

Two new species of deep-water bivalve from the Weddell Sea, West Antarctica (Mollusca: Kelliellidae and Cuspidariidae)

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Descriptions of *Kelliella sirenkoi* sp. n. and *Cuspidaria smirnovi* sp. n. are given.

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Introduction

Knowledge of the molluscan fauna in the Weddell Sea was very poor until the German Antarctic expeditions started in 1983. The present study was carried out based on specimens collected by the 39th Polarstern Expedition in 1996. Both new species, *Kelliella sirenkoi* and *Cuspidaria smirnovi*, were collected from one station in the northern part of the Atka Bay (East Weddell Sea, West Antarctica) with a small dredge (depth range 2315-2334 m) by B.I. Sirenko and I.S. Smirnov of the Laboratory of Marine Research, Zoological Institute, Russian Academy of Sciences. These species are named in their honour. The holotypes and paratypes are deposited in the Zoological Institute, St.Petersburg.

Family **KELLIELLIDAE** Fischer, 1887

Genus **Kelliella** M. Sars, 1870

Type species *Venus miliaris* Philippi, 1844.

Shells minute, rounded-ovate, inequilateral, with finest concentric striae, sometimes with more or less prominent ribs, ribblets or narrow folds. Lunule circumscribed with distinct outlines; two teeth on each valve. Deep-water species. Tertiary – Recent.

***Kelliella sirenkoi* sp. n.**

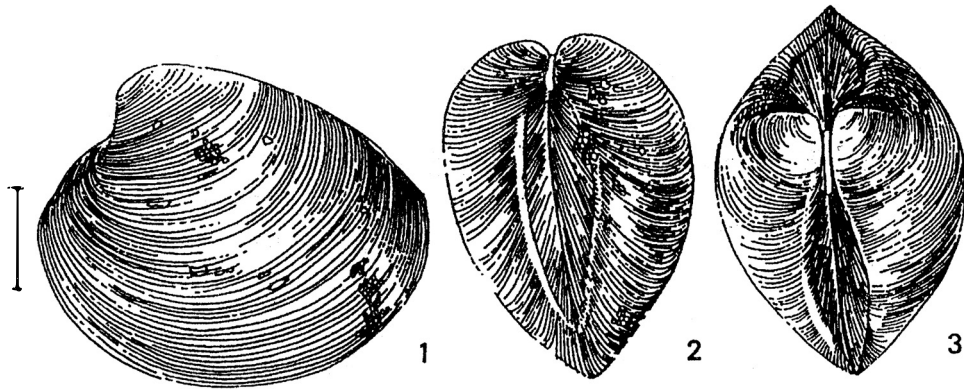
(Figs 1-12)

Holotype. Polarstern-39, I.III.1996, st. 30, dredge 24, 70° 05.30' S, 8° 20.00' W – 70° 05.30' S, 8° 21.80'

W, N Atka Bay, depth 2315-2334 m, silt with small stones and coarse-grained sand; coll. B.I. Sirenko & I.S. Smirnov.

Paratypes. 184 juveniles and adults (1 shell empty, 1 valve) from the same sample.

Description of the holotype. Shell small, triangular-rounded, convex, moderately thick-walled, semi-transparent, cordate in profile, a little longer than high, equivalve, inequilateral (postumbonal part about 73% of the total length), with short, rounded anterior margin and sloping, gently arcuate, somewhat longer posterior margin, the latter obliquely inclined, forming together with up-curved ventral outline a more acute angle than in front. Umbones large, elevated above hinge-line, curved to anterior dorsal margin and narrowed to minute, smooth, glossy prodissoconch. Angle between antero-dorsal and postero-dorsal edges about 115°. Lunule broadly cordate, a little concave immediately beneath beak and slightly convex in middle, with groove on periphery and delicate close striae on surface. Escutcheon (postero-dorsal part of shell) narrow, long, spear-like, with delicate striae, deepened, separated from remainder of shell surface by distinct, slightly arcuate rib. Concentric sculpture on shell surface with dense, closely spaced, fine, rounded on periphery or more thick, flattened in central part ribblets (more than 55 in number) and with microscopical growth lines on their surface. Periostracum dense, shiny, white. Inner surface white, polished, without distinct muscular scars, but with mantle line not far from ven-



