39); gill rakers 18 (18-21); vertebrae 23.

Body not deep for the genus, the maximum depth 2.1 (2.1-2.3) in SL, and compressed, the width about 3.7 in depth; head 3.3 (3.3-3.8) in SL; snout somewhat produced, the length 3.3 (2.9-3.4) in head; dorsal profile of snout nearly straight, forming an angle of about 50° to the horizontal; profile from above middle of eye to dorsal origin convex; ventral profile of snout distinctly concave; eye near middle of head, 3.3 (2.9-3.4) in head; interorbital space highly convex, the width 3.0 (2.8-3.1) in head; least depth of caudal peduncle 9.7 (9.8-11.2) in SL; length of caudal peduncle (measured from rear base of anal fin to mid-base of caudal fin) slightly greater than least depth of peduncle; predorsal length 2.7 (2.6-2.9) in SL; prepelvic length 2.5 (2.4-2.7) in SL.

Mouth very small, slightly oblique, the lower jaw projecting, the maxillary reaching a vertical at anterior nostril; teeth small (the longest on holotype about 0.3 mm), slender, the tips incurved, in one or two irregular rows in jaws; a slight bony prominence on each side at front of snout; nostril apertures round, close-set, the posterior about two nostril diameters from edge of orbit, the anterior with a low fleshy rim and posterior flap.

Posterior corner of opercle a sharp right angle; margins of opercular bones smooth except preopercle which is very finely crenulate; lacrymal and supraorbital margins smooth.

Origin of dorsal fin above upper end of gill opening; dorsal fin low, the first spine about 20 in SL, 1.6 in second dorsal spine; sixth dorsal spine the longest, 6.7 (6.6-7.8) in SL; last dorsal spine about 7.4 in SL; base of spinous portion of dorsal fin longer than soft, the spinous part 2.4 (2.4-2.5) in SL; only the first three interspinous membranes incised half or more length of spines; soft portion of dorsal fin relatively uniform in height, the second and third rays the longest, about 6.8 in SL; fifth anal spine the longest, 5.4 (5.3-6.3) in SL; first anal soft ray the longest, about equal to fifth spine; pectoral fins pointed, long, the third and fourth rays the longest, reaching beyond a vertical at origin of anal fin, their length 3.0 (2.7-3.0) in SL; origin of pelvic fins below lower base of pectoral fins; pelvic fins about 4.7 in SL, not reaching anus; pelvic spine about 6.6 in SL; caudal fin strongly emarginate, the caudal concavity (horizontal distance between longest and shortest rays) about 2.8 in head, the longest rays about 3.3 in SL.

Lateral line complete, forming a moderate arc with highest point in about middle of body.

Small ctenoid scales over all of head and body except lips, narrow adjacent regions of snout and chin, and a narrow zone containing nostrils; scaly sheath beginning near base of first dorsal spine, rising progressively higher to a point where it covers about three-fourths of last spine; soft portions of median fins scaled nearly to margins; about basal third of pectoral fins scaled; small scales extending on pelvic rays about two-thirds distance to distal tips; scaly axillary process of pelvic fins about 0.8 eye diameter.

Color in alcohol uniform dark brown. In life there is a bluish cast.

Remarks.—Observed and collected only at the island of Pitcairn over a well-developed coral reef at a depth of 40 to 44 meters. Like the three other members of the genus, this species feeds well above the substratum on small animals of the zooplankton; it retires to the protection of the reef with the approach of danger.

Named *multispinosus* from the Latin *multus* (many) and *spinosus* (having thorns or spines), in reference to the high number of dorsal and anal spines.

The author admits to a temptation to create a new genus for this species because of its higher dorsal and anal spine counts. Were it not for the existence of *H. thompsoni* FOWLER, *multispinosus* would certainly warrant generic distinction. *H. thompsoni*, however, provides a link between the high-bodied *H. zoster* (BENNETT) and *H. polylepis* (BLEEKER) in a number of characters. It shares some things such as XII dorsal and III anal spines with *zoster* and *polylepis*, others such as lower dorsal and anal fins, small scales, and drab brown hue with *multispinosus*, and it is intermediate in body depth and caudal fin shape.

Legend for Plates II & III

Plate II

- Fig. 1. *Chaetodon smithi* RANDALL, holotype, BPBM 13220, 129.8 mm standard length, Pitcairn.
Fig. 2. Feeding aggregation of *Chaetodon smithi* at Rapa (underwater photo by J. RANDALL).

Plate III

- Fig. 3. *Chaetodon declivis* RANDALL, holotype, BPBM 11734, 92.4 mm standard length, Fatu Hiva, Marquesas Islands. Tip of fourth dorsal spine cut off in photo.
Fig. 4. *Hemitaurichthys multispinosus* RANDALL, holotype, BPBM 13225, 144.1 mm standard length, Pitcairn.



Fig. 1.



Fig. 2.



Fig. 3.

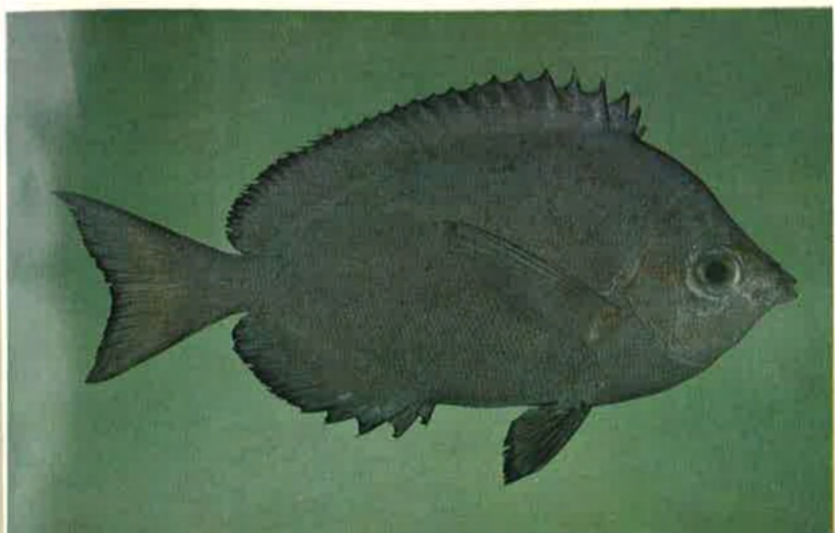


Fig. 4.