Proc. Jap. Soc. syst. Zool., No. 23: 37-55. June 25, 1982.

Serpulinae (Polychaetous Annelids) from the Palau and Yap Islands, Micronesia

Minoru IMAJIMA

Synopsis

IMAJIMA, M. 1982——Serpulinae (Polychaetous annelids) from the Palau and Yap Islands, Micronesia. *Proc. Jap. Soc. syst. Zool.*, Tokyo, No. 23: 37–55.

Serpulinae of polychaetous annelids collected from the Palau and Yap Islands, Micronesia are reported here. In the present study, 27 species, including two new species, *Serpula palauense* and *Hydroides bifidus*, and one new subspecies *Spirobranchus tricornigerus decoratus*, in nine genera of Serpulinae are recognized. The distributional data are analyzed in Table 1: of the 27 recorded serpulid species from the Palau and Yap Islands, 20 or 74% are known also from southern Japan, and 18 or 66% are known also from Australia, and 15 or 55% are known from the Indian Ocean.

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A survey of marine fauna around the Palau and Yap Islands, Micronesia, which is supported by the Grants-in-aid for Overseas Scientific Research (No. 504101) from the Ministry of Education, Science and Culture, Japan, was carried out by seven persons, from June 8 through July 20, 1980. The survey was undertaken as part of a project to elucidate the origin and hierarchy of Japanese marine fauna that are conveyed and dispersed by the Kuroshio Current derived from the North Equatorial Current.

Although many polychaetes have been obtained by the author in this survey, this report deals with specimens of Serpulinae only. Up till now only two serpulid species, *Hydroides novaepommeraniae* AUGENER and *Pomatostegus stellatus* (ABILDGAARD), have been recorded from the Koror Island by OKUDA (1937). In the present study, 27 species, including two new species and one new subspecies, in nine genera of Serpulinae are recognized. The calcareous tubes of serpulids are attached to rocks, corals, shells, and other hard substrates. The specimens were collected by hand in the intertidal zone and by dredging from depths ranging from 4 to 30 m.

Thanks are due to the staff of the Micronesia Mariculture Demon-

stration Center (MMDC) at Malakal and Mr. Kemesong KODEP at Kayangel, for their understanding and cooperation in undertaking the present survey. He wishes to express his thanks to Mr. Valentine RAMARUI and his family for their warm help and the members of the team for cooperation in this survey.

The bulk of the collection, including type-specimens, has been deposited in the National Science Museum, Tokyo.

Serpula LINNAEUS, 1758

Serpula vermicularis LINNAEUS, 1767

Serpula vermicularis: STRAUGHAN, 1967a, p. 206, fig. 3(a); ZIBROWIUS, 1968, pp. 96–98, pl. 1, figs. 1–5; IMAJIMA, 1976a, p. 141.

Material examined. Augulpel reef (1 specimen), Gesodokkuru reef (1).

Distribution. Cosmopolitan.

Serpula concharum LANGERHANS, 1880

(Fig. 1, a–i)

Serpula concharum LANGERHANS, 1880, pp. 118–119, pl. 5, fig. 35; FAUVEL, 1927, pp. 352–353, fig. 121, a–i; ZIBROWIUS, 1968, pp. 98–100, pl. 1, fig. 6–15, pl. 14, fig. a.

Material examined. Melekeiok (4), Gesodokkuru reef, off Arumonogui (1), Augulpel reef (1), Kayangel (8), Inuf, Yap Islands (1).

Description. The largest specimen measures 24 mm in length, including operculum, and about 1 mm in width in the thorax; it consists of 105 segments.

The branchiae have 15 to 16 gill-radioles on either side, which end in slender pinnule-free tips. The basal portions of the gill-radioles are connected by a branchial membrane; they are arranged in two semicircles.

The opercular peduncle is cylindrical and arises from the left or right branchial lobes, just below the first normal filament; a rudimentary operculum is situated at the opposite side. The opercular funnel is shaped like an inverted bell; it has 14 to 17 blunt marginal teeth. The grooves between the teeth reach nearly to the center of the funnel; at the outer side they cover only 1/3 of the length of the funnel (Fig. 1, a, b). The collar has one ventral and two latero-dorsal lobes, which are continuous with the thoracic membranes; they end at the posterior margin of the last thoracic segment.

The thorax has 7 segments, 6 of which are uncinigerous. The collar setae are of two types; slender, limbate capillaries (Fig. 1, c) and bayonet-shaped setae with two or three large conical teeth and a variable

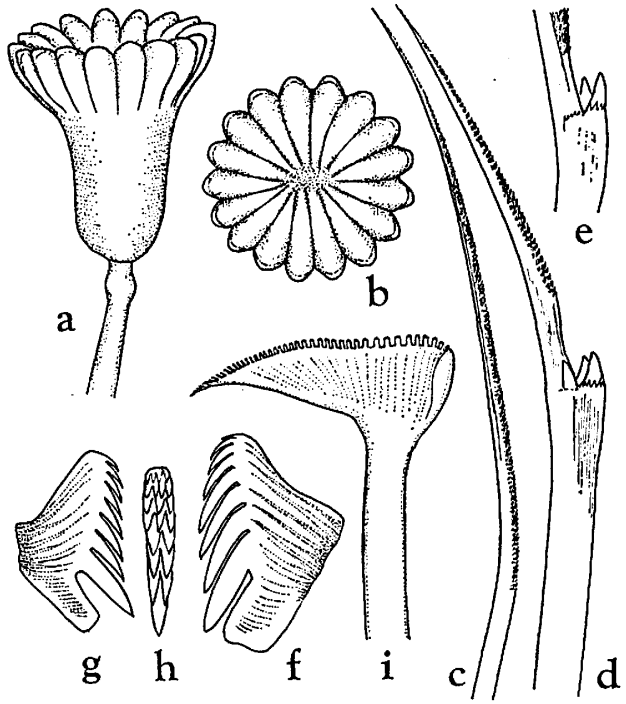

Fig. 1. *Serpula concharum* LANGERHANS. a, b, opercula, in lateral and frontal view, ×20; c, limbate collar seta, ×205; d, e, bayonet-shaped collar setae, ×205; f, thoracic uncinus, ×825; g, h, posterior abdominal uncini, in side and frontal views, ×825; i, abdominal seta, ×825.

number of small teeth at the base of the blade (Fig. 1, d, e). The remaining thoracic setae are limbate capillaries; the thoracic uncini have 8 pointed teeth in a row, of which the most anterior is the largest (Fig. 1, f). The anterior abdominal uncini have 8 teeth in a row; posteriorly they are saw-shaped, with 1 to 4 rows of sharp teeth, 8 teeth are visible in profile, of which the most anterior is the largest (Fig. 1, g, h). The abdominal setae are trumpet-shaped distally, with about 40 minute teeth in lateral view (Fig. 1, i) ; they are replaced by long capillary setae in the posterior segments.

