

# A Revision of the Labrid Fish Genus *Anampses*

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## Abstract

The tropical Indo-Pacific wrasse genus *Anampses* is distinctive in possessing a single pair of broad projecting incisiform teeth at the front of the jaws, scaleless head, smooth preopercular margin, complete lateral line, IX, 12 dorsal rays, and III, 12 anal rays. It is represented by two subgenera, *Pseudanampses* with 48 to 50 lateral-line scales (one species, *A. geographicus*) and *Anampses* with 26 or 27 lateral-line scales (11 species).

*Anampses femininus* is described as new from specimens collected at Easter Island, Pitcairn, Rapa, New Caledonia, and Lord Howe Island. The female, bright orange with dark-edged blue stripes and a blue caudal peduncle and fin, is unusual in being even more colorful than the male, which is dusky yellow to blackish with vertical blue lines on the scales.

The following pairs of nominal *Anampses* are here recognized as males and females of the same species (the first name of each pair has priority):

- 1) *A. caeruleopunctatus* Rüppell
- 2) *A. diadematus* Rüppell (male)
- 1) *A. cuvier* Quoy and Gaimard
- 2) *A. godeffroyi* Günther (male)
- 1) *A. chrysocephalus* Randall (male)
- 2) *A. rubrocaudatus* Randall
- 1) *A. neoguinaicus* Bleeker (male)
- 2) *A. fidjensis* Sauvage
- 1) *A. meleagrides* Cuvier and Valenciennes
- 2) *A. amboinensis* Bleeker (male)

More evidence is needed for the last pair in the above list, however, to be certain of conspecificity.

*A. tinkhami* Fowler (1946) from the Ryukyu Islands is placed in the synonymy of *A. caeruleopunctatus*, the species with the broadest distribution of the genus: Red Sea to Easter Island, but not Hawaii. New records for *A. caeruleopunctatus* are reported herein from Chagos Archipelago, Caroline Islands, Fiji, Starbuck, Marcus Island, Rapa, Pitcairn, and the Marquesas Islands.

*A. cuvier*, a Hawaiian endemic, is recorded from Johnston Island (within the Hawaiian province).

*A. meleagrides* is recorded from the Red Sea.

*A. fidjensis* Sauvage is not a synonym of *A. twistii* Bleeker as contended by Fowler (1928) and Schultz (1960), but *A. neoguinaicus*. This species is recorded for the first time from New Caledonia, the Capricorn Group of the Great Barrier Reef, and Taiwan.

*A. melanurus melanurus* Bleeker is here recorded from seven specimens from the Marquesas. This species is otherwise known only from the type from Ambon, a specimen from Samoa, and one from Taiwan. It shows little difference in color with sex. A new

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subspecies, *A. melanurus lineatus*, is described from four specimens from 130–150 feet in the Red Sea.

*A. elegans* Ogilby, previously known only from Lord Howe Island and Norfolk Island, is here recorded from New South Wales from the presumed large male form. Undersea photos indicate its occurrence also at Poor Knights Islands, New Zealand.

*A. twistii*, a species which appears to show no difference in color with sex is recorded for the first time from the Society Islands, Austral Islands, Fiji, Palau Islands, and Taiwan.

*A. lennardi* Scott is known from only four specimens from Western Australia; the two type specimens have been lost.

*A. viridis* Cuvier and Valenciennes is known only from Mauritius. *A. rubroviridis* Liénard (*In Sauvage*) may be the male form of *A. viridis*. No specimens of *A. rubroviridis* are available.

## INTRODUCTION

*Anampses* was established by Quoy and Gaimard (1824) when they described *A. cuvier* from the Hawaiian Islands, the first species of this distinctive labrid genus. They attributed the name *Anampses* to Cuvier from an unpublished manuscript.

Cuvier first published the name *Anampses* in his "Planches de Seba, . . ." (1827) when he applied the combination *Anampses moniliger* to Seba's pl. 31, fig. 6. Although obviously a labrid, the fish of this illustration may not be an *Anampses*. There are no jutting teeth as one would expect for a drawing of any species of the genus. The total number of dorsal rays (spines not distinguished from soft rays) are 23, whereas species of *Anampses* all have 21. The scales as shown on the drawing are too numerous for the subgenus *Anampses* and too few for the subgenus *Pseudanampses*. It would seem best to regard this name as a *nomen inquirendum*.

In 1828 Rüppell described the second species of the genus, *caeruleopunctatus*, from the Red Sea. In 1835 he named *A. diadematus*, also from the Red Sea. Cuvier and Valenciennes (1839) added four more species to the genus: *chlorostigma* (after Ehrenberg), *geographicus*, *meleagrides*, and *viridis*. Over the period 1856 to 1878 Bleeker named five: *twistii*, *melanurus*, *amboinensis*, *pterophthalmus*, and *neoguinicus*.

With the description of *A. femininus* and *A. melanurus lineatus* in the present paper, a total of 32 names have been proposed, although two of these represent emendations of existing names. Most of these were listed by Whitley (1964) who predicted, "Due to variations in colour with growth or sex in these fishes, it is probable that the number of species may be drastically reduced." The only example of sexual dichromatism in *Anampses* elucidated at that time, however, was the demonstration by Randall (1958a) that *A. pterophthalmus* Bleeker is a probable synonym of *A. geographicus* Cuvier and Valenciennes.

In addition to *geographicus*, nine names have been correctly referred to synonymy by other authors, but none because of being different sexual color forms. Günther (1862) and Bleeker (1878) referred *lineolatus* Bennett to the synonymy of *diadematus*. Fowler and Bean (1928) were in error in considering *lineolatus* a synonym of *geographicus*. They were correct, however, in regarding *chlorostigma* Cuvier

and Valenciennes a synonym of *caeruleopunctatus* and *taeniatus* Sauvage as the same as *diadematus*. Fowler (1928) referred *pulcher* Regan from Easter Island to the synonymy of *caeruleopunctatus*, and equated *evermanni* Jenkins with *godeffroyi* but was mistaken in considering *fidjensis* Sauvage as the young of *twistii* (a decision followed by Schultz, 1960). De Beaufort (1940) listed *lunatus* Sauvage as a synonym of *amboinensis*. Kamohara (1958) correctly linked *ikedai* and *nagayoi*, both described from Japan by Tanaka (1908), with *meleagrides*. Whitley (1964) concluded that *variolatus* Ogilby is a synonym of *elegans* (first mentioned in Whitley's mimeographed "List of Type-Specimens of Recent Fishes in the Australian Museum, Sydney", distributed in 1957).

Tanaka (1952) united six species of *Anampses* under the name *cuvieri* but all erroneously. His suspicion, however, that *diadematus* is the male of *cuvier* (his *cuvieri* is *caeruleopunctatus*) ultimately proved to be correct.

All of the authors who have described species of the genus have placed them in *Anampses*—a rare display of generic conformation. Bleeker (1862) retained his species in *Anampses* but offered the name *Pseudanampses* for the nominal species *pterophthalmus* and *geographicus*. He pointed out that these two have 48 to 50 lateral-line scales in contrast to the remaining species of *Anampses* which have 26 or 27. Jordan and Snyder (1902), unaware of *Pseudanampses*, proposed *Ampheces* as a subgenus for *geographicus*.

In view of other similarities of *geographicus* to the remaining species of *Anampses*, most authors have not accepted *Pseudanampses* as a generic name. It is perhaps best retained as a subgenus. The wrasse genus *Labroides* displays a comparable disparate lateral-line scale count among its species (Randall, 1958b).

Fin-ray counts, so useful in distinguishing the species of many genera of fishes, are without diagnostic value for the species of *Anampses*. All have IX, 12 dorsal rays and III, 12 anal rays (very rarely the soft rays are 11 or 13 for these fins) and 13 pectoral rays (of 197 specimens of the genus counted, three had pectoral counts of 12, and eight had counts of 14). Lateral-line counts within the subgenus *Anampses* were either 26 to the base of the caudal fin (*caeruleopunctatus*, *cuvier*, *chrysocephalus*, and *lennardi*) or 27 (remaining species). Gill-raker counts were more useful, ranging from 14 to 25 (Table 1). Counts of gill rakers have not been made by other authors, however.

As might be expected, a heavy reliance has been placed on color to distinguish the species. With the exception of the scale difference of the two subgenera, the key to the species of *Anampses* of the Indo-Australian Archipelago by Weber and de Beaufort (1940), for example, is based entirely on color. It is not surprising, therefore, that color forms of the same species have been described as different species.

Several lines of evidence have been useful in demonstrating that two different color phases of a fish represent a male-female pair of the same species. For *Anampses*, morphology has had limited value, and as mentioned, only the lateral-line scale counts and gill-raker counts have been helpful among meristic data.

The geographical distribution of the two forms of a suspected pair should be

Table 1. Gill-raker Counts of Species of *Anampses*.

Species	14	15	16	17	18	19	20	21	22	23	24	25
<i>caeruleopunctatus</i>												
Western Pacific—Red Sea					5	13	17	2				
Polynesia (east of 160°)						2	3	3	4	1		
Easter Island										2		1
<i>cuvier</i>					9	10	5	1				
<i>lennardi</i>						1	1					
<i>meleagrides</i>					3	6	4					
<i>elegans</i>					4	5	4					
<i>melanurus melanurus</i>	1	5	1	1								
<i>melanurus lineatus</i>	2	1	1									
<i>chrysocephalus</i>			2	9	3							
<i>femininus</i>		6	11	1								
<i>neoguinaicus</i>		1	4	6	1							
<i>twistii</i>			4	10	3	1						
<i>viridis</i>					1	1						
<i>geographicus</i>				1	7	12	3					

compared. If the species are well represented in collections, their ranges should be the same. The large male form is usually notably less abundant than the immature and female stages, however, and will be less common in general collections such as rotenone stations. On the other hand, if collections are made with hook and line or from local markets for which most of the fishes are taken by angling, the large male form may be represented by more specimens than would be expected from its actual proportion in the population of the species.

Undersea observations may provide clues to the co-identity of two fishes. We usually find the two forms sharing the same habitat. Often they may be seen swimming together, and they may show comparable behavior patterns. For example, if a female form is particularly wary of the approach of a diver, the male is apt to be comparably cautious.

The terminal male color form is larger, on the average, than the female stage (or the initial male form, if there is one, in which case it will be the same color as the female). This terminal male form results from a change in color from the female. This opens two avenues of evidence in uniting suspected pairs of labrid fishes. First, one will not find any small individuals of the male color pattern. Second, if given enough time, a diver may eventually see an individual fish in the process of transforming from one color phase to the other.

Equally convincing is the observation of the courtship or spawning between the two color forms. This need not be absolute evidence of conspecificity, however, as was apparent when two different species of *Thalassoma* were observed to spawn in Hawaii (Hobson and Randall, MS). In this particular example, one of the species was extremely rare and the other very abundant.

Randall (1958a) noted that both males and females were found in the "ptero-phthalmus" form of *Anampses geographicus*, although most were females. Only

males were detected among the specimens of *geographicus* for which the sex could be determined. All of the remaining species of *Anampses* for which there are two distinct color forms as adults have been of one sex for each color phase, except one large specimen of *caeruleopunctatus* from Pitcairn Island which was a male in the blue-spotted phase (prior observations had indicated this phase to be wholly female). For the remaining species probably too few specimens have been examined to determine if males are present in the "drab" phase.

In the present paper ten species of *Anampses* which heretofore have had different scientific names are linked as five male-female pairs of the same species. The evidence for joining *caeruleopunctatus* with *diadematus*, *cuvier* with *godeffroyi*, *chrysocephalus* with *rubrocaudatus*, and *neoguinaicus* with *fidjensis* is convincing. It has involved underwater observation as well as other considerations. The apparent conspecificity of the remaining pair, *meleagrides* and *amboinensis* is not as conclusive. Also the linking of an unnamed large male form from Lord Howe Island and New South Wales with *elegans* is largely an educated guess.

Because of occasional difficulty in determining which gill raker lies at the angle of the first gill arch, no attempt has been made to differentiate upper-limb from lower-limb gill-raker counts. Gill-raker counts include all rudiments. Counts of lateral-line scales were made to the base of the caudal fin. Usually there is a single pored scale beyond the hypural plate (or in the case of *geographicus*, there may be two such scales). Although some authors have included these end scales in their count of lateral-line scales, they are omitted here. Depth of body was taken as the greatest body depth, except when the abdomen was unduly extended, in which case an adjustment was made. Width of body was measured just posterior to gill opening. Head length was taken from the posterior end of the opercular membrane to either the front of the upper lip or the front of the upper teeth, whichever was the most anterior. Eye diameter was the greatest diameter of the orbit. The length of the upper jaw was measured from the front of the upper lip (or teeth) to the posterior end of the maxillary (concealed). The length of the caudal peduncle was measured horizontally between verticals at the rear base of the anal fin and the base of the caudal fin. Unless otherwise stated, all length measurements are standard length (SL).

The character of whether the dorsal spines are flexible or pungent may be difficult to assess. Three species of *Anampses*—*caeruleopunctatus*, *cuvier*, and *meleagrides*—have flexible spines. The spines of the remaining species appear to be pungent. For some such as *melanurus*, the spines are clearly strong and sharp-tipped, but specimens of others such as *elegans* and *neoguinaicus*, have spines which are somewhat flexible but with the tips usually sharp.

Specimens of *Anampses* were examined at the following institutions: Australian Museum at Sydney (AMS), Bernice P. Bishop Museum (BPBM), California Academy of Sciences (CAS), Museum of Comparative Zoology at Harvard University (MCZ), United States National Museum (USNM), British Museum (Natural History [BM(NH)]), Rijksmuseum van Natuurlijke Historie at Leiden (RMNH),

Museum National d'Histoire Naturelle of Paris (MNHN), and the Senckenberg Museum at Frankfurt (SMF).

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### Genus ANAMPSES

*Anampses* Quoy and Gaimard, 1824. Voyage autour du monde . . . "L'Uranie" et "La Physicienne" . . . , p. 276 (type species, *Anampses cuvier* Quoy and Gaimard, by monotypy).

*Pseudanampses* Bleeker, 1862. Atlas ichthyologique des Indes Orientales Néerlandaises, . . . vol. 1, p. 101 (provisionally proposed for *Anampses pterophthalmus* Bleeker and *A. geographicus* Cuvier and Valenciennes).

*Ampeces* Jordan and Snyder, 1902. Proc. U. S. Natl. Mus., vol. 24, p. 628 (type species, *Anampses geographicus* Cuvier and Valenciennes, by original designation) (proposed as "a new subgenus or probably distinct genus").

