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*Acanthurus reversus*, a New Species of Surgeonfish  
(Perciformes: Acanthuridae) from the Marquesas Islands

by

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*Acanthurus reversus* is described as a new acanthurid fish from five specimens from the Marquesas Islands. It is most similar to *Acanthurus olivaceus* of the central and western Pacific, differing principally in color. The caudal fin is pale yellow instead of gray-brown with small dark spots, and it has a black crescent posteriorly instead of a dark-edged white crescent; there is a broad, deep blue, longitudinal band in the humeral region with an elongate orange spot centered anteriorly, not reaching more than halfway back within the deep blue band (in *A. olivaceus* orange band is broader and extends nearly to the end of the blue band). Like *A. olivaceus* the young are bright yellow. *Acanthurus reversus* also differs in having longer dorsal spines (longest spine 15.2–16.3% SL, compared to 12.0–14.5% in *A. olivaceus* and the caudal spine is shorter on the average (7.7–10.8% SL, compared to 9.8–11.5% in *A. olivaceus*).

While snorkeling in Takaroa Atoll in the northern Tuamotu Islands in November 1956 one of us (J. E. R.) speared a surgeonfish, 175 mm standard length (measured fresh). It was much like the wide-ranging *Acanthurus olivaceus*, but there was only a small elongate orange spot anteriorly within the broad, deep blue band of the shoulder region, and the color of the caudal fin was very different, pale yellow without dark spots, and with a black crescent posteriorly in the fin instead of a white one. Typical *A. olivaceus* was common at the atoll, and the odd-colored fish was swimming with several individuals of this species. Four of the *A. olivaceus* specimens were speared from the area and compared with the atypical specimen. No morphological differences were found, but two of the four specimens of *A. olivaceus* had a narrower humeral orange band that was diffuse posteriorly; their caudal coloration, however, was typical of *A. olivaceus*. Due to limited formalin, only the odd-colored specimen was preserved. It was deposited in the U. S. National Museum of Natural History as USNM 16981; the standard length is now 168 mm.

In July, 1957 J. E. R. sailed his 10-m ketch *Nani* from Tahiti through the Marquesas Islands. There he found the odd-colored surgeonfish to be abundant, but no typical *A. olivaceus* were observed. One specimen of the Marquesas Is. form, 196 mm SL, was speared at Anaho Bay, Nuku Hiva and deposited in the Stanford Natural History Museum. Unfortunately, this specimen could not be found in the collection of the California Academy of Sciences where the Stanford University fish collection is now housed.

It was concluded that the one fish at Takaroa was a Marquesan form that was transported as a larva from the Marquesas Is. in the prevailing current. Randall (1960) discussed the Marquesan variant and indicated that it should be regarded as a subspecies of *A. olivaceus*. He declined to name it and indicated that additional specimens should be procured from both the Marquesas Is. and Tuamotu Archipelago.

In 1971 J. E. R. and colleagues visited the Marquesas Is. on the 30-m schooner *Westward* and collected fishes for a month at all the major islands of the archipelago. An adult and a juvenile of the Marquesan form of *A. olivaceus* were collected. An additional adult specimen was later obtained from the Honolulu Laboratory of the National Marine Fisheries Service. When these were compared with typical *A. olivaceus*, no meristic differences and no obvious morphological differences were noted. In a checklist of the fishes of French Polynesia, Randall (1985a) listed the Marquesan specimens as *A. olivaceus*.

In October, 1998, the authors spent eight days on a dive cruise at the northern Marquesan islands of Nuku Hiva and Eiao, mainly for underwater photography. Seeing the Marquesan color form of *A. olivaceus* again, and knowing how consistently colored the typical *A. olivaceus* is throughout the rest of the Pacific (Fig. 1), led us to make a more careful comparison of Marquesan specimens with typical *A. olivaceus* of similar size. We now find that the dorsal spines of the Marquesan form are longer, and the caudal spine shorter on the average. Coupled with the marked color differences, we conclude that the Marquesan form should be regarded as a distinct species. It seems likely that an occasional individual of this Marquesan surgeonfish drifts to the northern Tuamotu Archipelago as a larva and ultimately interbreeds there with *A. olivaceus*. Hybrids of closely related species of fishes may occur when one is rare and the other abundant. Such is the case with *A. achilles* and *A. nigricans* [= *A. glaucopareius*] at the island of Hawaii where *A. achilles* is common and *A. nigricans* is rarely seen (Randall 1985b).

