

***Scarus fuscocaudalis*, a new species of parrotfish (Perciformes:
Labroidei: Scaridae) from the western Pacific**

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Abstract—The parrotfish *Scarus fuscocaudalis* is described from four specimens from Guam and Luzon. Underwater photographs verify its occurrence in the Ryukyu Islands and Taiwan. This species is distinct in having 14 pectoral rays, 4 median predorsal scales, 3 rows of scales on the cheek, the lower row with 1 or 2 scales, and the following features of color pattern: initial phase brownish pink with blue-green stripes on abdomen, the large central part of caudal fin blackish; terminal males pink and green, with blue and pink stripes ventrally; head blue with pink stripes (a broad one on snout passing through lower eye to pectoral-fin base, and another from behind eye across upper part of operculum).

Introduction

The parrotfishes (family Scaridae) are easily recognized by the fusion of their teeth to form beak-like dental plates and by the bright coloration of most species, particularly the more colorful terminal males. Their sturdy dental plates and strong jaws enable them to scrape into algal-covered limestone and utilize algae no longer available to herbivores like surgeonfishes (Acanthuridae) and sea chubs (Kyphosidae) that can only graze directly on the thalli. They grind the limestone fragments and algae with their unique pharyngeal dentition, thus making the algae more digestible. Because of their more efficient use of algae when cropped to low levels by other herbivores, they occupy an otherwise unused niche on the coral reef. The abundance of parrotfishes on coral reefs is an indication of their success in exploiting this niche. As a result of the digestive process, these fishes void large quantities of sand and are therefore a major producer of calcareous sediment in coral-reef areas.

The generic classification of the family is now on a sound basis as result of the phylogenetic study by Bellwood (1994). Ten genera are recognized, of which the following seven occur in the Indo-Pacific region: *Calotomus*, *Leptoscarus*, *Cetoscarus*, *Bolbometopon*, *Chlorurus*, *Hipposcarus*, and *Scarus*. The last-

mentioned is the largest genus, with 49 species, and the only one common to all tropical and subtropical oceans.

The identification of the 40 Indo-Pacific species of *Scarus* can be difficult, especially for preserved specimens that have largely lost their distinctive life color. Meristic data are of limited value in species identification. All parrotfishes normally have IX,10 dorsal rays and III,9 anal rays. The number of pectoral rays of the species of *Scarus* vary from only 14-16, but the count is strongly modal for each species, so it is often helpful. The usual lateral-line scale count of 17-18 + 4-6 is of no diagnostic value, but the number of predorsal scales and the number of rows of scales on the cheek may be useful characters. The gill rakers are very small and variable in number within a species. The general morphology is very similar for most species of *Scarus*. Heavy reliance has been placed on life color in the classification of *Scarus*, but sexual dichromatism and the different color of the juvenile stages (Bellwood 1989, Bellwood & Choat 1989) greatly complicate species identification.

Many of the species of scarid fishes have been described more than once because of the variation in color with growth and with sex change. Only in recent years have most of the color phases of adults been properly linked as one species (Brock & Yamaguchi 1954, Randall 1963, Randall & Choat 1980, Randall & Bruce 1983, Bruce & Randall 1985, Choat & Randall 1986).

There is still more field work to be done with some species to determine the juveniles. Such is the case with the parrotfish we describe below. Its description has been delayed in the hope of discovering the juvenile. However, we now realize that naming this species is long overdue, as will be noted by the recent publications that have illustrated it as *Scarus* sp. (see synonymy below).

Materials and Methods

Type specimens of the new species have been deposited in the Bernice P. Bishop Museum, Honolulu (BPBM); California Academy of Sciences, San Francisco (CAS); and the U.S. National Museum of Natural History, Washington, D.C. (USNM).

Lengths of specimens are given as standard length (SL) which is measured from the most anterior median point of the upper lip or upper dental plate (whichever is more anterior) to the base of the caudal fin (posterior end of hypural plate); head length is measured from the same anterior point to the posterior end of the opercular flap; body depth is the greatest depth from the base of the dorsal spines to the ventral margin of the abdomen (correcting for any obvious malformation of preservation); body width is measured just posterior to the gill opening; orbit diameter is the greatest fleshy diameter, and interorbital width the least bony width; caudal-peduncle depth is the least depth, and caudal-peduncle length the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; caudal-fin length is taken from the base of the fin horizontally to the end of the longest ray; caudal concavity is the horizontal distance

between verticals at the tips of the shortest and longest rays; lengths of fin spines and rays of the dorsal and anal fins are measured from their extreme bases without straightening the rays; pectoral-fin length is the length of the longest ray; pelvic-fin length is measured from the base of the pelvic spine to the tip of the longest soft ray.