Body slightly to moderately deep, the depth contained 2.6 to 3.9 in standard length, and compressed, the width 1.9 to 2.7 in depth; head length 2.6 to 3.3 in standard length; least depth of caudal peduncle 2 to 2.8 in head length; caudal peduncle deeper than long, the length contained 1.5 to 2.1 times in least depth; snout moderate, 2.5 to 3.5 in head length; eye diameter 1.2 to 3.4 in snout; mouth small, terminal, the maxillary ending in front of or just reaching a vertical through anterior nostril; lips moderately fleshy, the inner surface of upper lip with a median thickening, the lateral inner surfaces plicate; lower lip with a median portion set off by a ventral groove on each side from lateral parts which are broadly free from the chin; a single pair of incisiform forward-projecting teeth at front of jaws, the uppers broader (usually with upcurved pointed tips), the lowers downcurved and nearly conical; remaining teeth in jaws minute or imperceptible; no teeth at corner of mouth or on palate; pharyngeal teeth asymmetrically conical, the uppers in two triangular adjacent patches of about 20 teeth each; lower unit of pharyngeal teeth triangular with a narrow anterior section; nostrils small, the anterior in a short tube, the posterior with a small flap at front; gill membranes broadly attached to isthmus; branchiostegal rays 6; gill rakers short, 14 to 25 on first arch; preopercle entire; head naked except for small scales on nape which reach nearly to a vertical at upper

preopercular margin (on most species the mid-dorsal region of nape is scaleless or the scales are deeply embedded); body with thin cycloid scales, those on thorax smaller than elsewhere; lateral line continuous, deflected downward below base of ninth dorsal soft ray to a horizontal section mid-laterally on caudal peduncle; lateral-line scales to base of caudal fin 26 or 27 (subgenus *Anampses*) or 48 to 50 (subgenus *Pseudanampses*); no scales on fins, except basally on caudal; dorsal rays IX, 12 (rarely 11 or 13); dorsal spines progressively longer posteriorly, the tips varying from pungent to flexible; soft portion of dorsal fin slightly higher than spinous portion with no notch between; anal rays III, 12 (rarely 11 or 13); pectoral rays 13 (rarely 12 or 14), including short upper bony splint (this and the second ray unbranched); pectoral fins short, 1.5 to 2.1 in head length; pelvic fins I, 5, their origin slightly posterior to a vertical through anterior pectoral base; pelvic fins usually shorter than pectorals, rarely reaching origin of anal fin, their length 1.5 to 2.6 in head length (pelvic fins of males of some species tend to be longer than females); principal caudal rays 14 (uppermost and lowermost unbranched); caudal fin short, 1.5 to 1.9 in head length; posterior margin of caudal fin varying from rounded to emarginate.

## KEY TO THE SPECIES OF ANAMPSES

- 1a. Lateral-line scales 26 or 27 (Subgenus *Anampses*)..... 2
- 2a. Mid-dorsal region of nape scaleless or with scales well embedded (except on juveniles of some species); color not as in 2b..... 3
- 3a. Body moderately to very deep, the depth 2.3 to 3 in standard length; gill rakers 18 to 25; lateral-line scales 27 (not including the last pored scale, beyond end of hypural)..... 4
- 4a. Body with dark-edged light blue spots or vertical lines on scales ..... 5
- 4b. Body with broad alternating stripes of blue and yellow (Western Australia) ..... *lennardi*
- 5a. Head with narrow dark-edged blue bands, the longer ones radiating from eye, the male form usually with a broad band of blue across anterior interorbital space (Indo-Pacific; Red Sea to Easter Island, but not Hawaii) . . . *caeruleopunctatus*
- 5b. Upper half of head brown with white dots, the lower half whitish with dark-edged red spots (female), or upper anterior quadrant of head green, the rest of head light red to orange-brown with a reticulum of blue (male) (Hawaiian Islands and Johnston Island) ..... *cuvier*
- 3b. Body not very deep, the depth 2.8 to 3.65 in standard length; gill rakers 14 to 20; lateral-line scales 26 (not including the last pored scale, beyond the end of hypural) (except *chrysocephalus*) ..... 6
- 6a. Caudal fin truncate to emarginate (except juveniles); gill rakers 18 to 20; body dark brown with a small round pale spot on each

- scale, the caudal fin entirely yellow, except extreme base which is colored like body (female), or reddish brown, lighter outwardly, the two colors separated by a curved black line with a whitish band adjacent and posterior to it (male) (Western Pacific to East Africa) ..... *meleagrides*
- 6b. Caudal fin slightly to moderately rounded; gill rakers 14 to 18 (except *elegans*); if body dark with pale spots, caudal coloration not as above ..... 7
- 7a. Pectoral fins relatively long, 1.5 to 1.7 in head length; gill rakers 18 to 20; color of body light brown with a faint pale (blue in life) spot, one per scale, above lateral line and seven faint pale (described as golden in life) stripes following centers of scale rows below lateral line; a faint dark stripe from front of snout to eye with a fainter continuation behind eye; lower half of head pale silvery; large individuals, presumed the male of this species, with vertical blue lines on scales and blue lines on upper half of head (Lord Howe Island, Norfolk Island, New Zealand, and New South Wales) ..... *elegans*
- 7b. Pectoral fins not long, 1.7 to 2.1 in head length; gill rakers 14 to 19 (rarely 19); color not as in 7a. .... 8
- 8a. Gill rakers 14 to 17, body dark brown with light blue-green stripes or rows of white spots along scale rows; a black spot on opercular membrane; caudal fin with a broad zone of bright yellow near base, an outer zone of black, and a pale posterior margin. .... 9
- 8b. Gill rakers 15 to 19; color not as in 8a (if colored dark brown with white spots, caudal fin not yellow and black) ..... 10
- 9a. Body with a small white spot on each scale; broad pale zone at base of caudal fin yellow in life (East Indies, Taiwan, Samoa, and Marquesas). ....  
..... *melanurus melanurus*
- 9b. Body with pale (light blue-green in life) longitudinal lines or rows of dashes following scale rows; broad pale zone at base of caudal fin white in life (Red Sea) ..... *melanurus lineatus*, n. subsp.
- 10a. Later al-line scales to base of caudal fin 27; body elongate, the depth 3.25 to 3.95 in standard length; width of body 2 to 2.3 in depth; dark brown with white spots, the basal half of caudal fin white and the outer half bright red (female), or brown with faint blue spots on



body, the head bright orange with blue markings, the caudal fin dark brown (male); no black spot posteriorly in dorsal and anal fins (Hawaiian Islands) ..... *chrysocephalus*

- 10b. Lateral-line scales to base of caudal fin 26; body not elongate, the depth 2.9 to 3.4 in standard length; width of body 2.2 to 2.7 in depth; color not as in 10a; a large black spot posteriorly in dorsal and anal fins of female form ..... 11
- 11a. Bright orange with dark-edged blue stripes anteriorly, shading to deep blue posteriorly (female) or dusky yellow to blackish with vertical blue lines on scales, the head broadly striped with brownish orange and blue (male) (southern Oceania, from Easter Island to Lord Howe Island).....  
..... *femininus*, n. sp.
- 11b. Color not as in 11a..... 12
- 12a. Back above a demarcation from pectoral base to rear base of dorsal fin blackish with blue dots, shading to whitish on sides and ventrally with blue spots (female) or vertical blue lines (male) on scales; no dark bar at pectoral base (Western Pacific) .....  
..... *neoguinaicus*
- 12b. No demarcation in color on upper side of body; dark reddish brown posteriorly with small dark-edged blue spots, shading to yellow on lower head, thorax and abdomen; a dark brown bar at pectoral base (Indo-Pacific)..... *twistii*
- 2b. Mid-dorsal region of nape with small scales which extend forward nearly to a vertical at posterior edge of eye; color entirely green; margin of anal fin yellowish (possible male form red anteriorly, green posteriorly, with blue lines on scales) (Mauritius) ..... *viridis*
- 1b. Lateral-line scales 48 to 50 (not including one or two beyond base of hypural) (Subgenus *Pseudanampses*) (Western Pacific and Indian Oceans).....  
..... *geographicus*

**Anampses caeruleopunctatus**

Plate 1, B, C; Fig. 1;

*Anampses caeruleopunctatus* Rüppell, 1828. Atlas Reise nörd. Afrika. Fische Rothen Meeres, p. 42, pl. 10, fig. 1 (type locality, Red Sea).

*Anampses diadematus* Rüppell, 1835. Neue Wirbelthiere Fauna Abyssinien, p. 21, pl. 6, fig. 3 (type locality Tor, Red Sea).

*Anampses lineolatus* Bennett, 1835. Proc. Zool. Soc. London, p. 208 (type locality, Mauritius).

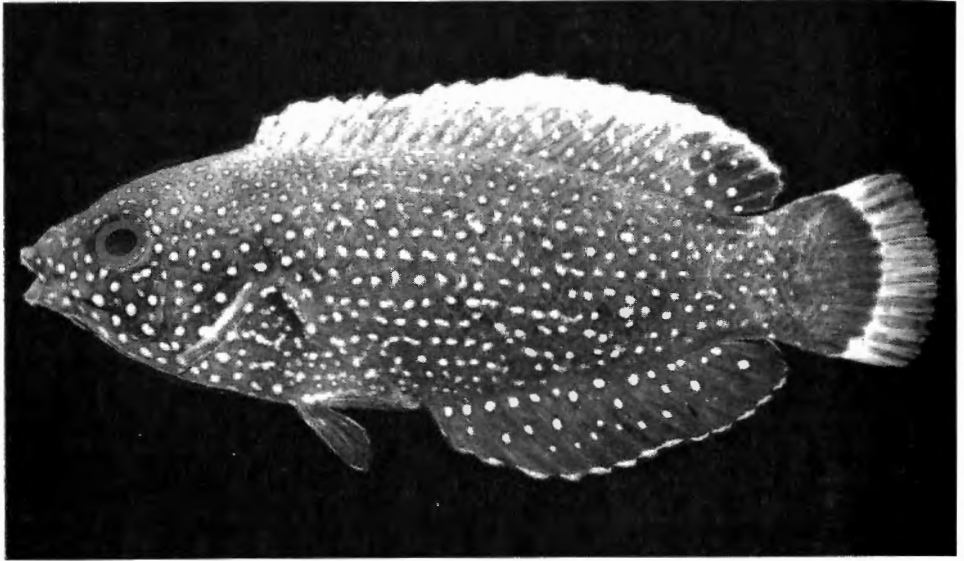


Fig. 1. *Anampses caeruleopunctatus*, 46 mm SL, Rapa, BPBM 11604.

*Anampses chlorostigma* Cuvier and Valenciennes, 1839. Hist. Nat. Poiss., vol. 14, p. 9 (type locality, Red Sea).

*Anampses taeniatus* Sauvage (after Liénard), 1891. Hist. Phys., Nat. Polit. Madagascar. Poiss., p. 457 (type locality, Mauritius).

*Anampses pulcher* Regan, 1913. Proc. Zool. Soc. London, p. 371, pl. 58, fig. 3, pl. 59 (type locality, Easter Island).

*Anampses tinkhami* Fowler, 1946. Proc. Acad. Nat. Sci. Philadelphia, vol. 98, p. 162, fig. 30 (type locality, Ryukyu Islands).

DIAGNOSIS: Lateral-line scales 27; gill rakers 18 to 25; body relatively deep, the depth 2.3 to 3 in standard length; width of body 2.3 to 2.7 in depth; head length 2.6 to 3 in standard length; snout 2.35 to 2.7 in head length (2.9 in 46-mm juvenile); eye 2.6 to 3.4 in snout (1.5 in a 44-mm juvenile); dorsal spines flexible; caudal fin truncate to slightly rounded; pectoral fins 1.6 to 1.9 in head length; pelvic fins 2.1 to 2.5 in head length.

Color of females: body brown, shading to reddish brown ventrally, with a

dark-edged light blue spot on each scale; head reddish brown with dark-edged narrow blue bands; dorsal fin brown with small dark-edged blue spots, a narrow blue margin and black submarginal line; anal fin brownish red to red with 2 or 3 rows of small dark-edged blue spots, a narrow blue margin, and black submarginal line; caudal fin brown with small dark-edged blue spots and blue margins; a dusky orange-red bar, edged in blue at pectoral base, the upper portion blackish."

Color of male ("diadematus") form: olive with a dark-edged blue vertical line on each scale of body (except on thorax, abdomen, and nape where the blue segments are shorter and variously oriented); head with irregular, narrow, dark-edged, blue bands and a broad blue band across anterior interorbital space; many individuals with a broad light green bar on side centered on sixth dorsal spine; dorsal and anal fins reddish with broad margins and basal stripes of bright blue, the dorsal with a median band of small dark-edged blue spots and the anal with one or two blue stripes in middle of fin; caudal fin reddish with prominent blue margins and blue stripes along rays, but with an upper and lower zone of fin largely free of blue; an orangish to dusky blue-edged bar at pectoral base, the upper portion of which is blackish.

Two specimens in the "diadematus" phase from Marcus Island, 225 and 252 mm in standard length, provided for a comparison of color. The ground color of the smaller specimen was olivaceous brown. The larger one was more green. The green bar in the pectoral region of the body was broader and brighter on the larger specimen. The blue band across the interorbital space was broader, as were the margins on the dorsal and anal fins. The upper lip and throat of the larger specimen were entirely blue, whereas there were no other blue markings on the head; in contrast, the smaller fish had less blue on the upper lip and throat and very evident blue markings on the head.

A specimen in the "diadematus" phase 253 mm in standard length speared by the author in 35 feet off Nuku Hiva, Marquesas lacked a blue band across the interorbital space. The body was olive, the edges of the scales dark green, each scale with a dark-edged vertical bright blue line; mid-dorsally on the head there was a bright blue irregular elliptical area (pale in preservative) extending forward from the origin of the dorsal fin for a distance about equal to the snout length; the opercle was dark green and the head more anteriorly light yellowish green, becoming dark green near the mouth (blackish in preservative); the edges of the dorsal and anal fins, upper and lower edges of the caudal fin, upper edge of the pectoral fins, and lateral edge of the pelvic fins were all broadly bright blue; there were blue stripes in the caudal fin running parallel with the rays and blue bands in the pelvic fins; the dorsal and anal fins had small dark-edged blue spots and lines. This specimen had the deepest body of any of the species (2.3 in SL). The depth in all other specimens examined ranged from 2.6 to 3.0 in standard length. No other specimens in the "diadematus" phase were obtained in the Marquesas, so it is not known if this one is aberrant with respect to color and body depth or whether it is typical of these islands. If the latter, it would not be surprising, for the author

observed that many species of fishes are different to a varying degree in the Marquesas than elsewhere in the Indo-Pacific.

The 46-mm juvenile of Fig. 1 was brownish yellow on the back, shading to dark brown on the sides and ventrally, with small spots of pale blue (almost white) on the head and body; the dorsal fin was orange, becoming blackish in region of about last 4 rays, and the anal fin reddish brown; both fins had whitish spots and broad whitish margins; the caudal fin was dark brown with a few scattered small pale spots, the outer third whitish.

The smallest juveniles examined were five from Taiwan (USNM, uncat.) which ranged from 25 to 47 mm SL. None displayed any black spot posteriorly on the dorsal and anal fins which is so characteristic of juveniles of *Anampses* and retained by the females of several species.

