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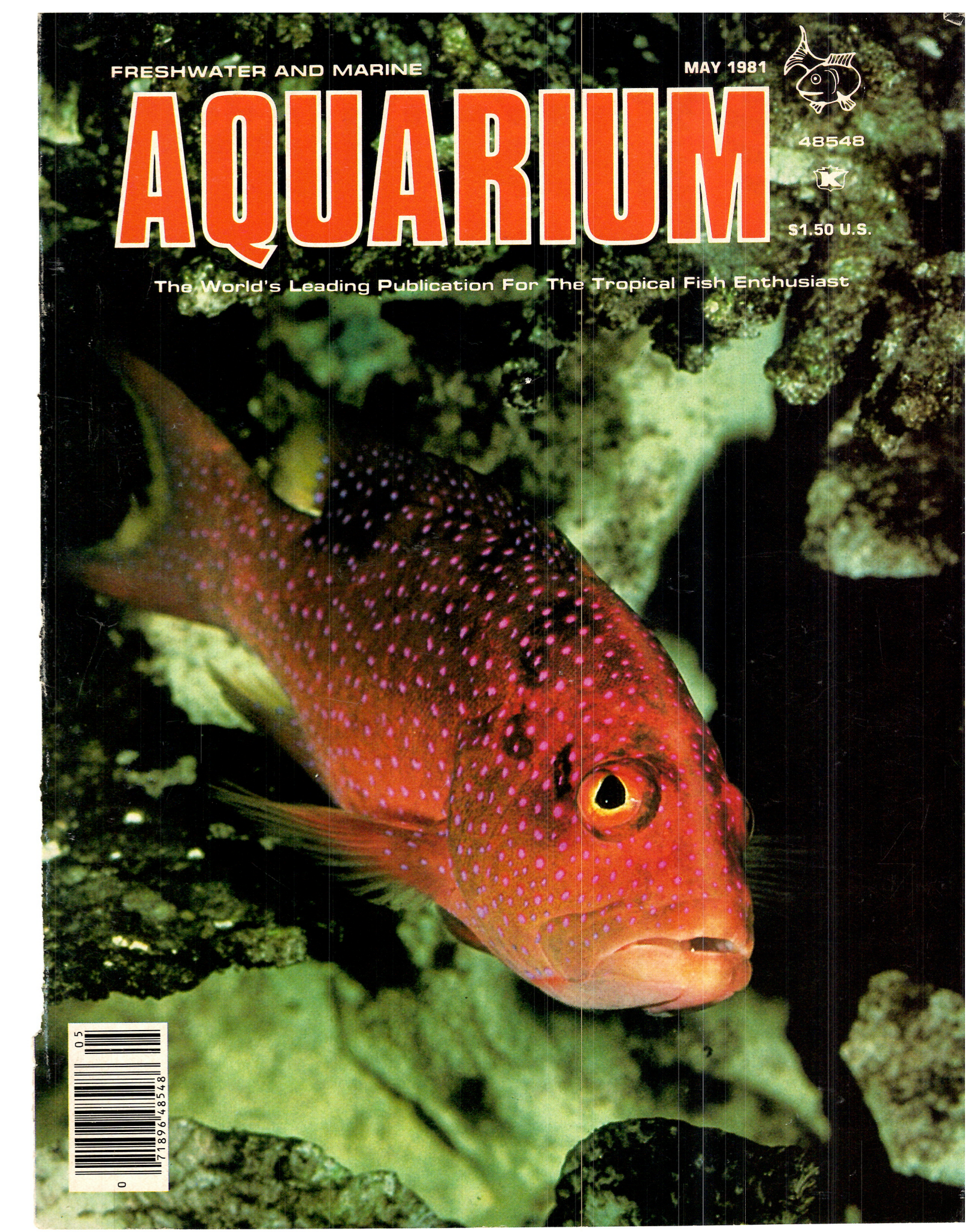

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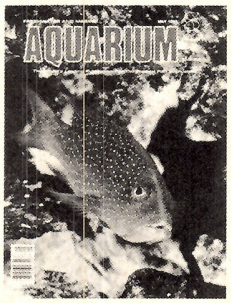

This Month's Cover

A beautifully colored 13" *Variola louti,* photographed by Aaron Norman.

