

New Insects from the Late Permian of the Ural Mountains

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Abstract—New insect taxa from the Ufimian of Cherdyn' District, Perm Region, *Visherifera camura* gen. et sp. nov. (Grylloblattida: Visheriferidae fam. nov.), *Misthodotes visherensis* sp. nov. (Ephemeroptera), and *Ideopsocus incommendatus* sp. nov. (Hypoperlida), are described.

INTRODUCTION

The Permian insect fauna of the Urals is known mainly from outcrops along the banks of the Sylva and Barda rivers, Perm Region: Chekarda, Krutaya Katushka, Krasnaya Glinka, etc. (all Kungurian). In addition, there are younger localities of Permian insects that are confined to the Cherdyn' and Solikamsk districts of the Perm Region.

The insect fossils described below were collected in 1998 and 2000 from the Ufimian deposits of the northern Perm Region (Cherdyn' District, right bank of the Visher River 1 km upstream from the village of Mogil'nikov; Solikamsk Horizon, upper Solikamsk Formation). The new finds are represented by wing impressions with the body fragments and belong to three insect orders: Grylloblattida, Ephemeroptera, and Hypoperlida. All these taxa are new for this and nearby localities of the Ufimian age. The fossils are slightly distorted by rock deformation.

Fossil insects were first recorded from the village of Mogil'nikov in 1947 by Yu.M. Zalessky, who described from this locality four (three?, see below) dragonflies of the family Meganeuridae (Zalessky, 1950). Later, the list was supplemented with an orthopteran of the family Tcholmanvissiidae G. Zal., miomipteran of the family Palaeomanteidae Mart. and two wing fragments placed into a separate genus, *Vischeria* G. Zal., of an uncertain systematic position (Zalessky, 1956). In the latter paper, Zalessky briefly described the geological section near the village of Mogil'nikov and analyzed the composition of the insect assemblage to reach the conclusion that, despite some similarity to the Kungurian paleoentomofauna of the Sylva River basin, the insect fauna of Cherdyn' District should be considered to be younger.

Further specimens were collected by geologist V.A. Molin in 1973: six specimens with the wings of *Arctotypus* dragonfly (undescribed).

Recently, it was conjectured that *Vischeria* represent merely isolated postero-basal hindwing fragments of Meganeuridae dragonflies (Ivanov, 1999), but this sup-

position remains unproved. There are no reasons to believe that the structures described from this locality, such as the wing fragments of the supergiant dragonfly (wingspan about 115 cm) (Zalessky, 1950), do belong to any insect. The rock slabs with these specimens were left by Zalessky in the outcrop and now are lost. It will be possible to reconsider this question if similar fossils are found at Mogil'nikov.

MATERIAL

The type material is registered in the Perm State University (PU) and deposited at the Paleontological Institute, Russian Academy of Sciences.

SYSTEMATIC PALEONTOLOGY

Order Grylloblattida

Family Visheriferidae Novokshonov, Ivanov et Aristov, fam. nov.

Type genus. *Visherifera* gen. nov.

Diagnosis. Small insects. Pronotum rounded, probably with complete ring of paranotia. Forewings rounded apically. SC long, ending near wing apex, for entire length running strictly parallel to R, with simple inclined anterior branches. R steeply arched apically (if not due to deformation). RS originating near wing midlength, with simple fork. M divided into MA and MP before one-third wing length; MA with simple fork; MP weakened, apparently likewise with simple fork beginning distal to RS origin and proximal to MA fork. CuA fused to M basally, lacking terminal fork. CuP weakened. Simple curved crossveins or wide-meshed network between main longitudinal veins.

Composition. Type genus.

