

## Eight Species of Onuphidae (Polychaeta) in and Offshore of Otsuchi Bay, Northeastern Japan

By

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**Abstract** The onuphid polychaetes in and offshore of Otsuchi Bay, northeastern Japan, are examined. Three genera and 8 species are recognized, including 5 new species, *Onuphis fuscata*, *O. longisetosa*, *O. nonpectinata*, *O. tetradentata* and *Nothria otsuchiensis*.

The onuphid polychaetes in the Japanese waters have been studied by various investigators, and a total of 10 species have been recognized. Of these species the following 4 species were reported from the northern Japan; *Nothria geophiliformis* MOORE (1903), *Diopatra sugokai* and *Nothria conchylega* by OKUDA (1939) and *Nothria shirikishinaiensis* IMAJIMA (1960).

The material on which this study is based was derived from the two sources: (1) the benthic invertebrate surveys in Otsuchi Bay taken during three years by dredging and (2) the benthic survey by the cruise KT-85-11 of the R. V. *Tansei Maru*, Ocean Research Institute, University of Tokyo (ORI) with ORI Dredge.

In the present study three genera and 8 species of Onuphidae are recognized, including 5 new species and 2 species newly recorded from Japanese waters. The bulk of the collection, including type specimens, is deposited in the National Science Museum, Tokyo.

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### Key to Species of Onuphidae from Otsuchi

1. Subacicular hooks absent, intrafascicular hooks present, pectinate setae scoop-shaped ..... *Nothria otsuchiensis*  
Subacicular hooks present, intrafascicular hooks absent, pectinate setae flat . . . . . 2
2. Pseudocompound hooks with long, pointed hoods; branchiae with at least 4 branchial filaments ..... *Sarsonuphis striata*  
Pseudocompound hooks with short, truncated hoods; branchiae simple or bifid (*Onuphis*) ..... 3
3. Branchiae starting on setiger 1 ..... 4  
Branchiae first present from setigers 3-5 ..... 6

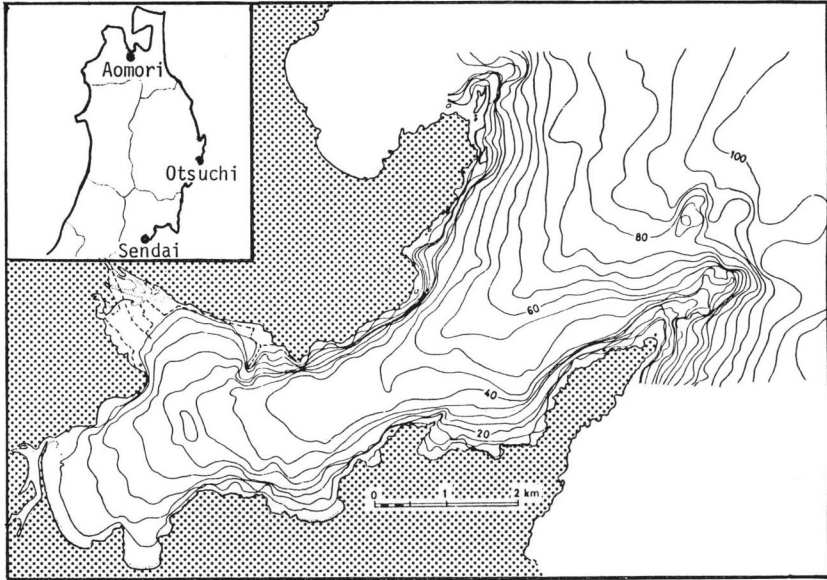


Fig. 1. Submarine topography of Otsuchi Bay, Iwate Prefecture.

4. Branchiae all simple filaments ..... 5  
 Branchiae in part with 2 branchial filaments.....*O. longisetosa*
5. Ventral cirri cirriform in first 4 setigers.....*O. holobranchiata*  
 Ventral cirri cirriform in first 6 setigers.....*O. opalina*
6. Branchiae from setiger 3; ventral cirri cirriform in first 5 setigers; pseudocompound hooks in first 5 setigers.....*O. fuscata*  
 Branchiae from setiger 5; ventral cirri cirriform in first 4 setigers; pseudocompound hooks in first 3–4 setigers ..... 7
7. Pseudocompound hooks in first 3 setigers; all hooks tridentate..*O. nonpectinata*  
 Pseudocompound hooks in first 4 setigers; most hooks tetridentate, present in first 3 setigers.....*O. tetridentata*

Genus *Onuphis* Audouin et Milne EDWARDS, 1833

*Onuphis holobranchiata* MARENZELLER, 1879

(Fig. 2, a–q)

*Onuphis holobranchiata* MARENZELLER, 1879, pp. 132–134, pl. 4, fig. 1; IZUKA, 1912, pp. 106–108, pl. 11, figs. 10–12; FAUCHALD, 1982, p. 48.

*Nothria holobranchiata*: IMAJIMA & HARTMAN, 1964, pp. 244–245.

*Material examined.* Off Otsuchi, 39°19.3'N, 142°04.0'E–39°19.3'N, 142°04.3'E, in 149 m, KT-85-11 (8 specimens).

*Description.* All specimens collected are anterior fragments; the largest one

measures 33 mm in length and about 2 mm in width including parapodia for 77 setigers. Each segment has a transverse brown band on the dorsum, and all segments except the first 2 setigers, have one or two small, brown patches at or near the dorsal base of the parapodia (Fig. 2 a).

The prostomium is narrowed anteriorly and has a pair of conical, frontal palps. There are two pairs of small eyespots; one pair is at the antero-lateral sides of the prostomium and other pair occurs near the outer bases of the inner lateral antennae. Of the five antennae, the outer lateral antennae reach the posterior margin of the setiger 1; the ceratophores have 9 shorter articles and a longer distal article, and are as long as the styles. The inner lateral antennae reach setiger 11, with the ceratophores consisting of 12 to 14 short articles and one long distal article. The median antenna reaches setiger 7, with a ceratophore consisting of 6 short and one long distal article. The peristomial cirri arise from the anterior margin of the peristomium; they are longer than the peristomium.

The first parapodia are directed forward; the presetal lobe is a low, transverse fold and the acicular lobe is evenly conical. The postsetal lobe is spindle-shaped and is a longer than the base of the parapodium. The dorsal cirrus is slender, digitiform and longer than the postsetal lobe. The ventral cirrus is about as long as the postsetal lobe (Fig. 2 b). The second to fourth parapodia are similar in shape, except that the branchiae are better developed than those of the first parapodia (Fig. 2 c, d).

In the fifth parapodium the acicular lobe is more evenly rounded than in the first four parapodia. Ventral cirri are cirriform through setiger 4, and transitional in a fifth (Fig. 2 e) and distinctly padlike thereafter (Fig. 2 f). The postsetal lobes are present in the first 10 setigers, as a distinct digitiform lobe; thereafter they are reduced to short, conical knobs that remain distinct through about setiger 25.

Branchiae are present from the first setiger, as a single, slender filament and continued throughout; they become gradually longer than the dorsal cirri posteriorly (Fig. 2 g).

Hooded, tridentate, pseudocompound hooks are present in the first 4 setigers. The first parapodium has 4 hooks; the hooks in the superior part of the fascicle (Fig. 2 h) are slightly thicker than those in the inferior ones (Fig. 2 i). There are also one simple seta (Fig. 2 j) and 3 protruded, distal tips of the acicula (Fig. 2 k). The fourth parapodium has one hook (Fig. 2 l) and simple setae replace the hooks. Posterior simple setae are somewhat geniculated distally and are minutely denticulated (Fig. 2 m). Bidentate subacicular hooks are present from setigers 11 to 13 (Fig. 2 n). Pectinate setae are distally oblique, with 12 fine teeth (Fig. 2 o). The maxillary formula is 1+1, 7+8, 7+0, 7+7 and 1+1 (Fig. 2 p). The whole jaw-apparatus is whitish and has thin, calcific distal plates (Fig. 2 q).

*Distribution.* Japan; Nicobar Islands; Gulf of Mannar; Maldivé Archipelago.

