

Four apogonid fishes from Ishigaki and Iriomote Islands, Okinawa, Japan

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(With 4 text-figures and 1 table)

沖縄県石垣島・西表島で採集されたテンジクダイ科魚類
4種について

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日本産テンジクダイ科魚類の分布と生態を明らかにする目的で行っている調査資料の中で、沖縄県石垣島・西表島周辺海域で採集した同科の4種は *Apogon melas* BLEEKER, *Archamia zosterophora* (BLEEKER), *Sphaeramia nematoptera* (BLEEKER) および *S. orbicularis* (KUHL and VAN HASSELT in CUVIER and VALENCIENNES) と同定され、いずれも日本初記録である。これら4種はインド洋・太平洋に広く分布することが知られているが、地理的に西表島に近い台湾周辺海域からは *S. nematoptera* をのぞいて未だ報告がない。

AOYAGI (1941a, b) はパラオ諸島で採集した *A. melas* にモンツキイシモチ, *S. nematoptera* にマンジュウイシモチ, *S. orbicularis* にホソスジマンジュウイシモチという和名をそれぞれ新称としてあたえた。日本における記録はないまま従来これらの和名が使用されてきているので、本報告でも名称の混乱をさけるために同和名を使用した。*A. zosterophora* についてはクロオビアトヒキテンジクダイの新和名をあたえた。

In addition to those reported in the paper of HAYASHI (in press), four additional species of apogonid fishes, *Apogon melas* BLEEKER, *Archamia zosterophora* (BLEEKER), *Sphaeramia nematoptera* (BLEEKER), and *S. orbicularis* (KUHL and VAN HASSELT in CUVIER and VALENCIENNES), were collected in Japan. These species, which are well known from the Philippine Islands and the Palau Islands, were caught at Ishigaki and Iriomote Islands in Okinawa, so we describe them here as new to Japan. These species are not very common at either of the two islands. Three of the species, with the exception of *S. nematoptera* have not yet been reported from Taiwan, within easy reach of Iriomote Island.

A. melas, *S. nematoptera*, and *S. orbicularis*, which were collected in the Palau Islands, have already been given Japanese names by AOYAGI (1941a, b). We have used the same Japanese names for these three species to avoid the confusion.

Most field surveys were made by snorkeling and diving for observation and

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Manuscript received Aug. 8, 1980. Contribution from the Yokosuka City Museum, No. 291.

catching the fish. In this report, some descriptions of these materials and brief comments are made.

1. *Apogon melas* BLEEKER, 1848

Japanese name: Montsuki-ishimochi

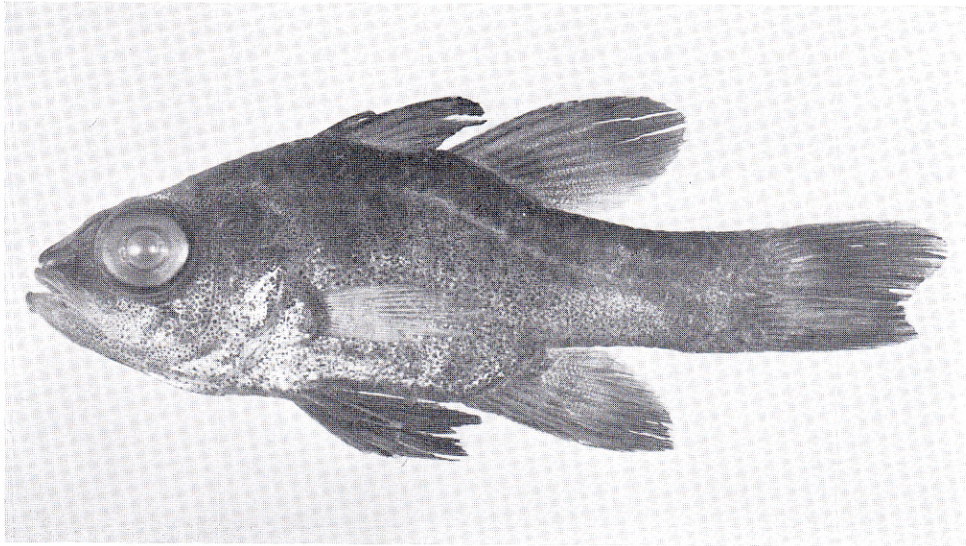


Fig. 1. *Apogon melas* BLEEKER, YCM-P6694, SL. 65.2 mm.

