

Six apogonid fishes from Islands of Okinawa, southern Japan

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(With 12 text-figures and 8 tables)

沖縄諸島で採集された6種のテンジクダイ科魚類

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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、西表島を中心とする沖縄諸島の海域から採集した同科の6種を *Apogonichthys waikiki* JORDAN et EVERMANN (新称ハワイマトイシモチ), *Apogon hyalosoma* BLEEKER (新称カガミテンジクダイ), *A. parvulus* (SMITH et RADCLIFFE in RADCLIFFE, 新称ネオンテンジクダイ), *A. savayensis* GÜNTHER (新称ナミダテンジクダイ), *Archamia biguttata* LACHNER (新称フタホシアトヒキテンジクダイ), *A. dispilus* LACHNER (新称スミツキアトヒキテンジクダイ) と同定し、本報告で新和名をあたえた。これら6種のテンジクダイ科魚類は日本から初記録である。上述の6種はインド洋・太平洋海域に分布することが知られているが、*A. parvulus* は模式産地であるフィリピン諸島海域以外での記録はない。また地理的に西表島に近い台湾周辺海域からも、*A. waikiki*, *A. parvulus*, *A. hyalosoma* は未記録であった。

LACHNER が報告した *A. bandanensis* グループの見解に基づき、沖縄諸島海域で採集される同グループの資料を再検討した結果、*A. savayensis* は *A. bandanensis* や *A. nubilus* として誤同定されていることが明らかとなった。本報告では従来、和名のなかった *A. nubilus* にホソスジナミダテンジクダイの新称を与えた。本報告の *A. biguttata* と *A. dispilus* を含めると日本沿岸域に分布する *Archamia* 属は5種類となる。これら5種類の外観は互いに類似することからよく誤同定されてきた。体側模様、臀鰭軟条数、体表鱗の形状、鰓耙数などをこの5種類の *Archamia* 属について再検討した結果、種を類別するための有意差を認めることができた。

In addition to those reported in papers of HAYASHI and KISHIMOTO (1980) and HAYASHI (1980), six more species of apogonid fishes, *Apogonichthys waikiki* JORDAN et EVERMANN, *Apogon hyalosoma* BLEEKER, *A. parvulus* (SMITH et RADCLIFFE in RADCLIFFE), *A. savayensis* GÜNTHER, *Archamia biguttata* LACHNER and *A. dispilus* LACHNER, were collected from coastal waters of Japan. These species, which are well known from the Indo-Pacific region, were caught at some islands in Okinawa, then I describe them here as new to Japan. *A. waikiki*, *A. parvulus* and *A. hyalosoma* are not common at Iriomote Island. *A. hyalosoma* seems to be a very rare species. *A. dispilus* is common in Ishigaki and Iriomote Islands, but has been overlooked presumably because it was confused with *Archamia fucata* (CANTOR). *A. waikiki* is known only from the Hawaii an

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Islands up to the present. *A. savayensis* was much confused with other group of *Apogon bandanensis* (BLEEKER).

Most field surveys were made by snorkeling and SCUBA diving for observation and catching fish with a dip net. In this report descriptions of these materials and brief comments are given.

Methods and materials

Unless otherwise noted, color descriptions are from specimens preserved in alcohol; individual numbers and standard length (mm) are given in parentheses of materials; predorsal scales count (in each table) include a few hypodermic scales of the nape. Abbreviations for repositories of materials examined are: AMSI, Australian Museum, Sydney; ASAO, Association for Study of Aquatic Organisms, Tokyo University of Fisheries; BPBM, Bernice P. Bishop Museum, Honolulu, Hawaii; FSKU, School of Fishery Science, Kitasato University; IORD, Iriomote Marine Research Station, Tokai University; NSMT, National Science Museum, Tokyo; SMBL, Seto Marine Biological Laboratory of Kyoto University; SMLVO, Subtropical Marine Laboratory, Tokai University, Iriomote; URM, Department of Marine Sciences, University of Ryukyus; YCM, Yokosuka City Museum; ZUMT, Department of Zoology, University Museum, University of Tokyo.

1. *Apogonichthys waikiki* JORDAN and EVERMANN, 1904 New Japanese name: Hawaii-matoishimochi

Apogonichthys waikiki JORDAN and EVERMANN, 1904: 179 (orig. descr., type-loc.: Waikiki, Hawaii); SNYDER, 1904: 526 (descr.; between Maui and Lanai I.); JORDAN and EVERMAN, 1905: pl. 35 (fig. of type); FRASER, 1972: 9 (listed, materials examined; Hawaii Is.).

Mionorus waikiki: JORDAN and EVERMANN, 1905: 156, pl. 35 (descr.; Waikiki, Hawaii); GILBERT, 1905: 617 (listed; between Maui and Lanai I.); KENDALL and GOLDSBOROUGH, 1911: 279 (descr.; Arhno Atoll, Marshalls); FOWLER, 1928: 162 (descr.; Hawaii Is.); FOWLER, 1931: 328 (listed; Hawaii Is., Guam I.); FOWLER, 1938: 280 (listed; Honolulu and Waikiki, Hawaii, etc.).

Apogon waikiki: FOWLER, 1949: 81 (listed; possibly from Hawaii Is.); GOSLINE and BROCK, 1960: 163 (in key, descr.; Hawaii Is.); TINKER, 1978: 214 (descr.; Hawaii Is., Johnston I.).

Materials: ASAO 76047 (YCM-P10249) (1, 31.7) 18. III. 1976, ASAO 76068 (YCM-P10250) (1, 29.5) 18. III. 1976, Ishigaki I.; YCM-P9417 (1, 17.2) 5. VIII. 1981, IORD 76-352 (1, 25.6) 16. IV. 1976, Amitori Bay, Iriomote I., Okinawa Pref.; URM-P6578 (1, 27.8) 8. X. 1979, Kuchierabu I., Kagoshima Pref.; SMBL-F770114 (YCM-P10252) (1, 26.2) 14. I. 1977, Shirahama, Wakayama Pref.; BPBM 9285 (2, 34.1-36.7), BPBM 15392 (7, 29.4-38.9) 8. IV. 1967, BPBM 1598 (19, 18.3-42.9) 23. XII. 1952, BPBM 19656 (1, 36.4) Oah I., Hawaii Is.; NSMT-P3107 (1, 26.3), Palau Is. .

Diagnosis: Characterised by stout short body, all fins rounded except first

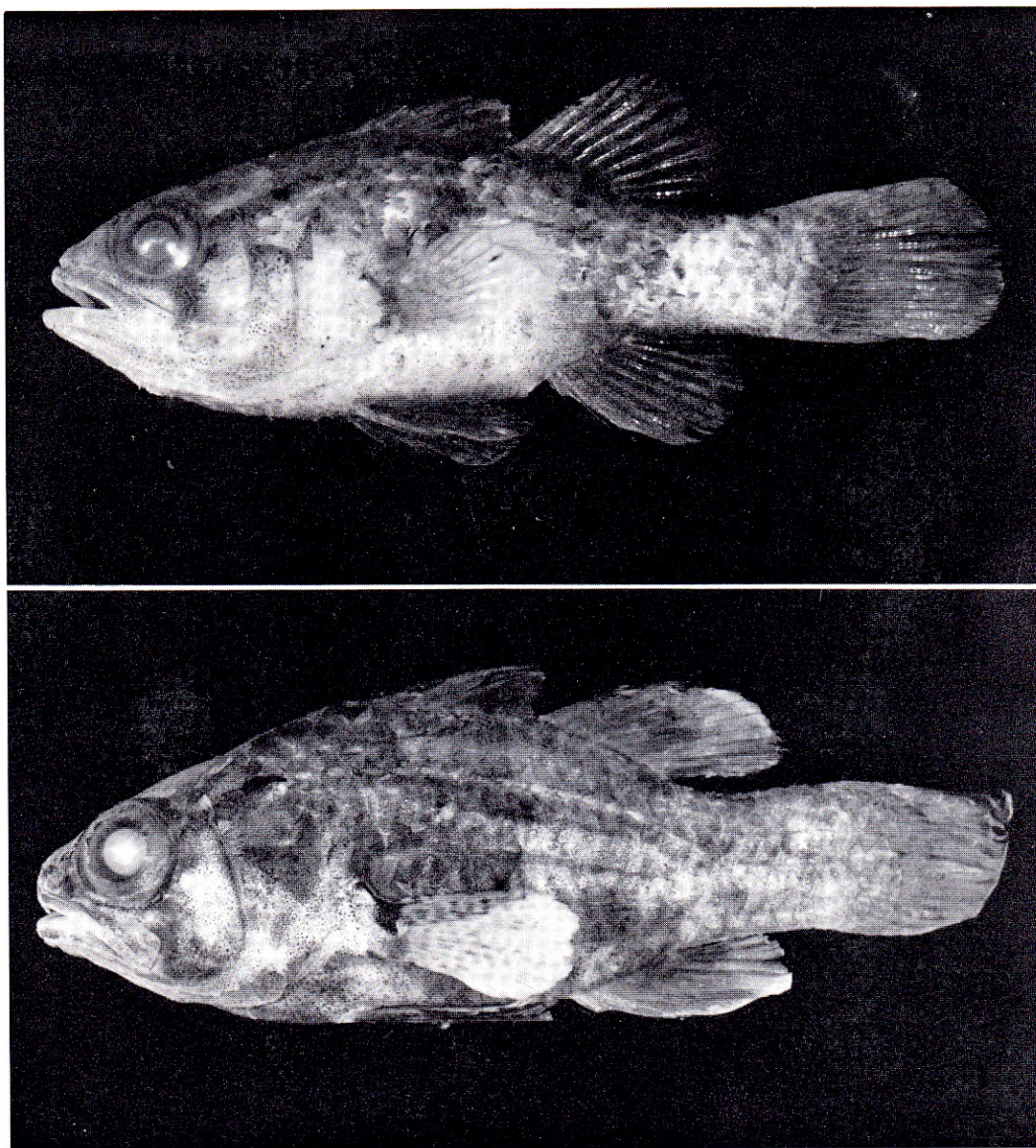


Fig. 1. *Apogonichthys waikiki* JORDAN and EVERMANN, YCM-P10249 (ASAO 76047), S.L. 31.7 mm.