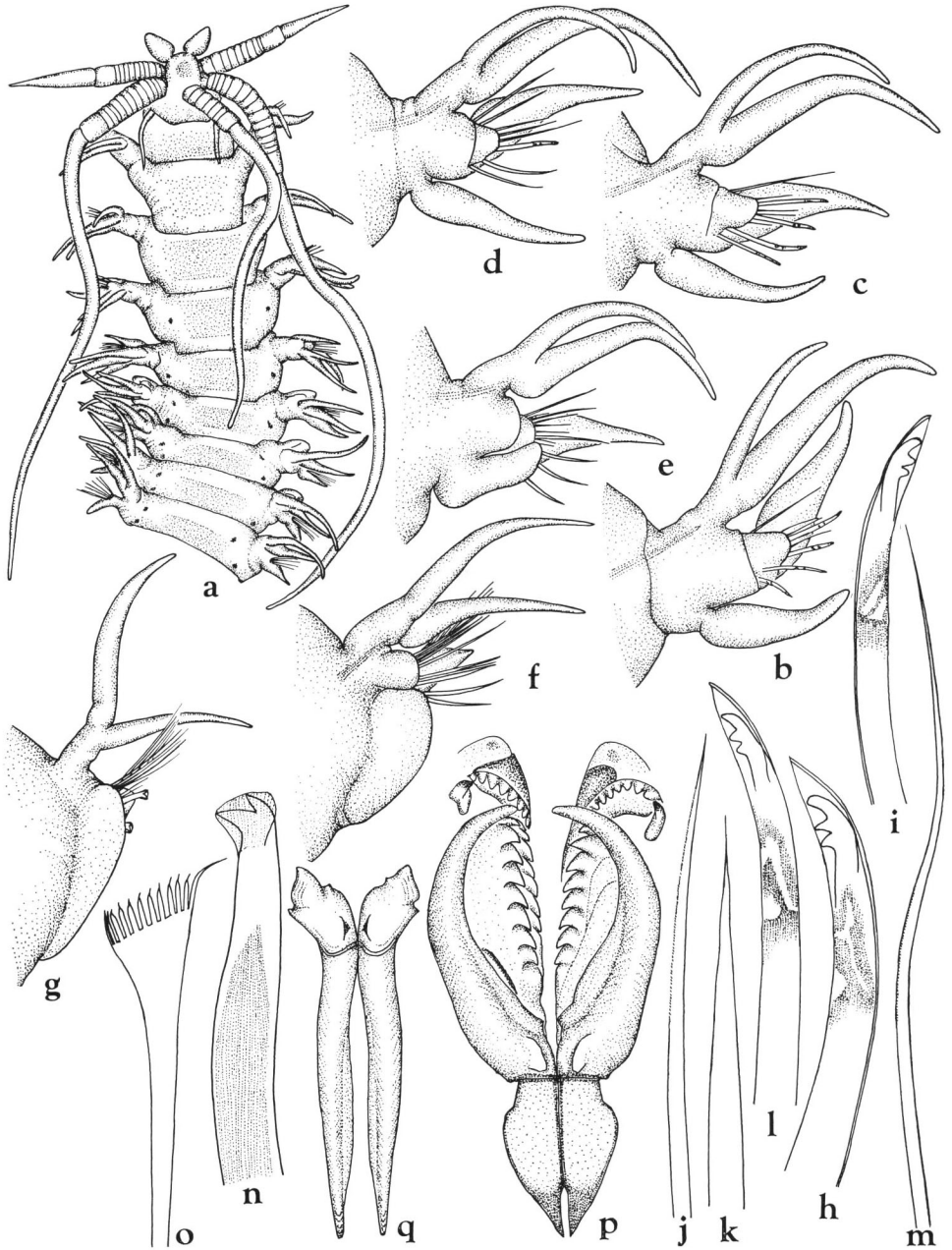


Fig. 2. *Onuphis holobranchiata* MARENZELLER. a, Anterior end, dorsal view,  $\times 14$ ; b, first parapodium, anterior view,  $\times 45$ ; c, third parapodium, anterior view,  $\times 45$ ; d, fourth parapodium, anterior view,  $\times 45$ ; e, fifth parapodium, anterior view,  $\times 45$ ; f, tenth parapodium, anterior view,  $\times 45$ ; g, twenty-fifth parapodium, anterior view,  $\times 45$ ; h, superior pseudocompound  $\rightarrow$

*Onuphis opalina* (VERRILL, 1873)

(Fig. 3, a-s)

*Nothria opalina* VERRILL, 1973, p. 102.*Onuphis (Nothria) opalina*: PETTIBONE, 1963, pp. 245-246, fig. 64.*Onuphis opalina*: FAUCHALD, 1982, pp. 50-51, fig. 14b, table 16.*Material examined.* Otsuchi Bay, in 68-101 m (10).

*Description.* All specimens collected are anterior fragments; the largest one measures 32 mm in length and about 2.3 mm in width including parapodia for 81 setigers. The anterior dorsum is pigmented by a transverse, brown stripe across the posterior half of each segment (Fig. 3 a).

The prostomium is subtriangular with a rounded tip and has a pair of ovate frontal palps. There are two pairs of minute eyespots; one pair is at antero-lateral end and another pair is near the outer base of the outer lateral antennae. The outer lateral antennae reach setiger 1; the ceratophore has 10 short basal and one long distal article; the style is as long as or slightly longer than the ceratophore. The inner lateral antennae reach setiger 13, with the ceratophore consisting of 9 to 11 articles plus the long distal one. The median antenna reaches setiger 5, with a ceratophore consisting of 7 articles plus a long distal article. The peristomial cirri arise from the anterior margin of the peristomium and are longer than the peristomium (Fig. 3a, b).

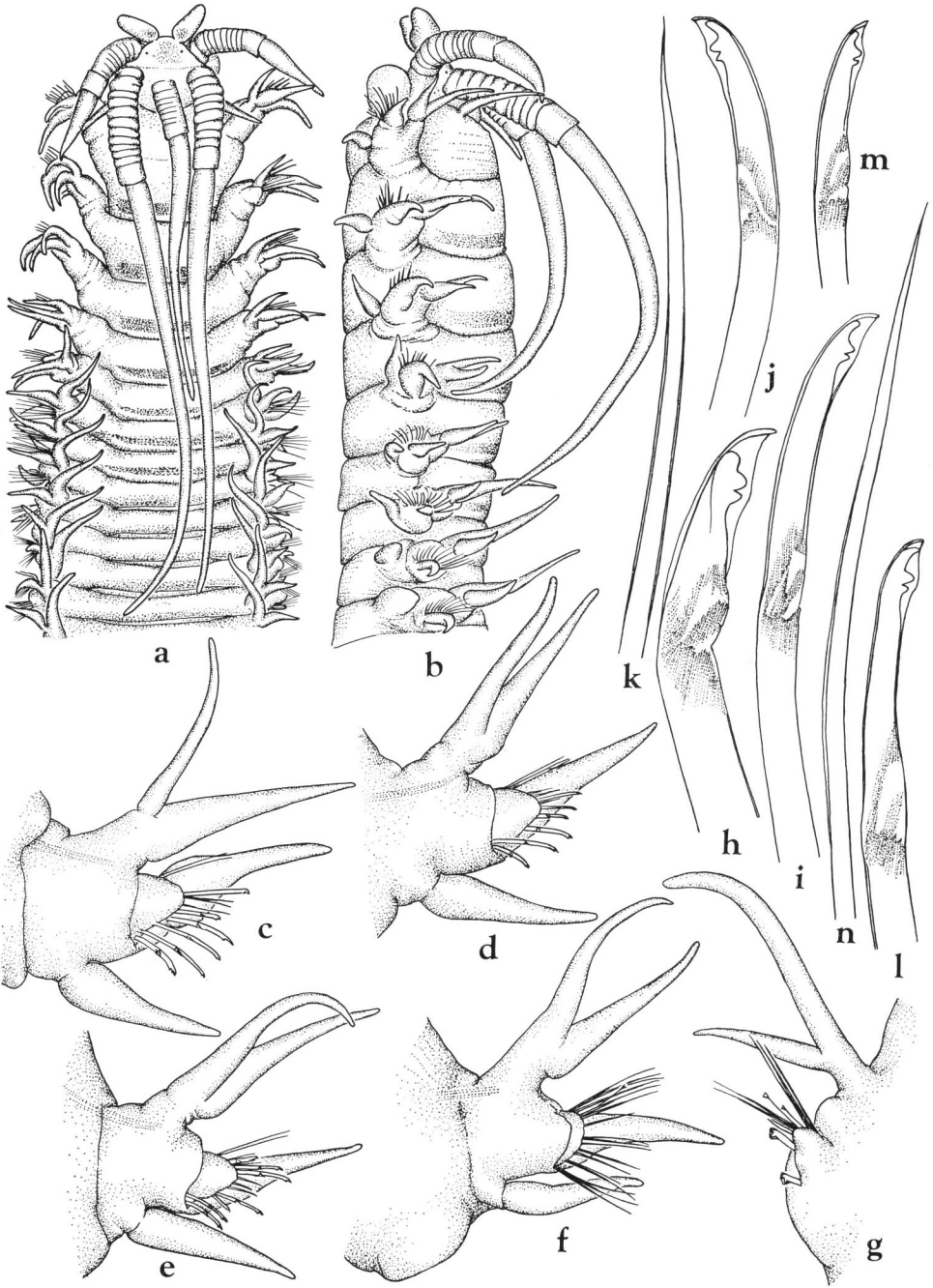
The first few parapodia are directed forward and these of first 3 setigers are larger than the following ones. In the first parapodia the presetal lobe is a low, transverse fold and the acicular lobe is triangular. The postsetal lobe is spindle-shaped and is longer than the base of the parapodium. The dorsal cirrus is digitate; it is longer than the postsetal lobe. The ventral cirrus is about as long as the postsetal lobe (Fig. 3 c). The second to fourth parapodia are similar in shape, but the parapodial bases are slightly shorter than those of the first parapodia (Fig. 3 d, e). In the fifth parapodium the acicular lobe is more evenly rounded than that of the first one (Fig. 3 f). The ventral cirri are cirriform through setigers 6, and padlike thereafter. The postsetal lobes are present in the first 10 setigers, as a distinct digitiform lobe.

Branchiae are present from the first setiger, as a single, slender filament and continued throughout (Fig. 3 g).

Hooded, tridentate, pseudocompound hooks occur through the first 4 setigers. The first parapodium has 1-2 thick hooks (Fig. 3 h), 4 slender hooks (Fig. 3 i, j) and 2 slender simple setae (Fig. 3 k). Hooks of the first 4 setigers number 5-8 in each fascicle; the length of the appendage to the articulations varies (Fig. 3 l, m). These

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→ hook from first parapodium,  $\times 335$ ; i, inferior pseudocompound hook from first parapodium,  $\times 335$ ; j, simple seta from first parapodium,  $\times 205$ ; k, aciculum from first parapodium,  $\times 165$ ; l, pseudocompound hook from fourth parapodium,  $\times 335$ ; m, simple seta from 40th parapodium,  $\times 335$ ; n, subacicular hook from 40th parapodium,  $\times 205$ ; o, pectinate seta,  $\times 825$ ; p, maxillae,  $\times 55$ ; q, mandibles,  $\times 45$ .



