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Spionidae (Annelida, Polychaeta) from Japan I. The Genera *Aonides* and *Apoprionospio*

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Abstract The spionids *Aonides oxycephala* (SARS) and a new subspecies *Apoprionospio dayi japonica* are described from Japanese waters. These species of *Aonides* and *Apoprionospio* are reported for the first time from the Japanese area.

The Spionidae is one of the largest and most common of the polychaete families encountered in intertidal and shallow subtidal habitats throughout the world. Some species are well known as borers in coralline rocks and shells.

The spionids of Japan have been studied by MOORE (1907), SÖDERSTRÖM (1920), OKUDA (1935, 1937a, 1937b, 1938), IMAJIMA (1959), IMAJIMA & HARTMAN (1964), IMAJIMA & TAKEDA (1975), TAMAI (1981, 1985), KOJIMA & IMAJIMA (1982) and IMAJIMA & SATO (1984). These studies report about 20 species of spionids from Japanese waters. However, the Japanese area is virtually unstudied with regard to its spionid fauna yet this family is usually one of the most abundant in benthic communities. The present paper is a contribution to a faunal study of spionids from Japanese waters.

Most of the descriptions are based on the author's collection unless otherwise stated, under *Material examined*. The bulk of the collection, including type-specimens, is deposited in the National Science Museum, Tokyo.

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Family Spionidae GRUBE, 1850

Body linear with variable number of setigers. Body regions not marked except by changes in parapodial shapes and setal types. Prostomium variable in shape, anteriorly tapered, bifurcate, rounded or blunt. A pair of long, grooved peristomial palps. Peristomium surrounding prostomium or extending laterally in form of wings. Proboscis without teeth or jaws. Branchiae cirriform, pinnate or straplike, limited to anterior region of body or extend along body length. Parapodia biramous. Noto- and neuropodial setae sheathed capillaries anteriorly but hooks may or may not present posteriorly. Hooks uni- or multidentate. Specialized setae sometimes present. Pygidium with lobes or cirri, or disc-like, collar-like, flared.

