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New Brachiopods from the Ordovician of Northeastern Russia

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Abstract—New brachiopod taxa, *Starnikoviella* gen. nov., with the type species *S. settedabanica* sp. nov. (family Clitambonitidae), and *Avdeevella* gen. nov., with the type species *A. mica* sp. nov. (subfamily Glyptomeninae), from the Middle–Upper Ordovician boundary deposits of northeastern Russia are described.

Keywords: Brachiopoda, Ordovician, northeast Russia

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INTRODUCTION

The Ordovician brachiopods of the Selennyakhskii Range and Sette-Daban Ridge were studied by Rozman (1964, 1967, 1968, 1970). M.M. Oradovskaya (Nikiforova et al., 1982) described brachiopods of the genus *Euroatrypa* Oradovskaya, 1982 from the Upper Ordovician of the Omulevka Mountains (northeastern Eurasia). However, later one of the authors of *Treatise on Invertebrate Paleontology* (Copper, 2002) synonymized *Euroatrypa* under the earlier established genus *Qilianotryma* Xu Hankui, 1979. Then, the new genera *Cyclorhynchia* and *Inatchirhynchus* were described from the Upper Ordovician of the Selennyakhskii Range (Baranov, 1994; Baranov and Shishkina, 1995). Slightly silicified, well-preserved complete shells and separate valves of brachiopods were received by disintegration in 7% acetic acid of samples of carbonaceous rocks from the Otvorot Formation (Ashgillian) of the Sette-Daban Ridge (southern Verkhoyansk Region) and upper part of the Syachan Formation (Lower Caradocian) of the Selennyakhskii Range.

Two new genera, *Starnikoviella* with the type species *S. settedabanica* sp. nov. and *Avdeevella* with type species *A. mica* sp. nov., are established based on very well-preserved imprints of peculiar brachiopod shell interior and exterior. *Starnikoviella* is assigned to the family Clitambonitidae Winchell et Schuchert (order Billingsellida) and *Avdeevella* is referred to the subfamily Glyptomeninae Williams (order Strophomenida). Figure 1 shows their geographic and stratigraphic ranges.

The brachiopod collection is stored in the Geological Museum of the Institute of Diamond and Precious Metal Geology, Yakutsk (GM IABM), collection no. 223.

SYSTEMATIC PALEONTOLOGY

Order Billingsellida

Suborder Clitambonitidina

Superfamily Clitambonitoidea Winchell et Schuchert, 1893

Family Clitambonitidae Winchell Et Schuchert, 1893

Genus *Starnikoviella* Baranov, gen. nov.

Etymology. In honor of the famous geologist V.I. Starnikov.

Type species. *Starnikoviella settedabanica* sp. nov.

Diagnosis. Shell small, biconvex, oval, and transversely elongated. Ventral area low and apsacline. Delthyrium and notothyrium open. Radial ornamentation of thin, intensely dichotomizing and intercalating ribs crossed in anterior half of valves by concentric growth lamellae varying in width. Spondylium simplex supported by short septum. From eight to ten distinct dichotomizing vascular markings, located laterally of spondylium. Notothyrial platform connected to valve bottom by curved in middle anterior part. Cardinal process absent. Adductor scars wedge-shaped; posterior pair wider and larger than anterior pair. Muscle field in anterior half divided by low septum. From three to five sharp vascular markings located laterally of septum.

Species composition. Type species.

Comparison. The new genus differs from *Clitambonites* Pander, 1830, *Hemipronites* Pander, 1830, and *Vellamo* Öpik, 1930 in the open delthyrium, apsacline area, thin ribs, absence of distinct concentric growth lamellae and cardinal process, well-developed, curved in the middle notothyrial platform, large posterior and narrow anterior adductor scars, and distinct vascular markings.

