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A REVIEW OF THE PROSOBRANCH FAMILY
VELUTINIDAE IN COLD AND TEMPERATE
WATERS OF THE NORTHERN HEMISPHERE.
I. CAPULACMAEINAE

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ABSTRACT

The family Velutinidae Gray, 1842 includes velutinid-like gastropods having a radular formula of 2 1 1 1 2 and a rectangular rachidian tooth. The family comprises three subfamilies: Capulacmaeinae Golikov & Gulbin, 1990, Velutininae Gray, 1842 and Onchidiopsinae Golikov & Gulbin, 1990 and includes 39 species and subspecies belonging to 17 genera and subgenera.

This first paper deals with the subfamily Capulacmaeinae consisting of the two genera *Piliscus* Loven, 1859 including the species *P. commodus* (Middendorff), *P. radiatus* M. Sars, *P. rostratus* (Golikov & Gulbin), *P. undulatus* (Golikov & Gulbin) and *Cilifera* Golikov & Gulbin, 1990 with the species *C. ciliata* Golikov & Gulbin.

INTRODUCTION

Most investigators place velutinid gastropods in the family Lamellariidae. However, members of *Lamellaria* sensu stricto possess a radular formula of 0 1 1 1 0 (marginal teeth lacking) and a triangular rachidian tooth with a large arcuate notch in its broadened part (Fig. 1a). Therefore, placing of Lamellariidae in the suborder Calyptraeioidea Lamarck, 1809 seems doubtful. In cold and temperate waters of the Northern Hemisphere, this suborder includes the families Trichotropidae Gray, 1850, Calyptraeidae Lamarck, 1809, Capulidae Fleming, 1822 and Velutinidae Gray, 1842. The unifying features are a common structure of the radula having a formula of 2 1 1 1 2 (two marginal teeth are present on each side) and a rectangular rachidian tooth (Fig. 1b,c,d).

Gastropods of the family Velutinidae are found almost exclusively in cold and temperate waters of the Northern Hemisphere. So far more than 75 velutinid taxa of the species rank have been described, of which most prove syno-

Ophelia publishes this paper – the first in a series – in spite of the fact that parts of the results were published in Russian in 1990. Reviewers and editors agree that since these results are little known outside Russia, a publication reaching a wider circle is justified.

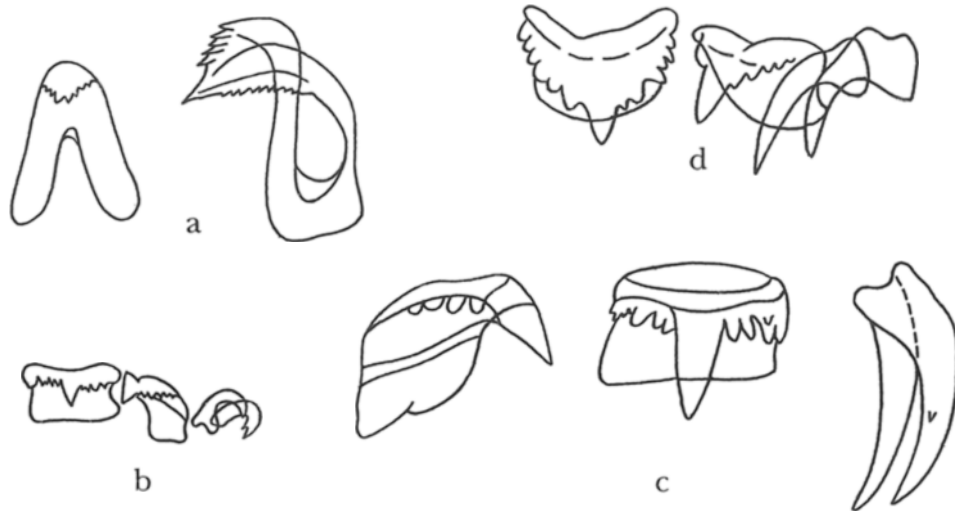


Fig. 1. Radular teeth of Lamellariidae and Velutinidae. a – *Lamellaria perspicua* (after Behrens, 1980); b – *Piliscus radiatus* (after Thiele, 1929); c – *Velutina velutina* (after Derjugin, 1950); d – *Onchidiopsis groenlandica* (after Derjugin, 1937).

nymys. We have examined 2833 specimens of velutinids, mainly from the Russian seas. Also, we have analysed the available world literature concerning velutinids.

