

A Review of Blattinopsida (Insecta) and Flora of Latest Early and Early Middle Permian in European Russia

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Abstract—The composition of the order Blattinopsida (Insecta) and plants in the later Early and early Middle Permian of the European Russia is reviewed. *Glaphyrophlebia semipenna* sp. nov. and *G. glinka* sp. nov. are described as new taxa from the Lower Permian of the Chekarda and Krasnaya Glinka localities in the Perm Region of Russia. A key to the genus *Glaphyrophlebia* is provided. Blattinopsida are hypothesized to feed on spores of heterosporous lycopodiophytes.

Keywords: Insecta, Blattinopsida, Blattinopsidae, Lower and Middle Permian, Russia, heterosporous lycopodiophytes, *Viatcheslavia*

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INTRODUCTION

The earliest blattinopsid insects from the territory of Russia are known from the Lower Permian. They were found in the Kungurian localities of Chekarda and Krasnaya Glinka in the Perm Territory. *Glaphyrophlebia uralensis* (Martynov, 1940) (Martynov, 1940; Rasnitsyn, 1980) and *G. semipenna* sp. nov. are described from Chekarda in the Suksun District (Koshelev Formation). From the stratigraphically close Krasnaya Glinka locality (Kishert District), *G. glinka* sp. nov. is described below. An unspecified representative of *Glaphyrophlebia* was found in the Kungurian (Lekvorkuta Formation) of the Pechora Basin (Aristov et al., 2021). *Blattinopsis indefinitus* Rasnitsyn et Aristov, 2021 (Rasnitsyn and Aristov, 2021) was described from the Fokina locality (Kungurian Upper Burgukla Subhorizon of the Krasnoyarsk Region of Russia). This is the latest known occurrence of the genus *Blattinopsis* Giebel, 1867 and the only representative of the genus from the Permian of Russia; the rest of Blattinopsida are represented by the genus *Glaphyrophlebia*. From the younger, Ufimian deposits of the Vorkuta field (Inta Formation of the Pechora Basin), *Glaphyrophlebia komia* Aristov, Rasnitsyn et Naugolnykh, 2021, *G. vorkutensis* Aristov, Rasnitsyn et Naugolnykh, 2021, and *G. borea* Aristov, Rasnitsyn et Naugolnykh, 2021 (Aristov et al., 2021) are described. From the nearly synchronous Tyulkino

locality in the Perm Territory (Solikamsk Formation), *G. vaga* Aristov et Rasnitsyn, 2022, *G. rara* Aristov et Rasnitsyn, 2022 and *G. kamaensis* Aristov et Rasnitsyn, 2022 are described (Aristov and Rasnitsyn, 2022). The youngest representatives of the order are known from the Lower Kazanian of Soyana locality in the Arkhangelsk Region, Russia and Tikhie Gory in Tatarstan (Russia). *G. subcostalis* (Martynov, 1928) and *G. iva* Aristov et Rasnitsyn, 2021 are described from Soyana; *G. rossica* (Martynov, 1930) are described from Tikhie Gory (Aristov and Rasnitsyn, 2021). No Blattinopsida are known from younger deposits. The diversity of blattinopsids in the Permian deposits of Russia is small and amounts to one to three species per locality, regardless of the proportion of blattinopsids among other insects. This proportion may be less than one percent in Kungurian (Chekarda and deposits of the Lekvorkuta Formation) and Lower Kazanian (Soyana and Tikhie Gory) localities. In Ufimian localities, the proportion of Blattinopsidae is higher, and amounts to 14% in the deposits of the Inta Formation of the Pechora Basin of Russia (Rasnitsyn et al., 2005) and 22.5% in the Tyulkino locality in the Perm Territory (Solikamsk Formation: Aristov and Rasnitsyn, 2022). In the Lower Permian, a similar proportion of blattinopsids is known only in the Asseian Niedermoschel locality (Meisenheim Formation, Rheinland-Pfalz, Germany), where it is 11% (Hörn-

schemeyer, 1999). It is unlikely that this high (for Blattinopsida) proportion is explained by climatic factors. The Niedermoschel was characterized by an arid continental climate, Tyulkino had a semiarid coastal sea climate, and the Inta localities of the Pechora basin had a humid coastal sea climate (Aristov et al., 2021).

BLATTINOPSIDS AND THE EARLY UFIMIAN ECOSYSTEM CRISIS

An analysis of the proportion of blattinopsids among other insects in the localities of Chekarda, the Lekvorkuta and Inta formations of the Pechora basin, Tyulkino, and Soyana clearly indicates an increase in the proportion of blattinopsids in the first half of the Ufimian, i.e., in the Solikamskian. A general assessment of changes in the paleogeographical situation in the east of the Russian (East European) Platform and in the Urals allows us to conclude that an increase in the proportion of blattinopsids in the early Ufimian localities of the Inta Formation of the Vorkuta deposit and Tyulkino could correspond to the appearance of specific landscape environments that favored the diversification and distribution of this group of insects. As studies of the Permian deposits of this region show, it was during the Solikamskian that the Cisuralian marine basin became isolated, and by the Kungurian age it had transformed into a hypersaline lagoon with evaporite deposition, including potassium salts and halite in the north near Solikamsk and Berezniki (Perm Region), as well as sulfates (starting from the latitude of the city of Perm and further south to the Peri-Caspian Depression; for details, see: Derevyagin et al., 1981; Zharkov, 2004). This situation, of course, directly affected the paleophytogeographic and phytocenotic differentiation of vegetation in this region, as well as the change in the type and composition of plant communities from the Kungurian (Chekarda locality) to the Kazanian (Soyana locality; modern ideas about trends in the evolution of vegetation in the Urals and its connections with other paleofloristic areas, see Naugolnykh, 2014, 2015, 2017, 2018; Tang et al., 2020). In the stratotype sections and boreholes in the Middle Urals, the thickness of the Solikamskian Regional Substage is 100–300 m (Silantiev, 1996; 1998). The Solikamsk deposits are mainly represented by laminated marls and limestones (the so-called “Solikamskian flagstones”), sometimes with interbeds of columnar and hemispherical stromatolites (for a review, see Sonin, 2015; Naugolnykh and Litvinova, 2021) with subordinate interbeds of sandstone.

