

NEW DATA ON PHORONIDS COLLECTED BY SOVIET
EXPEDITIONS*

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UDC 594.6
SYSTEMATICS

Data on the occurrence of *Phoronis muelleri*, *Ph. psammophila*, and *Phoronopsis harmeri* in Far Eastern seas and their redescription are presented.

Since the publication by Mankaev in 1962 of the only work on phoronids of the USSR, this group has become the object of wide study; bibliographies on phoronids are contained in the surveys by Emig (1979, 1982a). The taxonomy and systematics of adult individuals and their larvae *Actinotrocha* are now well documented (Emig, 1971, 1979). Despite this, phoronids in the seas of the USSR remain virtually untouched.

In this study three species of phoronids, *Phoronis muelleri*, *Ph. psammophila*, and *Phoronopsis harmeri*, which were collected by Soviet expeditions and stored at the Zoological Institute of the Academy of Sciences of the USSR, were investigated.

Phoronis muelleri Selys-Longchamps

This is a cosmopolitan species which is usually found on silty bottoms at depths of 1-390 m. It was discovered by the expeditionary ship "Toporek" (1947-1949) at many stations in Tatar Strait and southern part of the Sea of Okhotsk (Fig. 1) at depths of 16.5-140 m, with maximal population density at depths 50-100 m. The bottoms were mainly sandy and sandy-silty. Temperatures at the location of discovery were 12-0.8°C (from August to September), most often 3-1°C. This is of interest to note since the gonads of many individuals were in a state of maturation. *Ph. muelleri* was collected together with *Phoronopsis harmeri* at many stations. During the Soviet-Chinese expedition in the Yellow Sea (1957-1958), *Ph. muelleri* was collected at stations in the vicinity of the Changshan Islands together with *Phoronis psammophila*. Finally, some specimens of *Ph. muelleri* were found at Station 3578 by the research ship "Kurchatov" during voyage 34, 7°45'S and 80°05'W, at a depth of 156 m on clayey silt.

The characters of all investigated specimens correspond to the diagnosis of *Ph. muelleri* made by Emig (1979). The length of the tubules reaches 16 cm which corresponds to the length of the animal in a straightened state; earlier, the maximal length of this species was presented as 12 cm. The lophophore is horseshoe-shaped and tentacles numbering from 50 to 100 are 1-2 mm long. Characteristically, in *Ph. muelleri*, as the prebuccal tentacles approach the length of the postbuccal tentacles in armedian direction, they decrease in length. Each of the two nephridia has one coelomic funnel and a short descending branch, followed by a long ascending one which opens by the nephridiopore at the sides of the anus. A giant nerve fiber (7-40 μ in diameter) is present only at the left side, at the level of the attachment of the lateral left mesentery which is absent in *Ph. muelleri*. In this context in the muscle formulas, this absence is noted by a dotted line. Muscle formulas established for 37 specimens from the

region of Sakhalin Island (Fig. 2) yield the general formula $[23-30] \frac{8-12}{3-5} \frac{8-11}{3-5}$ and the average

$27 = \frac{16}{4} \frac{9}{4}$. Two muscle formulas of specimens collected in the Yellow Sea look like this:

$28 = \frac{8}{5} \frac{10}{5}$, $29 = \frac{10}{3} \frac{12}{4}$. Taking these results into account, the general formula of *Ph. muelleri*

*Prepared for press by V. V. Malakhov.

Station Marine d'Endoume, Marseille, France. Translated from *Biologiya Morya* No. 4, pp. 65-67, July-August, 1984. Original article submitted April 26, 1983.

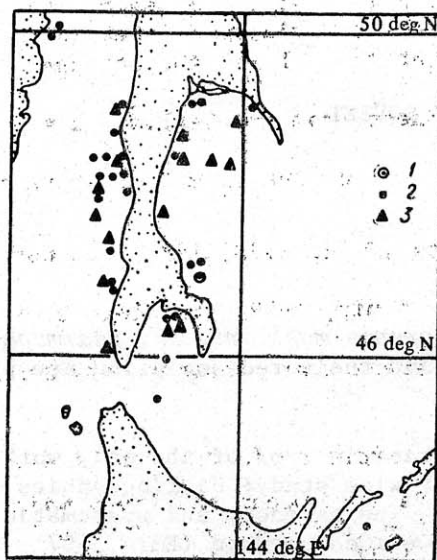


Fig. 1. Distribution of phoronids in Kurile-Sakhalin region. 1) *Phoronis psammophila*, 2) *Ph. muelleri*, 3) *Phoronopsis harmeri* (according to Mamkaev, 1962).



Fig. 2. Variations of total number of longitudinal muscles in *Phoronis muelleri* from the Kurile-Sakhalin region. Along the abscissa is number of longitudinal muscles; along the ordinate is number of specimens.

becomes: $[18-39] \frac{5-13}{2-8} \frac{5-12}{3-8}$, and the average $27 = \frac{109}{44}$, which alters the formula in Emig's diagnosis considerably (Emig, 1979).