Fig. 2. *Apogonichthys waikiki* JORDAN and EVERMANN, BPBM 15392, S.L. 31.9mm.

dorsal fin, spines in first dorsal eight and first spine remarkably short, dark brown lines radiating from eye, and body rather brownish.

Description: Meristic and morphomeristic characters as shown in Table 1. Proportional characters are almost similar to those in the original description

of *Apogonichthys waikiki* given by JORDAN and EVERMAN (1904).

Body short, stout and slightly compressed; head rather large, predorsal curve moderate; mouth oblique, maxillary reaching below pupil; bands of small villiform teeth in jaws and teeth on vomer; no palatine teeth (unlike in JORDAN and EVERMANN, 1905); caudal peduncle deep; scales ctenoid; lateral line complete; opercle edge smooth, preopercle margins moderately serrated and angles rounded; first dorsal spine very short, third longest; eighth dorsal spine reduced and covered by skin; posterior part of first dorsal fin remarkably contiguous to second dorsal fin base; all fins rounded, no incision on caudal fin; longest pelvic fin rays not reaching anal fin, pectoral fins reaching vertical of pelvic fins.

Color: *In life.* (This description originates in YCM-P9417 specimen) Head, body and fins generally reddish brown, with pepper-and-salt pattern, first dorsal and pelvic fins more reddish, also another fin base; pectoral fins pale, with brownish crossbars; all fins edged translucent; a few light-brown and very narrow lines running on body; four dark brown lines radiating from eye, first downward across cheek to tip of maxillary, second backward across cheek toward base of pectoral fin, third backward to origin of lateral line, forth upward to parietal; eye margin with many brownish crossbands; eyes redish with six lines radiating from pupil, pupil black.

In alcohol. Ground color rather dark brownish; three more dusky brown band encircling body and caudal, first and second passing through base of spiny and soft dorsal fin, third over caudal peduncle; four dark brown lines radiating from eye; spinous dorsal fin blackish, especially on last spine; pectoral fins pale with brownish crossbars and fin base blackish brown; other fins very dark brown and faded; outer fin rays somewhat paler. The ground color of some specimens from Hawaii (BPBM 15392, 15198, etc.) is more dusky brown than Japanese specimens, and brownish crossbars on the pectoral fin are distinct.

Behavior: Details of behavior are uncertain. Most specimens were collected from the shallow rocky coral reef, three or four meters deep. A single specimen of YCM-P9417 was collected among the *Zostera* grass-bed by means of a seine. A single specimen of SMBL-F770114 (YCM-P10252) was found washed ashore by the cold wave.

Distribution: *A. waikiki* has been known only from Hawaii as yet. A re-identified specimen of NSMT-P3107 has been collected from the Palau Islands. This species is new to Japan.

Note: FOWLER (1928) noted in his description of *Mionorus waikiki* as follows: it differs from the original account and figure in that the last half of the spinous dorsal fin has a large black blotch, embracing nearly all that extent of the fin as an ocellus. I think that this description points out to *Apogonichthys ocellatus* (WEBER).

2. *Apogon hyalosoma* BLEEKER, 1852

New Japanese name: Kagami-tenjikudai

Apogon hyalosoma BLEEKER, 1852a: 63 (orig. descr., type-loc.: Sumatra, on *Apogon thermalis* BLEEKER, 1845: 526, not CUVIER and VALENCIENNES in 1829).

Refer to synonym lists of WEBER and BEAUFORT (1929) and FOWLER and BEAN (1930) since 1852 till 1930.

HERRE, 1936: 133 (descr.; Auki I., Tunnibuli I.); HERRE, 1939: 301 (listed; Palau Is.); FOWLER, 1959: 80 (listed; Oceania Region); MARSHALL, 1964: 138 (in key; Queensland, Australia); MUNRO, 1967: 249, pl. 29, fig. 424 (descr.; New Guinea); KAILOLA, 1975: 108 (listed; Manubada I., New Guinea).

Apogon thermalis: (not CUVIER and VALENCIENNES, 1829) DUNKER and MOHR, 1931: 58 (descr.; Admiralty Is., New Guinea).

Amia hyalosoma: DUNKER and MOHR, 1931: 58 (descr.; New Pomerania I.); HERRE, 1931: 6 (listed, Tenibuli I.); FOWLER, 1934: 407 (listed; New Hebrides); FOWLER, 1959: 197, fig. 86 (descr.; Fiji Is.).

Yarica hyalosoma: FOWLER, 1944: (descr.; New Hebrides).

Materials: SMLVO 79-24 (1, 60.8) 20. VIII. 1979, Ayanda River mouth, Amitori Bay, Iriomote I., Okinawa Pref.; AMSI 17478-020 (2, 65.8-75.5) 29. VI. 1973, Luganville, New Hebrides; ZUMT 40399 (1, 97.2) II. 1909, Manila, Philippines; ZUMT 41032 (1, 74.6) 12. III. 1910, Singapore.

Diagnosis: Characterised by rhombic form, deep body, fairly concave nape,

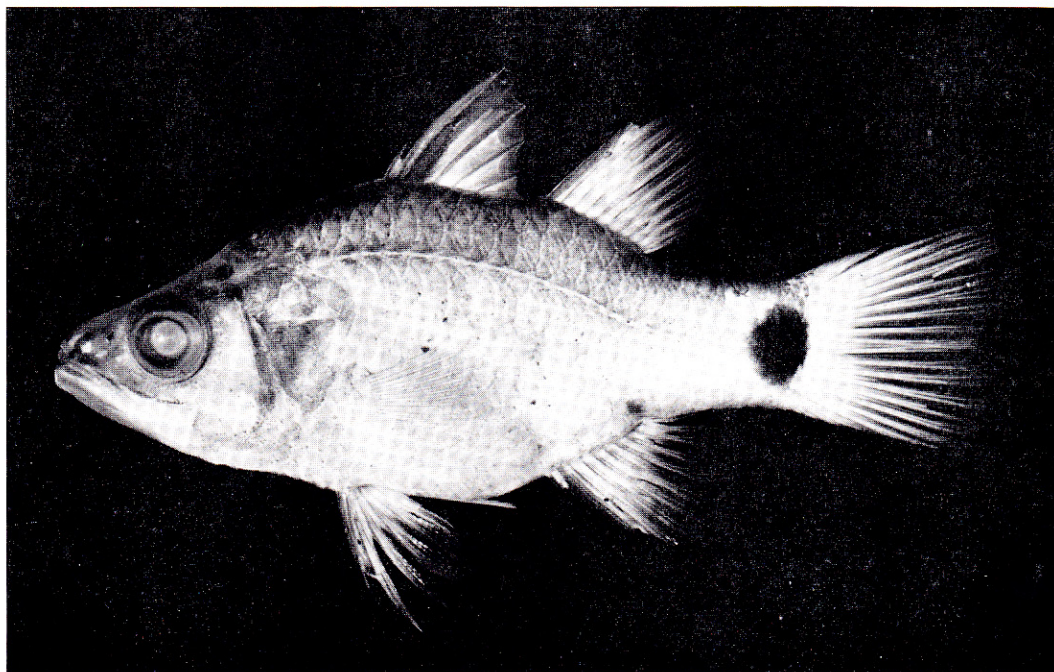


Fig. 3. *Apogon hyalosoma* BLEEKER, SMLVO 79-24, S.L. 60.8 mm.

a large black spot on caudal peduncle, large supramaxilla and glassy coloration.

Description: Meristic and morphomeric characters as shown in Table 1.

Head and body slightly compressed, trunk formed like rhomb; mid body depth high, equal to head length; nape strongly concave and smooth on external; snout impress juts out, length of it equals or exceeds eye diameter; mouth oblique, maxillary reaching almost below hindborder of eye, its posterior height like a pupil; fine teeth bands in jaws, on vomer and palatines; preopercle edge and ridge entire; lateral line scales well developed, tubes in lateral line large and well exposed; dorsal, ventral and anal spines strong, second and third spines of first dorsal fin much longer than others, first spine minute and equal to sixth one; least height of caudal peduncle somewhat longer than second dorsal or anal fin base; longest pectoral fin rays reach anterior part of anal fin base; caudal fin rounded and barely incised.

Color: *In life.* (This description originates in color picture taken by M. OSHIMA.) Body light brown, mid body yellowish with iridescent pearly luster and sides of head same; snout, nape and back side more dusky brown; around pectoral fin base look more flame-colored and translucent; maxillary whitish; pupil black and margin of it brilliant brown; a black spot at base of caudal fin on lateral line, like eye diameter; a small black blot at end of anal fin base; front border of first dorsal fin including filamentous part black; first and second spines of first dorsal fin and second dorsal spine reddish; other fins brownish, a dusky basal line on second dorsal and anal fin.