REMARKS: Twelve of 26 specimens of adult size in the *caeruleopunctatus* form for which the sex could be determined were females, and one (a 238-mm specimen from Pitcairn) was a male. These ranged from 147 to 238 mm in standard length, except for six specimens from the Chagas Archipelago which were mature in the size range of 72 to 95 mm standard length (USNM 206102). Of 18 specimens in the "diadematus" form, the sex of only eight was ascertain; all of these were males. These male specimens ranged from 163 to 358 mm in standard length except for the Chagas Archipelago where five were available (USNM 206107) which measured 110 to 122 mm in standard length.

The type of *caeruleopunctatus* (SMF 2745, 201 mm SL) was examined at the Senckenberg Museum. It is a dried stuffed specimen but in good condition. The type of *A. diadematus*, an alcoholic specimen (SMF 1580, 210 mm SL), is also at the Senckenberg Museum.

*A. caeruleopunctatus* has the broadest range of all the species of the genus: Red Sea to Easter Island. It is absent from the Hawaiian Islands, being replaced there by the closely related *cuvier* which is probably a derivative. The author has examined specimens from the Red Sea, Aldabra, Mauritius, New Guinea, Philippine Islands, Taiwan, Japan, Palau Islands, Mariana Islands, Marshall Islands, Samoa Islands, Phoenix Islands, Tuamotu Archipelago, Line Islands, Baker Island, Howland Island, Rarotonga, Society Islands, and Easter Island. All of these localities have been reported previously, along with others such as Réunion, Madagascar, Zanzibar, Aden, Seychelles, India, other East Indian islands, the Ryukyu Islands, Gilbert Islands, and Tubuai. All were listed by de Beaufort (1940), except Aldabra (Smith, 1955), Palau Islands (Abe, 1939), New Hebrides (Fowler, 1934, after Whitley), Marshall Islands (Schultz *In* Schultz and collaborators, 1960), Phoenix Islands (Schultz, 1943), and Howland and Baker (Fowler, 1938). In addition, specimens have been examined at the United States National Museum from Starbuck (uncat., 150 mm SL), the Chagas Archipelago (cited above), and at the California Academy of Sciences from Suva Harbor, Fiji (CAS uncat., 36 mm SL) and Ifaluk, Caroline Islands (CAS 13658, 194 mm SL) which constitute new records for these islands. Other records are represented by collections by the author at Marcus Island (BPBM

7117, 164 mm SL; BPBM 7118, 133 mm SL; BPBM 7119, 2: 225 and 252 mm SL; BPBM 7121, 236 mm SL), Pitcairn (BPBM 12048, 2: 238 and 260 mm SL; BPBM 12049, 216 mm SL), Rapa (BPBM 11604, 46 mm SL), Ua Pou, Marquesas Islands (BPBM 11606, 2: 56 and 67 mm SL), and Nuku Hiva, Marquesas Islands (BPBM 11601, 177 mm SL; BPBM 11640, 253 mm SL).

The record of *A. geographicus* from the Tuamotus by Fowler (1928; 1938) is probably based on the misidentification of a specimen of *A. caeruleopunctatus* from Hull Island (see discussion of *geographicus*). In the 1938 publication he misspelled *A. diadematus* as *didematus*. In his key to the species of *Anampses* of the Philippine area with Bean (1928), he referred to this form as *dimidiatus* and spelled the female form as *coeruleo-punctatus*, a mistake which has been made by other authors as well. Günther (1881) mislabeled his plate of *caeruleopunctatus* as *caeruleomaculatus*.

The largest specimen examined was a male 358 mm in standard length (16 inches total length) taken by the author at Easter Island. Its color was more blue than individuals from other localities. One cannot say whether this is due to its large size or possible differentiation of the population at Easter Island. The higher gill-raker count of the species at Easter (Table 1), however, does suggest that the population at this island is genetically different. Only three specimens of *A. caeruleopunctatus* were retained from recent collections at Easter Island: BPBM 6701, 222 mm SL; BC 65-458, 93 mm SL; and BC 65-403, 141 mm SL.

*A. caeruleopunctatus* occupies an inshore habitat, often exposed to surge. Nevertheless, the species may be found in at least 60 feet of water.

### *Anampses cuvier*

#### Plate 1, A, D

*Anampses cuvier* Quoy and Gaimard, 1824. Voyage autour du monde . . . "L'Uranie" et "La Physicienne" . . . , p. 276, pl. 55, fig. 1 (type locality, Maui, Hawaiian Islands).

*Anampses godeffroyi* Günther, 1881. Fische der Südsee, pt. 15(7), p. 252, pl. 140 (type locality, Hawaiian Islands).

*Anampses evermanni* Jenkins, 1901. Bull. U. S. Fish Comm., vol. 19, p. 57, fig. 14 (type locality, Hawaiian Islands).

DIAGNOSIS: Lateral-line scales 27; gill rakers 18 to 21; body of adults relatively deep, the depth 2.35 to 2.7 in standard length (2.7 to 3 in specimens of 25 to 150 mm standard length); width of body 2.35 to 2.9 in depth; head length 2.6 to 3 in standard length; snout 2.4 to 2.7 in head length (2.7 to 3.2 in specimens from 25 to 150 mm standard length); eye 1.25 in snout (25 mm SL) to 3.8 in snout (large adults); dorsal spines flexible; caudal fin truncate to slightly rounded; pectoral fins of adults short, 1.35 to 1.5 in head length (1.6 to 1.8 in juveniles); pelvic fins 1.9 to 2.6 (usually about 2) in head length.

Color of females brown to olive brown on body, shading to red ventrally, with a bluish white spot on each scale, most of which are dark-edged; many spots linked by whitish, thus nearly forming longitudinal bands (especially anteriorly on body);

some larger individuals with a small white spot on each scale above and below central spot (especially dorsally and anteriorly); upper half of head brown with small dark-edged white spots, lower half white with small red spots, this pattern continuing onto anterior thorax; dorsal and anal fins red with light blue stripes (sometimes broken or irregular) and blue margins; caudal fin yellowish, becoming red peripherally, with light blue upper and lower margins, the fin sometimes with white spots; pectorals mainly yellowish, pelvics light blue and red.

Males in the "godeffroyi" phase are brown on the body with a dark-edged vertical blue line on each scale (except peripherally on the body, including thorax and nape, where the markings are mainly small spots or irregular segments); upper anterior quadrant of head, which contains eye, green; rest of head light red to orange-brown with a reticular network of blue; caudal fin yellowish with blue bands and spots following rays, the upper and lower margins blue; dorsal and anal fins similar to those of the female but the ground color is light red to yellow; pectorals similar to the female but with a blue upper margin (except distally) and a faint dark bar at base of fin; pelvics yellowish and blue.

Juveniles up to a standard length of about 65 mm have a large ocellated black spot posteriorly in the dorsal and anal fins (dorsal spot the larger except in very small juveniles); the anal spot disappears at a standard length of about 70 mm; the dorsal spot fades out at a standard length of about 80 mm.

REMARKS: Ample evidence indicates that *A. godeffroyi* is the male form of this species. Thirteen specimens in this color phase range from 131 to 270 mm standard length, and all are males (or sex indeterminate for a few due to poor condition of viscera). Individuals have been seen intermediate in color to the female and male phases. The specimen of Plate 1 A exhibits a few white spots which have lengthened to form vertical lines—the first sign of transformation to the male form.

Two syntypes of *A. cuvier* are in the Museum National d'Histoire Naturelle in Paris (Bauchot, 1963). MNHN 177, 85 mm SL, is here selected as the lectotype.

*A. cuvier* is endemic to the Hawaiian Islands. The Bishop Museum has specimens from the islands of Hawaii, Maui, Oahu, and Midway. Also there are two from Johnston Island (BPBM 8945, 262 mm SL, "godeffroyi" phase; and BPBM 8969, 225 mm SL) which constitute the first record of the species from this island (the marine life of Johnston is largely Hawaiian in origin; the fish fauna has been summarized by Brock, Jones, and Helfrich, 1965). These two fish were speared by the author outside the reef in 6 to 8 feet of water in June, 1968. Fowler (1928) was in error in identifying specimens of *caeruleopunctatus* from the Society Islands at the Museum of Comparative Zoology as *godeffroyi* (= *cuvier*).

*A. cuvier* seems closely related to *caeruleopunctatus*, and it is possible that it arose by isolation in the Hawaiian chain from *caeruleopunctatus* stock. It differs from *caeruleopunctatus* in color, in having a deeper body (except for one "diadematus" phase from the Marquesas, the depth of *caeruleopunctatus* varies from 2.6 to 3 in the standard length), and longer paired fins.

*A. cuvier* is typically an inshore species of rocky substrate exposed to wave

action. It has been collected from large tidepools, but may also be found in relatively deeper water. The author obtained a male in 80 feet off the Waianae coast of Oahu.

The stomach and gut contents of 14 specimens of *cuvier* from 163 to 262 mm in standard length were examined. The most important group of good organisms were crustaceans, including shrimps, amphipods (gammarids and caprellids), copepods, ostracods, isopods, and brachyuran crabs. A few of the fishes had fed more heavily on other animals, however, such as polychaetes and pelecypods. Other important items of the diet included sipunculids, gastropods, chitons, and occasionally ophiuroids and echinoids (*Echinometra*). One had eaten some fish material. Pieces of tunicates, fragments of algae, foraminifera, and sand were present in varying degree. The most significant feature of the food material was the small size of nearly all the prey animals. Rarely did a food organism exceed 3 to 4 mm in size (disregarding linear items such as polychaetes or ophiuroid arms). Wrasses of other genera of comparable size such as species of *Coris*, *Bodianus*, and *Cheilinus* tend to feed on larger organisms; also they have a higher percentage of molluscs and echinoids in their stomach contents.

### **Anampses lennardi**

#### Fig. 2

*Anampses lennardi* Scott, T. D., 1959. Trans. Roy. Soc. S. Austral., vol. 82, p. 86, fig. 6 (type locality, Point Samson, Western Australia).

*Diagnosis*: Lateral-line scales 27; gill rakers 19 or 20; body moderately deep, the depth 2.6 to 2.75 in standard length; width of body 2.7 to 2.9 in depth; head length 2.7 to 2.8 in standard length; snout 2.7 to 2.9 in head length; eye 1.8 to 2.6 in snout, dorsal spines flexible; caudal fin slightly rounded; pectoral fins 1.6 to 1.7 in head length; pelvic fins reaching origin of anal fin, their length 2 to 2.1 in head length.

Color in life (after Scott, 1959): head, body and fins bright yellow with blue markings. Three broad blue stripes on head continued onto middle of body; two of these stripes cross snout and a further stripe crosses nape; posterior part of body with blue bars and spots; dorsal fin with a thin blue marginal band, below which is a series of round blue spots on the membranes; membranes blue between the bases of spines and rays; pectoral fins plain yellow; anal fin with thin blue bands (on Scott's figure one band is shown at margin and one half way out on fin); spine and first ray of pelvic fin blue, rest of fin yellow; caudal fin yellow with a thin blue band on the first and last ray.

*Remarks*: *A. lennardi* was described from a male specimen 203 mm TL and a second specimen 189 mm TL. Both were collected in 1957 at Point Samson, Western Australia (20°36' S; 117°12' E) and deposited in the South Australian Museum. Additional information was requested of these specimens; however, the Curator of Fishes, C. J. M. Glover, replied that they are lost, and his museum has no others.

The author has examined specimens of *Anampses* in many of the major museums of the world, including the Australian Museum at Sydney but could find no other specimens of this species. R. J. McKay, then of the Western Australian Museum, now of the Queensland Museum, was asked if there were any specimens in his care.

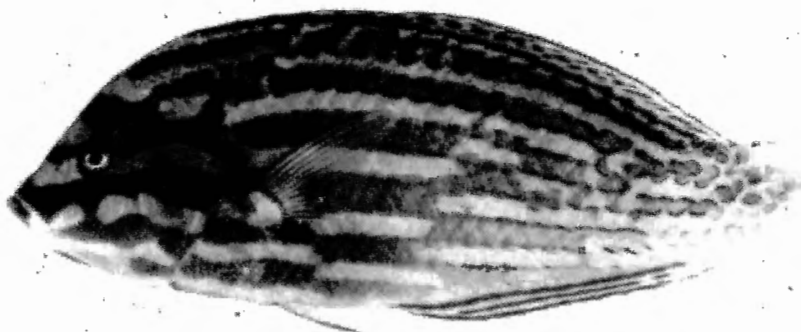


Fig. 2. *Anampses lennardi*, 175 mm SL, female, Dampier Archipelago, Western Australia, WAM 21588.

He replied to the negative, however, on May 26, 1971 he and associates collected two specimens at Kendrew Island, Dampier Archipelago, Western Australia in  $1\frac{1}{2}$  fathoms which he kindly sent on loan. The largest of these (WAM 21588), an adult female 175 mm in standard length, is shown in Fig. 2. The other (WAM 21589) is an 82-mm juvenile with a very similar color pattern. The specimens arrived in formalin and still retained alternating stripes of blue and orange-yellow; the blue stripes were narrowly dark-edged. Evidently this species shows relatively little change in color with sex or age. The diagnosis above is based on data from these two specimens.

#### ***Anampses meleagrides***

Figs. 3, 4

*Anampses meleagrides* Cuvier and Valenciennes, 1839. Hist. Nat. Poiss., vol. 14, p. 12 (type locality, Mauritius).

*Anampses meleagris* Günther, 1862. Cat. Fishes Brit. Mus., vol. 4, p. 135 (emendation for *meleagrides*).

*Anampses amboinensis* Bleeker, 1857. Acta Soc. Sci. Indo-Neerl., vol. 2, p. 80 (type locality, Ambon).

*Anampses lunatus* Sauvage, 1891. Hist. Phys. Nat. Polit. Madagascar. Poiss., p. 459 (type locality, Mauritius).

DIAGNOSIS: Lateral-line scales 26; gill rakers 18 to 20; body moderately elongate, the depth 3.1 to 3.4 in standard length; width of body 2.25 to 2.7 in depth; head length



2.9 to 3.3 in standard length (2.8 in a 30-mm juvenile); snout 3 to 3.3 in head length; eye 1.2 (30-mm juvenile) to 2.1 (151 mm SL) in snout; dorsal spines flexible; caudal fin of adults truncate to emarginate (rounded in small juveniles); pectoral fins 1.6 to 2 in head length (2 for 30-mm juvenile); pelvic fins 1.5 to 2 in head length of adults (2.7 for 30-mm juvenile).

