

13. Determinant of fresh-water seaweed of the USSR. – Moscow: Prosvescheniye, 1953. – Issue 2. – 653 p.
14. Kiryanov V.V. To a question on the nature of some Early Cambrian spheromorphic acritarchs // Pressing questions of modern paleoal-gology. – Kiev: Naukova dumka, 1986. – P. 40–45.
15. Life of plants. Seaweed. Lichens / Edited by M.M. Gollerbakh. – Moscow: Prosvescheniye, 1977. – V. 3. – 487 p.
16. German T.N., Timofeev B.V. Eosolenides – a new group of proble-matic organisms of Late Precambrian // Problematics of Late Pre-cambrian and Paleozoic. – Novosibirsk: Science, 1985. – P. 9–15.
- (Institute of Geology and Gas of Academy of Science of the USSR. – Issue 632).
17. Microfossils of Precambrian of the USSR / T.V. Yankauskas, N.S. Mikhaylova, T.N. German et al. – Leningrad: Nauka. – 1989. – 190 p.
18. Butterfield N.J. Macroevolution and macroecology through deep ti-me // Paleontology. – 2007. – V. 50. – P. 1. – P. 41–55.

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EARLY GIVETIAN RUGOSAS OF THE EAST PART OF SALAIR

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The rugosa complexes of several cuts of the Mamontovskiy and Safonovskiy horizons of Salair have been selected and monographically described. Descriptions of deposits are given and their age is specified by the rugosa complexes. Monographic descriptions and photos of fauna are enclosed.

Rugosa complexes of Mamontovskiy and Safonovskiy horizons have been studied by the author during the researches conducted in 2005–2006. The studied collection was collected by the author during field researches in 2003–2004 in structure of the expedition of Kuznetsk Pedagogical Academy. Within the limits of the Altai-Sayanskaya folded area the deposits of Eifel and Early Givetian are more or less widespread only on territories of Salair, which, apparently, is explained by regional regress that had taken place during this time on its territory. Uniqueness for the Altai-Sayanskaya area of deposits of this age makes their all-round studying especially important and actual. Mineral fauna of deposits, allocated as Mamontovskiy and Safonovskiy horizons, is presented by brachiopods, ostracodes, trilobites, pearlsides and corals rugosas. In the past it was studied and described by: E.Z. Bulvanker [1], E.A. Yolkin [2], V.A. Ivaney and S.K. Cherepnina [3, 4], M.A. Rzhonsnitskaya [5], N.Ya. Spasskiy [6], Yu.V. Udodov, O.P. Mez-entseva and N.V. Gumerova [7]. In 2006 the researches were continued by the author, rugosas of Mamontovskiy and Safonovskiy horizons were studied and monographically described. The cuts, were the described faunae was picked out, are cited in the given work.

Prokopyevskiy cut is located on the western suburb of Prokopyevsk city, Kemerovo oblast in the left bank of the stream Egos. The studied deposits are opened by two small pits. The strike of layers at the studied site is close to meridian, the falling is practically vertical. The total capacity of the opened by the cut deposits is 60 m. On the detailed geological map with the scale 1:50000, these deposits are attributed to the Kerlegeshskiy horizon but, based on results of the studying of faunae of

brachiopods and rugosas, they can be attributed to the Saphonovskiy horizon.

Description of the Prokopyevskiy cut:

1. Blue-gray plate-like limestones with thin horizontal lamination contain an insignificant impurity of ter-rigenous material. The fauna is as follows: fine brachiopods, gastropods, pearlsides, teeth and scales of fishes and rugosas *Grypophyllum gracile* Wede-kind and *Dialythophyllum annulatum* (Peetz).
2. Argillo-aleurite limestones with prolayers of poorly argillaceous limestones similar to rocks of the pre-vious interval in the ratio – 3:1. Pearlsides, brachio-pods, crinoids, and ostracods prevail in the fauna.
3. Massive, strongly shattered and recrystallized limes-tones.
4. Grey thin-plate limestones. In structure of fossils are shells of brachiopods and bivalve mollusks; mo-reover: goniatites, tabulates, crinoids, pearlsides. Ya.M. Gutak has defined the kind *Indospirifer pseu-dowilliamsi* Rzhonsnickaja from brachiopods.
5. Alternating prolayers of grey limestones and strongly schistic aleurolites with capacity up to 10...15 cm. The fauna it is presented by brachiopods and pearl-sides.
6. Grey thick-plate limestones with remains of brachiopods, crinoids, tabulates, and pearlsides. *Disphyllum pashiense* (Soshkina), *Heliophyllum ai-ense* Soshkina, *Grypophyllum gracile* Wedekind, *Calceola sandalina* Lamarck are defined from ru-gosas.
7. Dark grey thin-plate limestones with remains of ta-bulates and pearlsides.