The tube is white, thick-walled and irregularly coiled. It is subtrapezoidal in cross-section with 3 to 5 longitudinal ridges.

This is the first record of the species from Indo-Pacific areas.

Distribution. Madeira; Senegal; Palau Islands.

Serpula vittata AUGENER, 1914

Serpula vittata AUGENER, 1914, pp. 137–139, fig 17, pl. 1, fig. 18–19; IMAJIMA, 1979, pp. 160–162, fig. 2.

Material examined. Malakal (6).

Distribution. Western Australia; southern Japan; Palau Islands.

Serpula cf. *kaempferi* (KINBERG, 1867)

Zopyrus Kaempferi KINBERG, 1867, p. 351.
Serpula cf. *kaempferi*: IMAJIMA, 1978, pp. 50–52, fig. 2.

Material examined. Malakal (2), Kwannon (6), Gesodokkuru reef (10).

Distribution. North Celebes; southern Japan; Palau Islands.

Serpula watsoni WILLEY, 1905

Serpula watsoni WILLEY, 1905, p. 317, pl. 7, fig. 187, pl. 8, fig. 6; STRAUGHAN, 1967a, pp. 207–208, fig. 3b; IMAJIMA, 1977, pp. 91–92.

Material examined. Augulpel reef (1), Auluptagel (2).

Distribution. Sri Lanka; Australia; southern Japan (Ogasawara Islands); Palau Islands.

Serpula palauense sp. nov.

(Fig. 2, a–m)

Material examined. Arumizu Bay (holotype and 10 paratypes), Auluptagel (3), Malakal (1), Arakabesan (3), Gesodokkuru reef, Arumonogui (3).

Description. The holotype measures 31 mm in length, including operculum, and about 1.5 mm in width in the thorax; it has 173 setigerous segments.

The branchiae have 28 gill-radioles on the right and 30 on the left side, which end in slender, pinnule-free filaments. The paratypes have 16 to 26 gill-radioles on either side. The radioles are not connected by a branchial membrane.

The opercular peduncle is inserted to the right at the base of the branchial stem, just below and between the first and second normal filament. It is cylindrical, faintly wrinkled. The opercular funnel has a deep hollow; it measures about 2 mm in length. There are 23 marginal radii with blunt distal tips; all radii on inner and outer side extend farther down to the center (base of funnel respectively) (Fig. 2, a, b). The paratypes have 22 to 23 marginal radii. There is a constriction between the basal part of the funnel and the peduncle.

The collar has one ventral and two latero-dorsal lobes, which are continuous with the thoracic membranes. The thoracic membranes end just posterior to the fifth row of uncini (Fig. 2, c).

The thorax has 7 segments, 6 of which are uncinigerous. The collar setae are of two types: limbate capillaries (Fig. 2, d) and bayonet-shaped

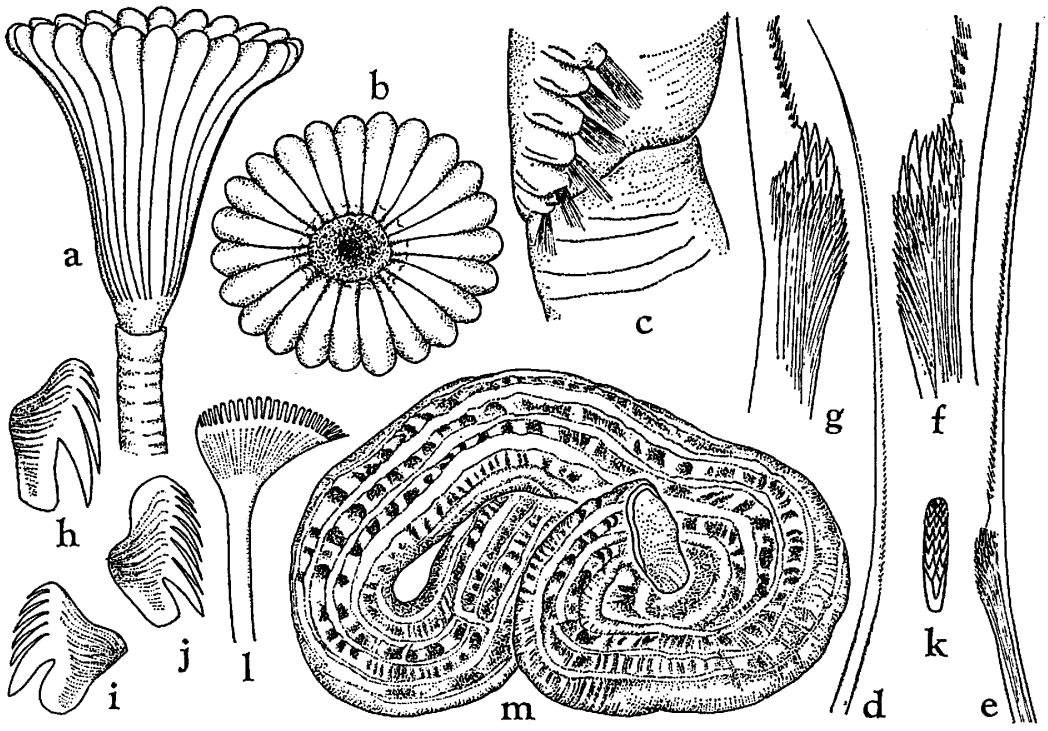

Fig. 2. *Serpula palauense* sp. nov. a, b, opercula, in lateral and frontal views, ×16; c, anterior end, showing posterior collar, ×12; d, limbate collar seta, ×155; e, bayonet-shaped collar seta, ×192; f, g, parts of bayonet-shaped setae, showing teeth at base of blade, ×500; h, thoracic uncinus, ×770; i, anterior abdominal uncinus, ×770; j, posterior abdominal uncinus, ×770; k, the same, in frontal view, ×770; l, abdominal seta, ×770; m, tube, ×3.8.

