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A new family of Triassic Grylloblattids from Central Asia

(Insecta, Grylloblattida)

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The new family Madygenophlebiidae, fam. nov., two new genera and four new species of the order Grylloblattida are described from the Triassic of Madygen, Kirghizia, USSR.

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Introduction

About 30 families of the order Grylloblattida (= Paraplecoptera) are known from Carboniferous to recent time, however, the majority of them are Permian (Sharov 1962, Kukalova 1964, Rasnitsyn 1980, Hennig 1981). The families Tomiidae, Mesorthopteridae, Megakhosaridae, Geinitziidae and Blattogryllidae are mentioned from Triassic, Blattogryllidae, Geinitziidae and Oecanthoperlidae are known from Jurassic and Lower Cretaceous (Rasnitsyn 1976, 1980, 1982, Storozhenko 1988). Only one recent family Grylloblattidae is found in Asia and North America (Storozhenko 1986).

The present paper is based on material deposited in the Paleontological Institute of the USSR Academy of Sciences, Moscow. The about 1000 imprints of representatives of the order Grylloblattida from Madygen, Kirghizia belong to the families Blattogryllidae, Megakhosaridae, Geinitziidae, Mesorthopteridae and few undescribed families. One of these families is described below.

Unfortunately imprints from Madygen are distorted by postsedimentational deformation of rock and therefore length of wing is calculated by a method proposed by A. Rasnitsyn (1982). Comparison of both, more broader and more elongate imprints of wing of the same species show that the ratio length of fore wing to its width seems to be about 2.5:1.

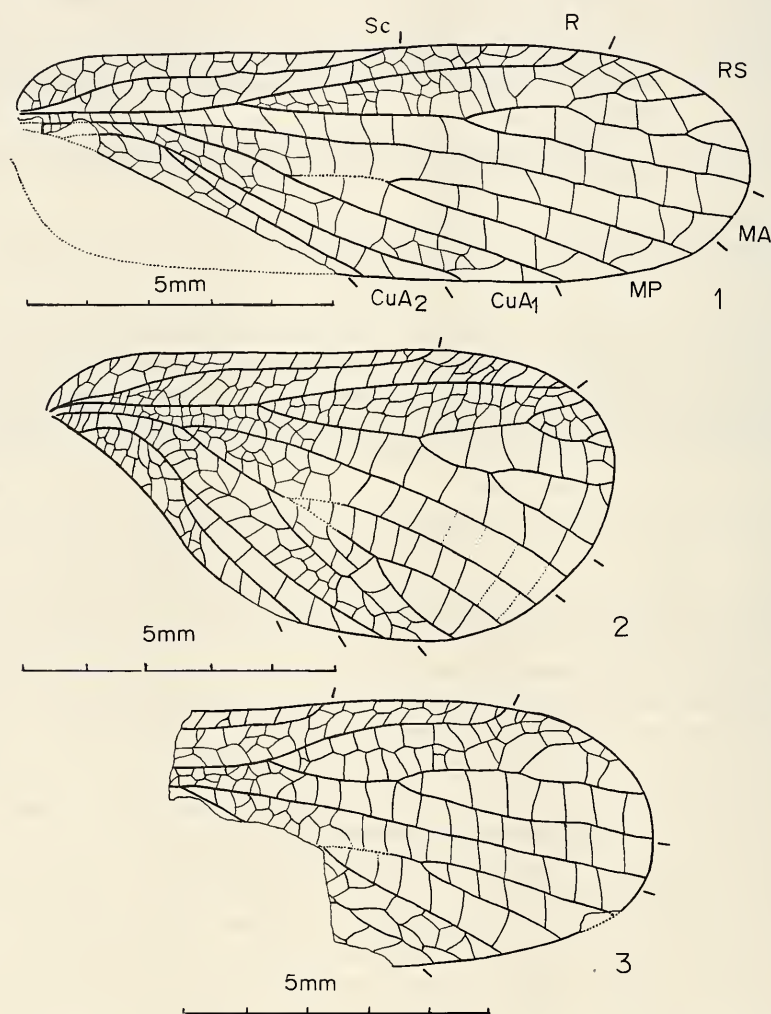
Family Madygenophlebiidae, fam. nov.

