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## NEW GRYLLOBLATTIDA (INSECTA) FROM KARGALA LOCALITY (RUSSIA; MIDDLE PERMIAN)

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One new family, three new genera, and six new species of grylloblattids (Insecta: Grylloblattida) are described from the Kargala locality (Orenburg Region; Middle Permian, Urzhumian Stage): *Liomopterites amanakicis* sp. n., *Expartolioma urzhumica* sp. n. (family Liomopteridae), *Megakhosara nana* sp. n. (family Megakhosaridae), *Urzhumskalicicia kargalensis* gen. et sp. n. (family Skalicidae), *Kargaloptera connexa* gen. et sp. n., and *Kargalia sakmarica* gen. et sp. n. (family Kargalopteridae fam. n.).

KEY WORDS: Grylloblattida, Permian, Urzhumian Stage, Orenburg Region, new taxa.

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Одно новое семейство, 3 рода и 6 видов гриллоблаттид (Insecta: Grylloblattida) описаны из местонахождения Каргала (Оренбургская обл.; средняя пермь, уржумский ярус): *Liomopterites amanakicis* sp. n., *Expartolioma urzhumica* sp. n. (семейство Liomopteridae), *Megakhosara nana* sp. n. (семейство Megakhosaridae), *Urzhumskalicicia kargalensis* gen. et sp. n. (семейство Skalicidae), *Kargaloptera connexa* gen. et sp. n. и *Kargalia sakmarica* gen. et sp. n. (семейство Kargalopteridae fam. n.).

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## INTRODUCTION

Kargala locality represents dumps of several past copper mines situated in Sakmara District of Orenburg Region, Russia. The Kargala section is composed of the fine clastic sediments of the Amanak Formation, Urzhumian Stage, Middle Permian. Kargala has yielded numerous plant and insects impressions. To date, members of the orders Odonata, Hypoperlida, Mischoptera, Homoptera, Paleomanteida, Coleoptera, Corydalida, Neuroptera, Panorpidia, Blattida, Grylloblattida, Perlida, and Orthoptera have been recorded. Among these, the most common orders are Blattida (53% insects impression) and Grylloblattida (29% insects impression).

Order Grylloblattida in Kargala locality is presented by 5 families, 11 genera and 13 species (Storozhenko, 1998; Aristov, 2004a; 2004c, and this paper). Family Liomopteridae Sellards, 1909 includes four genera and five species (*Khosara permjakovae* Martynov, 1937, *Liomopterites amanakicis* sp. n., and *Expartolioma urzhumica* sp. n.), as well as *Kargalella subcostalis* Martynov, 1937 and *K. gibbosa* Aristov, 2004, which must be transferred from family Caulioditidae to Liomopteridae (Aristov et al., in press). Family Megakhosaridae Sharov, 1961 is presented by three genera and four species (*Megakhosara fasciipennis* Martynov, 1937, *M. nana* sp. n., *Syndesmorpha composita* Martynov, 1937, *Kargalokhosara terraiffosa* Aristov, 2008). Families Ideliidae and Skalicidae includes *Metidelia kargalensis* Martynov, 1937 and *Urzhumskalicia kargalensis* gen. et sp. n., respectively. Family Kargalopteridae fam. n. in Kargala locality is presented by two species (*Kargaloptera connexa* gen. et sp. n. and *Kargalia sakmarica* gen. et sp. n.). In terms of the number of impressions, the families Liomopteridae (about 73%), and Megakhosaridae (about 17%) are dominating; Kargalopteridae (about 6%), Ideliidae and Skalicidae (about 2% each) are less abundant in Kargala locality.

The present work is based on collection No 199 (89 specimens) stored in Paleontological Institute of Russian Academy of Sciences (PIN) and gathered by O. Martynova and P. Sviridov in 1938. All material including holotypes are deposited in PIN (Moscow).

