

**NEW SPECIES OF OSTRACODS OF THE GENUS *APARCHITELLINA*
FROM THE YBA FORMATION (GIVETIAN?–FRASNIAN) OF SOUTHERN
TIMAN (DZHEZHIMPARMA)**

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Abstract. Two new species of ostracods of the genus *Aparchitellina* – *A. lenis* sp. nov. and *A. reticulata* sp. nov. from the carbonate shallow-shelf deposits of the Yba Formation (Givetian? – Frasnian) of the Southern Timan are described. The species *A. lenis* sp. nov. is restricted to its lower part of the section, while *A. reticulata* sp. nov. appears stratigraphically higher and is distributed almost throughout the section. The described species complete the biostratigraphic characterisation of the Givetian-Frasnian boundary interval in carbonate facies.

Keywords: *ostracods, new species, Aparchitellina, Givetian/Frasnian, Yba Formation, Southern Timan*

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INTRODUCTION

The Ybskaya Formation was first identified by S.I. Kirillin (1991) during a 1:50,000 scale group geological survey of the Dzhezhimparskaya structure in the Southern Timan. Based on the borehole material from these studies and the conclusions of A.B. Yudina (Institute of Geology, Komi Scientific Center, Ural Branch of the Russian Academy of Sciences, Syktyvkar) on the age of the

conodont fauna, the formation was compared with the Sargaevsky horizon of the Frasnian stage of the Upper Devonian. Unfortunately, the borehole material for this area has not survived. Subsequently, the section of the Ybskaya Formation was studied in more detail in natural outcrops along the Shera Creek (Fig. 1). The research results made it possible to expand its stratigraphic range (Soboleva, Sobolev, 2017; Soboleva et al., 2018, 2019; Soboleva, Sobolev, 2019). The authors note the abundance of various groups of fauna (conodonts, ostracods, stromatoporoids) and flora (spores of higher plants, fragments of algae) in the section, characteristic of the boundary interval of the Givetian and Frasnian stages and the Sargaevsky horizon of the lower Frasnian (Soboleva et al., 2019). A distinctive feature of the studied deposits is the predominance of the carbonate type of sedimentation, which is extremely rare in the Timan region at this interval. The Ybskaya Formation is composed of clastic, organogenic-clastic (bioclastic, oncolithic, etc.) limestones (packstones) with thin interlayers of clayey limestones (wackestones) and argillites. They were formed on the periphery of the Ochparma paleouplift, located southwest of the Ukhta-Izhevsky paleograbens. No significant influence of terrigenous erosion from the continent is observed in the studied sediments. Their lithological and stratigraphic characteristics have been partially published (Soboleva, Sobolev, 2017; Soboleva, Sobolev, 2019).

The study of the Ybskaya Formation section along the Shera creek showed an extraordinary diversity of ostracods with predominance of genera *Indivisia*, *Knobiella*, *Cytherellina*, *Bairdia*, *Acratia*, *Acratina*, *Schneideria*, *Gravia*, *Aparachitellina* and *Nodella* (more than 40 taxa). Among the representatives of the genus *Aparachitellina*, new species have been established, which are described in this paper. They are clearly stratified throughout the section. The species *A. lenis* sp. nov. is confined to the lower part of the Ybskaya Formation (Fig. 2). Together with it, ostracods of wide stratigraphic distribution were identified: *Indivisia indistincta* Glebovskaya et Zaspelova, 1959, *Cytherellina cuneata* (Rozhdestvenskaya, 1972), *Acratina pestrozvetica* Egorov, 1952, *Gravia fabra* Zaspelova, 1959, and others. In sample 8a, together with *Aparachitellina lenis* sp. nov., the first

appearance of *Nodella ex gr. hamata* Becker, 1968 was established, indicating the Early Frasnian age of the studied deposits (Sobolev et al., 2023). The same sample contains conodonts *Mehlina gradata* Youngquist, 1945, *Polygnathus decorosus* Stauffer, 1938, *P. foliatus* Bryant, 1921, *P. ljaschenkoi* Kuzmin, 1995, *P. pennatus* Hinde, 1879, *P. webbi* (Stauffer, 1938), *P. xylus* Stauffer, 1940, and others, widely distributed in both Upper Givetian and Frasnian deposits (Soboleva, Sobolev, 2019). E.V. Antropova identified stromatoporoids from this level that are characteristic of the Givetian stage of the Middle Devonian: *Actinostroma septatum* Lecompte, 1951, *Trupetostroma porosum* (Lecompte, 1952), *T. crassiforme* Bogoyavlenskaya, 1972, and *Stachyodes singularis* Yavorsky, 1961 (Soboleva et al., 2019).