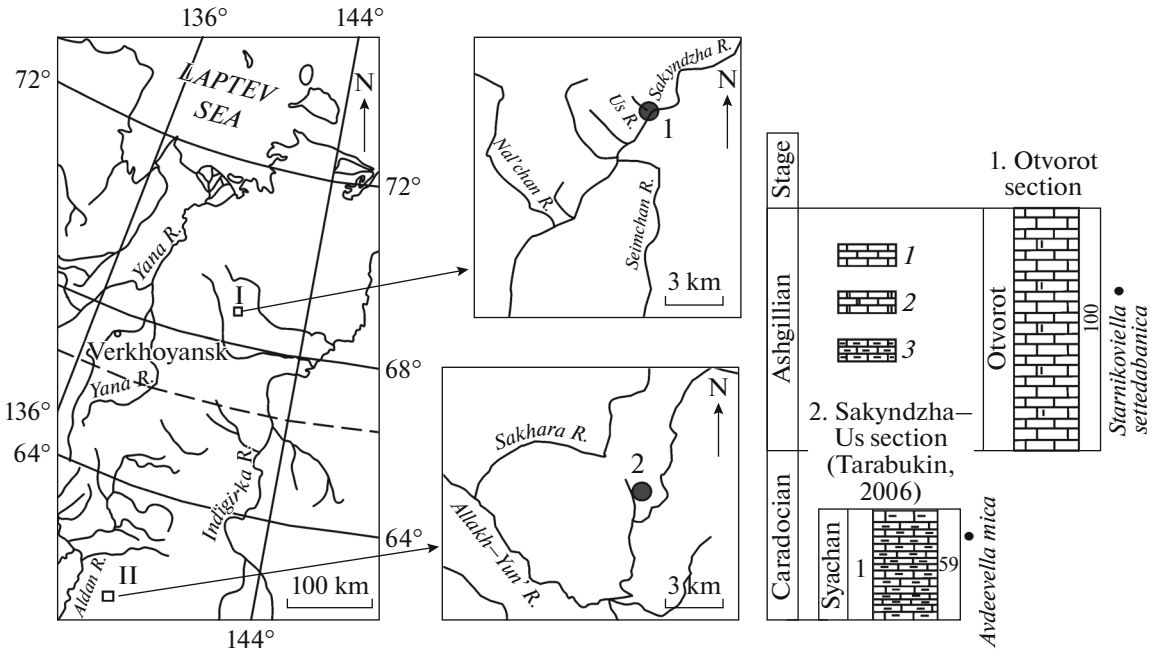


Fig. 1. Map with the locations and fragments of sections with the described brachiopods: (I) Selennyakhskii Range, (II) Sette-Daban Ridge; (1) Sakyndzha–Us section, (2) Otvorot section. Designations: (*1*) limestone, (*2*) dolomitic limestone, (*3*) clayey limestone.

Starnikoviella settedabanica **Baranov, sp. nov.**

Plate 5, figs. 1–14

Etymology. From the Sette-Daban Ridge.

Holotype. GM IABM, no. 223/1, ventral valve; northeastern Russia, Southern Verkhoyansk Region, Sette-Daban Ridge; Upper Ordovician, Ashgillian Stage, Otvorot Formation.

Description. The shell is small, biconvex, oval, slightly transversely elongated, with maximum width and thickness in the middle. The cardinal angles are rounded. The ventral valve is convex, with maximum width in the middle. The umbo is low and straight. The area is triangular and apsacline. The delthyrium is open. The dorsal valve is less convex than the ventral valve. The notothyrium is open. The area is very narrow and anacline. The median depression starts from the umbo. The radial ornamentation consists of thin, rounded, intensively dichotomizing and intercalating ribs, which are crossed in the anterior half of the valves by concentric growth lamellae varying in width. On the anterior margin, there are five ribs per 5 mm.

Shell interior. In the ventral valve, the spondylium simplex is supported by a short septum. The vascular markings are eight–ten in number, sharply pronounced, dichotomizing, and located laterally of spondylium. The notothyrial platform is connected to the valve bottom by its anterior region curved in the middle. In the dorsal valve, the cardinal process is absent. The adductor scars are wedge-shaped; the posterior pair is wider and larger than the anterior pair. The anterior half of the muscle field is divided by a low septum. The vascular markings are three–five in number, distinctly pronounced, and located laterally of the septum.

