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## New Triassic Grylloblattids from Kirghizia

(Insecta, Grylloblattida)

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The new family Gorochoviidae, fam. nov., three new genera and eight new species of the order Grylloblattida are described from the Triassic of Madygen, Kirghizia.

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### Introduction

29 species of the order Grylloblattida have been described from the Triassic of Asia, Australia and South Africa. They belong to the following families: Blattogryllidae, Geinitziidae, Ideliidae, Madygenophlebiidae, Mesojabloniidae, Mesorthopteridae, Perloblattidae and Tomiidae (Tillard 1916, 1922, Martynov 1936, Riek 1954, 1974, 1976, Rasnitsyn 1982, Storozhenko 1988, 1990, 1992a, 1992b). Three species of the family Megakhosaridae and 17 species of the family Ideliidae are being described from the Triassic of Central Asia in other papers (Storozhenko in press). One new family of the order Grylloblattida is described below from Madygen, Kirghizia.

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 the wing of the same species of the new family show that the ratio length of fore wing to width seems to be about 3.2:1.

The present paper is based on material deposited in the Paleontological Institute of the Russian Academy of Sciences, Moscow.

As all genera and species are included in the keys below, no specific diagnoses are given.

### Gorochoviidae, fam. nov.

Diagnosis. Fore wing small or medium-sized, membranous, unicolorous, without hairs, with broadly or acutely rounded apex. The subcosta (Sc) terminating on the costa (C) about apical third or quarter of wing. Costal area sending off a series of simple veinlets, narrow: maximum width of costal area 11.7–22.5 times less than width of wing. The radius (R) simple, extending well to the apex of wing. Its sector (RS) arising before the middle of wing, pectinate, with 3–10 branches, which are directed towards the apex and posterior margin of wing. The base of media (M) is deposited directly between R and CuA; M divided on a main anterior branch (MA), which is simple or with two branches, and a main posterior branch (MP) concave and desclerotized near the middle with 2–6 branches. MA and MP not anastomosed with other veins. The anterior cubitus (CuA) forking into two branches: CuA1 simple or with 2–5 branches; CuA2 always simple. The posterior cubitus (CuP) unbranched, concave. The area between CuA and CuP narrow, with simple or partly branched cross-veins. Anal area short and narrow. The first anal vein (A1) simple or with one or two forks; A2 with 3–6 branches. Cross-veins mostly straight and simple; in area between MP and CuA usually forming a double row of cells.

Hind wing with anastomoses between RS and MA. M fused shortly with CuA in basal part. CuA1 and CuA2 simple. Anal area broad. A1 simple, desclerotized. A2 branched, pectinate.

Body and appendages unknown.

Genera included. Three new genera from Middle or Upper Triassic of Central Asia.

Relations. By the very narrow costal area the new family is closely related to Blattogryllidae, Megakhosaridae, Oecanthoperlidae, Havlatiidae, Demopteridae and Protembiidae. Blattogryllidae and Megakhosaridae differ from Gorochoviidae by the presence of oblique S-shaped cross-veins in the CuA-CuP area. From Oecanthoperlidae the new family is distinguished by branched anal veins of the fore wing. Havlatiidae differs from Gorochoviidae by the distal part of fore wing suddenly broadening behind the first third of length of wing. From Demopteridae and Protembiidae the new family is distinguished by pectinate RS with branches towards the apex and posterior margin of fore wing.

Key to genera

- 1. Fore wing with broadly rounded apex; M divided into MA and MP slightly distal to the main fork of CuA ..... 2.
- Fore wing with acutely rounded apex; M divided into MA and MP clearly proximal to the main fork of CuA ..... *Pseudoliomopterites*, gen. nov.
- 2. Radial area with straight simple cross-veins ..... *Gorochovia*, gen. nov.
- Radial area with cross-veins forming a double row of cells ..... *Gorochoviella*, gen. nov.

*Gorochovia*, gen. nov.

Type-species. *Gorochovia individua*, spec. nov.

