

## A New Species of *Polydora* (Polychaeta, Spionidae) Collected from Abashiri Bay, Hokkaido

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### Abstract

A new species of *Polydora*, burrowing in the shells of the scallop *Patinopecten yessoensis*, is described from Abashiri Bay, Hokkaido, under the name of *P. variegata*. It is closely related to *P. websteri* HARTMAN, a well known shell-boring worm. However, it is different in morphological and ecological characteristics from the latter species.

Many species of the polychaete *Polydora* settle on calcareous substrates and are known to damage the shells of bivalves, especially oysters and scallops, by their burrowing actions. A large number of specimens of *Polydora* were observed to settle on the shells of the scallop *Patinopecten yessoensis* in sowing cultures in Abashiri Bay at a depth of 30–40 m on the Okhotsk Sea coast of Hokkaido (Fig. 1). Abashiri Bay has been famous for its abundant natural resources of the scallops. In recent years, however, the growth rate of the scallop in sowing cultures has been slowing down, and the authors had a chance to study *Polydora* species in relation to this phenomenon.

Of the species of *Polydora* found in the shells of the scallop, a new species described here is numerically dominant, and is widely distributed along the Okhotsk Sea as the most common species settling on shells all the year round. The *Polydora* species inhabiting these waters has been reported as *Polydora ciliata* (JOHNSTON, 1838) by OKUDA (1937); however, it is referred to the new species *Polydora variegata*.

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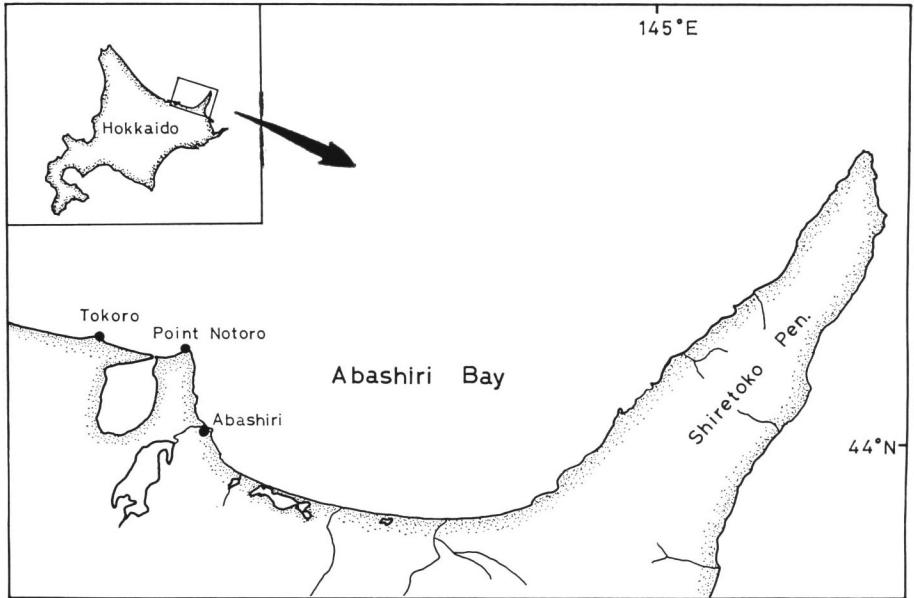


Fig. 1. Map of Abashiri waters, Hokkaido.

The specimens of the type-series have been deposited in the National Science Museum, Tokyo.

Genus *Polydora* BOSCH, 1802

*Polydora variegata* sp. nov.

(Figs. 2–26)