In the Solikamskian deposits of the Middle Urals, including the Tyulkino Section, arid and subarid carbonate paleosol profiles are widespread. So, for example, in deposits of this age, exposed in the lower reaches of the Chusovaya and Sylva rivers, there are carbonate paleosols with paleotakyr broken by ancient drying cracks into characteristic polygonal

plates (Naugolnykh and Litvinova, 2021). The profiles of paleotakyr often contain plant roots preserved in situ, and the roots are located either near, or directly in, the cracks. This is certainly because the cracks stored the moisture necessary for plants in the hot and dry climate of the Solikamskian time. The vegetation of the first half of the Ufimian is characterized by very low taxonomic diversity, apparently associated with the regional ecological crisis that took place at the Kungurian–Ufimian boundary (for more details, see: Naugolnykh, 2007, pp. 66–74). The arborescent heterosporous lepidophyte *Viatcheslavia vorcutensis* Zalessky emend. Neuburg was the absolute dominant of the Early Ufimian vegetation, the remains of which, including stem fragments, rhizophores, phylloids, sporophylls, megaspores, and microspores, are found in the Urals in most localities of the Solikamskian plant remains. Finds of *V. vorcutensis* trunks up to 30 cm in diameter are known (for more details on the morphology and growth forms of *V. vorcutensis*, see Naugolnykh, 2005). In this case, the height of the plant itself could reach 5 m. It is important to remember that the secondary tissues in arborescent lycopsids were formed not by xylem, but by bark, which does not prevent the growth form of these plants being considered arborescent.

Together with *Viatcheslavia*, the bryopsids *Intia* cf. *variabilis* Neuburg (Figs. 1a–1e), as well as the equisetophyte *Paracalamites* aff. *longisegmentatus* Naug. are present at the localities. The composition of the Solikamskian floristic assemblage also includes gymnosperms: a ginkgophyte *Psygmyphyllum* sp., rare conifers, Vojnovskyales *Rufhoria derzavinii* (Neub.) S. Meyen.

The floristic assemblage of the Inta Formation is significantly richer than the synchronous floristic assemblages of the Middle Urals, but it also contains the same or closely related species: *Viatcheslavia vorcutensis*, *Paracalamites* spp., and *Rufhoria derzavinii*.

Thus, the Ufimian floristic assemblage of different regions of Cisuralia have a generally similar taxonomic composition. As was briefly mentioned above, one of the most striking features of the Ufimian and, in particular, Early Ufimian (Solikamskian) floras of the Cisuralia is the presence of the arborescent lepidophyte *Viatcheslavia vorcutensis* (Figs. 1f–1h).

The most widespread category of *V. vorcutensis* fossil remains are bark fragments (Pl. 6, figs. 4, 7; Pl. 7, figs. 1–4), while 3-D fragments are less common. A unique locality with large fragments of *Viatcheslavia* trunks, sometimes accompanied by finds of rhizophores preserved in situ, is located near the mouth of the Sylva River, opposite the village of Old Lyady. However, as a rule, the trunks of *Viatcheslavia* from this locality are heavily decorticated (Pl. 6, fig. 6). *Viatcheslavia* sporophylls are much rarer (Pl. 6, figs. 1, 8); the structure was resolved only 60 years after the description of this lycopodiopsid species (Naugol-