Comparison. CuA is fused to M for some distance in the forewings of many unrelated grylloblattid families (Lemmatophoridae Sell., Euryptilonidae Mart., Sojanoraphidiidae O. Mart., Tshekardomimidae Novoksh. et Arist., Blattogryllidae Rasn.), but in no one of these taxa is CuA simple. The simple CuA occurs only in the

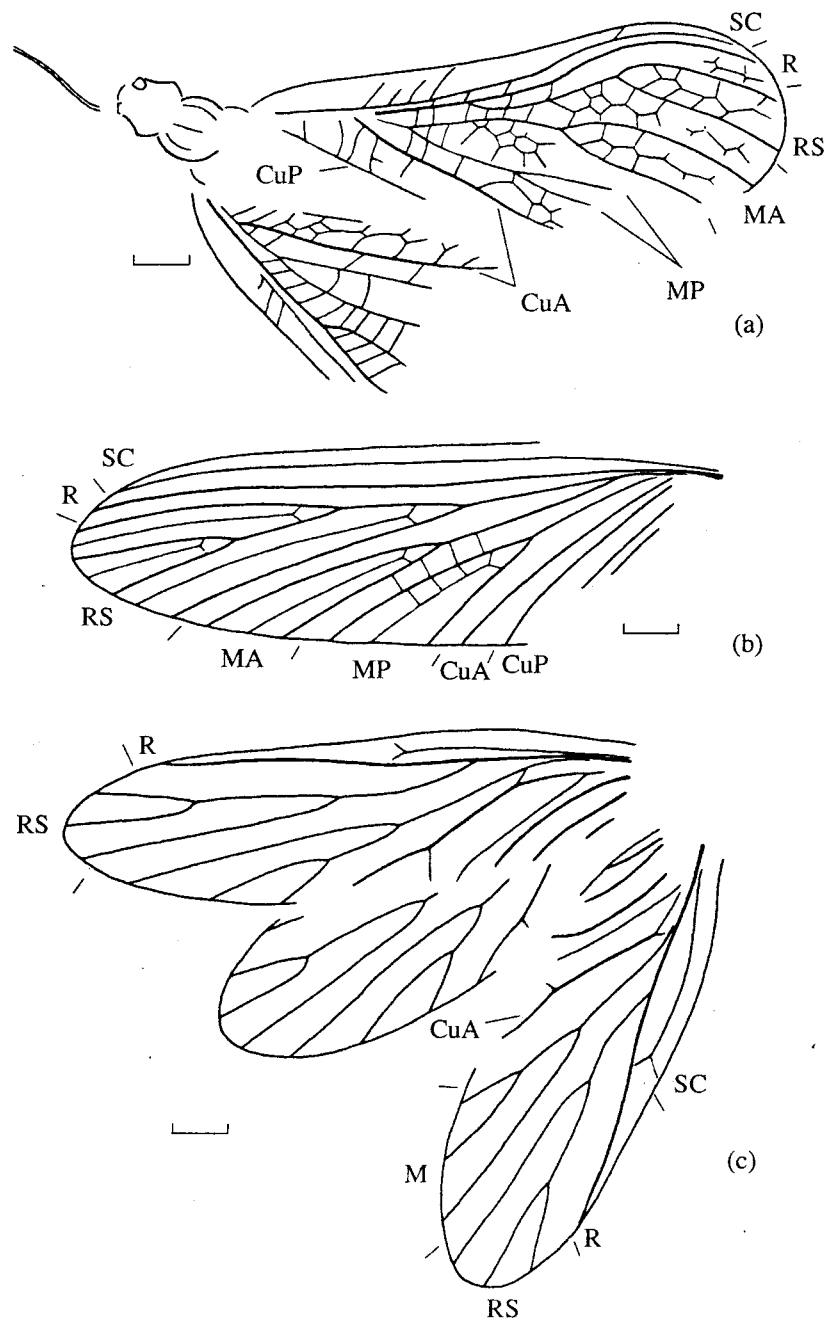


Fig. 1. New insects from Mogil'nikovo locality: (a) *Visherifera camura* sp. nov., holotype PU, no. VM/3, habitus; (b) *Misthodotes visherensis* sp. nov., holotype PU, no. VM/1, hind(?) wing; (c) *Idelopsocus incommendatus* sp. nov., holotype PU, no. VM/2, wings. Vein symbols standard. Scale bar 1 mm.