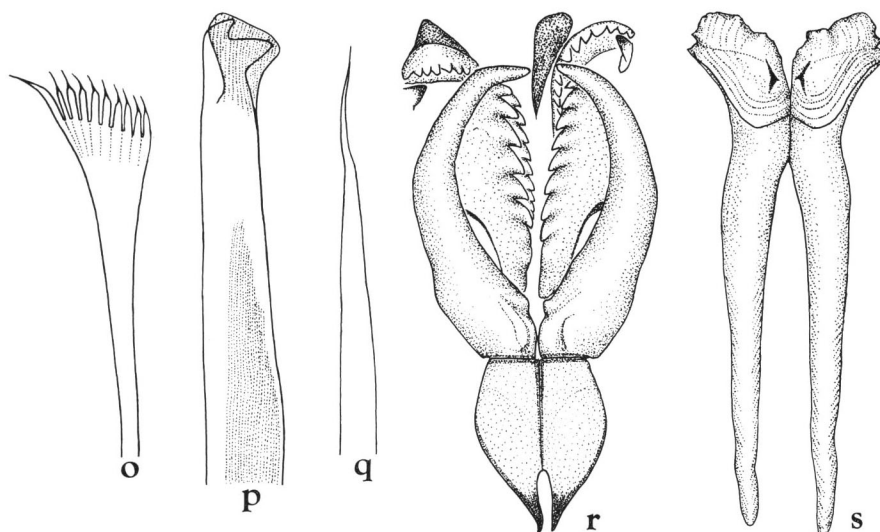


Fig. 3, on pp. 98–99. *Onuphis opalina* (VERRILL). a, Anterior end, dorsal view,  $\times 18$ ; b, anterior end of other individual, lateral view,  $\times 18$ ; c, first parapodium, anterior view,  $\times 45$ ; d, third parapodium, anterior view,  $\times 45$ ; e, fourth parapodium, anterior view,  $\times 45$ ; f, fifth parapodium, anterior view,  $\times 45$ ; g, 50th parapodium, posterior view,  $\times 45$ ; h, thick, pseudocompound hook from first parapodium,  $\times 335$ ; i, j, slender, pseudocompound hooks from first parapodium,  $\times 335$ ; k, simple seta from first parapodium,  $\times 335$ ; l, superior, pseudocompound hook from third parapodium,  $\times 335$ ; m, inferior, pseudocompound hook from third parapodium,  $\times 335$ ; n, limbate seta from fifth parapodium,  $\times 335$ ; o, pectinate seta,  $\times 825$ ; p, subacicular hook from 50th parapodium,  $\times 335$ ; q, acicula from 50th parapodium,  $\times 165$ ; r, maxillae,  $\times 55$ ; s, mandibles,  $\times 55$ .

hooks are replaced by limbate capillary setae (Fig. 3 n) from setiger 5. Pectinate setae are present from setiger 5; they are distally oblique, with 10 fine teeth (Fig. 3 o). Bidentate subacicular hooks are present from setiger 11 (Fig. 3 p). Acicula usually number 3 and are genuiculate with pointed tips (Fig. 3 q). The maxillary formula is 1+1, 7+8, 9+0, 7+10 and 1+1 (Fig. 3 r). The whole jaw-apparatus is whitish and has thin, calcific distal plates (Fig. 3 s).

The species is new to the Japanese fauna.

*Distribution.* Atlantic Ocean off New England (Gulf of St. Lawrence to off Chesapeake Bay); northern Japan.

#### *Onuphis nonpectinata* sp. nov.

(Fig. 4, a–p)

*Material examined.* Off Otsuchi, 39°19.3'N, 142°04.0'E–39°19.3'N, 142°04.3'E, in 149 m, KT-85-11 (holotype and 5 paratypes).

*Description.* All specimens collected are anterior fragments; the holotype measures 25 mm in length and 1.8 mm in width including parapodia for 56 setigers. Each segment has a transverse, brown dorsal band.

The prostomium is subtriangular with a rounded anterior margin, and has a pair

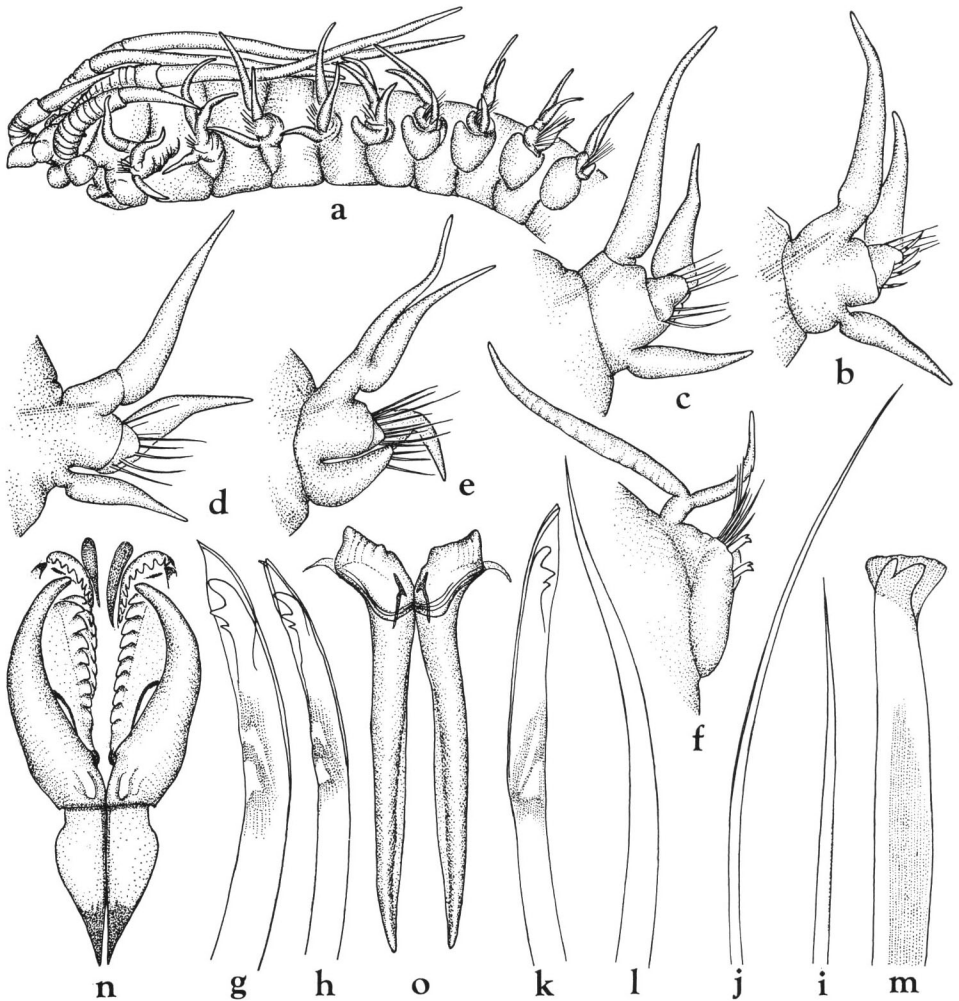


Fig. 4. *Onuphis nonpectinata* sp. nov. a, Anterior end, lateral view,  $\times 18$ ; b, first parapodium, anterior view,  $\times 45$ ; c, third parapodium, anterior view,  $\times 45$ ; d, fourth parapodium, anterior view,  $\times 45$ ; e, fifth parapodium, anterior view,  $\times 45$ ; f, 40th parapodium, anterior view,  $\times 370$ ; g, superior, pseudocompound hook from first parapodium,  $\times 370$ ; h, inferior, pseudocompound hook,  $\times 370$ ; i, simple seta from first parapodium,  $\times 205$ ; j, simple seta from third parapodium,  $\times 205$ ; k, pseudocompound hook from third parapodium,  $\times 370$ ; l, simple seta transformed from hook in third parapodium,  $\times 370$ ; m, subacicular hook,  $\times 205$ ; n, maxillae,  $\times 55$ ; o, mandibles,  $\times 55$ .



of conical, frontal palps. There are two pairs of small eyespots; one pair is near the anterolateral end and other pair occurs near the outer bases of the inner lateral antennae. Of the five antennae the outer lateral antennae reach the posterior margin of setiger 1; the ceratophores have 9–11 short basal articles and one long distal article, and are longer than the styles. The inner lateral antennae reach setiger 11, with the ceratophores consisting of 11 short basal plus the long distal one; the median antenna reaches setiger 4, with a ceratophore consisting of 6 short articles plus the long distal articles. The peristomial cirri arise from the anterior margin of the peristomium and are as long as the peristomium (Fig. 4 a).

Anterior parapodia are not distinctly directed forward. The first parapodia have a low presetal lobe and an evenly conical acicular lobe. The postsetal lobe is spindle-shaped and is a longer than the base of the parapodium. The dorsal cirrus is slender, digitiform with a distinct cirrophore at its base. The ventral cirrus is about as long as the postsetal lobe (Fig. 4 b). The second to fourth parapodia are similar in shape (Fig. 4 c, d). In the fifth parapodia the acicular lobes decrease to small triangular lobes. The ventral cirri are transitional to a glandular pad (Fig. 4 e); they are replaced by transversely elongated glandular pads in all setigers thereafter. The postsetal lobes are present in the first 10 setigers, as a distinct digitiform lobe.

Branchiae are present from setiger 5; they are as long as the dorsal cirri. Posteriorly, the branchiae increase in the length and are longer than the half of the body is wide (Fig. 4 f).

Hooded, tridentate, pseudocompound hooks occur in the first 3 setigers. These hooks number 3 to 5 in a setal fascicle; the superior hook (Fig. 4 g) is thicker than the inferior ones (Fig. 4 h). The teeth decrease rather evenly in size from the distalmost one. Simple setae are present in all setiger (Fig. 4 i, j). The third setiger has hooks (Fig. 4 k) and simple setae (Fig. 4 l) replacing some of the hooks; these simple setae are wider than the superior capillary setae and are more or less curved. Bidentate subacicular hooks are present from setigers 11 or 12 (Fig. 4 m). Pectinate setae were not seen in any setal fascicle. The maxillary formula is 1+1, 8+9, 8+0, 7+10 and 1+1 (Fig. 4 n). The whole jaw-apparatus is whitish; it has thin calcific distal plates (Fig. 4 o).