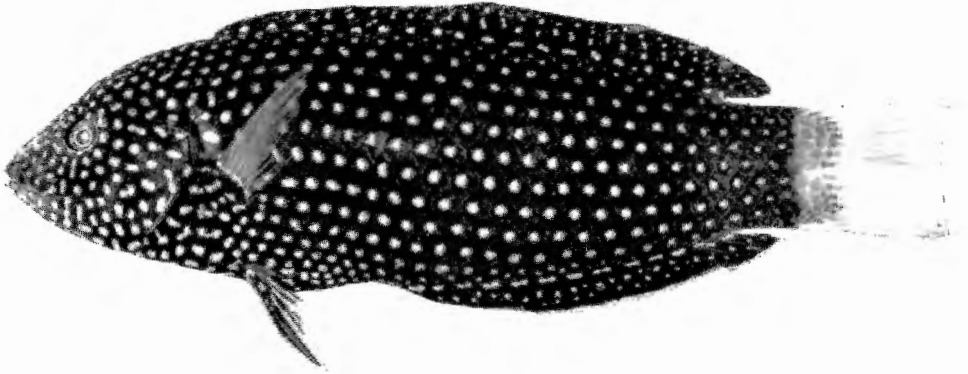


Fig. 3. *Anampses meleagrides*, 136 mm SL, female, Philippine Islands, USNM 153856.

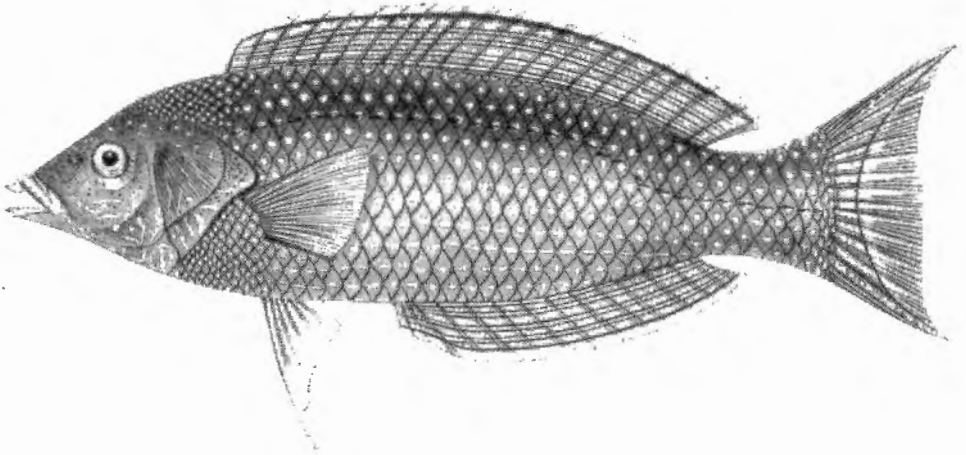


Fig. 4. *Anampses meleagrides* ("amboinensis" phase), after Bleeker (1862) Atlas Ichth., vol. 1, pl. 25, fig. 2.

Color of female (157 mm TL) (after Fowler and Bean, 1928): "Ground color very dark brown, becoming orange on front of head, including lower parts; body and fins everywhere spotted with white or very pale yellow; spots of fins slightly smaller than those on body. Soft dorsal and anal with a narrow white margin. Caudal bright cadmium. Ventrals spotted, except terminal portion of last three rays. Pectorals hyaline, white bar along bases of rays."

Color of presumed male form (after Bleeker, 1862, Atlas Ichth., vol. 1): body

deep violet; cheek and lower operculum with small irregular blue spots; scales of body with a round blue spot, those ventrally more oblong, where they nearly form longitudinal bands; dorsal and anal fins dark violet with a yellow margin, black submarginal band, and three or four longitudinal bands, with some small round to irregular blue flecks between the bands; pectoral membranes hyaline bluish, the rays dark golden, the base dark brown; pelvic fins dark golden with a dark brown anterior margin, the second and third interradial membranes with longitudinal blue bands; caudal fin dark violet with numerous blue ocelli, the posterior part with a crescent zone of pale violet, margined in front with a narrow band of yellow preceded by a black line; upper and lower margins of fin yellowish to bluish.

Juveniles and smaller females have a large ocellated black spot posteriorly in the dorsal and anal fins. The anal spot is lost at a standard length of about 110 mm; the dorsal spot is much reduced in size in two specimens of 135 to 136 mm standard length and is probably lost at slightly greater lengths.

REMARKS: On a few occasions in the western Caroline Islands the author has observed the spotted, yellow-tailed female form of this distinctive species underwater, but none were collected.

Only four specimens of the "amboinensis" form of *meleagrides* have been examined by the author. Two were collected in the Philippines by A. W. Herre in 1931 and reported by him (1934) as a new record for these islands. They were deposited at Stanford University, but are now at the California Academy of Sciences (SU 25901, 151 mm in standard length; SU 28582, 129 mm standard length).

In her catalog of fishes at the Museum National d'Histoire Naturelle in Paris, Bauchot (1963) listed the holotype of *A. meleagrides* (MNHN A. 8248, 156 mm SL).

M. Boeseman of the Rijksmuseum van Natuurlijke Histoire at Leiden has written that the largest of the two specimens on which Bleeker's description of *amboinensis* was based, a fish 203 mm in total length, is in his care. This specimen, RMNH 6567, 162 mm SL, is here designated as the lectotype. The second syntype, 141 mm SL and 180 mm TL is at the British Museum (Natural History). This specimen, BM(NH) 1862.2.28.92, was sent on loan by A. C. Wheeler.

The linking of *amboinensis* as the probable male of *meleagrides* is based on incomplete evidence. No small specimens of *amboinensis* have been found, whereas juveniles of *meleagrides* are known. The sex of eight specimens of *meleagrides*, ranging from 92 to 137 mm in standard length, could be determined, and all are females. Two of four specimens of *amboinensis* are males (sex of other two indeterminate). The lateral-line scale count and the gill-raker counts (gill rakers of the lectotype counted as 19 by Boeseman) are the same for both forms. Body proportions are similar. Both are among the few *Anampses* with flexible dorsal spines. Both have emarginate caudal fins—that of *amboinensis* is more deeply emarginate, but this might be expected for a male.

The distribution of the two is nearly identical. De Beaufort (1940) listed the localities for each as the East Indies, Philippines, Mauritius, and Zanzibar. Both

are also known from Japan (Tanaka, 1908; Okada, 1938; Kamohara, 1955, 1958). In addition, *meleagrides* is recorded from the Ryukyu Islands (Schmidt, 1930), Ceylon (Munro, 1955), the Seychelles (Smith and Smith, 1963), Aldabra (Smith, 1955), and Mozambique (Smith, 1957). Most of these localities are encompassed by the known range of *amboinensis*.

In June, 1972, the author speared a female *meleagrides* 93 mm in standard length and a large male in the *amboinensis* phase (BPBM, uncat.) in the Gulf of Aqaba, Red Sea. Previously Victor G. Springer collected a 24-mm juvenile (USNM, uncat.) in the same area.

### *Anampses elegans*

Figs. 5, 6

*Anampses elegans* Ogilby, 1889. Mem. Austral. Mus., no. 2, p. 67 (type locality, Lord Howe Island).

*Anampses variolatus* Ogilby, 1889. Mem. Austral. Mus., no. 2, p. 67 (type locality, Lord Howe Island).

DIAGNOSIS: Lateral-line scales 26; gill rakers 18 to 20; depth of body 2.8 to 3.2 in standard length (larger individuals deeper bodied); width of body about 2.4 in depth; head length 2.85 to 3.1 in standard length; snout 2.65 to 3.45 in head length (snout shorter in smaller individuals); eye 1.2 (48-mm specimen) to 3.1 (240 mm) in snout; dorsal spines somewhat flexible (spine tips usually sharp, particularly in small specimens); caudal fin truncate to rounded (rounded in the smaller individuals); pectoral fins moderately long, 1.5 to 1.7 in head length; pelvic fins 2.1 to 2.45 in head length (longer on larger individuals).

Color (after Ogilby, 1889, of the eight syntypes, 75.5 to 91 mm SL): "Upper half of head and back pale brown; sides and tail yellowish-grey; lower half of the head and thoracic region silvery; some blue dark-edged spots and lines on the upper surface of the head and behind the eye; scales between the lateral line and dorsal fin with numerous blue dots and transverse lines; below the lateral line seven longitudinal golden bands, as wide as the interspaces, which are ornamented by numbers of blue spots, which however fade gradually towards the abdominal region, which is immaculate. The dorsal and anal fins are golden with a very narrow dark border, the former with a basal and median row of pale-blue dark-edged spots, the latter spotless; the caudal fin is golden with its outer margin greyish; the pectorals and ventrals are grey, the base of the former with a broad golden band." In preservative these fish are brown with faint pale stripes following centers of scale rows below lateral line; faint pale spots above lateral line, one per scale; a faint dark stripe from front of snout to eye, and a region behind eye to upper opercle a little darker than rest of head; head below eye pale—slightly silvery; fins light yellowish.

The color of the 48-mm juvenile described as *variolatus* by Ogilby (placed in the synonym of *elegans* by Whitley, 1964) was: "Pale reddish-yellow with a broad brown band from the middle of the operculum through the eye to the anterior edge of the snout, where it joins the corresponding band on the opposite side; a curved

band from the centre of the cheek to the angle of the preopercle; occiput brown; body with brown blotches, which sometimes coalesce to form semi-transverse bands, and are visible but indistinct on the dorsal fin; a broad silvery band from the mouth to the opercle, partly interrupted by the curved brown band, and continued as far

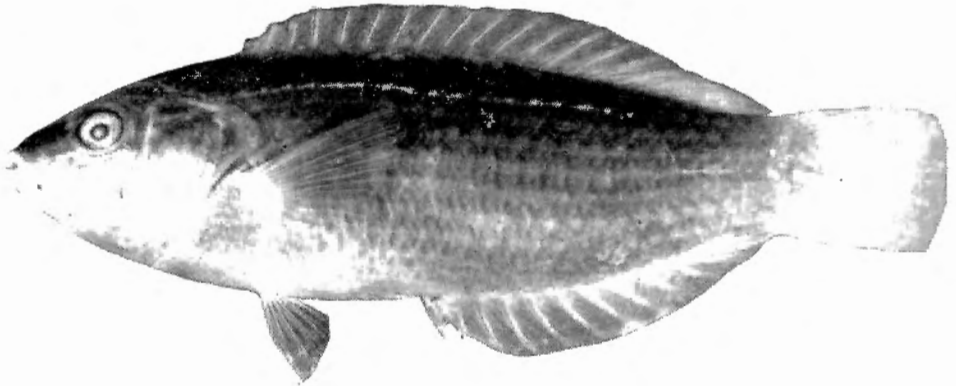


Fig. 5. *Anampses elegans*, lectotype, 91 mm SL, Lord Howe Island, AMS I. 1932.

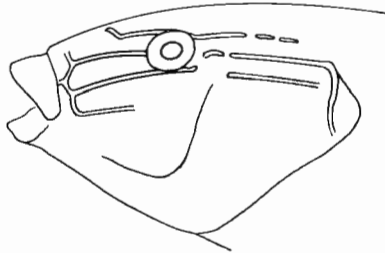


Fig. 6. Head of *Anampses elegans*, 227 mm SL, male, Lord Howe Island, AMS I. 5809.

as the caudal fin by means of large irregular blotches; above this is a much narrower and more indistinct band of similar blotches; the fins are pale yellow, with a small round black spot on the two penultimate rays of the dorsal and anal."

In addition to these nine specimens, the Australian Museum has one from Lord Howe 227 mm SL (AMS I.5809) and four from New South Wales (AMS IB.7470, 240 mm; IB.7471, 243 mm; IB.7468, 280 mm; IB.8011, 284 mm) which are here regarded as the probable male of *elegans*. These fish have a dark-edged vertical line on each scale of the body (except posteriorly where the lines become spots); there are narrow diagonal pale greenish (probably blue in life) bands on the snout and upper operculum (see Fig. 6).

REMARKS: The identification of the large specimens mentioned in the above paragraph as *elegans* is provisional. The gill-raker counts of these specimens correspond to those for the syntypes of *elegans* and are included in Table 1 for *elegans*. Never-

theless, this cannot obviate the possibility that these specimens represent a different species for which smaller individuals are yet unknown. In view of the striking difference in color of the large male form of most other species of the genus, however, it seems more reasonable to regard these specimens as probable males of *elegans*.

In addition to Lord Howe Island, *elegans* has been recorded from Norfolk Island (Waite, 1916).

In May, 1972 Barry Russell of the Australian Museum wrote that two underwater photographs taken at Poor Knights Islands, New Zealand by Wade Doak, editor of *Dive* magazine, appear to be *Anampses elegans*. The slides were sent to the author who is in agreement with Russell. The fish of one of the photographs is yellowish, shading ventrally to whitish, with rows of dark-edged blue spots along the scale rows (but not extending onto caudal peduncle); there is a broad dusky zone on the snout in front of the eye; the caudal fin is dusky yellow, and the anal primarily yellow; the axil of the pectoral fin is yellow (fin in forward position on photo).

The fish of the second slide is more colorful and is the presumed male form. It is olive on the upper half of body with a vertical blue line on each scale; the lower half is light blue with a large yellow area in the center of each scale. There is a small blackish spot posteriorly on the opercular membrane, preceded by a vertical narrow blue band; in front of this there is a large bright orange-yellow spot; three narrow bright blue bands run anteriorly and posteriorly from the eye, the lowermost rimming the lower edge of the eye; below this is a narrow zone of yellow; the remainder of the head and thorax is whitish with a blue band crossing the chin, a short blue streak anteriorly just under the yellow zone, a light blue band along what seems to be the preopercular margin and another along the posterior edge of the lower part of the operculum. The caudal fin is dusky yellowish.

### ***Anampses melanurus melanurus***

#### Pl. 2 A

*Anampses melanurus* Bleeker, 1857. Acta Soc. Sci. Indo-Neerl. vol. 2, p. 79 (type locality, Ambon).

DIAGNOSIS: Lateral-line scales 26; gill rakers 14 to 17; body elongate, the depth 3.2 to 3.6 in standard length; width of body 1.95 to 2.5 in depth; head length 2.7 to 2.9 in standard length; snout about 3 in standard length (3.3 in 35-mm juvenile); eye 1.3 (35-mm juvenile) to 2 (94-mm adult) in snout; dorsal spines pungent; caudal fin rounded; pectoral fins 1.7 to 1.8 in head length; pelvic fins 1.8 to 2.3 in head length.

Color of females: body dark brown with a white spot on each scale, these spots smaller posteriorly, disappearing on caudal peduncle; head orangish brown with larger and more scattered dark-edged white spots; a black spot on opercular membrane; lower lip with a broad band of light orange-red; caudal fin with a broad bright yellow bar near base, followed by a black zone of about equal width, the posterior edge of which is more curved than the anterior, followed by a pale blue margin

(broader at corners of fin); dorsal and anal fins dark brown with pale blue margins and rows of white dots (only a single basal row well developed on anal fin); no ocellated spot posteriorly in dorsal and anal fins (also absent on 34- and 35-mm juveniles); pectoral fins pale; pelvic fins pale blue with a brown band over spine and first two rays.