Early Cretaceous family Oecanthoperlidae Storozh. (Storozhenko, 1998), but the venation type in this family is entirely different (M simple, CuA and CuP closely approximated, etc.).

Genus *Visherifera* Novokshonov, Ivanov et Aristov, gen. nov.

Etymology. From the Vishera River and Latin *fera* (animal).

Type species. *V. camura* sp. nov.

Diagnosis. RS fork as long as its stem. MA fork slightly longer than its stem.

Composition. Type species.

Visherifera camura Novokshonov, Ivanov et Aristov, sp. nov.

Etymology. Latin *camura* (curved).

Holotype. PU, no. VM/3, moderately preserved, incomplete insect (negative impression); Mogil'nikovo; Solikamsk Horizon.

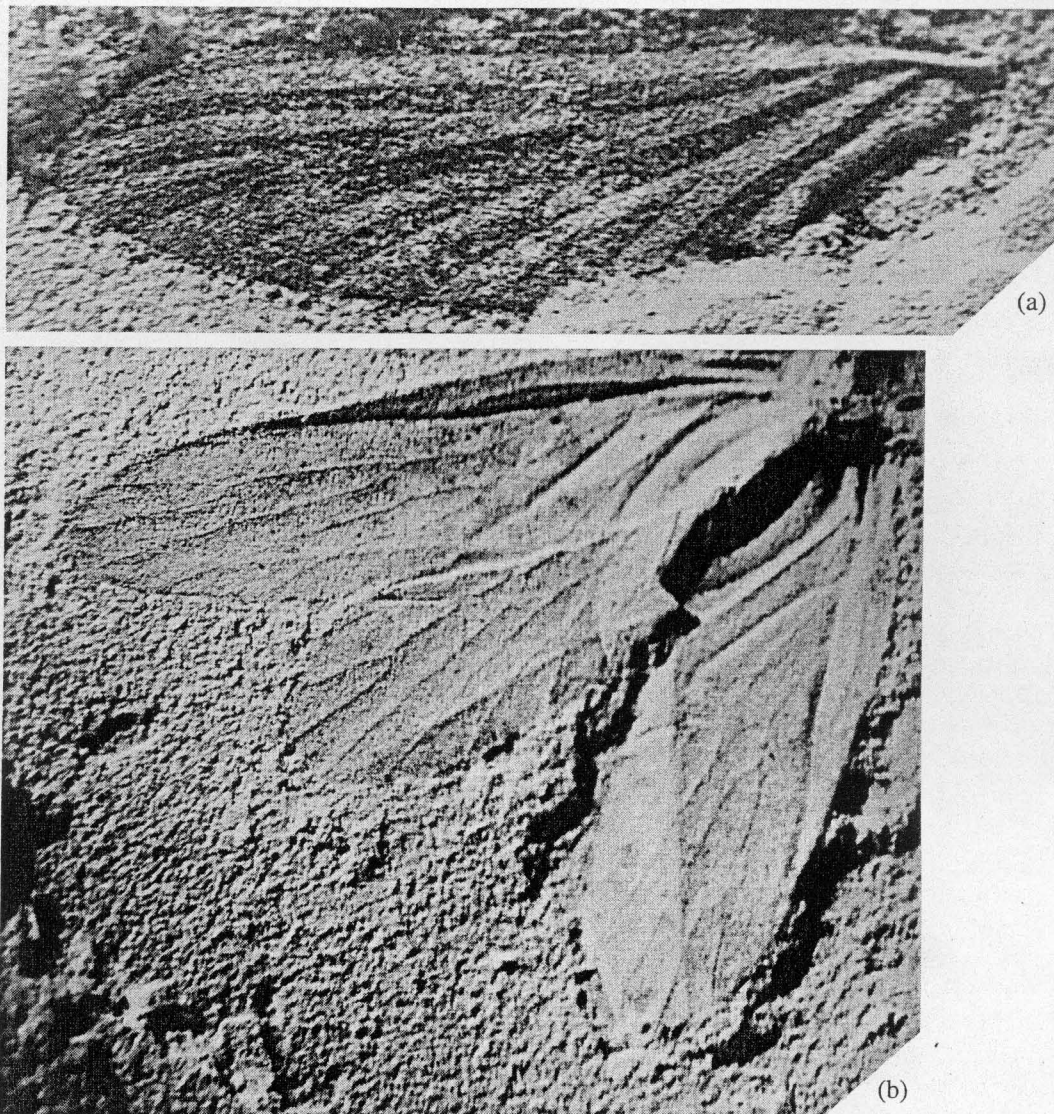


Fig. 2. New insects from Mogil'nikovo locality: (a) *Misthodotes visherensis* sp. nov., holotype PU, no. VM/1; (b) *Idelopsocus incomendatus* sp. nov., holotype PU, no. VM/2.

Description (Fig. 1a). In the RS fork, there is a double cell row. Between RS and MA, there are simple crossveins proximally, then a wide-meshed network, and a double cell row apically. In the MA fork, there is a double cell row. Near the center of the space between MA and MP, there is a wide-meshed network. Between MP and CuA, there are simple crossveins proximally, then a double cell row. Between CuA and CuP, there are more or less inclined crossveins, sometimes forming a wide-meshed network.

Measurements (mm): forewing length, 10.2.

Remarks. The curvatures of individual veins are excluded from the generic diagnosis and species description, because the impression is distorted.

Material. Holotype.

Order Ephemeroptera

Family Misthodotidae Tillyard, 1932

Genus *Misthodotes* Sellards, 1909

Misthodotes visherensis Novokshonov, Ivanov et Aristov, sp. nov.

Etymology. From the Vishera River.