Figs 1-3. *Kelliella sirenkoi* sp. n., holotype. 1, exterior of left valve; 2, posterior lateral view; 3, dorsal view.

tral margin. Hinge-teeth of irregular form. Left valve with two teeth, of which the posterior one, situated below the ligament, is small, oblique and narrow; anterior tooth longer than posterior, with irregularly undulated or sinuated edge, separated from the upper hinge margin by deep groove. Right valve with two teeth; oblique upper tooth long, with wavy external edge of a similar irregular conformation as a deep groove in opposing valve; lower tooth small, spoon-like, displaced to anterior edge. There are two grooves: one (long and deep) located between upper and lower teeth, the other situated between upper tooth and dorsal margin. External ligament light yellowish, short, situated deeply between two umbones.

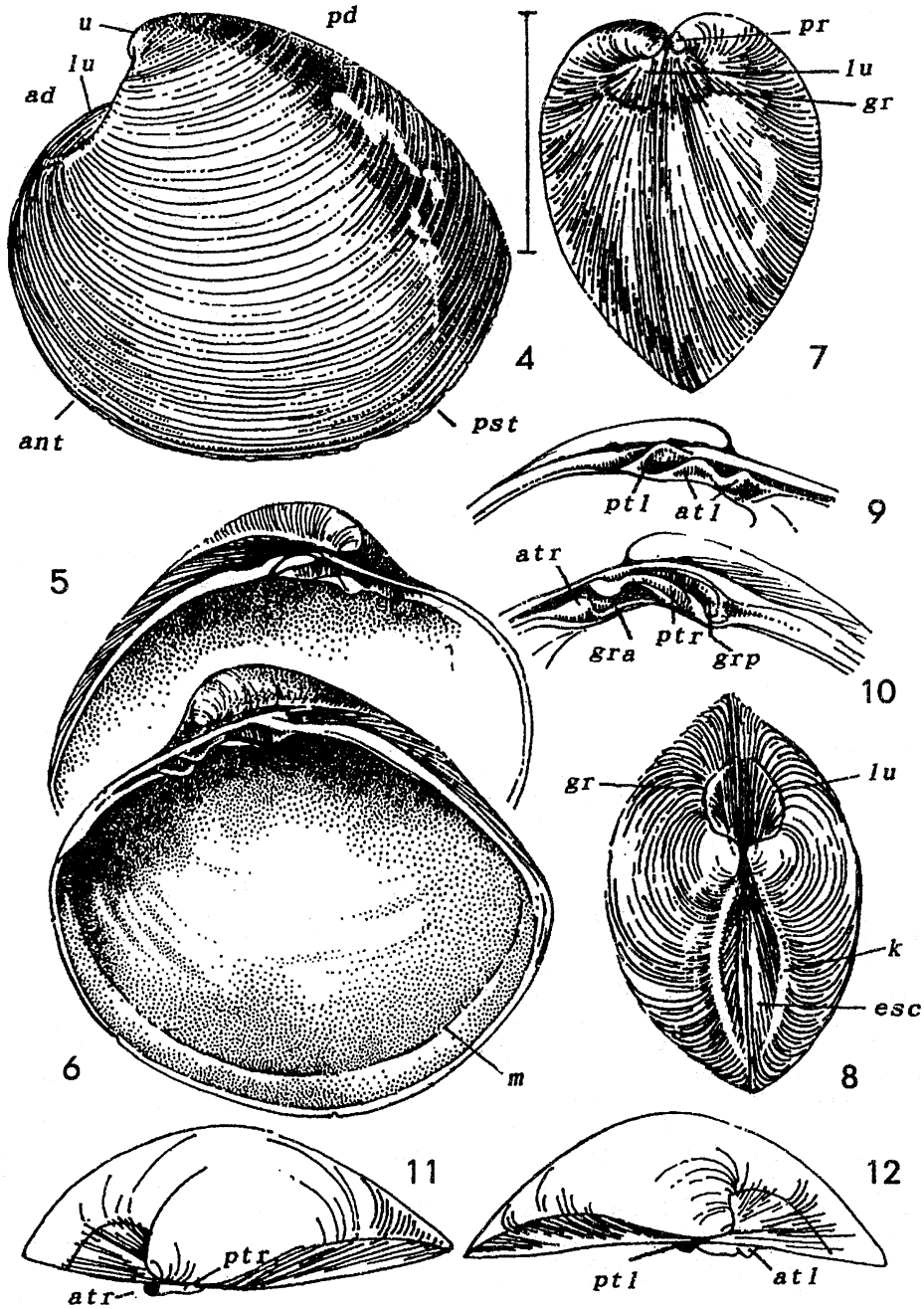
Measurements. Holotype: L (length) = 3.7 mm, H (height) = 3.3 mm, B (breadth of two valves) = 2.5 mm, H/L = 0.89. Paratypes: length 1.9-3.7 mm, H/L 0.87-0.97.