A male 94 mm in standard length was colored like the females but had a faint mid-lateral yellow stripe in life. A juvenile 35 mm in standard length was also similar to the female coloration, but there was a yellow bar in life anteriorly on the upper two-thirds of the body, which persists as a paler zone in preservative. Also the black opercular spot has not formed, and the pale spots on the scales extend onto the caudal peduncle.

REMARKS: *A. melanurus* was described by Bleeker from a single specimen from Ambon which he measured as 114 mm in total length. The type in the British Museum (Natural History) (no. 1864.5.15.47) was measured by A. C. Wheeler as 93 mm SL and 111 mm TL. Günther (1881) recorded a 2 1/4-inch specimen from Savaii, Samoa, and Yu (1968) a specimen 109 mm in total length from Taiwan. These were the only known specimens of this species until the author collected seven from the islands of Fatu Hiva, Hiva Oa, Ua Pou, and Nuku Hiva in the Marquesas in April and May of 1971 at depths of 50 to 125 feet (none were seen in shallower water). These specimens, which measure 34 mm to 94 mm in standard length, form the basis for the diagnosis above. Six are deposited at the Bishop Museum (BPBM 11615, 11617, 11633) and the seventh, 84 mm SL, at the United States National Museum (no. 206376).

***Anampses melanurus lineatus* n. subsp.**

Fig. 7

HOLOTYPE: BPBM 13268, 81.2 mm SL, male, Gulf of Aqaba, Red Sea, off Heinz Steinitz Marine Biology Laboratory, Hebrew University, Elat, 130 feet, rock, coral, and some sand; spear, J. E. Randall, June 6, 1972.

PARATYPES: BPBM 13269, 79.4 mm SL, female, same locality as holotype, spear, J. E. Randall, June 10, 1972; BPBM 13270, 59.1 mm SL, female, same locality as holotype, 150 feet, spear, J. E. Randall, June 8, 1972; USNM 208027, 74.5 mm SL, female, same locality as holotype, 140 feet, spear, J. E. Randall, June 11, 1972.

DESCRIPTION (see also Table 2): Dorsal rays IX, 12; anal rays III, 12; pectoral rays 13; pelvic rays I, 5; principal caudal rays 14; lateral-line scales 26 to base of caudal fin (one pored scale beyond base), rows of large scales above lateral line to middle of spinous portion of dorsal fin 2 (plus 2 diagonal rows of small scales above these); 8 rows of large scales below lateral line to base of third anal spine (plus 2 diagonal rows of small scales); circumpeduncular scales 20; gill rakers 14 (14 to 16 for paratypes); branchiostegal rays 6.

Body depth 3.15 to 3.4 in standard length; width of body 2.15 to 2.3 in depth; head length 2.8 to 2.9 in standard length; snout 3 to 3.3 in head length; eye diameter

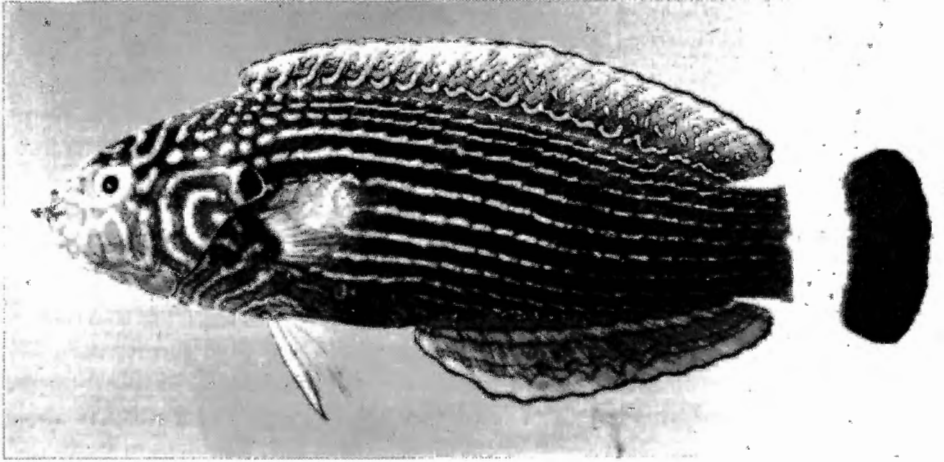


Fig. 7. *Anampses melanurus lineatus*, holotype, 80 mm SL, male, Gulf of Aqaba, Red Sea, BPBM 13268.

Table 2. Measurements of Type Specimens of *Anampses melanurus lineatus* (in Thousandths of the Standard Length)

	HOLOTYPE BPBM 13268	PARATYPES		
		BPBM 13269	USNM 208027	BPBM 13270
Standard length (mm)	81.2	79.4	74.5	59.1
Depth of body	308	316	288	297
Width of body	143	144	130	130
Head length	351	349	344	355
Snout length	111	112	115	103
Eye diameter	62	60	63	68
Bony interorbital width	84	79	78	81
Length of upper jaw	94	88	87	84
Least depth of caudal peduncle	145	140	134	133
Length of caudal peduncle	64	64	58	68
Snout to origin of dorsal fin	329	333	328	335
Snout to origin of anal fin	540	550	585	575
Length of caudal fin	213	215	212	207
Length of pectoral fin	192	190	176	187
Length of pelvic fin	190	160	162	169
Length of first dorsal spine	38	38	39	40
Length of second dorsal spine	47	51	51	59
Length of last dorsal spine	98	99	97	113
Length of longest dorsal ray	142	146	139	151
Length of first anal spine	31	28	28	34
Length of second anal spine	42	47	47	67
Length of third anal spine	65	—	68	93
Length of longest anal ray	139	149	137	138
Length of dorsal fin base	641	656	635	650
Length of anal fin base	418	394	369	387

1.55 to 2 in snout; interorbital space convex, the bony width 4.2 to 4.4 in head length; least depth of caudal peduncle 2.4 to 2.65 in head length; length of caudal peduncle 1.95 to 2.3 in least depth.

Maxillary reaching a vertical below nostrils; dentition typical of the genus, the upper incisors of holotype about one-third eye diameter; longest gill raker (at angle) of holotype about one-fourth eye diameter.

Caudal fin rounded, its length 1.6 to 1.7 in head length.

Origin of dorsal fin above upper end of gill opening; first dorsal spine 2.65 to 2.95 in snout, 1.2 to 1.5 in second dorsal spine; ninth dorsal spine about twice as long as second spine; longest dorsal soft ray (about the fifth) about 2.4 in head length; origin of anal fin below base of last dorsal spine; first anal spine shorter than first dorsal spine, 3.1 to 4.1 in snout; first anal spine 1.4 to 2 in second anal spine; second anal spine about two-thirds length of third anal spine; longest anal soft ray about equal in length to longest dorsal soft ray.

Head naked except for about eight diagonal rows of small scales on side of nape; mid-dorsal region of nape scaleless; scales on thorax smaller than rest of body (about ten diagonal rows to origin of pelvic fins) those ventro-anteriorly on thorax embedded; fins scaleless except one row of large scales and about five rows of small ones basally on caudal fin.

Color in life of holotype: orangish brown with narrow dark-edged light blue-green stripes passing along middle of scale rows (stripes becoming blue posteriorly), the stripes dorsally, ventrally, and posteriorly broken into a series of dashes; an area of yellow beneath basal three-fourths of pectoral fin and extending slightly above fin; head orange-brown, shading anteriorly and ventrally to dull yellow, with irregular dark-edged blue-green bands (more blue below eye), most of which radiate from eye; a black spot on opercular flap; dorsal fin yellow, somewhat dusky on lower half, with a row of dark-edged curved blue-green segments at the base and two to four rows of smaller irregular dark-edged light blue-green spots, a blue border, and a black submarginal line; anal fin yellow with a dark-edged basal blue stripe, a median dark-edged blue stripe (irregular in central part of fin), a blue margin, and black submarginal line; caudal fin white on basal two-fifths, the posterior margin hyaline, the region between black (but held against a bright light one can see a dusky yellowish zone in the outer part; also the rays within the remaining black part of the zone are dark blue); pectoral fins hyaline with pink rays; pelvic fins hyaline except for a broad lateral zone of yellow, edged in blue; iris orange with six pale bluish spots around outer rim.

The 59.1 mm female paratype was orange-brown on the head and anterior part of body, brown on rest of body, with pale yellowish green rows of dashes following scale rows and small spots and short segments of the same color on head (low on head and body the spots are pale blue-green); a black spot on opercular flap; lips orangish and brown (more orange on lower lip); dorsal fin olive brown with dark-edged pale yellowish green spots in two to three rows, the margin dark; anal brown with a dashed line of pale bluish at base, a median row of faint pale bluish



dots, a dark margin, and a broad dull yellowish submarginal zone; caudal fin pure white at base, then a broad zone of dark brown, followed by a hyaline border; pectoral fins pink; pelvic fins hyaline with olive brown rays; iris light orange-yellow with six small red spots at outer edge.

REMARKS: When the author collected the four specimens of this wrasse from the Gulf of Aqaba at the northern end of the Red Sea, he believed they represented an undescribed species. They seemed distinctive from *melanurus* in having light blue-green lines instead of rows of white spots on the body and a broad white band instead of a yellow one at the caudal base. In addition there were lesser differences in color such as the shape of the large dark area that covers most of the posterior half of the caudal fin. A comparison of the Red Sea specimens with Marquesan ones failed to reveal any significant differences other than color, so a subspecific status is proposed for the Red Sea population. It is expected that future collecting will reveal the existence of the species at various Indian Ocean localities. It will be of interest to learn if the *lineatus* form is confined to the northern Red Sea, all of the Red Sea, or part or all of the tropical Indian Ocean.

*Anampses melanurus* is known from a total of only ten specimens from four tropical Pacific localities and the four specimens from the Red Sea.

The paucity of specimens is undoubtedly a reflection of the relatively small size of the species (hence not apt to be caught by fishermen) and its predilection for depths greater than 50 feet.

The single male specimen of *lineatus* differed from the three females principally in having a prominent yellow area beneath much of the pectoral fin and in having longer pelvic fins.

### **Anampses chrysocephalus**

Pl. 2 B, C

*Anampses chrysocephalus* Randall, 1958. Jour. Wash. Acad. Sci., vol. 48, p. 100, fig. 3 (type locality, off Honolulu, Oahu).

*Anampses rubrocaudatus* Randall, 1958. Jour. Wash. Acad. Sci., vol. 48, p. 103, fig. 4 (type locality, Oahu).

DIAGNOSIS: Lateral-line scales 27; gill rakers 16 to 18; body elongate, the depth 3.25 to 3.95 in standard length; width of body 2 to 2.3 in depth; head length 2.75 to 3 in standard length; snout 2.7 to 3.3 in head length; eye 2 to 2.6 in snout (1.7 in a 47-mm juvenile); dorsal spines pungent; caudal fin rounded; pectoral fins 1.8 to 2 in head length; pelvic fins 1.7 to 2.3 in head length.

Color of females: dark brown with a white spot on each scale of body except dorsally where the spots are smaller and more numerous (two to five on each scale); head dark brown, spotted with white, the spots small and dense except on opercle where they are of about the size of those of middle of body; caudal fin reddish brown on scaled basal portion, followed by a bar of white, and thence by a broader bar of bright red, the anterior edge of which is nearly straight and the posterior edge curved like the posterior edge of the fin; margin whitish; dorsal fin dark brown with

numerous white dots, a broad whitish border, and often with an ocellated black spot posteriorly in fin; anal fin dark brown with a single irregular basal row of white dots; pectoral fins whitish; pelvic fins pale with a brown band over spine and first two rays. In preservative the caudal fin is entirely pale.

Color of males: body dark orangish brown with a faint gray green to blue spot posteriorly on each scale; head brilliant orange with dark-edged blue spots which are oval to slightly irregular; a bright yellow region mid-dorsally on nape; a black spot on opercular membrane; lips and adjacent portion of snout light tan; caudal and dorsal fins dark brown, the dorsal with a light blue border; anal fin yellow with two rows of dark-edged blue spots and a light blue margin; pectoral fins pale; pelvic fins light blue, the lateral edge yellow. In preservative, the head is whitish and the blue markings only faintly visible by their dark edges.

REMARKS: The author described both *chrysocephalus* and *rubrocaudatus* (1958a), with no hint that they might be the same species. Eight years later, upon returning to the Hawaiian Islands, he was amazed to see the two "species" in courtship. Few color forms of the same species of labrid fish are as incredibly different as these two. Ten specimens of the orange-headed male phase range from 95 mm to 151.5 mm in standard length. No smaller individuals of this color form have been observed. Several have been sighted which are intermediate between the *rubrocaudatus* form and the male *chrysocephalus*. One of these, BPBM 7333, 95 mm in standard length, is nearer the male color form but still retains some vestiges of "rubrocaudatus" color pattern. The head is orange with irregular grayish blue bands but dotted everywhere with pale blue spots, those in the blue bands paler than those on the orange; the dorsal fin has pale blue dots; the caudal fin is reddish black on the outer half and white basally (except scaled portion). The last trace of "rubrocaudatus" color pattern to disappear is the broad pale bar basally in the caudal fin.

This species is thus far known only from Oahu and the Kona coast of Hawaii. It appears to be more common on the leeward than the windward side of Oahu. It is generally observed at depths greater than 50 feet, but juveniles have been collected in as little as 35 feet. The Bishop Museum has 17 specimens in 11 lots. The holotype of *chrysocephalus* and *rubrocaudatus* are in the U.S. National Museum.

#### *Anampses femininus* n. sp.

Pl. 3 A, B

HOLOTYPE: BPBM 6696, 105 mm SL, female, Easter Island, off entrance to Hanga Piko, 15 to 20 feet, spear, J. E. Randall, February 1, 1969.