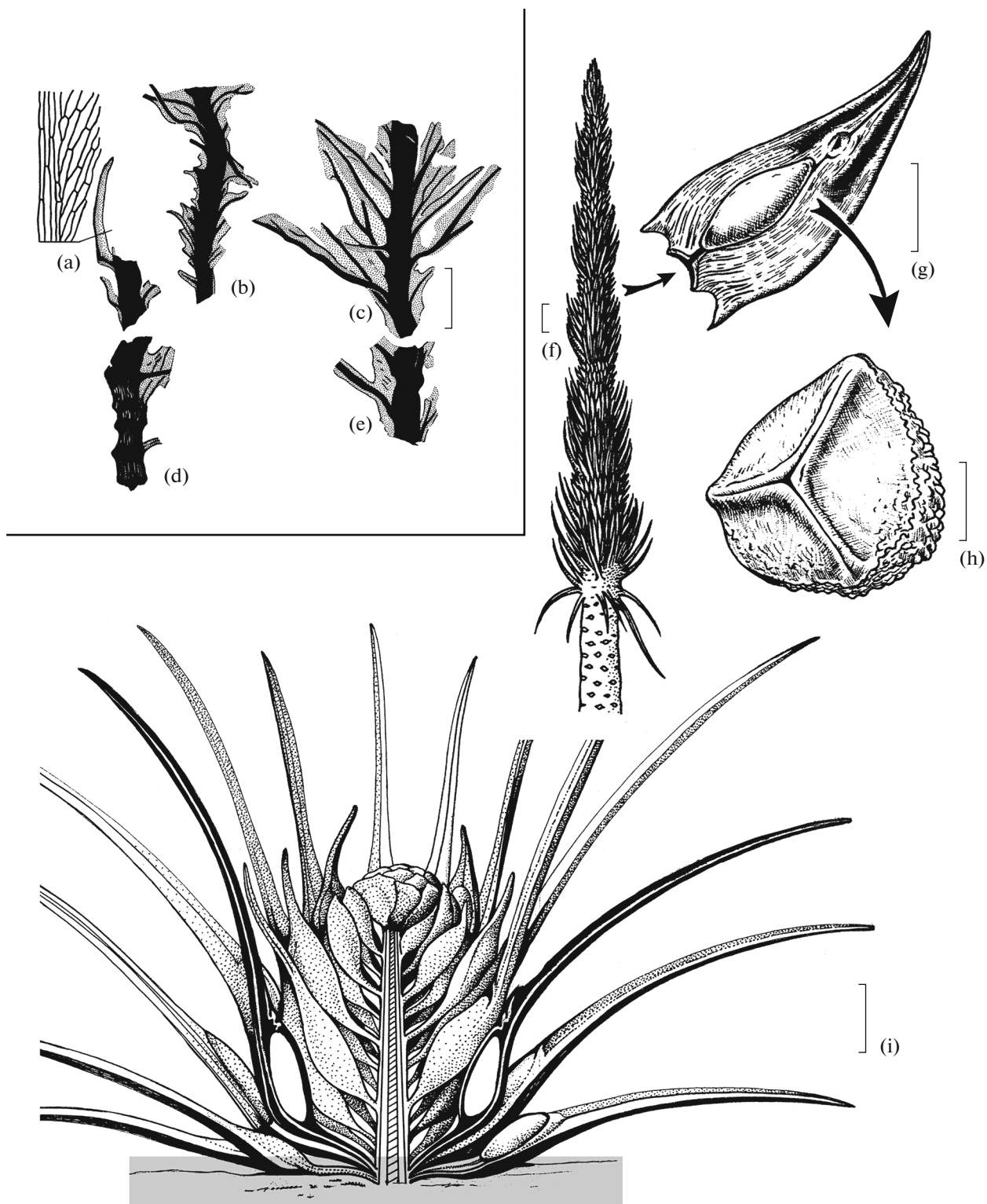


Fig. 1. Main types of bryopsid fossils (a–e) and heterosporous lycopsids (f–i) from Permian of the Perm Region, Russia: (a–e) shoots of the bryopsid *Intia* cf. *variabilis* Neuburg (after Naugolnykh, 2007, text-fig. 90, modified), Polazna, Middle Permian, Ufimian Stage, Solikamskian Regional Substage; (f) reconstruction of the apical part of the trunk of a heterosporous arborescent lepidophyte *Viatcheslavia vorcutensis* Zalesky; (g) sporophyll *V. vorcutensis* Zalesky; (h) microspore *Densoisporites polaznaensis* Naugolnykh et Zavialova, that belonged to *V. vorcutensis* Zalesky (after Naugolnykh, 2016, text-fig. 8, modified); Polazna, Middle Permian, Stage, Solikamskian Regional Substage; (i) *Sadovnikovia belemnoides* Naugolnykh, reconstruction of a herbaceous heterosporous lycopsid; Lower Permian, Kungurian Stage, Irenian Regional Substage. Scale bar 2 mm (a–e); 10 cm (f); 1 cm (g, i); 20 μ m (h).

nykh, 1994, 2001). Through analytical studies, it was possible to establish which microspores were produced by *Viatcheslavia* (Naugolnykh and Zavialova, 2004). It was shown that these are cavate microspores with a trilete tetrad scar (Pl. 6, figs. 2, 3, 5). The genus *Sadovnikovia* Naugolnykh from the Kungurian Stage of the Cis-Urals was considered as the immediate ancestor of *Viatcheslavia*. This monotypic genus with a single species *S. belemnoides* Naugolnykh is very rare, however, thanks to several findings of well-preserved sporophylls, including the holotype (Naugolnykh, 1994), it was possible to find out that *Sadovnikovia*, unlike *Viatcheslavia*, was a low, apparently herbaceous plant (Fig. 1i), externally very similar to modern heterosporous lycopsids of the genus *Isoetes* L. Most likely, dispersed megaspores of the *Laevigatisporites* morphotype, occasionally found in the Kungurian of Cisuralia, belonged to *Sadovnikovia* or some closely related lycopsids (Pl. 7, fig. 5).

A detailed consideration of the ecology of Permian and Triassic heterosporous lycopsids is given in the works of one of the authors (Naugolnykh, 2012, pp. 398, 399; 2013, pp. 2–5, 13). The proposed trophic relationship between blattinopsids and heterosporous lycopsids is in good agreement with the role played by heterosporous lycopsids in Permian paleophytocenoses. It is assumed (Naugolnykh, 2007) that these plants formed monodominant pioneer phytocenoses, which were widespread at the beginning of the Ufimian. That is why *Viatcheslavia* formed the main food substrate for blattinopsids in the Solikamskian time, which led to an explosive growth in the number of these insects.

Summing up all of the above, it can be assumed that a sharp increase in the share of blattinopsids in the localities of the beginning of the Ufimian may have been associated with the development of specific landscape settings dominated by arborescent heterosporous lycopsids, as well as bryophytes. With regard to more general data indirectly indicating the trophic preferences of blattinopsids, note that V.V. Zherikhin suggested that aquatic insects (mayflies, some beetles and caddisflies) feed on benthic algae, but no such indication is given for terrestrial insects, and further that “...Evidence of [Paleozoic] arthropods feeding on living plants is available for the lycopsids, the form-genus *Schizoneura* (Equisetopsida *incertae sedis*), the ferns of the order Marattiales” (Zherikhin, 2002, p. 338).

