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Two New Species of Serpulids (Annelida, Polychaeta) from Sesoko Island, Okinawa

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Abstract Two species of the Serpulidae previously recorded as *Hydroides* sp. and *Metavermilia* sp. from Sesoko Island, Okinawa, are reexamined. Both are new to science. *Hydroides bisectus* sp. nov. is remarkable in having 9 thoracic setigerous segments. *Metavermilia yamazatoi* sp. nov. is reported from Indonesia as well. Differential diagnoses are given.

Two benthic surveys on the coral reef invertebrates were carried out (in 1985 and 1986) around Sesoko Island and Bise, situated in the north-west part of Motobu Peninsula, Okinawa (YAMADA & YAMAZATO, 1987). In these surveys, 32 species of Serpulidae, except Spirorbinae, were reported by IMAJIMA (1987), of which 5 not identified to species.

Two of these unidentified species of the genera *Hydroides* and *Metavermilia* were reexamined, and are described as new species below.

TEN HOVE collected additional material during the Indonesian-Dutch Snellius II-Expedition, jointly organized by the Indonesian Institute of Science (LIPI) and the Netherlands Council of Oceanic Research (NRZ).

The authors are grateful to Dr. Kiyoshi YAMAZATO and his staff of the Sesoko Marine Science Center (SMSC), University of Ryukyus, for their help during the investigation.

The holotypes have been deposited in the National Science Museum, Tokyo; paratypes of *Metavermilia* are in the Zoological Museum, Amsterdam, and in the National Museum of Natural History, Leiden (RMNH).

Family **Serpulidae** JOHNSTON, 1865

Genus ***Hydroides*** GUNNERUS, 1768

Type species: *Hydroides norvegica* GUNNERUS, 1768; by monotypy.