8. Dark grey plate-like limestones with prolayers of aleurolites, where branchy and massive colonies of rugosas form small biogherms. *Marisastrum lazutkini* (Bulvanker), *Disphyllum pashiense* (Soshkina), *Neostrophophyllum* sp. are defined.
9. Alternating prolayers of grey thick-plate agrillaceous and aleurite limestones and green-grey schistic aleurolites with remains of tabulates, pearlsides, trilobites, and bivalve mollusks.
10. Brown-grey aleurolites replaced upwards along the cut by green-brown coarse-grained sandstones.

From brachiopods Ya.M. Gutak has defined the species *Indospirifer pseudowilliamsi* Rzonnickaja, a supervising form of the Safonovskiy horizon. The following species of rugosas were defined by the author during the research: *Dialytophyllum annulatum* (Peetz), *Heliophyllum aiense* Soshkina, *Grypophyllum gracile* Wedekind, *Calceola sandalina* Lamarck, *Marisastrum lazutkini* (Bulvanker), *Disphyllum pashiense* (Soshkina), *Neostrophophyllum* sp. Forms *Dialytophyllum annulatum* (Peetz) and *Heliophyllum aiense* Soshkina are zone kinds of the Saphonovskiy horizon. *Grypophyllum gracile* Wedekind and *Calceola sandalina* Lamarck are located in lower horizons. The first form is a transit form: it is widespread on territories of the Altai-Sayanskaya area, from Salairskiy horizon of the Emsian age and up to Saphonovskiy horizon of the Early Givetian. The second form is characteristic for Upper Shandinskii horizon of the Late Emsian. On the other hand, the species *Marisastrum lazutkini* Bulvanker is known from Vassinskii layers of the Early Frasnian age. The species *Disphyllum pashiense* (Soshkina), and the sort *Neostrophophyllum*, which was not presented possible to define up to the kind, are located in Givetian and Frasnian deposits Ural Mountains, Salair and Kuzbass. As a whole, we consider it possible to attribute the studied complex to the Saphonovskiy horizon.

The Bachatskiy cut is opened in the right bank of the river Bolshie Bachaty opposite of the village Mamontovo. Elements of rock deposition: strike 310, falling is close to vertical. The general capacity of the opened by the cut deposits is 114 m.

Description of the Bachatskiy cut:

1. Grey fine-grained sandstones.
2. Turf interval.
3. Dark grey limestones with remains of tabulate, crinoids, heliolitides, stromatoporates, brachiopods, and pearlsides.
4. Turf interval.
5. Grey thin-plate limestones containing remains of brachiopods, rugosas, pearlsides. From rugosas we have defined: *Grypophyllum gracile* Wedekind, *Calceola sandalina* Lamarck, *Peneckiella* sp. From brachiopods Ya.M. Gutak has defined the kind *Indospirifer pseudowilliamsi* Rzonnickaja.
6. Turf interval.

7. Green-brown coarse-grained sandstones with impurity of the gravel material.

Only *Grypophyllum gracile* Wedekind, *Calceola sandalina* Lamarck and *Peneckiella* sp are defined from rugosas. It has not been possible to define the latter form up to the species, but the sort *Peneckiella* Soshkina is widespread in Givetian and mainly in Frasnian deposits of Ural Mountains, Kuzbass and Salair. Because of absence in the Bachatskiy cut of zonal kinds of rugosas of the Safonovskiy horizon, the affiliation of these deposits to it is based on presence of brachiopods of the kind *Indospirifer pseudowilliamsi* Rzonnickaja. The complex of studied rugosas allows drawing a conclusion only about the Early Givetian age of these deposits.