On the basis of the revision made by us, we recognize a separate family Velutinidae Gray, 1842 consisting of three subfamilies:

I. Capulacmaeinae Golikov & Gulbin, 1990, comprising the genera *Piliscus* Loven, 1859 and *Cilifera* Golikov & Gulbin, 1990;

II. Velutininae Gray, 1842, including the genera *Limneria* H. & A. Adams, 1853, *Ciliatovelutina* Golikov & Gulbin, 1990, *Velutina* Fleming, 1821, *Velutella* Gray, 1867, *Cartilagovelutina* Golikov & Gulbin, 1990 and *Marsenina* Gray, 1850;

III. Onchidiopsinae Golikov & Gulbin, 1990, consisting of the genus *Onchidiopsis* Bergh, 1853.

The three subfamilies include 39 species and subspecies belonging to 17 genera and subgenera.

Abbreviations: Z. I. – Zoological Institute, Academy of Sciences of Russia, Saint Petersburg.

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LIST OF SPECIES

Order Cerithiiformes Ferrusac, 1819
Suborder Calyptraeioidae Lamarck, 1809

Family Velutinidae Gray, 1842

Subfamily Capulacmaeina
Golikov & Gulbin, 1990

Genus *Piliscus* Loven, 1859

P. commodus (Middendorff, 1849). *P. rostratus* (Golikov & Gulbin, 1990).
P. radiatus (M. Sars, 1859). *P. undulatus* (Golikov & Gulbin,
1990).

Genus *Cilifera* Golikov & Gulbin, 1990

C. ciliata Golikov & Gulbin, 1990.

Subfamily Velutininae Gray, 1842

Genus *Limneria* H. & A. Adams, 1853

Subgenus *Limneria* s.str.

L. (L.) undata undata (Brown, 1838). *L. (L.) undata bifasciata* (Derjugin,
L. (L.) undata ochotensis (Derjugin, 1950).
1950). *L. (L.) insculpta* (Odhner, 1913).

Subgenus *Conivelutina* Golikov & Gulbin, 1990

L. (C.) prolongata (Carpenter, 1865).

Genus *Ciliatovelutina* Golikov & Gulbin, 1990

C. lanigera (Moeller, 1862). *C. capillata* (Derjugin, 1950).
C. lanata (Derjugin, 1950). *C. nana* (Bartsch in Derjugin, 1950).

Genus *Velutina* Fleming, 1821

Subgenus *Velutina* s.str.

V. (V.) velutina (Mueller, 1776). *V. (V.) pulchella* (Derjugin, 1950).
V. (V.) schneideri (Friele, 1886).

Subgenus *Margaritavelutina* Golikov & Gulbin, 1990

V. (M.) tarasovi Derjugin, 1950.

Subgenus *Corneovelutina* Golikov & Gulbin, 1990

V. (C.) coriacea Pallas, 1788. *V. (C.) bartschi* Derjugin, 1950.

Genus *Velutella* Gray, 1867

V. plicatilis (Mueller, 1776).

Genus *Cartilagovelutina* Golikov & Gulbin, 1990

C. beringensis (Derjugin, 1950). *C. cristata* (Derjugin, 1950).
C. chondrina (Bartsch in Derjugin,
1950).

Genus *Marsenina* Gray, 1850

M. glabra (Couthouy, 1838). *M. ushidai* (Habe, 1958).
M. rhombica (Dall, 1871). *M. stearnsii* (Dall, 1871).

Subfamily Onchidiopsinae Golikov & Gulbin, 1990

Genus *Onchidiopsis* Bergh, 1853Subgenus *Onchidiopsis* s.str.