Comparison. The adult shell from the Weddell Sea is closely similar to *Vesicomya adamsii* (Smith, 1885) from the region south of Sierra Leone (3° 10' N, 14° 51' W) in numerous features, but can be distinguished by the smaller sizes in contrast to the largest *V. adamsii* (type specimen: L = 12.66 mm, H = 11.5 mm, B = 9.0 mm) and by outlines (more rounded, not oblique), proportions (H/L = 0.89 against 0.81), dentition (the right valve of the new species has two teeth in contrast to *V. adamsii* with a single elongate tooth). The Antarctic species resembles another species of *Vesicomya*, *V. atlantica* (Smith, 1885) (west of Azores), mainly in the small sizes (L = H = 4 mm). The latter differs from the new species in the outlines (more rounded), sculpture (strongly and not so regular con-

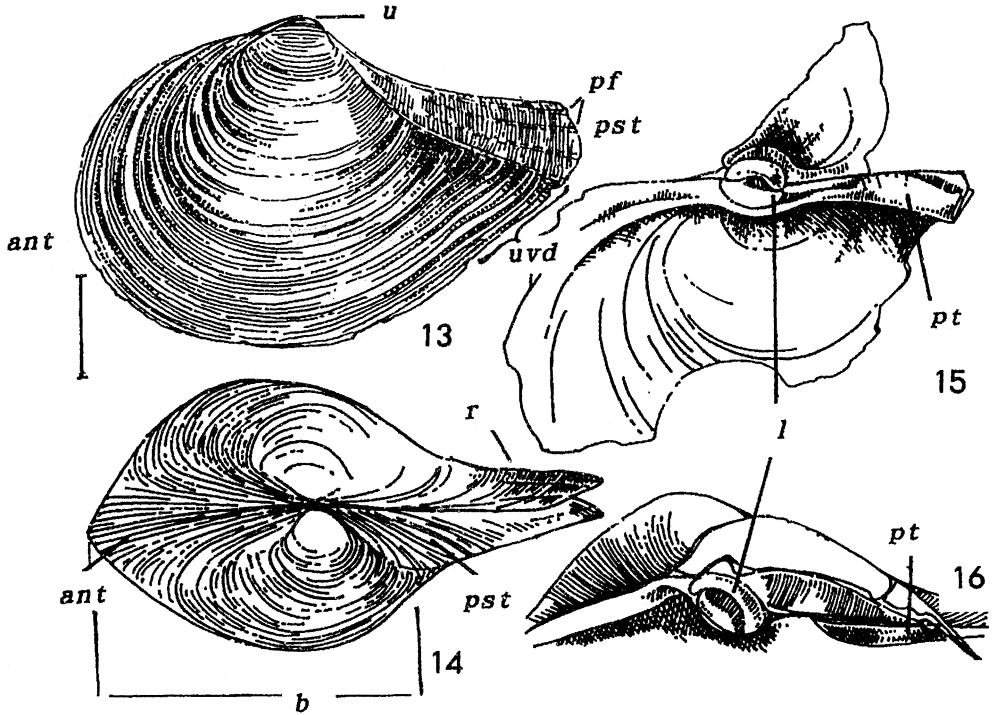
centric ribs) and teeth structure. The slight dorsal ridge marking off a postero-dorsal area and separating it from the shell surface, is specific for all species of the genus *Vesicomya* (Dall, 1886), which includes *Callo-cardia? atlantica* (type species) and *C.? adamsii*.