The Mamontovskiy horizon is broken down by previous researchers [2, 6, 8] on three packs: red-color conglomeratic-sandstone, calcareous and aleuro-pelitic, with the total capacity from 180 up to 300 m. Deposits of calcareous and aleuro-pelitic packs in the Guryevsk region have been studied by the author (Fig. 1).

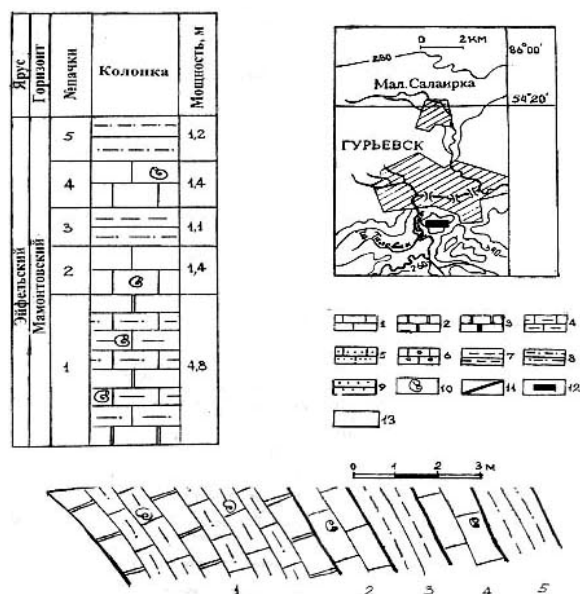


Fig. 1. A fragment of the stratotypical cut of the Mamontovskiy horizon. Symbols: 1-9) types of deposits: 1-6) limestones: 1) thin-plate, 2) thick-plate, 3) massive, 4) argillaceous, 5) sandy, 6) fragmental; 7) pelitoides; 8) aleurolites; 10) fossils; 11) borders of packs; 12) research site; 13) turf interval

Explanation to Fig. 1:

Эйфельский - Eifel; Колонка - Column; Мамонтовский - Mamontovskiy; Мощность, м - Capacity, m; Ярус - Stage; Мал. Салаирка - Malaya Salairka; Горизонт - Horizon; Гурьевск - Guryevsk; № пачки - pack number

Description of the cut of the Mamontovskiy horizon:

1. Plate-like coral limestones with thin prolayers of aleurolites. Branchy colonies of pearlsides occasionally appear in the limestones.

- Thin-plate coral limestones with prolayers of aleurolites. Fossils are presented by corals, sstromatoporates, gastropods, trilobites, brachiopods, and bivalves.
- Strongly schistic aleurolites (mute).
- Alternation of dark grey thin-plate mute limestones by light grey coral ones.
- Strongly schistic aleurolites.

The total capacity of the opened by the cut deposits is 9,9 m.

Among rugosas of the Mamontovskiy horizon the following forms are described: *Neostriophyllum mamontovensis* (Zhelt.), *Neospongophyllum variabile* Wdkd., *Grypophyllum gracile* Wdkd., *G. gurjevskiensis* Zhelt., *Dendrostella rhenana* (Frech). All complex of rugosas specifies the affiliation of containing it deposits to the Mamontovskiy horizon of the Eifel stage of the Middle Devonian.

Thus, as a result of researches of the cited complexes of rugosas and brachiopods the age of several deposits of the East part of Salair has been specified. It is possible to consider attribute deposits of the Prokopyevskiy and Bachatskiy cuts to the Safonovskiy horizon of the Lower Givetian, and deposits of calcareous and aleuro-pelitic packs, studied in the area of Guryevsk city to the Mamontovskiy horizon of the Eifel stage of the Middle Devonian.

Descriptions of species of the studied rugosas

Class *Kodonophyllida*

Family *Heliophyllidae* Nicholson

Sort *Heliophyllum* Hall

Heliophyllum aiense Soshkina, 1949

Material. 3 specimens, from which 10 sections were made, Fig. 2.