Further, additional indirect indications of the trophic preferences of the Paleozoic insects are given: “It is interesting to note in this respect that the present-day ferns, horsetails and especially the lycopods have a poor and distinctive herbivore fauna. As regards the latter group I myself have never seen any insects feeding on modern *Lycopodium* or *Selaginella* and have found only two published records of herbivorous insects, a satyrine butterfly caterpillar in North Amer-

ica [...] and an eumastacid orthopteran from Indonesia” (Zherikhin, 2002, p. 342).

About the diet of early winged insects, it is also noted: “early pterygotans probably fed mainly on living plant matter most rich in nitrogen, such as spores, pollen and seeds. Their feeding strategy originally should have been opportunistic and not highly selective in respect to both plant taxonomy or plant organ. Ill or damaged plant tissues could be consumed together with the healthy ones, and perhaps even preferably because of the presence of microorganisms and fungi that might provide additional nitrogen sources” (Zherikhin, 2002, p. 338).

Thus, the authors of this article agree that ancient terrestrial (not aquatic) insects, including blattinopsids, if they were phytophages, fed mainly on spores, pollen, and seeds/ovules, i.e., were phytembryophagous (Fig. 2).

Since blattinopsids, with their broad roof-like wings, probably lived on plants, and were not very adapted to living in holes in the substrate (including fungus-infected wood) where most of the dead plant and animal material is, and do not show adaptations for predation, it is most likely that they were phytembryophagous (Rasnitsyn, 1980; Rasnitsyn and Quicke, 2002).

MATERIAL

The material described in this work is housed at the Paleontological Institute named after A.A. Borissiak, Russian Academy of Sciences (PIN) and the V.I. Vernadsky State Geological Museum, Russian Academy of Sciences (GGM).

SYSTEMATIC PALEONTOLOGY

Order Blattinopsida

Family Blattinopsidae Bolton, 1925

Genus *Glaphyrophlebia* Handlirsch, 1906

Key to the Genus *Glaphyrophlebia*

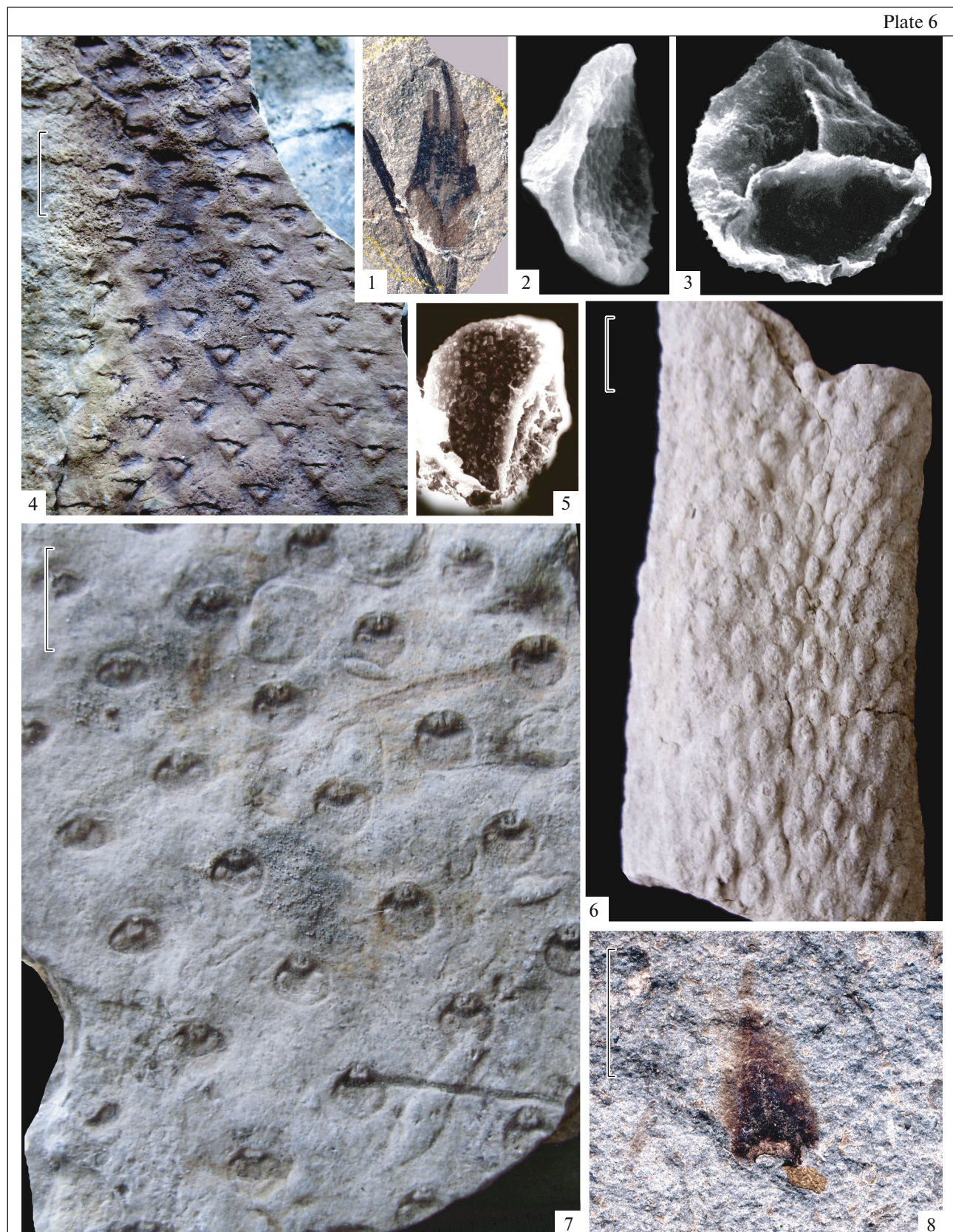
The key table does not include the insufficiently preserved *G. rossica* Martynov, 1931 from the Tikhie Gory locality (Middle Permian of Russia) and *G. glinka* sp. nov. from the Krasnaya Glinka locality (Lower Permian of Russia).