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Holacanthus griffisi

A New Species of Angelfish from the Central Pacific Ocean

By Bruce A. Carlson and Leighton R. Taylor

Introduction

■ In 1978 a new species of *Holacanthus* was collected by the authors at Canton Island in the Phoenix Islands bringing to 15 the total number of species assigned to this genus. Eight of these species occur in the Pacific Ocean, four in the Indian Ocean and Red Sea, and four in the Atlantic Ocean (*H. trimaculatus* is counted twice as it occurs in both the Pacific and Indian Oceans).

The original specimen collected by us was put on display at the Waikiki Aquarium. Additional specimens were collected in 1978 by Dr. John McCosker of the Steinhart Aquarium, and in 1979 by Terrance Morin, Gordon Damon, and Jacki Kilbride of the Waikiki Aquarium. This new species, *Holacanthus (Apolemichthys) griffisi* is described herein. We concur with Randall and Mauge (1978) in following Fraser-Brunner's (1933) placement of *Apolemichthys* as a subgenus of *Holacanthus* pending a thorough study of the generic classification within the family Pomacanthidae.

Methods

All measurements were made to the nearest tenth millimeter using dial calipers. Methods for making measurements and counts follow Hubbs and Lagler (1967) except for the caudal peduncle length which was measured horizontally from a vertical at the rear base of the anal fin to the caudal fin base. Counts and measurements of dorsal and anal fin spines and rays were made from x-radiographs.

In the following description, data in parentheses apply to paratypes if different from the holotype. The format follows that of Randall and Mauge (1978) in their description of a related species, *H. guezei*.

The holotype has been deposited at the Bernice P. Bishop Museum, Honolulu (BPBM). One paratype has also been deposited at the BPBM and seven paratypes at the California Academy of Sciences, San Francisco (CAS).

***Holacanthus (Apolemichthys) griffisi*, sp. nov.**
(Figs. 1 & 2)

Holotype — BPBM 22615, 140.7 mm standard length (SL), Canton Island, Phoenix Islands, north side, outside reef, 19.8 m, barrier net, T. Morin, G. Damon, J. Kilbride, 19 June, 1979.

Paratypes — BPBM 26446, 128.4 mm SL, same data as holotype; CAS 42002, 157.0 mm, 138.9 mm, 124.0 mm, 117.0 mm SL, Canton Island, Phoenix Islands, northwest lagoon edge, fore-reef slope, 33.5 m, J. McCosker, 12 August 1978.

Description

Dorsal rays XIV,18 (last ray divided to base); anal rays III,18 (last ray divided to base); pectoral rays 17 (18) (upper two and lowermost unbranched); pelvic rays I,5; pored lateral-line scales 39 + 4 (38-47 + 5-6); vertical scale rows from upper end of gill opening to base of caudal fin 46 (46-47); scales above lateral line to origin of dorsal fin 10 (9-11); scales below lateral line to origin of anal fin 28 (22-29); vertical scale rows on opercle 9 (8-10); gill rakers 6 + 13 (3-5 + 12-13); branchiostegal rays 6; vertebrae 10 + 14.

Body deep, the depth 1.71 (1.64-1.80) in SL, and compressed, the maximum width 3.1 (2.8-3.2) in depth; head length 3.3 (3.3-3.6) in SL; dorsal profile of forehead steep, forming an angle of about 58° (53°-60°) to the horizontal; snout 2.8 (2.7-3.0) in head length; diameter of orbit (measured horizontally) 3.8 (3.4-3.8) in head length; interorbital space slightly convex, the bony width 3.2 (2.9-3.5) in head length; caudal peduncle deeper than long, the least depth 2.2 (2.0-2.2) in head length.

Mouth small, terminal, the gape horizontal, the maxilla reaching a vertical through posterior nostril. Upper lip height greater than lower lip, the basal two thirds scaled, the width contained 1.4 (1.2-1.5) in diameter of orbit. Teeth slender, elongate, the longest 1.8 (1.7-2.5) in orbit, close-set, flexible in jaws, tricuspid (the large central cusp notably longer than the small lateral ones), in 4 rows in jaws (except posteriorly), 39 (31-43) in outer row of upper jaw and 37 (35-41) in lower jaw. No teeth on roof of mouth. Tongue short and broadly rounded.