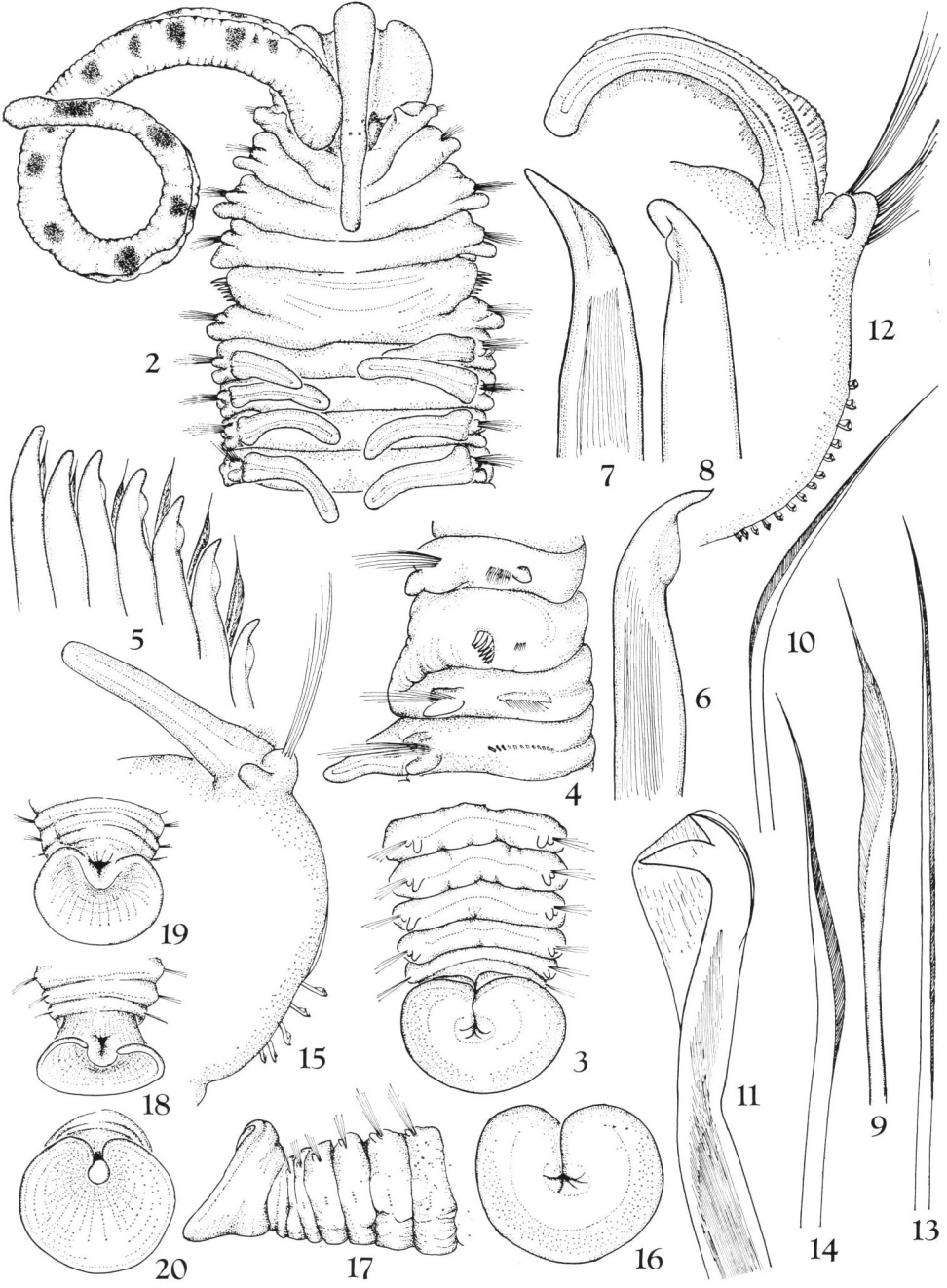
*Polydora ciliata*: OKUDA, 1937, p. 230 (not JOHNSTON, 1838)

*Type locality.* Abashiri Bay, Hokkaido, in 30–40 m, from the shells of the scallop *Patinopecten yessoensis*.

*Description.* The holotype is the largest complete specimen; it measures 33 mm

Figs. 2–17. *Polydora variegata* sp. nov. 2, anterior end, omitted right palpus, in dorsal view,  $\times 26$ ; 3, posterior end, in dorsal view,  $\times 33$ ; 4, setigers 4 to 7, showing the 5th modified segment, in lateral view,  $\times 33$ ; 5, fascicle of modified spines and pennonated setae from setiger 5,  $\times 190$ ; 6, 7, heavy modified spines with lateral flange, in different views,  $\times 530$ ; 8, worn modified spine,  $\times 530$ ; 9, pennonated companion seta of setiger 5,  $\times 530$ ; 10, winged capillary neuroseta of setiger 5,  $\times 530$ ; 11, bidentate hooded hook from setiger 10,  $\times 770$ ; 12, 10th setiger, in posterior view,  $\times 77$ ; 13, superior winged capillary seta of setiger 10,  $\times 580$ ; 14, inferior winged capillary seta of same setiger,  $\times 580$ ; 15, 40th setiger, in posterior view,  $\times 76$ ; 16, pygidium, in posterior view,  $\times 38$ ; 17, the same, in lateral view,  $\times 33$ .