setae with a well defined apical hairy zone, about 10 small teeth and a subapical (more proximal) denticulate zone at the base of the blade (Fig. 2, e, f, g). The remaining thoracic setae are thick and slender limbate capillaries; the thoracic uncini have 5 sharply pointed teeth in a row, of which the most anterior is the largest (Fig. 2, h). The anterior abdominal uncini are slightly small than those of the thorax, with 6 teeth in a row (Fig. 2, i); the posterior uncini are about as large as those of the thorax, with one to three rows of minute teeth, about 7 to 8 teeth are visible in profile (Fig. 2, j, k). Abdominal setae number about 10 in a fascicle; they are trumpet-shaped distally, with about 20 very slender teeth in lateral view (Fig. 2, l). Posteriorly they are replaced by long capillary setae.

The tube is calcareous, thick-walled and irregularly coiled. It is circular in cross-section, with 5 longitudinal ridges and many transverse wrinkles; its surface is brownish, and dotted with small deep-brown speckles at the spaces between transverse wrinkles (Fig. 2, m).

Remarks. *Serpula palauense* is similar to *S. massilensis* ZIBROWIUS, 1968 from Marseilles region, in having bayonet-shaped collar setae with small teeth and a subapical denticulate zone. However, the species differs from *S. massilensis* in the following characteristics: the opercular funnel has a deep hollow, and all radii extend farther down to the center, instead of about only 1/3 of the length of the funnel; the thoracic membranes end just posterior to the fifth row of uncini, instead of to the second or third row of uncini; moreover, the features of uncini and tube of the *palauense* are differing from those of *massilensis*.

Type-series. Holotype, NSMT-Pol. H 171; 10 paratypes, NSMT-Pol. P 172.

Distribution. Palau Islands.

Genus ***Hydroides*** GUNNERUS, 1768

Hydroides tambalagamensis PILLAI, 1961

Hydroides tambalagamensis PILLAI, 1961, pp. 36–38, fig. 12, A–G; STRAUGHAN, 1967b, p. 33, fig. 3, g; KOHN & LLOYD, 1973, p. 387; IMAJIMA, 1976a, pp. 123–126, fig. 2; 1976b, pp. 231–232.

Material examined. Malakal (5), Arakabesan (8), Gesodokkuru reef, off Arumonogui (7), Auluptagel (1), Kayangel (1), Arumizu Bay (2).

Distribution. Sri Lanka; Sumatra; Australia; southern Japan; Palau Islands.

Hydroides minax (GRUBE, 1878)

Serpula minax GRUBE, 1878, p. 269, pl. 15, fig. 5.

Hydroides minax: FAUVEL, 1953, p. 460, fig. 241, f; PILLAI, 1960, pp. 8–10, text-fig. 3, A–E; 1971, p. 110; GIBBS, 1971, p. 202; IMAJIMA, 1976a, pp. 129–130, fig. 5, a–j; 1976b, pp. 233–234.

Material examined. Gesodokkuru reef (7), Malakal (3).

Distribution. Southern Africa; Indian Ocean; Red Sea; Sri Lanka; Australia; Philippines; Japan; Solomon Islands; French Polynesia; Palau Islands.

Hydroides exaltata (MARENZELLER, 1884)

Eupomatus exaltatus MARENZELLER, 1884, p. 217, pl. 4, fig. 3; WILLEY, 1905, pp. 312–313, pl. 7, fig. 182.

Hydroides exaltata: FAUVEL, 1953, p. 461; DEW, 1959, pp. 27–28, fig. 6, A; PILLAI, 1960, pp. 10–12, text-fig. 4, A–E; STRAUGHAN, 1967a, p. 220; IMAJIMA, 1976a, pp. 127–128, fig. 4.

Material examined. Malakal (1), Kayangel (3).

Distribution. Red Sea; Arabian Gulf; Sri Lanka and S. India; Sumatra; W. and E. Australia; Japan; Solomon Islands; Palau Islands.

Hydroides brachyacantha RIOJA, 1941

(Fig. 3, a–j)

Hydroides brachyacantha RIOJA, 1941, pp. 169–172, pl. 3, fig. 2, pl. 4, figs. 1–9; DEW, 1959, p. 28, fig. 7; STRAUGHAN, 1967a, p. 222.

Material examined. Kayangel (81), Inuf, Yap Islands (4).

Description. The largest specimen measures 17 mm in length, including operculum, and about 0.6 mm in width in the thorax; it consists of 108 segments including the thoracic ones.