Nostrils anterior to center of eye, the posterior the larger, oval, with a low rim anteriorly, the anterior nostril with a flap postero-dorsally; distance between nostrils about one third the greatest diameter of posterior nostril; distance from edge of orbit to edge of posterior nostril about equal to greatest diameter of posterior nostril. Circumorbital pores not prominent, except one large pore in front of anterior nostril. Gill membranes narrowly attached to isthmus. Longest gill filament on first arch contained 1.6 (1.5-1.9) times in orbit. Gill rakers short, the largest 7.0 (6.5-8.6) in orbit.

Opercle ending posteriorly in a single, flat, blunt spine. A prominent large spine at corner of preopercle (without a groove), the spine length (measured along upper edge) contained 2.7 (2.1-2.9) times in head length; upper margin of preopercle finely serrate, with 31 (19-53) irregular serrae; lower preopercular margin with 3 (2-4) spines, the more posterior the largest; interopercle with 5 (2-9) serrae; subopercle with 0 (0-8) small serrae; preorbital with 9 (8-12)

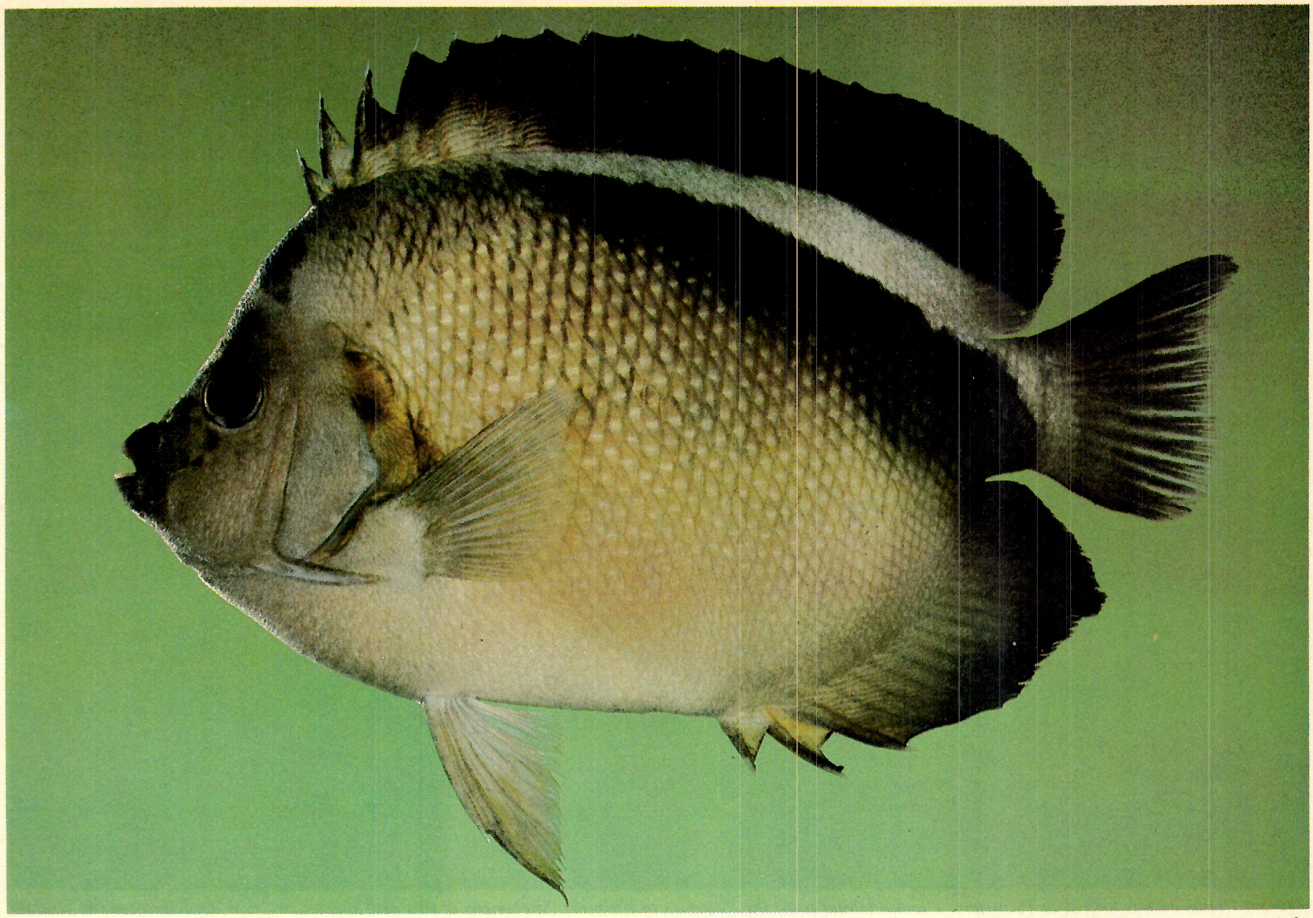

Figure 1: Holotype of Holacanthus griffisi (BPBM 22615, 140.7 mm SL, Canton Island, Phoenix Islands, taken at 19.8 meters, 19 June 1979. Photo by Dr. John E. Randall, B.P. Bishop Museum.)

serrae, none enlarged, the diagonal posterior margin scarcely free; exposed margin of supracleithrum with 52 (11-46) serrae, and margin of posttemporal with 24(6-32) serrae.

Scales finely ctenoid (up to 56 ctenii on margins), the exposed portion of each scale ridged; auxillary scales present on nape and between lateral line and dorsal fin base; head fully scaled except lower lip and distal one-third of upper lip; dorsal and anal fins scaled nearly to margins except anteriorly in spinous portion where fin membranes are deeply incised; caudal fin scaled about two-thirds distance to posterior margin; perctoral fins with scales basally; pelvic fins with small scales extending out on rays on outer surface but none on membranes.