## DESCRIPTION OF NEW TAXA

ORDER GRYLLOBLATTIDA WALKER, 1914

Family Liomopteridae Sellards, 1909

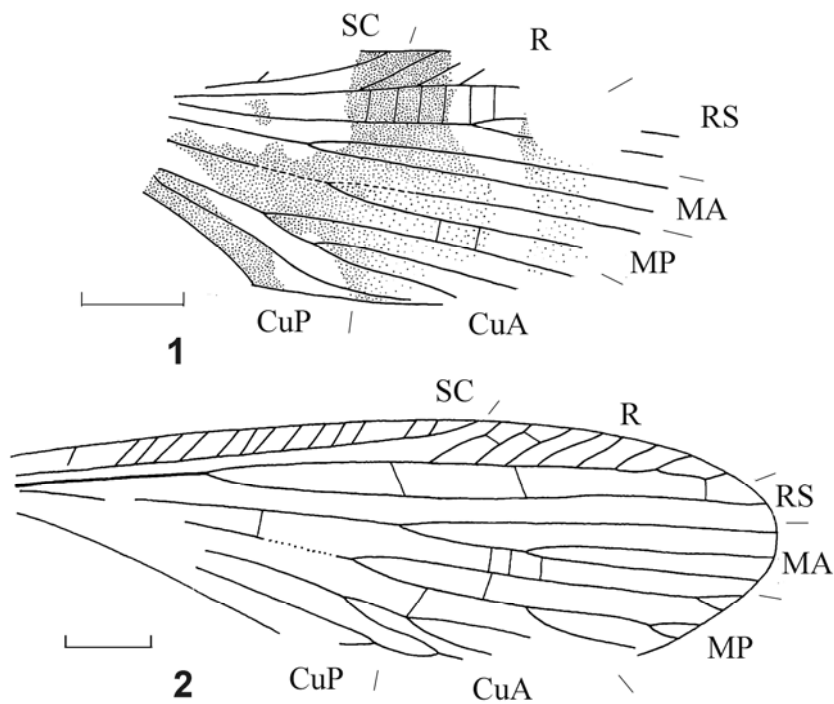
Genus *Liomopterites* Sharov, 1961

*Liomopterites amanakicis* Aristov, sp. n.

Fig. 1

MATERIAL. Holotype: PIN No 199/172, imprint of fragment of fore wing; Kargala locality.

DESCRIPTION. Medium size insect. The costal field in basal third of wing wider than subcostal one. *C* ended near middle of the wing. Anterior branches of *R* simple,



Figs. 1, 2. Family Liomopteridae, forewings: 1) *Liomopterites amanakicis* sp. n., holotype PIN No 199/172, 2) *Expartolioma urzhumica* sp. n., holotype PIN No 199/232. Scale bar – 2mm

straight. *RS* starts in the basal quarter of wing, *RS*, *MA* and *MP* with two branches each. *CuA*<sub>1</sub> with three branches, *CuA*<sub>2</sub> simple, parallel to posterior margin of wing. Intercubital field narrow. *CuP* ended at posterior margin of wing. Crossvein simple. Wing with large dark spots.

DIAGNOSIS. New species is similar with *Liomopterites accolis* Sharov, 1961 from Kaltan locality (Kazanian of Kemerovo region) in apex of *CuA*<sub>2</sub> parallel to posterior margin of wing, but differs from it by short *SC* and large size. *L. accolis* has *SC* ended in distal third of wing and forewing length about 8,3-9,1 mm (Sharov, 1961).

