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A New Pomacanthine Fish, *Holacanthus venustus*, from the Pacific Coast of Japan, with Notes on the Young of *H. sexstriatus* and *H. septentrionalis*

Fujio Yasuda and Yoshiaki Tominaga

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Abstract A new species of pomacanthine fish, *Holacanthus venustus*, is described from the Pacific coast of Japan. Young of *H. sexstriatus* and *H. septentrionalis* are elucidated by rearing them in the aquaria. The young of *H. sexstriatus* is similar but distinguishable from that of *H. semicirculatus* and *H. striatus* in color pattern. *H. albofasciatus* is proved to be the young of *H. septentrionalis*.

Introduction

Described below is a beautiful new species of pomacanthine fish, with yellow and blue colors, from Oshima I., the Gulf of Sagami. In the most recent world-wide revision of the subfamily Pomacanthinae, family Chaetodontidae, Fraser-Brunner (1933) recognized seven genera and eight subgenera of this group. For several reasons we conclude that Fraser-Brunner's generic splitting confused rather than improved our understanding of this subfamily. In many cases his distinguishing characters of the genera and subgenera are too trivial, and in several even inadequate and misleading. Here, we tentatively recognized only one genus, *Holacanthus*, for the Indo-Pacific pomacanthines. We plan to revise this group of fishes in and around Japanese waters, and the problem of the genera will be discussed in the forthcoming paper.

One of the difficulties met in classifying the pomacanthine fishes is that the color pattern of the young is frequently quite different from that of the adult. As a rule, the young and adult of the same species were described independently, and later, when the series of specimens showing the transitional color patterns were found, the species names of either young or adult became synonyms of another. Thus, Regan (1918) found that *Holacanthus lepidolepis* Bleeker is the adult of *H. semicirculatus* Cuvier, and Fraser-Brunner (1933) found that *H. nicobariensis* (Bloch and Schneider) is the young of *H. imperator* (Bloch). There remain, however, many species of which the young or adult are not yet known. We observed the processes of color-pattern change in two cases by rearing the young specimens in the aquaria, the most direct and reliable method to link young and adult. Discovery of the young of two species are described as well as the proposal of the new species.

Holacanthus ***venustus***, sp. nov.
(New Japanese name: sumire-yakko)
(Figs. 1 and 3)

Holotype.—Section: Zoology, University Museum, The University of Tokyo 52329; a sub-adult specimen, sex cannot be determined, 77 mm standard length, from Oshima I., Sagami Bay (34°41′N, 139°27′E). Collected by Fujio Yasuda, using dip net,