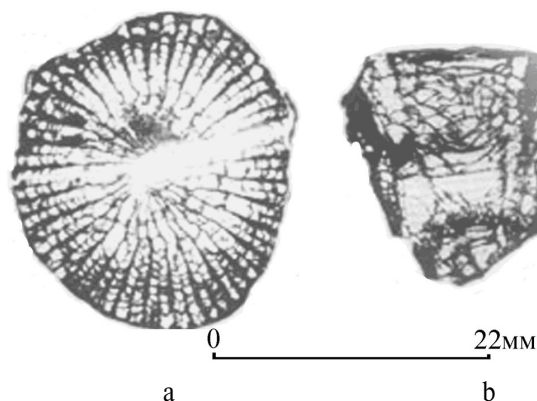


Fig. 2. *Heliophyllum aiense* Soshkina. Section of the coral: a) cross-section, b) longitudinal

Diagnosis. Single cylindrical coral. Diameter of adult individuals varies from 20 to 24 mm. There are 60–62 septums of two orders, thickened and carinated каринированных in the peripheral zone and thin at the center. Septums of the 1st order reach the center, se-

ptums of the 2nd order are 2/3 of their lengths. The bottoms are wide, split, frequent: 10 bottoms for 5 mm. Dissepiments are fine, tumid, and compose 5–9 rows.

Ontogenesis. *Reproduction* is parisidal. A specimen divided from the inside on 5 parisidal buds is presented in the collection.

Spread and age. Upper Givetian deposits of Ural Mountains and Mountainous Altai, the Mazalovsko-Kitayskiy horizon; Salair – Safonovskiy layers.

Location. Western suburb of Prokopyevsk city, the left bank of the stream Egos. Safonovskiy horizon of the Lower Givetian substage.

Family *Campophyllidae* Wedekind

Sort *Neostriophyllum* Wed., emend *Soshkina*

Neostriophyllum mamontovensis (Zhelt.), 2006

Holotype: # 2303. It is stored in geological museum of territorial funds of Kemerovo oblast (Novokuznetsk). Salair, village Tor Chumysh, Safonovskiy horizon. Middle Devonian substage.

Material: 11 copies in cross-section and longitudinal sections are studied, Fig. 3.

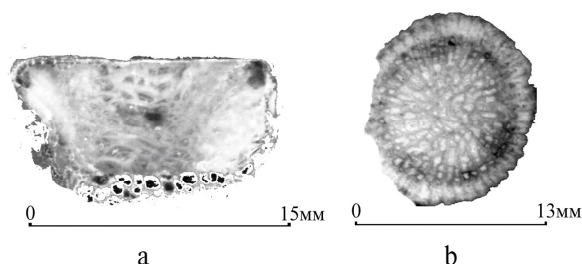


Fig. 3. *Neostriophyllum mamontovensis* (Zhelt). Section of the coral: a) longitudinal, b) cross-section

Diagnosis: Single coral with the diameter 13...15 mm. Cup of the goblet-like shape. A wide band is observed on periphery (up to one half of the radius). Total number of septums is 48–52. An arrangement of septums is radial. Septums are thin near the axis and get thicker towards the periphery. Locks and bubbles of flaking can be sometimes visible on them. Greater septums are long, reach reach the axis and twist. The axial ends of greater septums are claviformly thickened. Septums of the first order are geniculately twisted in the middle part. Small septums reach as long as half of the length of greater ones. Often they rest against the geniculately curve of the the first order. At early stages the arrangement of septums is distinctly crest-like, and most important, the septum is greater than others in length and width. The bottoms are incomplete, strongly split, bubble-like. Dissepiments are elongated, extended, inclined to the axis, often closed by stereoplasma. Compose 3–5 rows.

Comparison: This species differs from the other species by claviformed thickenings of the axial ends of great septums, and by elongated, extended dissepiments, partially closed by stereoplasma.

Spread: Salair, Mamontovskiy and Safonovskiy horizons of the Early Givetian substage of the Middle Devonian.

Location: The river Kara-Chumysh, village Verkhniy Chumysh, settlement Izora, the river Ur, village Verkhniy Teresh. Safonovskiy horizon, the Lower Jivet substage.

Family *Stringophyllidae* Wedekind

Sort *Grypophyllum* Wedekind

Grypophyllum gracile Wedekind, 1925

Material. 4 specimen are studied, from which 15 sections were made, Fig. 4.