In alcohol. Ground color almost the same as when alive, pearly luster on head and body disappears.

Behavior: This specimen (SMLVO 79-24) was collected from the river mouth. Many other specimens have been found in brackish water, and sometimes in fresh water of downstream. *A. hyalosoma* seems to remove from its wide habitat by the tidal rhythm like *Apogon amboinensis*. Details of behavior are uncertain. The buccal incubation of this species was reported by FOWLER and BEAN (1930; p.8, fig. 3).

Distribution: *A. hyalosoma* is known mainly in Borneo, Sulu, Celebes, Java and Arafura Sea, but not in Formosa. PLAYFAIR reported this species from the fresh waters of Seychelles in 1866.

Note: In 1845, BLEEKER reported *Apogon thermalis* (not CUVIER and VALENSIENNES, 1829) from Diakarta. *Apogon hyalosoma* was recorded by BLEEKER (1852a) from Sumatra but no diagnosis was given. Later, BLEEKER (1874) reported *A. thermalis* as a synonym of *A. hyalosoma*. A unique difference between *A. thermalis* and *A. hyalosoma* is the presence or absence of a blackish blot on front border of the first dorsal fin. *A. hyalosoma* by BLEEKER (1873-76; pl. 34, fig. 1) has no such black blot, but *A. hyalosoma* by DAY (1878-88; p. 64-65, 1899; pl. 17, fig. 5) has a black blot, and looks like *thermalis* type. DUNKER

Table 1. Comparison of characters and measurements of *Apogonichthys waikiki*, *Apogon hyalosoma* and *A. parvurus* collected from islands of Okinawa.

Species	<i>waikiki</i>			<i>hyalosoma</i>			<i>parvurus</i>
	Ishigaki	Hawaii	Iriomote	Australia	Iriomote		
Numbers of specimen	2	4	1	2	5		
Dorsal fin	VIII-1,9	VIII-1,9(10)	VI-1,9	VI-1,9	VI-1,9		
Anal fin	II,8	II,8	II,8	II,8	II,8		
Pectoral fin (left side)	1+11+1	1+11(12)+1	1+12+1	1+12+1	1+11+1		
Branched caudal fin rays	8+7	8+7	9+8	8+7	8+7		
Lateral line scales	23-24	24(25)	24+2	25+3	3-5(+21-23)*****		
Predorsal scales	3-4	4	8	8	4		
Gill rakers (first arch)	(1)1+1+5(7)*	(1)1+1+5(5)	(2)1+1+6(6)	(3)1+1+6(5)	(1)7+1+17		
Vertebrae (urostyler vertebra as one)	10+14	10+14	10+14	10+(13),14	10+14		
Predorsal bone	3	3	3	3	2		
Range of standard length (mm)	29.5-31.7	31.9-40.6	60.8	65.8-75.5	28.6-31.8		
Body depth	36.8±0.85	39.0±1.64	42.1	39.2±1.45	28.0±0.68		
Head length	43.3±1.40	42.6±1.05	43.6	42.6±2.20	37.0±1.70		
Snout length	10.2±0.35	9.4±0.25	12.0	12.1±0.40	10.7±0.35		
Eye diameter	12.9±0.00	11.5±0.47	10.9	13.0±0.40	11.7±0.80		
Interorbital width	6.4±0.25	6.2±0.37	9.7	8.7±0.00	8.7±0.29		
Upper jaw length	20.8±0.25	19.6±0.30	21.7	22.7±1.00	16.0±0.46		
Caudal peduncle depth (least)	16.5±0.40	17.7±0.43	17.4	15.5±0.30	11.2±0.26		
Snout to origin of dorsal fin base	47.7±1.55	46.1±1.18	49.2	50.0±1.70	41.1±1.49		
Snout to end of dorsal fin base	78.0±2.00	77.5±1.47	79.1	77.3±0.60	72.6±0.30		
Snout to origin of anal fin base	68.5±0.70	66.4±1.28	67.6	68.7±0.90	60.5±0.87		
Snout to end of anal fin base	79.9±2.55	78.0±1.46	77.6	76.9±0.75	73.1±0.96		
Snout to pectoral insertion	44.5±0.35	43.7±0.47	42.3	43.7±1.25	38.0±2.52		
Snout to pelvic insertion	43.5±0.35	42.6±1.09	40.9	43.8±0.40	38.8±2.07		
Snout to anus	65.9±0.05	63.5±2.40	65.8	66.2±1.20	56.3±1.55		
Length of dorsal fin base	36.5±0.15	38.6±0.88	35.9	33.1±1.20	34.5±1.25		
Length of anal fin base	13.7±0.50	14.2±0.52	14.6	12.5±0.20	14.4±0.32		
Length of pectoral fin	29.3±0.05	28.9±1.44	25.5	25.9±0.25	23.8±0.48		
Length of pelvic fin	23.7±0.60	22.9±1.04	22.9	21.9±0.15	17.4±0.40		
Length of first dorsal spine (3rd)	17.8±0.15	17.9±1.40	20.4	21.2±0.70	17.7±0.79		
Length of anal spine (longest)	13.2±0.00	12.7±1.00	13.8	15.8±0.05	12.8±0.71		
Length of pelvic spine	14.7±0.10	14.3±0.53	13.9	15.9±1.60	11.8±0.63		

* Rudiments on upper and lower arch.

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

*** Standard deviation.

**** Incomplete lateral line scales.

and MOHE (1931) accepted this difference, and both species were arranged as synonymy. I examined some specimens of *A. hyalosoma* on this coloration, and found both types which seem belonging to the same species. However, I was unable to compare with both type specimens in this study, therefore the scientific name here followed BLEEKER (1852).

3. *Apogon parvulus* (SMITH and RADCLIFFE in RADCLIFFE, 1912)

New Japanese name: Neon-tenjikudai

Amia parvula SMITH and RADCLIFFE in RADCLIFFE, 1912: 432 (orig. descr., type-loc.: Tawi Tawi group, Philippine Is.); FOWLER and BEAN, 1930: 80 (descr. Philippine Is.).

Brephamia parvula: JORDAN and JORDAN, 1922: 43 (in key of subgenera).

Apogon parvulus: FRASER, 1972: 18 (listed, Philippine Is., Borneo).

Materials: IORD 77-402 (1, 27.5) 18. V. 1977, IORD 78-64 (1, 32.2) 17. III. 1978, YCM-P7566 (152, 16.4-29.7) 20. VIII. 1980, YCM-P7631 (4, 24.5-25.0) 17. VIII. 1980, YCM-P9389 (3, 28.7-33.3) 5. VIII. 1981, YCM-P9406 (6, 24.4-26.1) 6. VIII. 1981, YCM-P10184 (59, 23.2-31.8) 10. V. 1982, Amitori Bay, Iri-



Fig. 4. *Apogon parvulus* (SMITH and RADCLIFFE in RADCLIFFE), a; YCM-P10184-1, Male, 30.2 mm, b; YCM-P10184-2, Female, 31.6 mm.

omote I., Okinawa Pref. .

Diagnosis: Characterised by small fusiform body, eye rather big, tip of lower jaw projecting and chin black, a narrow dark brownish pigmental line on mid-body, dorsal and anal fin base black, a opalescent green line on body and a brilliant scarlet blotch at caudal fin base in life.

Description: Meristic and morphomeristic characters as shown in Table 1. Proportional characters are almost similar to those in the original description of *Amia parvula* in RADCLIFFE (1912).

Generally body small and spindle-shaped, like *Rhabdamia*, slightly compressed; head gently smooth and oblong; mouth faintly oblique and lower lip protruding, lower jaw nearly horizontal and projecting; maxillary extending beneath middle of pupil; preoperculum ridge strongly serrated, crest smooth; villiform teeth in jaws, no teeth on vomer and palatines; opercular flap undeveloped; a few rays of soft dorsal and soft anal fins a little longer; second dorsal spine longest, all fins spine very weak; caudal fin forked; caudal peduncle slender and compressed; scales ctenoid; lateral line incomplete, three or four well-developed pore scales present anteriorly, but six in original description.

Color: *In life.* Body glassy, translucent, with a narrow reddish brown median line; back scarcely reddish on reticulate patterns; operculum with pearly reflection; a black bar from snout to eye, keeping on a brown median line through eye; single opalescent green line running parallel to a brown median line, slightly below; a brilliant scarlet blotch on central caudal fin base, posterior faded; chin and snout tip black; top of head dusky; dorsal and anal fins slightly dusky, other fins translucent; a dark brown bar near fin base across second dorsal and anal fins; among first to fourth spines of first dorsal fin more blackish; dorsal and anal fin base dusky brown, lines continued on upper and lower edges of caudal peduncle.

In alcohol. Ground color generally light-brown, dorsal side scales edged with brown on laticulate patterns; median black line formed from snout to caudal, a brilliant scarlet blotch on caudal fin base completely disappear; fins pale, a dark-brown bar on basal portion of first dorsal and anal fins, both fins base brownish; first dorsal fin dusky brown; tip of snout and chin black, especially a large blackish part on underside of chin; a brown obliquely stripe from middle of maxillary.

Coloration of this species well agree with the original description in RADCLIFFE (1912).

Behavior: *Apogon parvulus* usually forms small schools, and lives from the surface to the bottom of the coral reef. This species was collected often in the inner bay at the depth from five to twenty meters. Sometimes they were found with large schools of the young *Rhabdamia glasilis*, but not mixed with them. The buccal incubation of this species was confirmed.