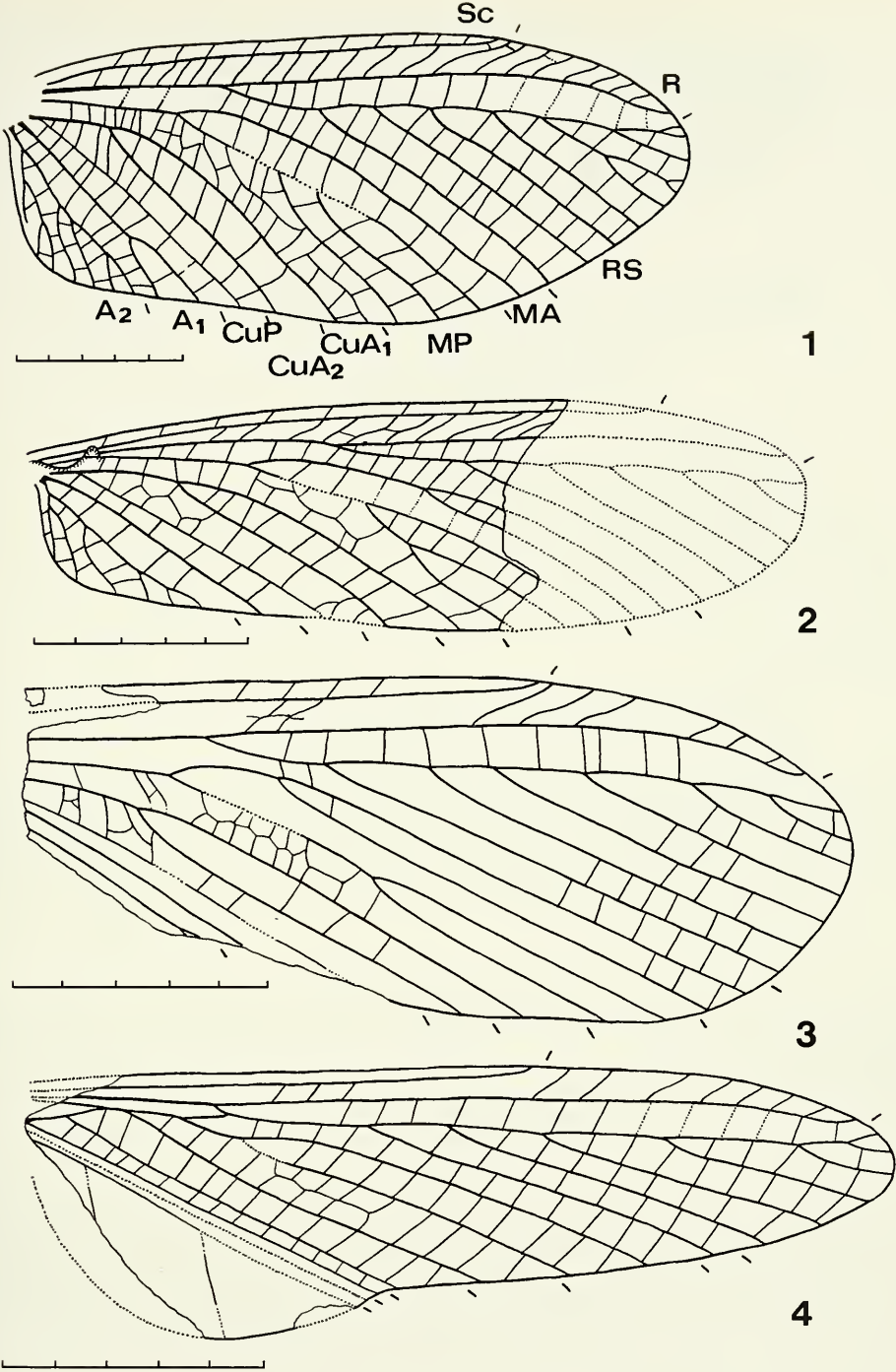
Derivatio nominis. Named in honour of the Russian orthopterologist and paleoentomologist Dr. A. Gorochov, St. Petersburg.

Diagnosis. Fore wing with broadly rounded apex. Sc terminating on C near apical third of wing. Width of radial area 1.85-2.75 times more than width of costal area. Cross-veins in radial area unbranched, straight. RS with 3-10 mainly simple branches. M divided into MA and MP slightly distal to forking CuA on CuA1 and CuA2. CuA1 simple or branched. Hind wing with broadly rounded apex. MA simple, anastomosed with RS. MP with 2-3 branches. Anal fan large. Body unknown.