#### MATERIALS AND METHODS

Type specimens of the new species are deposited in the Bernice P. Bishop Museum, Honolulu (BPBM); California Academy of Sciences, San Francisco (CAS); Museum National d'Histoire Naturelle, Paris (MNHN); 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 median anterior end of the upper lip to the caudal-fin base (posterior end of hypural plate); head length is taken 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; upper-jaw length is taken from the front of the upper lip to the posterior end of the maxilla; 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; lengths of fin spines and rays of the median fins are measured from their extreme bases; caudal concavity is the horizontal distance between verticals at the tips of the longest and shortest caudal-fin 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. Counts of gill-rakers were made on both the anterolateral and posteromedial side of the first gill arch (here termed anterior and posterior); the counts include all rudiments.

Data in parentheses in the description refer to paratypes. Table 1 presents 26 measurements as percentages of the standard length. Ratios of proportional measurements in the text are rounded to the nearest 0.05.



FIGURE 1. Adult of *Acanthurus olivaceus*, about 240 mm TL, Kona, Hawaii.

### SPECIES DESCRIPTION

#### *Acanthurus reversus* n. sp.

Figs. 2-6

MATERIAL EXAMINED. — HOLOTYPE: BPBM 12474, 209 mm, female, Marquesas Islands, Nuku Hiva, off point at S end of Marquisienne Bay, 15 m, spear, J. E. Randall, 10 May 1971. PARATYPES: USNM 169871, 168 mm male, Tuamotu Archipelago, Takaroa Atoll, outer reef slope, E side of entrance to pass, spear, J. E. Randall, 16 November 1956; CAS 204429, 210 mm, female, Marquesas Islands, Tahuata, Hana Hevane Bay, rotenone, *Charles H. Gilbert* Cruise 54, J. Manguson, 16 October 1961; MNHN 1999-60, 216 mm, male, Marquesas Islands, Ua Huka, small bay 0.4 miles NE of Motu Takatai, 6 m, spear, J. E. Randall, 7 May 1971; BPBM 12441, 36 mm, same locality as preceding, 4.5–9 m, rotenone, J. E. Randall, J. R. Haywood, and R. M. McNair, 7 May 1971.

DIAGNOSIS. — Dorsal rays IX,24–25; anal rays III,23–24; pectoral rays 16–17; anterior gill rakers 22–28; posterior gill rakers 21–27; body depth 2.1–2.2 in SL; head length 3.5–3.65 in SL; ninth dorsal spine 1.7(1.8–1.85) in head length; caudal spine 2.3–2.65 in head length; caudal fin strongly lunate in adults, the caudal concavity 3.35–4.7 in SL; color in life brown, the posterior half of body sometimes abruptly paler, with an elongate orange spot extending posteriorly from upper end of gill opening, the posterior half enclosed by a broad, deep blue band that extends beyond tip of pectoral fin; dorsal and anal fins with a faint orange line at base, the soft portion of the dorsal with three dark longitudinal bands on outer one-half of fin, the anal fin with a narrow blue margin; caudal fin pale yellow with a broad black posterior border that narrows as it extends onto elongate lobes of fin; outer one-third of pectoral fins abruptly white; juveniles bright yellow with blue margins on dorsal and anal fins.