O. (O.) groenlandica (Bergh, 1853). *O. (O.) zachtsi* Derjugin, 1937.
O. (O.) variegata Derjugin, 1937.

Subgenus *Rostroonchidiopsis* Golikov & Gulbin, 1990

O. (R.) glacialis (M. Sars, 1851). *O. (R.) longipes* Derjugin, 1937.
O. (R.) gurjanovae Derjugin, 1937. *O. (R.) brevipes* Derjugin, 1937.
O. (R.) carnea (Kroeyer, 1847).

Subgenus *Bullonchidiopsis* Golikov & Gulbin, 1990

O. (B.) maculata Derjugin, 1937. *O. (B.) ushakovi* Derjugin, 1937.
O. (B.) nadinae Derjugin, 1937.

In addition to the species revised by us, the literature affords descriptions of velutinid taxa which defy revision because of the scarcity of descriptions and the lack of illustrations, primarily of the radula and penis. They are as follows:

Velutina pusio A. Adams, 1860 found in the Korean Strait.

Lamellaria (Marsenina) ampla Verrill, 1882 described from Man Bay, New England.

Onchidiopsis kingmaruensis Russell, 1942 described from 1 specimen found at Baffin Land.

Revision of these species is possible only after examination of the type specimens.

Besides that, A. Warén, (1989) described a new genus and species *Pseudotorelia fragilis* from Iceland but we think this may belong to a separate new family.

SYSTEMATIC DESCRIPTIONS

Family Velutinidae Gray, 1842

Diagnosis. Shell usually weakly calcified, thin, cap-shaped, broadly ear-shaped or concealed by mantle, almost membranaceous. Aperture ear-shaped, pyriform, roundly ovate or irregularly ovate, ample, occupying most of frontal plane of shell. Spire consists of 1-4 whorls sunk into the very large last whorl or slightly projecting above it. Shell usually covered by differently developed periostracum (thin, membranaceous to thick, fibrous or setaceous). Edges of mantle thick, fleshy, sometimes project beyond the aperture, partly or entirely concealing shell and fusing over it. In the latter case, the shell is almost devoid of the calcareous layer, conchiolinous, having a soft membranaceous texture. Foot large, oblong or almost rounded with nodulated sole. Operculum lacking. Radula taenioglossate, having a formula of 2 1 1 1 2. Animals hermaphroditic.

Subfamily Capulacmaeinae Golikov & Gulbin, 1990

Diagnosis. Shell not concealed by mantle, cap-shaped, with 1-2 rapidly enlarging whorls. Apex located medially or slightly shifted to right, bent backwards. Periostracum fairly well developed, membranaceous, coriaceous or setaceous.

The type genus of the subfamily is *Capulacmaea* M. Sars, 1858.

Genus *Piliscus* Loven, 1859

Diagnosis. Shell small or medium-sized (maximum shell length varies among species from 11 to 45 mm), almost bilaterally symmetrical or with spire slightly displaced to right; 1-2 inflated whorls covered by thin, membranaceous periostracum. Protoconch large, with 1 to 1.5 calcified whorls, uncovered by periostracum. Sculpture represented by concentric growth lines, occasionally faint radial striae or axial swellings. No spiral sculpture.

Since Thiele (1929) and Wenz (1938-1943) most investigators have named this genus "*Capulacmaea* M. Sars, 1859" but Warén (1989: 18) proved the name *Piliscus* Loven, 1859 to have priority.

Type species: *Capulus radiatus* M. Sars, 1851.

The genus includes 4 species.

Piliscus commodus (Middendorff, 1851)

Fig. 2

Pilidium commodum Middendorff 1849: 99 (nom. nud.); Middendorff 1851: 214, pl. 17, fig. 4-11.