Distribution: *Apogon parvulus* is known mainly from the coastal area of the Philippine Islands. All specimens from Japan were collected only from Amitori Bay and Funauki Bay of Iriomote Island, Okinawa Prefecture. But *A. parvulus* is regarded as having a wide distribution in the Indo-Pacific region.

Note: *Apogon parvulus* is the only one species in the genus of *Apogon*, having the incomplete lateral line. Also this species has no teeth on vomer and palatines, differing from another *Apogon* group. JORDAN and JORDAN (1922) set up a new genus *Brephamia* on the basis of this character, as a monotypy in *Amia parvula*. After wards *Brephamia* was adopted as one of the subgenera in the genus *Apogon*. I consider that these unique characters are more noticeable to the step of genera.

4. *Apogon savayensis* GÜNTHER, 1871

New Japanese name: Namida-tenjikudai

Apogon savayensis GÜNTHER, 1871: 656 (orig. descr., type-loc.: Savay, Samoa Is. and Mando, Celebes Is.); GÜNTHER, 1873: 21, pl. 19, fig. B (descr.; Samoa, Tonga, Yap I., etc.); DAY, 1878-88: 60 (descr.; Africa, India); DAY, 1889: pl. 16, fig. 5 (figure for description in 1878-88); LACHNER, 1951: 598, pl. 19, fig. a-c (descr.; Philippine Is., Red Sea, etc.); LACHNER in SCHULTZ ed., 1953: 460, pl. 36, fig. 79 (descr.; Bikini, Kwajalein Atoll etc.); BURGESS and AXELROD, 1973: 678, fig. 152 (color picture; Maldives Is.); BURGESS and AXELROD, 1975: 1446, fig. 99 (color picture; Solomon Is.); SHEN and LAM, 1977: 174, fig. 18 (descr.; Hou-pi-hu, Formosa).

Apogon bandanensis: SMITH, J. L. B., 1949: 207, pl. 23, fig. 432 (descr.; Tropical Indo-Pacific); MASUDA *et al.*, 1975: 37, fig. F (color picture with description as young *Apogon bandanensis*; Okinawa Is., Indo-Pacific).

Amia savayensis: JORDAN and SEAL, 1906: 239, fig. 33 (descr.; Samoa Is.).

Ostorhynchus savayensis: SMITH, J. L. B., 1961: 399, pl. 47, fig. B (descr.; East Africa, Seychelle Is., etc.); SMITH, J. L. B. and SMITH, M. M., 1963: 18, pl. 16, fig. A (listed; Seychelle Is.); JONES and KUMARAN, 1980: 260, fig. 219 (descr.; Laccadive Is., India etc.).

Materials: YCM-P4444 (1, 39.2) 4. IV. 1978, YCM-P6696-3,5 (2, 41.2-42.1) 4. V. 1979, YCM-P6705-2,3 (2, 43.0-45.1) 6. V. 1979, Kabira Bay, Ishigaki I.; YCM-P4530 (1, 68.8) 31. III. 1978, YCM-P6453 (1, 59.2) 25. II. 1978, YCM-P6487 (1, 75.0) 2. III. 1979, Kuroshima I.; YCM-P7594 (10, 21.6-27.4) 21. VIII. 1980, YCM-P10194-2 (1, 46.2) 21. V. 1982, YCM-P10204 (1, 49.5) 12. V. 1982, YCM-P10244 (4, 47.0-49.2) 1979, Amitori Bay, Iriomote I.; URM-P1914-3 (1, 64.7), Sesoko I., Okinawa Pref.; PCM-P2000 (1, 50.0) 20. IV. 1963, Cebu I., Philippines; YCM-P7414-1 (1, 27.0) 7. XII. 1979, Malakal I., Palau Is. .

Diagnosis: Characterised by big eye, triangular cheek mark extending from eye, a dark saddle over caudal peduncle very clear, faint dusky and silvery

Fig. 5. a; *Apogon savayensis* GÜNTHER, YCM-P10204, S.L. 49.5 mm.
 b; *Apogon nubilus* GARMAN, YCM-P2980-8, S.L. 56.5 mm.
 c; *Apogon bandanensis* BLEEKER, URM-P1909, S.L. 49.1 mm.

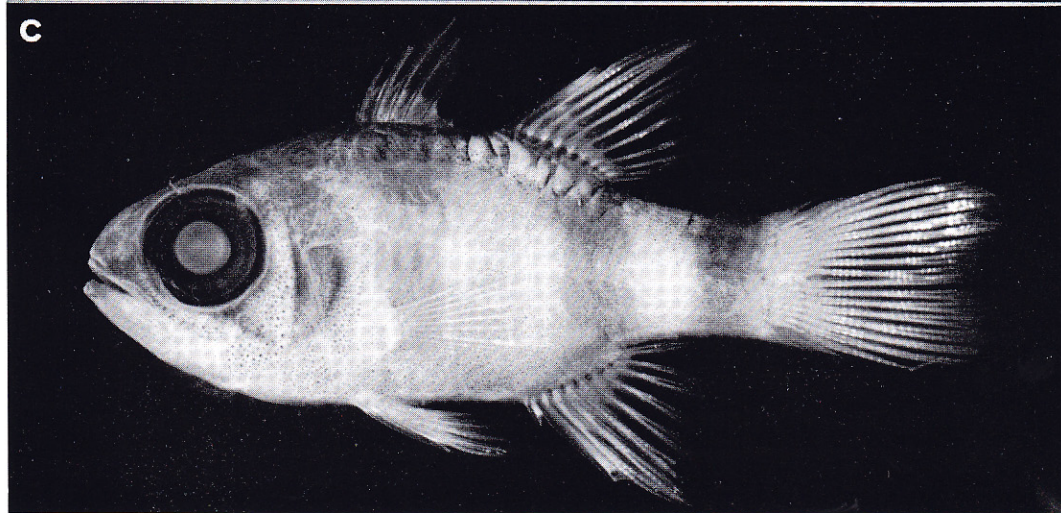
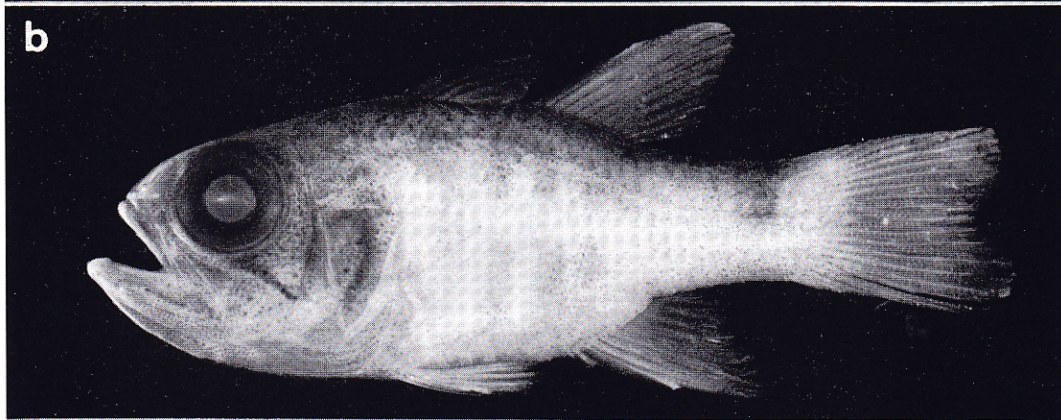


Table 2. Comparison of characters and measurements of three species of *Apogon* from islands of Okinawa.

Species	<i>bandanensis</i>	<i>nubilus</i>	<i>savayensis</i>
Numbers of specimen	5	5	5
Dorsal fin	VII-I,9	VII-I,9	VII-I,9
Anal fin	II,8	II,8	II,8
Pectoral fin (left side)	1+11+1	1+11+1	1+11+1
Branched caudal fin rays	8+7	(7)8+(6)7	8+(6)7
Lateral line scales	26	26	26
Predorsal scale	3	3	3
Vertebrae (urostylar vertebra as one)	10+14	10+14	10+14
Predorsal bone	3	3	3
Range of standard length (mm)	69.2-78.4	63.9-71.7	49.5-75.0
Body depth	43.8±1.30**	40.6±1.90	40.7±3.43
Head length	44.1±1.71	43.0±1.41	43.6±1.50
Snout length	11.4±0.64	10.6±0.80	10.7±0.41
Eye diameter	17.1±0.35	17.3±0.63	17.5±0.69
Interorbital width	14.0±1.22	12.8±0.23	14.1±0.64
Upper jaw length	23.1±0.61	21.9±0.70	22.2±0.71
Caudal peduncle depth (least)	17.9±0.33	17.6±0.52	18.9±0.57
Snout to origin of dorsal fin base	44.0±0.44	43.7±0.63	44.4±0.46
Snout to end of dorsal fin base	77.2±0.42	74.6±0.81	76.4±0.56
Snout origin of anal fin base	69.9±1.87	66.3±1.28	67.7±0.68
Snout to end of anal fin base	80.5±1.10	76.5±1.38	78.3±0.81
Snout to pectoral insertion	43.1±1.30	42.4±1.11	41.6±0.29
Snout to pelvic insertion	45.1±2.46	43.2±1.36	43.7±0.73
Snout to anus	65.6±1.76	63.2±1.83	63.9±0.52
Length of dorsal fin base	38.2±1.08	35.7±0.85	37.8±0.79
Length of anal fin base	16.0±0.47	14.6±0.47	15.4±0.51
Length of pectoral fin	28.0±0.99	26.7±0.57	29.5±0.64
Length of pelvic fin	25.1±0.61	22.0±2.80	25.2±1.24
Length of first dorsal spine (4th)	20.7±1.09	18.6±0.85	20.0±1.52
Length of anal spine (longest)	17.6±0.98	18.3±3.25	18.7±1.06
Length of pelvic spine	16.8±0.52	15.8±0.93	16.9±0.73

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

** Standard deviation.

vertical bands (6-8) on body, outer caudal fin blakish and edged white.