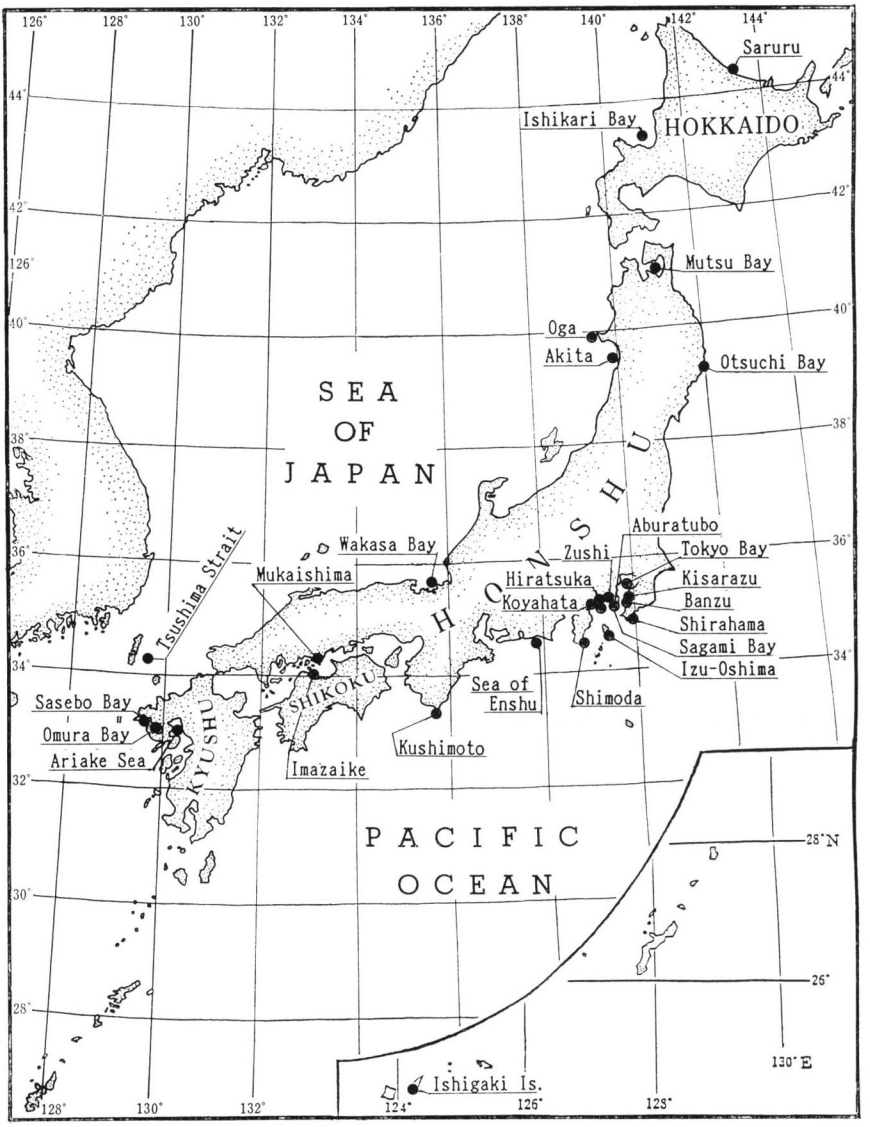


Fig. 1. Map of Japan, showing localities mentioned in Japan.

Genus *Aonides* CLAPARÈDE, 1864

Diagnosis. Prostomium conical, tapered both anteriorly and posteriorly; occipital tentacle present or absent. Peristomium poorly developed. Branchiae apinnate, cirriform, separated from dorsal lamellae, beginning on setiger 2 and present on a variable number of anterior setigers, absent posteriorly. Bi- or tridentate hooded hooks present in both notopodia and neuropodia. Pygidium with anal cirri.

Aonides oxycephala (SARS, 1862)

(Fig. 2 a–q)

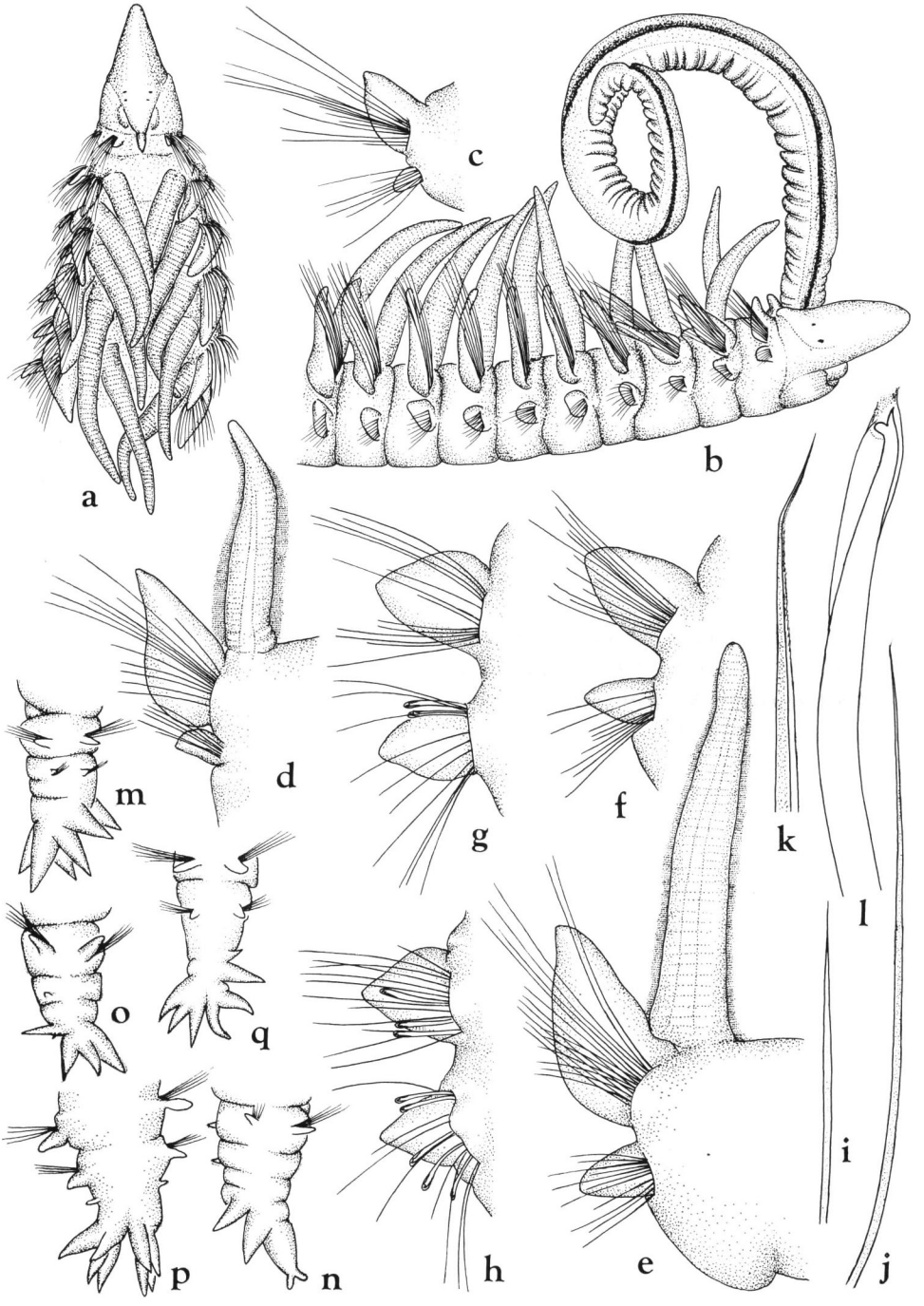
Nerine oxycephala SARS, 1862, p. 64.