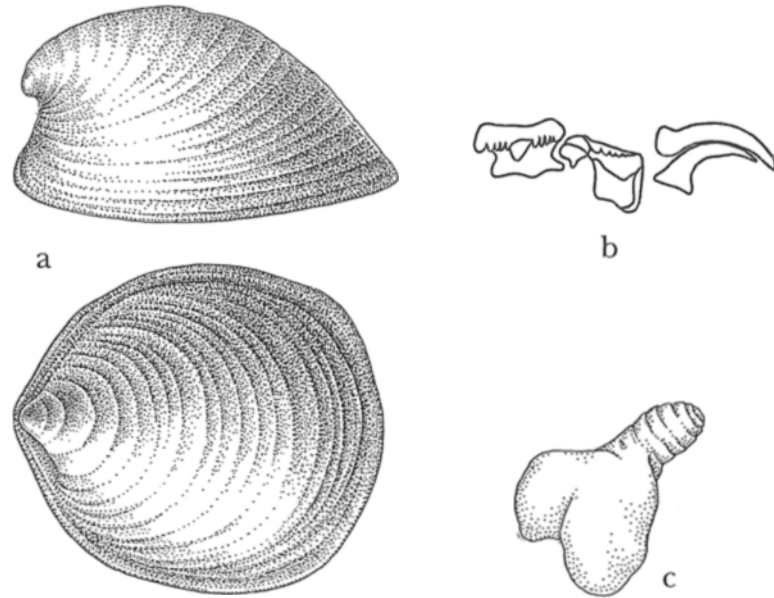


Fig. 2. *Piliscus commodus* (Middendorff). a – shell; b – radula; c – penis.

Piliscus commodus: Dall 1921: 161; Oldroyd 1927: 111-112; MacGinitie 1959: 93-94, pl. 5 fig. 4-6.

Capulacmaea commoda: Kuroda & Kinoshita 1951: 15; Golikov & Gulbin 1990: 108.

Description. Shell broad, irregularly cap-shaped, two whorled. Apex slightly shifted to right. Protoconch very small, white, one whorled, uncovered by periostracum, hanging over upper third of back slope of shell. Last whorl covered by thin, light greyish-brown, membranaceous periostracum adherent to shell surface. Calcareous layer more developed than periostracum, bluish-grey; some specimens (especially from the southern part of geographic range) with violet bands of variable width radiating from apex. External coloration visible on inside of shell.

Aperture irregularly ovate, with periostracum projecting along the apertural margin. Axial sculpture consisting of elevated, irregular, distinct growth lines. Spiral sculpture lacking.

Measurements. A. T. Middendorff's holotype: length 22 mm, width 19 mm, height 10 mm. Largest seen specimen: length 45 mm, width 35 mm, height 20 mm.

Remarks. Most investigators consider this species to be synonymous with *Piliscus radiatus* (M. Sars, 1851); however, the small protoconch in *P. commodus*, which

forms a complete spire and is not adherent to the last whorl, and the geographic disjunction of their ranges are arguments for regarding them as separate species.

Distribution. From Peter the Great Bay and Hokkaido Island in the south and east to Point Barrow and the Pribilof Islands in the north and west. The species occurs most abundantly in the Sea of Okhotsk.

Holotype No 1/11630 collected by A. T. Middendorff in 1844 in Tugursky Bay, the Sea of Okhotsk, is deposited with the gastropod collection at the Z. I.

Ecology. Intertidal zone to 500 m depth, usually 10-50 m; substrata varying from mud mixture and sand to rocks or more typically, stones.

Piliscus radiatus (M. Sars, 1851)

Fig. 3

Capulus radiatus M. Sars 1851: 184.

Piliopsis radiatus: Danielssen 1861: 26.

Pilidium radiatum: G. O. Sars 1878: 144-145, pl. 8, fig. 6a-d.

Piliscus commodus: Verril 1885: 567, Warén 1989: 18, fig. 12F, 13F-G.