Description: Meristic and morphomeric characters as shown in Table 2.

Body rather short, stout; head stout and robust; snout short, slightly rounded; nape depressed and nearly flat; eyes large; mid body depth high, equal to head length; mouth large, obliquely; maxillary reaching center of pupil; villiform teeth bands on jaws; a few teeth on vomer and at end of palatines; anterior dorsal spines short, fourth spine of first dorsal longest and a little longer than third one; depressed first dorsal reaches origin of second dorsal fin; terminal of pectoral fins reach anterior anal fin in full; pelvic fins do not reach origin of anal fin; posterior margin of preopercle serrated; opercular flap not developed;

scales ctenoid, lateral line complete; caudal fin forked, notch shallow and other fins rounded.

Color: *In life.* An excellent color photograph is present in BURGESS and AXELROD (1973; p. 678, fig. 152).

In alcohol. The color condition in alcohol or formalin is close to the photograph of the specimen which was identified as *Apogon bandanensis* in MASUDA *et al.* (1975).

Body light brown, head and back more dusky; a large oblique black streak extending from below eye to angle of preopercle, shaped triangular; about six to eight vertical silvery stripes on body sides between pectoral fin base and posterior anal fin base, these bands more clearly in young but sometimes irregular in adult; a clear dark saddle over caudal peduncle, reaching down to lateral line; caudal outer fin rays blackish, edged in white; second dorsal and anal fins slightly dark, sometimes retaining a dark streak on anterior part of second dorsal fin; anterior and outer portions of first dorsal fin blackish; pectoral fins pale.

Behavior: *Apogon savayensis* was collected from shallow water in the coral reef, and occasionally in the tide-pool, unlike *Apogon nubilus*. They are found into coral hollows of *Montipora* sp. at the depth of fifteen meters, with

Table 3.* Color and color patterns differentiating three species of *Apogon* collected from islands of Okinawa.

Species	<i>bandanensis</i>	<i>savayensis</i>	<i>nubilus</i>
Characters			
Cheek mark extending from eye to angle of anterior margin of preopercle	Triangular, oblique direction	Triangular, slightly more horizontal	Narrow, elongate, arched at bellow
Saddles over body, passing through bases of spiny and soft dorsal	Present, vertical	Sometime present, obliquely on dorsal	Always absent
Mark at base of caudal fin on caudal peduncle in adult	A dark brown saddle over caudal peduncle, extending to lateral line	A clear dark saddle over caudal peduncle, reaching down to lateral line	A diffuse dark spot on caudal peduncle distinctly above midbase of caudal fin, not forming a saddle
Color of caudal fin	Outer rays slightly blackish edged in white; remainder of fin dusky	Outer rays distinctly blackish edged in white; remainder of fin dusky	Uniformly dusky
Faint dusky and silvery vertical bands on body	Absent; sometimes faint dusky bands, extending from bases of spiny and soft dorsal	From six to eight, clearly; sometimes absent, but rare	From four to five, indistinct

* Table was modified from LACHNER (1951) in part.

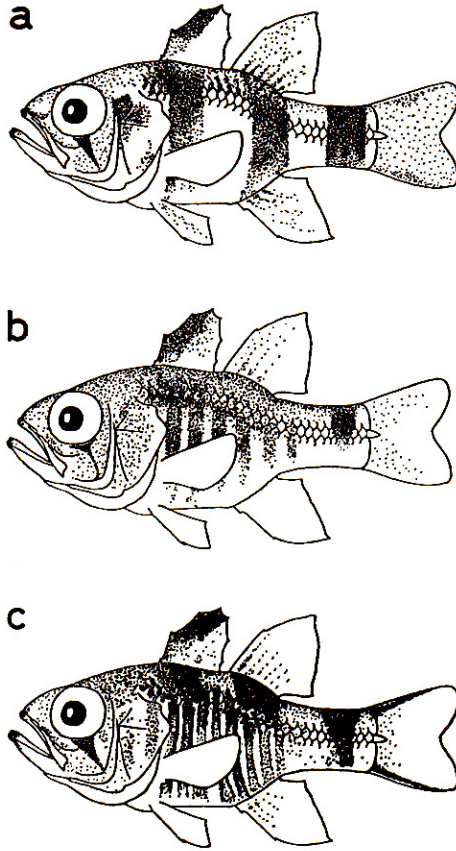


Fig. 6. Typical illustrations of three species of *Apogon*.
 a; *A. bandanensis*, b; *A. nubilus*, c; *A. savayensis*.

Apogon compressus, *Apogon fraenatus* and *Sphaeramia nematoptera*. The young of this species especially live in shallower water. *A. nubilus* rises well to the surface from the bottom at night, but in *A. savayensis* such a behavior has not been known yet. The buccal incubation of them was recognized.

Distribution: *A. savayensis* is known from the Indo-Pacific region extensively. In Japan this species was collected more from Iriomote Island than from Ishigaki, Kuroshima and Sesoko Islands in Okinawa Pref. .

Note: Three species of *Apogon bandanensis* BLEEKER, *A. nubilus* GARMAN and *A. savayensis* had been treated as a synonym to one another because of the similar coloration and the growth transformation, for example FOWLER and BEAN (1930; *A. nubilus* and *A. savayensis* as a synonym of *A. bandanensis*), JORDAN and SEALE (1906; *A. nubilus* as a synonym of *A. savayensis*), and SCHULTZ (1943; *A. savayensis* as a synonym of *A. bandanensis*). Later, LACHNER (1951) examined the *A. bandanensis* group which involved many taxonomic problems. LACHNER in his discussion (1951; p. 594), recognized the differentiation of

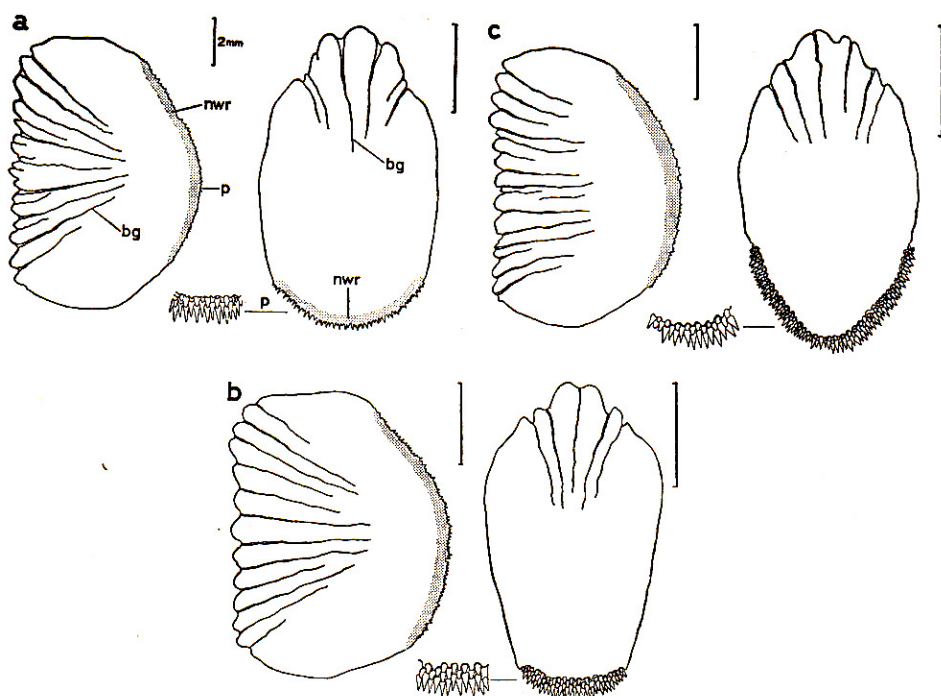


Fig. 7. A ctenoid scale under the seventh lateral line scale and a separately ctenoid scale between the base of pelvic fins for three species of *Apogon*.

a; *A. bandanensis*, b; *A. nubilus*, c; *A. savayensis*.
bg; basal groove, nwr; network ridge, p; spine.

Table 4. Frequency distributions of the total number of gill rakers in four species of *Apogon*.

Species and Locality		Total number of gill rakers on 1st arch							
		23	24	25	26	27	28	29	30
<i>erdamani</i>	Red Sea			1	2	11	6	2	1
<i>bandanensis</i>	Philippine Is.		1	17	18	8	1		
	Okinawa Is.*			1	4				
<i>savayensis</i>	Philippine Is.					8	1	1	
	Northern Marshall Is.				5	4	5	2	
	Samoa				1	3	8	4	4
	Okinawa Is.*					5			
<i>nubilus</i>	Red Sea		2	1	12	6	4	1	
	Philippine Is.	1	4	5	6	1			
	Northern Marshall Is.	1	2	8	5	1		1	
	Samoa		2	3		1			
	Fiji			1					
	Okinawa Is.		2	2	2				
	Okinawa Is.*	2	3						

* Count by HAYASHI, another data from LACHNER (1951).

saddles on the caudal base, bands on body in addition to the category of a triangular cheek mark. Then he examined many samples from the Indo-Pacific region and included four species into the group of *A. bandanensis*, but *A. erdmani* LACHNER was known only from the Red Sea. LACKNER's opinions are valid for specimens of the *A. bandanensis* group in Islands of Okinawa, Japan.

