# Two New Pomacanthid Fishes of the Genus Centropyge from Oceania

John E. Randall and Richard C. Wass

Centropyge multicolor is described from the Marshall Islands and Tahiti. It is white dorsally on the body, becoming yellow on the caudal peduncle and fin; the lower head and thorax are yellow, shading through orange to brown on abdomen and lower posterior part of body; there are alternating bars of black and bright blue on the nape.

C. aurantius is described from Samoa. It is distinctive in its deep body (depth about 1.7 in SL), pelvic fins which reach to soft portion of anal fin, fine serrations on preopercle and preorbital, and its predominately orange color with irregular dark bars.

#### Introduction

The pomacanthid genus Centropyge is a close-knit assemblage of small, usually colorful, tropical reef fishes which are popular in the aquarium trade. The number of species has nearly doubled since the revision of the angelfishes by Fraser-Brunner (1933). He recognized 11 species of Centropyge, though erred in placing C. loriculus (Günther) and C. potteri (Jordan and Metz) in the synonymy of C. bispinosus (Günther). Also he overlooked C. interruptus (Tanaka) from Japan which Tanaka (1931) erroneously placed in the synonymy of C. fisheri (Snyder) (C. interruptus resurrected by Tominaga and Yasuda, 1973). The number of species of Centropyge remained constant at 14 until 1951 when Woods and Kanazawa described C. argi from Bermuda. Schultz and Woods in Schultz et al. (1953) added two species from the tropical Pacific to the genus: C. heraldi and C. nigriocellus (their C. flammeus is a synonym of C. loriculus). Klausewitz (1963) named C. eibli from the Nicobar Islands. Randall and Burgess (in Burgess and Axelrod, 1972) described C. ferrugatus from the Ryukyu Islands, and Randall and Caldwell (1973) added C. hotumatua from SE Oceania. In the same year Shen described C. caudoxanthorus from Taiwan; however this may only be a color variant of C. flavicauda Fraser-Brunner—the same as the specimens from Taiwan he identified as C. fisheri. The latter is a Hawaiian

endemic. The related *C. flavicauda* was described from the Macclesfield Bank, China Sea; the senior author has also taken it in the Solomon Islands, Society Islands, and Tuamotu Archipelago, Bruce Carlson at Fiji, and Gerald R. Allen at New Guinea and the Palau Islands (specimens at Bishop Museum).

With the description herein of *C. multicolor* from the Marshall Islands and *C. aurantius* from American Samoa, the total number of valid Indo-Pacific species of *Centropyge* is raised to 22. At least three additional species remain to be described, one from Ceylon and two from the Cocos-Keeling Islands, Indian Ocean. The latter were collected by William F. Smith-Vaniz and associates and will be described by Smith-Vaniz and Randall.

Randall and Caldwell (1973) stated that Holacanthus multifasciatus Smith and Radcliffe, which Fraser-Brunner (1933) and others have placed in Centropyge, warrants a genus by itself. It seemed distinctive in its deep body (depth 1.52 to 1.75 in SL), steep head profile, and a dorsal fin formula of XIII, 18. However, the discovery of C. aurantius with a similar deep body (depth 1.63 to 1.75 in SL) and steep head profile but with XIV dorsal spines, tends to rule out the erection of a new genus for C. multifasciatus.

We follow Fraser-Brunner (1933) in his classification of *Centropyge* as a genus, although the distinction from *Holacanthus* is admittedly slight. Some authors such as Herre (1953)

have preferred to treat Centropyge as a subgenus of Holacanthus.

When the last two dorsal or anal fin rays share the same pterygiophore, they were counted as one ray. Pectoral-ray counts include the rudimentary upper ray. Lateral-line scale counts were made only of the dorsal series which ends beneath the soft portion of the dorsal fin. Counts of scales, the small spines on margins of cheek bones, and gill rakers were made on the left side. Upper-limb gill-raker counts are listed first; the raker at the angle is included in the lower-limb count.