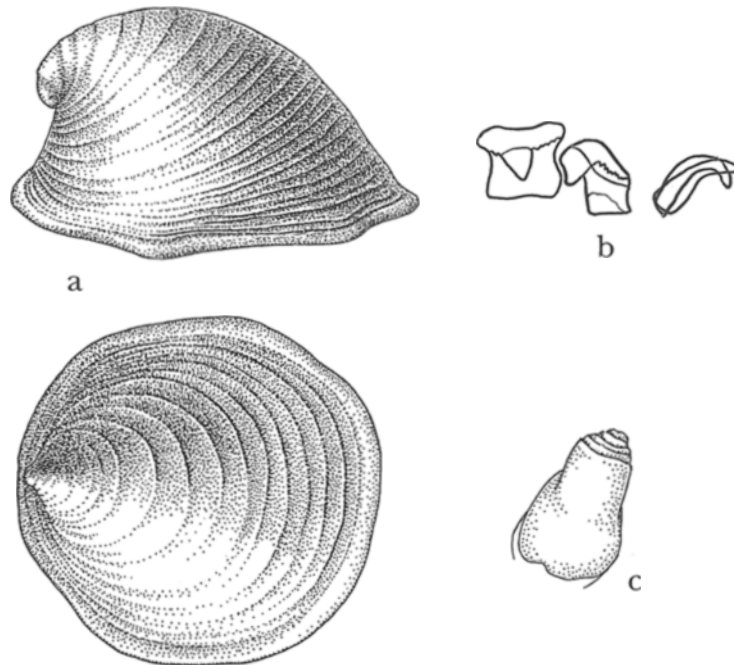


Fig. 3. *Piliscus radiatus* (M. Sars). a – shell; b – radula; c – penis.

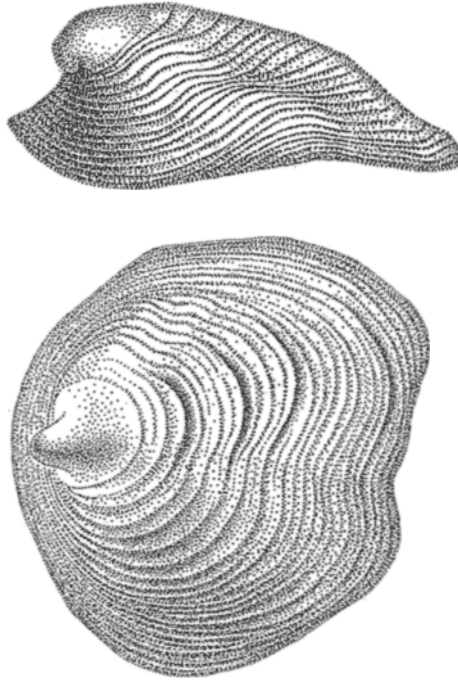


Fig. 4. *Piliscus undulatus* (Golikov & Gulbin).

Piliscus radiatus: Dautzenberg & Fischer 1912: 219-220 (part.).

Capulacmaea radiata: Macpherson 1971: 53-54, pl. 3, fig. 4,7, map 23 (part.);

Golikov & Gulbin 1990: 108.

Description. Shell highly cap-shaped, of 1.5 convex whorls. Apex slightly shifted to right. Protoconch large, grey, uncovered by periostracum, adherent to upper fourth of back slope of shell. Last whorl covered by a light greyish-brown coriaceous periostracum projecting beyond calcareous layer along shell margins. Calcareous layer bluish-greyish, more weakly developed than periostracum, sometimes well defined only in upper part of shell. Bands coloured darker than background often present on surface of shell. Aperture irregularly roundly ovate. Axial sculpture consisting of coarse slightly elevated, incremental lines. Spiral sculpture lacking.

Measurements. Largest seen specimen: length 34 mm, width 28 mm, height 27 mm.

Remarks. The higher shell and the characteristic protoconch separate *P. radiatus* from *P. commodus* and other species in the genus.

Distribution. In the Norwegian, Barents, Kara seas, and in the eastern part of

the Laptev Sea, along the coasts of Iceland, Spitzbergen, Franz Josef Land, Novaya Zemlya, Severnaya Zemlya, Finnmark (Norway) as well as along the coasts of Greenland, and arctic shores (excluding the Beaufort Sea) of Canada where it ranges from Ellesmere Island to Hudson Bay.

Type locality. Komagfiord of Finnmark, depth 54-72 m.

Ecology. 1-2 m to 930 m depth, most common at 50 to 200 m. Mud, sand and stone mixtures.

Piliscus undulatus (Golikov & Gulbin, 1990)

Fig. 4

Capulacmaea undulata Golikov & Gulbin 1990: 111-112, fig 3a,c.