Lateral line arched, discontinuous on the holotype, ending beneath base of twelfth dorsal soft ray; four pored scales in a detached horizontal row mid-laterally on caudal peduncle (lateral line continuous on four paratypes).

Caudal fin rounded with upper three rays produced forming a short filament, caudal fin length (including filament) 4.1 (3.2-4.6) in SL. Origin of dorsal fin slightly anterior to a vertical at upper end of gill opening. Dorsal spines progressively longer, the last seven subequal, longest dorsal spine XIV (XIII), 5.5 (4.7-5.2) in SL; longest dorsal soft ray (first) 5.2 (4.7-5.3) in SL; first three interspinous membranes of dorsal fin incised one-half or more length of spines; posterior margin of soft portions of dorsal and anal fins rounded, the longest dorsal and anal rays reaching posteriorly one third the length of caudal fin; origin of anal fin below base of dorsal fin spine XIII (XII-XIV); third anal spine the longest 5.1 (4.4-5.7) in SL; length of longest anal soft ray (first) 4.8 (4.2-5.9) in SL; pectoral fins moderately pointed, not reaching a vertical through anus, their length 3.4 (3.2-4.8) in SL.

Color of holotype in alcohol — head and body light gray; face and head streaked with black in four separate areas: below eye; above eye; through nostril area; and, extending across nuchal area. Dorsal fin gray from DI to DVI-VII, becoming black at dorsal VII, and extending for remainder of dorsal fin, area beneath dorsal fin white from D IV to posterior margin of dorsal fin: this stripe narrow (1-2 scale rows anteriorly) to wide (7-8 scale rows posteriorly), and extending onto caudal peduncle. Dorsal part of body beneath white stripe markedly black from a point beneath D V extending onto caudal peduncle and posterior section of anal fin, this black stripe varying in width from narrow anteriorly (3-4 scale rows) to wide posteriorly (11-12 scale rows). Tail gray; pectoral fins and bases gray; pelvic fins gray, but longest rays (1,2,3) tipped with black; anal fin darkish gray anteriorly with black posterior margin. Opercle gray, a black spot on supracleithrum equal in area to about one-half orbital area; eye light bluish gray.