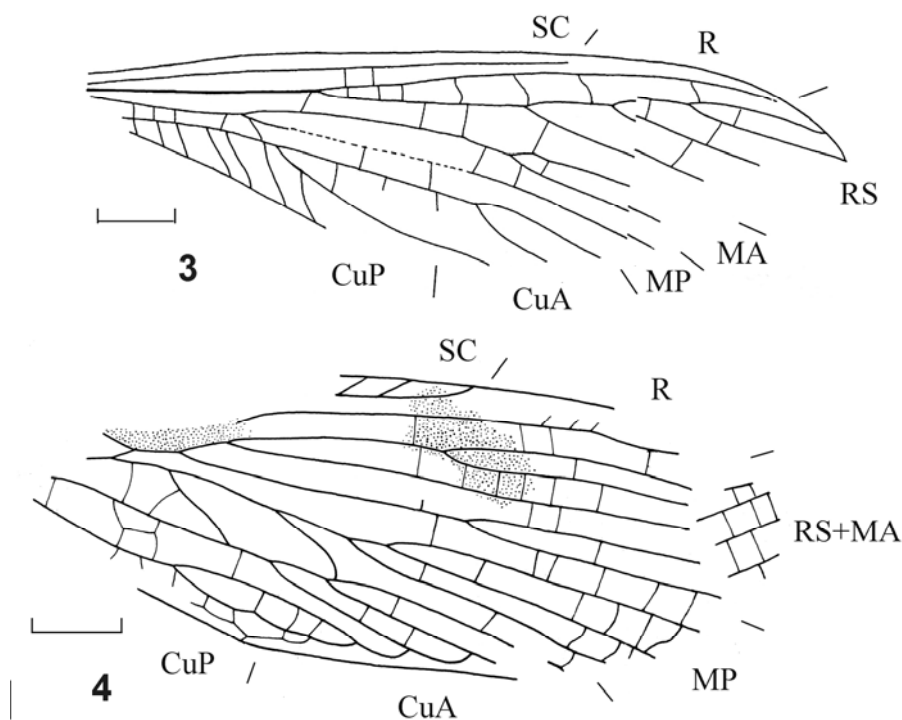
MEASUREMENTS. Length of forewing about 14 mm.

#### Genus *Expartolioma* Aristov, 2004

##### *Expartolioma urzhumica* Aristov, sp. n.

Fig. 2

MATERIAL. Holotype: PIN No 199/232, imprint of fore wing; Kargala locality.



Figs. 3, 4. Families Megakhosaridae and Skalicidae, forewings: 3) *Megakhosara nana* sp. n., holotype PIN No 199/139, 4) *Urzhumskalicia kargalensis* gen. et sp. n., holotype PIN No 199/171. Scale bar – 2mm

DESCRIPTION. Medium size insect. Anterior margin of forewing slightly convex. Costal field 2 times as wide as subcostal one and crossed with simple and straight anterior branches of *SC*. *SC* reaching distal wing third. Anterior branches of *R* simple, S-shaped. *RS* starts in basal wing third, simple. *MA* with three branches, *MP* with five ones. *CuA<sub>1</sub>* with three branches, apex of *CuA<sub>2</sub>* parallel to posterior margin of wing, ending in *CuA<sub>1</sub>*. Intercubital field narrow. *CuP* ending in *CuA<sub>2</sub>*. Crossvein simple.

DIAGNOSIS. Differs from the type species *Expartolioma hirta* Aristov, 2004 from Aristovo locality (Vyatkian of Vologda region) in having *SC* shorter, *MP* with five branches and *CuP* ending in *CuA<sub>2</sub>*. *E. hirta* has *SC* ending in distal quarter of wing, simple *MP*, and *CuP* ending in posterior margin of wing. (Aristov, 2004b).

MEASUREMENTS. Length of forewing 19 mm.

**Family Megakhosaridae Sharov, 1961**

**Genus *Megakhosara* Martynov, 1937**

***Megakhosara nana* Aristov, sp. n.**

Fig. 3

MATERIAL. Holotype: PIN No 199/139, imprint of fore wing; Kargala locality.

DESCRIPTION. Medium size insects. Anterior margin of forewing slightly convex. The width of costal field is equal to subcostal one. *RS* comb-like, starts in basal third of wing, *RS* with four branches, *MA* with two ones, *MP* simple. Posterior branchlets of *CuA* slightly S-shaped, *CuA<sub>1</sub>* with two branches, *CuA<sub>2</sub>* simple, *CuP* straight. Crossveins simple and forming double row of cells.

DIAGNOSIS. Differs from type species *Megakhosara fasciipennis* Martynov, 1937 from Kargala locality in having two-branched *MA* and smaller size. *M. fasciipennis* has *MA* with three branches and forewing length 45 mm. (Aristov, 2004c).

MEASUREMENTS. Length of forewing 20 mm.

**Family Scalicidae Kukalova, 1964**

**Genus *Urzhumskalicia* Aristov, gen. n.**

Type species: *Urzhumskalicia kargalensis* sp. n. (Kargala locality).