Diagnosis. Fore wing small, membranous, without hairs, unicolorous, not broadened in distal half, with broadly rounded apex. Sc terminating on C, S-shaped. Costal area narrow, distinctly broadened near base of wing, with simple or branched cross-veins; maximum width of costal area 6.5–12 times less than width of wing. Subcostal area relatively broad. R simple, terminating on anterior margin of wing. RS originating at about first third or near the middle of wing; branches of RS terminating on the anterior margin and apex of wing. M clearly dividing proximally of origin of RS into simple MA and branched MP. Usually MP desclerotized near the middle. CuA dividing

on CuA_1 and CuA_2 , both simple or branched. CuP oblique, straight, simple. Cross-veins in cu-a-cup area mostly branched especially in basal half of area. A_1 simple, A_2 simple or with fork. Cross-veins in apical part of wing mainly simple, in basal half of wing branched. Hind wing similar to foring, but very probably with large anal area and with anastomosis between MA and RS.

Genera included. *Madygenophlebia*, gen. nov. and *Micromadygenophlebia*, gen. nov. from Triassic of Central Asia.

Relations. Wing-venation of fore wing of the new family similar to Lower Permian families Havlatidae and Skalicidae, but differing in S-shaped Sc. Moreover, Havlatidae easily distinguished from Madygenophlebiidae, fam. nov. by distal part of wing suddenly broadened behind first third; Skalicidae differ from Madygenophlebiidae by very narrow subcostal area. On the other hand, one species of this new family, *Madygenophlebia primitiva*, spec. nov., is similar to representatives of Mesozoic families Geinitziidae and Mesorthopteridae by the strongly branched CuA . Branches of



Figs 1–3. *Madygenophlebia bella*, spec. nov., fore wing. 1. holotype, specimen N 2555/819; 2. paratype, specimen N 2555/824; 3. paratype, specimen N 2555/828.

RS in Geinitziidae terminate on anterior margin of wing, in Mesorthopteridae terminate on posterior margin of wing. Branches of RS in the new family has an intermediate position. Therefore Triassic-Jurassic Geinitziidae seems to be derived from Triassic Mesorthopteridae by forms closely related to Madygenophlebiidae, fam. nov.

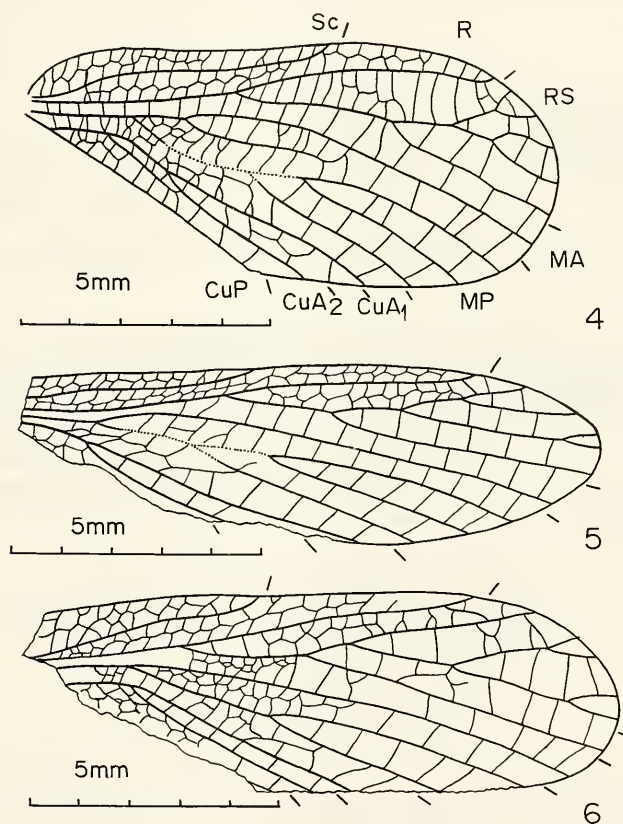
Madygenophlebia, gen. nov.

Type-species. *Madygenophlebia bella*, spec. nov.

Derivatio nominis. From locality *Madygen* and Greek *phlebia* – vein.

Diagnosis. Fore wing small, with slightly concave, straight or slightly convex anterior margin. Sc terminating on C near the middle or apical third of wing. RS with 4–6 branches. Radial area equal, 1.1 times less or 1.1–1.2 times broader than subcostal area; with branched cross-veins. CuA divided near, slightly proximal or distal of the main fork of M. CuA₁ simple or with 3 branches; CuA₂ simple or with fork. A₁ and A₂ simple. In hind wing MA anastomosed with RS, basal parts of M and CuA united. Fore and hind wing light, without stripes or spots.

Species included: Three species from Middle or Upper Triassic of Kirghizia.



Figs 4–6. *Madygenophlebia bella*, spec. nov., fore wing. 4. paratype, specimen N 2240/2160; 5. paratype, specimen N 2785/2256; 6. paratype, specimen N 2555/748.

Madygenophlebia bella, spec. nov.