Color in life (from an Ektachrome transparency of the holotype taken by Dr. John E. Randall, Fig. 1) — head, belly, and paired fins light gray, sides of body brownish-gray with each major scale bearing a central white spot; dorsal fin gray at base from D I to D VII, anterior distal margin of dorsal fin black from D III to DVIII, entire dorsal fin black from D VII to posterior edge, white stripe underlying dorsal

Figure 2: Holacanthus griffisi at 10 meters, Canton Island (now the Republic of Kiribati). Specimens of this new species are now on display at the Waikiki Aquarium in Honolulu and are available at various Hawaiian fish suppliers; for example, Reef Life Hawaii. This new species is the latest in a series to have been discovered as a result of the increasing collecting activities of aquarium hobbyists and suppliers. Other notable examples are the masked angelfish (Genicanthus personatus) from Hawaii, discovered by a professional aquarium collector, and the longfin bass (Anthias ventralis) also collected in Hawaii. All three of these fishes have entered the aquarium trade prior to receiving a scientific name; thus, these new species have been familiar to many laymen months before they were known to the general world of science (photo by Bruce Carlson, Waikiki Aquarium).

fin base on side of body from D VII to posterior end of dorsal fin and extending onto caudal peduncle; distal margin of anal fin black, base gray, anal fin membrane between A I to A III yellowish-brown; eye black.

Remarks

Holacanthus griffisi is placed in the subgenus *Apolemichthys*, which is characterized by having fewer than 50 scale rows, an incomplete lateral line (continuous on four specimens of *H. griffisi*), the hind edge of the preorbital mostly covered, about 9 scale rows on the operculum, and a truncate caudal fin. Seven species are included in this subgenus: *H. xanthurus, H. xanthotis, H. xanthopunctatus, H. trimaculatus, H. guezei, H. arcuatus* and *H. griffisi*. *H. griffisi* is most similar to *H. xanthurus* from the Indian Ocean and *H. xanthotis* from the Red Sea. In *H. xanthurus, H. xanthotis* and *H. griffisi* the supracleithrum is pale or black but not greatly enlarged, as opposed to *H. trimaculatus* and *H. xanthopunctatus* where the supracleithrum is dark and enlarged forming an ear-like spot. *H. xanthurus, H. xanthotis* and *H. griffisi* also have a distinct filament on the upper caudal lobe which is absent, or only poorly developed (*H. trimaculatus*). A further comparison of these three species is given in Table 2; proportional measurements are taken from a paper by Klausewitz and Wongratana (1970), and counts made by us on specimens in the Bishop Museum. *H. griffisi* shows overlap in most of the characters listed but is easily separable from *H. xanthurus* and *H. xanthotis* on the basis of coloration.

Additional specimens and observations of *H. griffisi* have been made since the collection of the holotype and paratypes. In 1980 Anthony Nahacky and Dennis Yamaguchi collected a live individual at Christmas Island in the Line Islands at a depth of about 33 m. Dr. John E. McCosker has observed it at Fanning Island, also in the Line Islands. Recently we received an underwater photograph of *H. griffisi* taken by Valerie Taylor in the Gilbert Islands (now Kiribati). To date no other locality records are known to us and *H. griffisi* thus appears to be confined to the central Pacific region.

At Canton Island and apparently at other localities, *H. griffisi* occurs on the fore-reef slopes at depths of 10-33 m. It was only occasionally encountered at most dive sites and was more often observed singly, rarely in pairs.

Two specimens of *H. griffisi* have been maintained alive at the Waikiki Aquarium in Honolulu. One of these, collected by Charles Apuna and Joyce Haas at Canton Island, has survived over 12 months to date. Both individuals readily adapted to captivity and have accepted a wide variety of fish foods. They are generally non-aggressive but have been observed to attack a specimen of *H. xanthopunctatus*

Table I. — Proportional measurements of type specimens of *Holacanthus griffisi* expressed as percent standard length