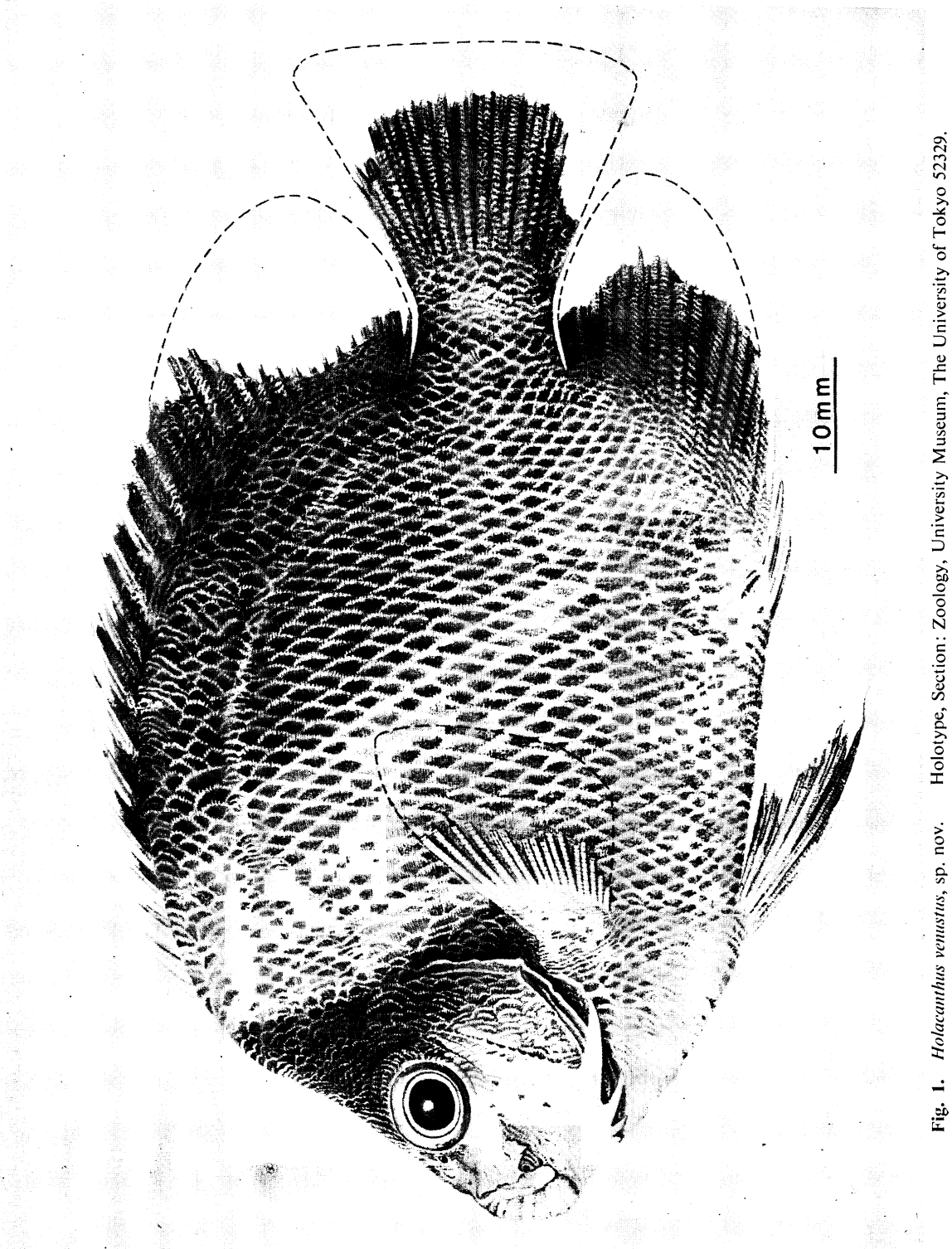

Fig. 1. *Holacanthus venustus*, sp. nov.　Holotype, Section: Zoology, University Museum, The University of Tokyo 52329.

from rocky shore, water depth about 10 m; 5th February 1969. Kept alive for a few days, when color photos were taken.

Diagnosis

A pomacanthine with first infraorbital, vertical arm of preopercle and interopercle serrated, and with large scales. Distinguished at once by its unique color pattern. Anal fin with 15 soft rays, fewest for the subfamily and recorded only in *H. nigriocellus* (Woods and Schultz, 1953) and *H. tutuilae* (Jordan and Jordan, 1922).

Description

D. XIV, 16; A, III, 15; P_1. 16; P_2. I, 5; C. 8+7. Pored scales in lateral line 41, scales above lateral line 6, scales below lateral line 27, number of diagonal scale rows tilting posteriorad ventrally, from upper end of opercle to caudal base about 46, that tilting forward ventrally is about 34. Branchiostegals 5; gill rakers, 10 (lower)+1 (middle)+3 (upper); Number of vertebrae 10+14 (urostylar vertebra counted as 1).

Measurements expressed in hundredths of standard length (77 mm): depth of body at base of 6th dorsal spine 66.9, head length 31.2, snout length 13.6, horizontal diameter of orbit 9.7, width of bony orbital over center of eyes 10.4, depth of caudal peduncle 15.6, snout to dorsal origin 42.9, snout to anal origin 71.4, snout to pectoral insertion 31.8, snout to pelvic insertion 40.9, dorsal base 74.7, length of 4th (longest) dorsal spine 16.2, anal base 39.0, length of 3rd (longest) anal spine 18.8, length of pelvic fin 32.5, length of pelvic spine 22.1.