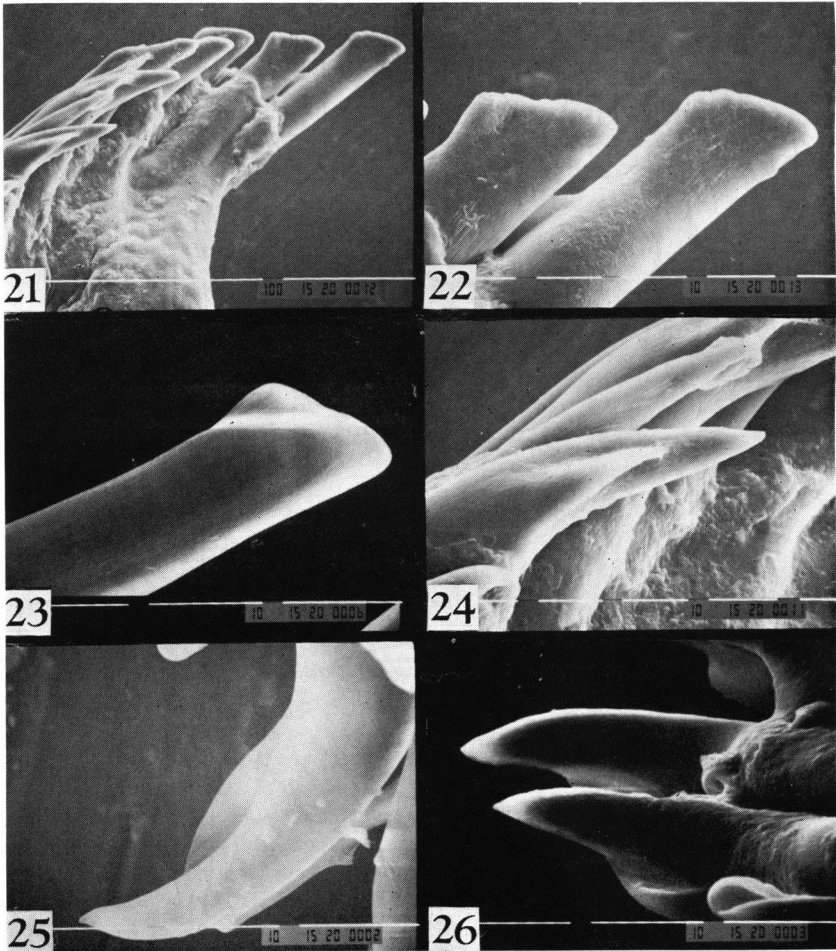
Figs. 18–20. Pygidium of paratypes of *P. websteri*, in dorsal (18), dorso-posterior (19), posterior (20) views,  $\times 33$ .



in length and about 1.6 mm in width at the fifth setiger, and consists of 125 setigerous segments. The body in life is light tan, without pigment.

The prostomium is anteriorly rounded, and the caruncle extends to the third setiger; there are four tiny eyes in trapezoidal arrangement. The peristomium is large and fairly closely applied to the prostomium. Palpi are stout and crossed by 9 to 13 dark bands of pigment at irregular intervals (Fig. 2). Branchiae first appear on the 7th setiger. The first branchiae are rather long, about  $2/3$  as long as the following branchiae; they continue to near the end of the body, gradually diminishing in size; the last few are short, almost papilliform (Fig. 3).

Notopodial lamellae of the first setiger are erect, thin and tall, while those of



Figs. 21–26. Modified spines of setiger 5 from paratype of *P. variegata* sp. nov. by SEM. 21, fascicle of modified spines; 22, worn heavy spines without lateral flange; 23, worn heavy spine with a small elevation; 24–26, unworn spines with lateral flanges in different views.

setigers 2 to 4 are broader and more leaflike. Neuropodial lamellae are thin and small. Setiger one lacks notosetae; neurosetae of this setiger are winged capillaries, as one the remaining noto- and neuropodial fascicles through setiger 4.