Apogon melas BLEEKER, 1848: 635 (original description; type-locality: Sumbawa I.); BLEEKER, 1849: 29 (description; Sumbawa I.); BLEEKER, 1856: 27 (description; Moluccas Is.); GÜNTHER, 1859: 243 (description; Celebes I., Sumbawa I., etc.); de BEAUFORT, 1913: 115 (description; Philippines); WEBER and de BEAUFORT, 1929: 309 (description; Bali I., Batu Is., etc.); HERRE, 1936: 131 (description; Tenibuli I., Solomon Is., etc.); AOYAGI, 1941a: 57 (listed; Palau Is.); MARSHALL, 1950: (description; Cocos Is.); FRASER, 1972: 18 (listed; Philippines).

Amia melas; BLEEKER, 1873-1876: 94, pl. 348, fig. 1 (description; Singapore, Celebes I., etc.); BLEEKER, 1874: 52 (description; Batu I., Nias I., etc.); FOWLER, 1918: 17 (description; Philippines); FOWLER and BEAN, 1930: 88 (description; Cebu I., Negros I., etc.).

Materials. YCM-P (Yokosuka City Museum) 6694, two specimens, 51.1 and 65.2 mm SL., May 5, 1979, from Kabira Bay, Ishigaki I., Okinawa Pref.: IORD (Institute of Oceanic Research and Development, Tokai University) 76-1158, 76-1159, two specimens, 43.3 and 57.2 mm SL., Oct. 26, 1976; IORD 77-44, one specimen, 84.0 mm SL., Feb. 2, 1977; IORD 78-145, one specimen, by Ikuo MURATA, 80.6 mm SL., Aug. 12, 1978, from Amitori Bay, Iriomote I., Okinawa Pref.

Description. D. VII-I, 9; A. II. 8; P. 14 or 15; branched caudal rays 9+8; vertebrae including urostyle 10+14; gill rakers on first arch 5+1+14 (this count was made on only one specimen of the IORD 78-145 sample.); lateral line scales 27; scales above and below lateral line 2/6; predorsal scales 2.

Table 1. Comparison of characters and measurements of *Apogon melas*, *Archamia zosterophora*, *Sphaeramia nematoptera* and *S. orbicularis* collected in Japan.