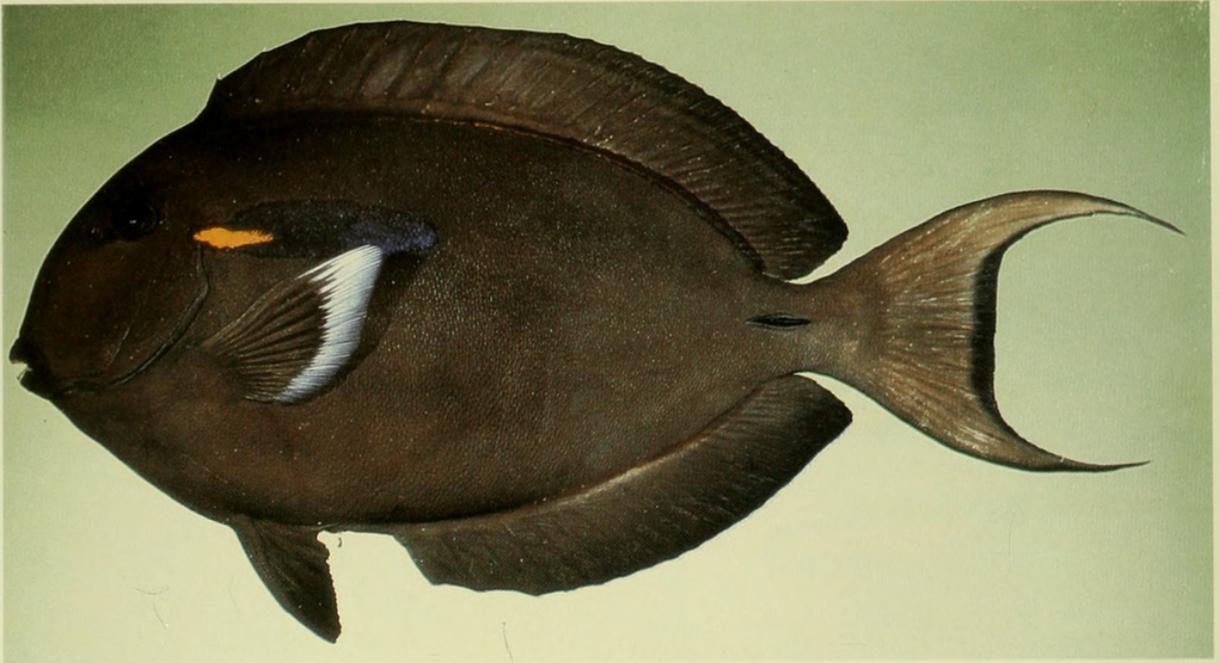


FIGURE 2. Holotype of *Acanthurus reversus* 209 mm SL, Nuku Hiva, Marquesas Is.

DESCRIPTION. — Dorsal rays IX,25(24), the first 3 soft rays unbranched; anal rays 23(23–24), the first 2 soft rays unbranched; pectoral rays 16(16–17), the upper 2 and lowermost unbranched; pelvic rays I,5; principal caudal rays 16, the outermost unbranched; upper and lower procurent caudal rays 7; scales small, 157 in longitudinal series from upper end of gill opening to caudal-fin base of holotype; anterior gill rakers 22(22–28); posterior gill rakers 24(21–27).

Body deep, the depth 2.15(2.1–2.2) times into SL, and compressed, the width 3.0(2.55–3.15) in depth; head length 3.65(3.5–3.6) in SL; dorsal profile of head strongly convex; snout length 4.9(4.75–4.8) in SL; orbit diameter 4.65(3.75–4.3) in head length; interorbital strongly convex, the least width 3.25(3.0–3.2) in head length; caudal-peduncle depth 2.6(2.6–2.7) in head length.

Mouth small, the gape slightly oblique, the upper jaw length 4.1(3.6–4.1) in head length; teeth uniserial in jaws, incisiform, spatulate with denticulate edges, and close-set; holotype with 20 upper and 18 lower teeth; (36-mm juvenile paratype with 12 upper and 14 lower teeth; 169-mm paratype with 16 upper and lower teeth; 216-mm paratype with 19 upper and 20 lower teeth).

Scales on body coarsely ctenoid, the cteni on posterior edge of scales in middle of body 10 to 18; scales on head embedded; lateral line obscure, approximately following dorsal contour of body and ending at front of caudal-spine socket; a finely-scaled fleshy sheath at base of dorsal and anal fins; very small scales extending about one-third distance out on membranes of posterior one-half of dorsal and anal fins; extremely small scales extending out on caudal fin more than three-fourths distance to outer margin; pectoral fins with extremely small, embedded scales extending about three-fourths distance to outer margin; lateral surface of pelvic fins with a narrow column of tiny scales on first soft ray and membrane about one-half distance to tip of fin, the medial edge with a narrow band of extremely small scales on each membrane extending about one-half distance to posterior edge of fin.

A deep groove extending anteriorly and slightly ventrally from lower edge of orbit, its length about three-fourths orbit diameter; anterior nostril small, centered above groove anterior to eye, with a membranous rim and rounded posterior flap which completely covers nostril aperture when folded forward, and just reaches slit of posterior nostril when folded back.

Dorsal-fin origin above upper end of gill opening, the predorsal length 2.55(2.6–2.7) times into SL; first dorsal spine about one-half length of second spine; second dorsal spine 2.5(2.45–2.5) in head length; ninth dorsal spine longest, 1.7(1.8–1.85) in head length; first dorsal soft ray longest,



FIGURE 3. Adult of *Acanthurus reversus* about 240 mm TL, Eiao, Marquesas Is.



FIGURE 4. Group of adult *Acanthurus reversus* feeding, Eiao, Marquesas Is.

1.6(1.65–1.7) in head length; anal-fin origin below base of seventh dorsal spine, the preanal length 2.0(2.0–2.05) in SL; first anal spine very short; second anal spine 2.85(2.55–2.8) in head length; third anal spine 2.4(2.2–2.45) in head length; middle anal soft rays longest, 1.75(1.7–1.75) in head length; caudal fin of adults long, the fin length 2.65(2.05–2.4) in SL, and extremely lunate, the caudal concavity 4.35(3.35–4.7) in SL; third and fourth pectoral rays longest, 3.9(3.6–3.7) in SL; pelvic fins reaching anal-fin origin, the first ray longest, 4.8(4.45–4.65) in SL; caudal spine 2.35(2.3–2.65) in head length.