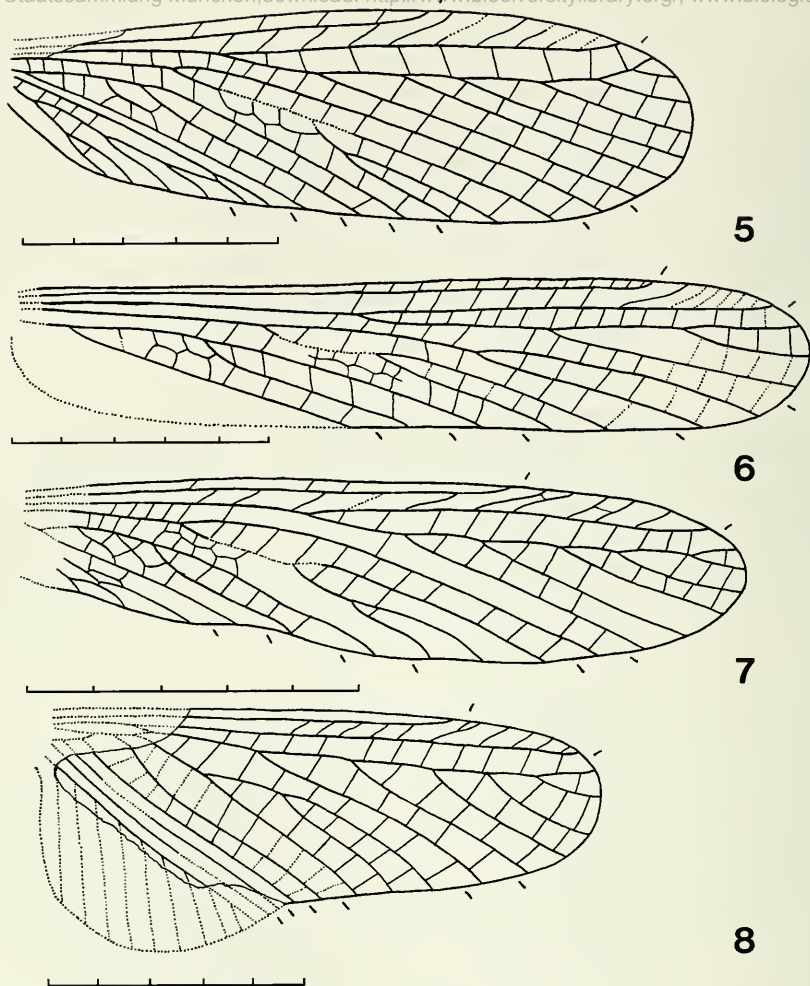
Species included. Five species from Middle or Upper Triassic of Kirghizia.

Key to species (based on fore wing)

- 1. CuA1 simple ..... 2.
- CuA1 branched ..... 4.
- 2. MP with 2-3 branches ..... 3.
- MP with 6 branches ..... *G. fecunda*, spec. nov.
- 3. Length of fore wing 16.6-27.0 mm ..... *G. individua*, spec. nov.
- Length of fore wing 8.5-13.0 mm ..... *G. minuta*, spec. nov.
- 4. CuA1 with 2-3 branches ..... *G. bifurca*, spec. nov.
- CuA1 with 5 branches ..... *G. anomala*, spec. nov.



Figs 1-4. *Gorochovia individua*, spec. nov. 1. Holotype, specimen N 2555/731, fore wing. 2. Paratype, specimen N 2240/1935, fore wing. 3. Paratype, specimen N 2069/1772, fore wing. 4. Paratype, specimen N 2785/2142, hind wing. For abbreviations see text. Scales: 5 mm.



Figs 5-8. *Gorochovia minuta*, spec. nov. 5. Holotype, specimen N 2069/1666, fore wing. 6. Paratype, specimen N 2785/2123a, fore wing. 7. Paratype, specimen N 2069/1847, fore wing. 8. Paratype, specimen N 2240/1835, hind wing. Scales: 5 mm.

*Gorochovia individua*, spec. nov.

