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**NEW AND LITTLE KNOWN SPECIES OF THE GENUS *PERMOSIALIS*
(INSECTA: PALAEOMANTEIDA: PERMOSIALIDAE) FROM
THE MIDDLE PERMIAN OF RUSSIA**

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Summary. *Permosialis belebei* sp. n. from Kityak locality (Kazanian Stage of Middle Permian, Kirov Region of European Russia) and *P. bayda* sp. n. from Baydaevskii coal site (Urzhumian Stage of Middle Permian, Kemerovo Region of West Siberia) are described as new, and *Permosialis ualentovae* Novokshonov et Zhuzhgova, 2004 from Kityak locality is redescribed.

Key words: Palaeomanteida, Permosialidae, *Permosialis*, new species, Permian, Russia.

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Резюме. Из среднепермских отложений России описаны *Permosialis belebei* sp. n. из местонахождения Китяк (казанский ярус Кировской обл.) и *P. bayda* sp. n. из местонахождения Байдаевский угольный участок (уржумский ярус Кемеровкой обл.). Переописан *Permosialis ualentovae* Novokshonov et Zhuzhgova, 2004 из Китяка.

INTRODUCTION

The paper deals with new and insufficiently known Permosialidae (Insecta: Palaeomanteida) in the Middle Permian (later Kazanian and Urzhumian) of Russia. At this time interval, Permosialidae are known from insect sites Kityak (Kirov region, Malmyzh district; Upper Permian, Upper Kazanian, Belebei Formation), Kaltan (Kemerovo Region, Kuzedeevskii District; Middle Permian, Upper Kazanian Substage, Mitina Formation), Chepanikha (Udmurtia, Zav'yalovskii District, Middle Permian, Urzhumian Stage, *Ulemosaurus svijagensis* Zone), Kostovaty (Udmurtia, Votkinskii District, Middle Permian, Urzhumian Stage, *Ulemosaurus svijagensis* Zone) and Baydaevsky coal field (Kemerovo region, Novokuznetsk district, Baydaevsky coal field, core of borehole 1171, depth 506 m, sample 32/1611; Middle Permian, Urzhumian Stage, Uskat Formation). Described in Kityak are *Permosialis ualentovae* Novokshonov et Zhuzhgova, 2004 and *Permosialis belebei* sp. n., in Kaltan

P. matutina O. Martynova, 1961, *P. sibirica* O. Martynova, 1961 and *P. asiatica* O. Martynova, 1961 (Martynova, 1961), in Chepanikha *P. zavialovensis* Rasnitsyn et Aristov, 2013, *P. udmurtensis* Rasnitsyn et Aristov, 2013, *Epimastax tshepanikha* Rasnitsyn et Aristov, 2013 and *Onthomastax coprinus* Rasnitsyn et Aristov, 2013, in Kostovaty *Permosialis* sp. (Rasnitsyn & Aristov, 2013), and in Baydaevsky coal field *Permosialis bayda* **sp. n.**