Teeth on both jaws needle-like, arranged in several rows, the internal ones smaller. Prevomer and palatine devoid of teeth. Nostril immediately in front of eye, anterior one with raised fleshy rim. Eye diameter nearly equal to interorbital width. Anterior and ventral margins of 1st infraorbital (preorbital) free, serrated irregularly, posterior margin covered with skin and scales.

Preopercle with a stout spine at angle, and with 3 graduated spines on ventral horizontal margin; posterior vertical margin with fine bony projections. Interopercle with a spine between the 1st and 2nd spines of preopercle. Posterior to the spine, the bone concealed entirely by preopercle, and extending to subopercle. Scales on opercle arranged somewhat irregularly, in about 8 vertical rows.

Scales strongly ctenoid, accessory scales absent. Scales on occiput, around eye, and on fins small. Lateral line terminates in front of end of soft dorsal.

Soft portions of dorsal and anal fins rounded, the latter extending a little posteriorly. Tip of pelvic reaching anal origin. Caudal rounded. Distal portions of the soft dorsal, soft anal, pectoral, and caudal fins of the holotype were torn off by the teeth of other fish kept in the same aquarium.

Life colors (Fig. 3):

Anteroventral half of body brilliant yellow, with a triangular blue patch extending above eye to origin of spinous dorsal and to pectoral insertion. Posterodorsal part of body including spinous dorsal and caudal peduncle blue, with lighter blue markings on each scale. Soft dorsal and caudal dark blue with light blue markings. Posteroventral side of body and anterior half of anal dusky yellow. Posterior half of anal dark blue, the fin with light blue markings like those of the dorsal and caudal fins. Pectoral yellowish, transparent. Pelvic yellow with light blue outer margin.

Color in formalin:

Brilliant yellow part of living specimen turned pale, dusky yellow part grey, and blue part dark sepia. Light blue markings on vertical fins becoming indiscernible.

Distribution

Besides the type locality, Fujio Yasada witnessed and photographed an apparently conspecific fish at Ishigaki I., Yaeyama Is (24°27′N, 124°07′E) at a depth of about 5 m.

Etymology

Latin adjective *venustus*, meaning charming or beautiful.

Holacanthus sexstriatus Cuvier
(Japanese name: rokusen-yakko)
(Figs. 2 and 4 to 6)

Holacanthus sexstriatus Cuvier, 1831: 194 (Java: Mus. Nat. Hist. Nat. Paris and Leiden Mus.); Fowler and Bean, 1929:177 (1st record from uncertain locality of Japan); Kumada and Hiyama, 1941: pl. 120 (introduction of Japanese name 'rokusen-yakkodai'); Bauchot, 1963: 145 (note on type).

Holacanthus semicirculatus, Fowler and Bean, 1929: 186 (part), middle-left fig. of fig. 9 (? Philippines). New synonymy.

Euxiphipops sexstriatus, Weber and de Beaufort, 1936: 146, fig. 38 (Singapore, Java, etc.).

Pomacanthus (*Pomacanthodes*) *chrysurus* (nec Cuvier, 1831: 188), Weber and de Beaufort, 1936: 139, fig. 35 (Kei Is.; synonymy excluded). New synonymy.

Pomacanthus semicirculatus, Smith, 1953 (part): pl. 30 (584, right fig. only); Smith and Smith, 1963 (part): 24, pl. 18, C (C′ excluded). New synonymy.

For other synonymy see Weber and de Beaufort (1936: 146).

A juvenile pomacanthine, about 40 mm in total length, was caught alive by dip net in water about 3 m deep near the reef of Seragaki, Onna Village, Okinawa-jima (26°30′N, 127°-56′E) on 15th February 1967. The fish has been fed on chopped clam and reared up to now in an aquarium kept about 25°C throughout the year by one of us (Fujio Yasuda). After more than two years, the fish grew to 128 mm in total length, and underwent marked color-pattern change (Fig. 2 and Table 1). The color pattern of this single specimen was recorded time and again by color-film.