On another hand, the new species is similar to *Kelliella galathea* Knudsen, 1970 from the East Pacific (two stations between 5-9° N and 79-89° W, 2950-3570 m). Surprising similarities are found in most shell characteristics: small shell with lunule demarcated by a distinct groove with a notch at the anterior edge; large umbo; wide postumbonal part; regular concentric sculpture consisting of close-set, flat, band-like ribs narrower and more prominent on periphery. The Antarctic species differs from *K. galathea* in the more elongate shell (H/L = 0.89) against more rounded in the holotype of *K. galathea* (H/L = 1.0), with more convex valves (B = 2.5 mm, when L = 3.7 mm in contrast to B = 2 mm, when L = 5 mm); with obtuse dorsal angle instead of straight angle typical of most deep-sea *Kelliella*, except *K. sundaensis* (Knudsen, 1970) with dorsal angle up to 115°; adductor scars are invisible, in contrast to *K. galathea*.

There are some problems in determination of the family to which the new species belongs. This is caused by the commonness of general structural features characterizing two families: Kelliellidae Fischer, 1887 and Vesicomidae Dall & Simpson, 1901 (Keen, 1969; Knudsen, 1970; Abbott, 1974; etc.). Both families include species with small-sized, triangular-oval or suborbicular shells, not gaping, inequilateral, with or without



Figs 4-12. *Kelliella sirenkoi* sp. n., paratype. 4, exterior of left valve (*ant*, anterior part; *pst*, posterior, or postumbonal part; *u*, umbo; *ad*, antero-dorsal margin; *pd*, postero-dorsal margin; *lu*, lunule); 5, interior of left valve; 6, interior of right valve (*m*, mantle line); 7, frontal view (*pr*, prodissoconch; *lu*, lunule); 8, dorsal view (*lu*, lunule; *gr*, groove; *esc*, escutcheon; *k*, keel); 9, hinge of left valve (*ptl*, posterior tooth; *atl*, anterior tooth); 10, hinge of right valve (*grp*, groove for tooth *ptl*; *gra*, groove for tooth *atl*; *ptr*, upper, or posterior tooth; *atr*, lower, or anterior tooth); 11, dorsal view of right valve (*atr*, anterior tooth; *ptr*, posterior tooth); 12, dorsal view of left valve (*atl*, anterior tooth; *ptl*, posterior tooth). Scale bar: 1 mm.



Figs 13-16. *Cuspidaria smirnovi* sp. n., holotype. 13, exterior of left valve (*ant*, anterior part; *pst*, posterior, or post-umbonal part; *u*, umbo; *uvd*, umbonal-ventral depression; *pf*, periostacal folds); 14, dorsal view (*ant*, anterior part; *pst*, posterior part; *b*, body part; *r*, rostrum); 15, dentition margin of right valve, ventral view (*pt*, posterior tooth); 16, dentition margin of right valve, front view (*l*, interior ligament; *pt*, posterior tooth). Scale bar: 1 mm.

postero-ventral angle (*K. indica* Knudsen, 1970); antero-dorsal edge with circumscribed lunule, with a notch on the anterior edge at the base of lunule, with not clearly differentiated teeth, with or without pallial sinus, with very indistinct or lacking muscular scars. Abbott (1974) noted that "Vesicomysidae is an incorrect version". Comparison of *Callocardia? atlantica* Smith, 1885 with *Kelliella miliaris* Philippi, 1844 from the North Atlantic allowed discovery of small differences in the shape and outlines, and slight variation in the dentition (Smith, 1885). The structural features of deep-water species belonging to the genus *Kelliella* are very similar to shell characteristics of all *Callocardia* species later identified as *Vesicomys*. External features of the new Antarctic species are equally close to both named families.