1(10) M branching (besides terminal forks).

2(3) The RS base is fused with R; RS extends from R by two or three stems. R posterior of RS base is S-like flexed. Forewing 10.5 mm long. Midco, Lower Permian USA.....
.....*G. anderhalterorum* Beckemeyer, 2013.

3(2) Base of RS not fused with R, RS extend from R by one stem. R posterior of RS base is not flexed S-like.

4(7) CuA regularly comb-like backward.



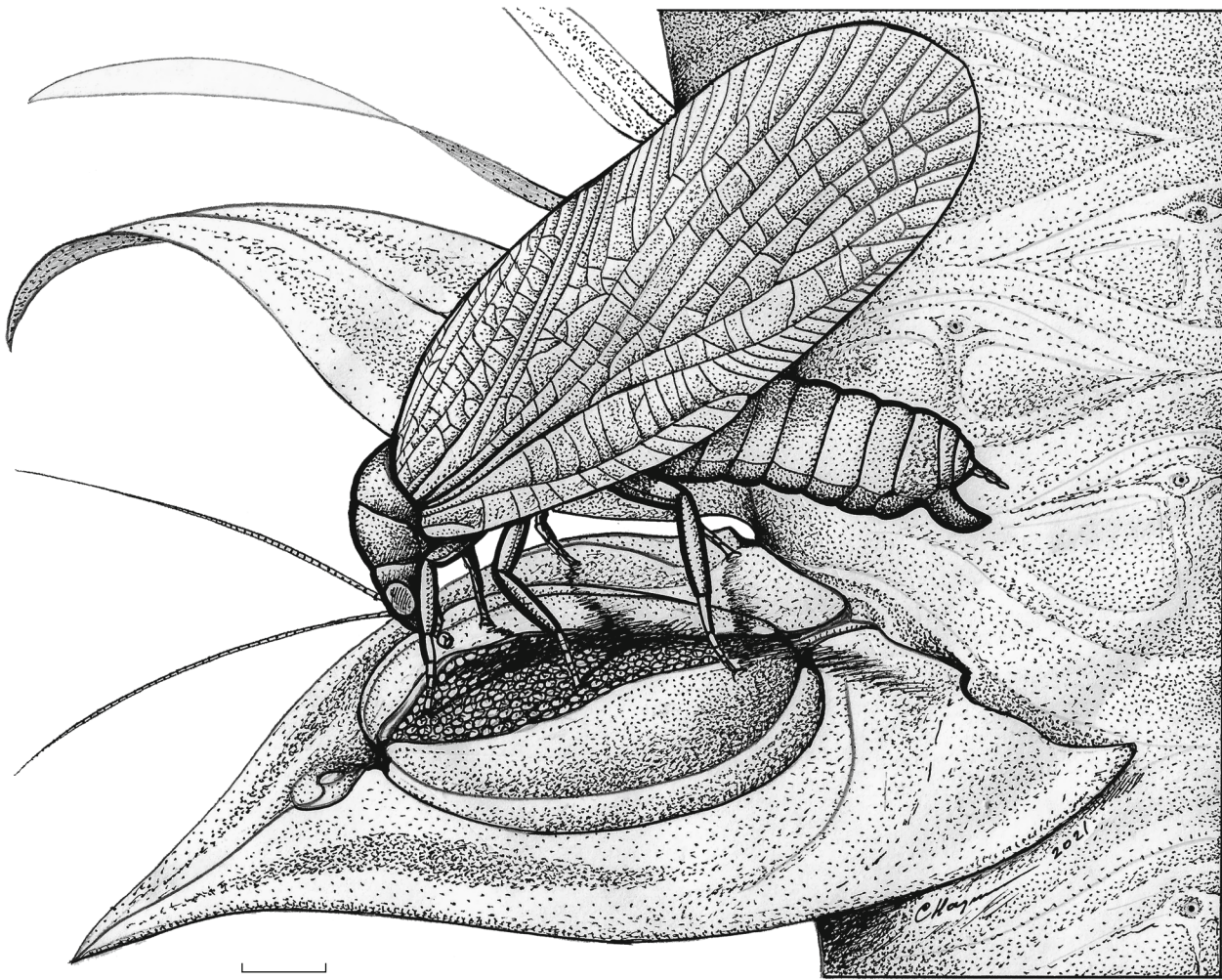


Fig. 2. Reconstruction of *Glaphyrophlebia vaga* Aristov et Rasnitsyn, on a sporophyll of *Viatcheslavia vorcutensis* Zalessky; Perm Region, Tyulkino; Middle Permian, Ufimian Stage, Solikamskian Regional Substage. Scale bar 1 mm.