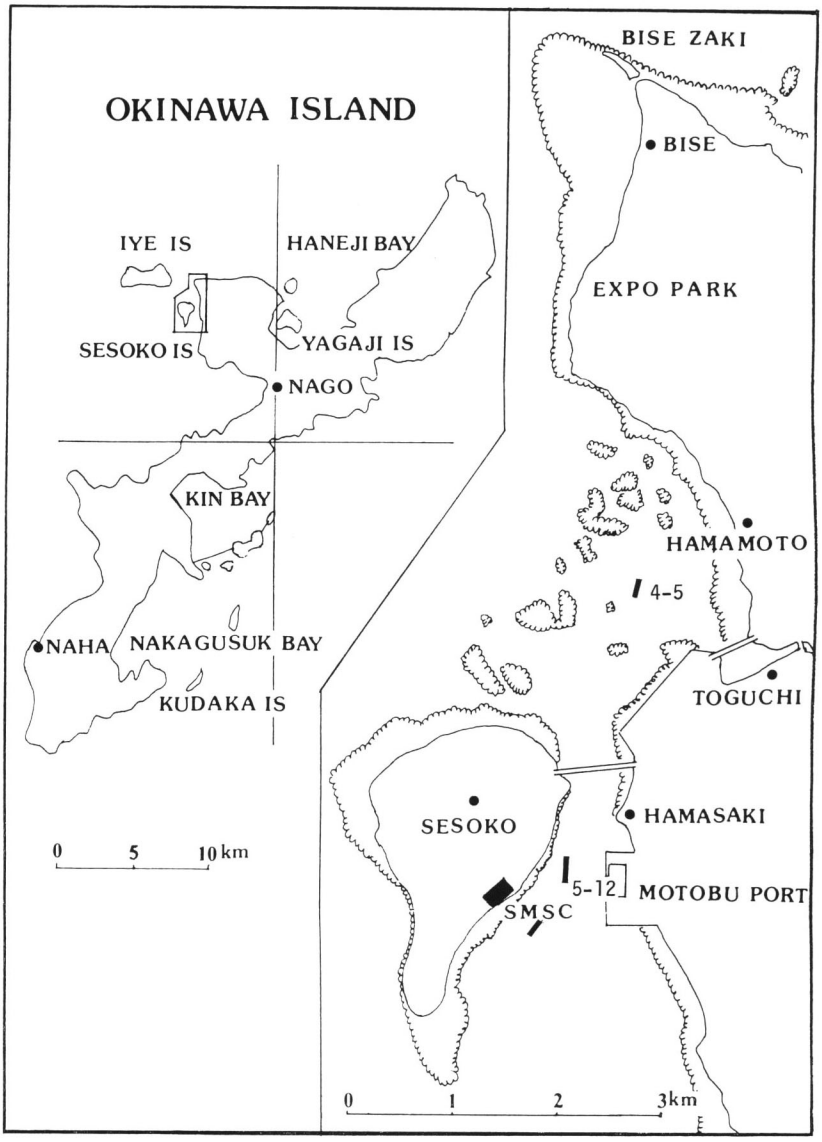

Fig. 1. Map of Okinawa and Sesoko Islands showing stations.

Emended diagnosis: Seven thoracic setigers (exceptionally more). Branchiae in semicircles, radioles not connected by branchial membrane. Operculum with proximal denticulate funnel (exceptionally absent or developed as a few knobs only), and distal verticil of chitinous spines. Peduncle without any appendages; opposite radiole clublike pseudo-operculum. Tonguelets between collar and thoracic membranes

absent, latter forming apron. Collar setae bayonet and narrowly hooded ("capillaries"); thoracic setae broadly hooded ("limbate") and "capillaries." *Apomatus*-setae absent. Abdominal setae flat trumpet-shaped. Uncini subquadrangular with a single row of up to 7 teeth in thorax; in posterior abdomen multiple rows may occur.

Remarks: The main differences with previous diagnoses are a variable number of thoracic setigers (7–10) and some variation in the proximal funnel of the operculum. Apart from the species described here, a variable number of thoracic setigers is known for a species from Hawaii (BAILEY-BROCK, pers. comm.) and a species from the Caribbean (TEN HOVE & PERKINS, in preparation). In *Serpula*, the sister genus of *Hydroides*, species more often have a number of thoracic setigers higher than the usual 7 (TEN HOVE, 1984: 193). Variation in development of the funnel occurs in the species from Hawaii mentioned above, and is figured by TEN HOVE (1984, fig. 6).

Setae traditionally described as "limbate" and "capillaries" are in fact hooded setae of two different sizes, similar to the ones described for various sabellids by PERKINS, 1984 (e.g. pp. 287–288, fig. 5 A).

Hydroides bisectus sp. nov.

(Fig. 2 a–l)

Hydroides sp. A: IMAJIMA, 1987, p. 78.

Material examined. Off SMSC, 8 m deep (holotype).

Description. The holotype is, including the operculum, 9.2 mm in length, and about 0.4 mm in width in the thorax; it consists of 71 segments.

The branchiae have 6 radioles on the left side, and 7 on the right side, which end in slender, pinnule-free filaments. They are not connected by a branchial membrane.

The opercular peduncle is sub-cylindrical and arises from the left branchial lobe, just below the first filament; a rudimentary operculum is situated at the opposite side.

The opercular funnel is thinly chitinized; it has 27 marginal radii with yellowishly chitinized, acute, distal tips. The grooves, separating the radii, extend down for 1/2 of the funnel; the latter is separated from the peduncle by a clear constriction. The opercular crown (verticil) is inserted on a short stalk into the funnel; it has a circle of 7 spines (Fig. 2 a) arranged around a small, flat, central plate. All spines have a terminal darkish hook, pointing downwards and inwards; a distinct, outwardly curved, terminal whip is inserted to the outer edge of the hook. These whips are dark at their bases, white at their tips. The verticil spines do not show basal spinelets (Fig. 2 b).

The collar has one ventral and two latero-dorsal lobes, which are continuous with the thoracic membranes. The thoracic membranes are wide, covering the dorsal thorax, and are united ventrally across the anterior abdominal segments.