TAXONOMY

Order Palaeomanteida Bolton, 1925

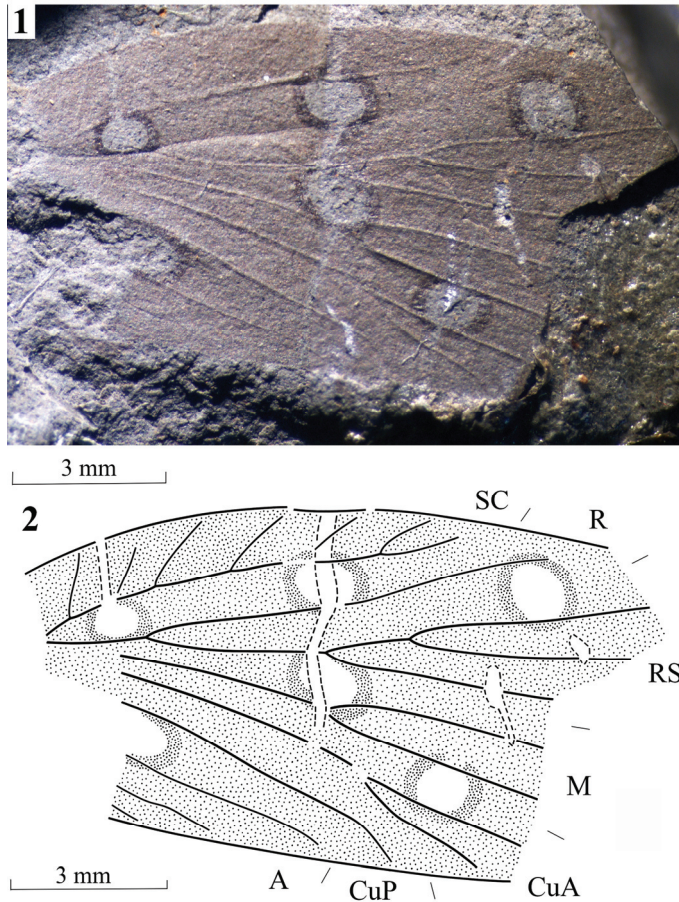
Family Permosialidae Martynov, 1928

Genus *Permosialis* Martynov, 1928

***Permosialis ualentovae* Novokshonov et Zhuzhgova, 2004**

Figs 1, 2

Permosialis ualentovae: Novokshonov & Zhuzhgova, 2004: 183, fig. 6a, Pl. 10, fig. 2.



Figs 1, 2. Forewing of *Permosialis ualentovae* Novokshonov et Zhuzhgova, 2004, holotype PIN, No 1366/349. 1 – general appearance; 2 – reconstruction.

MATERIAL. Holotype PIN, No 1366/349, counterpart of forewing fragment; Russia, Kirov region, Malmyzh district, left bank of the Kityak River opposite the village of Bol'shoi Kityak; Upper Permian, Upper Kazanian, Belebei Formation; in Borissiak Paleontological Institute, Russian Academy of Sciences (PIN RAS).

DIAGNOSIS. Differs from all other species of *Permosialis* by color pattern (three pairs of margined pale spots on darkened background) and venationally from all but *P. belebei* sp. nov. by two RS forks placed close to each other and far from both R base and wing margin, and from *P. belebei* sp. n. (as well as from all or most of other congeners) by reduced (short and narrow) fork of CuA.

DESCRIPTION. Forewing comparatively narrow (not as wide oval as *P. sibirica*), with characteristic color pattern of round dark margined pale spots on somewhat darkened background: two spots in subcostal area and one in each interrarial, radiomedial, mediocubital and cubitoanal ones that form three vertical pairs (first subcostal spot with cubitoanal one, second subcostal with radiomedial, and interrarial with mediocubital one). Costal and subcostal spaces both moderately wide (costal one wider), SC almost straight, with few almost regularly spaced short branchlets (6 visible). RS 3-branched, both forks placed close to each other but not to RS base. M stalk apparently free, fork leveled with first RS fork. M₅ not preserved. CuA stalk and branches concave, fork short, narrow. CuP curved apical. 1A concave.

MEASUREMENTS. Forewing fragment length 12.6 mm, supposed full length about 16 mm, width 7.5 mm.

NOTES. Novokshonov & Zhuzhgova (2004: 183) list three paratypes of the present species. Of them, 1366/379 and 1366/463 are described as a different species *P. belebei* sp. n. herein (see below), and PIN, No. 1366/382 represents a fragmentary hind wing which can be hardly ascribed to *P. ualentovae* because it shows a darker subapical transverse belt (vs. margined spots in fore wings of *P. ualentovae*) and would be rather treated as *Permosialis* sp. until more conclusive information appears.

***Permosialis belebei* Aristov et Rasnitsyn, sp. n.**

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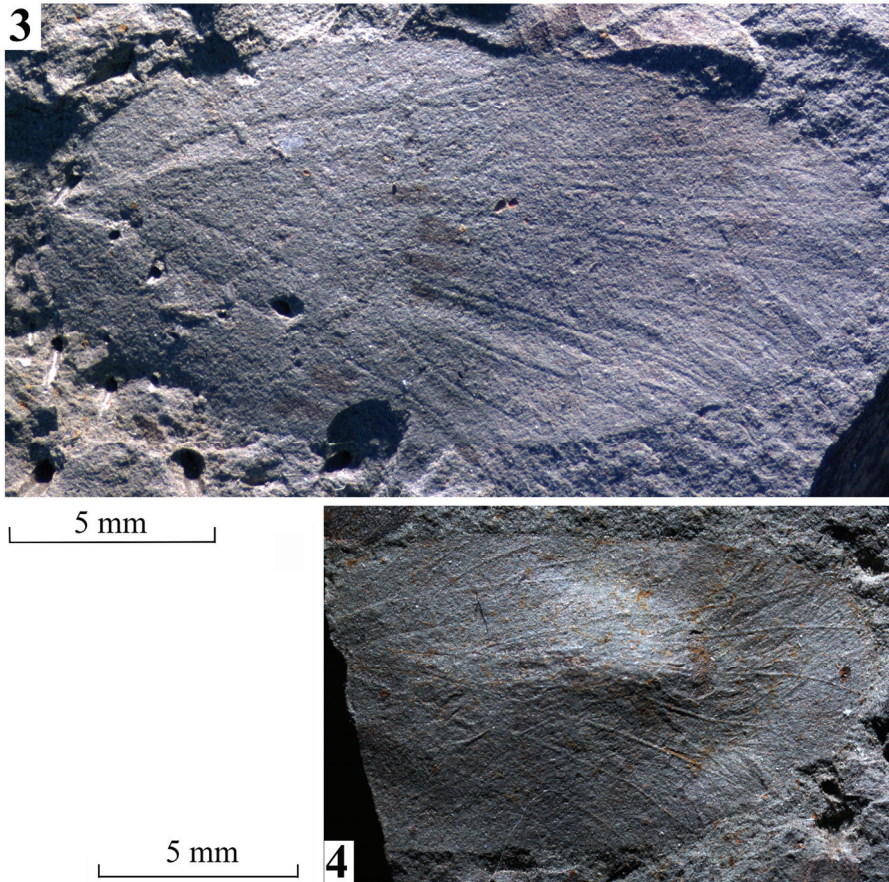
Figs 3–6