Body depth was measured from the lowest point of the abdomen to the extreme base of the dorsal spine vertically above it. Head length was taken from the median edge of the upper lip to the posterior end of the opercular membrane. Length of the caudal peduncle was measured diagonally from the mid-base of the caudal fin to the rear base of the anal fin. Dorsal and anal spine and soft-ray measurements were made to the extreme bases of these elements (aided by transmission of a bright light through the tissues).

In the descriptions of the two new species, data in parentheses apply to paratypes.

Type specimens have been deposited at the Bernice P. Bishop Museum (BPBM), British Museum (Natural History) [BM(NH)], California Academy of Sciences (CAS), and the U.S. National Museum of Natural History (USNM).

### Centropyge multicolor, sp. nov. Fig. 1

Holotype—BPBM 10058, 45.8 mm SL, Enewetak Atoll (formerly Eniwetok), Marshall Islands, Rigili (Leroy) Islet, off ocean reef on near-vertical slope, 30 m, quinaldine, G. R. Allen and R. H. Snider, July 29, 1970.

Paratypes—BPBM 9664, 49.1 mm SL, Majuro Atoll, Marshall Islands, ocean reef off Laura Islet (SW corner of atoll), upper edge of steep drop-off, 20 m, spear, J. E. Randall and A. R. Emery, April 1, 1970; BM(NH) 1947. 7. 3. 1. 43.2 mm SL, same data as preceding; CAS 30690, 43.0 mm SL, same data as preceding; USNM 212152, 42.1 mm SL, same data as preceding; BPBM 17243, 62.9

mm SL, Tahiti, Society Islands, District of Paea, vertical drop-off in 53.5 m, dip nets, Clemens Classen, January 17, 1974.

Diagnosis—Dorsal rays XIV,16~17; anal rays III,17; pectoral rays 16~19; gill rakers  $6\sim7+16$ ; depth of body  $1.9\sim2$  in standard length; caudal fin rounded; first 5 or 6 interspinous membranes of dorsal fin incised onefourth or more length of spines; posterior margin of dorsal and anal fins rounded, the rays not extending posterior to mid-length of caudal fin; cirrus at upper end of each interspinous membrane small, not extending above spine tips; no enlarged spines on preorbital; upper half of body white in life; lower head and thorax yellow, shading through orange to brown on abdomen and lower posterior part of body; nape with alternating bars of black and bright blue.

**Description**—Dorsal rays XIV.16 (one paratype with 17); anal rays III,17; pectoral rays 16 (17 on right side) (3 paratypes with 17, one with 16), the upper 2 and lowermost unbranched; pelvic rays I,5; principal caudal rays 17 (upper and lowermost unbranched); tubed lateral-line scales 37 ( $35\sim37$ ); nearvertical scale rows from upper end of gill opening to mid-base of caudal fin 45 ( $44\sim46$ ); scales above lateral line to origin of dorsal fin 7; scales below lateral line to origin of anal fin 20 ( $18\sim19$ ); circumpeduncular scales 20; gill rakers 6+16 ( $6\sim7+16$ ); branchiostegal rays 6; vertebrae 10+14.

Body moderately deep, the depth  $1.9 (1.9 \sim 2)$  in standard length, and compressed, the width  $2.85 (2.74 \sim 2.94)$  in depth; head length  $3.37 (3.35 \sim 3.5)$  in standard length; dorsal profile of forehead about  $42^{\circ}$ ; snout  $3.16 (3.13 \sim 3.37)$  in head; eye  $2.57 (2.38 \sim 2.57)$  in head; interorbital space slightly convex, the bony width  $3.68 (3.6 \sim 3.76)$  in head; caudal peduncle deeper than long, the least depth  $2.09 (2.14 \sim 2.35)$  in head.

Mouth small, terminal, the gape horizontal; maxillary just reaching a vertical at posterior nostril. Lips nearly equal in width, the median height of upper lip about one-third eye diameter. Teeth slender, elongate, closeset, flexible in jaws, tricuspid (central cusp notably longer than each laternal one), in 3 rows at front of jaws, the uppers numbering

about 55 in outer row and the lowers about 50. No teeth on roof of mouth. Tongue short and broadly rounded.