The thorax has 9 setigerous segments, 8 of which are uncinigerous (Fig. 2 c). The conspicuous collar setae are of two types: bayonet-shaped setae with two large, conical teeth at the base of a minutely serrated blade (Fig. 2 d) and narrowly hooded setae ("capillaries;" Fig. 2 e). The subsequent thoracic setae are hooded (Fig. 2 f);

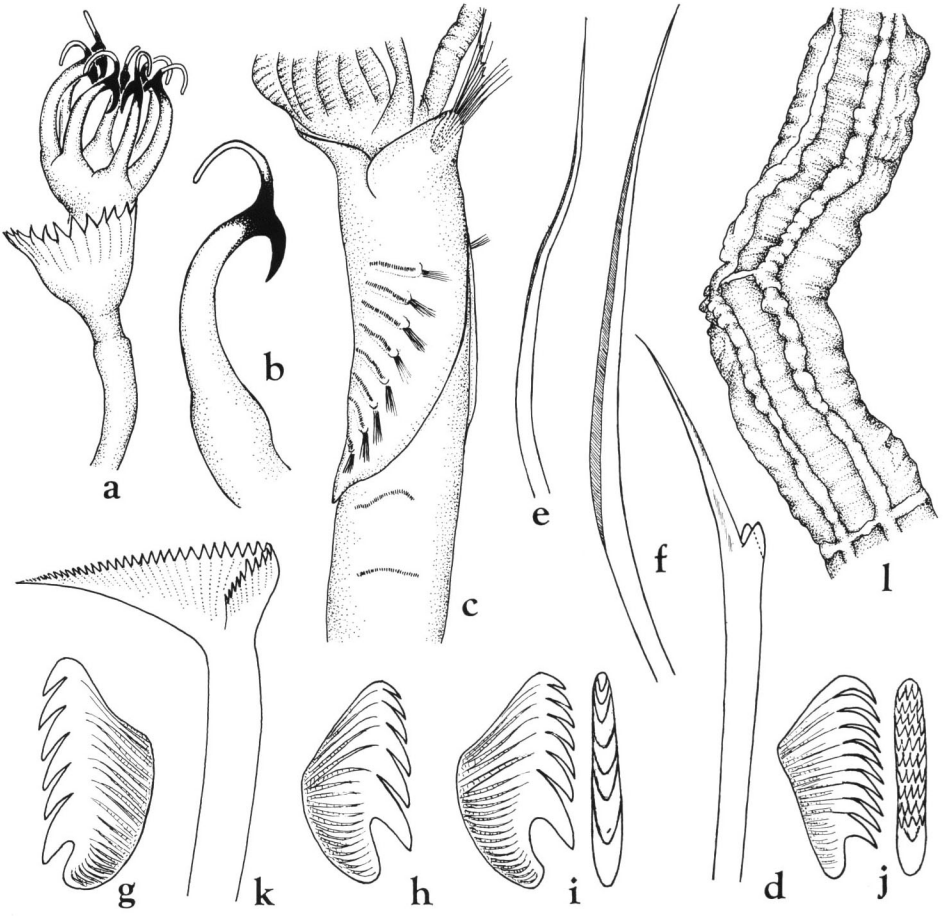

Fig. 2. *Hydroides bisectus* sp. nov. —— a, Operculum, ×44; b, verticil spine; ×88; c, anterior end of worm, in lateral view, ×44; d, e, collar setae, ×240; f, thoracic seta, ×640; g, thoracic uncinus, ×1,500; h, anterior abdominal uncinus, ×1,500; i, posterior uncini with 7 teeth in one row, in side and frontal views, ×1,500; j, posterior uncini with minute teeth in 3 to 4 rows, ×1,500; k, abdominal seta, ×1,500; l, tube, ×20.

the thoracic uncini have 6 teeth in one row, of which the most anterior tooth is the largest (Fig. 2 g). The anterior abdominal uncini are similar to those of the thorax, with 6 teeth in one row (Fig. 2 h). In posterior tori two types of uncini may be found: saw-shaped ones with 7 teeth, like those of the thorax (Fig. 2 i); and rasp-shaped ones, with 3 to 4 rows of minute teeth, and 10 to 11 teeth visible in profile (Fig. 2 j). Abdominal setae are flat trumpet-shaped distally, with about 25 teeth in lateral view (Fig. 2 k); they are replaced by long capillary setae in the posterior segments.

The tube is white, sub-trapezoidal to semi-circular in cross-section, with two longitudinal ridges (Fig. 2 l).

Remarks. About 125 species have been placed in the genus *Hydroides*, of which 80 are considered to be valid; 8 more species await description (TEN HOVE, unpublished). None of these show an operculum even remotely similar to that of *H. bisectus*, with its external whip-like appendages to the verticil spines.