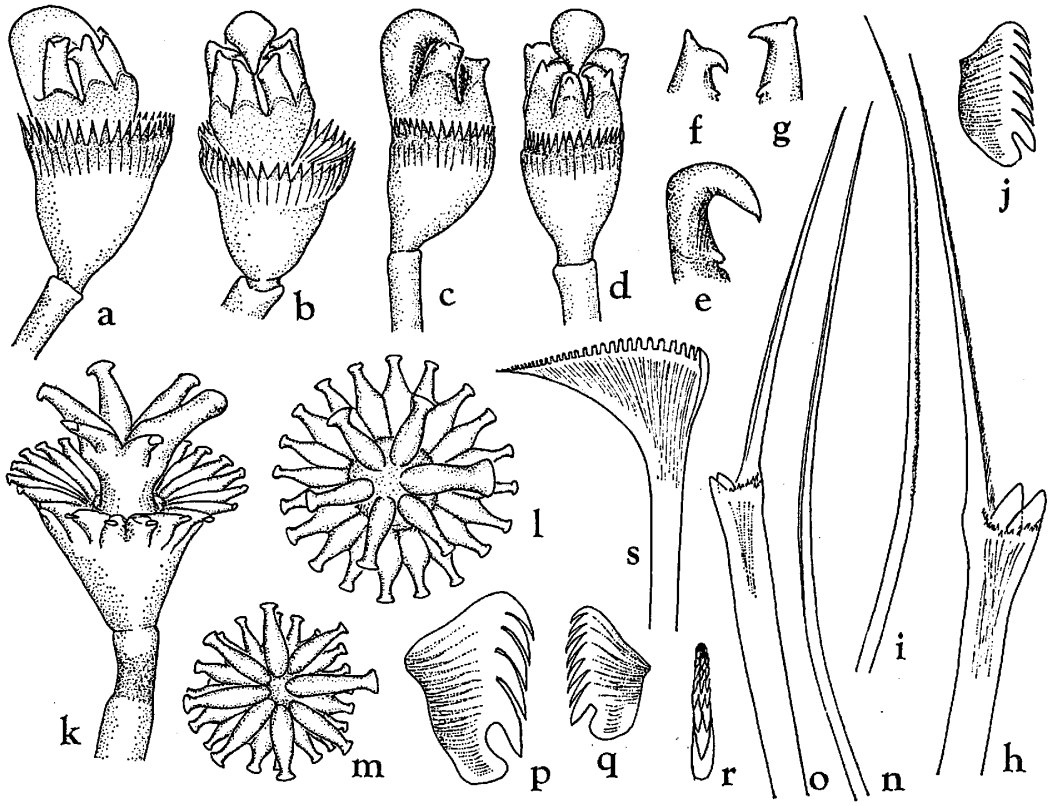

Fig. 3. *Hydroides brachyacantha* RJOJA. a, b, opercula, in lateral and ventral views, ×33; c, d, opercula of other specimen, lateral and ventral views, ×33; e, largest spine of opercular crown, ×33; f, g, two small spines of same crown, ×33; h, bayonet-shaped collar seta, ×310; i, limbate collar seta, ×310; j, thoracic uncinus, ×770.
Hydroides malleolaspina STRAUGHAN. k, l, opercula, in lateral and frontal views, ×33; m, operculum of other specimen, in frontal view, ×33; n, limbate collar seta, ×155; o, bayonet-shaped collar seta, ×155; p, thoracic uncinus, ×770; q, r, posterior abdominal uncini, in side and frontal views, ×770; s, abdominal seta, ×770.

The branchiae have 6 to 10 gill-radioles on either side; the gill-radioles end in enlarged slender tips. The peduncle is cylindrical and arises from the left or right side of the branchial lobes.

The distal half of the opercular funnel and the basal part of the crown are dark-brown in colour. The opercular funnel has 38 to 46 radii, pointed outwards. The opercular crown has 5 to 7 spines, with a thick cuticle (Fig. 3, a–d). The dorsalmost spine is larger and stouter than the others; it has a longer distal end, curved towards the center of the crown, forming a cage (Fig. 3, e). The remaining spines have a nearly terminal hook pointing downwards and inwards. They also have a small external swelling at its shoulder and a somewhat pointed accessory basal radial spine (Fig. 3, f, g).

The collar setate are of two types: bayonet-shaped setae with two large conical teeth and some small accessory teeth at the base of the minutely serrated blade (Fig. 3, h) and finely serrated capillaries (Fig. 3, i). The remaining thoracic setae are limbate capillaries; the thoracic uncini have 7 teeth, the anteriormost tooth is the largest (Fig. 3, j). Abdominal setae are trumpet-shaped distally; the posterior abdominal uncini have 2 to 7 rows of minute teeth, about 10 teeth are visible in profile.

The tube is white, sinous; it is sub-trapezoidal in cross-section with two or three longitudinal ridges.

Distribution. Mexico; Australia; Palau Islands.

Hydroides tuberculata IMAJIMA, 1976

Hydroides tuberculata IMAJIMA, 1976a, pp. 132–133, fig. 7, a–j; 1976b, p. 233.

Material examined. Malakal (14), off Kwannon (1), Gesodokkuru reef, off Arumonogui (54), Kayangel reef (3), Augulpel reef (1).

Distribution. Japan; Palau Islands.

Hydroides albiceps (GRUBE, 1870)

Serpula (*Eupomatus*) *albiceps* GRUBE, 1870, pp. 520–521.

Hydroides albiceps: STRAUGHAN, 1967a, p. 220, fig. 6(m); IMAJIMA, 1976a, pp. 133–135, fig. 8, a–v; 1976b, pp. 234–235.

Material examined. Malakal (17), near KB Bridge (2), Auluptagel (1), off Kwannon (3), Arumizu Bay (93), Kayangel (3), Gesodokkuru reef, off Arumonogui (13).

Distribution. Red Sea; Australia; Japan; Palau Islands.

Hydroides malleolaspina STRAUGHAN, 1967
(Fig. 3, k–s)

Hydroides malleolaspina STRAUGHAN, 1967a, pp. 222–224, fig. 7.

Material examined. Arakabesan (1), off Kwannon (1), Arumizu Bay (10), off Arumonogui, in 5–7 m (9), Kayangel attol, in 4 m (2).

Description. The largest specimen measures about 20 mm in length, including operculum, and about 1 mm in width in the thorax; it consists of 97 segments.

The branchiae have 10 to 12 pairs of gill-radioles on either side; each gill-radiole has a rather long, free filament. The collar has three lobes; the latero-dorsal ones are large and associated with the collar setae. The peduncle is smooth and cylindrical; it arises from the left side or the right side. The opercular funnel is whitish; it has 15 to 20 marginal radii, their tips are club-shaped with semi-circular frontal margins. The opercular crown consists of a stout, dorsal spine and 4 to 7 spines, which rather slightly slender than the dorsal one. These spines are elongated bottle-shaped, with a semicircular anterior margin and a short neck-like constriction; the dorsal spine is 1.2 to 1.5 times as thick as the remaining ones (Fig. 3, k, l, m).