DESCRIPTION. Medium size insects. Anterior margin of forewing convex. *SC* reaching distal wing third. *RS* fused with *MA*, *RS+MA* branching near its base. Basal branches of *MP* fused with *CuA<sub>1</sub>*. *CuA<sub>1</sub>* and *CuA<sub>2</sub>* are branched near its middle, *CuA<sub>1</sub>* with three branches, *CuA<sub>2</sub>* with two ones, the basal branches of *CuA* fused at apex and not reaching the posterior margin of wing. Crossveins simple or H-shaped and forming double row of cells in intercubital field. Wing with dark spots.

DIAGNOSIS. New genus is most similar with *Doubravia* Kukalova, 1964 from Obora locality (Sakmariian of Moravia), but differs in early origin of *RS* fused with *MA*, in basal branches of *MP* fused with *CuA<sub>1</sub>* and apexes of basal branches of *CuA* ending in *CuA*. *Doubravia* has *RS* starts near middle of wing and *RS* basal branches of *MP* free and apexes of basal branches of *CuA* ending in posterior margin of wing (Kukalova, 1964).

SPECIES INCLUDED. Type species only.

***Urzhumskalicia kargalensis* Aristov, n. sp.**

Fig. 4

MATERIAL. Holotype: PIN No 199/171, imprint of fore wing; Kargala locality.

DESCRIPTION. Anterior branches of *SC* simple, straight. *RS* starting in wing basal third, *RS+MA* with five branches. *MP* with five ones, two basal branches of *MP* fused with *CuA<sub>1</sub>*.

MEASUREMENTS. Length of forewing 25 mm.

**Family Kargalopteridae Aristov, fam. n.**

Type genus: *Kargaloptera* gen. n. (Kargala locality).

DESCRIPTION. Medium size insect. Base of *RS* fused with *M* or *MA*, *M* branching after origin of *RS*. *RS+M* or basal branch of *MP* fused with *CuA<sub>1</sub>* or its distal branch. *CuA* dividing on branching *CuA<sub>1</sub>* and simple *CuA<sub>2</sub>*. Intercubital field extends to posterior margin of wing. *A<sub>1</sub>* simple, crossveins simple and forming two-three row of cells. Wing with dark spots.

DIAGNOSIS. From all families of grylloblattids (Storozhenko, 1998) new family differs by combination *RS* fused with *M* or *MA*, *M* branching after origin of *RS* and *RS+M* or *MP* fused with *CuA<sub>1</sub>* or its distal branch.

GENERA INCLUDED. Type genus only.

**Genus Kargaloptera Aristov, gen. n.**

Type species: *Kargaloptera connexa* n. sp. (Kargala locality).

DESCRIPTION. Anterior margin of forewing convex. *SC* ended near middle of the wing. *R* ended on wing apex. *RS* starts in the wing middle or basal third. *RS* fused with *M*, *RS+M* fused with distal branch of *CuA<sub>1</sub>*, *CuA<sub>1</sub>* branching at its basal third.

SPECIES INCLUDED. Type species only.

***Kargaloptera connexa* Aristov, sp. n.**

Fig. 5, 6

MATERIAL. Holotype: PIN No 199/145, imprint of fore wing; Kargala locality. Paratype: PIN No 199/261, imprint of fore wing; from same locality.

DESCRIPTION. *RS+M* with five to six branches, *RS+M+CuA* with four or five branches, *CuA<sub>1</sub>* with two-three free branches. *CuP* convex toward anterior margin of the wing or straight.

MEASUREMENTS. Length of forewing 20-25 mm.