Figs 1–6

Holotype. Imprint of fore wing without anal area, specimen N 2555/819; USSR, Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage, in collection of Paleontological Institute, Moscow. – Paratypes. Imprints and counter-imprints of fore wing, specimens N 2555/748, 2555/824, 2555/828, 2240/2160, 2785/2155 and 2785/2256 from same locality.

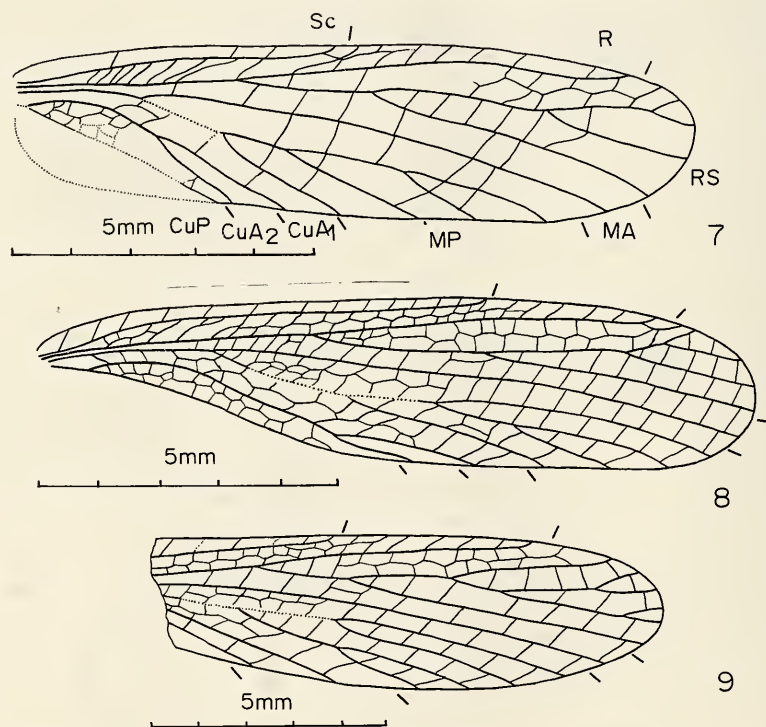
Derivatio nominis. From Latin *bellus* – pleasant.

Diagnosis. It differs from *M. nana*, spec. nov. by narrow radial area and by more proximal main fork of CuA. From *M. primitiva* spec. nov. it differs by simple CuA₁ and CuA₂.

Description

Fore wing length 9.8–10.9 mm. Sc terminating on C in distal half of wing. Costal area with double row of cells, sometimes only with 1–5 simple cross-veins near the middle of area. Maximum width of subcostal area equal, 1.1 times more or 1.1 times less than maximum width of costal area near the base of wing. RS originating clearly before the middle of wing, with 4–6 branches. Radial area 1.4–1.6 times broader than costal area. MP with 2–4 branches. CuA dividing on simple CuA₁ and CuA₂ at about the main fork of M. Wing light. Hind wing and body unknown.

Locality and horizon: USSR, Kirghizia, Madygen; Middle or Upper Permian, Madygenian Stage.



Figs. 7–9. *Madygenophlebia nana*, spec. nov., fore wing. 7. holotype, specimen N 2069/1640; 8. paratype, specimen N 2069/1609; 9. paratype, specimen N 2785/2169.

Madygenopplebia nana, spec. nov.

Figs 7–9

Holotype. Imprint and counter-imprint of fore wing without anal area, specimen N 2069/1640; USSR, Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage; in collection of Paleontological Institute, Moscow. – Paratypes. Imprints of fore wing, specimens N 2069/1609 and 2785/2169 from same locality.

Derivatio nominis: From Latin *nana* – dwarf.

Diagnosis. It differs from *M. primitiva*, spec. nov. by simple CuA₁ and CuA₂. Distinguished from *M. bella*, spec. nov. by more distal main fork of CuA and by broad radial area.

Description

Fore wing length 8.9–9.1 mm. Sc terminating on C near the middle of wing or slightly distally. Costal area with only simple cross-veins. Maximum width of subcostal area 1.25–1.3 times more than width of costal area near the base of wing. RS originating before middle of wing, with 4–6 branches. Radial area 1.75–2.0 times broader than costal area. MP with 4 branches. CuA dividing on simple CuA₁ and CuA₂ clearly distally of the main fork of M. Wing light. Hind wing and body unknown.

Locality and horizon. USSR, Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage.

Madygenopplebia primitiva, spec. nov.

Figs 10, 11

Holotype. Imprint and counter-imprint of fore wing and hind wing, specimen N 2555/718; USSR, Kirghizia, Madygen; Middle or Upper Triassic; Madygenian Stage; in collection of Paleontological Institute, Moscow.