The differentiation of color patterns of three species in Japan according to LACHNER's (1951) view is shown in Table 3 and Figure 6. A separate ctenoid scale between the base of pelvic fins (Fig. 7) and the number of gill rakers on the first arch (Table 4) were different among three species.

A. nubilus, listed from Sesoko Island in Okinawa by YOSHINO and NISHIJIMA (1981), is given a new Japanese name here as Hososuji-namida-tenjikudai.

5. *Archamia biguttata* LACHNER, 1951

New Japanese name: Futahoshi-atohiki-tenjikudai

Amia macropterus: (non *Apogon macropterus* KÜHL and VAN HASSELT in CUVIER and VALENCIENNES, 1828) BLEEKER, 1874: 72 (descr.; Sumatra, Celebes Is., etc.); BLEEKER, 1873-76: 103, Perc. 68, tab. 346, fig. 2 (descr., illustration; Singapore, Java I., etc.).

Archamia biguttata LACHNER, 1951, 588: pl. 17, fig. d (new name, replacing *Amia macropterus* BLEEKER, 1874; East Indies, Samoa Is., etc.); LACHNER in SCHULTZ ed., 1953: 477, pl. 41, fig. A (in key *Archamia*; Marshall Is.); BURGESS and AXELROD, 1975: 1445, fig. 96 (color picture; Solomon Is.); SHEN and LAM, 1977: 165, fig. 6 (descr.; Keelung, Formosa).

Archamia bleekeri FOWLER and BEAN, 1930: 110 (in part; descr.; Parawan I., Luzon I., etc.).

Materials: YCM-P7612 (1, 47.7) 21. VIII. 1980, Amitori Bay, Iriomote I., Okinawa Pref.; FSKU 720227 (YCM-P10251-1,4,6) (3, 42.9-43.6) 27. II. 1972, Rabaul, New Britain I.

Diagnosis: Characterised by compressed body, black humeral blotch at junction of gill opening, black spot on caudal base, black wide cheek bar and numerous soft anal fin rays about sixteen to seventeen.

Description: Meristic and morphomeristic characters as shown in Table 5. The head and body proportions are nearly identical to those of *Archamia zosterophora* in HAYASHI (1980; p. 47). Anal fin rays and gill rakers counts slightly differ from other *Archamia* species.

Body rather deep, compressed; head gently compressed and snout rounded; mouth strongly oblique; maxillary reaching beneath middle of pupil, jaws equal; villiform teeth in jaws, a few on vomer and palatines; preopercle ridge entire but hind margin serrated; two rows of scales on opercle; scales on body ctenoid, weak and deciduous; delicate first dorsal fin only reaches anterior base of second dorsal fin; anterior soft rays of second dorsal and anal fins a little longer, symmetrical; tail slightly long equal to dorsal fin base; caudal fin oblong, incised; pectoral fins reach origin of anal fin.



Fig. 8. *Archamia biguttata* LACHNER, YCM-P7612, S.L. 47.7 mm.

Fig. 9. *Archamia dispilus* LACHNER, YCM-P10183-1, S.L. 56.2 mm.

Color: *In life.* A beautiful color photograph is present in BURGESS and AXELROD (1975; p. 1445, fig. 96).

In alcohol. Ground color yellowish with light-blue pearly reflection on sides of cheek, opercle and lower body; head with scattered brown spots which are bigger and rough on opercle and cheek but a few on body; a broad and characteristic oblique black band from lower margin of eye to basal margin, width almost equal to diameter of pupil; a dark brown blotch at junction of opercle on just first lateral line scale, diameter longer than pupil; a black circular blotch at midbase of caudal fin sometimes faded in circumference; snout and lips

Table 5. Comparison of characters and measurements of two species of *Archamia* collected from islands of Okinawa.

Species	<i>biguttata</i>		<i>dispilus</i>
	Iriomote I.	Rabaul	Iriomote I.
Numbers of specimen	1	3	5
Dorsal fin	VI-1,9	VI-1,9	VI-1,9
Anal fin	II,17	II,16	II, (16)17(18)
Pectoral fin (left side)	1+11+1	1+11+1	1+ (11)12+1
Branched caudal fin rays	8+7	8+7	8+ (6)7
Lateral line scales	26+1*	25-26+2-3	26+2-3
Predorsal scales	5	(5)6	6
Gill rakers (first arch)	(1) ^{**} 4+1+15	(3)3+1+16	(2-3)3-4+1+15-16(1)
Vertebrae (urostyler vertebra as one)	10+14	10+14	10+14
Predorsal bone	3	3	3
Range of standard length (mm)	47.7	42.9-43.6	54.0-74.7
Body depth	37.5	36.4±0.75 ^{***} ^{****}	39.3±1.02
Head length	39.8	37.9±1.02	39.9±1.52
Snout length	8.0	8.3±0.34	8.9±0.66
Eye diameter	12.8	12.0±0.22	12.5±0.42
Interorbital width	10.1	8.3±0.29	9.6±0.45
Upper jaw length	18.9	17.8±0.42	18.9±0.77
Caudal peduncle depth (least)	14.7	15.7±0.71	15.4±0.35
Snout to origin of dorsal fin base	42.3	39.6±0.94	42.5±0.94
Snout to end of dorsal fin base	71.9	69.7±1.36	71.5±1.28
Snout to origin of anal fin base	56.4	57.2±0.26	56.7±1.40
Snout to end of anal fin base	82.0	78.2±0.86	80.9±1.04
Snout to pectoral insertion	39.4	36.4±0.49	37.5±0.98
Snout to pelvic insertion	39.2	36.1±0.92	37.5±1.20
Snout to anus	53.7	49.7±1.80	51.3±1.63
Length of dorsal fin base	32.9	32.6±1.74	32.7±0.62
Length of anal fin base	31.7	27.1±1.11	32.1±1.00
Length of pectoral fin	29.8	30.6±1.72	29.3±1.37
Length of pelvic fin	19.3	21.8±0.45	20.0±0.76
Length of first dorsal spine (3rd)	17.0	16.2±1.18	16.4±0.52
Length of anal spine (longest)	15.5	14.4±0.71	13.1±0.96
Length of pelvic spine	16.1	17.2±0.16	14.0±0.80

* Incomplete lateral pore scales.

** Rudiments on upper and lower arch.

*** Measurements in mm expressed in hundredths of standard length.

**** Standard deviation.

blackish; narrow, strigous and brownish arched bars on body sides, about twenty traces but obsolete in some specimens; first dorsal and caudal fins dark, another fins pale.

Behavior: This specimen was collected with *Archamia dispilus* and *A. zosterophora*, and lives in coral limbs of *Pavona* sp. The specimen (YCM-P7612) was found in the large school of *A. dispilus*. Details of behavior are still uncertain.

Table 6. Synonymous relationships of four species of *Archamia* by the reference before LACHNER (1951).
 SA; soft anal fin numbers, B1; a dark spot on the caudal fin base, B2; a dark spot on just posterior to opercular flap or junction of opercle, A1; *Archamia lineolata*, Af; *A. fucata*, Ad; *A. dispilus*, Ab; *A. biguttata*.

Original description:

Archamia lineolata (CUVIER and VALENSIENNES in CUVIER, 1828)

Archamia fucata (CANTOR, 1849)

Archamia dispilus LACHNER, 1951

Archamia biguttata LACHNER, 1951 (in part *Amia macropterus* BLEEKER, 1874)

References	Species	Characters from references						Possibility of species				
		SA	B1	B2	A1	Af	Ad	Ab	Af	Ad	Ab	
CUVIER and VALENSIENNES	1828 <i>Apogon lineolata</i>	14	+	+	+	+	+					
	1832 <i>Apogon macropterus</i>	13	+	+	+	+	+					
VALENSIENNES	1832 <i>Apogon zeylonichus</i>	14			(+)*							
	1849 <i>Apogon argenteus</i>	14	+		+							
	BLEEKER	1851 <i>Apogon fucatus</i>	16	+	+	+						
		1852b <i>Apogon macropterus</i>	15-18	+	+	+						
	GÜNTHER	1859 <i>Apogon macropteroideus</i>	16-17	+	+	+						
1859 <i>Apogon lineolatus</i>		14	+	+	+						(+)	
DAY	<i>Apogon fucatus</i>	16	+	+	+							
	<i>Apogon macropterus</i>	13	+	+	+							
	<i>Apogon bleekeri</i>	14-17	+	+	+							
	<i>Apogon macropteroideus</i>	16-17	+	+	+							+
	<i>Apogon macropterus</i>	14-17	+	+	+							
BLEEKER	1878-88 <i>Archamia lineolata</i>	14-17	+	+	+							
	1889 <i>Amia macropterus</i>	14-17	+	+	+							(+)
	1873-76 <i>Amia macropterus</i>	14-18	+	+	+							(+)
JORDAN and SNYDER	1874 <i>Amia macropterus</i> (fig.)	16	+	+	+							(+)
	1901 <i>Amia macropterus</i>	14-18	+	+	+							(+)
	1907 <i>Archamia kagoshimana</i>	16	+	+	+							
EVERMAN and SEALE	1907 <i>Archamia macropteroideus</i>	17	+	+	+							
	1907 <i>Archamia bleekeri</i>	16	+	+	+							
WEBER and BEAUFORT	1929 <i>Apogon lineolatus</i>	13-17	+	+	+							
	1930 <i>Archamia bleekeri</i>	16-17	+	+	+							
FOWLER and BEAN	1930 <i>Archamia lineolata</i>	13-17	+	+	+							
	1943 <i>Archamia lineolata</i>	14-16	+	+	+							

* From the insufficient data.