The two as yet undescribed species with 7–10 thoracic setigers both are characterized by simple, straight verticil spines.

Distribution. Sesoko Island, Okinawa.

Type. Holotype, NSMT-Pol. H 256.

Genus *Metavermilia* BUSH, 1905

Metavermilia yamazatoi sp. nov.

(Fig. 3 a–p)

Metavermilia sp.: IMAJIMA, 1987, p. 80.

Material examined. Off Sesoko Island, dredge st. 4–5, 16 m deep (holotype); dredge st. 5–12, 8–5 m deep on dead corals (1 paratype); Snellius II-Exp. Stn. 4.056, Sawu Sea, off NE coast of Sumba, 125 m (1 paratype).

Description. Based on holotype, values of paratypes are given between parentheses. The holotype measures, including branchiae, about 10 mm (to 20 mm) in length and about 0.7 mm (to 1.0 mm) in width in the thorax; it consists of 42 (to about 110) segments.

The branchiae have 12 (–14) radioles on either side, which have a pectiniform arrangement and are not connected by a branchial membrane; all radioles end distally in filamentous tips. The second radiole on the right side is transformed into a large, ribbon-like opercular stalk; it is irregularly annulated, and wingless (Fig. 3 a).

The operculum is composed of four tiered funnel-like structures, of different types. The proximal soft globular funnel is fringed by nine (to ten) bifurcated spines, gradually increasing in size from the dorsal towards the ventral side of the funnel. Each spine has two lateral, horn-like, recurved prongs. The second funnel has (four to) six horn-like spines on its ventral side and two (to four) conical tubercles dorsally. The third funnel has two small, conical tubercles dorsally (In the largest paratype there is a fringe of ten dark knobs, of which the four dorsal ones are developed as conical tubercles). The most distal storey has a circle of (seven to) nine simple, outwardly curving spines and a long central spine (Fig. 3 b–f).

The collar is ample and has a ventral and two laterodorsal lobes. The latter are continuous with the thoracic membranes, which end posterior to the sixth uncinigerous segment. The thoracic membranes are rather wide anteriorly, but the posterior part of the thorax is largely unprotected (Fig. 3 a).

The thorax has 7 segments, 6 of which are uncinigerous (the 7th setiger on the right side is undeveloped in one paratype). The small fascicles of collar setae contain only a few hooded setae, thick (Fig. 3 g) and slender (Fig. 3 h). The subsequent thoracic