PARATYPES: BC 65-429, 155 mm SL, Easter Island, south coast off Rano Raraku, rotenone, I. E. Efford and J. A. Mathias, Jan. 8, 1965; BPBM 6699, 168 mm SL, male, Easter Island, off Ahu Akapu, 70 feet, spear, J. E. Randall, Feb. 3, 1969; BPBM 6697, 2: 65 and 137 mm SL, the largest a female, Easter Island, off Motu Tautara, 60 feet, spear, J. E. Randall, Feb. 7, 1969; CAS 13703, 56 mm SL, same data as preceding; BPBM 6698, 167 mm SL, male, Easter Island, west coast between Hanga Piko and Motu Kaukau, 60 feet, spear, J. E. Randall, Feb. 8,

1969; BPBM 6700, 2: 173 and 207 mm SL, males, Easter Island, small bay in middle of south coast, spear, J. E. Randall and G. R. Allen, Feb. 9, 1969; USNM 206377, 2: 132 and 168 mm SL, smallest a female and largest a male, same data as preceding; BM (NH) 1971.11.9.1, 97 mm SL, female, Pitcairn Island, off Bounty Bay, 100 to 130 feet, rotenone, J. E. Randall, D. B. Cannoy, and J. D. Bryant, Dec. 26, 1970; BPBM 11602, 2: 37 and 88 mm SL, largest a female, Pitcairn Island, west side, 65 feet, rotenone, J. E. Randall, D. B. Cannoy, and J. D. Bryant, January 20, 1971; BPBM 11603, 57 mm SL, Rapa, off entrance to Haurei Bay north of Rapa Iti, 65 feet, rotenone, J. E. Randall, D. B. Cannoy, and J. D. Bryant, Jan. 27, 1971; MNHN 1971-127, 103 mm SL, Rapa, Ruea Point, 45 feet, spear, A. Sinoto, Feb. 9, 1971; BPBM 10567, 44 mm SL, New Caledonia, off Noumea, R. Catala, through P. Fourmanoir, October, 1970; AMS IB.5284, 38 mm SL, New Caledonia, Noumea Aquarium, R. Catala, 1961; AMS I.1931, 42 mm SL, Lord Howe Island.

DESCRIPTION (see also Table 3): Dorsal rays IX, 12; anal rays III, 12; pectoral rays 13 (one paratype with 14 on one side); pelvic rays I, 5; principal caudal rays 14; lateral-line scales 26 to base of caudal fin (one pored scale beyond base); rows of large scales above lateral line to middle of spinous portion of dorsal fin 2 (plus 2 diagonal rows of small scales above these); 8 rows of large scales below lateral line to base of third anal spine (plus 2 diagonal rows of small scales); circumpeduncular scales 20; gill rakers 15 (15 to 17 for 17 paratypes); branchiostegal rays 6; vertebrae 25 (holotype only).

Body depth 3 to 3.4 in standard length; width of body 2.2 to 2.65 in depth; head length 2.65 to 2.85 in standard length; snout 2.5 to 2.85 in head length; eye diameter 1.6 to 3 in snout; interorbital space convex, the bony width 3.95 to 4.75 in head length; least depth of caudal peduncle 2.4 to 2.65 in head length; length of caudal peduncle 1.6 to 2.1 in least depth.

Maxillary nearly or just reaching a vertical at anterior nostril; dentition typical of the genus, the upper incisors of holotype about one-third eye diameter. Pharyngeal teeth (dissected from one male paratype) asymmetrically conical, the uppers in two triangular adjacent patches (20 teeth in one patch, 21 in the other); lower unit broadly triangular with the base posterior and transverse; 11 large teeth in the basal series, the largest ones centrally located; another 15 smaller teeth comprising the rest of the triangle, the apex continuing into a forward-projecting section of 17 teeth in a narrow band of one to two teeth in width, this section nearly twice the length of the height of the rest of the triangular patch. Longest gill raker of holotype one-fourth eye diameter.

Caudal fin rounded, its length 1.55 to 1.8 in head length.

Origin of dorsal fin slightly anterior to a vertical at upper pectoral base; first dorsal spine 3.5 to 5 in snout length, one-half to three-fourths the length of the second dorsal spine; ninth dorsal spine about twice as long as second; longest dorsal soft ray (sixth to ninth) 2.5 to 2.75 in head length; origin of anal fin below last dorsal spine; first anal spine slightly shorter than first dorsal spine; second anal spine nearly

Table 3. Measurements of Type Specimens of *Anampses femininus* (in Thousandths of the Standard Length).

	HOLOTYPE		PARATYPES			
	BPBM 6696	BPBM 6697	BPBM 6697	BPBM 6698	BPBM 6700	BPBM 11602
Standard length (mm)	105.0	137.0	65.0	167.0	207.0	37.0
Depth of body	305	336	295	316	333	324
Width of body	135	137	120	136	149	127
Head length	352	365	350	363	346	376
Snout length	123	146	126	146	136	138
Eye diameter	56	53	72	48	46	84
Bony interorbital width	76	77	77	82	87	86
Length of upper jaw	95	97	94	96	95	97
Least depth of caudal peduncle	143	140	146	138	143	157
Length of caudal peduncle	76	86	69	73	79	76
Snout to origin of dorsal fin	340	364	339	350	329	368
Snout to origin of anal fin	580	599	590	573	570	596
Length of caudal fin	204	206	215	204	218	240
Length of pectoral fin	200	192	187	181	178	197
Length of pelvic fin	152	153	164	164	165	149
Length of first dorsal spine	35	29	31	38	30	32
Length of second dorsal spine	48	47	45	60	59	51
Length of last dorsal spine	98	96	82	85	broken	100
Length of longest dorsal ray	128	136	137	132	126	151
Length of first anal spine	28	26	29	22	20	28
Length of second anal spine	43	47	50	48	broken	54
Length of third anal spine	72	68	69	69	broken	73
Length of longest anal ray	126	128	130	127	113	135
Length of dorsal fin base	590	571	585	599	603	590
Length of anal fin base	386	361	370	377	399	365

twice as long as first anal spine; second anal spine 0.6 to 0.75 length of third anal spine; longest anal soft ray slightly shorter than longest dorsal soft ray.

Pectoral fins 1.75 to 2 in head length, the tips reaching a vertical at posterior ends of pelvic fins or extending slightly beyond, the second to fourth rays the longest. Origin of pelvic fins below lower base of pectoral fins; pelvic fins 2.1 to 2.5 in head length, the tips nearly or just reaching anus; pelvic spine about 1.8 in longest (first) pelvic ray.

Head naked except for about eight diagonal rows of small scales on side of nape; mid-dorsal region of nape scaleless except on juveniles; scales on thorax notably smaller than those of rest of body, about 14 in mid-ventral series between pelvic fins and isthmus (embedded on adults and difficult to count); no scales on fins except base of caudal fin where there are about five rows of progressively smaller scales posterior to hypural.

Color of holotype, other females and juveniles: bright orange with ten narrow bright blue stripes, edged in black, on body which merge into an entirely deep blue region posteriorly; third stripe above pectoral base incomplete, ending beneath posterior dorsal spines or anterior soft rays; stripes of adult females may be broken

in part into segments or have short angular branches or consist of a close-set series of "V"-shaped or triangular spots (especially posteriorly); head with narrow black-edged blue bands, mostly slightly diagonal to nearly horizontal, some irregular or broken into segments; a few scattered small dark-edged blue spots, mainly dorsally, ventrally, and on upper lip; a dark-edged narrow blue band mid-dorsally on nape and mid-ventrally on head (the latter may continue onto thorax); dorsal fin bright orange, becoming blue posteriorly, with a dark-edged bright blue band at base, a narrow dark blue margin and submarginal blackish line, a series of dark-edged blue spots forming a mid-horizontal row near front of fin which merge to form a solid band toward middle of fin and thence to a broad reticular pattern before merging into blue posterior part of fin (mid-horizontal band not as well developed on juveniles and may consist of only a posterior row of spots); anal fin blue with a narrow black uneven band basally on anterior two-thirds of fin and a broad zone of orange in outer part of fin (except blue margin and black submarginal line), which gradually disappears in about posterior third of fin; dorsal and anal fins with a black spot in lower third between tenth and eleventh soft rays, this spot about the size of pupil in adults but larger and rimmed in blue on juveniles; caudal fin deep blue with a whitish posterior margin and a black submarginal zone; pectoral fins pale with orange-edged rays and a small blue spot at upper base preceded by a blackish smudge; pelvic fins orange with a dark blue lateral edge and two or three dark-edged blue spots or short bands.

Males are dusky yellow to blackish on the body with a vertical dark-edged bright blue line on most of the scales (anteriorly above pectoral base there are large roundish spots; dorsally and on side of caudal peduncle the lines are shorter, some are not vertical, and a few are broken into small spots; ventrally the lines are also shorter with a lower row horizontal in orientation and tending to coalesce into a solid blue band which is best developed on lower side of caudal peduncle where the lower edge is bordered by black; upper side of caudal peduncle with a similar but less marked band); lower part of body below ventral row of spots more yellow or yellow-orange than rest of body; head dusky orange with four broad slightly irregular blue bands, the uppermost beginning on upper snout, touching dorsal edge of eye, and running along upper edge of operculum, the second commencing behind eye, passing to a blackish spot at posterior end of opercle, thence curving downward on edge of opercle to level of upper pectoral base where it joins the third band that passes along lower edge of eye to front of snout; fourth band on lower cheek parallel to upper three (may be broken into large spots); two broad blue bands on thorax in line with two lowermost bands of head; dorsal fin dusky reddish with numerous dark-edged blue dots and short irregular lines and a blue margin and black submarginal line; anal fin orangish with three rows of dark-edged blue spots and short bands, a blue margin and black submarginal line; caudal fin orangish with black-edged blue spots (mostly elongate, in alignment with rays, some touching posterior edge of fin) and long bands, the bands mainly in middle of fin parallel with rays; upper and lower edges of fin with blue margins which turn the corners and extend a short distance onto pos-

terior edge; pectoral fins pale with yellowish rays edged in brown and an indistinct dark bar at base; pelvic fins with a blue lateral margin, then a broad zone of orange edged in blue, this with or without one or two dark-edged blue spots, the rest of fin brownish to orangish with a dark-edged blue streak.

In life the ground color of the males varies from near yellow to blackish; some individuals were seen to exhibit a yellow bar the full height of the body in the region of the pectoral fin.

In preservative the orange of the females becomes tan to light brown, the blue stripes light bluish gray, and the deep blue of the posterior part of the body and caudal fin blackish. The males are dark in preservative, the blue markings still retaining much of this color.

REMARKS: This species was collected by the author at Easter Island in early 1969. When first observed, the male form was believed to be a different species. Suspicion was aroused that it might be the male of *femininus* when no small individuals were seen with this color pattern and when all that were collected were males, in contrast to the orange and blue form which was either female or immature. Also the large males were often seen swimming with the females. Ultimately an individual was sighted which was intermediate in color pattern to the two. The male form is much less abundant than the female.

Juveniles often swim in small aggregations. They are seen in shallow water (15 to 30 feet) with greater frequency than adults, but none were observed in turbulent inshore water where *Anampses caeruleopunctatus* and *Thalassoma purpureum* are the dominant wrasses.

The species was observed by the author in December, 1970 in outer reef areas of Mangareva at depths of 70 to 110 feet. It was collected at Pitcairn in 65 to 130 feet later in the same month and in January. It was also taken at Rapa in 65 feet in January and February, 1971. Subsequently, juvenile specimens were examined from New Caledonia and Lord Howe Island. Thus the species has an interesting distribution at islands across the entire expanse of southern Oceania between latitudes 23° and 31°30'. It may be expected from Norfolk Island and the Kermadecs.

This species is unusual among fishes showing sexual dichromatism in the female being more attractively colored than the male. For this reason it is named *femininus*.

### ***Anampses neoguinaicus***

Pl. 3 C, D

*Anampses (Anampses) neoguinaicus* Bleeker, 1878. Arch. Neerl. Sci. Nat., vol. 13, p. 57, pl. 3, fig. 4 (type locality, New Guinea).

*Anampses fidjensis* Sauvage, 1880. Bull. Soc. Philom. Paris, vol. 7, p. 224 (type locality, Fiji).

DIAGNOSIS: Lateral-line scales 26; gill rakers 15 to 18 (modally 16 or 17); depth of body 2.9 to 3.3 in standard length; width of body 2.3 to 2.7 in depth; head length 2.65 to 3 in standard length; snout 2.5 to 2.85 in head length; eye 1.5 (39-mm juvenile)

to 2.75 (123-mm adult male) in snout; dorsal spines pungent (but those of some specimens nearly flexible); caudal fin rounded; pectoral fins 1.7 to 1.8 in head length; pelvic fins 1.5 to 2.25 in head length (1.5 in the male, the tips reaching slightly beyond origin of anal fin).

Color of females: black dorsally with blue dots (faintly dark-edged), becoming yellowish white on sides below a line of demarcation from front of snout through lower edge of eye to rear base of dorsal fin, and white ventrally; a large black ocellus posteriorly on opercle at level of eye; dorsal fin purplish black (except last ray and associated membrane which is white), with a light blue margin, a basal row of small blue spots, and a large black spot between the ninth and eleventh rays which is broadly rimmed in blue on lower two-thirds and in yellow on outer third, this spot then surrounded by a narrow region of darker pigment than rest of fin; anal fin light blue except for last ray and adjacent membrane which are whitish, with a broad band of black in outer part of fin near margin, this band interrupted by an ocellated spot similar to but smaller than the one in dorsal fin (except the blue lower rim merges imperceptibly with the blue basal half of the fin); caudal fin white with a hyaline posterior border (broader at corners); paired fins with white rays and hyaline membranes.

Color of a male, 123 mm SL, from New Caledonia (BPBM 11443): body blackish dorsally with light blue dots, shading gradually to light yellowish green with a vertical light blue line on each scale below a demarcation running from level of opercular flap to rear base of dorsal fin; upper thorax and abdomen with small light blue spots instead of lines on scales; lower thorax and abdomen bright salmon without blue markings; upper half of head dark reddish with dark-edged blue spots on nape and dark-edged blue bands radiating from eye (the lowermost, which runs anterior and posterior from lower edge of eye is the demarcation between upper dark and lower light yellowish green parts of head); isthmus salmon; posterior end of opercular flap black; an area of red-orange anterior, adjacent, and slightly above black opercular spot; below the spot an area of greenish yellow, separated from the spot by a narrow blue band which is continuous with the near-horizontal blue band which passes to rear of eye; snout above lowermost blue band dull red-orange; dorsal fin blackish green near base, becoming blackish red over most of fin; numerous tiny blue dots over all of fin except blue margin, black submarginal band and a narrow dusky orange-red zone below this; a large black spot basally on each of the first two interspinous membranes of dorsal fin, the outer part of membranes dull yellow up to the blue-black margin; anal fin light green on basal fourth, this containing a broken line of blue, then a narrow blue band, followed by a broad zone of orange (brighter basally) with two longitudinal narrow blue bands, the lowermost broken; margin of fin blue with an adjacent black line beneath; pectoral fins clear with no dark markings at base; pelvic fins with a broad zone of bright orange, edged in blue, on lateral part of fin; rest of fin clear with light yellowish green rays.

REMARKS: A few differences exist between Bleeker's color description of the type of *neoguinicus*, 140 mm in total length (specimen not located), and the above description

of the male from New Caledonia. Bleeker described the color of the body below the dark upper portion as orange. The New Caledonia specimen was yellowish green, not displaying any orange except ventrally on the body. Bleeker described the base of the anal fin as purpurescent; it was light green on the New Caledonia fish. Nevertheless, there is little doubt that the two are the same species. Bleeker stated that his type was deposited in the museum at Hamburg.

Sauvage's description of *fidjensis* was based on the female form. Fowler (1928) and Schultz *In* Schultz and collaborators (1960) were in error in considering *fidjensis* the young of *Anampses twistii*.