Color of holotype in alcohol dark brown with a horizontally elongate, ellipsoidal, pale orangish spot extending posteriorly from upper end of gill opening, its length 1.5 times orbit diameter, this spot contained within a dark brown band a little broader than orbit diameter, extending slightly beyond tip of pectoral fin; caudal fin lighter brown than body, with a black posterior margin that is one-half orbit diameter in width centrally, but narrows to a black line on the prolonged caudal lobes; upper and lower edges of caudal fin narrowly black; dorsal, anal, and pelvic fins dark brown, the outer part of soft portion of dorsal with three faint longitudinal darker brown bands; pectoral fins dark brown, the outer one-third abruptly whitish except second ray brown to tip.

The color of the holotype when fresh is shown in Figure 2. Note that the dark brown humeral band as seen on preserved specimens is deep blue with a black edge in life, and only the black edge continues around the front of the orange spot. In life (Figs. 3, 4), the caudal fin of adults is pale yellow, contrasting sharply with the black posterior crescent of the fin, and the blue margin of the anal fin is more evident.

The bright yellow juvenile of Figure 4 was estimated to be 45 mm total length; note the truncate caudal fin. Figure 5 shows two subadults estimated to have been 90 mm total length; their caudal fins are more yellow than that of adults, but not as yellow as the color of the juvenile.

ETYMOLOGY. — This species is named *Acanthurus reversus* from the Latin with the same meaning as English, in reference to the reversal of the color pattern of the caudal fin compared to that of its close relative, *A. olivaceus*.

REMARKS. — *Acanthurus reversus* is endemic to the Marquesas Islands, and the one specimen collected at Takaroa in the northern Tuamotu Archipelago is regarded as a stray from the Marquesas. The species is common inshore at all the islands of the Marquesas, but it has a different native Marquesan name at each of the major islands (Lavondès and Randall 1978).

*Acanthurus olivaceus* Forster in Bloch and Schneider, 1801, type locality, Tahiti, is clearly its closest relative. This surgeonfish remains unknown from the Marquesas, but it is common throughout the rest of the central and western Pacific and ranges into the eastern Indian Ocean to western Australia, Christmas Island, and Cocos (Keeling) Islands; in the western Pacific it extends from southern Japan to New South Wales. It appears to be replaced in the western Indian Ocean by *Acanthurus tennentii* Günther (Randall, 1956).

As noted above, the Marquesan surgeonfish was first considered to be only a color variant of *A. olivaceus* and subspecific status was suggested. The most obvious color differences are the reduced size of the orange part of the humeral band in the Marquesan fish and its having a pale yellow caudal fin with a black posterior crescent instead of a gray-brown fin with small dark brown spots and a black-edged white posterior crescent. When four adults of *A. reversus* were recently compared with 11 adults of *A. olivaceus* of about the same size from the collections of the Bishop Museum and California Academy of Sciences (specimens listed below), no meristic differences were detected, but the dorsal spines of *A. reversus* were noted to be longer, and the caudal spine shorter. No overlap was found in the measurements of the longest (ninth) dorsal spine, 15.2–16.3% SL for *A. reversus* compared to 12.0–14.5% for *A. olivaceus* specimen. Two of the 11 specimens of *A. olivaceus* have shorter caudal spines than the *A. reversus* specimen with the longest spine. The caudal spine of the four *A. reversus* specimens are 7.7–10.8% SL ( $\bar{x} = 9.4$ ), compared to 9.8–11.5% ( $\bar{x} = 11.0$ ) for the eleven *A. olivaceus* specimens.



FIGURE 5. Juvenile of *Acanthurus reversus* about 45 mm TL, Nuku Hiva, Marquesas Is.



FIGURE 6. Subadults of *Acanthurus reversus* about 90 mm TL, Eiao, Marquesas Is.

TABLE 1. Proportional measurements of type specimens of *Acanthurus reversus* expressed as percent of standard length (% SL).