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| <p>5(6) Branches RS simple, only with terminal forks. R less than with 10 fore branches. Forewing length 8.5 mm. Obora locality, Lower Permian of Czech Republic.....<i>G. clava</i> Kukalová, 1965.</p> <p>6(5) Branches of RS with primary and terminal forks. R more than with 15 anterior branches. Forewing length 21 mm. Niedermoschel, Lower Permian of Germany.....<i>G. arnulfi</i> Hörnschemeyer et Stapf, 2001.</p> | <p>7(4) CuA divided into an anterior branch with one-two terminal forks and comb-like posterior branch.</p> <p>8(9) SC flexed S-like. Forewing 12.5 mm long. Niedermoschel, Lower Permian of Germany.....<i>G. jeckenbachi</i> Hörnschemeyer et Stapf, 2001.</p> <p>9(8) SC not flexed S-like. Forewing 16.5–17.1 mm long. Niedermoschel, Lower Permian of Germany.....<i>G. rohwedderi</i> Hörnschemeyer et Stapf, 2001.</p> |
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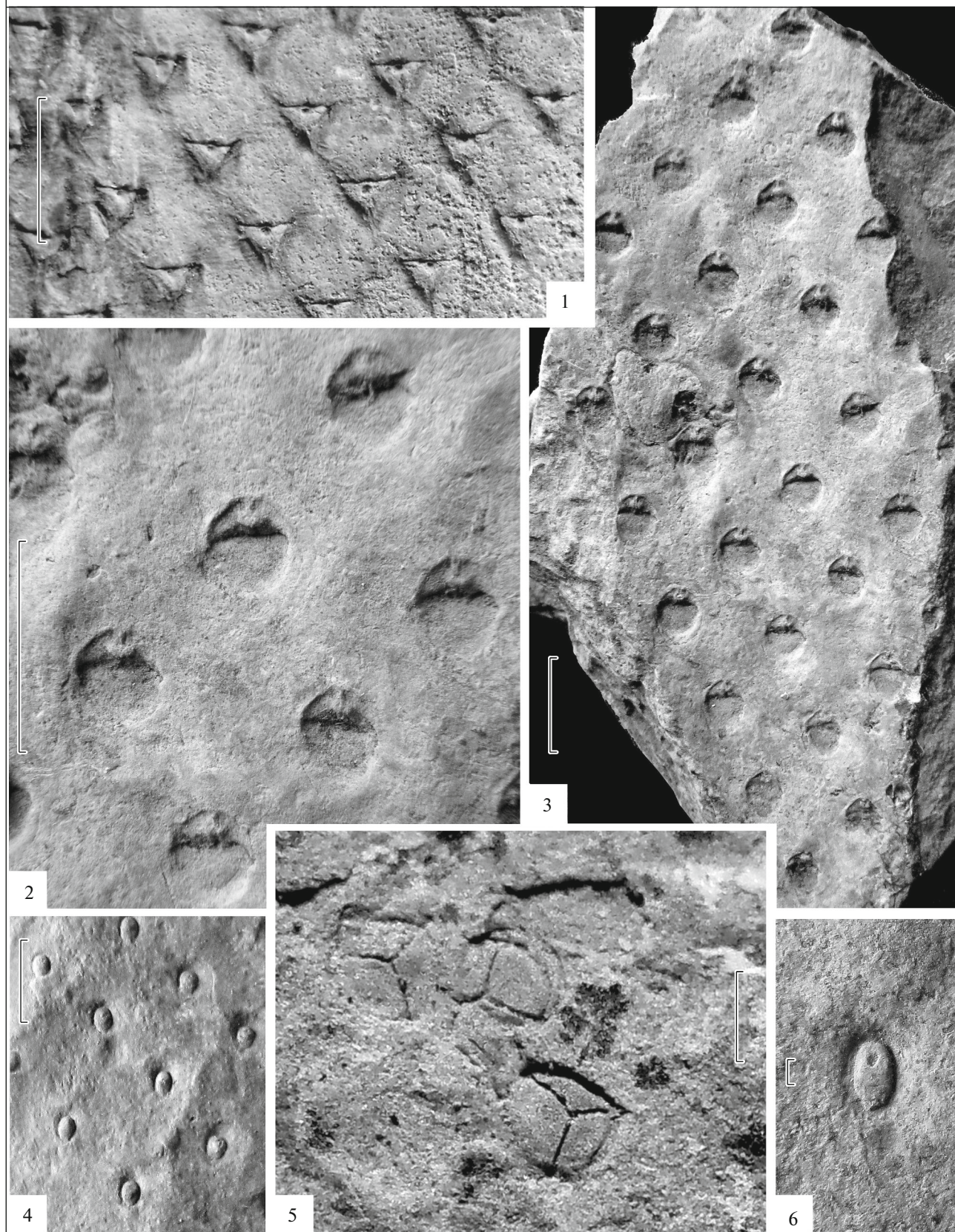
Explanation of Plate 6

Figs. 1, 8. Sporophylls of *Viatcheslavia vorcutensis* Zalessky; Perm Region, Polazna locality; Middle Permian, Ufimian Stage, Solikamskian Regional Substage.

Figs. 2, 3, 5. Microspores *Densoisporites polaznaensis* Naugolnykh et Zavalova, belonging to *Viatcheslavia vorcutensis* Zalessky; Perm Region, Polazna locality. Diameter of the microscopes is 50 µm.

Figs. 4, 6, 7. *V. vorcutensis* Zalessky: (4, 7) fragments of bark of varying degrees of decortication; Perm Region, Polazna locality; (6) fragment of a trunk; Ustye Sylva locality, opposite the village of Starye Lyady; Middle Permian, Ufimian Stage, Solikamskian Regional Substage.

Scale bar (1, 4, 6–8) 1 cm.