The species *Aparchitellina reticulata* sp. nov. appears stratigraphically higher than *A. lenis* sp. nov. in the section, but presumably still within the debated Givetian-Frasnian interval (Fig. 2). Previously, we had assigned this species to the formally undescribed species *A. incognita* T. Soz., ms (Soboleva, Sobolev, 2019). However, upon reviewing our material and comparing it with materials from M.N. Moskalenko (LLC "TP NITs", Ukhta) from the stratotype of the Lower Timansky subhorizon (Reference..., 1997: borehole 1-B, depth 281-285 m), differences were identified that allow us to classify it as a new species. The Frasnian age for the upper part of the section is confirmed by conodonts *Ancyrodella rotundiloba* Bryant, 1921, *A. rugosa* Branson et Mehl, 1934, *A. pristina* Khalymbadzha et Tchernysheva, 1970, *Mesotaxis asymmetrica* (Bischoff et Ziegler, 1957), *M. falsiovalis* Sandberg, Ziegler et Bultynck, 1989 and stromatoporoids *Gerronostroma batschatense* (Yavorsky, 1931). Ostracods here are represented by a diverse transitional Givetian-Frasnian assemblage: *Nodella faceta* Rozhdestvenskaya, 1972, *Rectella elata* Zaspelova, 1959, *Schneideria schigrovskiensis* (Polenova, 1955) and others, as well as zonal taxa presumably from the lower Frasnian stage *Cavellina chvorostanensis* Polenova, 1953 and *Nodella ex gr. hamata* Becker (Sobolev et al., 2023).

Thus, the new species of the genus *Aparchitellina* complement the biostratigraphic characteristics of the Givetian-Frasnian boundary interval in carbonate facies.

MATERIAL

The studied section is located in the Ust-Kulom district of the Komi Republic on the left bank of the Shera stream, upstream from the Sherael quarry (N61°48'52.09"; E54°01'00.07") (Fig. 1). The quarry is located 1 km from the Syktyvkar-Troitsko-Pechorsk highway (the fork to Asyvvozh settlement). The section consists of carbonate shallow-marine deposits with an incomplete thickness of 15 m.

The material for this study was ostracods of the genus *Aparchitellina*, isolated from 20 samples (Fig. 2), weighing from two to 10 kg. Samples were collected in 2015-2023 jointly with M.A. Soboleva, E.V. Antropova, and A.N. Sandula (Institute of Geology, Komi Science Center, Ural Branch of the Russian Academy of Sciences, Syktyvkar). Ostracods from dense limestones were extracted by dissolving the rock in glacial acetic acid according to the method of (Lethiers, Crasquin-Soleau, 1988). Some clay samples were soaked in water and washed to remove clay through a 0.05-0.1 mm sieve.

The ostracod collection is stored in the A.A. Chernov Geological Museum at the Institute of Geology FRC Komi SC UB RAS (Syktyvkar) under No. 333. Images were obtained using a Tescan Vega 3 LMH scanning electron microscope (CCU "Geoscience" IG FRC Komi SC UB RAS, operator V.A. Radaev).

The systematics of suprageneric taxa and terminology of shell morphological elements are adopted from "Practical Guide..." (1990). Abbreviations used in the article: spec. – specimen, samp. – sample, L – length, H – height, ♂ – tecnomorph, ♀ – heteromorph.

SYSTEMATIC PART

① ORDER BEYRICHICOPIDA

② SUPERFAMILY TREPOSELLACEA HENNINGSMOEN, 1954

③ FAMILY APARCHITELLINIDAE ABUSHIK, 1990

④ Genus *Aparchitellina* Polenova, 1955

⑤ *Aparchitellina lenis* Sobolev, sp. nov.

⑥ Table V, fig. 1–7

Species name *lenis* *Lat.* – smooth.

Holotype – IG FRC Komi SC RAS, No. 333/71-15, complete tecnomorph shell; Komi Republic, southern part of the Timan Ridge, Dzhezhimparma, Shera stream; Givetian? – Frasnian? stage, lower part of the Yb Formation, sample Sh-8A.