Posterior nostril about twice as large as anterior, the opening elliptical; anterior nostril with a membraneous rim which is elevated into a flap postero-dorsally; nostrils separated by a space about equal to diameter of anterior nostril. Gill membranes narrowly attached to isthmus. Longest gill filament on first arch about 2.4 in eye. Longest gill raker about 4.6 in eye.

A prominent large spine at corner of preopercle; a single spine on lower margin of preopercle (its length about equal to width of base of corner spine), and 24  $(13\sim26)$  small spines on upper margin; margin of interopercle with 2  $(1\sim3)$  spines; margin of subopercle with 7  $(5\sim7)$  small spines; postero-

ventral margin of preorbital with 5 (4 $\sim$ 6) small spines, this margin free for about half the distance from lowermost point to eye; antero-ventral margin of preorbital with a shallow emargination.

Scales coarsely ctenoid (up to about 30 ctenii on margins), the exposed portion strongly ridged; head and body completely scaled except for lips and a narrow zone from eye to upper jaw containing nostrils; dorsal and anal fins scaled nearly to margins except region of anterior spines where fin is deeply incised; caudal fin scaled on about basal two-thirds of fin; pectoral fins scaled basally; pelvic fins with row of scales extending about half-way out on rays, none on membranes.

Lateral line steeply arched, ending beneath rear base of dorsal fin, the anterior scales with 2 tubules, the posterior ones with a single

Table 1. Proportional measurements of type specimens of Centropyge multicolor (in thousandths of the standard length).

	Holotype BPBM 10058	Paratypes			
		BPBM 9964	BM(NH) 1947.7.3.1	CAS 30690	USNM 212152
Standard length (mm)	45.8	49.1	43.2	43.0	42.1
Depth of body	528	503	515	510	517
Width of body	185	183	186	186	176
Head length	297	298	300	305	304
Snout length	94	86	89	91	97
Diameter of eye	116	120	126	128	119
Bony interorbital width	81	79	82	84	81
Length of preopercular spine	85	99	90	100	86
Least depth of caudal peduncle	142	134	127	132	133
Length of caudal peduncle	120	117	120	116	112
Snout to origin of dorsal fin	387	377	394	394	394
Snout to origin of anal fin	642	622	602	600	603
Snout to origin of pelvic fins	377	362	350	340	340
Length of dorsal fin base	718	698	695	713	702
Length of first dorsal spine	103	101	103	104	107
Length of second dorsal spine	153	155	157	151	157
Length of third dorsal spine	185	183	188	193	197
Length of last dorsal spine	238	239	252	244	237
Length of longest dorsal ray	262	245	248	249	261
Length of anal fin base	390	380	394	391	392
Length of first anal spine	153	161	162	156	
Length of second anal spine	203	228	202	220	214
Length of third anal spine	251	273	255	249	261
Length of longest anal ray	312	285	301	309	304
Length of caudal fin	310	300	311	302	295
Length of pectoral fin	306	295	322	302	285
Length of pelvic spine	207	214	210	220	204
Length of pelvic fin	347	354	348	387	361

tubule. Four tubed scales in separate peduncular part of lateral line.

Caudal fin rounded, its length 3.23 (3.21 $\sim$ 3.39) in standard length. Origin of dorsal fin above upper end of gill opening. spines progressively longer, the last 4.20 (3.96 $\sim$ 4.21) in standard length; longest dorsal soft ray (about the sixth) 3.82 (3.83 $\sim$ 4.08) in standard length (see Table 1 for other fin measurements); first  $5(5\sim6)$  interspinous membranes of dorsal fin incised one-fourth or more length of spines; a small cirrus projecting from membrane just posterior to tips of dorsal spines, these cirri not extending above spine tips; posterior margin of soft portion of dorsal and anal fins broadly rounded, the rays not reaching posterior to mid-caudal length. Origin of anal fin beneath base of tenth dorsal spine. Pectoral fins slightly pointed, just reaching a vertical at origin of anal fin; origin of pelvic fins below lower base of pectoral fins, the filamentous tips reaching to base of spinous portion of anal fin.