- 10(1) M simple or with terminal fork branches thinner than the stem.
- 11(22) RS extending from R by two stems.
- 12(15) CuA evenly comb-like backwards.
- 13(14) SC apex located far behind level of nodal fold. R in distal half strongly S-like flexed. Forewing 9.5 mm long. Niedermoschel, Lower Permian of Germany.....*G. parvavena* Hörnschemeyer et Stapf, 2001.
- 14(13) SC short, hardly reaching basal level of nodal fold. R weakly S-like flexed. Forewing ca. 12 mm long. Tyulkino locality, Middle Permian of Russia.....*G. rara* Aristov et Rasnitsyn, 2022.
- 15(12) CuA anterior of its distal third forks into two branches, posterior with at least three branches.
- 16(19) RS evenly comb-like (it branches only with terminal forks). SC short (hardly reaching level of nodal fold base). CuA with separated anterior branch.
- 17(18) SC reaching far behind base of nodal fold. In subcostal field crossveins simple. Soyana, Middle Permian, Russia.....*G. iva* Aristov et Rasnitsyn, 2021.
- 18(17) SC hardly reaches level of the nodal fold. In subcostal field crossveins branching. Tyulkino, Middle Permian, Russia.....*G. kamaensis* Aristov et Rasnitsyn, 2022.
- 19(16) RS branches with primary and terminal forks. CuA without separated anterior branch.
- 20(21) Anterior branches of SC and R straight, weakly oblique. Costal field in wing basal third as wide as subcostal field. Forewing 11–12 mm long. Chekarda, Lower Permian, Russia.....*G. uralensis* (Martynov, 1940).
- 21(20) Anterior branches of SC and R strongly oblique and the latter strongly bent. Costal field in wing basal third considerably wider than subcostal. Forewing ca. 9.5 mm long. Vorkuta Mine. Middle Permian, Russia.....*G. vorkutensis* Aristov, Rasnitsyn et Naugolnykh, 2021.
- 22(11) RS extending from R by one stem.
- 23(24) CuA with seven branches. SC very short, far not reaching basal level of nodal fold. Forewing 8 mm long. Elmo, Lower Permian, USA.....*G. speciosa* (Sellards, 1909).
- 24(23) CuA with 10 and more branches. SC reaching basal level of nodal fold.
- 25(26) R with 25 branches on wing anterior margin. Forewing 8 mm long. Elmo, Lower Permian, USA.....*G. ovata* (Sellards, 1909).
- 26(25) R with fewer than 20 branches on wing anterior margin.
- 27(32) CuA before its distal third forks into two branches, posterior with no less than three branches.
- 28(29) Bases of two posterior branches of CuA merged in distinct fork. Forewing length 9–10 mm. Vorkuta Mine, Middle Permian, Russia.....*G. borea* Aristov, Rasnitsyn et Naugolnykh, 2021.
- 29(28) Regions of bases of posterior branches of CuA disorganized, with no merge in clear fork.
- 30(31) Wing not colored. Forewing 8–11 mm long. Tyulkino, Middle Permian of Russia.....*G. vaga* Aristov et Rasnitsyn, 2022.
- 31(30) Wing dark, with a large light-colored spot. Forewing 10–11 mm long. Soyana, Middle Permian, Russia.....*G. subcostalis* (Martynov, 1928).
- 32(27) CuA evenly comb-like backward.
- 33(36) RS with primary and terminal forks.
- 34(35) R with less than 10 branches on wing anterior margin. Forewing 15.5 mm long. Weissig, Lower Permian, Germany.....*G. oblonga* (Deichmüller, 1882).
- 35(34) R with more than 10 branches on wing anterior margin. Forewing 10 mm long. Chekarda, Lower Permian, Russia.....*G. semipenna* Aristov, Rasnitsyn et Naugolnykh, sp. nov.
- 36(33) RS evenly comb-like. R with more than 10 branches on wing anterior margin. Forewing 9.5–11 mm long. Vorkuta Mine, Middle Permian Russia.....*G. komia* Aristov, Rasnitsyn et Naugolnykh, 2021.

Glaphyrophlebia semipenna Aristov, Rasnitsyn et Naugolnykh, sp. nov.

E t y m o l o g y. From the Latin *semi*—semi- and *penna* (wing), after characteristic coloration.

H o l o t y p e. PIN, no. 1700/522, part and counterpart of an incomplete forewing; Russia, Perm Region, Suksun District, left bank of the Sylva River, near the Chekarda village, Chekarda locality; Lower Permian, Kungurian, Irenian Regional Substage, Koshelev Formation.

Explanation of Plate 7

Figs. 1–4, 6. *Viatcheslavia vorcutensis* Zalesky, fragments of bark of varying degrees of decortication; Perm Region, Polazna locality; Middle Permian, Ufimian Stage, Solikamskian Regional Substage.

Fig. 5. *Laevigatisporites* sp., megaspores; Perm Region, Mazuevka locality; Lower Permian, Kungurian Stage, Irenian Regional Substage.

Scale bar (1–4) 1 cm, (5, 6) 1 mm.