Description (fig. 3). The shell is truncated-oval with a prepectic outline. The dorsal margin is long, straight, slightly elevated above the hinge margin. The ventral margin is gently convex. The anterior end is widely and smoothly rounded at the level of the median line. The posterior end is evenly rounded and located closer to the dorsal margin. In adult shells, the posterior end is gently sloped toward the ventral margin, while in juvenile specimens it is more abrupt. Cardinal angles are obtuse, rounded. The anterior end extends beyond the hinge line by a quarter of the hinge length. The posterior end in larvae extends beyond the hinge line by a third, and in adults - by less than a quarter of the hinge length. The maximum height is located closer to the anterior margin. The left valve is slightly larger than the right one and slightly overlaps it along the free margin. There is no overlap of valves in the hinge area. The velar ridge is gentle, smoothed. It runs along the entire free margin and disappears at the cardinal angles. The posterodorsal node at all ontogenetic stages is gentle, smoothed, and slightly elevated above the hinge margin. In front of the posterodorsal node, there is a weakly expressed gentle and short transverse sulcus (S2), which disappears in the centrodorsal area. The

adductor is not visible on the outer side of the shell. Sexual dimorphism is expressed only at the adult stage. In heteromorphs, the crumina is gentle, affecting the posteroventral, centroventral, and medioventral areas, slightly overhanging the velar ridge (pl. V, fig. 2). Tecnomorphs do not differ in outline from juveniles (except for the earliest stages). The surface of the valves is smooth.

Dimensions in mm:

Specimen №	L	H
Holotype № 333/71-15 ♂	0.77	0.52
333/76-5 ♀	0.77	0.53
№ 333/70-35 ♂	0.76	0.52
№ 333/71-13	0.71	0.49
№ 333/76-6	0.67	0.47
№ 333/48-3	0.63	0.44
№ 333/76-4	0.55	0.39
№ 333/71-16	0.43	0.31
№ 333/76-3	0.43	0.29

Variability. It is manifested only in ontogeny, where the posterior end in adult shells is more rounded than in larvae (fig. 3).

Comparison. This species differs from *A. domratchevi* Polenova, 1955 from the Vyazovka beds of the Middle Devonian of the Southern Urals (Polenova, 1955) by greater elongation of the carapace, less pronounced dorsal hump, and strongly smoothed velar ridge. It differs from the new species *A. reticulata* sp. nov. by a wider and more gentle posterodorsal hump, absence of reticulation, and the adductor muscle scar not being visible on the external side of the valves.

Material. 14 complete carapaces and four well-preserved valves from the type locality.

⑤ **Aparchitellina reticulata Sobolev, sp. nov.**

⑥ Table. V, fig. 8–19

Species name from *reticulatus* *Lat.* – reticulate.

Holotype -IG FRC Komi SC RAS, No. 333/72-25, complete carapace of tecnomorph; Komi Republic, southern part of the Timan Ridge, Djezhimparma, Shera Creek; Givetian? – Frasnian Stage, Yb Formation, sample Sh-17A.

Description (Fig. 4). Shell truncated-oval in shape with a pleated outline. Dorsal margin long, straight, slightly elevated above the straight hinge margin. Ventral margin gently convex. Anterior end widely and smoothly rounded at the median line level. Posterior end evenly rounded, located closer to the dorsal margin and gently sloped toward the ventral margin. Cardinal angles obtuse, rounded. The anterior end extends beyond the hinge line by 1/3 of the hinge length in larvae and by 1/4 in adults. The posterior end at all growth stages extends beyond the hinge line by less than 1/5 of the hinge length. Maximum height is located closer to the anterior margin. Left valve slightly larger than the right one and slightly overlaps it along the free margin. There is no overlap of valves in the hinge margin area (Plate V, Fig. 15). A distinct velar ridge runs along the free margin, disappearing at the cardinal angles. In front of the posterodorsal node, there is a weakly expressed gentle and short transverse furrow (S2), which disappears in the centrodorsal area. The adductor spot is distinct, located in the central area of the valve and is well visible due to the absence of reticulation on it. The dorsal node is wide, gently smoothed, slightly elevated above the straight hinge margin. Sexual dimorphism is evident only in adult stages A and A-1. In heteromorphs, the crumina is gentle, encompassing the posteroventral, centroventral, and midventral areas (Plate V, Fig. 11, 12), slightly overhanging the velar ridge (Table V, Fig. 10). The velar ridge in heteromorphs is wider compared to tecnomorphs. Tecnomorphs compared to heteromorphs are lower, with greater elongation (Fig. 4).