Aonides oxycephala: RAMOS, 1976, pp. 11–20, figs. 1–2; BLAKE & KUDENOV, 1978, pp. 189–191, figs. 1–50; HUTCHINGS & TURVEY, 1984, pp. 7–8.

Material examined. Off Saruru, Hokkaido, in 30 m (2 specimens), X–1972. Ishikari Bay, 43°24.6′N, 141°03.5′E, in 66 m (1), V–1987. Off Kanida River, Mutsu Bay, in 5 m (3), I–1973. Otsuchi Bay, in 46 m (12), VII–1985. Kisarazu, Chiba Pref., in tidelands (1), IV–1987. Banzu, Chiba Pref., in 5 m (10), VI–1974. Urayasu, Chiba Pref., in tidelands (4), VI–1974. Tokyo Bay, 35°22.0′N, 139°40.0′E, in 10 m (7), VIII–1981; 35°22.0′N, 139°48.0′E, in 14 m (1), 35°23.0′N, 139°44.0′E, in 19 m (1), 35°24.0′N, 139°46.0′E, in 18 m (1), 35°20.1′N, 139°47.4′E, in 6 m (1), 35°20.0′N, 139°46.0′E, in 14 m (1), 35°24.0′N, 139°52.0′E, in 14 m (1), X–1981; 35°22.0′N, 139°48.0′E, in 14 m (2), 35°22.0′N, 139°40.0′E, in 10 m (4), 35°22.0′N, 139°44.0′E, in 20 m (1), XI–1982; 35°20.0′N, 139°46.0′E, in 14 m (1), 35°22.0′N, 139°40.0′E, in 10 m (10), 35°38.0′N, 140°00.0′E, in 7 m (4), 35°17.5′N, 139°42.5′E, in 49 m (1), III–1983. Off Aburatsubo Bay, in 50 m (2), III–1979. Aburatsubo Bay, intertidal zone (4), III–1968. Off Zushi, Sagami Bay, 35°16.5′N, 139°33.4′E, in 17 m (1), VII–1967; 35°17.0′N, 139°34.0′E, in 6 m (2), II–1979. Off Oiso, Sagami Bay, 35°17.9′N, 139°19.5′E, in 20 m (1), VI–1982. Off Hiratsuka, Sagami Bay, 35°18.1′N, 139°22.0′E, in 13 m (2), V–1980. Off Koyahata, Sagami Bay, in 30 m (6), VII–1966. Shimoda, intertidal zone (2), X–1970. Off Shimoda, in 27–30 m (3), in 37–39 m (5), IX–1987. Sea of Enshu, 35°36.4′N, 137°22.9′E, in 30 m (2), 35°38.3′N, 137°49.3′E, in 15 m (1), 35°37.2′N, 138°02.7′E, in 40 m (2), V–1967. Off Kushimoto, 33°28.3′N, 135°45.1′E, in 19 m (5), 33°27.4′N, 135°44.2′E, in 45 m (1), 33°27.8′N, 135°47.7′E, in 35 m (3), 33°27.7′N, 135°44.8′E, in 44 m (1), 33°26.4′N, 135°44.3′E, in 74 m (1), VII–1978. Mukaishima, Hiroshima Pref., intertidal zone (55), X–1966. Hiroe River, Imazaike, Ehime Pref., intertidal zone (2), VIII–1969. Omura Bay, 33°01.5′N, 128°46.0′E, in 30 m (8), 33°01.5′N, 128°48.0′E, in 25 m (6), VIII–1972, coll. T. OKINO. Sasebo Bay, 33°05.0′N, 128°38.0′E, in 35 m (3), VIII–1972, 33°04.0′N, 128°44.0′E, in 20 m (94), XI–1972, coll. T. OKINO. Tsushima Strait, 34°25.1′N, 129°59.3′E, in 115 m (1), VIII–1968. Ariake Sea, in 25 m (1), IX–1957, in 34 m (7), XII–1957. Kabira Bay, Ishigaki Island, intertidal zone (1), VI–1973.