Derivatio nominis. From Latin *primitivus* – early.

Diagnosis. Well distinguished from all other species of the genus by branched CuA₁ and CuA₂.

Description

Fore wing, length 11.5 mm. Sc terminating on C in apical third of wing. Costal area mainly with simple cross-veins, but near middle with double row of cells. Maximum width of subcostal area 1.25 times broader than width of costal area near the base of wing. RS originating at about the middle of wing, with 4 branches. Radial area 1.2 times broader than costal area. MP with 2 branches. CuA dividing before the main fork of M; CuA₁ with 4 branches, CuA₂ with 2 branches. A₁ and A₂ simple. Hind wing length 8.9 mm. Cross-veins in costal area simple. RS originating in proximal third of wing, with 6 branches. Radial area 1.2 times broader than costal area. MA anastomosed with RS. MP with 3 branches. Basal part of M and CuA united. CuA and CuP simple. Fore and hind wing light. Body unknown.

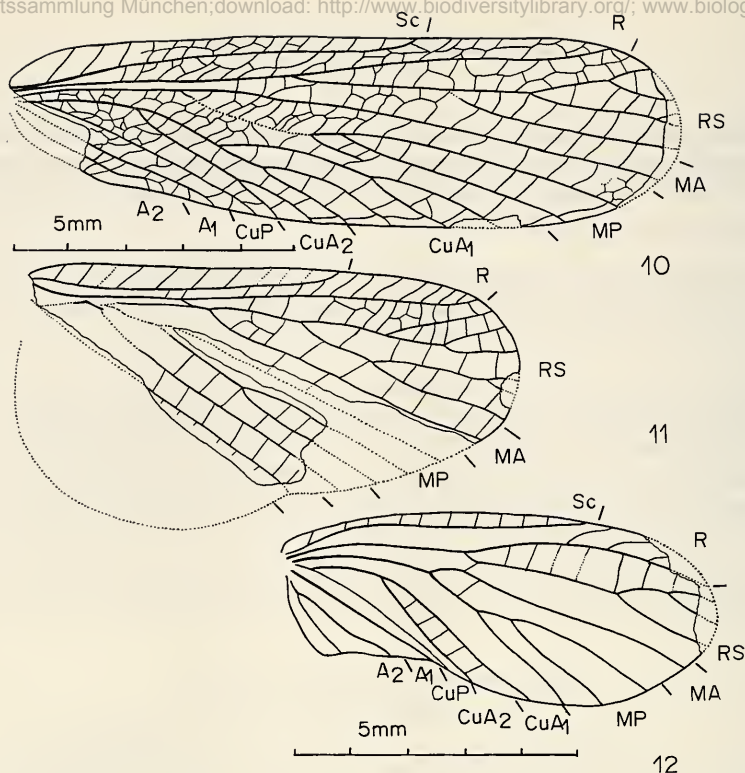
Locality and horizon. USSR, Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage.

Micromadygenopplebia, gen. nov.

Type-species. *Micromadygenopplebia obscura*, spec. nov.

Derivatio nominis. From Greek *micro* – little and generic name *Madygenopplebia*.

Diagnosis. Fore wing very small, with clearly convex anterior margin. Sc terminating on C in apical third of wing. RS with 3 branches. Radial area 1.6 times broader than subcostal area; with



Figs 10–12. Wings of Grylloblattids. 10. 11. *Madygenophlebia primitiva*, spec. nov., holotype, specimen N 2555/718. 10. fore wing; 11. hind wing; 12. *Micromadygenophlebia obscura*, spec. nov., fore wing, holotype, specimen N 2555/826.

simple cross-veins. CuA dividing on simple CuA₁ and CuA₂ clearly proximally of main fork of M. A₁ simple, A₂ with 2 branches. Wing unicolorous dark.

Relations. Similar to *Madygenophlebia*, gen. nov., but differing by simple cross-veins in radial area, more proximal fork of CuA and by branched A₂.

Species included. Type species only.

Micromadygenophlebia obscura, spec. nov.

Fig. 12

Holotype. Imprint of fore wing with damaged apical part, specimen N 2555/826; USSR, Kirghizia, Madygen; Middle or Upper Traissic, Madygenian Stage; in collection of Paleontological Institute, Moscow.

Derivatio nominis. From Latin *obscurus* – dark.

Description

Fore wing length 7.8 mm. Costal area with simple cross-veins. Maximum width of subcostal area 1.8 times more than maximum width of costal area near base of wing. RS originating slightly before middle of wing. Radial area 3.0 times broader than costal area. MP with 3 branches. Cross-veins in cua-cup area simple. Wing dark. Hind wing and body unknown.

Locality and horizon. USSR, Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage.

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