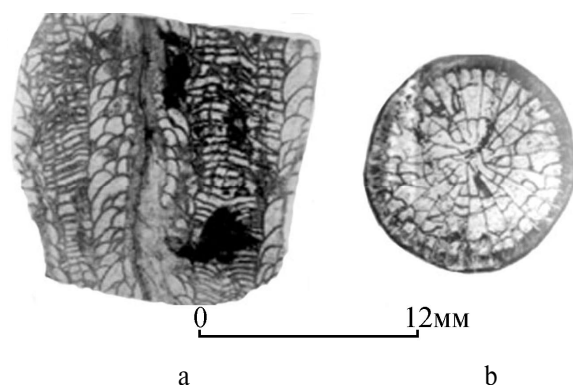


Fig. 4. *Grypophyllum gracile* Wedekind. Section of the coral: a) cross-section, b) longitudinal

Siagnosis. A small single coral with the average diameter of 12 mm. Quantity of septums two orders is 42. Septums are thin, lamellar, thickened towards the axis. Great septums are long, reach the center; small are short, thick, reach up to 1/3...1/5 of the length of the first ones, can be absent. The bottoms are full, horizontal, make 1/3 from diameter of the coral. 11 bottoms for 5 mm. Large lonsdaleoid dissepiments are spread in 3–5 rows.

Spread and age. The species is described in Germany, Ural Mountains, and Altai-Sayanskaya areas. *Grypophyllum gracile* Wedekind begins to appear in the Salairinskaya layers of the Emsian age, proceeds to the Shandinskiy, and then the Eifel century – to the Mamontovskiy; it is widespread enough in Kerlegeshskiy and Safonovskiy layers of the Early Givetian.

Location: Suburbs of Guryevsk city, the right bank of the river Talovaya. Mamontovskiy of the Eifel stage.

Family *Mycophyllidae* Hill

Sort *Calceola* Lamarck

Calceola sandalina Lamarck, 1799

Material. 2 specimen are studied, fig. 5.

Diagnosis. Single shoe-shape tectiform coral. The cup is funnel-shape. One part of the coral is consolidated, the other is convex. Уплотненная the party of a coral is raised up by an edge. Diameter is about 5 mm. Length of the coral is 15 mm. Densely located septums

merge among themselves so the border between them is difficult to establish. The bottoms are horizontal rare. Dissepiments are absent.

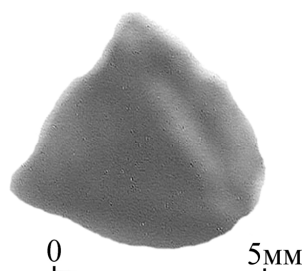


Fig. 5. *Calceola sandalina* Lamarck. General view of the coral

Spread and age. Average Devonian of Eurasia and Northern Africa. In Altai-Sayanskaya areas it is present from Shandinskiy layers of the Late Emsian up to Safonovskiy layers of the Early Givetian.

Location. The right bank of the river Bolshie Bachaty. Safonovskiy horizon of the Lower Givetian substage.

Class *Columnariida* Rominger

Family *Marisastridae* Rozkowska

Sort *Marisastrum* Rozkowska

Marisastrum lazutkini (Bulvanker), 1953

Material. 2 copies are studied, from which 7 sections are made, Fig. 6.

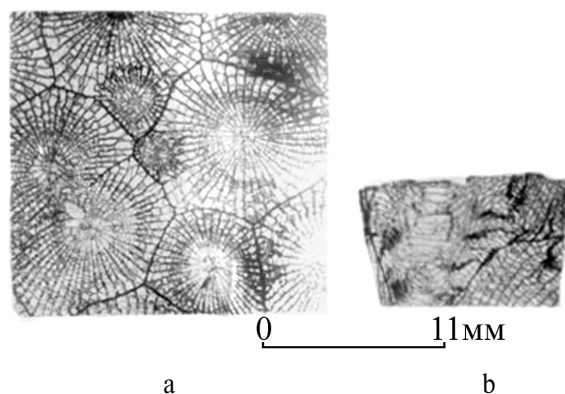


Fig. 6. *Marisastrum lazutkini* (Bulvanker). Section of the coral: a) cross-section, b) longitudinal

Diagnosis. A colony of massive corallites 10...11 mm in diagonal. Septums of two orders in of quantity 32–40 are present. Septums are carinated, thin on periphery up to the middle, fusiformly thickened. Great septums do not reach the center. Small ones reach up to 2/3 of the length of the great ones. The bottoms are horizontal, 11 to 15 on 5 mm. Dissepiments are steeply sloped to the axis, 3–5 rows.