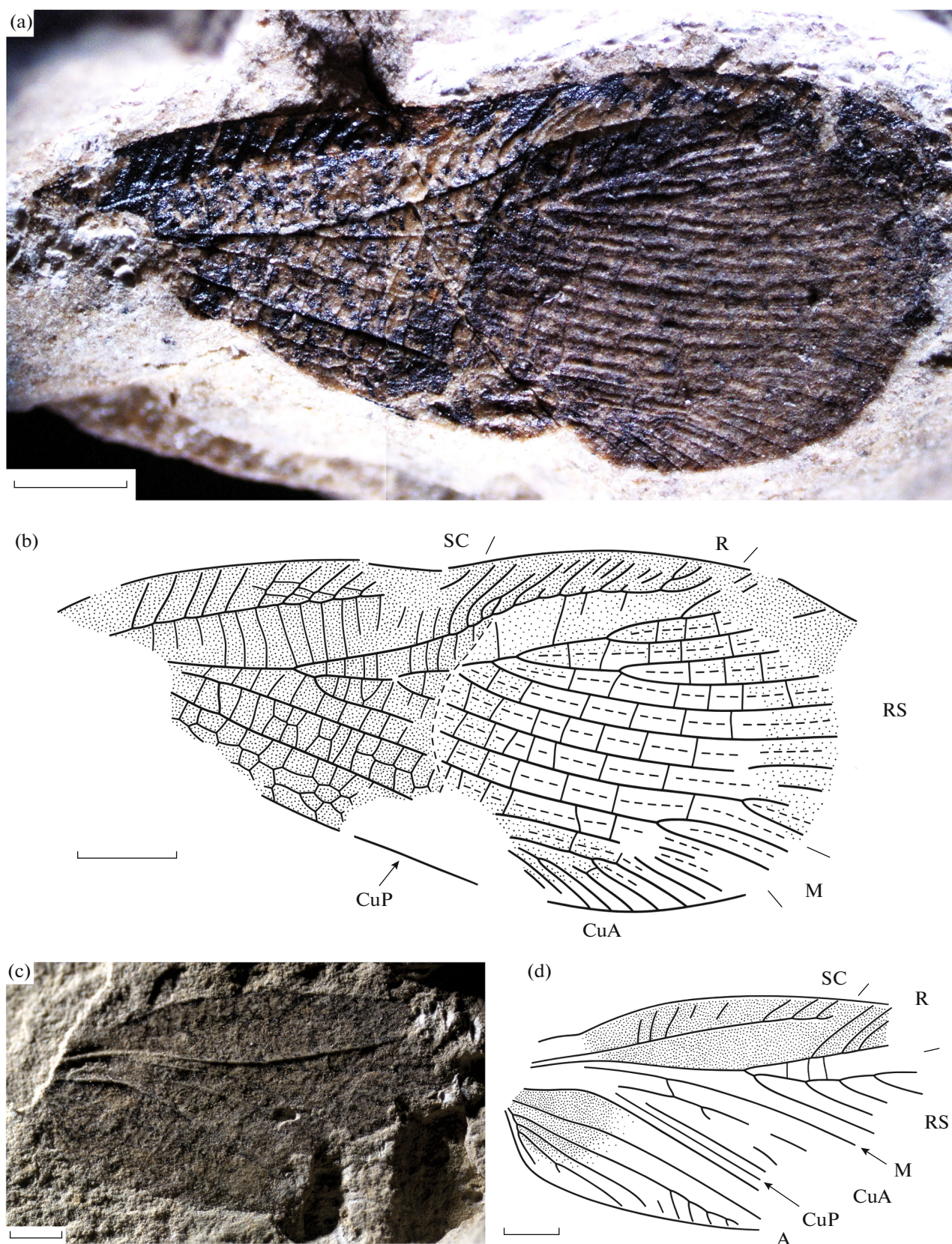


Fig. 3. New representatives of the genus *Glaphyrophlebia* from the Chekarda and Krasnaya Glinka localities (Lower Permian, Permian Region, Russia), forewings: (a, b) *G. semipenna* sp. nov., holotype PIN, no. 1700/522: (a) general view, (b) drawing of the venation; (c, d) *G. glinka* sp. nov., holotype GGM-1844-01/BP-12884: (c) general view, (d) drawing of venation. Scale bar 1 mm.

Description (Figs. 2, 3a, 3b). Small insects. The anterior margin of the forewing is convex. The costal field near the RS bases is slightly narrower than subcostal. SC terminates near mid-wing, curved parallel its anterior margin, with simple anterior branches connected by crossveins. RS begins before the border of the wing basal third, extending from R by one stem. RS is evenly comb-like (except one dichotomizing branch), with eight main branches. M simple, almost straight, with a short terminal fork. CuA begins branching after confluence with M_5 , behind its middle. In its distal third, CuA is subdivided into the anterior branch with three terminations and comb-like posterior one with more than seven branches. The crossveins are simple, Y- and H-like, form rows of cells in the middle of a median field and base of intercubital field. The wing is dark, with a large light-colored spot behind the nodal line.

Measurements in mm: forewing length is 10.

Comparison. The new species is more similar to *G. jeckenbachi* Hörnschemeyer et Stapf, 2001 from the Asselian locality Niedermoschel (Rheinland-Pfalz, Germany). The new species differs from it in the lately branched M. In *G. jeckenbachi*, M branches near its middle (Hörnschemeyer and Stapf, 2001). It is distinguished from *G. uralensis* (Martynov, 1940) from Chekarda by RS, extending from R by one stem. In *G. uralensis*, RS extends from R by two stems (Rasnitsyn, 1980).

Material. Holotype.

Glaphyrophlebia glinka Aristov, Rasnitsyn et Naugolnykh, sp. nov.

Etymology. From the Krasnaya Glinka locality.

Holotype. GGM-1844-01/BP-12884, part and counterpart of an incomplete forewing; Russia, Perm region, Kishert District, right bank of the Barda River, near the village of Matveevo, Krasnaya Glinka locality; Lower Permian, Kungurian, Filippovian Regional Substage, Lek Formation.

Description (Figs. 3c, 3d). Small insects. The anterior margin of the forewing is convex. The costal field near the RS bases is 0.67 times as wide as the subcostal field. SC terminates behind the mid-wing, not parallel to its anterior margin, with simple anterior branches. RS begins before the wing midlength, extends from R in one stem, comb-like backward, with more than five branches. M is simple up to the distal third of the wing. CuA begins branching before the entry of M_5 , comb-like. The posterior branch of CuA (extending before the M_5 apex) is simple. The base of the simple A_1 is S-like flexed, A_2 is comb-like forward, with four main branches and more than 10 terminations. The crossveins are straight in the interrational field. Coloration as a dark strip in the preradial field and dark spot at the base of the anal region.

Measurements in mm: forewing width 4, length ca. 10.

Comparison. The new species is most similar to *G. borea* Aristov, Rasnitsyn et Naugolnykh, 2021, from which it is distinguished by the simple posterior branch of CuA. In *G. borea* this branch begins branching before its middle (Aristov et al., 2021).

Material. Holotypes.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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