The surface of the valves is reticulate. The size of the cells ranges from 0.013 mm in larvae and reaches 0.018 mm in adult shells.

Dimensions in mm:

Spec. No.	L	H
Holotype No. 333/72-25		
♂	0.74	0.48
No. 333/75-22 ♀	0.8	0.55
No. 333/75-39 ♀	0.77	0.52
No. 333/75-5 ♀	0.75	0.55
No. 333/75-6 ♂	0.74	0.51
No. 333/75-4 ♀	0.71	0.49
No. 333/75-38 ♂	0.71	0.46
No. 333/75-9	0.68	0.47
No. 333/75-10	0.62	0.43
No. 333/72-24	0.61	0.41
No. 333/75-37	0.6	0.43
No. 333/75-28	0.58	0.39
No. 333/74-39	0.57	0.43
No. 333/76-1	0.57	0.39
No. 333/72-22	0.55	0.38
No. 333/74-45	0.54	0.36
No. 333/75-34	0.54	0.36
No. 333/75-12	0.49	0.31
No. 333/48-32	0.43	0.29

No. 333/72-21	0.43	0.29
No. 333/75-40	0.41	0.29

Variability is manifested in the size and smoothness of the dorsal hump (Fig. 4). Some larvae may have a slightly pointed apex of the dorsal hump (Pl. V, fig. 13).

Comparison. The species differs from *A. decorata* Polenova, 1955 from the Vyazovsk beds of the Middle Devonian of the Southern Urals (Polenova, 1955) by having a more elongated carapace and a smoothed gentle dorsal hump. It differs from *A. incognita* T. Soz. nom. nud. from the Lower Timan subhorizon (coll. M.N. Moskalenko) by a short groove S2, obtuse posterior cardinal angle, less elongated carapace, and distinctly manifested velar ridge.

Material. 131 complete carapaces and 17 well-preserved valves from the type locality.

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CONFLICT OF INTERESTS

The author of this work declares that he has no conflict of interest.

REFERENCES

1. *Kirillin S.I.* Devonian of the Djedzhimparma Upland (Southern Timan) // Geology of the Devonian of the North-East of the European part of the USSR. Abstracts of the meeting / Eds. V.S. Tsyganko, V.A. Chermnykh, L.Z. Aminov. Syktyvkar: Komi Scientific Center of the Ural Branch of the USSR Academy of Sciences, 1991. P. 26–28.
2. Reference sections of the Frasnian Stage of Southern Timan: Field excursion guide of the International Subcommission on Devonian Stratigraphy (July 15–22, 1994, Ukhta) / Comp. Yu.A. Yudina, M.N. Moskalenko; Ed. M.A. Rzhonsnitskaya. Ukhta; St. Petersburg: VSEGEI Publishing House, 1997. 79 p.
3. *Polenova E.N.* Foraminifera, radiolarians and ostracods of the Devonian of the Volga-Ural region. Leningrad: Gostoptekhizdat, 1955. P. 191–317.
4. Practical guide to microfauna of the USSR. Vol. 4. Paleozoic ostracods / Ed. A.F. Abushik. Leningrad: Nedra, 1990. 356 p.
5. *Sobolev D.B., Soboleva M.A., Evdokimova I.O.* Ostracod zonation of the Givetian-Frasnian boundary interval in the Timan-North Ural region // Lithosphere. 2023. Vol. 23. No. 3. P. 348–366. DOI: 10.24930/1681-9004-2023-23-3-348-366
6. *Soboleva M.A., Sobolev D.B.* First data on conodonts of the Yb Formation from the Shera Creek (Djedzhimparma Upland) // Structure, substance, history of the lithosphere of the Timan-North Ural segment. Proceedings of the 26th Scientific Conference. Syktyvkar: Geoprint, 2017. P. 289–293.
7. *Soboleva M.A., Sobolev D.B., Antropova E.V., Telnova O.P.* Biota at the boundary of the Middle and Upper Devonian in the section of Southern Timan (Djedzhimparma Upland) // Geology and mineral resources of the European North-East of Russia. Vol. 2. Syktyvkar:

Geoprint, 2019. P. 176–178. (Proceedings of the XVII Geological Congress of the Komi Republic).

