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## A NEW EOBLATTIDS (INSECTA: EOBLATTIDA) FROM THE PERMIAN OF RUSSIA

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New taxa of the order Eoblattida (Insecta) from the Permian of European Russia are described: Soyanopteridae **fam. n.** with *Soyanoptera volucris* **gen. et sp. n.** from the Lower Kazanian (Middle Permian) of Archangelsk Region, *Poldarsia relictaria* **gen. et sp. n.** from the upper Severodvinian (Upper Permian) of Vologda Reg., and *Stereosylva singularis* Aristov, 2002 from the Kungurian (Lower Permian) of Perm Region. Genus *Stereosylva* Aristov, 2002 is transferred to Soyanopteridae from the family Euryptilonidae (order Grylloblattida). *Letopala costalis* **gen. et sp. n.** (Eoblattida incertae familia) is described from the Lower Kazanian of Archangelsk Region.

KEY WORDS: Eoblattida, Soyanopteridae, taxonomy, new taxa, Permian, Russia.

Д. С. Аристов<sup>1)</sup>, А. П. Расницын<sup>1,2)</sup>. Новые эоблаттидовые насекомые (Insecta: Eoblattida) из перми России // Дальневосточный энтомолог. 2011. N 230. С. 1-12.

Из перми европейской части России описаны новые эоблаттидовые насекомые (Insecta; Eoblattida): Soyanopteridae **fam. n.** включающее *Soyanoptera volucris* **gen. et sp. n.** из нижнеказанских отложений (средняя пермь) Архангельской области, *Poldarsia relictaria* **gen. et sp. n.** из верхнесеверодвинских отложений (верхняя пермь) Вологодской области и *Stereosylva singularis* Aristov, 2002 из кунгурских отложений (нижняя пермь) Пермского края. Род

*Stereosylva* Aristov, 2002 перенесен из семейства Euriptilonidae (отряд Grylloblattida) в семейство Soyanopteridae. Из средней перми Архангельской области описан *Letopala costalis* **gen. et sp. n.** (Eoblattida incertae familia).

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## INTRODUCTION

Until recently, the extinct order Eoblattida was considered entirely Carboniferous in age (Rasnitsyn, 2002). Since that time two Permian families have been transferred there from the order Grylloblattida, viz., Tillyardembiidae from the Lower and Middle Permian of Russia (Aristov & Rasnitsyn, 2009; Rasnitsyn & Aristov, 2010) and Prottembiidae (= Sylvardembiidae) from the Lower Permian of USA and the Lower and Middle Permian of Russia (Aristov & Rasnitsyn, 2011). Additionally, an Eoblattida incertae familia is described from the Upper Permian of Russia (Rasnitsyn & Aristov, 2010). In spite of a wide geographic and stratigraphic distribution, diversity of the Permian Eoblattida remains low. One new family and a new Eoblattida incertae familia are described in the order herein.

The main reason to transfer Tillyardembiidae and Prottembiidae to Eoblattida was *SC* entering *R* or forked apically and not entering *C* as is characteristic of Grylloblattida. *Soyanoptera volucris* **gen. et sp. n.** from the Middle Permian fossil site Soyana (Lower Kazanian of Archangelsk Region) and *Poldarsia relictaria* **gen. et sp. n.** from the Upper Severodvinian of Isady (Upper Permian of Vologda Region) display same features and so deserve similar attribution. Within the order, these two differ from the rest taxa in having *RS* fusing with *M* near its base for a short distance, very wide *RS* field, and lost *M*<sub>5</sub>, and so deserve a status of the family of its own. The same combination of characters is found in *Stereosylva singularis* Aristov, 2002 from the Kungurian of Tsherkarda (upper Lower Permian of Permian Region) originally described in the grylloblattidan family Euriptilonidae (Aristov, 2002). That is why the genus *Stereosylva* Aristov, 2002 is also transferred to Soyanopteridae herein. Besides, *Letopala costalis* **gen. et sp. n.** (Eoblattida incertae familia) is described from the Lower Kazanian of Russia. As a result, we can see Eoblattida as still rather diverse in the Permian time.

Studied material was gathered by Ya.D. Zekkel in 1935, A.G. Sharov in 1972 (Soyana locality), V.G. Novokshonov in 1987-1999 (Tsherkarda locality) and PIN team in 2009 and 2010 (Isady locality). Material is stored in A.A. Borisyak Paleontological Institute, Russian Academy of Science (PIN), Moscow.

## ORDER EOBLATTIDA HANDLIRSCH, 1906

### Family Soyanopteridae Aristov et Rasnitsyn, **fam. n.**

Type genus: *Soyanoptera* **gen. n.**

DESCRIPTION. Head large, wider than long, with rather small eyes and narrow antenna. Pronotum small, trapezoid, with paranota very wide, and with fore margin excised. Legs short, apparently not specialized, with hind tibia directed backward. Forewing with no precostal field, with costal field wider than subcostal one. *SC* forked apically. Interradial field very narrow, *RS* field very wide. *RS* starting at or before wing midlength, fused with *M* or *MA* shortly after its base for a short distance, branching only subapically. *M*<sub>5</sub> absent. Intercubital field lacking oblique branches. Anal area much reduced, no distinct clavus present. Hind wing with not strong *CuA* concave, anal area wide.