Species	<i>melas</i>			<i>zosterophora</i>			<i>nematoptera</i>			<i>orbicularis</i>		
	Ishigaki I.	Iriomote I.	Iriomote I.	Iriomote I.	Iriomote I.	Iriomote I.	Iriomote I.	Iriomote I.	Iriomote I.	Iriomote I.	Iriomote I.	Iriomote I.
Locality	2	4	4	4	2	2	2	2	2	2	1	1
Numbers of specimen	51.1-65.2	43.3-84.0	43.3-84.0	43.3-84.0	51.1-65.2	51.1-65.2	51.1-65.2	51.1-65.2	51.1-65.2	51.1-65.2	25.8	25.8
Range of standard length (mm)	VII-I, 9	VII-I, 9	VII-I, 9	VII-I, 9	VI-I, 9	VI-I, 9	VI-I, 9	VI-I, 9	VI-I, 9	VI-I, 9	VI-I, 9	VI-I, 9
Dorsal fin	II, 8	II, 8	II, 8	II, 8	II, 16(17)	II, 9	II, 9	II, 9	II, 9	II, 9	II, 8	II, 8
Anal fin	1+13+(1)	1+12+1	1+12+1	1+12+1	1+12+1	1+12+1	1+12+1	1+12+1	1+12+1	1+12+1	1+10+1	1+10+1
Pectoral fin (left side)	9+8	9+8	9+8	9+8	9+8	9+8	9+8	9+8	9+8	9+8	9+8	9+8
Branched caudal fin rays	27	27	27	27	(26)27	(26)27	(26)27	(26)27	(26)27	(26)27	23	23
Lateral line scales	2/6	2/6	2/6	2/6	2/6	2/6	2/6	2/6	2/6	2/6	2/7	2/7
Scales above and below lateral line	2	2	2	2	5	8	8	8	8	8	7	7
Predorsal scales	2(3)+1+14	5+1+14	5+1+14	5+1+14	6+1+15	7+1+26	7+1+26	7+1+26	7+1+26	7+1+26	6+1+18	6+1+18
Gill rakers (first arch)	10+14	10+14	10+14	10+14	10+14	10+14	10+14	10+14	10+14	10+14	10+14	10+14
Vertebrae (urostyler vertebra as one)	3	3	3	3	3	3	3	3	3	3	3	3
Predorsal bone												
Body depth	37.2*±1.75**	40.3±0.34	40.3±0.34	40.3±0.34	35.6±1.09	55.4±0.78	55.4±0.78	55.4±0.78	55.4±0.78	55.4±0.78	46.5	46.5
Head length	39.6 ±1.55	40.0±0.43	40.0±0.43	40.0±0.43	40.3±0.68	43.3±1.35	43.3±1.35	43.3±1.35	43.3±1.35	43.3±1.35	39.1	39.1
Snout length	10.8 ±0.90	11.6±0.83	11.6±0.83	11.6±0.83	9.6±0.22	10.4±0.20	10.4±0.20	10.4±0.20	10.4±0.20	10.4±0.20	12.4	12.4
Eye diameter	14.1 ±0.60	13.5±0.68	13.5±0.68	13.5±0.68	13.0±1.41	16.1±0.25	16.1±0.25	16.1±0.25	16.1±0.25	16.1±0.25	14.7	14.7
Interorbital width	10.5 ±1.00	12.1±1.38	12.1±1.38	12.1±1.38	10.7±0.51	12.2±0.50	12.2±0.50	12.2±0.50	12.2±0.50	12.2±0.50	14.3	14.3
Upper jaw length	17.1 ±0.35	18.0±0.73	18.0±0.73	18.0±0.73	19.4±1.26	17.3±0.10	17.3±0.10	17.3±0.10	17.3±0.10	17.3±0.10	18.9	18.9
Caudal peduncle depth (least)	16.1 ±0.55	17.3±1.50	17.3±1.50	17.3±1.50	14.5±0.31	18.7±0.50	18.7±0.50	18.7±0.50	18.7±0.50	18.7±0.50	18.9	18.9
Snout to origin of dorsal fin base	42.3 ±0.60	43.6±0.78	43.6±0.78	43.6±0.78	42.0±0.73	50.0±0.00	50.0±0.00	50.0±0.00	50.0±0.00	50.0±0.00	47.7	47.7
Snout to origin of anal fin base	63.2 ±2.25	63.8±1.32	63.8±1.32	63.8±1.32	56.5±0.73	69.1±0.25	69.1±0.25	69.1±0.25	69.1±0.25	69.1±0.25	68.2	68.2
Snout to pectoral insertion	40.5 ±2.45	40.2±0.89	40.2±0.89	40.2±0.89	38.3±1.07	40.7±0.55	40.7±0.55	40.7±0.55	40.7±0.55	40.7±0.55	41.9	41.9
Snout to pelvic insertion	41.3 ±1.60	40.5±0.57	40.5±0.57	40.5±0.57	38.4±0.64	43.6±0.55	43.6±0.55	43.6±0.55	43.6±0.55	43.6±0.55	45.3	45.3
First dorsal spine (longest)	22.2 ±2.85	22.1±0.36	22.1±0.36	22.1±0.36	13.5±0.79	34.4±0.07	34.4±0.07	34.4±0.07	34.4±0.07	34.4±0.07	32.6	32.6
Length of dorsal fin base	32.3 ±1.20	35.4±0.99	35.4±0.99	35.4±0.99	32.5±0.61	39.6±0.25	39.6±0.25	39.6±0.25	39.6±0.25	39.6±0.25	35.3	35.3
Length of pelvic spine	16.9 ±1.55	17.2±0.55	17.2±0.55	17.2±0.55	13.4±0.72	24.8±0.42	24.8±0.42	24.8±0.42	24.8±0.42	24.8±0.42	22.9	22.9
Length of anal fin base	13.5 ±0.25	15.6±1.36	15.6±1.36	15.6±1.36	30.2±0.69	19.6±0.30	19.6±0.30	19.6±0.30	19.6±0.30	19.6±0.30	16.7	16.7
Length of anal spine (longest)	18.9 ±1.90	18.9±0.68	18.9±0.68	18.9±0.68	14.2±0.97	25.6±1.00	25.6±1.00	25.6±1.00	25.6±1.00	25.6±1.00	20.2	20.2