8. *Soboleva M.A., Sobolev D.B., Sandula A.N., Antropova E.V.* Givetian-Frasnian boundary deposits in the Southern Timan (Dzhedzhimparma Upland) // Fundamental and Applied Paleontology. Proceedings of the LXIV session of the Paleontological Society at RAS. St. Petersburg: Kartfabrika VSEGEI, 2018. P. 115–116.
9. *Lethiers F., Crasquin-Soleau S.* Commeat extraire les microfossiles a tests calcitiques des roches calcaires dures // Rev. Micropaléontol. 1988. V. 31. № 1. P. 56–61.
10. *Soboleva M.A., Sobolev D.B.* Conodonts and ostracodes from the Givetian–Frasnian shallow-water deposits of the Southern Timan // Vestnik IG Komi SC UB RAS. 2019. № 10. P. 28–38. DOI: 10.19110/2221-1381-2019-10-28-38

Figure captions

Fig. 1. Location of the Shera Creek section: A – on the overview map of the Komi Republic; B – on the scheme of the Sherael quarry: D₂gv – Givetian stage of the Middle Devonian, D₃fr – Frasnian stage of the Upper Devonian.

Fig. 2. Composite lithological column of the Yb Formation section along the Shera Creek with distribution of species *Aparchitellina lenis* sp. nov. and *A. reticulata* sp. nov. Legend: 1 – limestones, 2 – calcareous sandstones, 3 – oncolitic limestones, 4 – clayey limestones with clay interlayers, 5 – clays; appearance of fauna in the section: 6 – stromatoporoids, 7 – ostracodes, 8 – conodonts; 9 – distribution of new species in the section.

Fig. 3. Diagram showing the relationship between length and height of the *Aparchitellina lenis* sp. nov. shell and outlines of different growth stages. Images: *a* – specimen № 333/71-16, *b* – specimen № 333/48-3, *c* – specimen № 333/71-13, *d* – holotype № 333/71-15.

Fig. 4. Diagram showing the relationship between length and height of the *Aparchitellina reticulata* sp. nov. shell and outlines of different growth stages. Images: *a* – specimen № 333/75-40, *b* – specimen № 333/75-34, *c* – specimen № 333/72-24, *d* – holotype № 333/72-25, *e* – specimen № 333/75-22.

EXPLANATION TO PLATE V V

Fig. 1–7. *Aparchitellina lenis* sp. nov., complete shells; Givetian?–Frasnian? stage: 1 – holotype No. 333/71-15, tecnomorph, view of left valve; sample Sh-8A; 2 – specimen No. 333/76-5, heteromorph: 2a – view of right valve, 2b – inclined view from ventral margin; sample Sh-8A; 3 – specimen No. 333/71-13, heteromorph, view of right valve; sample Sh-8A; 4 – specimen No. 333/48-3, view of left valve; sample Sh-7; 5 – specimen No. 333/71-14, view of dorsal margin; sample Sh-8A; 6 – specimen No. 333/76-6, view of ventral margin; sample Sh-8A; 7 – specimen No. 333/71-16, view of right valve; sample Sh-8A.

Fig. 8–19. *Aparchitellina reticulata* sp. nov.; Givetian?–Frasnian stage: 8 – holotype No. 333/72-25, tecnomorph, complete shell, view of right valve; sample Sh-17A; 9 – specimen No. 333/75-9, tecnomorph, complete shell, view of left valve; sample Sh-23; 10 – specimen No. 333/75-35, heteromorph, left valve, view from posterior end; sample Sh-33c; 11 – specimen No. 333/75-22, heteromorph, complete shell, view of right valve; sample Sh-20; 12 – specimen No. 333/75-4, heteromorph, complete shell, view of left valve; sample Sh-28A; 13 – specimen No. 333/75-10, complete shell, view of right valve; sample Sh-23; 14 – specimen No. 333/72-24, complete shell, view of right valve; sample Sh-17A; 15 – specimen No. 333/72-23, complete shell, view of dorsal margin; sample Sh-17A; 16 – specimen No. 333/72-22, complete shell, view of right valve; sample Sh-17A; 17 – specimen No. 333/75-8, complete shell, view of ventral margin; sample Sh-23; 18 – specimen No. 333/75-34, right valve, external view; sample Sh-35A; 19 – specimen No. 333/75-40, complete shell, view of right valve; sample Sh-19A.