Holotype. PU, no. VM/1, moderately preserved wing (part and counterpart); Mogil'nikovo; Solikamsk Horizon.

Description (Figs. 1b, 2a). The hind(?) wing is elongate, with straight anterior margin and slightly acuminate apex. The MA fork is as long as its stem. The MP fork is very wide. The crossveins in the central wing part are spaced wider than their length.

Measurements (mm): wing length, 12.5; wing width, 3.9.

Comparison. Distinct from the other species (Tchernova, 1965; Carpenter, 1992) in having a longer MA fork and wide MP fork.

Remarks. The straightened anterior margin probably indicates that the specimen represents a hindwing. The wing shape could be partly deformed in the impression.

Material. Holotype.

Order Hypoperlida

Family Hypoperlidae Martynov, 1928

Genus *Idelopsocus* M. Zalesky, 1929

Idelopsocus incommendatus Novokshonov, Ivanov et Aristov, sp. nov.

Etymology. Latin *incommendatus* (left free).

Holotype. PU, no. VM/2, three wings of a single moderately preserved insect (part and counterpart); Mogil'nikovo; Solikamsk Horizon.

Description (Figs. 1c, 2b). The anterior margin of forewing is distinctly convex, turning feebly concave beyond the SC apex. The main fork of RS is conspicuously longer than its stem. The terminal RS fork is as wide as the posterior M fork.

Measurements (mm): length of left (as figured) forewing, 10.3; length of right forewing, 9.

Comparison. It differs from most species in the shape of anterior wing margin (distinctly convex proximally, feebly concave distally); from *I. tataricus* M. Zalesky, 1929 (Tatarstan, Kazanian), according to the figure in Zalesky (1929, text-fig. 6), it differs in having a shorter RS stem.

Remarks. The impression is considerably distorted, which prevents sound comparison with other species.

Material. Holotype.

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