The initial phase (Fig. 4) had been maintained with little change for about a year, in color pattern.

The color-slides of the specimen on 8th September 1968 (Fig. 5) (about one and a half years after capture) show the color pattern intermediate between the initial pattern and that of adult *H. sexstriatus*. The specimen on 18th February 1969 (Fig. 6) (about two years after capture) was unmistakably identical with the subadult coloration of *H. sexstriatus* recorded by Fowler and Bean (1929: 178).

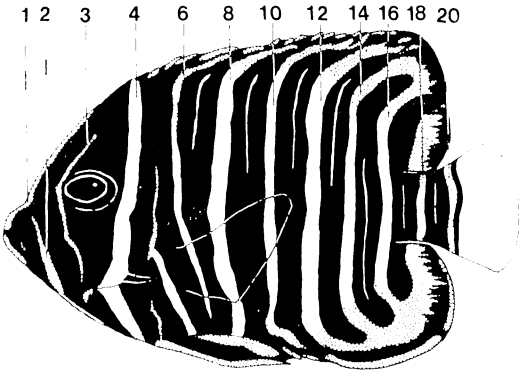

Fig. 2. Color pattern of the young of *Holacanthus sexstriatus*, with the numbering of the bands. Black areas, black to chocolate brown; dotted areas, blue; white areas, white.

Discussion

The juvenile color pattern of this species, now clarified for the first time, agrees quite well with the figure and description by Weber and de Beaufort (1936: 139, fig. 35) under the name of *Pomacanthus chrysurus*. In addition, among the published figures and descriptions of juvenile pomacanthines under various names, some of them probably belong to the present species (see synonymy). The photos of the holotype of *H. chrysurus* (MNHM Paris, A. 605), however, indicate that Weber and de Beaufort's specimen is not *H. chrysurus*, differing in distribution and shape of vertical bands, and in the shape of the dorsal fin. Fowler (1946: 136) recorded *Pomacanthus chrysurus* from Aguni I., Ryukyu Is.; his note is very brief "One, 47 mm. Agrees with my figure of *Holacanthus nicobariensis*.", and footnote "Not of Schneider, in Fowler and Bean, Bull. U. S. Nat. Mus., no. 100, vol. 8, 1929, p. 186, fig. 9 (upper right figure)". Curiously enough, only the upper left figure of fig. 9 was referred by Fowler

Table 1. Color-pattern change of a specimen of *Holacanthus sexstriatus*.

Post-capture time	40 days (18: II: 67)	18 months (8: IX: 68)	30 months (VIII: 69)
Ground color of side of body	brownish black	pale brown	white with brownish tint
Ground color of head	brownish black	brownish black	brownish black
Ground color of posterior halves of dorsal and anal fins	brownish black	brown, with olive--green tint	olive-green
Markings on posterior halves of dorsal and anal fins	blue bands continuous with each other and with vertical body bands	blue margin and rhomboid blue markings	blue margin and blue spots
Markings on each scale	none	dark	dark blue
Pectoral fin	transparent	blue	blue
Caudal fin posterior to band 20	transparent	blue margin and irregular blue markings	blue margin and blue markings
Vertical bands			
1.	blue	blue	blue
2.	blue	blue	blue
3.	blue	blue; dorsal to eye absent	two blue spots
4.	white	white	white; absent below preopercle
5.	white	blue and extending dorsad	absent
6.	white; blue on dorsal fin	white; faintly blue on dorsal fin	faint black bar
7.	absent	indistinct white bar	absent
8.	white; blue on dorsal and anal fins	white; none on dorsal	
9.	absent	indistinct white bar	absent
10.	white; blue on dorsal and anal fins	mostly black; narrow and blue on dorsal	black
11.	absent	very indistinct	absent
12.	white, blue on dorsal and anal fins	half white and other half changed black	black
13.	absent	faint bluish white bar	absent
14.	white; blue on dorsal and anal fins	beginning to become black	black
15.	absent	faint bluish white bar	white
16.	white; blue on dorsal and anal fins	white	black
17.	absent	blue bar	series of blue spots
18.	white	white	blue
19.	absent	blue bar	two blue spots
20.	white	bluish white	two blue spots

For the numbering of the vertical bands see Fig. 2.

and Bean to *H. nicobariensis* (=*H. imperator*), and the upper right one to *H. semicirculatus*, both identifications we assume to be correct. In any case, Fowler's specimen from Ryukyu Is. is neither true *H. chrysurus* nor the young of *H. sexstriatus*.