Color of body in alcohol pale except for brown on posterior abdomen and region above anal fin; head pale except for a broad darkbrown area on nape running from interorbital above a vertical at front edge of pupil to origin of dorsal fin and extending ventrally on postorbital part of head to level of center of eye; dorsal fin pale anteriorly and basally, brown on outer part of fin posterior to fifth dorsal spine, the brown occupying about outer half of soft portion of fin; a brown spot about size of pupil, faintly edged in pale, centered on ninth and tenth soft dorsal rays about twothirds distance to edge of fin; margin of dorsal fin dark-brown except anteriorly and posteriorly; anal fin brown with a dark-brown margin on about anterior half of soft portion of fin and a broad pale submarginal zone (which becomes marginal posteriorly on fin); caudal and paired fins pale.

Color in life of holotype as illustrated on Fig. 1. The 49.1-mm paratype from Majuro had more organge on the abdomen between the yellow anteriorly and the brown posteriorly on the ventral part of the body; also the upper half of the body was not as white as on the holotype.

Remarks—C. multicolor is named for the 7

different colors it exhibits in life: white, brown, black, yellow, orange, blue, and violet—more than any other species of the genus.

In addition to the Marshall Islands and Society Islands, the species also occurs in the Tuamotu Archipelago. The senior author observed it at 46 m at the atoll of Manihi on April 11, 1971. It can be expected from elsewhere in Oceania, though probably not the Hawaiian Islands or Easter Island. It has thus far been observed only on steep dropoffs in outer reef areas.

C. multicolor shows a slight similarity in color pattern to C. bicolor (Bloch) and C. hotumatua Randall and Caldwell. It is readily distinguished from C. bicolor as the latter has XV dorsal spines and longer and more angular soft portions of the dorsal and anal fins. It differs from C. hotumatua in having a more rounded caudal fin, fewer incised interspinous membranes, shorter cirri of these membranes, and modally one less dorsal and anal fin rays.

## Centropyge aurantius, sp. nov. Fig. 2

Holotype—BPBM 17000, 49.4 mm SL, Tutuila, American Samoa, Aua Reef, Pago Pago Harbor, steep reef front of coral and rock with a few patches of coarse sand, 36 m, rotenone, J. E. Randall and R. C. Wass, May 7, 1974.

Paratypes—BM(NH) 1974. 7. 3. 2, 47.8 mm SL, Tutuila, American Samoa, Larsen Bay, west side; cave in coral and adjacent sand and rubble, 36∼39 m, rotenone, J. E. Randall, R. C. Wass, and J. L. McGuire, May 11, 1974; CAS 30691, 47.2 mm SL, same data as preceding; USNM 212153, 42.6 mm SL, same data as preceding.

Diagnosis—Dorsal rays XIV,16 $\sim$ 17; anal rays III,17 $\sim$ 18; pectoral rays  $16\sim$ 17; gill rakers 5+12; body deep, the depth  $1.6\sim$ 1.8 in standard length; caudal fin rounded; first 8 interspinous membranes incised one-fourth or more length of spines; cirrus at upper end of each interspinous membrane extending well above dorsal spine tip; posterior margin of dorsal and anal fins obtusely angular, the anal rays extending slightly posterior to mid-caudal length; pelvic fins long, the filamentous tips

extending posterior to spinous portion of anal fin; spines on upper margin of preopercle small and numerous (43 or more); spines on postero-ventral margin of preorbital small and delicate; orange in life, the sides of the body with irregular narrow bars of light orange alternating with broader ones of brownish orange; bands of dull green in median fins which parallel margin.

**Description**—Dorsal rays XIV,17 (one paratype with 16); anal rays III,18 (one paratype with 17); pectoral rays 17 (3 paratypes with 16), the upper 2 and lower 2 unbranched; pelvic rays I, 5; principal caudal rays 17 (upper and lowermost unbranched); tubed lateral-line scales  $36 (30 \sim 33)$ ; near vertical scale rows from upper end of gill opening to mid-base of caudal fin 42 (44 $\sim$ 46); scales above lateral line to origin of dorsal fine 7;

scales below lateral line to origin of anal fin 20 (19 $\sim$ 20); circumpeduncular scales 21 (19 $\sim$ 20); gill rakers 5+12; branchiostegal rays 6; vertebrae 10+14.