The modified fifth setiger is at least twice as long as the following (Fig. 4); there is a row of heavy modified spines alternating with pennoned companion setae (Fig. 5). The modified spines are falcate and have a lateral flange or sheath (Figs. 6, 7), but worn setae are distally rounded and their lateral flange is small (Fig. 8) or lacking. A fascicle of the modified spines of the paratype as seen by the SEM is shown (Fig. 21). Some worn heavy spines are simple and falcate without the lateral flange (Fig. 22) or with a small elevation (Fig. 23), but unworn spines have well developed lateral flanges (Figs. 24–26). The pennoned companion setae are slender and have a distal wide wing (Fig. 9). The neurosetae of the modified segment are short, winged capillary setae, numbering 7 in per fascicle (Fig. 10). The winged capillary neurosetae are replaced by bidentate hooded hooks beginning on the 7th setiger. Each hook has two developed teeth, the major one at a right angle to the shaft; the hook has a constriction on the shaft (Fig. 11). There are 14 hooks on the 10th setiger, although fewer are found in posterior segments, where they number about 4. In the branchial segments there is a short notopodial lamella and a setal fascicle of winged capillary setae (Fig. 12); superior setae are long and slender with a long narrow wing (Fig. 13) and inferior ones are short, thicker, and with a short wing (Fig. 14). The number of setae per fascicle gradually diminishes in the middle region (Fig. 15) and in posterior segments only a few long, thin capillary setae are present.

The pygidium is disclike; the posterior plaque is almost flattened, with an anal aperture in its center; there is no median dorsal notch (Figs. 3, 16, 17). Darkly pigmented patches are scattered around the edge of the plaque.

*Reproduction and development.* Many young worms of this species were observed to settle in a very narrow band around the periphery of the left valve of the scallop in April, after the drift ice period in Abashiri Bay. They burrow holes in the shells and sometimes penetrate through it. The main spawning seemed to take place during September to October. The worms lay egg capsules that are attached to the wall of their mud tubes; the eggs are 130 to 140  $\mu\text{m}$  in diameter. Mature sperm are elongated, and the head length including middlepiece measures 12.5–15.0  $\mu\text{m}$ . The larvae hatch from the egg capsule at the three setiger stage, measuring 320  $\mu\text{m}$  in length. The larvae remain in the plankton until they settle and metamorphose during the drift ice period; at this time they have approximately 18 setigers.

*Remarks.* By courtesy of Ms. S. WILLIAMS, *Polydora variegata* was compared with paratypes of *P. websteri* HARTMAN, 1943 from Lemon Bay, Florida, from oyster shells. As previously mentioned by BLAKE (1969, 1971), the heavy modified spines of the fifth setiger of *P. websteri* have a sheath on one side, and its features are similar to these of *P. variegata*. However, *P. variegata* differs from *P. websteri* as follows: the prostomium is rounded at its anterior end, instead of clearly bifurcated; the palpi are crossed by 9 to 13 distinct dark bands at irregular intervals, instead of lacking thus

bands; the pygidium is disclike, without a median dorsal notch, and the anal aperture is in center of the pygidial plaque. In *P. websteri*, the pygidium is cup-shaped, flaring, and with a distinct dorsal notch; the anal aperture is dorsal to the pygidium (Figs. 18–20).

According to S. A. RICE (1981), the average total length of sperm head and middlepiece of *P. websteri* measures 22.8  $\mu\text{m}$ . On the other hand, that of *P. variegata* measures 12.5 to 15  $\mu\text{m}$  in length, with the average being 13.7  $\mu\text{m}$ .

*P. websteri* is reported to reproduce year round in the Gulf of Mexico (HOPKINS, 1958), or March to July in Maine (BLAKE, 1969). However, the main spawning of *P. variegata* is found in September to October.

The two species can be distinguished in Table 1.

Table 1. Differences in certain morphological and ecological characters between *Polydora variegata* sp. nov. and *P. websteri* HARTMAN.

Features	<i>P. variegata</i> sp. nov.	<i>P. websteri</i> HARTMAN
Prostomium	Anteriorly rounded	Anteriorly bilobed
Palpus	With 9–13 dark bands	Without dark bands
Pygidium	With anal aperture in center of plaque Without a dorsal notch	With anal aperture dorsally With a distinct dorsal notch
Sperm (head + middlepiece) length	12.5–15 $\mu\text{m}$	22.8 $\mu\text{m}$ (average)
Reproduction period	September–October	March–July (BLAKE, 1969) Year round (HOPKINS, 1958)

*Polydora ciliata* reported by OKUDA (1937, p. 230) from Mombetsu, Hokkaido, is referred to this species on the basis of the following comments by OKUDA: "The tentacles are fairly long and, in a specimen preserved in alcohol, were crossed with brown bands." This character corresponds with that of *P. variegata*, as the palpi of *P. ciliata* have no such brown bands.

*Type series.* Holotype, NSMT-Pol. H 176; 10 paratypes, NSMT-Pol. P 177.

*Distribution.* Northern Japan.

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