The juvenile of this species is also similar to those of *H. semicirculatus* and *H. striatus*. Full analysis and comparison of young pomacanthines, with white or blue vertical bands, will be present in the forthcoming paper.

Holacanthus septentrionalis
Temminck and Schlegel
(Japanese name: kinchaku-dai)
(Figs. 7 to 10)

Holacanthus septentrionalis Temminck and Schlegel, 1844: 82 (Nagasaki; Leiden Mus.): Ishikawa and Matsuura, 1897: 52; Weber and de Beaufort, 1936:127 (Java); Okada and Matsubara, 1938:274 (Japan, China); Uchida and Yabe, 1939:11 (Quelpart I.); Katayama, 1940:15 (Toyama Bay; listed); Boeseman, 1947:83 (note on type); Kamohara, 1950:186 (Japan, China, East Indies); Kuroda, 1951:376 (Suruga Bay); Mori, 1952:116 (Tongyong, Fusan, Quelpart I.; listed).

Holacanthus ronin Jordan and Fowler, 1902: 546 (Misaki, Kanagawa Pref. and Wakanoura, Wakayama Pref.; U. S. Nat. Mus.).

Holacanthus albofasciatus Tanaka, 1909:16 (Nagasaki, Japan; type probably missing). New synonymy.

Chaetodontoplus septentrionalis, Weber and de Beaufort, 1936:127; Matsubara, 1955: 935 (key); Mori, 1956:18 (San-in; listed); Fujita and Mito, 1960:227 (egg and hatched larva); Honma, 1962:131 (Awashima, Niigata Pref.; desc. of young); 1963:22 (Sado, Niigata Pref.; listed); Araga and Tanase, 1966:89 (Wakayama; listed); Yasuda, 1967: 79 (Koajiro, near Misaki; desc. of young); Lindberg and Krasjukowa, 1969:346, fig. 351 (copied).

Holacanthus (*Chaetodontoplus*) *septentrionalis*, Kamohara, 1958:43 (Kochi Pref.: listed); 1964:56 (Kochi Pref.: listed).

Pomacanthus albofasciatus, Matsubara, 1955: 935 (key). New synonymy.

For other synonymy, see Weber and de Bearfort (1936:127; species name *chrysocephalus* exclusive).

Change of color pattern with growth has already been reported in this species (Yasuda, 1967); the life colors of two juveniles, about 20 mm in total length; caught alive by dip net in water depth of about 5m; near mouth of Koajiro Bay, Kanagawa Pref., (35°10′N, 139°37′E); October 1965, are briefly repeated.

Initial phase (Fig. 7). Ground color chocolate brown. A median yellowish band from snout to occiput. Another yellowish band running from origin of dorsal, broadened near pectoral base, and reaching pelvic base. Margins of the soft rays of dorsal and anal narrowly yellowish. Caudal yellow with transparent distal margin. Pectoral yellowish on base.

Intermediate phase (Figs. 8 and 9). After four months of rearing: three narrow longitudinal blue bands behind vertical yellow band appearing. After six months: longitudinal bands increasing to six, and in addition a few blue vermiculate markings on head and blue spots along dorsal base (similar to original description of *H. albofasciatus* in coloration).

Final phase (Fig. 10). After eight months: ground color orange brown. Yellow bands absent and markings similar to adults of *H. septentrionalis*.