Description. Largest, complete individual from Mukaishima intertidal zone, with 167 setigers measuring 38 mm in length and about 1 mm in width including parapodia. Body slender, subcylindrical, colorless in alcohol.

Prostomium spindle shaped, extending anteriorly to long, tapering point, widest at midregion, posteriorly pointed, ending on setiger 1, with erect occipital tentacle on posterior end, with two pairs of small eyes in trapezoidal arrangement (Fig. 2 a). Peristomium surrounding posterior half of prostomium. Palps with heavily scalloped ridges and ciliated groove, extending to about setiger 20 (Fig. 2 b).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Parapodia of setiger 1 with small, subtriangular notopodial postsetal lamellae and small conical neuropodial postsetal lamellae (Fig. 2 c). Parapodia of setiger 2 with well-developed asymmetrical notopodial postsetal lamellae and slightly larger neuropodial postsetal lamellae (Fig. 2 d). Notopodial postsetal lamellae become larger around setiger 10 (Fig. 2 e), then become smaller, triangular in postbranchial setigers, always slightly larger than neuropodial lamellae (Fig. 2 f–h). No dorsal ridges extending between parapodia.

Branchiae cirriform, apinnate, present from setiger 2 (Fig. 2 a, b), numbering 17–22 pairs (usually 18 pairs), with 13–14 pairs in juveniles; all branchiae separate from notopodial lamellae and heavily ciliated (Fig. 2 d, e).

Anterior noto- and neuropodial setae all sheathed capillaries with distally bent end (Fig. 2 i–k), arranged in 2 rows, setae of anterior row shorter. Neuropodial hooded hooks from setiger 32–42, numbering up to 5 per fascicle, accompanied by thin capillaries. Notopodial hooded hooks from setiger 37–43, numbering up to 3 per fascicle; hooks bidentate (Fig. 2 l). Ventral sabre setae lacking. Pygidium with 6–12 anal cirri (Fig. 2 m–q).

Remarks. Specimens from Japan agree well with the description of *A. oxycephala* by RAMOS (1976) in the number of branchiae and the number of setigers on which noto- and neuropodial hooded hooks.

The species is new to the Japanese fauna.

Distribution. Norway; Spain; New South Wales, Victoria, Australia; Japan.

Genus *Apoprionospio* FOSTER, 1969

Diagnosis. Prostomium triangular, flared anteriorly, lacking frontal horns, bearing two pairs of eyes. Peristomium fused with setiger one, surrounding prostomium posteriorly as a yoke or collar; with no lateral wings or elevations. Four pairs of branchiae beginning on setiger two; first three pairs apinnate, fourth pair with platelike pinnules. Pygidium with anal cirri. Hooded hooks in posterior neuropodia and notopodia; bidentate or multidentate. Dorsal membranous ridges connecting notopodial lamellae at some point along body.

Remarks. FOSTER (1971) divided *Prionospio* into 5 genera: *Paraprionospio* CAULLERY, 1914; *Apoprionospio* FOSTER, 1969; *Aquilaspio* FOSTER, 1971; *Minuspio* FOSTER, 1971; and *Prionospio* MALMGREN, 1867, *sensu stricto* based on the arrange-

Fig. 2. *Aonides oxycephala* (SARS). —— a, Anterior end, dorsal view, ×38; b, anterior end of other specimen, omitted right palp, ×38; c, first parapodium, anterior view, ×85; d, second parapodium, anterior view, ×85; e, 10th parapodium, anterior view, ×85; f, 19th parapodium, anterior view, ×85; g, 35th parapodium, anterior view, ×120; h, 45th parapodium, anterior view, ×120; i, short capillary seta, ×235; j, long capillary seta, ×235; k, distal end of long capillary seta, ×875; l, hooded hook, ×875; m–q, pygidia with various number of anal cirri, three pairs (m, n), four pairs (o, p), six pairs (q), ×65.

ment of pinnate and apinnate branchiae. BLAKE & KUDENOV (1978) did not consider the arrangement of pinnate and apinnate branchiae to be a generic level character, and they synonymized *Apoprionospio* with *Prionospio*. However, MACIOLEK (1985) recognized the genus *Apoprionospio* but limited it to species having branchiae starting from setiger 2, at least one pair of which have platelike rather than digitiform pinnules.