The thorax has 7 segments, 6 of which are uncinigerous. The collar setae are of two types: fine capillaries (Fig. 3, n) and bayonet-shaped setae with two conical teeth and a variable number of small teeth at the base of the blade (Fig. 3, o). The remaining thoracic setae are limbate capillaries; the thoracic uncini are subtriangular and have 5 teeth in a row (Fig. 3, p). The anterior abdominal uncini are smaller than those of the thorax, and have 5 teeth in a row; posteriorly they are rasp-like, with 8 teeth visible in profile, in one to three rows (Fig. 3, q, r). The abdominal setae are trumpet-shaped distally, with about 30 minute teeth in lateral view (Fig. 3, s); they are replaced by long capillary setae in the posterior segments.

The tube is white, thick-walled and irregularly coiled. It is sub-trapezoidal in cross-section, with three longitudinal ridges and many transverse wrinkles.

Distribution. Australia; Palau Islands.

Hydroides fusca IMAJIMA, 1976

Hydroides fusca IMAJIMA, 1976a, pp. 130–131, fig. 6, a–i.

Material examined. Augulpel reef (1), off Arumonogui, in 5 m (1).

Distribution. Japan; Palau Islands.

Hrdroides elegans (HASWELL, 1883)

Eupomatus elegans HASWELL, 1883, p. 633, pl. 12, fig. 1.
Hydroides elegans: ZIBROWIUS, 1971, pp. 721–727, figs. 56–64; 1973a, pp. 42–44; 1973b, pp. 684–685; TEN HOVE, 1974, p. 46, figs. 1–3; IMAJIMA, 1976b, pp. 237–238, fig. 3.

Material examined. Arumizu Bay (75).

Distribution. Australia; W. Europe; Mediterranean Sea; Caribbean Sea; Sri Lanka; Hawaiian Islands; Philippines; Japan; Palau Islands.

Hydroides longispinosa IMAJIMA, 1976

Hydroides longispinosa IMAJIMA, 1976b, pp. 240–246, fig. 5, a–q.

Material examined. Attached to boat of MMDC, Malakal (42), off Arumonogui (2), Arakabesan (1).

Distribution. Japan; Palau Islands.

Hydroides bifidus sp. nov.

(Fig. 4, a–o)

Material examined. Off Arumonogui, in 5 m (holotype).

Description. The holotype is, including the operculum, 17 mm in length, and about 2 mm in width in the thorax; it consists of 94 segments.

The branchiae are about 5 mm in length; there are 22 gill-radioles on the right side and 23 on the left, arranged in a semi-circle. The radioles are not connected by a branchial membrane, and have a slender, pinnule-free tip distally.

The opercular peduncle is thick and cylindrical, and arises from the right branchial lobe, just below the first filament; a rudimentary operculum is situated at the opposite side. The opercular funnel has 25 marginal radii with long, bifurcated tips. The radii are V-shaped, and each prong of the fork terminates in a slender, tapering and outwardly; there is no any spine in the inner surface (Fig. 4, a, b). The opercular crown is a circlet of 21 bifurcated spines, similar to those of the funnel. Each spine has about seven accessory teeth, arranged in a single row on the inner side; the most distal accessory tooth of the spine is bi- or tridentate (Fig. 4, c, d). A central spine is lacking. There is a constriction between the basal part of the funnel and peduncle.

The collar has one ventral and two latero-dorsal lobes, which are continuous with the thoracic membranes, ending just posterior to the fifth uncinigerous segment.

The thorax has 7 segments, of which 6 are uncinigerous. The collar setae are of two types: slender, limbate capillaries (Fig. 4, e) and bayonet-shaped setae, with two large, symmetrical conical teeth at the base