*Remarks.* *Onuphis nonpectinata* resembles *O. geophiliformis* (MOORE, 1903) from off Sendai Bay, in 62 fms., in the following characters: strap-like branchiae are present from setigers 5 or 6, ventral cirri are cirriform in the first 4 or 5 setigers and tridentate pseudocompound hooks are present in the first 3 setigers. However, *O. nonpectinata* differs from *O. geophiliformis* in that (1) the teeth of the pseudocompound hooks decrease rather evenly in size from the distalmost tooth, instead of having two proximal teeth in similar size, and (2) the pectinate setae absent through the all parapodia of the fragment, instead of appearing from about setiger 10.

*Type series.* Holotype, NSMT-Pol. H 208; 5 paratypes, NSMT-Pol. P 209.

*Distribution.* Northeastern Japan.

*Onuphis tetradentata* sp. nov.

(Fig. 5, a-p)

*Material examined.* Off Otsuchi, 39°19.3'N, 142°04.0'E–39°19.3'N, 142°04.3'E, in 149 m, KT-85-11 (holotype).

*Description.* The holotype is an incomplete specimen with 40 setigers that is 16 mm in length and 2 mm in width including parapodia. Each segment of the anterior dorsum has a broad, brown transverse band.

The prostomium is subtriangular and has a pair of ovate frontal palps. There are two pairs of minute eyespots; a pair is at the antero-lateral end and another pair is near the outer base of the inner lateral antennae. Of the five antennae the outer lateral antennae reach setiger 2, with the ceratophores consisting of 10 short basal articles and a long distal one; the styles are shorter than the ceratophore. The inner lateral antennae reach setiger 10, with the ceratophores consisting of 11 short and one long distal article; the median antenna reaches setiger 5, with a ceratophore consisting of 7 short articles plus a long distal article. The peristomial cirri arise from the anterior edge of the peristomium and are longer than the peristomium (Fig. 5 a).

The first two parapodia are directed forward. The first parapodia have rounded acicular lobes; the presetal lobes follow the outlines of the acicular lobes closely. The postsetal lobes are spindle-shaped and are longer than the bases of the parapodia. Dorsal cirri are digitiform with distinct cirrophores basally. Ventral cirri are about half length of the dorsal cirri (Fig. 5 b). Parapodia of setigers 2 to 4 are similar in shape (Fig. 5 c). Parapodia of setiger 5 have short acicular lobes, smaller than those of the first ones, and ventral cirri are blunt-tipped (Fig. 5 d); all following setigers have glandular, elliptical ventral pads (Fig. 5 e). Postsetal lobes are present in the first 10 setigers, as a distinct digitiform lobe.

Branchiae are present from setiger 5 as a single filament, and continue to the end of fragment; each is strap-like, and flattened in posterior setigers (Fig. 5 f).

Pseudocompound hooks with short hoods occur in the first 4 setigers. Each fascicle in the first 3 setigers has three kinds of hooks: (1) one distinct tetradentate hook in which the 3 proximal teeth are similar in size (Fig. 5 g), (2) 2–4 hooks in which a large basal tooth is formed by fusion of the lower 2 teeth (Fig. 5 h) and (3) one hook with a minute extra tooth formed by a bifurcation of the lowermost tooth (Fig. 5 i). These hooks are replaced by 2 distinctly tridentate hooks (Fig. 5 j) and 4 thick, simple setae (Fig. 5 k) in setiger 4. Limbate setae are present in all setigers (Fig. 5 l). Bidentate subacicular hooks are present from setiger 12 (Fig. 5 m). Each of pectinate setae is distally oblique and has 13 fine teeth (Fig. 5 n). The maxillary formula is 1+1, 7+9, 7+0, 4+7 and 1+1. Maxillary carriers are longer than broad with tapering posterior ends (Fig. 5 o). The whole jaw-apparatus is whitish; the distal plates are thin and calcific (Fig. 5 p).

*Remarks.* *Onuphis tetradentata* resembles *O. geophiliformis* (MOORE, 1903) from off Sendai Bay, in 62 fms, in having single branchiae starting on setiger 5 and cirriform

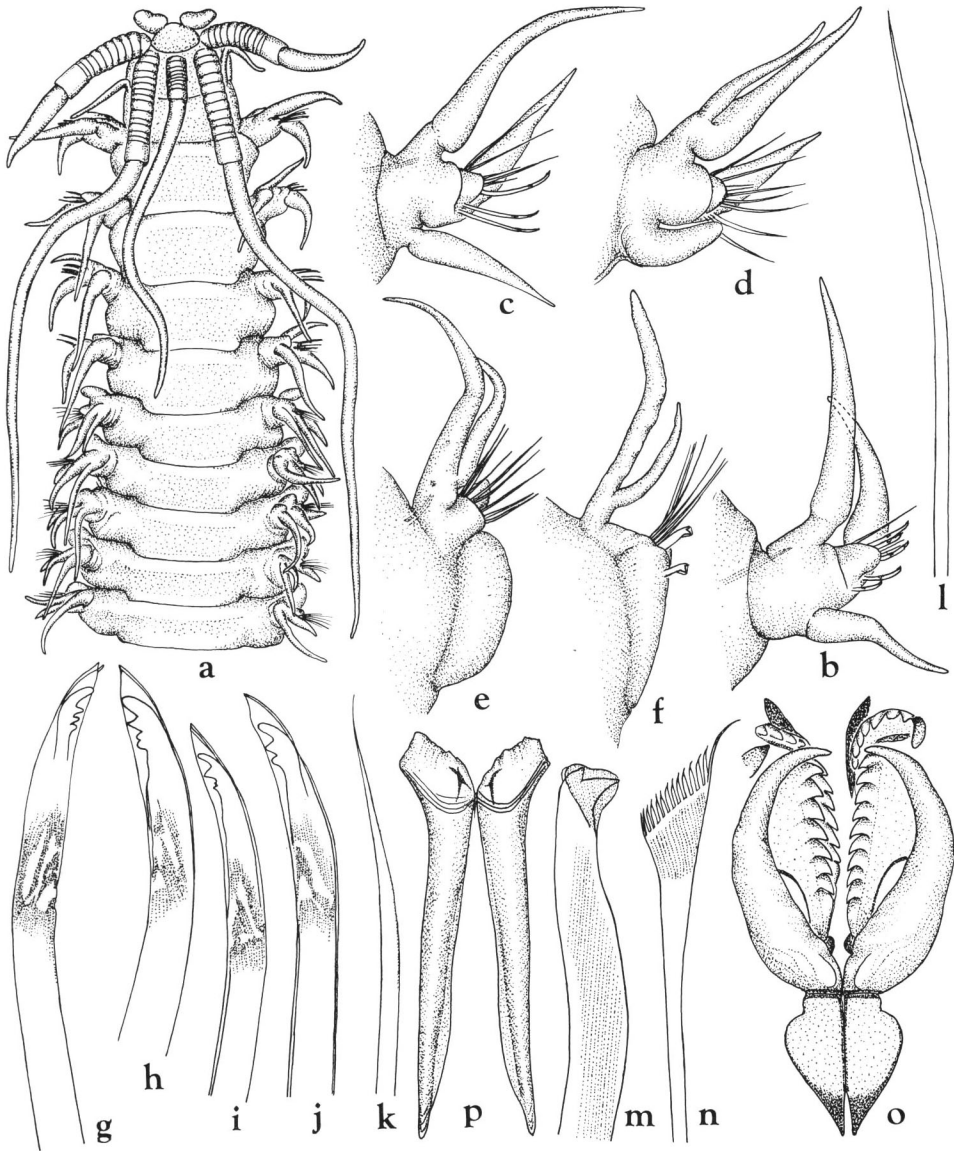


Fig. 5. *Onuphis tetrudentata* sp. nov. a, Anterior end, dorsal view,  $\times 18$ ; b, first parapodium, anterior view,  $\times 45$ ; c, fourth parapodium, anterior view,  $\times 45$ ; d, fifth parapodium, anterior view,  $\times 45$ ; e, 10th parapodium, anterior view,  $\times 45$ ; f, 30th parapodium, anterior view,  $\times 45$ ; g, tetrudentate pseudocompound hook with basally fused teeth from first parapodium,  $\times 370$ ; h, i, tetrudentate pseudocompound hooks with basally fused teeth from first parapodium,  $\times 370$ ; j, tridentate pseudocompound hook from fourth parapodium,  $\times 370$ ; k, simple seta transformed from hook in fourth parapodium,  $\times 205$ ; l, simple seta from first parapodium,  $\times 205$ ; m, subacicular hook from 14th parapodium,  $\times 205$ ; n, pectinate seta,  $\times 545$ ; o, maxillae,  $\times 55$ ; p, mandibles,  $\times 55$ .

ventral cirri through the first 4 setigers. However, *O. tetradentata* differs from *O. geophiliformis* in that the pseudocompound hooks have tetradentate in the first 3 setigers and tridentate on setiger 4, instead of having tridentate in all anterior setigers.

*Type.* Holotype, NSMT-Pol. H 210.

*Distribution.* Northeastern Japan.

*Onuphis fuscata* sp. nov.