Figs 1-4

Holotype: Imprint and counter-imprint of fore wing, specimen N 2555/731; Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage, in collection of Paleontological Institute, Moscow. - Paratypes: Imprints and counter-imprints of fore wing, specimens N 2555/763; 2555/873; 2785/2109; 2785/2128; 2785/2129; 2785/2133; 2785/2137; 2785/2141; 2785/2154; 2785/2191; 2785/2195; 2785/2200; 2785/2231; 2785/2255; 2069/1404; 2069/1590; 2069/1772; 2069/1783; 2069/1884; 2240/1839; 2240/1848; 2240/1877; 2240/1935; 2240/1940; 2240/2010; 2240/2035; 2240/2051; 2240/2067; 2240/2134; 2240/2149; 2240/2170; 2240/3000 and imprints and counter-imprints of hind wing, specimens N 2555/857; 2785/2142; 2785/2153; 2240/2005; 2240/2039; 2240/2082 from same locality.

Derivatio nominis. From Latin *individuus* = undivided.

Description. Length of fore wing 16.7-27.0 mm, hind wing 16.8-23.5 mm. Fore wing unicolorous light; veins dark. RS with 5-10 branches. MA simple or with two branches; MP with two or three branches. CuA1 simple. Cross-veins mostly straight, simple, in area between MP and CuA and in area between CuA and CuP sometimes forming a double row of cells. A1 simple or with fork; A2 with 5-7 branches.



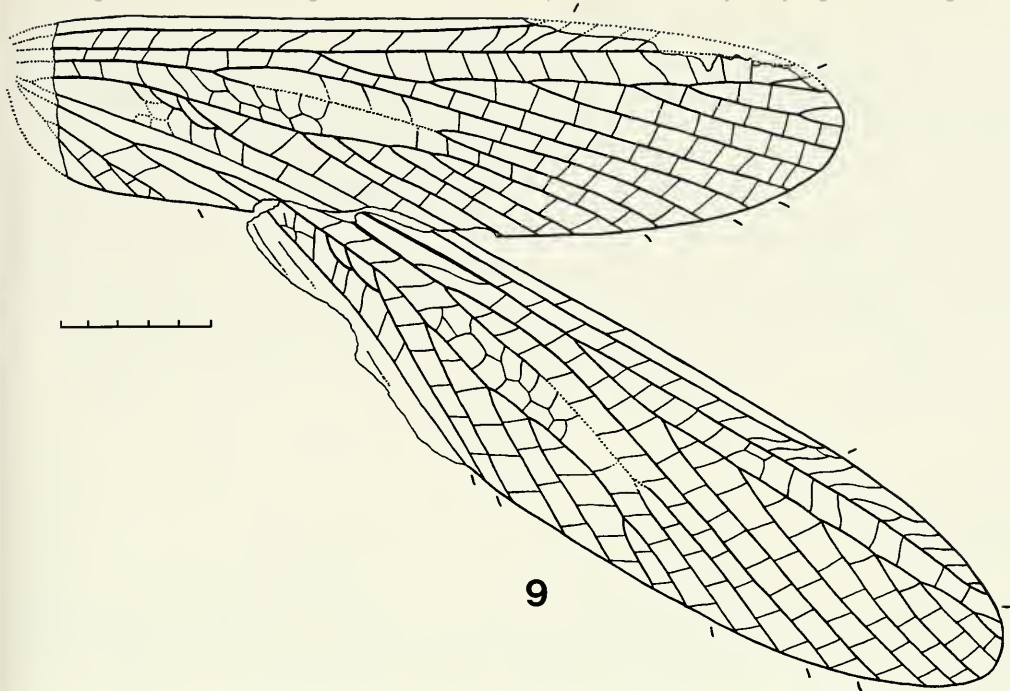


Fig. 9. *Gorochovia anomala*, spec. nov., fore wing, holotype, specimen N 2240/2083. Scale: 5 mm.

Hind wing unicolorous light. RS with 6-7 branches. CuA1 simple. Cross-veins mostly straight, simple, in area between MP and CuA and in area between CuA and CuP sometimes forming a double row of cells. A1 simple or with fork; A2 with 5-7 branches. Hind wing unicolorous light. RS with 6-7 branches. MP with 2-3 branches.