	HOLOTYPE	PARATYPES				
	BPBM 22615	CAS 42002	CAS 42002	CAS 42002	CAS 42002	CAS 42002	BPBM 26446
Standard Length (millimeters)	140.7	157.0	138.9	124.0	124.0	117.0	128.4
Depth	58.4	58.2	55.7	60.9	57.2	60.0	56.2
Width	18.8	18.4	18.9	22.1	19.3	18.6	19.3
Head length	30.1	29.2	28.0	29.1	30.5	29.3	29.0
Snout length	10.9	10.8	protruded	9.8	10.8	10.2	10.1
Diameter of orbit	8.0	7.6	8.1	8.4	8.0	8.5	8.2
Bony interorbital width	9.6	10.1	9.2	9.7	9.2	8.4	8.6
Least depth of caudal peduncle	13.6	14.3	13.9	14.4	13.8	13.9	14.2
Length of caudal peduncle (horizontal)	7.8	7.8	6.4	7.3	6.4	6.4	6.4
Snout to origin of dorsal fin	35.3	34.3	32.8	33.4	35.3	35.0	33.3
Snout to origin of anal fin	68.0	70.8	72.8	69.8	70.0	68.4	67.1
Snout to origin of pelvic fin	41.0	41.3	42.7	40.4	40.9	40.8	38.6
Length of dorsal fin base	72.6	74.1	73.2	75.8	73.1	75.0	75.7
Length of anal fin base	41.2	37.2	37.6	40.4	39.2	38.8	36.7
Length of dorsal spine: I	8.1	9.6	8.3	8.9	9.1	8.9	10.5
Length of dorsal spine: II	11.7	13.9	11.8	14.0	12.8	13.8	15.3
Length of dorsal spine: III	15.9	14.9	15.9	17.1	16.9	16.9	17.7
Length of dorsal spine: IV	17.6	19.6	18.3	18.7	19.3	18.7	17.8
Length of dorsal spine: XIV	18.3	21.1	19.4	19.2	19.6	20.6	20.0
Length of longest dorsal ray	19.4	20.6	19.7	18.8	20.1	21.2	20.6
Length of anal spine: I	9.7	10.2	10.2	10.6	9.6	11.0	13.6
Length of anal spine: II	14.7	12.8	16.0	17.3	15.2	16.9	17.2
Length of anal spine: III	19.4	17.6	20.0	22.8	21.2	21.2	18.7
Length of longest anal soft ray	20.9	17.0	21.4	23.7	20.0	23.4	22.6
Length of caudal fin	24.3	30.6	24.3	23.9	23.0	31.0	21.6
Length of left pectoral fin	23.0	24.6	24.4	24.7	26.2	28.2	20.8
Length of pelvic fin spine	17.9	18.8	19.3	19.7	19.0	20.4	18.6
Length of pelvic fin	25.3	26.4	21.0	28.7	30.7	31.0	23.7
Length of angular preopercular spine	10.9	13.9	10.9	10.2	10.8	10.9	10.6

Table 2. — Comparison of proportional measurements and counts for *Holacanthus griffisi*, *H. xanthurus*, and *H. xanthotis*

	H. griffisi	*H. xanthurus*	*H. xanthotis*
Depth (% SL)	55.7-60.9 (N = 7)	67.4	61.7
Snout (% SL)	9.8-10.9 (N = 7)	9.2	10.6
Orbit (% SL)	7.6- 8.5 (N = 7)	10.7	8.7
Scale rows	46-47 (N = 7)	45-46 (N = 3)	44-45 (N = 4)
*Preopercle serrae (vertical margin)	19-53 (N = 7)	38-54 (N = 3)	33-46 (N = 4)
Preopercle serrae (horizontal margin)	2-4 (N = 7)	1-2 (N = 3)	1-2 (N = 4)
Subopercle serrae	0-8 (N = 7)	0 (N = 3)	0-7 (N = 4)
Interopercle serrae	2-9 (N = 7)	1-3 (N = 3)	1-7 (N = 4)
Supracleithrum serrae	11-52 (N = 7)	17-36 (N = 3)	15-34 (N = 4)
Posttemporal serrae	6-32 (N = 7)	14-18 (N = 3)	10-21 (N = 4)
Preorbital serrae	8-12 (N = 7)	7-13 (N = 3)	10-12 (N = 4)

* excludes preopercular spine

introduced later in the same aquarium (*H. xanthopunctatus* and *H. griffisi* co-occur at Canton Island and the Line Islands).

Etymology

Holacanthus griffisi is named in gratitude to Mr. Nixon Griffis, Trustee of the New York Zoological Society and Patron of the New York Aquarium whose interest in marine life and whose generosity resulted in our collecting trip to Canton Island and the discovery of this new species. To further acknowledge Mr. Griffis's support of aquarium science, and because this species has already become established in the aquarium trade, we suggest the common name, "Griffis angelfish."

Acknowledgements

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