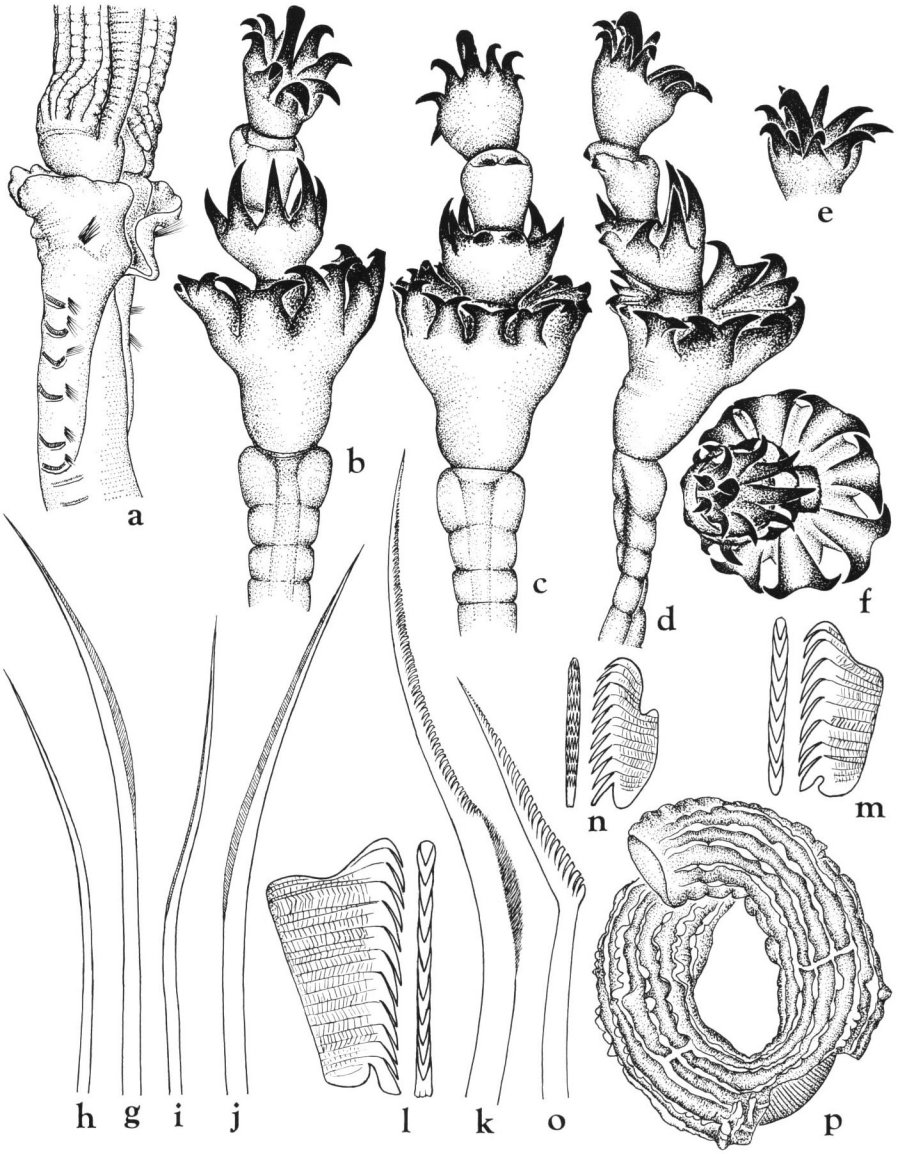

Fig. 3. *Metavermilia yamazatoi* sp. nov. —— a, Anterior end of worm, in latero-dorsal view, ×20; b–d, opercula, in ventral (b), dorsal (c) and lateral (d) views, ×40; e, most distal storey of operculum, ×40; f, operculum, in frontal view, ×40; g, h, collar setae, ×330; i, j, thoracic hooded setae, ×330; k, thoracic "*Apomatus*"-seta, ×540; l, thoracic uncinus, in side and frontal views, ×840; m, anterior abdominal uncinus, in side and frontal views, ×840; n, posterior abdominal uncinus, in side and frontal views, ×840; o, geniculate abdominal seta, ×840; p, tube, ×9.

bundles have slender (Fig. 3 i) and thick (Fig. 3 j) hooded setae and "*Apomatus*"-setae, with a denticulate blade and a short, limbate proximal zone (Fig. 3 k). The thoracic uncini are saw-shaped, with 11 teeth; the most anterior tooth is truncated, and has a minute median tubercle in frontal view (Fig. 3 l). Anterior abdominal uncini are similar but slightly smaller than the thoracic ones, with 8 to 9 teeth, including a round anterior tooth (Fig. 3 m); posteriorly they are replaced by rasp-shaped uncini, with 4 rows of minute teeth, with 10 to 11 teeth visible in profile (Fig. 3 n). Abdominal setae are geniculate, with a coarsely denticulate edge (Fig. 3 o); they are replaced by long capillary setae in the posterior segments.

The tube is white, with a hyaline overlay. It may be irregularly coiled upon itself. The tube is sub-circular in cross-section, with 5 to 6 longitudinal ridges (Fig. 3 p).

Remarks. *Metavermilia yamazatoi* can easily be distinguished from the other species of *Metavermilia* by its very characteristic operculum. It should be noted, however, that the distal opercular storey in *M. yamazatoi* and *M. spicata* IMAJIMA (1977: 97–99, fig. 5) are extremely alike. Moreover, *M. spicata* has sharply bifurcated spines as well, although their prongs are straight and not curved as in *M. yamazatoi*. Apparently both species are morphologically more close to each other, than to the remaining species of the genus.

Etymology. The species is named after Prof. K. YAMAZATO of the University of the Ryukyus, who gave IMAJIMA the chance to collect on Sesoko Island.

Type series. Holotype, NSMT–Pol. H 257; 1 paratype, ZMA tH 657; 1 paratype, RMNH 18178.

Distribution. Sesoko Island, Okinawa; off Sumba, Sawu Sea, Indonesia.

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