Discussion

Holacanthus albofasciatus Tanaka (1909) was described on the basis of a subadult specimen (54 mm in standard length). He noted: "the species is very closely allied to *Holacanthus septentrionalis* Schlegel and *Holacanthus ronin* Jordan & Fowler, but differs from both in showing a less number of longitudinal bands and in having a white band behind eye as well as on the upper median part of head." Since he dealt with a specimen preserved in formalin, it is no wonder that

he took yellow bands in the living condition as white. Unfortunately the holotype is absent now in Section: Zoology, University Museum, The University of Tokyo, it was destroyed probably by the Great Earthquake of 1923. *H. albofasciatus* was overlooked by Fraser-Brunner (1933), in the most recent world-wide revision of the Pomacanthinae. Matsubara (1955:935) placed it tentatively in the genus *Pomacanthus* (sensu Fraser--Brunner). Honma (1962) reported a young specimen (53 mm in standard length) approximating to the original description of Tanaka under the name *Chaetodontoplus septentrionalis*. It is now evident that *H. albofasciatus* represents a transition phase of the color-pattern change of this species (Fig. 9 and Yasuda, 1967: pl. 5, fig. 4). To our regret, the sizes of fish in Figs. 7 to 10 were not recorded, but our specimens passed through the *albofasciatus*-stage (i.e., disappearance of yellow bands) at a much smaller size than did those of Tanaka and Honma, maybe owing to the individual variation and/or the effect of captivity.

Fraser-Brunner (1933:554) suggested that *H. chrysocephalus* Bleeker is a variety of the present species, and Weber and de Beaufort (1936:127) actually treated it so. Admitting these two forms may be closely allied, we have no positive or negative data for this. It may be sound to treat these two forms as distinct species, until they are clearly shown to be allopatric subspecies.

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(Fisheries Department, Faculty of Agriculture, and Zoological Institute, Faculty of Science, The University of Tokyo, Bunkyo-ku, Tokyo, Japan)

キンチャクダイ亜科の新種，スミレヤッコ，およびロクセンヤッコ・キンチャクダイの幼魚について

安田富士郎・富永義昭

伊豆大島産の標本に基づいて，キンチャクダイ類の新種スミレヤッコ (*Holacanthus venustus*) を記載した．この種類は，生時は黄色と青紫色の特有の斑紋（フォルマリン標本では黄色部は明色に青紫色部は暗色になる）を有することなどにより，他種と容易に区別される．

同一個体を水槽内で継続飼育した結果，ロクセンヤッコ (*H. sexstriatus*) の幼魚の斑紋は，ミノヤッコ (*H. chrysurus*)，サザナミヤッコ (*H. semicirculatus*) および *H. striatus* の幼魚のそれに類似するが，それ等と区別できることが判明した．同様な継続飼育の結果，ハクセンキンチャク (*H. albofasciatus*) はキンチャクダイ (*H. septentrionalis*) の幼魚から成魚に至る過渡期的時期の斑紋のものであることが判明した．

（東京都文京区　東京大学農学部水産学科および理学部動物学教室）

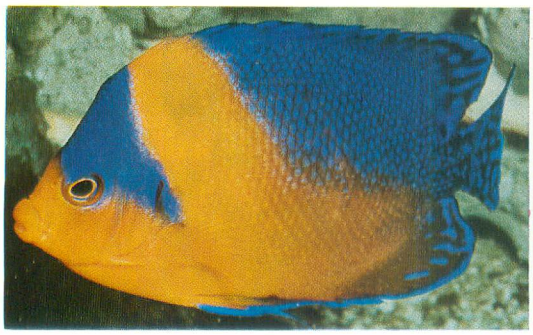

Fig. 3.

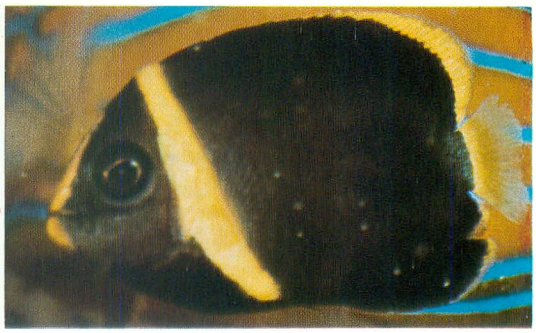

Fig. 7.