Ph. muelleri is a gonochoristic species; the males have large and glandular lophophoral organs which were observed in some specimens collected in August on Sakhalin Island. Larvae in the course of maturation were noted in females in September. The larvae of *Ph. muelleri* are *Actinotrocha branchiata* (Emig, 1982a).

Phoronis psammophila Cori

This is a cosmopolitan species living on finely granular, sometimes silty sands, from the littoral to a depth of 35 m, usually 5-10 m. Our specimens were collected in Mordvinova Bay at the southeastern coast of Sakhalin Island (Fig. 1) in August on silty sand at a depth of 19.5 m. This species was also encountered in the Yellow Sea at most of the stations during the work of the Soviet-Chinese expedition.

The species reach 19 cm in length, with diameter 0.5-2 m. The lophophores are horse-shoe-shaped, the number of tentacles go up to 190 (Emig, 1982), and the length is 2.5 mm.

Nephridia contain one coelomic funnel; behind the descending short branch there follows a long ascending one that opens by the nephridiopore just below the anus. A single large nerve fiber (7-27 μ m in diameter) lies at the left of the attached left lateral mesentery. Muscle

formulas established for 10 specimens from the Yellow Sea are as follows: general [34-46]

$\frac{9-14}{7-9} | \frac{10-14}{6-9}$, average $38 = \frac{11}{8} | \frac{12}{7}$. For specimens from Mor'dvinova Bay: $39 = \frac{12}{9} | \frac{11}{11}$; $44 = \frac{14}{9} | \frac{13}{8}$; $46 = \frac{13}{10} | \frac{15}{8}$.

These and earlier reported results (Emig, 1980, 1982b) do not change the general formula of

Ph. psammophila: [25-53] $\frac{7-19}{4-11} | \frac{7-17}{4-11}$ (Emig, 1979), but lead to a new average formula: $35 = \frac{12}{6} | \frac{11}{6}$.

The larvae of this gonochoristic species are *Actinotrocha sabatiera* recently investigated by Emig (Emig, 1982a).

Phoronopsis harmeri Pixell

This is distributed in the Pacific Ocean and lives mainly on sandy-silty bottoms from the littoral zone to a depth of 15 m (Emig, 1979). It was found at Sakhalin Island at depths of 23-104 m (Mamkaev, 1962; Emig, 1977) on finely granular sands with gravel and on soft silts. Maximal temperatures at the bottom from August to October vary from 7 to 0.6°C. Maximum settlement density at depths 35-60 m. It is found jointly with *Ph. muelleri* at some stations.

Ph. harmeri was also found at three stations in Posyet Bay (Skarlato et al., 1967). In Ekspeditsiya Bay the species was collected at a depth of 5 m on silty-sandy bottom in a biocenosis of *Anadara broughtoni* + *Luidia quinaria bispinosa*. Settlement density here reaches 70 specimens/m². In Minonosok Bay it was found at depths of 4-6 m on silty sand mixed with gravel and bits of shells in a biocenosis of *Patiria pectinifera* + *Strongylocentrotus nudus*, and at depths of 20-22 m on silty-sandy coquina in a biocenosis of *Laminaria cichoroides*, *Desmarestia viridis* + *Modiolus difficilis*. In the latter biocenosis the density of settlement of *Ph. harmeri* reaches 40 specimens/m². The species was found on Sivuchii Bay at a depth of 3 m on slightly silty sand in a biocenosis of *Zostera asiatica* + *Spisula sachalinensis*. In this biocenosis, density was not more than 1 specimen/m². It was also encountered in Vostok Bay, Sea of Japan.*

The muscle formulas for 16 individuals collected in Posyet Bay is as follows:

[77-127] $\frac{30-38}{13-27} | \frac{21-40}{13-23}$, average formula: $100 = \frac{33}{16} | \frac{32}{16}$. Having studied the position of longitudinal

muscle bundles in 45 specimens collected at Sakhalin Island and utilizing earlier published data on the structure of the musculature of *Ph. harmeri* from this region (Mamkaev, 1962;

Emig, 1977), we write the general formula: [75-138] $\frac{24-47}{14-25} | \frac{26-48}{11-24}$ and the average formula

$107 = \frac{35}{20} | \frac{35}{17}$.

The present work was carried out within the framework of Soviet-French cooperation during the author's stay at the Zoological Institute of the Academy of Sciences of the USSR (Leningrad) in 1980, 1982. The author expresses his appreciation to O. A. Skarlato, A. N. Golikov, A. V. Ivanov, Yu. V. Mamkaev, and M. A. Dolgolenko for their assistance in this work.

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*In Vostok Bay, according to Tarasov (1978), the biomass of *Ph. harmeri* is 100 g/m² (ed. note).

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