(Fig. 6, a-r)

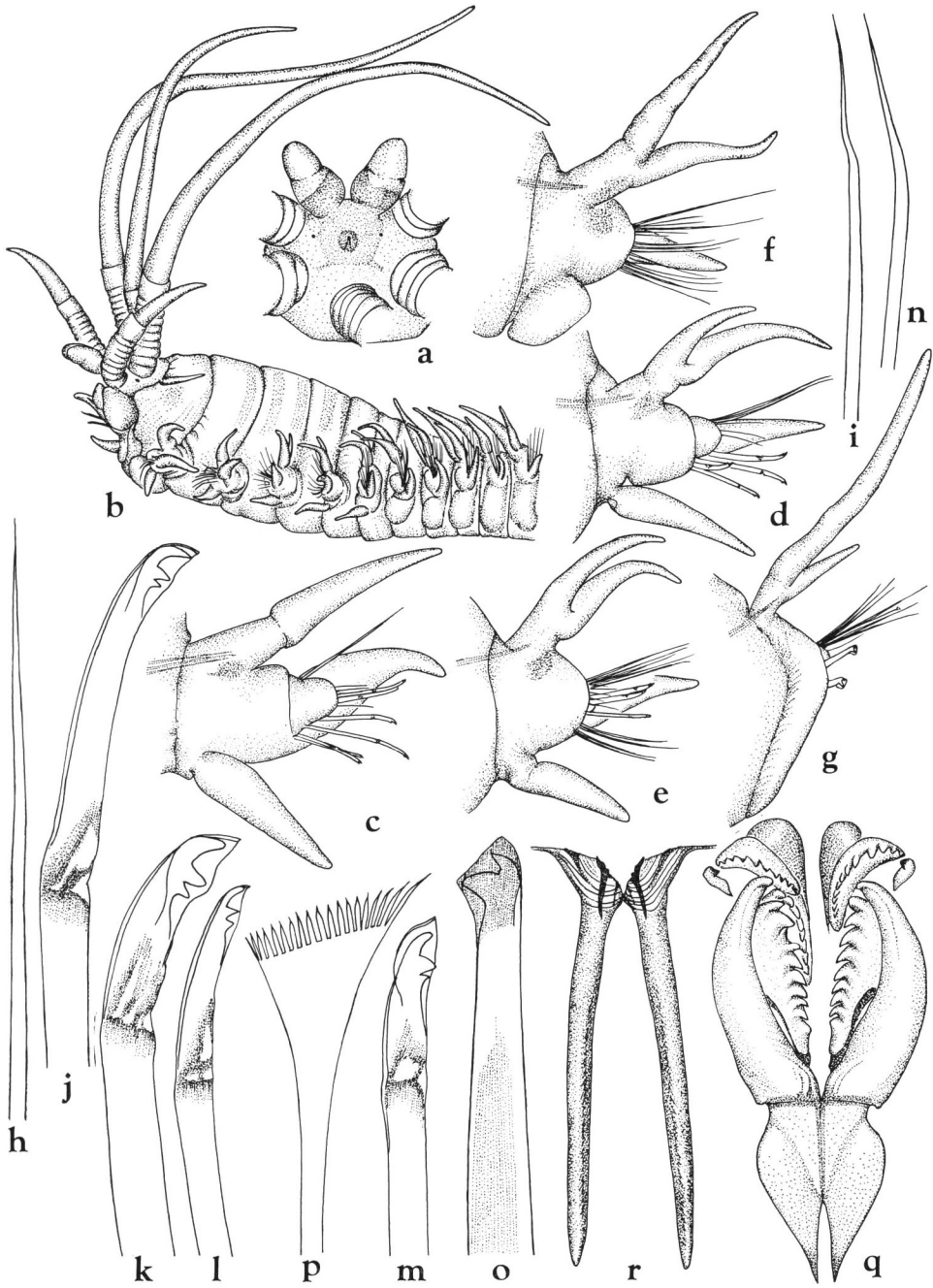
*Material examined.* Otsuchi Bay, in 40–44 m (holotype and 2 paratypes).

*Description.* All specimens are anterior fragments; the holotype measures 25 mm in length and 2 mm in width including parapodia for 70 setigers; two paratypes are almost as large as the holotype. Each segment has a brown transverse dorsal band.

The prostomium is nearly circular; there is a round, pigmented pattern with a depression centrally; a pair of small eyespots is present laterally to the central pattern. Another pair of eyespots occurs at the bases of the inner lateral antennae. There are two frontal palps; they are conical with an indistinct annulation (Fig. 6 a). Of the five antennae the outer lateral antennae reach the posterior margin of the setiger 1, with ceratophores consisting of 9 distinct short, basal articles and a longer distal one; the ceratophores are longer than the styles. The inner lateral antennae reach setiger 15, with the ceratophores consisting of 10 short articles plus a long distal one; the median antenna reaches setiger 8, with a ceratophore consisting of 7 short, basal articles and a long distal article. The peristomial cirri arise from the anterior edge of the peristomium and are slightly shorter than the peristomium (Fig. 6 b).

The first parapodia are directed forward; each has a low presetal lobe and an evenly rounded acicular lobe. The postsetal lobe is spindle-shaped and longer than the base of the parapodium. The dorsal cirrus is digitiform with a distinct cirrophore at its base. The ventral cirrus is comparatively large, about as large as the postsetal lobe (Fig. 6 c). Parapodia of setigers 2 to 4 are similar in shape, except branchiae are present from setiger 3 (Fig. 6 d). In the parapodia of setiger 5 the acicular lobes decrease drastically in size to a small rounded lobe (Fig. 6 e). Ventral cirri are cirriform through setiger 5; all following setigers have glandular pads replacing the ventral cirri (Fig. 6 f). Dorsal cirri are present in all setigers to the end of the fragment; they become gradually shorter and more slender posteriorly. Postsetal lobes are present in

Fig. 6. *Onuphis fuscata* sp. nov. a, Prostomium, dorsal view,  $\times 30$ ; b, anterior end, lateral view,  $\times 15$ ; c, first parapodium, anterior view,  $\times 45$ ; d, fourth parapodium, anterior view,  $\times 45$ ; e, fifth parapodium, anterior view,  $\times 45$ ; f, sixth parapodium, anterior view,  $\times 45$ ; g, 40th parapodium, anterior view,  $\times 45$ ; h, simple seta from first parapodium,  $\times 165$ ; i, aciculum from first parapodium,  $\times 165$ ; j, k, l, pseudocompound hooks from first parapodium, superior hook (j), inferior hook (l),  $\times 335$ ; m, pseudocompound hook from third parapodium,  $\times 335$ ; n, simple seta transformed from hook in third parapodium,  $\times 165$ ; o, subacicular hook,  $\times 335$ ; p, pectinate seta,  $\times 825$ ; q, maxillae,  $\times 40$ ; r, mandibles,  $\times 45$ .



the first 10 setigers, as a distinct digitiform lobe.

Branchiae are present from setiger 3 as a single filament. Posteriorly, the branchiae increase in the length and are as long as half the width of the body (Fig. 6 g).

Hooded, tridentate, pseudocompound hooks occur through first 5 setigers. The first parapodia have 6 hooks, 1 slender simple seta (Fig. 6 h) and 3 bayonet-shaped acicula (Fig. 6 i); the length of the appendages varies, and inferior hooks are more slender than the superior ones (Fig. 6 j, k, l). Parapodia of setiger 5 have 3 hooks (Fig. 6 m), 4 simple setae (Fig. 6 n) replacing some of the hooks and limbate setae. At setiger 6 all hooks have been replaced by simple setae. Bidentate subacicular hooks are first present from setigers 10 or 11 (Fig. 6 o). Pectinate setae are distally oblique, with 19–20 fine teeth (Fig. 6 p). The maxillary formula is 1+1, 9+9, 8+0, 10+12 and 1+1. Maxillary carriers are longer than broad and are basally drawn out into fine tips (Fig. 6 q). The whole jaw-apparatus is amber colored; the mandibles have long, slender basal ends (Fig. 6 r). The distal plates are conspicuously thin and each has two blackish bands along annulations.

*Remarks.* *Onuphis fuscata* resembles *O. mexicana* (FAUCHALD, 1968) from off the southern end of Baja California, in 1500 fms. and *O. vibex* (FAUCHALD, 1972) from Cedros Island, Baja California in that all 3 species have hooded, tridentate pseudocompound hooks present in the first 5 setigers, ventral cirri cirriform in the first 5 or 6 setigers and simple branchiae present from setigers 3 to 5. However, *O. fuscata* is distinguished by the following characteristics: (1) simple branchiae are present from setiger 3, (2) ventral cirri are cirriform in the first 5 setigers, (3) tridentate, pseudocompound hooks with blunt hoods are present in the first 5 setiger, and (4) whole jaw-apparatus is amber colored and distal plates have blackish bands. Moreover, *O. mexicana* has very prolonged and practically smooth antennal ceratophores, and *O. vibex* has rather short antennae and its peristomium is very narrow dorsally and the proximal small tooth of the hooks is bifurcated.

*Type series.* Holotype, NSMT-Pol. H 211; 2 paratypes, NSMT-Pol. P 212.

*Distribution.* Northeastern Japan.

### *Onuphis longisetosa* sp. nov.

(Fig. 7, a–p)

*Material examined.* Otsuchi Bay, in 40–115 m (holotype and 14 paratypes).

*Description.* All specimens are anterior fragments; the holotype measures 77 mm in length and 2.8 mm in width including parapodia for 192 setigers. The body except some anterior segments is dorso-ventrally flattened. Each of the anterior segments has a brown transverse band dorsally.

The prostomium is subtriangular; the frontal palps are short and conical in shape. Of the five antennae, the outer lateral antennae reach the posterior margin of setiger 1, with the ceratophores consisting of 10 to 11 distinct short articles plus a long distal

one; their ceratophores are longer than the styles. The inner lateral antennae reach setiger 5, with the ceratophores consisting of 14 to 17 short, basal articles plus a long distal one; the median antenna reaches setiger 3, with a ceratophore consisting of 9 short, basal articles and a long distal article. A pair of eyespots is present near the base of the outer lateral antennae. The peristomial cirri arise from the anterior margin of the peristomium and are about 2/3 as long as the prostomium (Fig. 7 a).

The first few parapodia are directed forward; they are of about the same size. In the first parapodia the presetal lobe is a low, transverse fold. The acicular lobe is also low with a rounded thick pad dorsally. The postsetal lobe is spindle-shaped and about as long as the base of the parapodium. The dorsal cirrus is digitiform; it is distinctly longer than the postsetal lobe. The ventral cirrus is digitiform and extends beyond the distal end of the acicular lobe (Fig. 7 b). The second (Fig. 7 c) and third parapodia are similar in shape. In the fourth and fifth (Fig. 7 d) parapodia the parapodial bases become shorter and narrower than those of the first parapodia. The ventral cirri are cirriform through setiger 5; they are all similar in size, and padlike thereafter. The sixth parapodium (Fig. 7 e) has the acicular lobe as long as the presetal lobe, thus not visible in anterior view. Dorsal cirri are present in all setigers to the posterior end of the fragment; they become shorter and slender posteriorly. Postsetal lobes are distinct digitiform lobes anteriorly; they decrease gradually in size from about setiger 20, but can be recognized in about the first 30 setigers, as a short conical lobe.