Pectoral-ray counts include the upper rudimentary ray. Lateral-line scale counts do not include the two pored scales posterior to the hypural plate (i.e. lying on the base of the caudal fin); counts of the scales of the cheek are made as indicated in Figure 5 of Schultz (1958).

Data in parentheses in the Description refer to paratypes. Proportional measurements in the text are rounded to the nearest 0.05.

Scarus fuscocaudalis, new species
(English common name: Darktail Parrotfish)
Plate I A-E; Table 1

Scarus n. sp. Myers, 1989: 198, pl. 111 G (Philippines, Ryukyus, New Guinea, and Guam).

Scarus sp. 1 Kuitert, 1992: 205, figs. A, B (Kerama Island, Okinawa).

Scarus sp. Lieske and Myers, 1994: 108, fig. 12 (Philippines, Ryukyus, Papua New Guinea, and Guam).

Scarus sp. 1 Masuda and Kobayashi, 1994: 301, figs. 3-6 (Kerama Islands, Okinawa).

Scarus sp. Kuitert and Debelius, 1994: 213, upper fig.) (Indonesia, Philippines, and Micronesia).

Scarus sp. Eichler and Myers, 1997: 360, lower fig. (Philippines, Indonesia, Ryukyu Islands, and Mariana Islands).

Scarus sp. Okamura and Amaoka, 1997: 524, lower figs. (Iriomote Island and Okinawa).

HOLOTYPE: BPBM 31331, male, 187 mm, Mariana Islands, Guam, 1/4 mile N of Tanguison Power Plant (13°33'N, 144°48'E), near cables, reef, 20 m, powerhead blast, J.E. Randall, 28 June 1986.

PARATYPES: BPBM 22257, 139 mm, Philippines, Luzon, Batangas Province, Caban Island, E side, about 600 m S of Layaglayag Point, 25 m, spear, J.E. Randall, 3 September 1977; CAS 205597, 129 mm, same data as holotype; USNM 353675, 145 mm, Mariana Islands, Guam, Cabras Island (13°28'N, 144°40'E), reef, 25 m, powerhead blast, J.E. Randall, 18 July 1986.

DIAGNOSIS: A species of *Scarus* with 14 pectoral rays; 4 median predorsal scales; 3 rows of scales on cheek, the upper row with 6-7 scales, the middle row with 6 scales, and the lower row with 1 or 2 scales; 1 or 2 laterally projecting canines posteriorly on side of dental plates of adults; lips covering more than

three-fourths of dental plates; dorsal fin moderately high, the longest dorsal spine 2.1-2.6 in head length; caudal fin truncate in young, double emarginate in initial-phase fish, and somewhat lunate in terminal males. Color of initial phase brownish pink to rose pink, the throat and thorax green with green stripes extending posteriorly across abdomen; naked part of caudal fin blackish with orange lobes and a broad whitish posterior margin; body of terminal males pink and green, with blue and pink stripes ventrally; head blue with pink stripes (a broad one on snout passing through lower eye to pectoral-fin base, and another from behind eye across upper part of operculum); naked part of caudal fin purple centrally, green posteriorly, the lobes blue with a pink submarginal band.

DESCRIPTION: Dorsal rays IX,10; anal rays III,9; all dorsal and anal soft rays branched, the last to base; pectoral rays 14, the upper two rays unbranched, the uppermost rudimentary; pelvic rays I,5; principal caudal rays 13, the upper and lower unbranched; upper and lower procurrent caudal rays 6; lateral-line interrupted, the pored scales 18 + 5 (17-18 + 4-5), plus 2 on caudal-fin base; scales above lateral line 1.5; scales below lateral line 6; circumpeduncular scales 12; median predorsal scales 4, the scales progressively smaller and progressively more ridged posteriorly, the last three progressively more notched posteriorly; last (most posterior) predorsal scale 62% width of first predorsal scale; no pair of small scales (one to each side) anterior and lateral to first median predorsal scale; median prepelvic scales 4; scale rows on cheek 3, the upper row with 7 (6-7) scales, the middle row with 6 scales, and the lower row with 2 (1-2) scales; gill rakers on first arch 48 (39-47); pseudobranchial filaments 28 on holotype; branchiostegal rays 5; vertebrae 12 + 13.

Body moderately elongate, the depth 2.5 (2.6-2.8) in SL, and compressed, the width 2.1 (2.05) in body depth; head length 2.65 (2.7-2.85) in SL; snout length 2.6 (2.7-2.8) in head length; orbit diameter 6.25 (5.2-5.55) in head length; interorbital space strongly convex, the least width 3.05 (3.2-3.25) in head length; caudal-peduncle depth 2.55 (2.35-2.5) in head length; caudal-peduncle length 3.2 (2.95-3.25) in head length.