Apoprionospio dayi japonica subsp. nov.

(Figs. 3a–h, 4a–l)

Material examined. Off Oga Peninsula, 39°49.9′N, 139°53.3′E—39°49.6′N, 139°53.4′E, in 31–33 m (1), VI–1983. Off Akita, 39°47.0′N, 140°02.4′E, in 5 m (5), VIII–1982, 39°47.0′N, 140°01.8′E, in 10 m, IV–1982 (1), VI–1982 (7), VIII–1982 (3), IV–1983 (2), 39°47.0′N, 140°00.8′E, in 20 m, IV–1982 (4), VI–1982 (7), IV–1983 (38), 39°47.0′N, 139°58.0′E, in 30 m, IV–1982 (2), VIII–1982 (1), IV–1983 (7), 39°47.0′N, 139°54.7′E, in 40 m, VI–1982 (4), VIII–1982 (2), coll. Akita Fish. Exper. Sta. Tokyo Bay, 35°36.0′N, 140°02.0′E, in 10 m (1), 35°32.0′N, 140°02.0′E, in 14 m (1), VIII–1981. Off Zushi, Sagami Bay, 35°16.7′N, 139°33.7′E, in 12 m (1), VII–1969. Off Hiratsuka, Sagami Bay, 35°18.0′N, 139°21.5′E, in 27 m (1), VI–1982. Off Koyahata, Sagami Bay, in 15 m (1), in 70 m (3), VI–1966. Off Yuragawa, Wakasa Bay, in 10 m (holotype and 73 paratypes), IV–1976, coll. H. YOKOYAMA.

Description. Holotype is largest complete individual, with 65 setigers measuring 16 mm in length and about 0.7 mm in width including parapodia. Body slender, subcylindrical, colorless in alcohol.

Prostomium subtriangular, widest anteriorly with small medial protuberance, tapered posteriorly, ending on setiger 1 with narrow caruncle; two pairs of small reddish eyes present, anterior pair farther apart and larger than those of posterior pair (Fig. 3 a, b). Peristomium surrounding posterior half of prostomium and clearly separated from setiger 1 (Fig. 3 b, c).

Branchiae present from setiger 2, numbering four pairs (Fig. 3 a, b); pairs 1–3 apinnate, heavily ciliated, slightly longer than notopodial lamellae (Fig. 3 b); pair 4 longer with platelike pinnules arranged in two rows extending about two-thirds along shaft of branchiae (Fig. 3 d); pinnae closely adhering to one another (Fig. 3 e); both sides of posterior face of shaft bearing tufts of cilia (Fig. 3 d, f).

Parapodia of setiger 1 with low, subrectangular notopodial postsetal lamellae and conical neuropodial postsetal lamellae (Fig. 3 g). Parapodia of setiger 2 with erect, triangular notopodial postsetal lamellae folded anteriorly and bluntly rounded neuropodial postsetal lamellae (Fig. 3 h). Following notopodial postsetal lamellae becoming elongate, symmetrical, forming V-shaped cup; neuropodial postsetal lamellae with thinner and bluntly rounded (Fig. 3 e). Notopodial lamellae on setiger 7 connected by a large transverse dorsal crest (Fig. 4 a); setiger 8 without dorsal ridge (Fig. 4 b). From setiger 11 (or 12) notopodial lamellae much more lateral (Fig. 4 c); low ridges approximately level with dorsum starting on setiger 22, continuing on