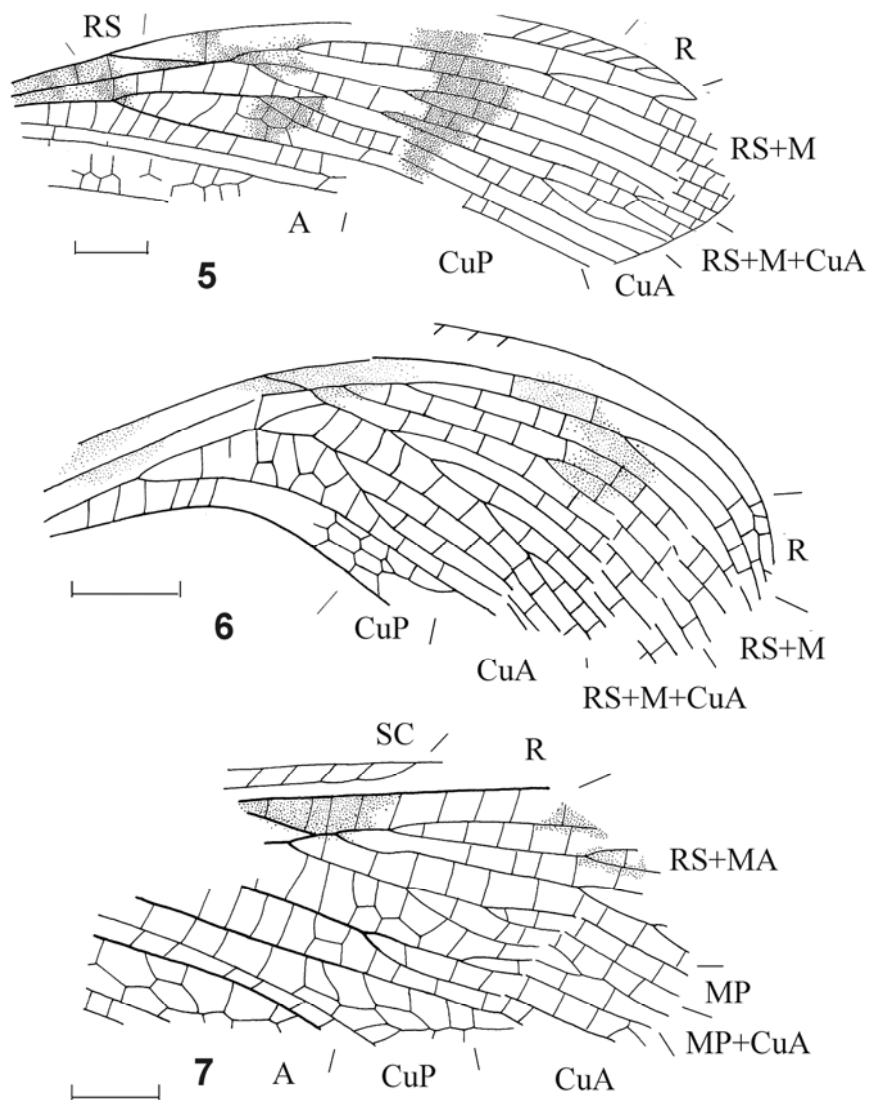
**Genus Kargalia Aristov, gen. n.**

Type species: *Kargalia sakmarica* sp. n. (Kargala locality).

DESCRIPTION. Anterior margin of forewing almost straight. *SC* reaching distal wing middle. *RS* starts in the wing basal third. *RS* fused with *MA*. Basal part of *MP* is free, apical part of *MP* is fused with *CuA<sub>1</sub>*. *CuA<sub>1</sub>* branching near its middle. *A<sub>2</sub>* with two branches.

DIAGNOSIS. New genus differs from *Kargaloptera* gen. n. in *RS* fused with *MA*, part of *MP* is free, part is fused with *CuA<sub>1</sub>*, *CuA<sub>1</sub>* branching near its middle. *Kargaloptera* has *CuA<sub>1</sub>* branching in its basal third and *RS* fused with *M*.

SPECIES INCLUDED. Type species only.



Figs. 5-7. Family Kargalopteridae, forewings: 5, 6) *Kargaloptera connexa* gen. et sp. n.: 5) holotype PIN No 199/145, 6) paratype PIN No 199/261, 7) *Kargalia sakmarica* gen. et sp. n., holotype PIN No 199/156. Scale bar – 2mm

***Kargalia sakmarica* Aristov, sp. n.**

Fig. 7

MATERIAL. Holotype: PIN No 199/156, imprint of fore wing; Kargala locality.

DESCRIPTION. *RS+MA* with six or more branches. *MP* with two free branches. *MP+CuA<sub>1</sub>* simple. *CuA<sub>1</sub>* with two free branches.

MEASUREMENTS. Length of forewing 22-23 mm.

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