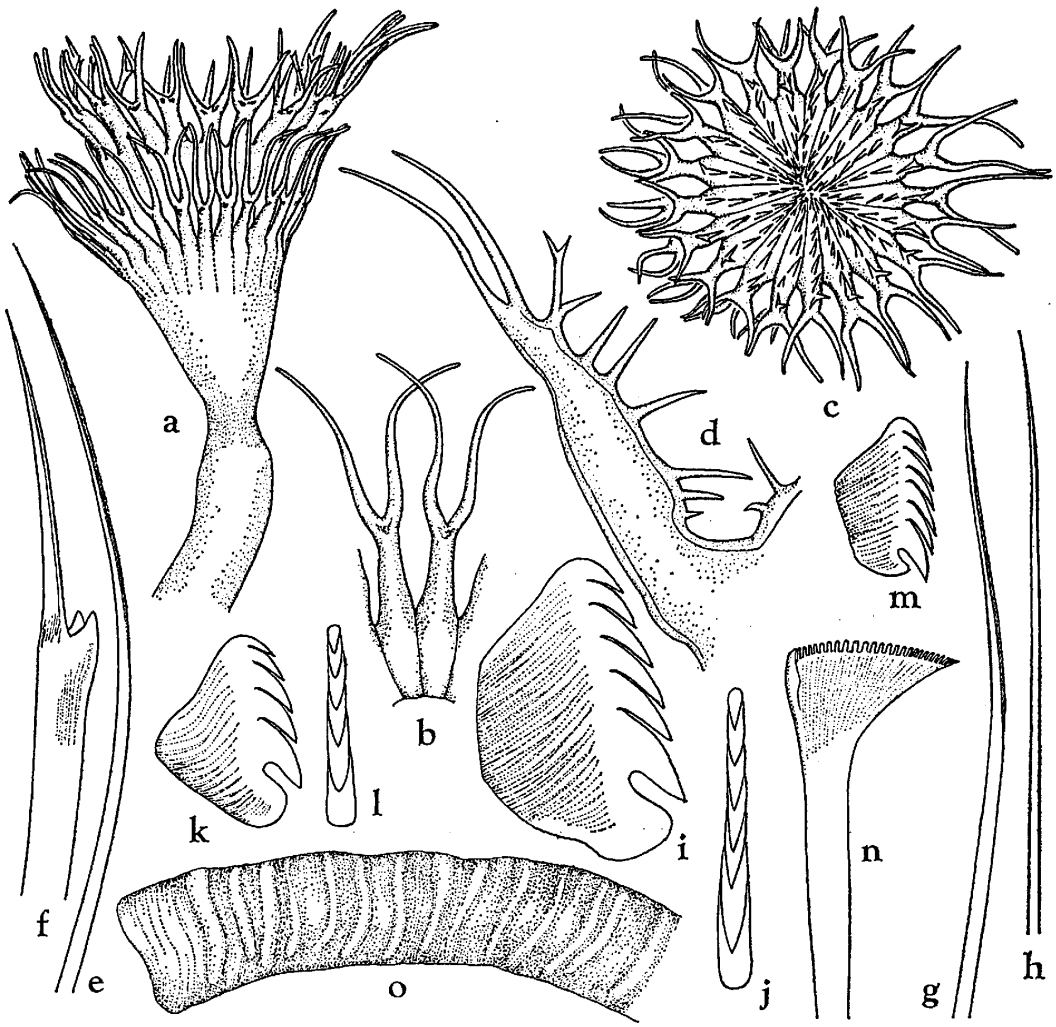

Fig. 4. *Hydroides bifidus* sp. nov. a, operculum, in lateral view, ×17; b, part of opercular funnel, in frontal view, ×30; c, operculum, in frontal view, ×17; d, part of opercular crown, in lateral view, ×30; e, f, collar setae, ×143; g, h, thoracic limbate setae, ×143; i, j, thoracic uncini, in side and frontal views, ×700; k, l, anterior abdominal uncini, in side and frontal views, ×700; m, posterior abdominal uncinus, in side view, ×700; n, abdominal seta, ×700; o, anterior part of tube, ×4.8.

of the blade (Fig. 4, f). The remaining thoracic setae are thick (Fig. 4, g) and slender limbate capillaries (Fig. 4, h) ; the thoracic uncini have six sharply pointed teeth in a row, of which the most anterior is the largest (Fig. 4, i, j). The anterior abdominal uncini are about 2/3 as large as those of the thorax, with five teeth in a row (Fig. 4, k, l) ; posteriorly the number of teeth increases to seven visible in profile, in one to three rows (Fig. 4, m). The abdominal setae are trumpet-shaped distally, with about 25 minute teeth in lateral view (Fig. 4,n) ; they are

replaced by long capillary setae in the posterior segments.

The tube is white, thick-walled and subequal throughout the whole length; it is sub-circular in cross-section and the surface has many transverse winkles (Fig. 4, o).

Remarks. *Hydroides bifidus* is related to *H. heterofurcata* PILLAI, 1971 from Sri Lanka. However, *H. bifidus* can be easily distinguished from the latter, by the features of the opercular funnel and crown. Although the features of the operculum of the present species are closely similar to *Schizocraspedon furcifera* (GRUBE, 1878) (as *Serpula furcifera*) from Philippines, the remaining characters, chiefly in the setae, differ from those of the genus *Hydroides*.

Type. Holotype, NSMT-Pol. H 173.

Distribution. Palau Islands.

Genus ***Spirobranchus*** BLAINVILLE, 1818

Spirobranchus giganteus giganteus (PALLAS, 1766)

Spirobranchus giganteus giganteus: TEN HOVE, 1970, pp. 14–23, figs. 35–62.

Material examined. Malakal (3).

Distribution. Tropical and subtropical coasts.

Spirobranchus giganteus corniculatus (GRUBE, 1862)

Spirobranchus giganteus corniculatus: TEN HOVE, 1970, pp. 24–32, figs. 63–73, pl. 2, c; IMAJIMA, 1976a, pp. 136–137, fig. 9.

Material examined. Malakal (3), Gesodokkuru reef, off Arumonogui (1).

Distribution. Indian Ocean; Malaysian Archipel.; Philippines; southern Pacific Islands; N. Eastern Australia; Japan; Palau Islands.

Spirobranchus tetraceros (SCHMARDA, 1861)

Spirobranchus tetraceros: TEN HOVE, 1970, pp. 3–14, figs. 1–27; IMAJIMA, 1979, pp. 177–178, fig. 8.

Material examined. Malakal (4), attached on boat of MMDC (1); Arumizu Bay (33), Gesodokkuru reef, off Arumonogui (1).

Distribution. Caribbean Sea; tropical pacific coast of America; Malaysian Archipel.; Indian Ocean; Natal; Sydney; Japan; Palau Islands.

Spirobranchus tricornigerus decoratus subsp. nov.

(Fig. 5, a–m)

Material examined. Malakal (2), Gesodokkuru reef, off Arumonogui (holotype and 4 paratypes), Aiyasu reef (5), Augulpel reef (4), Melekeiok

(1), Kayangel (3).

Description. The holotype is, including operculum, 11 mm in length, and about 1.5 mm in width in the thorax; it consists of 71 segments.

The branchiae have 17 gill-radioles on either side; the gill-radioles end distally in slender, pinnule-free filaments, and have four transverse colour bands through the whole length. The radioles are connected by web-like branchial membrane for about 2/5 of their length (Fig. 5, a). The collar has one ventral lobe and two latero-dorsal ones. The latter are continuous with the thoracic membranes, which end posterior to the