*A. neoguinaicus* is known in the literature from the single type specimen from New Guinea and Sauvage's 80-mm specimen from Fiji. Three additional specimens (BPBM 11381, 54 and 62 mm SL, and BPBM 11383, 56 mm SL) were obtained by the author in Fiji where the species was noted to be moderately common for the genus (more so than *A. twistii*).

*A. neoguinaicus* is here recorded for the first time from New Caledonia (male specimen mentioned above, speared by the author outside the barrier reef off Noumea in 60 feet, and AMS IB.5283, 42 mm SL); Heron Island, Great Barrier Reef (BPBM 9398-9402, 6: 25 to 103 mm SL; AMS I.1544-001, 107 mm SL), collected by J. H. Choat and reported by him as *Anampses* sp. in his Ph. D. thesis on labroid fishes at the University of Queensland, 1969; and One Tree Island, Great Barrier Reef (USNM 206105, 3: 49 to 68.5 mm SL), collected by V. G. Springer. In addition, the species was sighted at Taiwan by Choat and recently collected there by R. S. Jones and H. T. Kami (specimens deposited at the University of Guam). This species can certainly be expected from other western Pacific islands, such as the New Hebrides, Solomon Islands, and the Philippines.

### **Anampses twistii**

#### Pl. 2 D

*Anampses Twistii* Bleeker, 1856. Acta Soc. Sci. Indo-Neerl., vol. 1, p. 56 (type locality, Ambon).

DIAGNOSIS: Lateral-line scales 26; gill rakers 16 to 19 (the sole specimen from Mauritius with 19); depth of body 3 to 3.3 in standard length; width of body 2.3 to 2.6 in depth; head length 2.7 to 3.1 in standard length; snout 2.5 to 2.8 in head length of adults (3.5 in a 35-mm juvenile); eye diameter 1.25 (35-mm juvenile) to 2.7 (141-mm adult) in snout; dorsal spines pungent; caudal fin rounded; pectoral fins 1.65 to 1.8 in head length; pelvic fins 1.8 (141-mm adult) to 2.3 (35-mm juvenile) in head length.

Color brown, with scattered dark-edged blue dots, shading to yellow on abdomen, thorax, and lower head, and to reddish posteriorly; lips reddish; a large black spot posteriorly on operculum; a green spot above and adjacent to black spot, and above this a red spot (the latter at upper end of gill opening); dorsal and anal fins reddish brown with a basal and a middle row of black-edged small blue spots, the margin blue with an adjacent black line; a large black spot rimmed in blue and



black posteriorly in dorsal and anal fins; caudal fin light red with small dark-edged blue spots and a blue posterior margin; pectoral fins with yellow rays and a dark brown bar at base (not visible on Mauritius specimen); pelvic fins yellow.

REMARKS: *A. twistii* appears to exhibit no obvious difference in color with sex. Mature females range from 66 to 102 mm SL (except one 146-mm specimen from Mauritius) and mature males from 83 to 141 mm SL.

Among three Bleeker specimens of *twistii* in the Rijksmuseum van Natuurlijke Historie at Leiden is one from Ambon (No. 6566) labelled holotype; it measures 111 mm SL and 134 mm TL. Lunel (1881) reported *twistii* from Mauritius. Schmidt (1930) included the species in his "Fishes of the Riu-Kiu Islands". Schultz (1960) recorded it from Rongerik in the Marshall Islands (USNM 113274, 2: 89 and 92 mm SL). He also examined specimens from the Philippines (USNM 135556, 56 mm SL) and Mauritius (USNM 113273, 146 mm SL). Smith (1955) recorded the species from Aldabra. In a subsequent paper (1957) he listed it from Pemba and Mozambique to 14° S. Smith and Smith (1963) reported it from the Seychelles and illustrated the juvenile and adult in color. Dor (1970) recorded it from Elat, Red Sea. Springer collected 20 specimens from the Gulf of Aqaba in 15 to 90 feet in 1969 (USNM, uncatalogued). The Red Sea and Indian Ocean specimens differ in having one pale spot on each scale rather than scattered spots, as seen on Pacific examples. The author has collected *twistii* from Tahiti (BPBM 9058, 112 mm SL; BPBM 8385, 79 mm SL); Moorea, Society Islands (BPBM 9085, 86 mm SL; USNM 114743, 79 mm SL); Raivavae, Austral Islands (BPBM 11605, 141 mm SL); Eniwetok, Marshall Islands (BPBM 6247, 89 mm SL); Viti Levu, Fiji (BPBM 11402, 92 mm SL); and the Palau Islands (BPBM 9615, 66 mm SL; CAS uncat., 40 mm SL) in the depth range of 20 to 70 feet. He observed but did not collect it at Mangareva. Victor G. Springer collected a female specimen 102 mm SL from Taiwan (USNM uncat.).

### *Anampses viridis*

Fig. 8

*Anampses viridis* Cuvier and Valenciennes, 1839. Hist. Nat. Poiss., vol. 14, p. 13 (type locality, Mauritius).

?*Anampses rubro-viridis* Liénard In Sauvage, 1891. Hist. Phys. Nat. Polit. Madagascar. Poiss., p. 458 (type locality, Mauritius).

DIAGNOSIS: Lateral-line scales 27; small scales continuous across dorsal part of nape (mid-dorsal region of nape naked on adults of other species of *Anampses*; juveniles of *elegans*, *twistii*, and *neoguinaicus* have small scales mid-dorsally on nape); gill rakers 18 or 19; body moderately elongate, the depth 3 to 3.2 in standard length; width of body 2.2 to 2.7 in depth; head length 2.9 to 3.1 in standard length; snout 2.25 to 2.4 in head length; eye 3 to 3.7 in snout; dorsal spines pungent; caudal fin slightly rounded; pectoral fins 1.6 to 1.75 in head length; pelvic fins 2.2 in head length.

Cuvier and Valenciennes described the color as entirely green on the body and

fins; there was no trace of spots or bands on the head; the pectorals seemed to have some yellow on the terminal part of the lower rays; the upper rays were malachite green; the anal fin had a yellowish border.

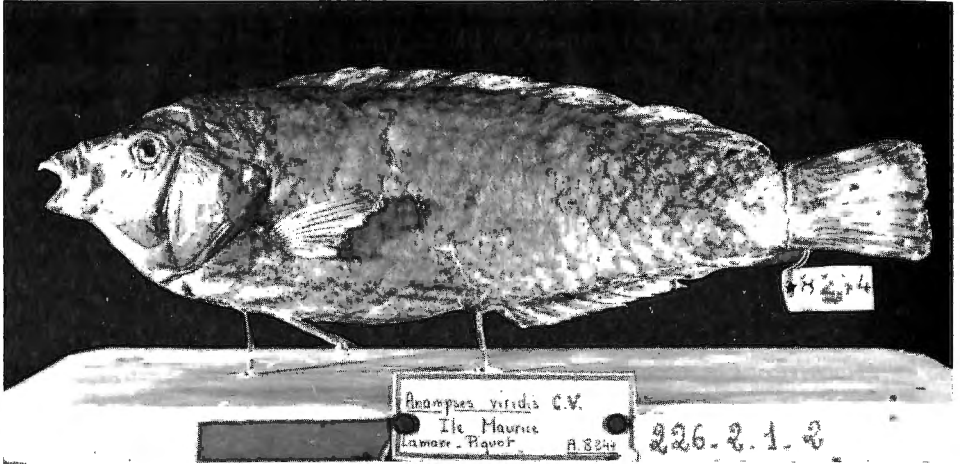


Fig. 8. *Anampses viridis*, lectotype, 237 mm SL, Mauritius, MNHN A. 8244.

Assuming that the color of *A. viridis* is for the female form, the male coloration might be that of *rubroviridis* Liénard, *In Sauvage* 1891 (see Remarks below). According to Liénard, this color is as follows: the nape from the dorsal fin to opposite the preopercle is bottle green lined with greenish blue. There is a large blackish green spot from the slightly projecting bump on the forehead to the nostrils which is broad in its inferior part and very narrow superiorly; this spot is surrounded by a circle of sky blue which joins with a band that encloses the eye and extends to the upper lip. The pupil of the eye is black and the iris is the color of fire. There are somewhat irregular blue streaks on the throat and around the lips. From the suprascapular region to an oblique demarcation between the sixth dorsal ray and the first anal ray the fish is blood red. All the rest up to the tail is light green which darkens as it approaches the caudal fin, especially dorsally, whereas the lower green part retains a little of the red color up to the caudal fin. All the scales of this fish have blue lines on the back and violet towards the anal fin (these lines less evident on the red part of the body). The dorsal fin is light green, bordered and speckled with light blue. The anal fin also has a broad blue border with three violet lines beneath. The first ray of the ventral fin, that of the pectoral, and eight rays of the caudal are blue; there is between each ray a streak of the same color; the ninth ray on each side is red and the two internal ones are violet; the extremity of each of the intermediate rays is dirty white with a yellowish spot on the border.

REMARKS: Two specimens of *viridis* are labelled as types at the Museum National d'Histoire Naturelle in Paris. Both are dried, varnished specimens from Mauritius which were sent on loan by M. L. Bauchot. MNHN A. 8244 (Fig. 8) is here regarded

as the lectotype. It is 237 mm SL and 279 mm TL. The other, MNHN 8243, 239 mm SL seems to be the same species, but a pale bar occurs anteriorly on the body beneath the pectoral fin which is suggestive of the "diadematus" phase of *caeruleopunctatus*. It was not possible to obtain a gill-raker count from this specimen or determine if the spines are flexible or pungent. A gill-raker count of 18 was made on the lectotype, and its spines are pungent. A third specimen from Mauritius also sent on loan from Paris (MNHN 1695, 171 mm SL) is a colorless alcoholic specimen. It has 19 gill rakers and pungent spines. This specimen and the lectotype form the basis for the diagnosis above.

The *Anampses viridis* of Sauvage (1891: 456, pl. 45, fig. 3) from Madagascar and the Marquesas is *A. caeruleopunctatus* (Marquesan specimen also sent on loan by M. L. Bauchot).

No specimens are available of *Anampses rubroviridis* Liénard, also known only from Mauritius, which is here regarded as a possible synonym of *viridis*. It would seem more plausible to link this as a male color form of *viridis* than to consider it a sixth distinct species of the genus at Mauritius (in addition to *viridis*, *caeruleopunctatus*, *meleagrises*, *twistii*, and *geographicus* are also known from the island). The large size of *rubroviridis* (described from a 14-inch specimen), its rarity, and its ornate color with blue lines on the scales strongly suggests a male color phase. The green posterior color of the fish might also be indicative of relationship to *viridis*.

### **Anampses geographicus**

Figs. 9, 10

*Anampses geographicus* Cuvier and Valenciennes, 1839. Hist. Nat. Poiss., vol. 14, p. 10 (type locality unknown).

*Anampses pterophthalmus* Bleeker, 1857. Acta Soc. Sci. Indo-Neerl., vol. 2, p. 81 (type locality, Ambon).

DIAGNOSIS: Lateral-line scales 48 to 50 (to base of caudal fin; usually one or two pored scales beyond); gill rakers 17 to 20; depth of body 2.7 to 3.1 in standard length; width of body 2.5 to 2.8 in depth; head length 2.6 to 2.8 in standard length; snout 2.5 to 3 (juvenile) in head length; eye 1.5 (44-mm juvenile) to 3 in snout; dorsal spines pungent; caudal fin emarginate (more deeply emarginate in "geographicus" form), rounded in juveniles; pectoral fins 1.75 to 2.1 in head length; pelvic fins 2.15 (male in "geographicus" color) to 2.7 (juvenile) in head length.

Color of a Philippine specimen 159 mm TL of the "pterophthalmus" form (after Fowler and Bean, 1928): "Very dark olive-brown; scales show somewhat reddish margins on fading but no spots or bars; head similar but of more purplish shade. Dorsal and anal fins similar to body, without markings except large black centered tawny rimmed ocellus on last three or four rays; caudal plain except hyaline pinkish tips; ventrals colored as body; pectorals olive yellow; membranes more or less hyaline." A specimen 210 mm TL: "Black on top of head; body above line of pectoral shading into tawny on hind third. Breast region and lower head brick red

shades. Dorsal black, with brick-red shades in front and tawny behind; jet black ocellus on last three rays and membranes with narrow yellow rim. Lips whitish. Caudal sooty black, with narrow hyaline tip. Anal similar to dorsal but with more tawny shades; ocellus same, not quite so close to posterior edge. Anal black, with brick red membranes. Pectoral hyaline yellow, upper edge blackish, base black. Iris dark, with narrow crimson inner edge."

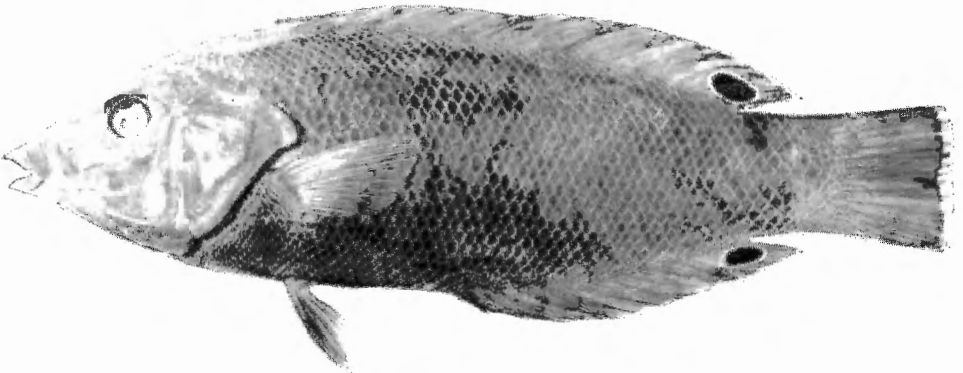


Fig. 9. *Anampses geographicus* ("pterophthalmus" phase), 125 mm SL, Philippine Islands, USNM 152218.

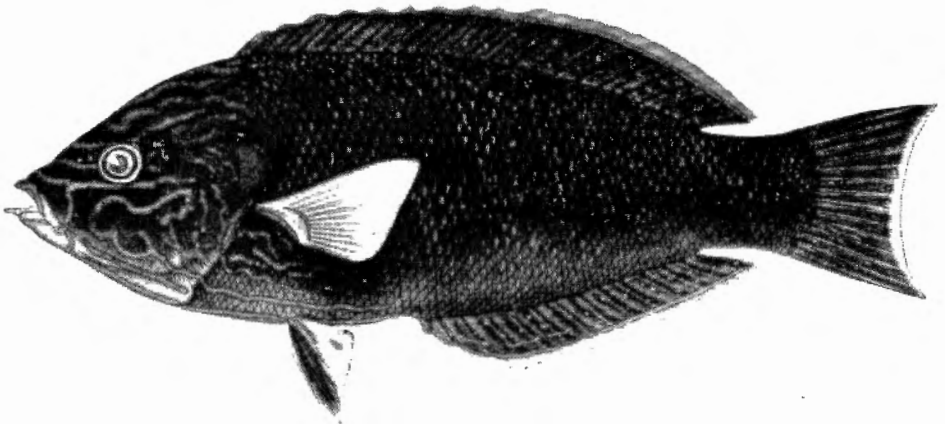


Fig. 10. *Anampses geographicus*, 148 mm SL, male, Philippine Islands, USNM 152319. From a color painting in the files of the Fish Division, U. S. National Museum made during the "Albatross" Philippine Expedition.