Dimensions in mm and ratios:

Specimen GM IABM, no.	Sample, no.	L	W	T	L/W	L/T
Holotype 223/1	1521	7.5	8.0	–	0.9	–
223/2	1521	9.0	11.0	–	0.8	–
223/3	1521	8.4	10.0	–	0.8	–
223/4	1521	6.4	8.4	–	0.76	–
223/5	1521	9.6	11.0	–	0.87	–

Explanation of Plate 5

Figs. 1–14. Starnikoviella settedabanica sp. nov.: (1–3) ventral valve exterior: (1) holotype GM IABM, no. 223/1, ×5.3; (2) specimen GM IABM, no. 223/2, ×4; (3) specimen GM IABM, no. 223/3, ×5; (4–8) dorsal valve exterior: (4) specimen GM IABM, no. 223/4, ×4; (5) specimen GM IABM, no. 223/5, ×6.3; (6) specimen GM IABM, no. 223/6, ×4.2; (7) specimen GM IABM, no. 223/7, ×6; (8) specimen GM IABM, no. 223/8, ×4.7; (9–11) ventral valve interior: (9) specimen GM IABM, no. 223/9, ×6.2; (10) specimen GM IABM, no. 223/10, ×4; (11) specimen GM IABM, no. 223/11, ×5; (12–14) dorsal valve interior: (12) specimen GM IABM, no. 223/12, ×6; (13) specimen GM IABM, no. 223/13, ×5; (14) specimen GM IABM, no. 223/14, ×6.7; southern Verkhoyansk Region, Sette-Daban Ridge, Otvorot Creek; Upper Ordovician, Ashgillian Stage, Otvorot Formation.