Mouth oblique and slightly inferior, the upper dental plate overlapping the lower, the gape forming an angle of about 30° to horizontal axis of head and body; lips covering three-fourths or more of dental plates; holotype with 2 lateral canines posteriorly on side of upper left dental plate that project slightly ventroposteriorly, and 2 on right lower dental plate that project dorsoposteriorly (139- and 145-mm paratypes with a single canine on upper dental plate, none on the lower; the 129-mm paratype with none); each upper pharyngeal bone of 139-mm

Plate I. A. Holotype of *Scarus fuscocaudalis*, BPBM 31331, terminal male, 187 mm SL, Guam. B. Paratype of *Scarus fuscocaudalis*, BPBM 22257, 139 mm, Batangas, Luzon. C. Terminal male of *Scarus fuscocaudalis*, artificial reef, Kerama Island, Okinawa. D. Large initial phase of *Scarus fuscocaudalis*, Guam. E. Small initial phase of *Scarus fuscocaudalis*, Bohol, Philippines. F. Terminal male of *Scarus longipinnis*, Heron Island, Great Barrier Reef. G. Juvenile of *Scarus longipinnis*, New Caledonia.

paratype with a row of 9 ridged molariform teeth that interlock medially with teeth of other side; a small nodular tooth lateral and adjacent to each ridged molar; the single lower pharyngeal bone with a horizontally elongate concave surface studded with 5 transverse rows of molariform teeth in 13 anterior-posterior series, the lateral row as small rounded molars, the medial rows laterally elongate; molars of both upper and lower pharyngeals progressively more worn posteriorly.

Nostrils very small, the anterior in a short membranous tube, higher dorso-posteriorly, anterior to upper edge of pupil by a perpendicular distance from orbit six-tenths orbit diameter; posterior nostril about 3 times larger than largest sensory pore of head, dorsoposterior to anterior nostril, the internarial distance about one-fourth orbit diameter.

Scales large and cycloid; median predorsal scales extending to mid-interorbital space; dorsal fin with a low basal scaly sheath of a single row of small scales, one per membrane, diminishing in size posteriorly, and absent from about last 5 membranes; no comparable scaly sheath on anal fin; caudal fin with 2 vertical rows of large scales on base, the middle pored scale of each row a little anterior to scales above and below, the first row distinctly larger than scales of caudal peduncle, the second row about twice size of first and extending about two-thirds distance from base of fin to central posterior margin; paired fins without basal scales; a pointed axillary scale above base of pelvic fins extending to more than half length of pelvic spine; a pointed midventral scaly process extending posteriorly from between bases of pelvic fins for a distance about half length of pelvic spine.

Origin of dorsal fin slightly anterior to upper end of gill opening, the predorsal length 2.85 (2.85-2.9) in SL; dorsal and anal spines flexible, the tips curving posteriorly; first dorsal spine 2.8 (2.5-2.65) in head length; fourth to seventh dorsal spines of holotype longest (eighth spine longest on paratypes), 2.6 (2.3-2.45) in head length; first dorsal soft ray longest in holotype (eighth longest in paratypes), 2.65 (2.4-2.7) in head length; origin of anal fin below base of second dorsal soft ray, the preanal length 1.45 (1.5-1.55) in SL; first anal spine slender, about one-third length of second spine; second anal spine 4.5 (3.95-4.5) in head length; third anal spine 3.65 (3.25-3.6) in head length; first anal soft ray of holotype longest (middle to eighth rays longest on paratypes), 3.0 (2.6-2.8) in head length; caudal fin of holotype slightly double emarginate with produced lobes (the fin of paratypes truncate to slightly double emarginate), the fin length 1.65 (1.6-1.7) in head length, the caudal concavity 5.0 (3.5-32.0) in head length; pectoral fins pointed, the third ray longest, 1.55 (1.45) in head length; pelvic fins 1.7 (1.75) in head length.

Color of holotype in alcohol: body brown, darker dorsally, the edges of scales narrowly darker than centers; head dark brown above level of corner of mouth and lower edge of orbit, paler below; dorsal fin translucent brown with a broad basal paler gray-brown band above scaly sheath, its upper edge wavy, especially in anterior soft portion of fin, and a dark-edged pale submarginal line; base of first dorsal spine and membrane just behind base of first spine very dark brown; anal fin pale yellowish with a basal gray-brown band, less than one-fourth height

of spinous portion of fin, but three-fourths height posteriorly, the two zones separated by a distinct brown line; unscaled part of caudal fin light brown, the rays paler than membranes, with a dark-edged pale band in each lobe; paired fins with transparent membranes and pale yellowish rays; a small dark brown spot at upper base of pectoral fins.

The paratypes are paler than the holotype, but all have a large darker central area on the caudal fin; all have the small dark brown spot basally on the first interspinous membrane of the dorsal fin, and all have the small dark spot at the upper base of the pectoral fin (though not as dark as on the holotype).