Branchiae are present from the first setiger and continue to as a single filament on the first 24 setigers (23–32 setigers in the paratypes). Thereafter, they are replaced by 2 branchial filaments and continue to the posterior end of the body of holotype (Fig. 7 f).

Hooded, pseudocompound hooks occur through first 5 setigers. The first parapodium has 12 slender tridentate (Fig. 7 g, h) and 2 coarser bidentate (Fig. 7 i) hooks; the slender hooks have longer appendages than the coarse ones. There are also 2 slender, simple, pointed setae. In the second and third parapodia there are 8 to 11 slender tridentate and 3 coarse tridentate (Fig. 7 j) hooks. A fifth parapodium has 2 slender and 3 coarse tridentate hooks. From the sixth parapodium these hooks are replaced by limbate capillary setae (Fig. 7 k); posterior capillary setae are more slender than the anterior ones (Fig. 7 l). Acicula usually number 2 in a parapodium; they taper distally to fine points. Bidentate subacicular hooks are present from setiger 10 (Fig. 7 m). Each of the pectinate setae is distally oblique, with 13 to 15 fine teeth (Fig. 7 n). The maxillary formula is 1+1, 9+8, 13+0, 14+11 and 1+1 (Fig. 7 o). The whole jaw-apparatus is whitish and has thin, calcified distal plates (Fig. 7 p).

*Remarks.* *Onuphis longisetosa* resembles *O. dibranchiata* WILLEY, 1905, from Sri Lanka, in that the fully developed branchia has 2 branchial filaments, and bi- and tridentate pseudocompound hooks of two different sizes are present. However, it is distinguishable in that *O. dibranchiata* has additional 2 stout, tridentate simple hooks in a setal fascicle, instead of missing.

*Type series.* Holotype, NSMT-Pol. H 213; 14 paratypes, NSMT-Pol. P 214.

*Distribution.* Northeastern Japan.

Genus *Nothria* MALMGREN, 1867*Nothria otsuchiensis* sp. nov.

(Fig. 8, a-r)

*Material examined.* Otsuchi Bay, in 48–79 m (holotype and 27 paratypes).

*Description.* The holotype is a complete specimen; it measures 18 mm in length and about 3 mm in width including parapodia anteriorly, and consists of 49 setigers. The body is dorso-ventrally flattened. The prostomium has a central pigmented patch on the mid-dorsal line. Each of the anterior parapodia has a brown patch near its base (Fig. 8 a).

The prostomium is slightly wider than long and is somewhat convex on the dorsal side, and has a pair of frontal palps. Of the five antennae, the outer lateral antennae reach the posterior margin of setiger 1, the inner lateral antennae reach setiger 5, and the median antenna reaches setiger 10. The ceratophores are short and have 3 to 4 distinct articles. There are two pairs of eyes; a pair of minute eyespots is present near the bases of the outer lateral antennae and other pair is much large and is present ventrally to the inner lateral antennae (Fig. 8 b). A pair of peristomial cirri is attached near the anterior edge of the peristomium; each is slender and about as long as the prostomium.

The first 2 parapodia are greatly enlarged and projects forwards; the first parapodia are much larger than the second ones, and project well beyond the anterior margin of the prostomium. The first 3 parapodia have large, foliose presetal lobes; each lobe is heart-shaped and those of the third parapodium are smaller than the first ones (Fig. 8 c). Dorsal cirri are slender and digitiform in anterior parapodia, thereafter these are reduced in a short lobe but continue to the posterior end. Ventral cirri are cirriform in the first 2 setigers (Fig. 8 d, e); they are replaced by glandular pads from setiger 3 (Fig. 8 f). The postsetal lobes are cirriform; the first lobes are shorter than the foliose presetal lobes; the postsetal lobes of the setigers 2 to 10 are well developed and reach beyond the distal ends of the acicular lobes (Fig. 8 e, f); thereafter, the postsetal lobes decrease in size (Fig. 8 g), and disappear on setiger 15.

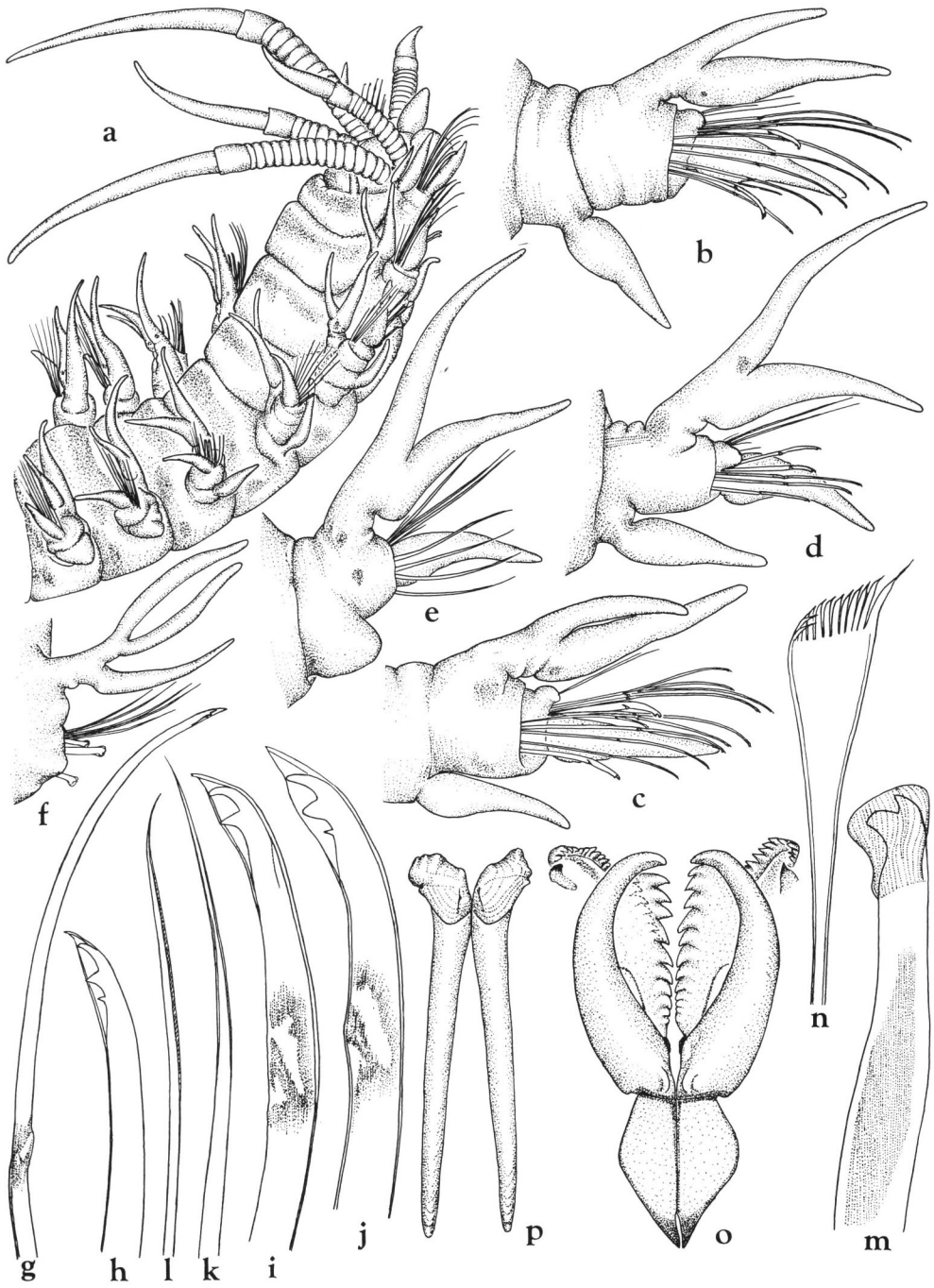
Strap-like branchiae are present from setiger 10 and continue to the posterior end of the body; the median branchiae are well developed (Fig. 8 h).

In the first and second parapodia each has 2 to 3 thick, bidentate simple falcate

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Fig. 7. *Onuphis longisetosa* sp. nov. a, Anterior end, lateral view,  $\times 16$ ; b, first parapodium, anterior view,  $\times 42$ ; c, second parapodium, anterior view,  $\times 42$ ; d, fifth parapodium, anterior view,  $\times 42$ ; e, sixth parapodium, anterior view,  $\times 42$ ; f, 106th parapodium, anterior view,  $\times 42$ ; g, slender pseudocompound hook from first parapodium,  $\times 155$ ; h, distal end of the same hook,  $\times 530$ ; i, coarser pseudocompound hook from first parapodium,  $\times 310$ ; j, coarser pseudocompound hook from second parapodium,  $\times 310$ ; k, limbate simple seta from sixth parapodium,  $\times 155$ ; l, limbate simple seta from 106th parapodium,  $\times 155$ ; m, subacicular hook from 106th parapodium,  $\times 310$ ; n, pectinate seta,  $\times 770$ ; o, maxillae,  $\times 42$ ; p, mandibles,  $\times 42$ .





spines superiorly (Fig. 8 i) and 1 pseudocompound hook inferiorly (Fig. 8 j, k); some hoods of the some falcate spines are detached. The third parapodium has 3 to 5 slender hooded, bidentate, pseudocompound hooks (Fig. 8 l), 2 limbate capillary setae (Fig. 8 m) and about 30 pectinate setae (Fig. 8 n). The pectinate seta is distally scoop-shaped and has about 20 teeth. From the fourth setiger the hooks are replaced by limbate capillary setae (Fig. 8 o), and the pectinate setae decrease to 5 or 6 in a parapodium. Intrafascicular hooks are present from setiger 10 and increase in number to 5 on setiger 13; each has a bent, bidentate end with hood (Fig. 8 p). The maxillary formula is 1+1, 6+9, 8+0, 11+13 and 1+1 (Fig. 8 q). The whole jaw-apparatus is whitish and with a horn-like substance (Fig. 8 r). Two anal cirri are slender and as long as the last 11 setigers.