All specimens are from the Sher Creek section (Southern Timan, Komi Republic, Yb Formation). Scale bar is 0.2 mm.

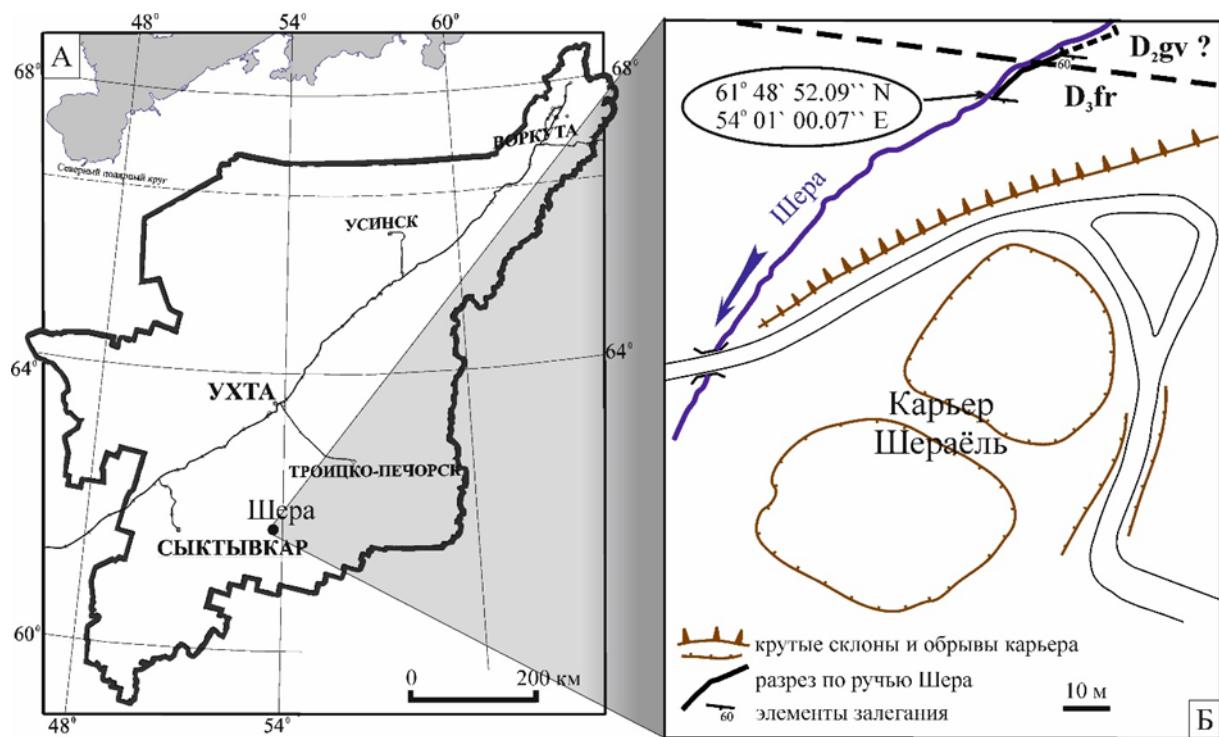


Fig. 1.