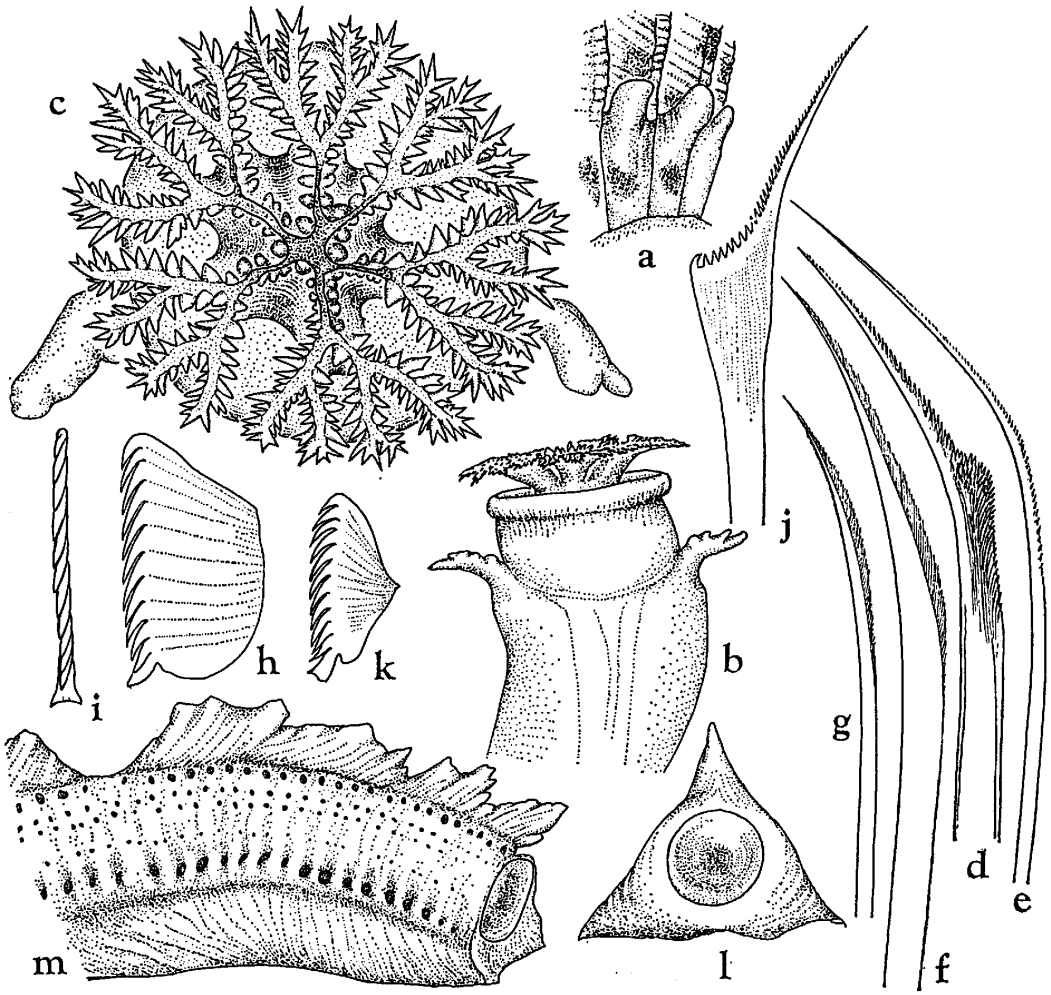

Fig. 5. *Spirobranchus tricornigerus decoratus* subsp. nov. a, basal part of branchial lobe, showing branchial membrane, ×16; b, operculum, in ventral view, ×16; c, the same, in frontal view, ×37; d, bayonet-shaped collar seta, ×310; e, capillary collar seta, ×155; f, g, thoracic limbate setae, ×310; h, thoracic uncinus, in side view, ×770; i, the same, in frontal view, ×770; j, abdominal seta, ×770; k, abdominal uncinus, ×770; l, cross-section of tube, ×8; m, tube, in lateral view, ×8.

last row of uncini.

The peduncle arises from the base of the right branchial lobe; it is flattened and has a pair of wing-like expansions, bearing 2 to 4 short processes on their upper margin. The operculum is a circular, concave disc, with six main branched spines in a crown-like structure arising fro mthe centre of the disc. Each one of the six spines is bifurcated distally, and has many triangular denticles closely arranged along both sides of branches. The denticles near the centre of the disc are somewhat conical and erected (Fig. 5, b, c).

The thorax has 7 segments, 6 of which are uncinigerous. The collar setae are of two types: bayonet-shaped setae covered with papillate to pilose processes along the distal portions of their shafts (Fig. 5, d), and capillary setae with minutely serrated blades (Fig. 5, e). The remaining thoracic setae are limbate capillaries of two sizes (Fig. 5, f, g); the thoracic uncini have 12 teeth in a row, the most anterior tooth is large and gouge-shaped (Fig. 5, h, i). The abdominal setae are compressed trumpet-shaped, terminating in a long delicate point, with a double row of serrations (Fig. 5, j); they number two to seven in a segment and continue to the posterior end. The abdominal uncini are sub-triangular, smaller than the thoracic ones, and have 12 teeth, with one anterior gouge (Fig. 5, k).

The tube is pink or partly pink on the white ground; it is triangular in cross-section, with a hight, coarsely serrated medial keel (Fig. 5, l). There is five longitudinal rows of circular pits, those in the superior and inferior rows are larger than the rest (Fig. 5, m).

Remarks. The present new subspecies is closely allied to the stem form, *Spirobranchus tricornigerous* GRUBE, 1878 from Philippines, by may be differentiated from it in features of the operculum with more closely arranged denticles along the spines.

Type-series. Holotype, NSMT-Pol. H 174; 4 paratypes, NSMT-Pol. P 175.

Distribution. Palau Islands.

Genus ***Pomatoleios*** PIXELL, 1913

Pomatoleios kraussii (BAIRD, 1865)

Pomatoleios kraussii: DAY, 1955, p. 449; STRAUGHAN, 1967a, p. 235; IMAJIMA, 1976a, pp. 135–136.

Material examined. Arumizu Bay (50).

Distribution. Indian Ocean; Red Sea; South Africa; Australia; Japan; Palau Islands.

Genus *Pomatostegus* SCHMARDA, 1861

Pomatostegus stellatus (ABILDGAARD, 1789)

Terebella stellata ABILDGAARD, 1789, p. 142, pl. 3, fig. 5a–b.
Pomatostegus stellatus: PIXELL, 1913, p. 79; FAUVEL, 1932, p. 246; 1953, p. 465, fig. 248; OKUDA, 1937, pp. 309–311, figs. 56–58; DEW, 1959, pp. 41–42, fig. 14, A–G; PILLAI, 1960, pp. 23–25, text-fig. 9, A–D; STRAUGHAN, 1967a, p. 238; IMAJIMA, 1977, pp. 101–102, fig. 7.

Material examined. Malakal (2), Gesodokkuru reef, off Arumonogui (2), Inuf, Yap Island (12).

Distribution. West Indies; Red Sea; Atlantic Ocean; Australia; Palau Islands; southern Japan (Okinawa and Ogasawara Islands).