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

### *Gorochovia minuta*, spec. nov.

Figs. 5-8

Holotype: Imprint and counter-imprint of fore wing, specimen N 2069/1666; Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage, in collection of Paleontological Institute, Moscow. - Paratypes: Imprints and counter-imprints of fore wing, specimens N 2785/2123a; 2785/2139; 2785/2172; 2785/2174; 2785/2229; 2785/2259; 2785/4062; 2069/1398; 2069/1433; 2069/1469; 2069/1631; 2069/1755; 2069/1830; 2069/1841; 2069/1847; 2069/1848; 2240/1873; 2240/1939; 2240/1944; 2240/1992; 2240/2109; 2240/2168 and imprints and counter-imprints of hind wing, specimens N 2069/1669; 2240/1835 and 2240/1878 from same locality.

Derivatio nominis. From Latin *minutus* = little.

Description. Length of fore wing 8.5-13.0 mm, hind wing 9.1-12.3 mm. Fore wing unicolorous light; veins dark. RS with 3-7 branches. MA simple or with two branches; MP with two or three branches. CuA1 simple. Cross-veins mostly straight, simple, in area between MP and CuA and in area between CuA and CuP sometimes forming a short double row of cells. A1 anastomosed with A2. Hind wing unicolorous light. RS with 5-6 branches. MP with 2-3 branches. Body unknown.

Remarks. Two types of the fore wing are observed: the first type, RS + M with 6-7 branches and length of wing 8.5-12.1 mm, is probably the male, and the second type, RS + M with 9-11 branches and fore wing length 10.1-13.0 mm is probably the female.

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

***Gorochovia anomala*, spec. nov.**

Fig. 9

Holotype: Imprint of fore wing and apex of hind wing, specimen N 2240/2083; Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage, in collection of Paleontological Institute, Moscow.

Derivatio nominis. From Greek *anomalos* = abnormal.

Description. Length of fore wing 25.4 mm. Fore wing unicolorous light; veins dark. RS with 5-6 branches, 1-2 distal branches with fork. MA simple; MP with two branches. CuA1 with 5 branches, pectinate. Cross-veins mostly straight, simple, in area between MP and CuA forming a double row of cells, in area between CuA and CuP near the main fork of CuA forming two or three short oblique veins. A1 as well as A2 with 3 branches. Apex of hind wing unicolorous light, similar with the apex of fore wing. Body unknown.

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

***Gorochovia fecunda*, spec. nov.**

Fig. 10

Holotype: Imprint of fore wing, specimen N 2240/1985; Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage, in collection of Paleontological Institute, Moscow.

Derivatio nominis. From Latin *fecundus* = abundant.

Description. Length of fore wing 22.4 mm. Wing unicolorous light; veins dark. RS with 7 simple branches. MA simple; MP with 6 branches. CuA1 simple. Cross-veins straight, simple, only near the base of area between CuA and CuP forming a double row of cells. Hind wing and body unknown.

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

***Gorochovia bifurca*, spec. nov.**

Figs 11-12

Holotype: Imprint of fore wing, specimen N 2785/2262; Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage, in collection of Paleontological Institute, Moscow. - Paratypes: Imprint of fore wing without basal part, specimens N 2069/1846; 2785/2183, 2785/2184, 2785/2237 from same locality.

Derivatio nominis. From Latin *bifurcus* = forked.

Description. Length of fore wing 20.0-25.8 mm. Wing unicolorous light, veins dark. RS with 6-7 simple branches. MA simple; MP with 2-4 branches. CuA1 with 2-3 branches, sometimes the more proximal branch of CuA1 anastomosed with CuA2. Cross-veins straight, simple, in the area between MP and CuA forming a double row of cells, near the base of the area between CuA and CuP forming three oblique veins. A1 simple, A2 with 5-8 branches. Hind wing and body unknown.