The color of the male phase represented by a painting of a fresh specimen collected by the Philippine Albatross Expedition (a black and white copy is shown herein as Fig. 10) is as follows: reddish brown, the scales of the body with a vertical blue line on each scale; head and thorax with very irregular blue bands (on most specimens the most prominent band is a broad one which crosses the dorsal part

of the head from eye to eye in front of the interorbital space); the dorsal and anal fins are reddish brown with blue dots and short lines, a yellowish border, and a blue submarginal line; the caudal is reddish brown with irregular horizontal blue lines and a bluish white posterior margin which is broader at the central part of the fin; the pectoral fins are clear with brownish yellow rays and two transverse blue bands at the base; the pelvic fins have a broad blue-edged brown zone laterally, the rest of the fin yellow with a single blue spot.

REMARKS: Randall (1958a) stated that he believed *A. geographicus* and *A. pterophthalmus* are color forms of the same species. He found mostly females and a few males among the specimens of *pterophthalmus* for which the sex could be determined, but only males among specimens of *geographicus*. One specimen 152 mm in standard length was intermediate to the two color forms. Since this study four additional specimens of *geographicus* 167 to 201 mm SL from the Philippines have been examined at the California Academy of Sciences. Three are males (the sex of the fourth is indeterminate).

As indicated by Bauchot (1963) the holotype of *geographicus* is in the Museum National d'Histoire Naturelle in Paris (No. A. 7403, 190 mm SL). The type of *pterophthalmus* is in the Rijksmuseum van Natuurlijke at Leiden.

This species is known from the East Indies (Weber, 1913; Fowler, 1934, after Whitley; de Beaufort, 1940), Philippine Islands (Fowler and Bean, 1928; Herre, 1934), Taiwan (Okada, 1938; Chen, 1953; Yu, 1968), the Ryukyu Islands (Jordan and Snyder, 1902), Japan (Okada, 1938; Kamohara, 1955), Palau Islands (Abe, 1939), Oualan (=Kusiae, Caroline Islands) (Günther, 1881), Kandavu, Fiji (Fowler, 1928, after Schmeltz), Shark Bay, Western Australia (Scott, 1959), Great Barrier Reef (Woodland and Slack-Smith, 1963; Whitley, 1964), and Mauritius (Peters, 1876). The record of *geographicus* from the Tuamotus by Fowler (1928) is probably in error. He listed one specimen in the National Museum "obtained by the Wilkes Expedition in the Tuamotus". The author was unable to find any specimens of *Anampses* in the U. S. National Museum from the Tuamotus. There is, however, one specimen of *caeruleopunctatus* obtained by the Wilkes Expedition at Hull, Phoenix Islands. Possibly this is the fish responsible for Fowler's record. It may also be the basis for his listing of *geographicus* from the Tuamotus in his "The Fishes of the George Vanderbilt South Pacific Expedition, 1937". James E. Böhlke has written the author that he is unable to find any specimens of *Anampses* from the Tuamotus at the Academy of Natural Sciences of Philadelphia.

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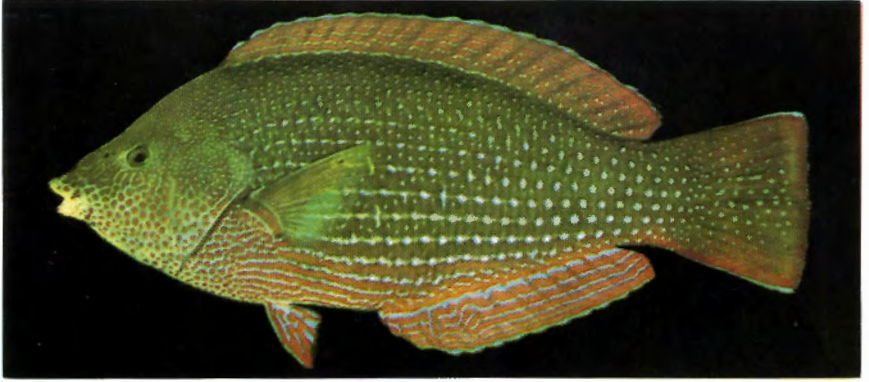
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## LEGEND FOR PLATE

- Pl. 1. a. *Anampses cuvier*, 225 mm SL, Johnston Island, BPBM 8969.  
b. *Anampses caeruleopunctatus* ("diadematus" phase), 190 mm SL, male, Eniwetok, Marshall Islands, BPBM 6302.  
c. *Anampses caeruleopunctatus*, 164 mm SL, Marcus Island, BPBM 7117.  
d. *Anampses cuvier*, 248 mm SL, male, Oahu, Hawaiian Islands, BPBM 12742.



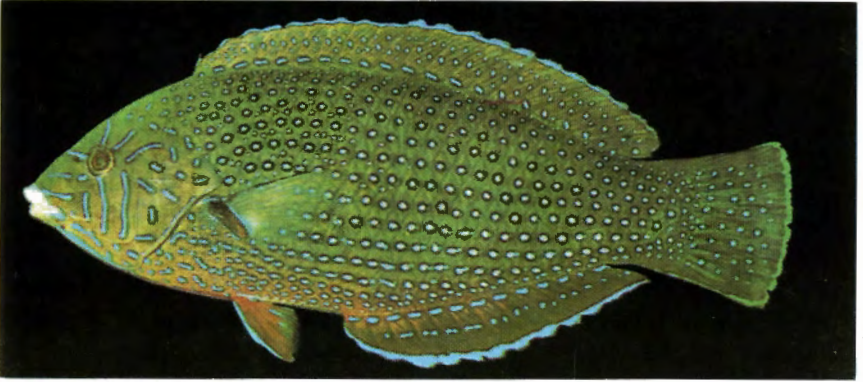
PL. 1



a



b



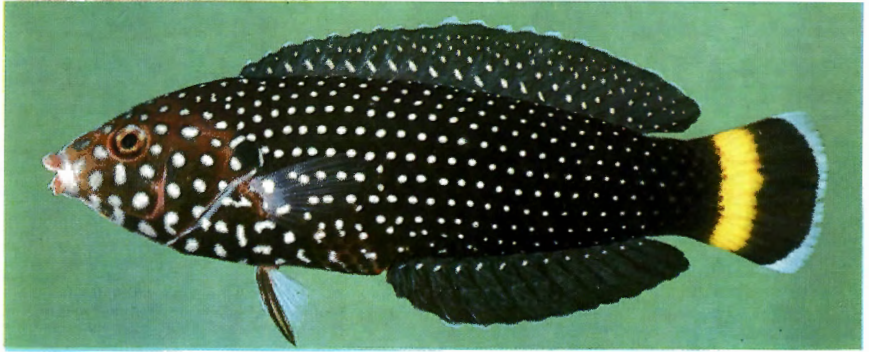
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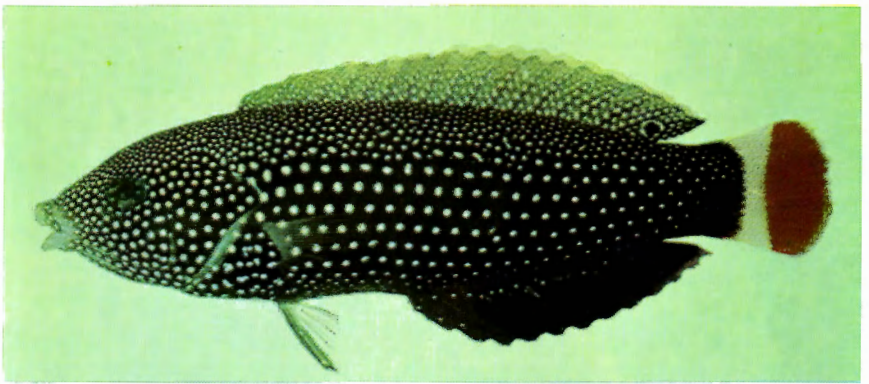
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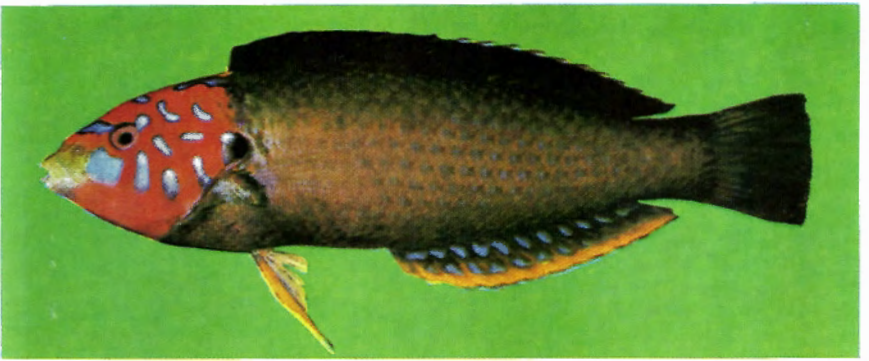
- Pl. 2. a. *Anampses melanurus*, 80 mm SL, female, Nuku Hiva, Marquesas Islands, BPBM 11617.  
b. *Anampses chrysocephalus* ("rubrocaudatus" phase), 63 mm SL, female, Oahu, Hawaiian Islands, BPBM 6006.  
c. *Anampses chrysocephalus*, 136 mm SL, male, Oahu, Hawaiian Islands, BPBM 6361.  
d. *Anampses twistii*, 103 mm SL, Tahiti, Society Islands, BPBM 11561.



a



b



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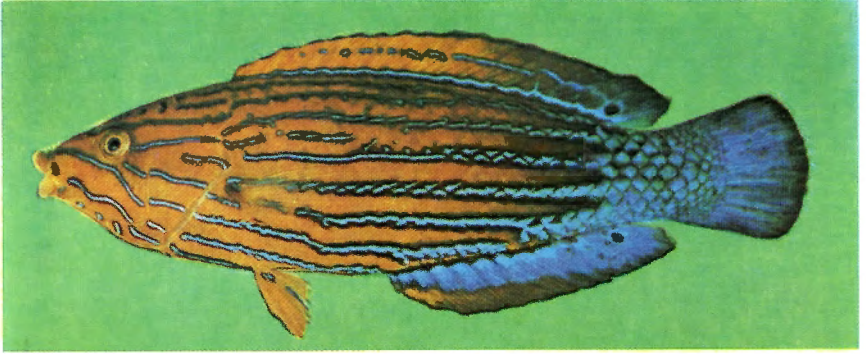
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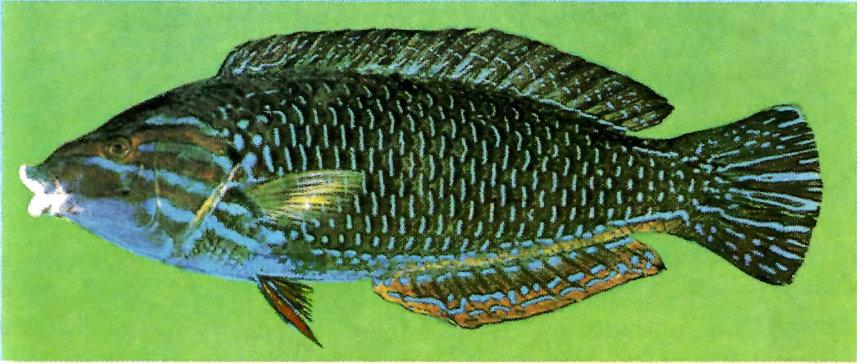
- Pl. 3. a. *Anampses femininus*, holotype, 107 mm SL, female, Easter Island, BPBM 6696.
- b. *Anampses femininus*, paratype, 173 mm SL, male, Easter Island, BPBM 6700.
- c. *Anampses neoguinaicus*, 56 mm SL, female, Viti Levu, Fiji Islands, BPBM 11383.
- d. *Anampses neoguinaicus*, 123 mm SL, male, New Caledonia, BPBM 11443.

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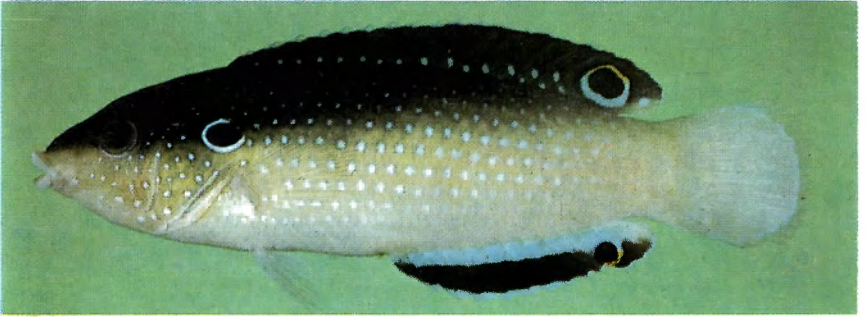
- Pl. 3. a. *Anampses femininus*, holotype, 107 mm SL, female, Easter Island, BPBM 6696.
- b. *Anampses femininus*, paratype, 173 mm SL, male, Easter Island, BPBM 6700.
- c. *Anampses neoguinaicus*, 56 mm SL, female, Viti Levu, Fiji Islands, BPBM 11383.
- d. *Anampses neoguinaicus*, 123 mm SL, male, New Caledonia, BPBM 11443.



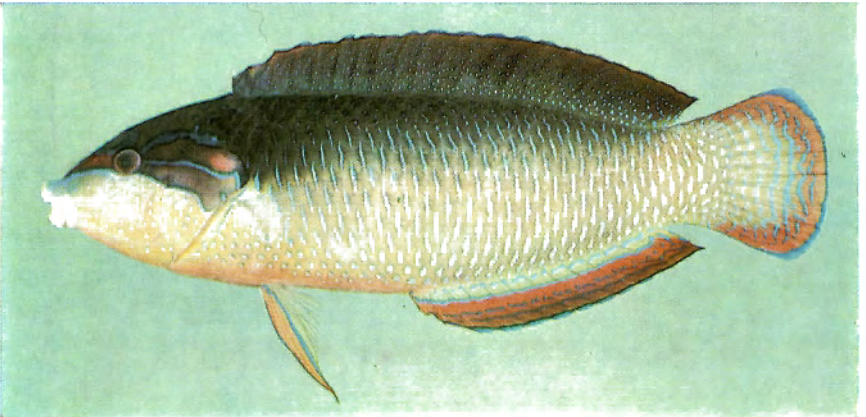
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