Permosialis ualentovae: Novokshonov & Zhuzhgova, 2004: 183, fig. 6b (pro parte, quoad paratypes 1366/379, 1366/463).

MATERIAL. Holotype PIN, No 1366/379, counterpart of forewing; Russia, Kirov region, Malmyzh district, left bank of the Kityak River opposite the village of Bol'shoi Kityak; Upper Permian, Kazanian, Belebei Formation; in Borissiak Paleontological Institute, Russian Academy of Sciences (PIN RAS). Paratype PIN, No 1366/463, part of forewing fragment, same origin and museum.

DESCRIPTION. Forewing comparatively narrow (not as wide oval as *P. sibirica*), holotype with weakly preserved color pattern of narrow bent belt from mid RS₁₊₂ through base of CuA fork to subapical anal area, and hardly visible small spots between RS₁, RS₂, RS₃ and M₁ near wing apex (no color pattern preserved in paratype). SC c 5 long branches (much longer than distances between them), including long apical fork. RS first fork before wing midlength, with RS stalk about as long as RS₁₊₂ stalk; RS₁₊₂ more than half as long as entire RS, starting shortly after wing midlength. M stalk free, M₅ short, oblique. RS₁₊₂, M

and Cu forks aligned in proclival line (with RS_{1+2} most basal) in holotype and scarcely reclival (with CuA more basal) in paratype, CuA all concave, with fork wide basally.



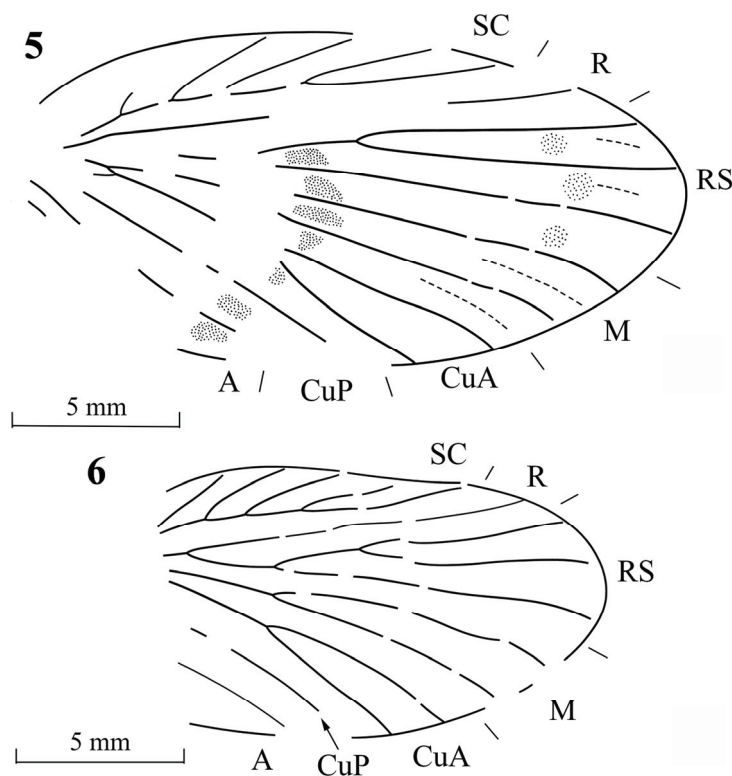
Figs 3, 4. Forewing of *Permosialis belebei* Aristov et Rasnitsyn, **sp. n.** 3 – holotype PIN, No 1366/379, general appearance; 4 – paratype PIN, No 1366/463, general appearance.