* Measurements expressed in hundredths of standard length based on examined specimens. ** Standard deviation.

Meristic characters and measurements expressed in hundredths of standard length are listed in Table 1.

Head and body rather compressed; mouth oblique, maxillary reaching to below middle of eye; posterior margin of preopercle minutely serrated; two vertical rows of scales on preopercle; villiform teeth bands in jaws, on vomer and palatines; first dorsal spine minute, first and second spine shorter, third one much longer and stronger than the others; caudal lobes rounded and feebly forked; lateral line complete.

Color in life: Body dark brown in the daytime, but more blackish at night; head very dark brown, with silvery reflection on the side of opercle; a dark brown streak from eye diagonally backward to lower angle of preopercle, of a faded color in young specimens; all fins dusky to blackish except pectorals; a large black ocellus of the same length as pupil, on the basal portion of first dorsal and anal; this black ocellus seen distinctly in daylight but not clearly at night.

Color in alcohol: Ground color almost the same as when alive; opercles and breast with beautiful silvery reflection; eye fringed with blackish color; a narrow dark brown streak below the eye remains; under side of head and body with minute melanophores.

Behavior. Two specimens were collected from Ishigaki I. They were found at twilight and lived solitarily in dead coral hollows about two meters deep. This species is not found in the day time. The swimming action is slow. Details of behavior are unknown.

Note. *Apogon hypselonotus*, which was described by BLEEKER in 1855, has been regarded as a synonym of *A. melas*, or sometimes of *Apogon doryssa* by JORDAN and SEALE in 1906. We think that *Apogon nigricans* DAY, 1875 (type-locality: Madras Is.) is also a synonym of *A. melas*. But this time we could not examine these two type specimens, so *A. hypselonotus* and *A. nigricans* are not included in the synonym list in this paper.

2. *Archamia zosterophora* (BLEEKER), 1856

New Japanese name: Kuroobi-atohiki-tenjikudai

Apogon zosterophorus BLEEKER, 1856: 36 (original description; type-locality: Celebes I.); GÜNTHER, 1859: 245 (listed; Celebes I.); MACLEAY, 1883: 235 (listed; New Guinea); WEBER and de BEAUFORT, 1929: 346 (description; Celebes I., Ternate I., etc.).

Archamia zosterophora; FOWLER, 1918: 63 (description; Philippines); FOWLER, 1928: 164 (description; Philippines etc.); FOWLER and BEAN, 1930: 117 (description; Mindanao I., Palawan I., etc.); HERRE, 1934: 42 (listed; Philippines); HERRE, 1936: 137 (description; Tenibuli I., Ysabel I., etc.); ROXAS and MARTIN, 1937: 108 (listed; Philippines); LACHNER, 1951: 585 (description; New Guinea, Philippines); FRASER, 1972: 25 (listed; Borneo I.); BURGESS and AXELROD, 1975: 1442 (color picture; New Guinea).