Spread and age. Altai-Sayanskaya area, Yzylinskiy layers of the Late Jivet and vassinskiy layers of the Early Frasnian.

Location. Western suburb of Prokopyevsk city, the left bank of the stream Egos. Sagonovskiy horizon of the Lower Jivet substage.

Family *Disphyllidae* Hill
Sort *Disphyllum* Fromental

Disphyllum pashiense (Soshkina), 1939

Material. 2 copies are studied, from which 6 sections are made, Fig. 7.

Diagnosis. A colony of branchy corallites 13 mm in diameter on average. Septums are sphenoidally thickened, two orders in quantity of 48–52. Great septums are long, can reach the axis. Small septums reach $1/2 \dots 1/3$ the lengths of the great ones. The bottoms are horizontal, rare (4 bottoms on 5 mm). Dissepiments are fine, вздутые, compose 2–3 rows.

Spread and age. In Ural Mountains and Altai-Sayanskaya areas this form is widespread in Givetian and Frasnian deposits. It is found in Kuzbass in Zarubinsky, Izylinskiy layers of the Late Givetian and Vassinskiy layers of the Early Frasnian.

Location: Western suburb of Prokopyevsk city, the left bank of the stream Egos. Safonovskiy horizon of the Early Jivet substage.

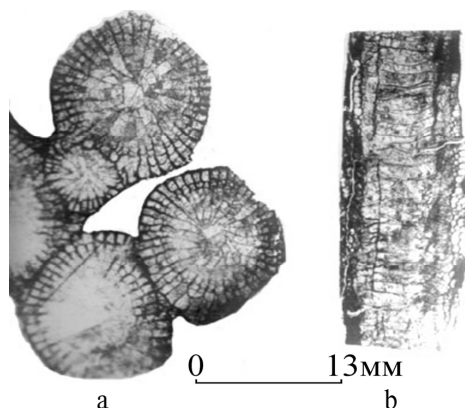


Fig. 7. *Disphyllum pashiense* (Soshkina). Section of the coral: a) cross-section, b) longitudinal

REFERENCES

1. Bulvankar E.Z. Devonian four-beam corals of Kuznetsk basin suburbs. – Leningrad: Publishing house of All Russia Geological Institute, 1958. – 212 p.
2. Yolkin E.A. Trilobites and stratigraphy of the Lower and Middle Devonian of the south of Western Siberia. – Moscow: Nauka, 1968. – 156 p.
3. Ivaniya V.A. Devonian corals. Rugosas of the Sayano-Altayskaya mountainous area. – Tomsk: Publishing house of Tomsk State University, 1965. – 398 p.
4. Ivaniya V.A., Cherepina S.K. On zonal partition of the Devonian of Western Siberia by rugosas. – Tomsk: Publishing house of Tomsk State University, 1979. – P. 28–40.
5. Rzhonsnitskaya M.A. Biostratigraphy of the Devonian of Kuznetsk basin suburbs. – V. 1. – Stratigraphy. – Leningrad: Nauka, 1968. – 287 p.
6. Spasskiy N.Ya. Devonian rugosas of the USSR. – Leningrad: Publishing house of Leningrad University, 1977. – 344 p.
7. Udodov Yu.V., Mezentseva O.P., Gumerova N.V., Tolokonnikova Z.A. Trepotomides of the Eifel-Early Givetian deposits of the eastern macroslope of Salair // Nature and economy of Kuzbass. Regional collection of scientific articles. – Novokuznetsk: Publishing house of KuzGpA, 2004. – V. 1. – P. 35–49.
8. Protocol of the session of the Devonian subsection of Siberian Regional Stratigraphic Commission, January 23, 1996. – Novosibirsk, 1996.

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