Color of holotype, a terminal male, when fresh as shown in Plate I A: scales dorsally on body salmon pink and blue-green, the blue-green lost in middle of body; thorax blue; abdomen crossed by three blue stripes; head blue with salmon pink stripes, one from front of snout through eye and across upper end of operculum, another from below eye to pectoral-fin base; throat and chin pale salmon pink with two narrow transverse deep blue-green bands; upper lip with a deep blue-green band extending nearly to orbit; dorsal fin blue with a broad salmon pink band at base and a submarginal salmon pink line; anal fin salmon pink basally, blue distally; scaled basal part of caudal fin salmon pink and blue, the lobes blue with a salmon pink band, the central part of fin purplish blue with a broad whitish border; pectoral fins pale, the base salmon pink with an outer arc of blue-green; pelvic fins salmon pink and lavender with a broad blue-green leading edge.

The terminal males in life are more vivid pink and brighter blue-green (see Plate I C); the central part of the caudal fin may be purple, and the broad centro-posterior border of the fin may be bright green.

Initial-phase fish (Plate I B, D) are brownish pink to rose pink, the ventral part of the head and thorax blue-green, with two or three narrow blue-green stripes on abdomen (sometimes faint), one or two deep blue-green transverse bands on chin, and one on upper lip curving toward eye posteriorly; dorsal fin salmon pink with a blue margin and a broad blue band or series of large blue spots, one per membrane; anal fin salmon pink basally and blue distally; caudal fin with a large blackish central area, which may be faint in large individuals, the lobes orange, the broad central posterior border whitish; paired fins with pale salmon rays and transparent membranes.

REMARKS: This colorful species of *Scarus* is named *fuscocaudalis* from the Latin in reference to the dark color of the large central portion of the caudal fin of the initial phase. The name is also appropriate for the terminal male which can have a dark purple area centrally in the caudal fin.

This species is represented by type specimens from Guam in the Mariana Islands, Luzon in the Philippines, and by our underwater photographs in the Ryukyu Islands, Guam and Bohol, Philippines. We also have underwater photographs on file at Bishop Museum taken at Bolinao, Luzon and Lan Yu (Orchid Island) off southeast Taiwan. It has been reported also from Indonesia and Papua New Guinea (see synonymy), but these records are questionable and confirmation

is needed. This parrotfish is generally found at depths greater than 20 m, in contrast to most scarids. It was difficult to approach underwater at Guam, probably because of the effect of spearfishing, so an explosive-tipped spear (powerhead) was fired at a rock near intended specimens. Unfortunately, the explosion caused some damage to the specimens, especially to the viscera.

Scarus fuscocaudalis appears to be most closely related to *S. longipinnis* Randall & Choat (Plate I F,G) which ranges in the South Pacific from the Pitcairn Islands to Lord Howe Island and the southern Great Barrier Reef. *S. longipinnis* also tends to be deep-dwelling for a scarid. The two species have the same meristic data and share many color features such as ventral blue-green stripes on the body, a similar pattern of stripes on the head, the broad white to green crescentic area posteriorly in the caudal fin, and especially the small dark brown to black spot basally on the first membrane of the dorsal fin. In addition, the juvenile of *longipinnis* has a large central dark area on the caudal fin (Plate I G), although this apparently does not persist in initial-phase adults, as it does in *fuscocaudalis*. We believe that *S. longipinnis* and *S. fuscocaudalis* are sister species with nonoverlapping distributions, the former being restricted to the southern subtropical zone of the Pacific.

Scarus longipinnis differs from *S. fuscocaudalis* and all other species of *Scarus* in its elevated dorsal fin and long pelvic fins as an adult. The longest dorsal spine varies from 16.0-21.5% SL, compared to 14.4-15.7% in *fuscocaudalis*. It should be added that the dorsal fin of *fuscocaudalis* is higher than the average for the genus. The pelvic-fin length of *longipinnis* varies from 21.9-29.4% SL, compared to 19.9-21.9% for *fuscocaudalis*. There are also obvious differences in coloration. *S. longipinnis* has dark bars on the body that persist in preservative, whereas a barred pattern seems to be only a transient phase in *fuscocaudalis*; bars do not show on the fresh or preserved specimens and only rarely in underwater photographs. The stripe on the head of *longipinnis* from the lower edge of the orbit to the base of the pectoral fin is blue-green, whereas it is pink in *fuscocaudalis*. There is a broad blue-green band extending dorsally from the eye in *longipinnis* that usually crosses the interorbital; in *fuscocaudalis* there is only a short narrow blue-green stripe extending anteriorly and posteriorly from the upper edge of the eye. *Scarus longipinnis* has a large blue-green spot in front of the eye that continues as a bar to the chin and curves posteriorly on the throat; this color marking is lacking in *fuscocaudalis*.

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