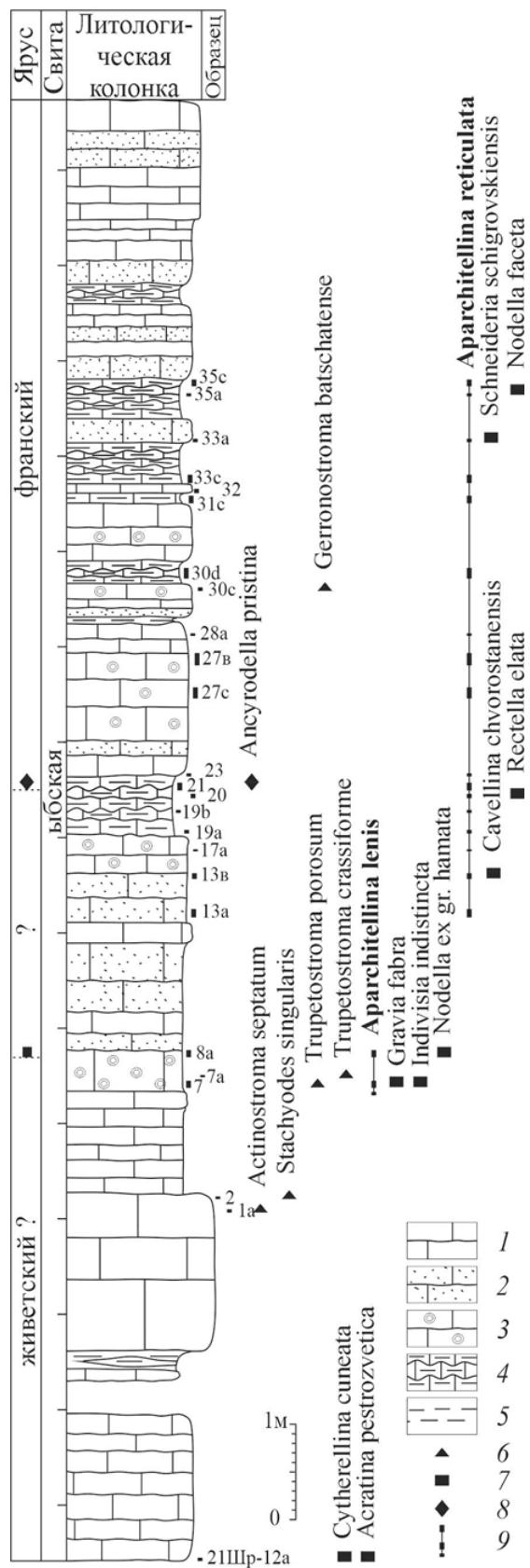


Fig. 2.

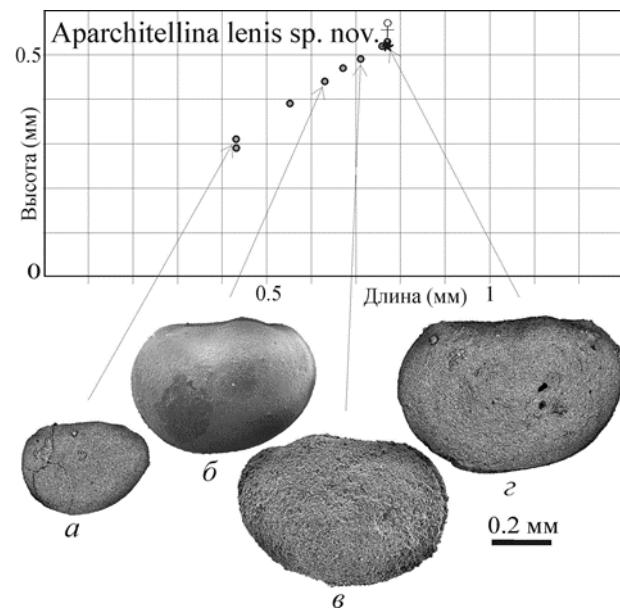


Fig. 3.

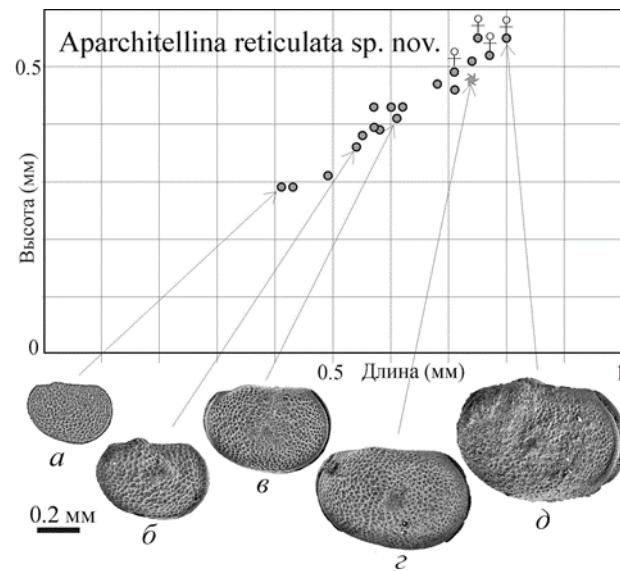


Fig. 4.

Table V