Plate 5

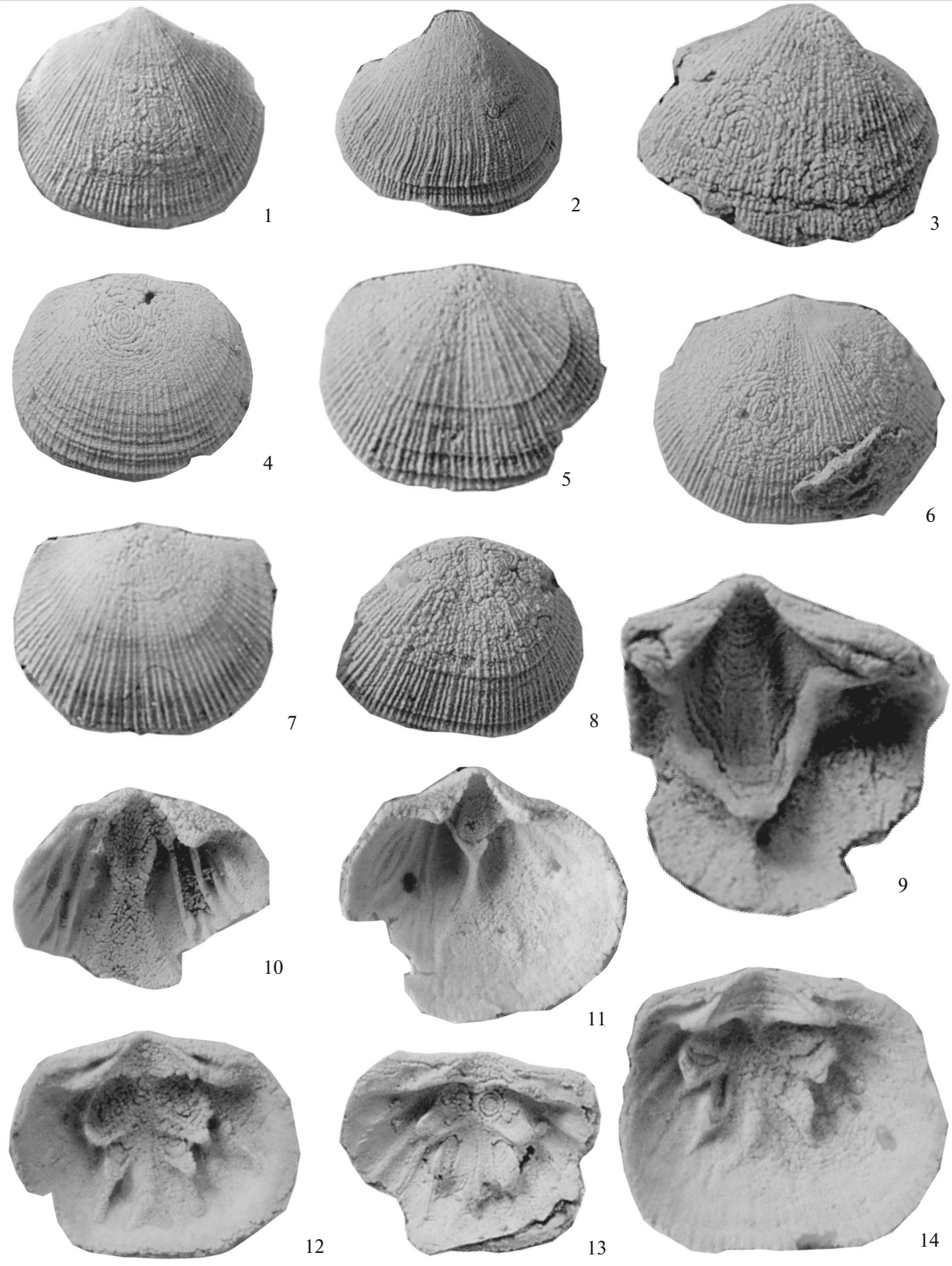
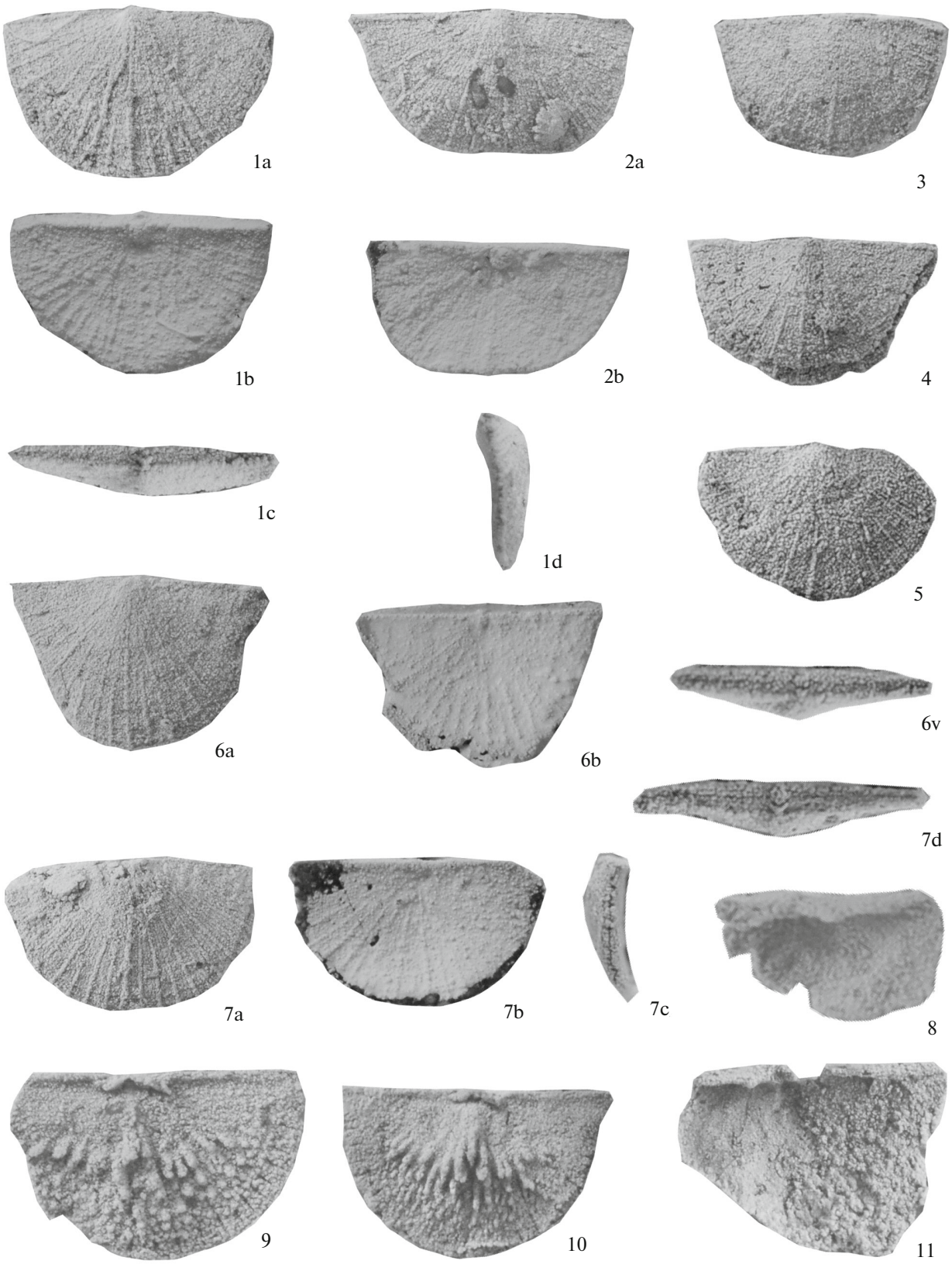