Amia zosterophora; BLEEKER, 1873-1876: 103, pl. 313, fig. 2 (description; Celebes I.).



Fig. 2. *Archamia zosterophora* (BLEEKER), IORD 76-1264, SL. 45.4 mm.

Materials. SMLVO (Subtropical Marine Laboratory, Tokai University, Iriomote) 76-310, 311, two specimens, 26.6 and 35.1 mm SL., Nov. 26, 1976; IORD 76-1264, 1265, 1266, three specimens, 31.0-45.4 mm SL., Nov. 26, 1976; IORD 78-85, 86, 87, 88, 89, 90, 91, seven specimens, 36.5-48.6 mm SL., Mar. 17, 1978, from Amitori Bay, Iriomote I., Okinawa Pref.

Description. D. VI-I, 9; A. II, 16(17); P. 14; branched caudal rays 9+8; vertebrae including urostyle 10+14; gill rakers on first arch 6+1+15 (this count was made on only one specimen of the seven specimens in the SMLVO78-85-91 samples); lateral line scales 26-27; scales above and below lateral line 2/6; predorsal scales 5.

Meristic characters and measurements are listed in Table 1.

Body slightly compressed, head gently; mouth strongly oblique; maxillary extending beneath the middle of eye, jaws equal; preoperculum ridge serrated; two rows of scales on opercle; villiform teeth in jaws, few on vomer and palatines; first dorsal not so high, about half the length of second dorsal, and very weak; anterior soft rays of second dorsal and anal longer and symmetrical; caudal slightly incised.

Color in life: Color photographs are present in BURGESS and AXELROD (1975: 1442). All fins except pectorals look more reddish, and broad dark brown band not so clear than in the photograph.

Color in alcohol: Ground color yellowish, with pearly reflection on the side of head and body; a small black spot on the central caudal base; a dark brown bar from snout to eye; a broad dark brown band, which consists of distinct dots and spots, running from base of second dorsal obliquely downwards to the middle

of anal base and behind pelvic region, as wide as the caudal height; two dark brown spotted bars run on posterior margin of opercle and preopercle ledge; these bars are colored light red in life; anterior margin of the first and second dorsal with brownish color, other fins all colorless.

Behavior. This species was collected with *Apogon leptacanthus* and the other species of the genus *Archamia*, and lives in coral limbs of *Pavona* sp. Usually this species was found in small or sometimes large groups consisting of adults and juveniles. This species rises to the surface from coral limbs at twilight time, and forms large schools.

Note. *A. zosterophora* was reported as a luminous apogonid fish by HANEDA in 1969. But the luminescence of this species was not seen by us in the field survey in the night.