Family CUSPIDARIIDAE Dall, 1886

Genus *Cuspidaria* Nardo, 1840

Type species *Tellina cuspidata* Olivi, 1792.

Shell small to medium-sized, thin, globose in front, rostrate, inaequivalve, inaequilateral, smooth or with concentric sculpture; hinge with a posterior lateral tooth in the right valve or without tooth; resilium in a spoon-shaped fossette, inclined rearwards and attached to the hinge margin by posterior edge. (Triassic or Jurassic?) Upper Cretaceous – Recent.

The traditional cuspidarian classification involves an analysis of structural shell features (Jeffreys, 1881; Smith, 1885; Dall, 1886; etc.). This represents some difficulties with identification of status or taxonomic level for different groups (Dall, 1886; Thiele, 1935; Vokes, 1967; Bernard, 1974; etc.), because differences in the shape, sculpture and hinge teeth not always help in the taxonomic determination. It was found (Pelseneer, 1911; Knudsen, 1967; Allen & Morgan, 1981; etc.) that the great means for this aim are the morphological structure of the siphonal distal part (the shape of the palpes) and the great variation in the septal morphology (different combinations and num-

bers of the septal pores). The anatomy and morphology of the Antarctic Cuspidariidae are not studied up today. It was difficult to examine the soft parts of the new species, but its shell features are very specific.

Cuspidaria smirnovi sp. n.

(Figs 13-16)

Holotype. Polarstern-39, 1.III.1996, st. 30, dredge 24, 70° 05.30' S, 8° 20.00' W – 70° 05.30' S, 8° 21.80' W, N Atka Bay, depth 2315-2334 m, silt with small stones and coarse-grained sand; coll. B.I. Sirenko & I.S. Smirnov.

Paratype: as holotype.

Both specimens are broken.

Description of the holotype. Shell small, white, delicate, fragile, elongate-ovate, rounded anteriorly, almost semi-circular together with front and ventral margins; inequilateral, with short and broad rostrum not distinctly separated from the shell body; postero-dorsal edge slightly concave and oblique, with postumbonal part about 57.4% of the total length; umbonal-ventral depression shallow; umbo low and broadly rounded; shell inequivalved with slightly smaller right valve; posterior ventral margin widely and shallowly sinuate; shell convex in central body part, with very flat rostrum walls. The main concentric sculpture consists of numerous, closely spaced, fine growth lines, with weakly developed, indistinct, very low, irregular folds (about 7-8 in number). All sculptural elements extend in dorsal direction to rostral situation and then on the rostrum surface become thinner than on shell body. Fine periostracal folds (up to 4 in number) running from the rostral posterior edge to the umbo and better visible only in its first third are typical of this species. Light yellowish external ligament is placed behind the umbo. Resilifer hemispherical, projected somewhat ventrally. Right valve with weak lateral tooth, broad anteriorly and narrow posteriorly.

Measurements. Holotype: L = 4.4 mm, H = 2.9 mm, B = 2.4 mm. The paratype has the same sizes and is similar in many respects to holotype.

Comparison. This species is typical of the genus *Cuspidaria* and similar to the New Zealand *C. morelandi* Dell, 1956 in the character (not number) of the radial folds on the rostrum, but *C. morelandi* is larger (L = 18.8 mm). Periostracal folds may be noted on the rostrum surface of high-latitude species belonging to the genus *Rhinoclama* Dall &

Smith, 1886 (Cuspidariidae), but they have other shell structural features (Allen & Morgan, 1981; Krylova, 1994; etc.).

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