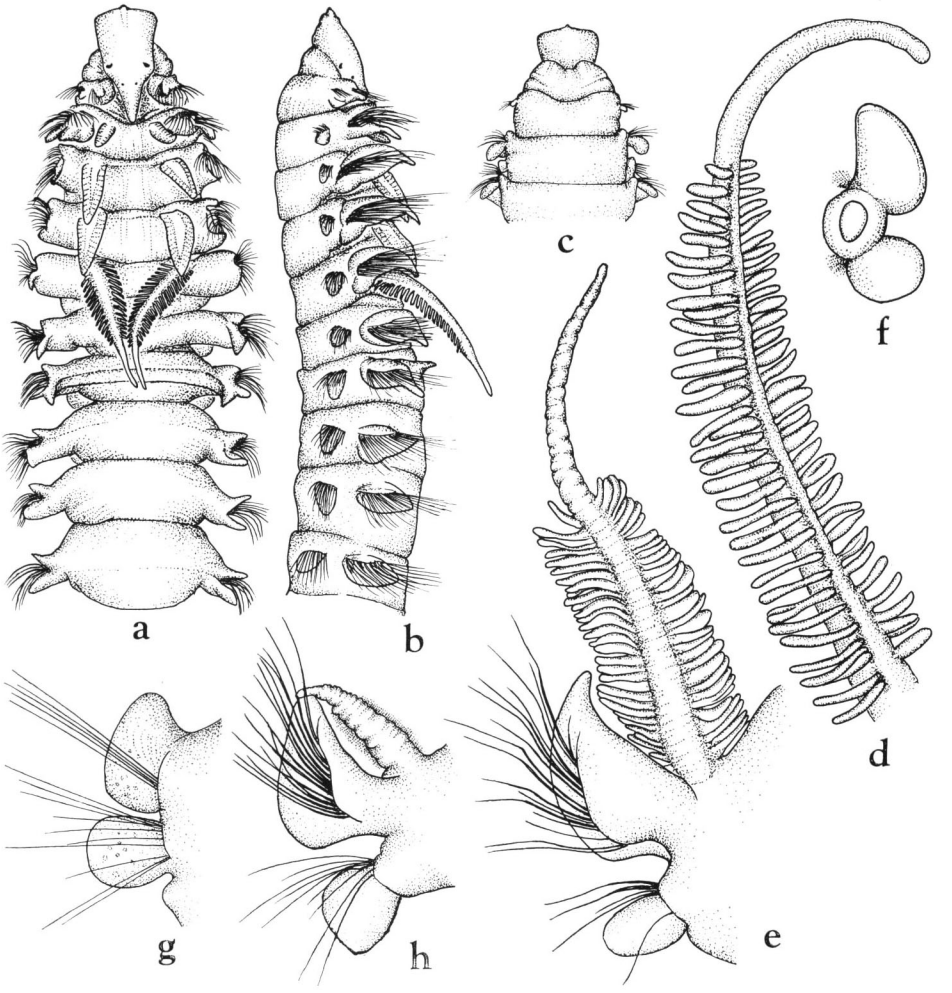

Fig. 3. *Apoprionospio dayi japonica* subsp. nov. —— a, Anterior end, dorsal view, ×44; b, same, lateral view, ×44; c, anterior end, ventral view, showing prostomium and peristomium, ×44; d, pinnate branchia of fifth parapodium, postero-lateral view, ×88; e, fifth parapodium, anterior view, ×122; f, cross section of branchial shaft, showing two platelike pinnules arising from shaft, ×180; g, first parapodium, anterior view, ×180; h, second parapodium (first branchial segment), anterior view, ×122.

posterior setigers (Fig. 4 d). Neuropodial lamellae similar to those of anterior setigers. Posteriorly, notopodial lamellae becoming lower and thinner with scattered cilialike tufts arising from glandular structures along margin (Fig. 4 e).

Anterior noto- and neuropodial setae all sheathed capillaries; notopodial setae (Fig. 4 f, g) longer, thicker and more broadly sheathed than those of neuropodial