The tubes have a tough, translucent inner lining and are densely and evenly covered with shell-fragments and sand.

*Remarks.* *Nothria otsuchiensis* resembles *N. occidentalis* FAUCHALD, 1968 (re-viewed by FAUCHALD, 1982) from southern California south to Colombia, in having bidentate, simple falcate spines in the first 2 setigers. However, the two species can be separated by the following characteristics: (1) the branchiae are present from setiger 10, instead of setiger 8, (2) the foliose presetal lobes are present the first three parapodia, instead of first two parapodia and (3) about 30 pectinate setae are first present from setiger 3, and each has 20 teeth, instead of 20 pectinate setae are first present from setiger 2, and each has 10 teeth. *N. otsuchiensis* is distinguishable from *N. conchylega* (M. SARS, 1835) in having simple falcate spines in the first 3 setigers, instead of 2 setigers.

*Type series.* Holotype, NSMT-Pol. H 215; 27 paratypes, NSMT-Pol. P 216.

*Distribution.* Northeastern Japan.

### Genus *Sarsonuphis* FAUCHALD, 1982

#### *Sarsonuphis striata* (USCHAKOV, 1950)

(Fig. 9, a-t)

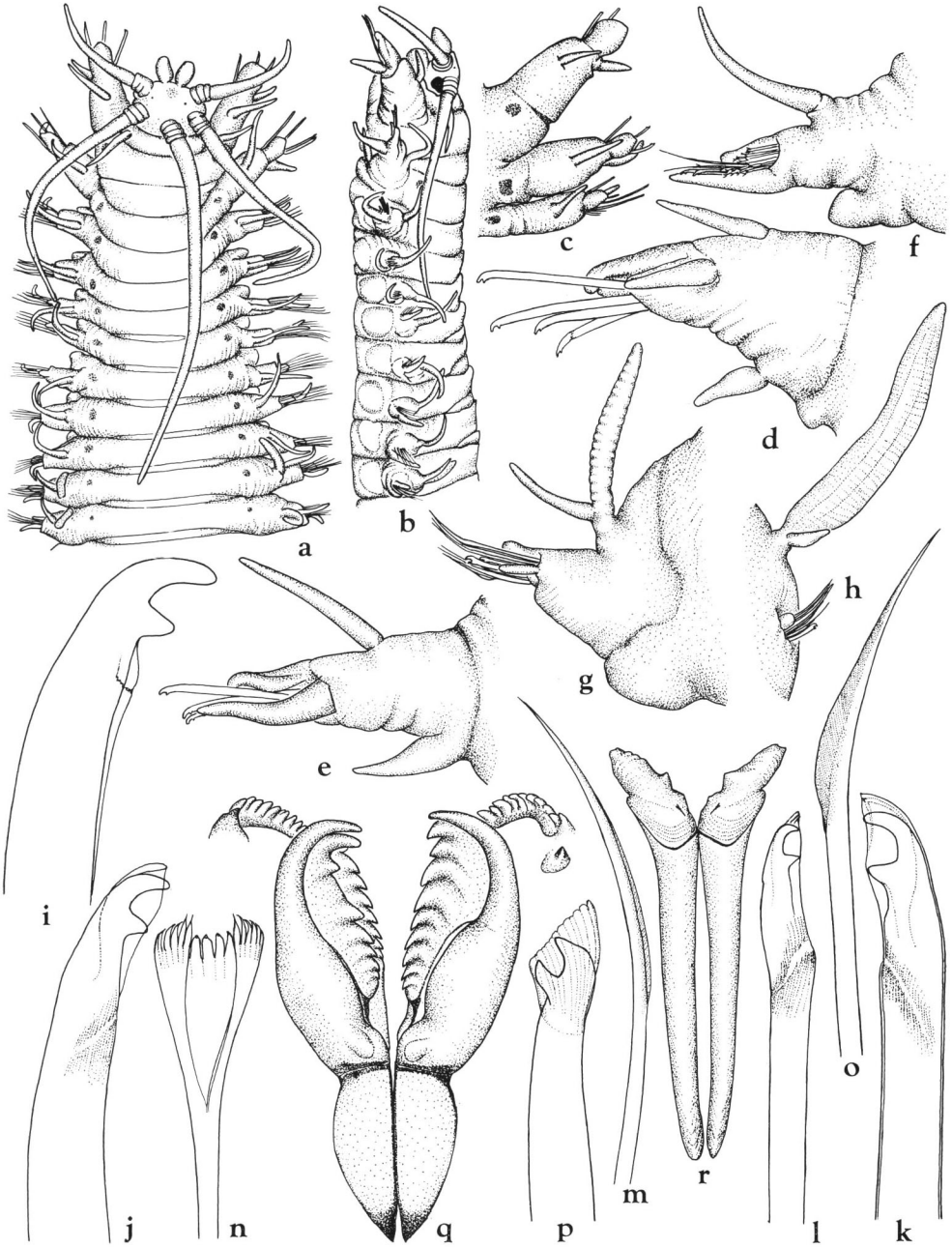
*Onuphis parva striata* USCHAKOV, 1950, p. 193, fig. 25; 1955, p. 234, figs. 74 b, 77 j.

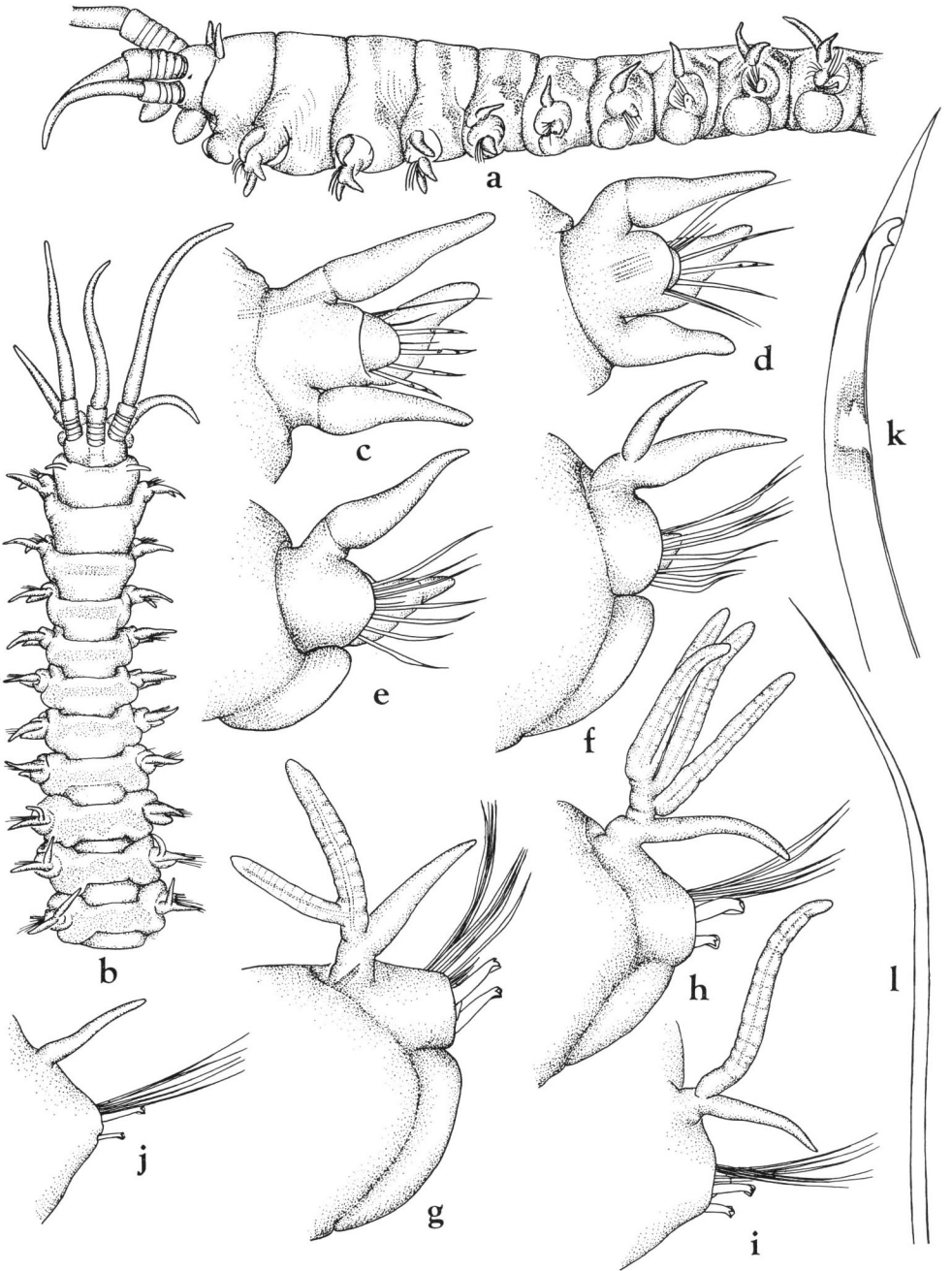
*Sarsonuphis striata*: FAUCHALD, 1982, pp. 78-79, fig. 20 c.