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

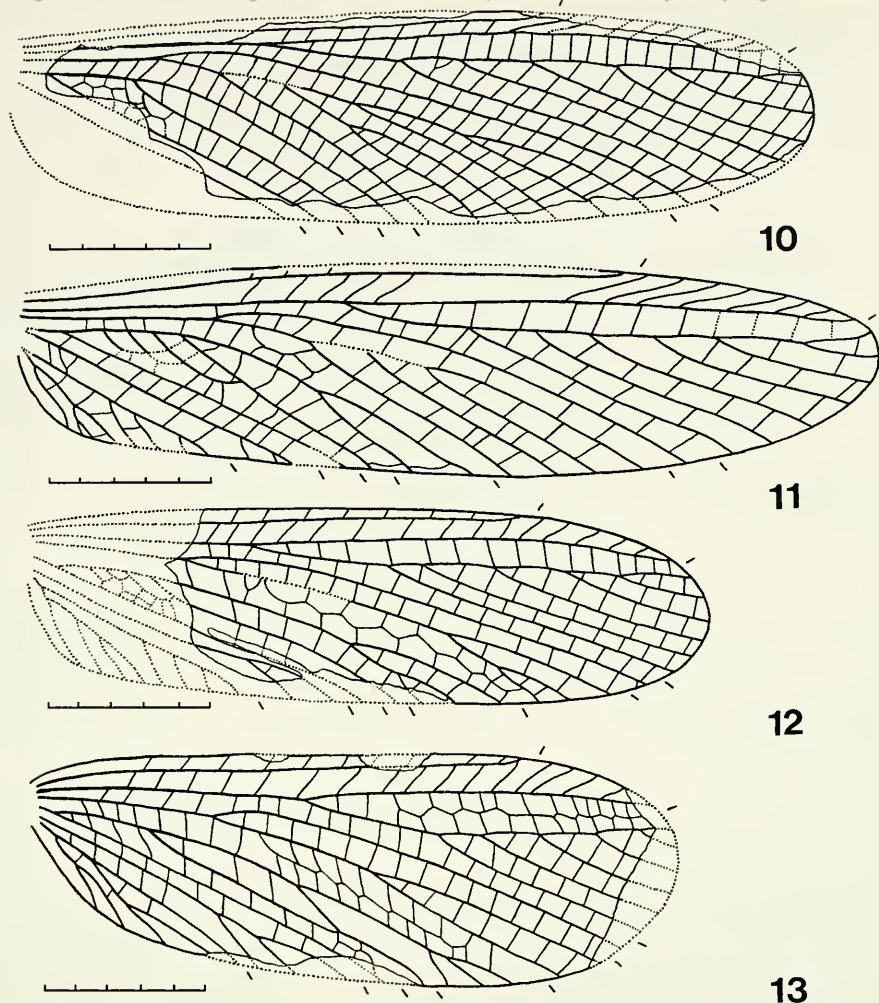
***Gorochoviella*, gen. nov.**

Type-species. *Gorochoviella conjuncta*, spec. nov.

Derivatio nominis. From the generic name *Gorochovia*.

Diagnosis. Fore wing with broadly rounded apex. Sc terminating on C near apical quarter of wing. Width of radial area 2.6 times more than width of costal area. Cross-veins in radial area forming a double row of cells. RS with 6 simple branches. M divided into MA and MP clearly distal to forking CuA on CuA1 and CuA2. CuA1 branched; were are anastomosis between proximal branch of CuA1 and CuA2. Hind wing and body unknown.

Species included. Type species from Middle or Upper Triassic of Kirghizia.



Figs 10-13. Fore wings of Grylloblattids. 10. *Gorochovia fecunda*, spec. nov., holotype, specimen N 2240/1985. 11. 12. *Gorochovia bifurca*, spec. nov. 11. holotype, specimen N 2785/2262. 12. Paratype, specimen N 2785/2237. 13. *Gorochoviella conjuncta*, spec. nov., holotype, specimens N 2240/1982 and N 2240/2153. Scales: 5 mm.

*Gorochoviella conjuncta*, spec. nov.