3. *Sphaeramia nematoptera* (BLEEKER). 1856

Japanese name: Manju-ishimochi

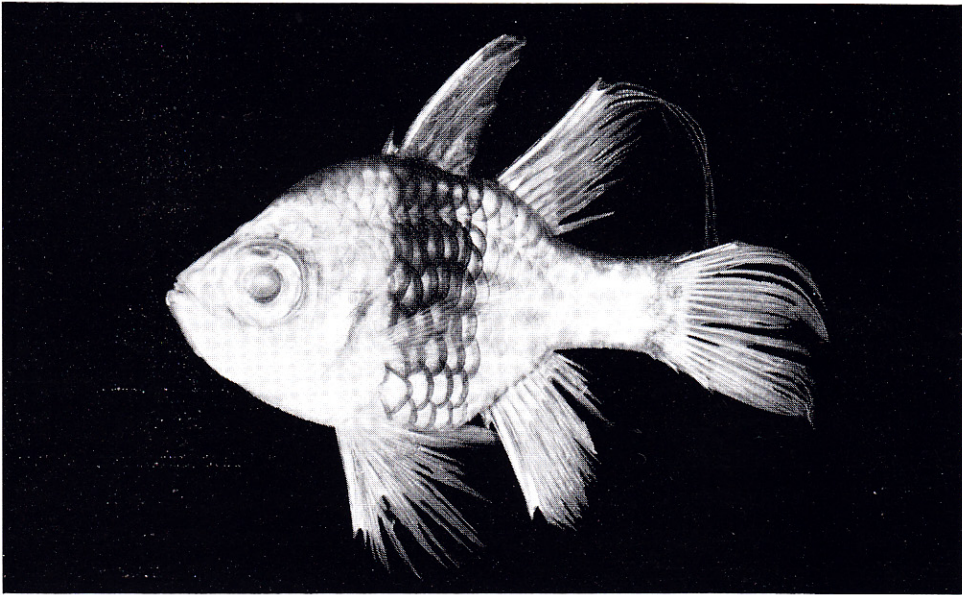


Fig. 3. *Sphaeramia nematoptera* (BLEEKER), IORD 77-17, SL. 55.8 mm.

Apogon nematoptera BLEEKER, 1856: 35 (original description; type-locality; Celebes I.).

Apogon nematopterus; GÜNTHER, 1859: 233 (description; Java Sea); MACLEAY, 1882: 236 (listed; New Guinea); WEBER and de BEAUFORT, 1929: 335 description; Celebes I.); AOYAGI, 1941a: 56 (description; Palau Is.); HIYAMA and YASUDA, 1971: 203 (color picture; Philippines); SHEN and LAM, 1977: 170 (description; Taiwan).

Amia nematopterus; BLEEKER, 1874: 18 (description; Celebes I.); BLEEKER, 1873-1876: 79 (description, Celebes I.).

Amia nematophora; BLEEKER, 1873-1876: pl. 313, fig. 1 (illustration; Celebes I.).

Amia nematoptera; FOWLER, 1928: 154 (description; New Guinea); FOWLER and BEAN, 1930: 29 (description; Palawan I., Samar I., etc.).

Sphaeramia nematoptera; FRASER, 1972: 26 (listed; Philippines); BURGESS and AXELROD, 1975: 1448 (color picture; New Guinea).

Materials. IORD 77-17, 18, two specimens, 52.2 and 55.8 mm SL., Feb. 12, 1977, from Amitori Bay, Iriomote I., Okinawa Pref.

Description. D. VI-I, 9; A. II, 9; P. 13; branched caudal rays 9+8; vertebrae including urostyle 10+14; gill rakers on first arch 7+1+26 (this count was made on only one specimen of the SMLVO77-18 sample.); lateral line scales 26~27; scales above and below lateral line 2/7; predorsal scales 8.

Meristic characters and measurements are listed in Table 1.

Body rather compressed, head steeply gradient; mouth oblique, reaching to below middle of eye; villiform teeth in jaws, very minute on vomer and palatines; preopercle ridge entire, edge denticulate; two rows of scales on cheek; second spine on first dorsal little enlarged, third spine very strongly enlarged; anterior rays of the second dorsal prolonged into long filaments; caudal rather deeply emarginate; lateral line complete.

Color in life: Color photographs are present in HIYAMA and YASUDA (1971: 203), and BURGESS and AXELROD (1975: 1448).

Color in alcohol: Ground color generally light brown, lower side of breast yellowish with silver reflection; lower margin of opercle dark brown; almost perpendicular dark band running from base of the first dorsal to before anal, breadth of this dark band equal to the first dorsal base; outer margin of scales inside this dark band more dusky; first dorsal and pelvic blackish, the other fins more or less dark brown; pectorals especially translucent; upper and lower border of caudal slightly dark; many round dark spots on posterior part of body and tail; the spots on caudal base about the size of pupil and indistinct.