*Material examined.* Otsuchi Bay, in 43-115 m (398); off Otsuchi, 39°19.3'N,

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Fig. 8. *Nothria otsuchiensis* sp. nov. a, Anterior end, dorsal view,  $\times 13$ ; b, the same, lateral view,  $\times 13$ ; c, first three parapodia of light side, dorsal view,  $\times 17$ ; d, first parapodium, posterior view,  $\times 38$ ; e, second parapodium, posterior view,  $\times 38$ ; f, third parapodium, posterior view,  $\times 38$ ; g, 13th parapodium, posterior view,  $\times 38$ ; h, 20th parapodium, anterior view,  $\times 43$ ; i, bidentate, simple spine from first parapodium,  $\times 290$ ; j, pseudocompound hook from first parapodium,  $\times 290$ ; k, pseudocompound hook from second parapodium,  $\times 290$ ; l, pseudocompound hook from third parapodium,  $\times 290$ ; m, limbate, capillary seta from third parapodium,  $\times 177$ ; n, pectinate seta from third parapodium,  $\times 700$ ; o, limbate, capillary seta from 13th parapodium,  $\times 177$ ; p, intrafascicular hook from 13th parapodium,  $\times 290$ ; q, maxillae,  $\times 53$ ; r, mandibles,  $\times 38$ .





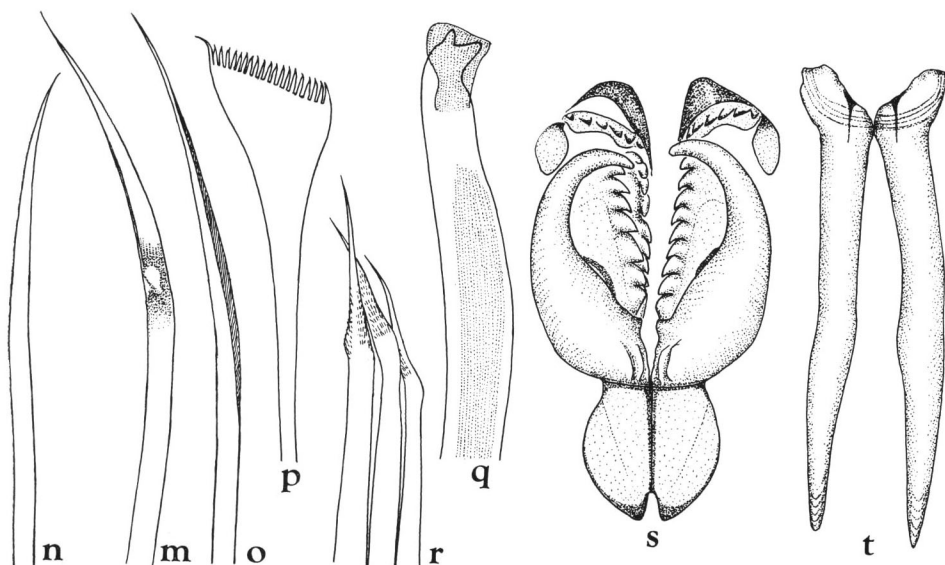


Fig. 9, on pp. 112–113. *Sarsonuphis striata* (USCHAKOV). a, Anterior end, lateral view,  $\times 15$ ; b, the same, dorsal view,  $\times 9$ ; c, first parapodium, anterior view,  $\times 45$ ; d, third parapodium, anterior view,  $\times 45$ ; e, fourth parapodium, anterior view,  $\times 45$ ; f, eighth parapodium, anterior view,  $\times 45$ ; g, 12th parapodium, anterior view,  $\times 45$ ; h, 23rd parapodium, anterior view,  $\times 45$ ; i, 34th parapodium, anterior view,  $\times 45$ ; j, 40th parapodium, anterior view,  $\times 45$ ; k, pseudo-compound hook from first parapodium,  $\times 370$ ; l, simple seta from first parapodium,  $\times 165$ ; m, pseudocompound hook with distally pointed hood from third parapodium,  $\times 205$ ; n, simple seta transformed from hook in third parapodium,  $\times 205$ ; o, limbate, capillary seta from posterior parapodium,  $\times 205$ ; p, pectinate seta,  $\times 545$ ; q, subacicular hook,  $\times 205$ ; r, acicula from 10th parapodium,  $\times 205$ ; s, maxillae,  $\times 45$ ; t, mandibles,  $\times 55$ .

142°04.0'E–39°19.3'N, 142°04.3'E, in 149 m, KT-85-11 (9).

*Description.* A complete specimen measures 48 mm in length and about 1 mm in width including parapodia; it consists of 145 setigers. Another fragments are 2 to 2.5 mm in width at the anterior body. The anterior part of the body is cylindrical and is dorsally flattened posteriorly (Fig. 9 a). Each of the first 20 segments, except the peristomium and the first setiger, has a conspicuous, brown transverse band across the dorsum.

The prostomium is a rounded lobe; the frontal palps are short and oval. Of the five antennae, the outer lateral antennae reach the posterior margin of setiger 1, the inner lateral antennae reach setigers 2 to 4, and the median antenna reaches the posterior margin of setiger 3. The ceratophores have 4 to 5 distinct basal articles plus a long distal one (Fig. 9 b). Eyes are present near the base of the inner lateral antennae. The peristomial cirri have a dorso-lateral position and are about as long as the prostomium.

Anterior parapodia are not distinctly enlarged. Each of the first parapodia has an evenly rounded acicular lobe; the presetal lobe is a low, transverse fold covering the bases of the setae. The postsetal lobe is clavate and is longer than the base of the parapodium. Dorsal cirri remain of about the same length in all setigers but become slender in the posterior setigers; each has a distinct cirrophore at its base. Ventral cirri are cirriform in first 3 setigers (Fig. 9 c, d); they are replaced by glandular pads thereafter (Fig. 9 e). Digitiform postsetal lobes are distinct in the first 8 or 9 setigers.

Branchiae are present from setigers 7 to 10 as a single branchial filament (Fig. 9 f); they are bifurcated from setigers 10 to 12 (Fig. 9 g), and trifurcated from setigers 16 to 17, and the best developed branchia has 4 filaments (Fig. 9 h). The number of branchial filaments decrease posteriorly and become a single filament at between setigers 30 and 40 (Fig. 9 i), and posterior segments lack branchiae (Fig. 9 j).

Each parapodium of the first 3 setigers has 1 to 5 bidentate, pseudocompound, hooded hooks; these hooks have long and distally pointed hoods (Fig. 9 k). Superior setae in the setal fascicle are capillaries without limbation (Fig. 9 l). In setiger 3 one pseudocompound hook in which the appendage has fused with the hood occurs in the median part of the setal fascicle (Fig. 9 m), and some hooks are replaced by thick, limbate setae (Fig. 9 n). Posterior setigers have limbate setae (Fig. 9 o) and slender pectinate setae (Fig. 9 p) in addition to the bidentate subacicular hooks with hoods (Fig. 9 q). Each of the pectinate setae is distally oblique and has about 20 fine teeth. The subacicular hooks are present from setigers 9 to 10; usually 2 hooks are present in a parapodium. All parapodia are supported by a pair of acicula; acicula of the setal lobe in setiger 10 are bayonet-shaped with slender pointed ends (Fig. 9 r). The maxillary formula is 1+1, 7+9, 8+0, 6+7 and 1+1. The maxillary carriers are rather short and broad (Fig. 9 s). The whole jaw-apparatus is whitish and has thin, calcific distal plates (Fig. 9 t).

The species is new to the Japanese fauna.

*Distribution.* Off the coast of Kamchatka; northern Japan.

### Distributions of Onuphids in and Offshore of Otsuchi Bay

Otsuchi Bay is situated on the northeastern coast of Honshu, the Japanese main island. The outline of the bay is somewhat V-shaped, and the width of the bay is about 3.5 km at its entrance and the long axis of the bay is about 9 km.

The bottom sediments within and just outside of Otsuchi Bay was studied by HORIKOSHI *et al.*, 1976. The surface sediments of Otsuchi Bay may be roughly divided into two parts: muddy area in the depths between 20 and 43 m in inner half of the bay, and coarser sediments area including shells forwards to the bay mouth. Offshore of the bay is found mud, with occasional patches of coarse sand.

Onuphids were not found in the inner half of the bay, during the whole 3-year survey. Of the 8 species of onuphids, *Sarsonuphis striata* is the most common in the bay, and also occurs offshore in about 150 m depth. *Onuphis holobranchiata*, *O.*

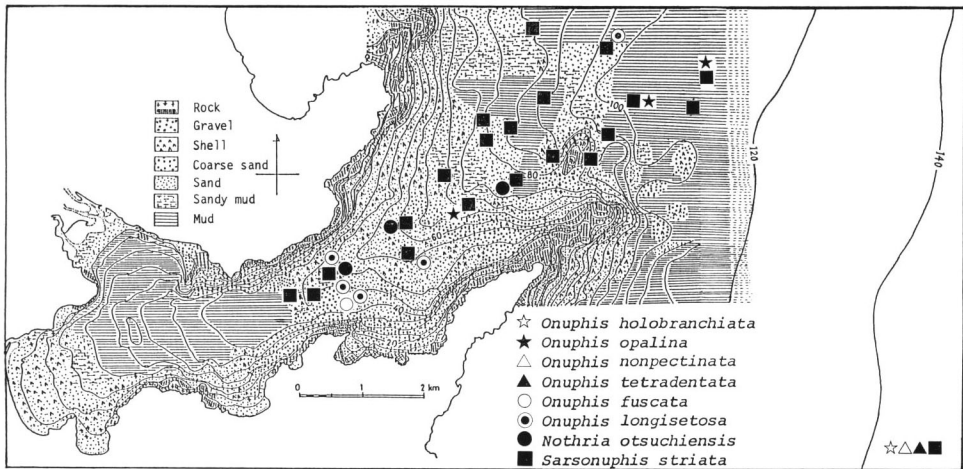


Fig. 10. Distributions of surface sediments and 8 species of onuphids within and just outside of Otsuchi Bay.

*nonpectinata* and *O. tetrudentata* are only present offshore. On the other hand, *Onuphis fuscata* is found only from one station in the median part of the bay. *Nothria otsuchiensis* is distributed in depths between 50 to 80 m in the bay, and were found with *Sarsonuphis striata* at three stations (Fig. 10).

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