DIAGNOSIS. Differs from other *Permosialis* by SC with few long branches.

MEASUREMENTS. Forewing length in holotype 22 mm, in paratype 13.5 mm as preserved, full length probably *ca.* 16 mm.

NOTES. Novokshonov & Zhuzhgova (2004) considered this species as female of *P. ualentovae* based on larger wings with similar venation. Hypothesis of the possible sexual dimorphism of *Permosialis* in wing size proposed in the above publications needs further consideration based on a more wide material which is planned to do later in this series of publication.

ETYMOLOGY. From the Belebei Formation.



Figs 5, 6. Forewing of *Permosialis belebei* Aristov et Rasnitsyn, **sp. n.** 5 – holotype PIN, No 1366/379, interpretation; 6 – paratype PIN, No 1366/463, interpretation.

***Permosialis bayda* Aristov et Rasnitsyn, sp. n.**

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Figs 7, 8

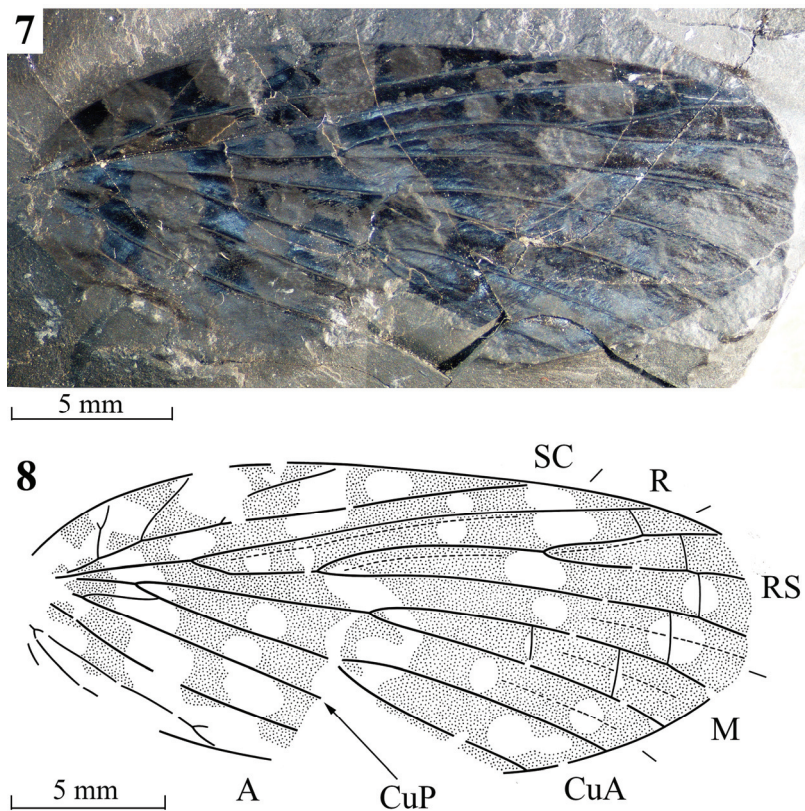
MATERIAL. Holotype PIN, No 3701/2, counterpart of forewing; Russia, Kemerovo region, Novokuznetzk district, Baydaevsky coal field, sample 32/1611, core of borehole 1171, depth 506 m; Middle Permian, Urzhumian, Uskat Formation; in Borissiak Paleontological Institute, Russian Academy of Sciences (PIN RAS).

DIAGNOSIS. Differs from other *Permosialis* by wing color pattern (dark wing with numerous pale spots) and venationally by very long stalk RS_{1+2} (almost twice as long as RS stalk).

DESCRIPTION. Wing dark with numerous pale spots placed between main veins and sometimes joined in irregular, mainly transverse belts. SC with three visible, rather short fore branches. RS stalk very short (almost half as long as stalk RS_{1+2}), not reaching wing midlength, RS_{1+2} fork within distal quarter of wing. M stalk free, M_5 short, oblique, M fork distal of both RS and CuA forks. CuA concave only up to fork, further neutral.

MEASUREMENTS. Forewing length about 25 mm.

ETYMOLOGY. From the Baydaevsky Coal Field.



Figs 7, 8. Forewing of *Permosialis bayda* Aristov et Rasnitsyn, **sp. n.**, holotype PIN, No 3701/2. 7 – general appearance; 8 – reconstruction.

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