Description. Shell broadly cap-shaped with an almost medial apex; whorls 1.5. Protoconch rostriform, calcified, white, one-whorled adherent to shell slightly below middle part of back slope. Last whorl covered by light yellow membranaceous periostracum projecting in apertural area beyond calcareous layer. Calcareous layer of shell yellowish-white, well defined near apex, gradually disappearing towards the base of shell. Inner surface of shell also yellowish-white. Aperture almost rounded. Axial sculpture consisting of wrinkled, elevated, sinuous growth lines. Shell surface bearing 4 radially located nodose undulations, which give last whorl a wavy shape. No radial sculpture.

Measurements. Holotype: length 12.5 mm, width 14 mm, height 5 mm.

Remarks. By having an apex only slightly displaced to the right and a somewhat compressed shell, this species is well separated from *P. commodus* (Middendorff) and *P. radiatus* (M. Sars); and it differs from *Piliscus rostratus* in having a nodose, undulated surface of the shell.

Distribution. The only specimen was found at the South Kurile Islands.

Holotype No. 1/5464 collected 21.7.1984 from shingle at 600 m depth, is deposited in the gastropod collection at the Z. I.

Piliscus rostratus (Golikov & Gulbin, 1990)

Fig. 5

Capulacmaea rostrata Golikov & Gulbin 1990: 112-113, fig. 4a,c.

Description. Shell broadly cap-shaped, with an almost medial apex of 1.5 moderately expanding whorls. Protoconch very large, white, calcified, adherent to lower third of back slope. Last whorl covered by light greyish-brown coriaceous periostracum projecting beyond base of shell. Calcareous layer bluish-grey, as well developed as periostracum. Aperture ample, irregularly roundly ovate. Axial sculpture of irregular, incremental lines.

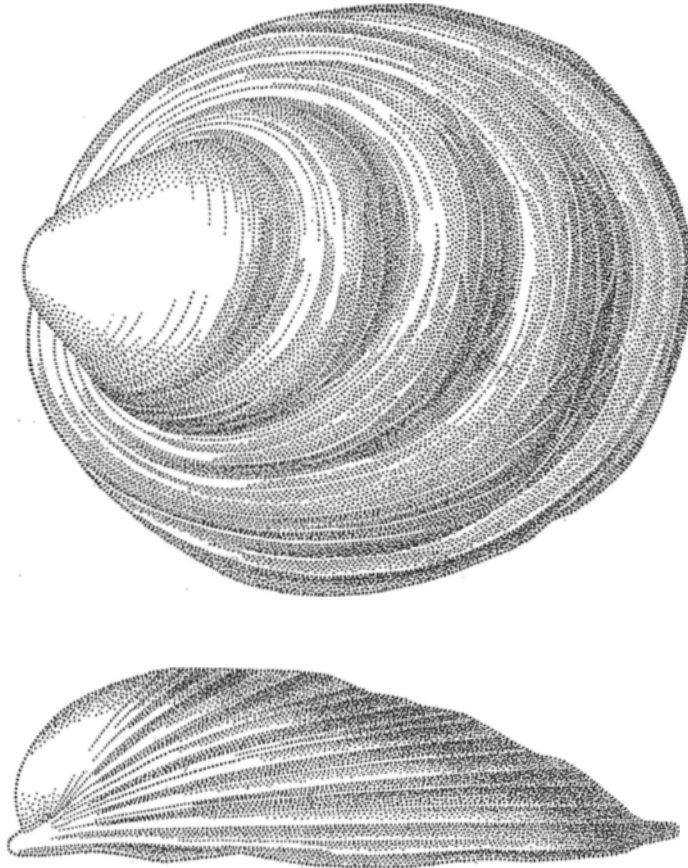


Fig. 5. *Piliscus rostratus* (Golikov & Gulbin).

Measurements. Holotype: length 11.5 mm, width 10 mm, height 4 mm.

Remarks. The species is well separated from other members of the genus by having a somewhat compressed shell with a smooth surface.

Distribution. The only specimen was found at the Middle Kurile Islands.

Holotype No. 1/54563 collected at 139-160 m depth from a stony substratum is deposited in the gastropod collection of Z. I.