Body deep, the depth 1.63  $(1.69\sim1.75)$  in standard length, and compressed, the width 2.78  $(2.71\sim2.75)$  in depth; head length 3.42  $(3.34\sim3.41)$  in standard length; dorsal profile of forehead about  $52^\circ$ ; snout 3.60  $(3.71\sim4.03)$  in head; eye 2.53  $(2.40\sim2.65)$  in head; interorbital space slightly convex, bony width 3.69  $(3.58\sim3.71)$  in head; caudal peduncle deeper than long, the least depth 1.92  $(2.07\sim2.17)$  in head.

Mouth small, terminal, the gape horizontal; maxillary just reaching a vertical at anterior nostril. Lips nearly equal in width the median height of upper lip almost half eye diameter. Teeth slender, elongate, close-set, flexible in

Table 2. Proportional measurements of type specimens of *Centropyge aurantius* (in thousandths of the standard length).

	Holotype BPBM 17000		Paratypes	
		BM(NH) 1974.7.3.2	CAS 30691	USNM 212153
Standard length (mm)	49.4	47.8	47.2	42.6
Depth of body	613	586	593	575
Width of body	227	213	218	207
Head length	292	299	299	293
Snout length	81	75	81	73
Diameter of eye	115	113	119	122
Bony interorbital width	79	84	81	80
Length of preopercular spine	93	86	91	80
Least depth of caudal peduncle	152	144	138	139
Length of caudal peduncle	89	98	98	101
Snout to origin of dorsal fin	403	402	386	380
Snout to origin of anal fin	640	644	636	641
Snout to origin of pelvic fins	370	356	371	373
Length of dorsal fin base	743	703	699	695
Length of first dorsal spine	75	71	64	75
Length of second dorsal spine	119	111	100	101
Length of third dorsal spine	140	132	119	117
Length of last dorsal spine	192	193		181
Length of longest dorsal ray	245	228	225	228
Length of anal fin base	466	429	441	423
Length of first anal spine	138	142	136	143
Length of second anal spine	187	172	174	162
Length of third anal spine	219	190	184	195
Length of longest anal ray	269	230	242	242
Length of caudal fin	275	266	269	254
Length of pectoral fin	340	339	328	333
Length of pelvic spine	213	207	201	211
Length of pelvic fin	512	469	460	453

jaws, tricuspid (central cusp notably longer than each lateral one), in 3 rows at front of jaws, the uppers numbering about 50 in outer row and the lowers about 45. No teeth on roof of mouth. Tongue short and broadly rounded.

Posterior nostril larger than anterior, the opening elliptical; anterior nostril with a membraneous rim which is elevated into a flap postero-dorsally; nostrils separated by a space about equal to diameter of anterior nostril. Gill membranes narrowly attached to isthmus. Longest gill filament on first arch about 2.3 in eye. Gill rakers short, the longest about 10 in eye.

A prominent large spine at corner of preopercle; a single spine (2 on the right side of one paratype) on lower margin of preopercle (its length equal to or slightly greater than width of base of corner spine), and 43 (49 or 50) tiny spines on upper margin; no spines on margin of interopercle; margin of subopercle with 1 (0 $\sim$ 4) small spines; postero-ventral margin of preorbital with 4 (3 $\sim$ 6) small spines, this margin free for about half the distance from lowermost point to eye; antero-ventral margin of preorbital with 1 small spine.

Scales coarsely ctenoid (up to about 25 ctenii on margins), the exposed portion strongly ridged; head and body completely scaled except for lips and a narrow zone around nostrils; dorsal and anal fins scaled nearly to margins except region of anterior spines where fin is deeply incised; caudal fin scaled on about basal three-quarters of fin; pectoral fins scaled basally with tiny scales on unbranched portions of rays, none on membranes; pelvic fins with scales extending about half-way out rays, none on membranes.

Lateral line steeply arched, ending beneath rear base of dorsal fin, the anterior scales with 2 tubules, the posterior ones with a single tubule. Two  $(1\sim3)$  tubed scales in separate peduncular part of lateral line.