	Holotype		Paratypes	
	BPBM 12474	USNM 169871	MNHN 1999-60	CAS 204429
Sex	Female	Male	Female	Male
Standard length (mm)	209	168	210	216
Body depth	46.9	47.0	45.6	45.8
Body width	15.7	14.9	17.9	17.1
Head length	27.5	28.7	27.9	28.4
Snout length	20.3	21.1	20.9	21.2
Orbit diameter	5.9	7.7	6.6	6.6
Interorbital width	8.4	9.1	9.2	8.9
Upper-jaw length	6.7	7.8	7.8	6.9
Caudal-peduncle depth	10.5	10.7	10.6	11.0
Caudal-peduncle length	11.0	11.5	11.4	11.2
Predorsal length	39.0	37.7	38.6	38.0
Preanal length	50.5	50.2	50.3	49.0
Prepelvic length	32.8	34.4	33.9	33.4
Dorsal-fin base	67.2	69.5	67.0	69.5
Second dorsal spine	11.0	broken	11.3	11.2
Last dorsal spine	16.3	16.0	15.7	15.2
Longest dorsal soft ray	17.3	16.7	16.8	16.8
Anal-fin base	45.0	44.4	45.6	44.5
Second anal spine	9.7	10.3	10.9	10.2
Third anal spine	11.5	12.5	12.7	11.5
Longest anal soft ray	15.5	16.9	16.6	16.2
Caudal-spine length	7.7	10.8	8.4	10.7
Caudal-fin length	37.8	broken	41.2	49.1
Caudal concavity	23.0	—	21.2	30.0
Pectoral-fin length	26.3	27.7	27.1	27.5
Pelvic-spine length	14.3	14.6	13.8	14.1
Pelvic-fin length	20.8	22.4	21.5	21.6

An updated checklist of the shore fishes of the Marquesas Islands has been completed (Randall and Earle, in press). The total number of shore fishes is 401, a relatively impoverished fish fauna compared to the Society Islands with 593 species (Randall 1985a). But the level of endemism of the fishes in the Marquesas Is. is high, 11.2%. This is third highest in the Pacific, after the Hawaiian Islands and Easter Island, with 23.1 and 22.2%, respectively (Randall 1998). The Marquesas Is. are not as isolated as Hawaii and Easter Island, the nearest shoal water being the northern atolls of the Tuamotu Archipelago some 500 km to the south. However, the prevailing South Equatorial Current sweeps to the west, and the nearest shoal water to the east that could be the source of larvae of inshore marine animals is the Galapagos Islands, 3700 km away. Only a rare change in current pattern could result in recruiting larvae from the Tuamotu Archipelago or Caroline Atoll to the west.

MATERIAL OF *ACANTHURUS OLIVACEUS* EXAMINED. — CAS 53992, 214 mm, Hawaiian Islands, Oahu; CAS 31961, 2:180–185 mm, Hawaiian Islands, Oahu; BPBM 4284, 208 mm, Johnson Island; BPBM 4287, 227 mm, Johnson Island; BPBM 6222, 2:200–219 mm, Line Islands, Baker Island; CAS 96922, 196 mm, Caroline Islands, Kapingamarangi Atoll; CAS 96926, 186 mm, Caroline Islands, Kapingamarangi Atoll.

## LITERATURE CITED

- BLOCH, M. E. AND J. G. SCHNEIDER. 1801. *Systema ichthyologiae iconibus ex illustratum*. Post obitum auctoris opus inchoatum absoluit, correxit, interpolavit. Sanderiano Commissum, Berlin. lx + 584 pp.
- LAVONDÈS, H. AND J. E. RANDALL. 1978. Les noms de poissons marquisiens. *Jour. Soc. Océanistes* 34(60):79–112.
- RANDALL, J. E. 1956. A revision of the surgeon fish genus *Acanthurus* *Pacif. Sci.* 10(2):159–235.
- . 1960. A new species of *Acanthurus* from the Caroline Islands, with notes on the systematics of other Indo-Pacific surgeonfishes. *Pacif. Sci.* 14(3):267–279.
- . 1985a. Fishes. Pp. 462-481 in *French Polynesian Coral Reefs*. B. F. Delesalle, R. Galzin and B. Salvat, eds., Vol. 1, Fifth International Coral Reef Congress, Tahiti, 27 May 1-June 1985.
- . 1985b. *Guide to Hawaiian reef fishes*. Harwood Books, Newtown Square, Pennsylvania. 74 pp.
- . 1998. Zoogeography of shore fishes of the Indo-Pacific region. *Zool. Stud.* 37(4):227–268.
- RANDALL, J. E. AND J. L. EARLE. In press. Annotated checklist of the shore fishes of the Marquesas Islands, with 40 new records. *Occ. Papers, B. P. Bishop Mus., Hawaii*.



1999. "Acanthurus reversus, a new species of surgeonfish (Perciformes: Acanthuridae) from the Marquesas Islands." *Proceedings of the California Academy of Sciences, 4th series* 51, 473–481.

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