Plate 6



Explanation of Plate 6

Figs. 1–11. *Avdeevella mica* sp. nov.: (1) holotype GM IABM, no. 223/20, ×5, complete shell: (1a) ventral valve; (1b) dorsal valve view; (1c) posterior view; (1d) lateral view; (2) specimen GM IABM, no. 223/21, ×9.6: (2a) ventral valve view; (2b) dorsal valve view; (3–5) ventral valve view: (3) specimen GM IABM, no. 223/22, ×5.4; (4) specimen GM IABM, no. 223/23, ×5; (5) specimen GM IABM, no. 223/24, ×5.4; (6) specimen GM IABM, no. 223/25, ×6: (6a) ventral valve view; (6b) dorsal valve view; (6c) posterior view; (7) specimen GM IABM, no. 223/26, ×6.7: (7a) ventral valve view; (7b) dorsal valve view; (7c) lateral view; (7d) posterior view; (8) specimen GM IABM, no. 223/27, ventral valve interior, ×5; (9, 10) dorsal valve interior: (9) specimen GM IABM, no. 223/28, ×12.7; (10) specimen GM IABM, no. 223/29, ×6; (11) specimen GM IABM, no. 223/30, ventral valve interior, ×5; Selennyakhskii Range, left bank of the Sakyndzha River and its tributary Us Creek, Sakyndzha–Us section; Middle Ordovician, lower half of the Caradocian Stage, lower part of the *Phragmodus undatus* Conodont Zone, Syachan Formation.

Material. Twenty-five satisfactorily preserved ventral and dorsal valves from the Sette-Daban Ridge, right bank of the Allakh-Yun' River, Otvorot Creek.

Order Strophomenida

Superfamily Strophomenoidea King, 1846

Family Glyptomenidae Williams, 1965

Subfamily Glyptomeninae Williams, 1965

Genus *Avdeevella* Baranov, gen. nov.

Etymology. In honor of the famous stratigrapher V.I. Avdeeva.

Type species. *Avdeevella mica* sp. nov.

Diagnosis. Shell small, planoconvex, oval, and transversely elongated. Ventral area low and narrow; delthyrium closed with deltidium; notothyrium open. Ornamentation consisting of ribs of two orders. Cardinal process small and almost bifid; inner socket ridges developed. Inner surface of dorsal valve with tubercles.

Species composition. Type species.

Comparison. The new genus differs from all other strophomenids of the subfamily Glyptomeninae in the presence of densely spaced tubercles on the inner surface of the dorsal valve.

***Avdeevella mica* Baranov, sp. nov.**

Plate 6, figs. 1–11

Etymology. From the Latin *micus* (tiny).

Holotype. GM IABM, no. 223/20, ventral valve; northeastern Russia, Selennyakhskii Range; Middle Ordovician, lower half of the Caradocian Stage, Syachan Formation.

Description. The shell is small, planoconvex, with the maximum width at the posterior margin and the maximum thickness in the posterior region. The cardinal extremities are acute. The ventral valve is slightly convex, with maximum thickness in the posterior half. The area is flat and catacline. The delthyrium is covered by the deltidial plate. The dorsal valve concavity corresponds to the convexity of the ventral valve. The area is narrow, with almost parallel margins. The notothyrium is covered by the chilidium. The ornamentation is composed of thin ribs of two orders: two or three thin ribs are located in the larger ribs interspaces.

Shell interior. In the dorsal valve, there are a small knob-shaped cardinal process, relatively high socket ridges, and long densely spaced tubercles.

Dimensions in mm and ratios:

Specimen GM IABM, no.	Sample, no.	L	W	T	L/W	L/T
Holotype 223/20	8835-4/2	6.0	7.2	0.9	0.8	6.6
223/21	8835-4/2	5.0	7.0	0.7	0.7	7.1
223/24	8835-4/2	5.0	8.0	0.8	0.6	6.2
223/25	8835-4/2	4.2	6.8	0.6	0.6	7.0
223/26	8835-4/2	4.0	7.0	0.8	0.57	5.0

Material. Seventy-two complete shells and four satisfactorily preserved dorsal valves from the Selennyakhskii Range, left bank of the Sakyndzha River, Us Creek.

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