Table 7. The number of gill rakers on the first gill arch for species of *Arhamia*.

Species and Locality	Upper limb				Lower limb			Total						
	1,3	2,3	3,3	1,4	2,4	14	15	16	18	19	20	21	22	23
<i>A. biguttata</i> *	4	5	3	2		1	7	6			2	4	4	4
New Britain I.	1	1	1			1	1	2			1	1		2
Iriomote I.			1					1				1		
<i>A. dispilus</i> *	9		2	2		3	7	3			3	6	3	1
Philippine Is.			1					1				1		
Iriomote I.	4	1	1	2				8				5	2	1
<i>A. lineolata</i> *	1	2	2	12		1	11	5				2	6	3
Philippine Is.				4				4					1	3
<i>A. fucata</i> **	30	2				11	21				12	21		2
Philippine Is.	2	8		2			11	1	1	1	9	1		

* All collections from the Philippine Is. unless indicated otherwise.

** All collections from the Philippine Is., Formosa, Marshall Is. and Samoa unless indicated otherwise, from LACHNER (1951).

Table 8. The number of soft anal fin rays for species of *Arhamia*.

Species and locality	Soft anal rays						
	12	13	14	15	16	17	18
<i>A. biguttata</i>							
Philippine Is.*					14	8	
New Britain I.					5	1	
Iriomote I.				1			
<i>A. dispilus</i>							
Formosa, Philippine Is.*					8	3	2
Philippine Is.						2	
Iriomote I.					4	9	1
<i>A. lineolata</i>							
Philippine Is.*			7	31	3		
Samoa*			1	4	3		
Philippine Is.				7	1		
<i>A. fucata</i>							
Philippine Is.*					1	15	6
Formosa*							1
Marshall Is.*						7	6
Samoa*						7	12
Philippine Is.						28	17
Iriomote I.					1		1

* From LACHNER (1951)

Distribution: *A. biguttata* is known only from Iriomote Island in Japan. Distributional ranges knowing up present are East Indies, Philippine Islands, Samoan Islands and Formosa.

Note: See discussion that follows note of *A. dispilus* and some data in Tables 5, 6, 7, 8 and Figures 10, 11, 12.

6. *Archamia dispilus* LACHNER, 1951

New Japanese name: Sumitsuki-atohiki-tenjikudai

Archamia dispilus LACHNER, 1951: 586, pl. 17, fig. c (descr.; type-loc.: Soo Wan Bay, Formosa); LACHNER in SCHULTZ ed., 1953: 476, pl. 41, fig. c (in key; East Africa, Islands of Oceania); SHEN and LAM, 1977: 164, fig. 7 (descr.; Mao-pi-tou, Su-ao, etc. in Formosa).

Archamia fucata: MASUDA *et al.*, 1980: 39, fig. K (color picture with description as *Archamia fucata*; Okinawa Is., Marshall Is., etc.); JONES and KUMARAN, 1980: 250, fig. 209 (descr.; India, Ceylon, etc.).

Materials: YCM-P4356 (2, 76.4–76.9) VII. 1940, Itoman; YCM-P9498 (79, 27.4–38.3) 5. VIII. 1981, YCM-P10183 (8, 49.4–61.8) 6. V. 1982, IORD 76–1405, 1406, 1408 (3, 54.0–72.2) 18. XII. 1976, IORD 78–80, 84 (2, 70.5–74.7) 17. III. 1978, Amitori Bay, Iriomote I., Okinawa Pref. .

Comparative materials. *Archamia lineolata* YCM-P4569 (3, 24.8–30.7) 2. VIII. 1978, Kabira Bay, Ishigaki I., Okinawa Pref.; YCM-P1951 (11, 45.6–55.6) 19. XI. 1974, Cebu I., Philippines; *Archamia fucata* YCM-P7611 (1, 32.9) 21. VIII. 1980, Amitori Bay, Iriomote I., Okinawa Pref.; YCM-P 1956 (47, 50.5–68.7) 19. XI. 1974, Cebu I., Philippines; YCM-P7408 (2, 40.8–52.6) 6. XI. 1979, Malakal I., Palau Is. .

Diagnosis: Characterised by compressed body, a dusky diffused large spot on just posterior to opercular flap and below lateral line, a diffuse, blackish circular spot on caudal fin base, smaller than pupil.

Description: Meristic and morphomeristic characters as shown in Table 5. Proportional particulars are the same as aforesaid *Archamia biguttata*.

Body deep and compressed; snout rounded; jaws oblique, reaching below middle of eye; pectoral fins pointed; soft dorsal fin slightly rounded; preopercle with ridge entire but hind margin serrated; scales all deciduous; caudal fin faintly forked.

Color: *In life.* A color photograph is present in MASUDA *et al.* (1980; p. 39, fig. k as *Archamia fucata*).

In alcohol. Ground color yellowish; head and body rather dark with numerous dark-brown pepperlike spots, these spots abundant on opercle, cheek, mid-body and caudal peduncle; caudal fin base with a large and diffuse black spot, equal to depth of caudal peduncle or to diameter of eye; irregular blackish blotch just below lateral line and just posterior to opercular flap; snout and lips dark with pepperlike spots; clear brown traces on body sides but indistinct in young.

Behavior: This species was collected with *Apogon sangiensis* and *Apogon leptacanthus*, and lives in coral limbs of *Pavona* sp. Usually this species forms large groups consisting adult and young specimens of the same stage. *Archamia* species occupy the upper region of the community space in corals, but *A. sangiensis* usually stays in the lower region. This species rises to the surface from coral limbs at twilight, and forms larger schools.

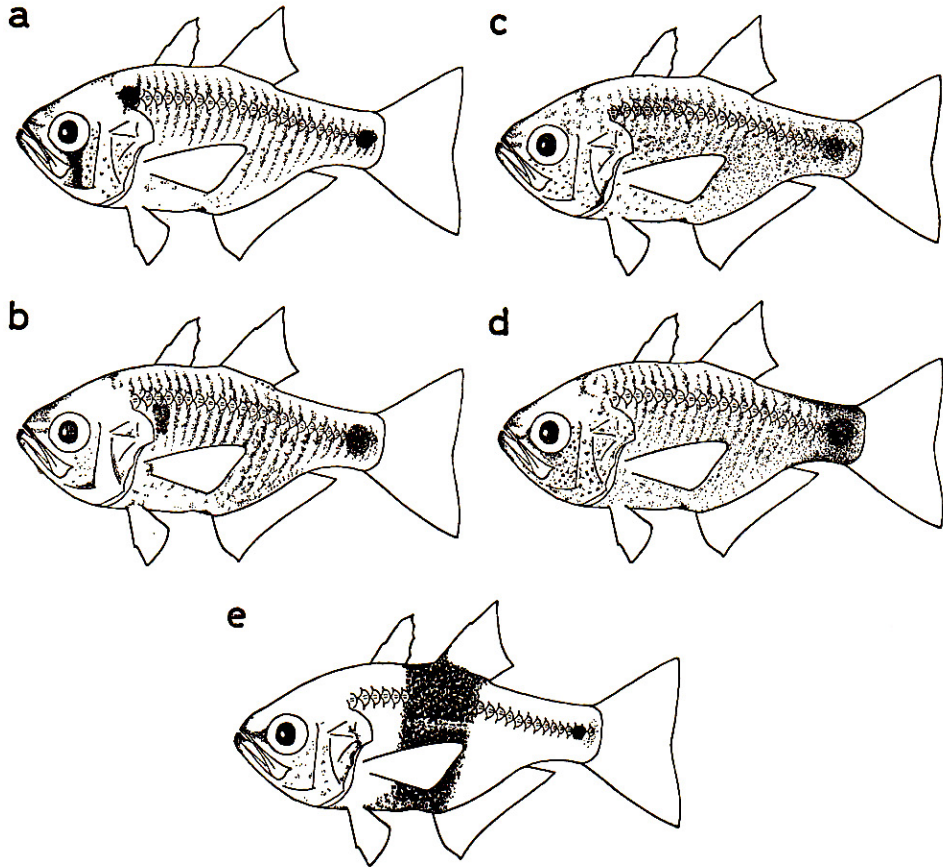


Fig. 10. Typical illustrations of five species of *Archamia*.
 a; *A. biguttata*, b; *A. dispilus*, c; *A. lineolata*, d; *A. fucata*,
 e; *A. zosterophora*.

Distribution: *A. dispilus* has been known from Formosa and Philippines. Its distributional in Japan is known around some islands of Okinawa Prefecture.

Note: Six species of the genus *Archamia* were reported from the Indo-Pacific region by LACHNER (1951) namely, *A. lineolata*, *A. fucata*, *A. zosterophora*, *A. biguttata*, *A. dispilus* and *A. buruënsis*. The synonymy of *Archamia* has been confused so far, as proportional characters and colorations are quite similar to each other (Table 6). LACHNER attached to importance of anal fin rays and gill rakers number in addition to the coloration on body in his paper in 1951.