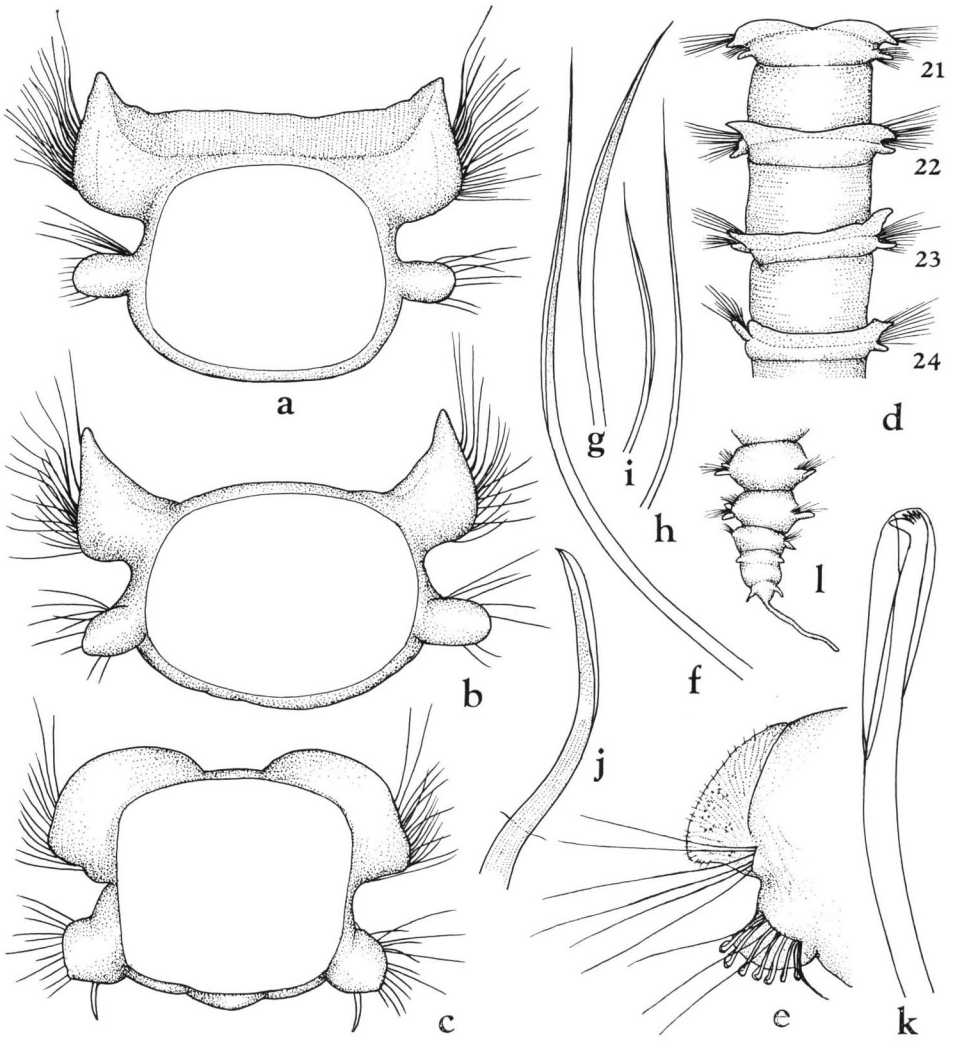

Fig. 4. *Apoprionospio dayi japonica* subsp. nov. —— a, Cross section of seventh segment, posterior view, showing dorsal crest, ×96; b, cross section of eighth parapodium, posterior view, ×96; c, cross section of 13th parapodium, posterior view, ×96; d, segments 21 through 24, dorsal view, showing dorsal crest, ×44; e, median parapodium, anterior view, ×122; f, g, long (f) and short (g) notopodial setae from 11th parapodium, ×353; h, i, long (h) and short (i) neuropodial setae from same parapodium, ×353; j, ventral sabre seta from same parapodium, ×353; k, hooded hook, lateral view, ×900; l, posterior end, dorsal view, ×44.

setae (Fig. 4 h, i); setae of anterior row longer than those of posterior row. Ventral sabre setae from setiger 11 on all specimens, broadly sheathed, heavily granulated

(Fig. 4 j), occupying ventralmost position in neuropodial fascicle (Fig. 4 c), but emerging on same level of hooded hooks posteriorly (Fig. 4 e). Neuropodial hooded hooks from setiger 16–17, notopodial hooks from setiger 34–37, numbering 7–8 per fascicle; hooks with long primary hoods and small secondary hoods, with 3–5 small teeth visible in profile above main tooth (Fig. 4 k).

Pygidium with 1 long medial and 2 shorter lateral cirri (Fig. 4 l).

Remarks. *Apoprionospio dayi japonica* is closely allied to the stem, *A. dayi* FOSTER, 1969, from North Carolina. However, the new subspecies differs from the stem in that the peristomium is completely separated from rather than fused with setiger 1, and the neuropodial lamellae on setiger 2 is bluntly rounded, rather than being especially large and triangular with the long axis extending ventrally.

Type-series. Holotype, NSMT-Pol. H 295; 73 paratypes, NSMT-Pol. P 296.

Distribution. Japan.

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