Behavior. Generally the swimming action is very slow, but more lively at twilight time. This species often lives among the coral limbs of *Stylophora* sp. at a depth of two or three meters in the inner bay. This species was found in mixed small schools with *Apogon leptacanthus* and *Archamia zosterophora* in the Palau Is., but solitary in Iriomote I. Immature specimens of this species were collected among dead coral chips along the shore line in Iriomote I.

4. *Sphaeramia orbicularis* (KÜHL and VAN HASSELT in CUVIER and VALENCIENNES), 1828

Japanese name: Hososuji-manju-ishimochi

Apogon orbicularis KÜHL and VAN HASSELT in CUVIER and VALENCIENNES, 1828: 155 (original description; type-locality: Java I.); QUOY and GAIMARD, 1834: 648 (description; Philippines); BLEEKER, 1852: 254 (description; Moluccas Is.); BLEEKER, 1856: 28 (description; Moluccas Is.); DAY, 1870: 681 (description; Andaman Is.); GÜNTHER, 1873: 22 (description; Radack I.); DAY, 1875-1878: 65 (description; Andaman Is.); MAYER, 1885: 12 (description; India); DAY, 1889: 500 (description; Andaman Is.); WEBER, 1913: 221 (description; Biaru I.); de BEAUFORT, 1913: 115 (description; Waigiui I.); WEBER and de BEAUFORT, 1929: 333 (description; Sumatra I., Celebes I.,

etc.); HERRE, 1934: 40 (listed; Cebu I.); HERRE, 1936: 120 (description; Auki I., Malaita I., etc.); AOYAGI, 1941b: 151 (description; Palau Is.); SMITH, 1955: 690 (listed; Aldabra Is.); SMITH, 1961: 384 (description; Aldabra Is.).

Apogon nigromaculatus; GÜNTHER, 1859: 233 (description; Java Sea).

Amia orbicularis; BLEEKER, 1865: 284 (description; Moluccas Is.); BLEEKER, 1873-1876: 79, pl. 338, fig. 1 (description; Sumatra I.); BLEEKER, 1874: 19 (description; Sumatra I., Nias I., etc.); SEALE and BEAN, 1907: 242 (description; Mindanao I.); FOWLER, 1928: 154 (description; Ponape I.); FOWLER and BEAN, 1930: 31 (description; Luzon I., Cebu I., etc.).

Amia nigromaculata; BLEEKER, 1873-1876: 80 (description, New Guinea); BLEEKER, 1874: 20 (description; New Guinea).

Sphaeramia orbicularis; FRASER, 1972: 26 (listed; Borneo I.); BURGESS and AXELROD, 1975: 1448 (color picture; New Guinea).