Caudal fin rounded, its length 3.63 ( $3.72 \sim 3.94$ ) in standard length. Origin of dorsal fin above upper end of gill opening. Dorsal spines progressively longer, the last  $5.21(5.18 \sim 5.52)$  in standard length; longest dorsal soft ray (about the sixth) 4.38 ( $4.08 \sim 4.44$ ) in

standard length (see Table 2 for other fin measurements); first 8 interspinous membranes of dorsal fin incised one-fourth or more length of spines; a pronounced cirrus projecting from membrane just posterior to tips of each spine, these cirri extending well above spine tips and becoming shorter posteriorly. Origin of anal fin beneath base of tenth dorsal spine; a pronounced cirrus projecting posterior to each spine, again extending well beyond each spine tip; posterior margin of soft portion of dorsal and anal fins obtusely angular, the anal rays extending slightly posterior to midcaudal length. Pectoral fins slightly pointed, reaching a vertical at base of second anal spine; pelvic fins long, originating below lower base of pectoral fins, the filamentous tips reaching about to base of fourth anal soft ray.

Color of body in alcohol dusky tan, the side with 15 or 16 irregular light bars about 1 scale wide alternating with darker bars about 2 scales wide; head dusky tan with or without irregular dark markings; posterior two-thirds (three-fourths in smaller paratype) of orbit with a dark brown edge; lips pale with dusky edges; anterior nostrils blackish; preopercular spine ensheathed in a dusky membrane; opercular membrane blackish; thorax and abdomen pale; dorsal and anal fins pale anteriorly with black cirri, soft rayed portions with 3 to 5 dark bands (the distal band being the most distinct), then a whitish band, a black submarginal line and finally a pale margin (ray tips only); caudal fin with 3 to 5 dark bands, a whitish band and a black line all continuous with their counterparts on the dorsal and anal fins; membranes of posterior edge of fin (about one-half eye diameter in width) dusky, the rays blackish; base of pectoral fins dusky; pectoral rays blackish, the membranes transparent; pelvic fins, including filament, dusky except the first soft ray which is light.

Color in life as illustrated on Fig. 2.

Remarks—C. aurantius is named in reference to its orange ground color. Our four specimens have come from two rotenone stations, both in bay environments (though Larsen Bay is much more exposed to the open sea than Pago Pago Harbor). We saw no live



Fig. 1. Holotype of Centropyge multicolor, 45.8 mm SL, Enewetak, Marshall Islands, BPBM 10058.

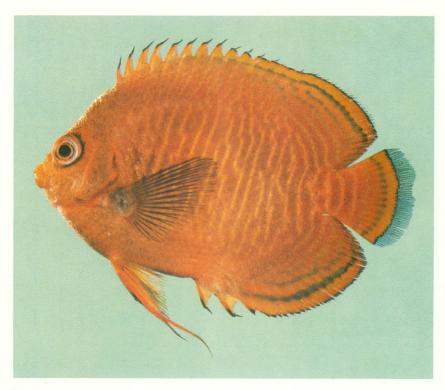


Fig. 2. Holotype of Centropyge aurantius, 49.4 mm SL, Tutuila, American Samoa, BPBM 17000.

individuals at either station though both sites were carefully scouted before the rotenone was dispensed.

With its deep body, steep profile, long pelvic fins and low gill-raker counts, *C. aurantius* might seem allied to *C. multifasciatus* (Smith and Radcliffe); however, the latter has XIII dorsal spines, and its dorsal and anal fins are very different in shape. In the configuration of these fins, *C. aurantius* resembles the somberhued *C. nox* (Bleeker) and *C. multispinis* (Günther).

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### 大洋州から得られたキンチャクダイ科の2新種 John E. Randall・Richard C. Wass

Centropyge multicolor はマーシャル諸島とタヒチから記載された。 背部は白色で尾柄と尾鱗にかけて黄色を帯びる。体の下半部は黄、橙、 ないし褐色を帯びる。 頸部には黒と青の条が交互にある。

C. aurantius はサモアから記載された。体高が大きいこと、腹鰭が臀鰭軟条部に達すること、前鰓蓋骨と第一眼下骨に細かい鋸歯があること、主として橙色で、不規則な暗色の条があることが特徴である。