Apogon lineolatus and *Apogon macropterus* were described as two new species by CUVIER and VALENSIENNES in 1828, but it is very difficult to identify the two species only from the brief descriptions. Also anal fin rays of *A. macropterus* (=13) are allied to those of *A. lineolatus* (=13-15) having the least count in all of *Archamia*. From this point of view, LACHNER concluded that *A. macropterus* was a synonym of *A. lineolatus*. I agree with his opinion.

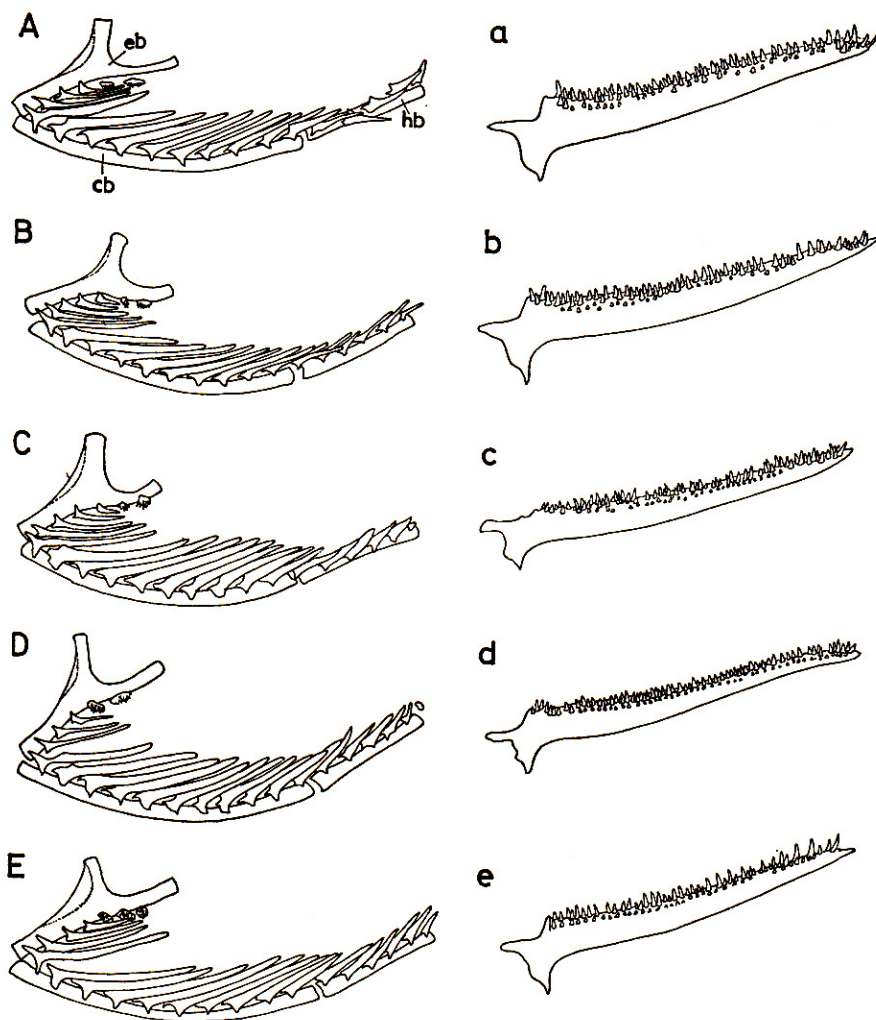


Fig. 11. Gill rakers on the first arch and each rakers (a-e) on the middle limb for five species of *Archamia*.

Aa; *A. biguttata*, Bb; *A. dispilus*, Cc; *A. lineolata*, Dd; *A. fucata*, Ee; *A. zosterophora*.

cb; ceratobranchial, eb; epibranchial, hb; hypobranchial

On the other hand, BLEEKER (1873-76) described *Amia macropterus* as one of *Amia* (after *Archamia*) species. BLEEKER's *macropterus* was strikingly different from another species of *Archamia* up to the present, judging from his description and figure. Also this species was quite different from *A. macropterus* (synonym of *A. lineolata*) in CUVIER and VALENCIENNES (1928). LACHNER (1951) gave *biguttata* for BLEEKER's *macropterus* as a new name. His opinions is as follows; already *macropterus* preoccupied in CUVIER and VALENCIENNES for another species, *A. macropterus* in CUVIER and VALENCIENNES is a synonym of

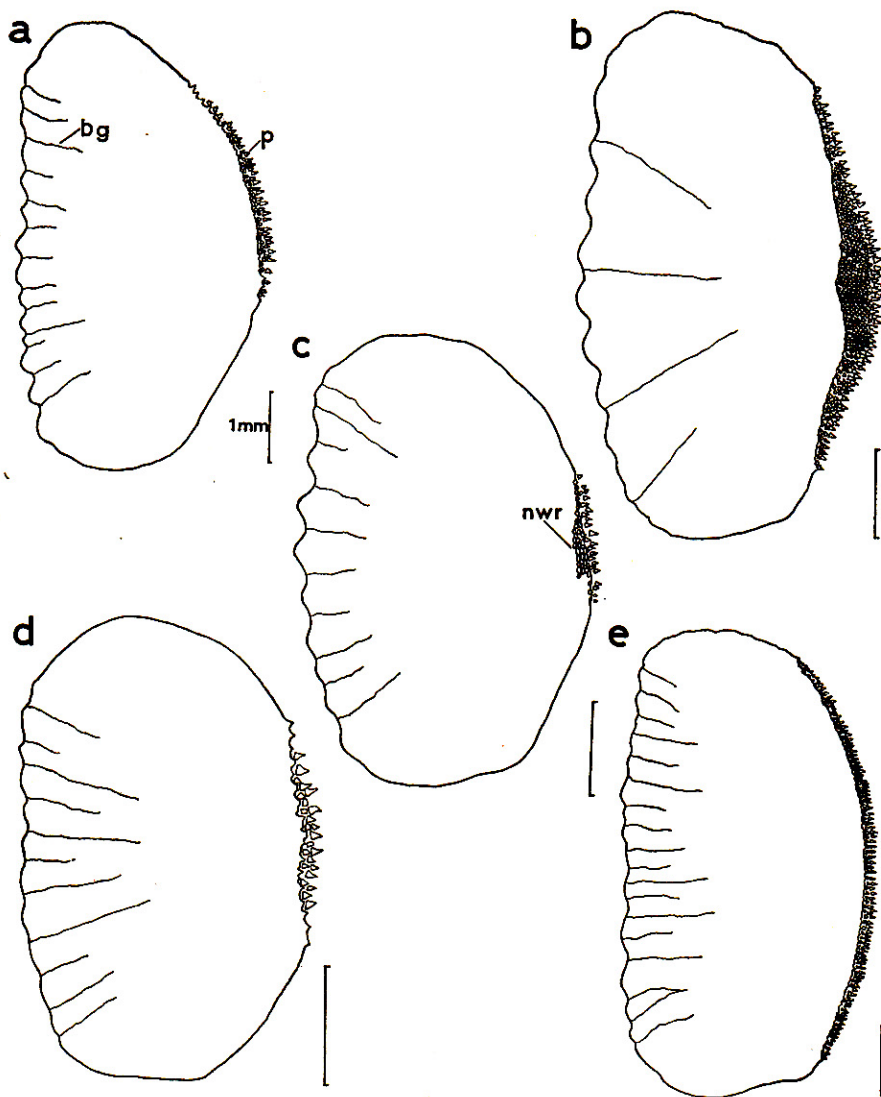


Fig. 12. A ctenoid scale under the seventh lateral line scale for five species of *Archamia*.

a; *A. dispilus*, b; *A. lineolata*, c; *A. zosterophora*, d; *A. biguttata*, e; *A. fucata*.

bg; basal groove, nwr; network ridge, p; spine

A. lineolata.

LACHNER described *A. dispilus* as a new species at the same time, which had been confused with *A. fucata* (CANTOR). *A. lineolata*, *A. fucata*, *A. dispilus* and *A. biguttata* are quite similar in their coloration. *A. biguttata* has unique color patterns such as a wide black cheek mark, a blackish blotch at junction of the gill opening and at the mid caudal fin base. In these characters *A. biguttata*

is separated from other three species. Also *A. fucata* is similar to *A. dispilus*. *A. dispilus* has a large and diffuse dark brown spot on posterior to the opercular flap and below the lateral line, but in *A. fucata* there is no such spot. A large and circular black blotch at the base of caudal fin in *A. fucata* is bigger than in *A. dispilus*. The characteristic coloration of *Archamia* is shown in Figure 10. *A. fucata* is also similar to *A. lineolata*. Both species are identified simply by the number of soft anal fin rays.

The author examined gill rakers (Fig. 11) and their number on first arch (Table 7) in addition to the number of soft anal fin rays (Table 8) on five species of *Archamia* in the Okinawa regions. These meristic counts generally agree with LACHNER'S (1951) results. I also examined body scales which are attached below the seventh lateral line scale, mainly in mid-body. As the result, some difference in forms of the network ridge and spines was found among the five species (Fig. 12).

A. lineolata, *A. fucata* and *A. zosterophora* had been known from some islands in Okinawa. *A. biguttata* and *A. dispilus* were newly added to the *Archamia* group in Japan. But *A. dispilus* had been mixed with *A. fucata* in the past. Two specimens of *A. lineolata* (YCM-P4356) in AOYAGI (1943; p. 86) from Okinawa were reidentified as *A. dispilus* this time. *A. dispilus* is very common in the islands of Okinawa, and *A. fucata* rather rare.

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