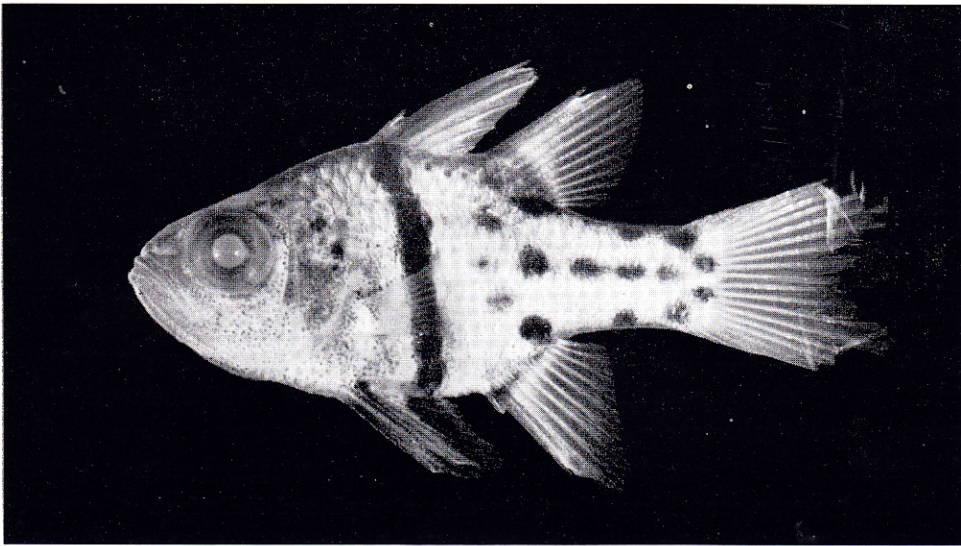


Fig. 4. *Sphaeramia orbicularis* (KUHLE and VAN HASSELT in CUVIER and VALENCIENNES), YCM-P6740, SL. 25.8 mm.

Materials. YCM-P6740, one specimen, 25.8 mm SL., Jul. 19, 1979, from Oohara, Iriomote I., Okinawa Pref., by Toshiyuki SUZUKI and Hiroshi SENO; YCM-P7425, seven specimens, 16.0-51.3 mm SL., Dec. 7, 1979, from Malakal I., Palau Is.

Description. D. VI-I, 9; A. II, 8; P. 12; branched caudal rays 9+8; vertebrae including urostyle 10+14; gill rakers on first arch 6+1+18 (this count was made on only one specimen of the seven specimens in the YCM-P7425 samples); lateral line scales 23; scales above and below lateral line 2/7; predorsal scales 7.

Meristic characters and measurements are listed in Table 1.

Body rather compressed, very deep; head steeply gradient; snout slightly contracted; mouth oblique, maxillary extends beneath the middle of eye; two vertical rows of scales on cheek; preoperculum ridge smooth; villiform teeth in

jaws, few or none on vomer and palatines; first dorsal spine minute, second longest, as long as tail; anterior soft rays of second dorsal and anal longer and symmetrical, but not filamentous; caudal feebly forked; lateral line complete.

Color in life: Color photographs are present in BURGESS and AXELROD (1975: 1448).

Color in alcohol: Ground color light brown, lower sides of head and breast with silvery reflection; head above and lower sides of opercles dusky; a blackish indistinct streak from eye diagonally backward to lower angle of preopercle; an oblique black band running from the origin of first dorsal to belly before anus, breadth of this dark band equal to pupil; black oval spots on lateral line at a short distance; caudal base with five or six similar size spots arranged in a semi-circle; head with many small indistinct black spots; fins all brownish, pelvic fins darker than the other fins; first dorsal sometimes with small black spots; a dusky basal line on second dorsal and anal fin.

Behavior. Swimming action is slow. Usually this species lives in hiding places among joints in a coral rock and roots of the mangrove in the daytime. At night, they were found in large schools near the shorelines, almost motionless. This species is abundant in the Palau Is. but few in Iriomote I. The sample of YCM-P6740 was collected from the mouth of a small river in Iriomote I. The chlorinity was 11.53‰.

Note. The young of *S. orbicularis* are similar to the young of *S. nematoptera*. It is easy to distinguish small specimens of the two species about ten mm in standard length, by using the breadth of the dark band running from the first dorsal base to belly and the numbers of black spots on the posterior part of body and tail.

Acknowledgements

We are deeply indebted to Mr. Toshiyuki SUZUKI of the Faculty of Fisheries, Nagasaki University and Mr. Hiroshi SENO of the Faculty of Fisheries, Kinki University for the gift of specimens. Publication of this paper is financially supported by the Department of Zoology, University Museum, University of Tokyo and the Department of Zoology, National Science Museum, Tokyo. To these institutions, we extend our thanks. We wish to express our thanks to Mr. Takashi ITO of the Yokosuka Health Center and Mr. Ikuo MURATA of the Faculty of Marine Science and Technology, Tokai University, for assistance in obtaining materials. This work was partly supported by a grant from the Ito Foundation for the Advancement of Ichthyology given to the senior author.

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