Genus *Cilifera* Golikov & Gulbin, 1990

Diagnosis. Shell broad, irregularly cap-shaped, with apex slightly shifted to right, one-whorled. Protoconch uncovered by periostracum, adherent to middle portion of back slope of shell. Calcareous layer sculptured merely with con-

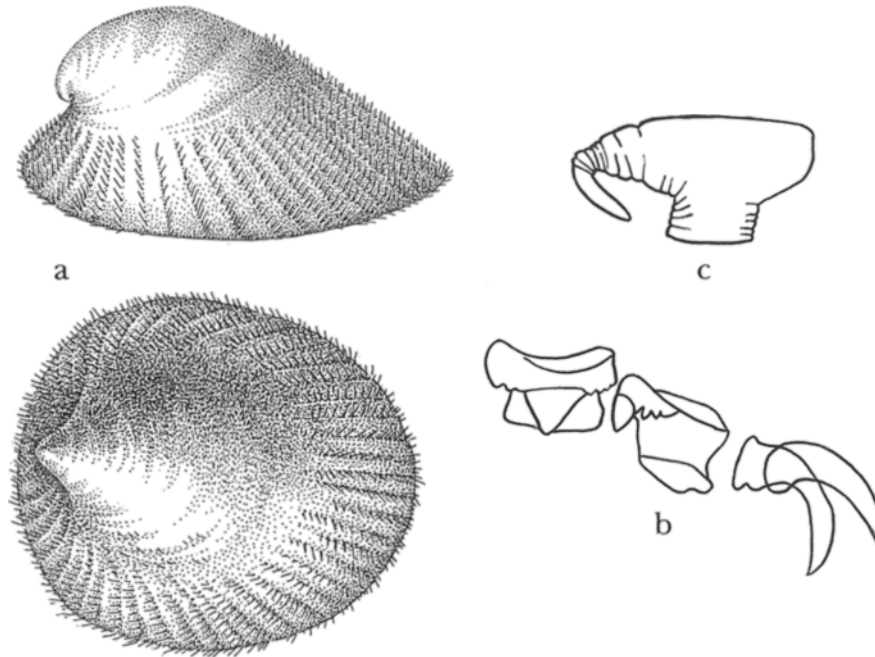


Fig. 6. *Cilifera ciliata* Golikov & Gulbin. a – shell; b – radula; c – penis.

centric growth lines. Aperture broad, irregularly elliptical. Periostracum coriaceous, forming radial rows of long setae.

Type species: *Cilifera ciliata* Golikov & Gulbin, 1990, by monotypy.

Cilifera ciliata Golikov & Gulbin, 1990

Fig. 6

Cilifera ciliata Golikov & Gulbin 1990: 110-111, fig. 2a-g.

Description. Shell broad, irregularly cap-shaped, with apex slightly shifted to right, one-whorled. Protoconch whorl small, white, uncovered by periostracum, 0.5 whorl, adherent to mid-portion of back slope of shell. Last whorl covered by thick setaceous light greyish-brown periostracum. Calcareous layer thin, white-grey, not reaching base of shell. Aperture ample, irregularly-elliptic in shape. Axial sculpture of distinct wrinkled growth lines. Spiral sculpture in adult individuals consists of 39-54 rows of setae disposed at intervals 4-5 times the width of rows. Height of setae in adult individuals up to 1.5 mm. Setae in rows regularly arranged, with intervals exceeding their width at base by 2-3 times. On front slope of shell, there are about 30 setae in a row. Setae often obsolete near apex.

Measurements. Largest seen specimen: height 18.5 mm, width 40 mm, length 46 mm.

Remarks. The species differs from other species of the subfamily by a very characteristic periostracum consisting of setae arranged into numerous (about 50) radial rows.

Distribution. The Sea of Okhotsk.

Holotype No. 1/53633 was collected 27.8.1938 in the western part of the Sea of Okhotsk at Cape Mariya, at a depth of 58 m, from muddy stones and pebbles. One paratype was collected 19.8.1978 at the Shantarskiye Islands, at a depth of 8 m from muddy sand with stones. The collection site of a second paratype is unknown. Types are deposited in the gastropod collection of Z. I.

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