Genus *Metavermilia* BUSH, 1904

Metavermilia acanthophor (AUGENER, 1914)

Vermiliopsis acanthophora AUGENER, 1914, pp. 155–158, pl. 1, figs. 21–24; DEW, 1959, p. 32, fig. 9A–E; STRAUGHAN, 1967a, p. 234.
Metavermilia acanthophora: TEN HOVE, 1975, p. 57; IMAJIMA, 1976a, pp. 138–139, fig. 10, a–k.

Material examined. Malakal (1), Kwannon (1).

Distribution. Australia; southern Japan; Palau Islands.

Genus *Vermiliopsis* SAINT-JOSEPH, 1894

Vermiliopsis infundibulum/glandigera-group

Vermiliopsis infundibulum/glandigera-group: IMAJIMA, 1976a, pp. 139–141, fig. 11, a–o [for synonymy]; 1978, p. 57.

Material examined. Malakal (24), Arumizu Bay (22), Arakabesan (13), Auluptagel (18), Gesodokkuru reef, off Arumonogui (53), Kayangel (26), Inuf, Yap Island (18).

Distribution. Circum (sub-)tropical; Japan; Plau Islands.

Genus *Filograna* BERKELEY, 1835

Filograna implexa BERKELEY, 1835

Filograna implexa: DAY, 1967, pp. 817–818, fig. 38.7. a–h.
Salmacina dysteri: DEW, 1959, p. 50, fig. 19; STRAUGHAN, 1967a, pp. 250–251.

Material examined. Melekeiok (many), Kayangel (many), off Arumonogui (many).

Distribution. Atlantic Ocean; western Africa; Mediterranean Sea; Red Sea; S.W. Australia; Japan; Palau Islands.

Table 1. Geographic distribution of the serpulid species found in the Palau and Yap Islands.

Species of Serpulid	Southern Japan	Philip-pines	Palau, Yap Islands	Australia	Indian Ocean	Other localities
Serpula vermicularis	+	+	+	+	+	+
Hydroides exaltata	+	+	+	+	+	+
Hydroides elegans	+	+	+	+	+	+
Hydroides minax	+	+	+	+	+	+
Spirobranchus giganteus corniculatus	+	+	+	+	+	−
Ditrupa arietina	+	+	+	−	+	+
Pomatoleios kraussii	+	−	+	+	+	+
Pomatostegus stellatus	+	−	+	+	+	+
Vermiliopsis infundibulum/ glandigera-group	+	−	+	+	+	+
Spirobranchus tetraceros	+	−	+	+	+	+
Hydroides albiceps	+	−	+	+	+	+
Serpula watsoni	+	−	+	+	+	−
Hydroides tambalagamensis	+	−	+	+	+	−
Filograna implexa	+	−	+	+	−	+
Serpula vittata	+	−	+	+	−	−
Metavermilia acanthophora	+	−	+	+	−	−
Serpula cf. *kaempferi*	+	−	+	−	+	−
Hydroides fusca	+	−	+	−	−	−
Hydroides longispinosa	+	−	+	−	−	−
Hydroides tuberculata	+	−	+	−	−	−
Spirobranchus giganteus giganteus	−	+	+	+	+	+
Hydroides brachyacantha	−	−	+	+	−	+
Hydroides malleolaspina	−	−	+	+	−	−
Serpula concharum	−	−	+	−	−	+
Serpula palauense	−	−	+	−	−	−
Hydroides bifidus	−	−	+	−	−	−
Spirobranchus tricornigerus decoratus	−	−	+	−	−	−

Genus *Ditrupa* BERKELEY, 1832

Ditrupa arietina (O. F. MÜLLER, 1776)

Ditrupa arietina: FAUVEL, 1927, pp. 374–375, fig. 128, a–g; IMAJIMA, 1964, pp. 48–50, text-fig. 1–5; ZIBROWIUS, 1968, pp. 169–171, pl. 9, fig. 8–13.

Material examined. Kayangel Atoll (32), off Arumonogui, in 5 m (13).

Distribution. Western Europe; Mediterranean Sea; Red Sea; Indian Ocean; Philippine Islands; Japan; Palau Islands.

Zoogeography

The Palau Islands are located roughly at 7°3′ North Latitude and 134°3′ East Longitude and about 500 miles east of Mindanao, the Philippines. The tropical marine fauna are dispersed by the North Equatorial Current and the warm Kuroshio Current, which flows northward along the Ryukyu Islands. Its effects may extend from the surface waters to a depth of 700 m. From the distributional data analyzed in Table 1, of the 27 recorded serpulid species from the Palau Islands, 20 or 74% are known also from southern Japan. This indicates that the serpulid polychaetes in this area are similar to that of the southern Japan. On the other hand, of the 27 recorded species, 18 or 66% are known also from Australia, and 15 or 55% are known from Indian Ocean. A small percentage of the species were found in the Philippines, this is due to the fact that the fauna around its area is not yet clear. The two species and one subspecies are endemic to the Palau Islands, as far as it is known.

摘　　要

今島　実(国立科学博物館　動物研究部)——パラオ諸島とヤップ諸島から得られたカンザシゴカイ類（多毛類).

昭和55年度文部省科学研究費補助金による海外学術調査（研究代表者　今島　実，課題番号504101）が昭和55年6月8日～7月20日間に，ミクロネシア海域のパラオ諸島とヤップ諸島において海産動物相を明らかにする目的で実施された.

この調査により多くの多毛類が採集されたが，ここではカンザシゴカイ科について研究された．それはパラオ諸島のカンザシゴカイ科は現在まで2種のみしか知られていず，甚だ不充分であることと，日本では今島（1976～）によりかなりよく調査されていてミクロネシア海域の種類相と日本の種類相とを比較検討できるなどからである.

パラオ諸島とヤップ諸島から9属，27種のカンザシゴカイ類を明らかにした．この中には *Serpula palauense* と *Hydroides bifidus* の2新種と *Spirobranchus tricornigerus*

decoratus の 1 新亜種が含まれる.

明らかにされた27種を日本，フィリピン，オーストラリア，インド洋，その他の海域などと各種の分布を比較してみると，20種（74%）が南日本に，18種（66%）がオーストラリアに，そして15種（55%）がインド洋に分布している．フィリピンとの共通種（7種，25%）が少ないのはフィリピン海域でのこの類の研究が不充分なためと考えられる.

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