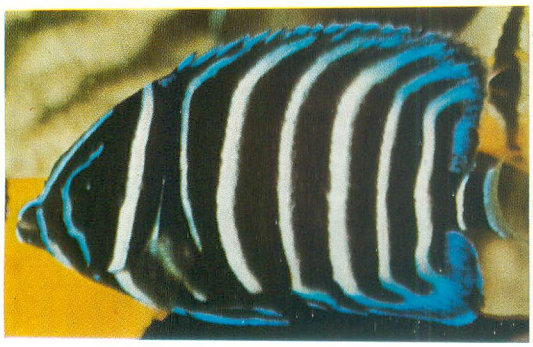

Fig. 4.

Fig. 8.

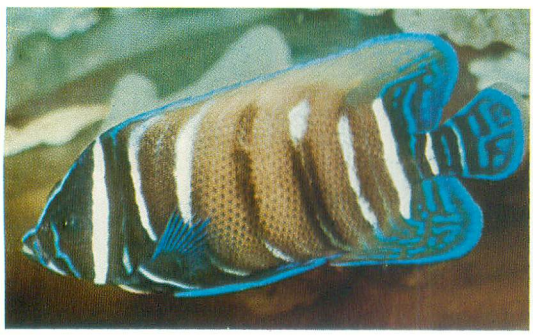

Fig. 5.

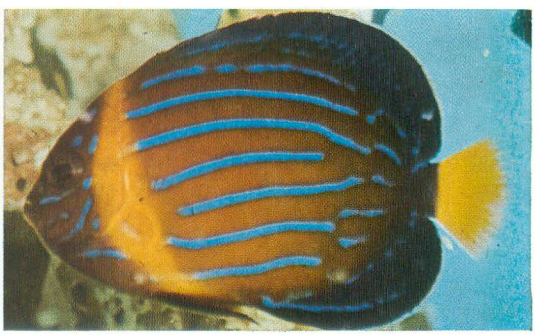

Fig. 9.

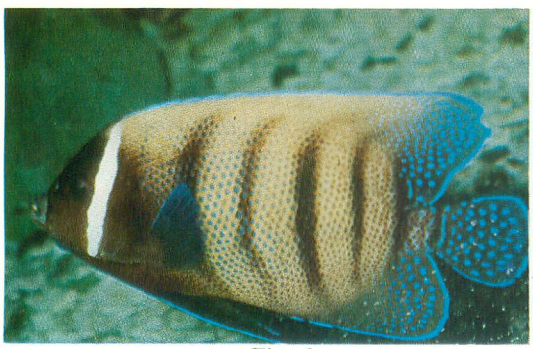

Fig. 6.

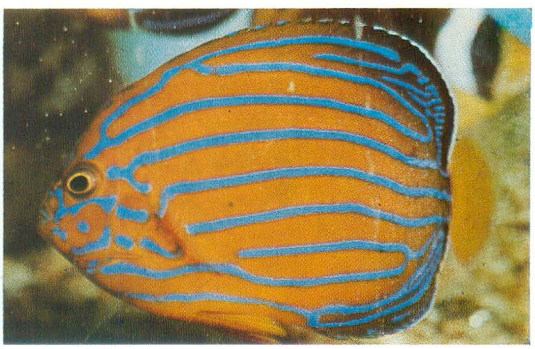

Fig. 10.

Fig. 3. *Holacanthus venustus*, sp. nov. Photographed in the aquaria just after collected.

Figs. 4–6. *Holacanthus sexstriatus* Cuvier (same specimen). Fig. 4, photograph 40 days after caught (on 18th Feb. 1967); fig. 5, after 18 months; fig. 6, after 30 months.

Figs. 7–10. *Holacanthus septentrionalis* Temminck and Schlegel. Fig. 7, photograph just after caught (in Oct. 1965); fig. 8, after 4 months; fig. 9, after 6 months; fig. 10, after 8 months.