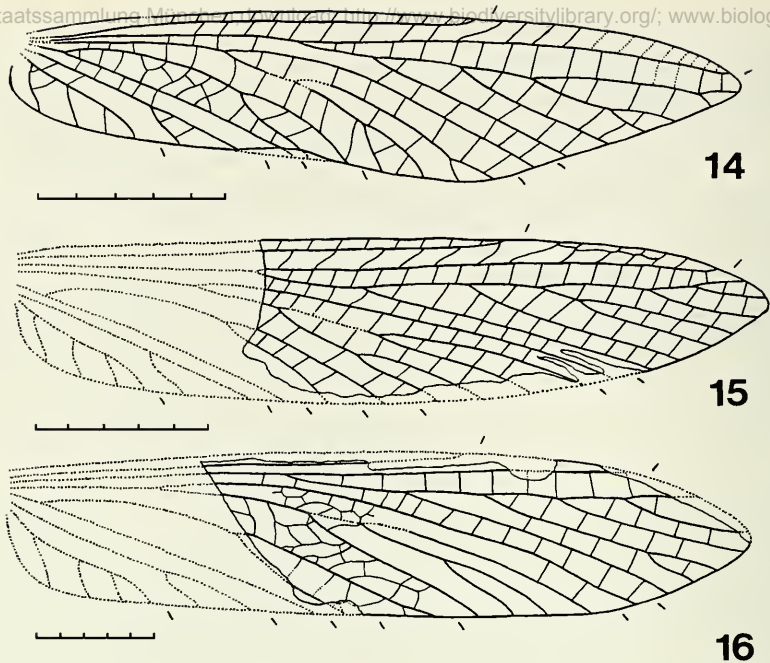
Fig. 13

Holotype: Imprint of fore wing without apical part, specimen N 2240/1982 and counter-imprint of same wing, specimen N 2240/2153; Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage, in collection of Paleontological Institute, Moscow. - Paratypes: Imprint of fore wing without basal part, specimens N 2069/1846, 2785/2183 and 2785/2237 from same locality.

Derivatio nominis. From Latin *conjunctus* = united.

Description. Length of fore wing 21.1 mm. Wing unicolorous light; veins dark. RS with 6 branches. MA simple; MP with two branches. CuA1 with 3 branches; the more proximal branch of CuA1 anastomosed with CuA2. Cross-veins straight, simple, in the area between MP and CuA and in radial area forming a double row of cells. A1 with 3 branches, A2 with 5 branches. Hind wing and body unknown.

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



Figs. 14-16. Fore wings of Grylloblattids. 14, 15. *Pseudoliomopterites obscurus*, spec. nov. 14. Holotype, specimen N 2069/1805. 15. Paratype, specimen N 2785/2111. 16. *Pseudoliomopterites lucidus*, spec. nov., holotype, specimen N 2069/1482. Scales: 5 mm.

*Pseudoliomopterites*, gen. nov.

Type-species. *Pseudoliomopterites obscurus*, spec. nov.  
Derivatio nominis. From Greek *pseudo* = false, and generic name *Liomopterites*.

Diagnosis. Fore wing with acutely pointed apex. Sc terminating on C near apical third of wing. Width of radial area 2.0-3.2 times more than width of costal area. Cross-veins in radial area simple, straight. RS with 6-7 branches. M divided into MA and MP clearly proximal to forking CuA on CuA1 and CuA2. CuA1 short, simple. Hind wing and body unknown.

Species included. Two species from Middle or Upper Triassic of Kirghizia.

Key to species (based on fore wing)

- 1. Area between MP and CuA with simple cross-veins ..... *P. obscurus*, spec. nov.
- Area between MP and CuA with branched cross-veins ..... *P. lucidus*, spec. nov.

*Pseudoliomopterites obscurus*, spec. nov.  
Figs 14, 15

Holotype: Imprint of fore wing, specimen N 2069/1805; Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage, in collection of Paleontological Institute, Moscow. - Paratype: Imprint of fore wing without basal part, specimens N 2785/2111 from same locality.  
Derivatio nominis. From Latin *obscurus* = dark.



Description. Length of fore wing 18.1-19.2 mm. Wing dark, with light veins. RS with 6-7 branches. MA simple; MP with 4 branches, CuA1 simple. Cross-veins straight, simple, in the area between CuA and CuP branched. A1 with 2 branches, A2 with 4 branches. Hind wing and body unknown.

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

*Pseudoliomopterites lucidus*, spec. nov.

Fig. 16

Holotype: Imprint of fore wing without base and anterior margin, specimen N 2069/1482; Kirghizia, Madygen; Middle or Upper Triassic, Madygenian Stage, in collection of Paleontological Institute, Moscow.

Derivatio nominis. From Latin *lucidus* = light.

Description. In all probability total length of fore wing is about 31-32 mm. Wing dark, with light veins. RS with 6 branches. MA simple; MP with 4 branches. CuA1 simple. Cross-veins in apical part of wing straight, in the area between CuA and CuP forming a double row of cells, in area between MP and CuA cross-veins branched. Hind wing and body unknown.

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

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