DIAGNOSIS. Soyanopteridae differ from the rest Eoblattida in having fused with *M* or *MA* at or before wing midlength in combination with wide *RS* field, lost *M*<sub>5</sub>, and narrow anal area. Anastomosis of *RS* and *M* occurs in the “*Narkemina* genus group” (Rasnitsyn & Aristov, 2010) but placed distal there, and additionally the latter group has its *RS* field not widened and *M*<sub>5</sub> present.

GENERA INCLUDED. Three monotypical genera: *Soyanoptera volucris* gen. et sp. n. from the Middle Permian fossil site Soyana (Lower Kazanian of Archangelsk Region), *Poldarsia relictaria* gen. et sp. n. from the Upper Severodvinian of Isady (Upper Permian of Vologda Region) and *Stereosylva singularis* Aristov, 2002 from the Kungurian of Tshekarda (Lower Permian of Permian Region).

#### Key to genera and species of Soyanopteridae

- 1 (4) *SC* entering wing distal half. *RS* fusing with *MA*. *CuA* running within fore 0.3-0.5 wing width, branching almost since its base.
- 2 (3) Costal field 1.5 times as wide as subcostal one in basal wing quarter. *M* branching in basal wing third. Length of body 6.5 mm, forewing 5.5 mm, hind wing 4.5 mm (Figs. 1, 2) ..... *Soyanoptera volucris*
- 3 (2) Costal field 4.5 times as wide as subcostal one in basal wing quarter. *M* branching before wing midlength. Length of body 9.5 mm, forewing 9 mm, hind wing 8 mm (Figs. 3, 4) ..... *Stereosylva singularis*
- 4 (1) *SC* not reaching wing midlength. *RS* fusing with *M* before its branching. *CuA* running within hind 0.3 wing width, branching almost since its base. Forewing length ca. 5 mm. (Figs. 5-9) ..... *Poldarsia relictaria*

#### Genus *Soyanoptera* Aristov et Rasnitsyn, gen. n.

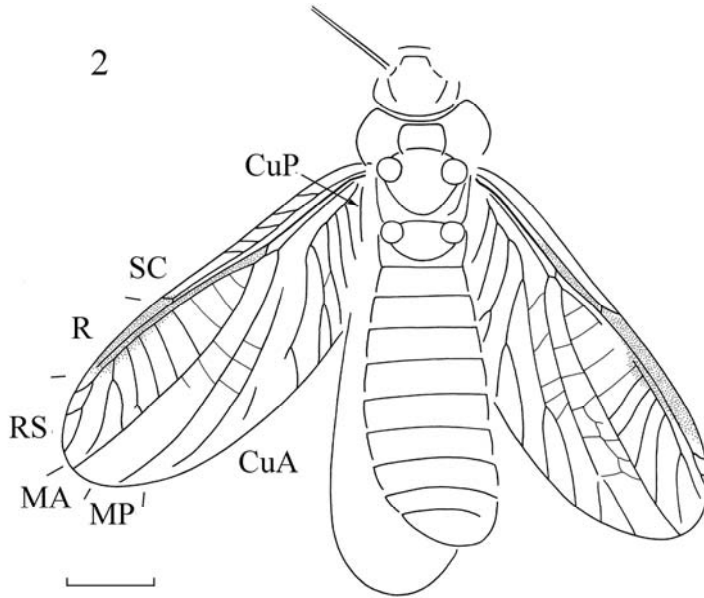
Type species: *Soyanoptera volucris* sp. n.

DESCRIPTION. Head narrowing forward. Lateral paranotal lobes as wide as pronotum. Forewing fore margin slightly concave near midlength. Costal field 1.5 times as wide as subcostal one in basal wing quarter. *SC* meeting *R* before wing basal third. *RS* starting near basal wing third, fused with *MA* for a short distance almost from its base, with 3 apical branches at wing fore margin and apex. *RS* field with long, straight, vertical cross-veins transforming smoothly into *RS* branches apically. *M* forking into *MA* and *MP* at level of *RS* base. *CuA* branching from near

1



2



Figs 1, 2. General appearance of *Soyanoptera volucris* sp. n., holotype PIN No 3353/424. Scale bar 1 mm.

its base, with 3 or 4 simple or branching basal branches forming dense hind comb, farther distal branching dichotomously. Cross-veins simple or branching in intermedial field.

SPECIES INCLUDED. Type species only.

ETYMOLOGY. Generic name is after Soyana locality and *pteron*, the Greek for wing. Gender feminine.

***Soyanoptera volucris* Aristov et Rasnitsyn, sp. n.**

Figs 1, 2

MATERIAL. Holotype: PIN, No 3353/424; imprint of entire insect; Russia, Arkhangelsk Region, Mezen' District, right bank of the Soyana River, 56–60 km upstream of its mouth, Soyana locality; Middle Permian, Lower Kazanian Substage, Iva-Gora beds; in PIN.

LOCALITY AND HORIZON. Russia: Soyana locality; the Middle Permian, Lower Kazanian Substage.

DESCRIPTION. Head slightly wider than long. Antenna narrow, getting narrower toward apex. Fore pronotal excision shallow, not enclosing head sides. Mesonotum transverse, with mesoscutum triangular, its lobes small, clear-cut, prescutum slightly extending. Metanotum shorter, otherwise of similar structure. Abdomen widening caudad, not reaching apices of folded wings. *SC* with simple, oblique fore branchlets. *MA* simple, *MP* with one or two, *CuA* with eight-nine branches.

MEASUREMENTS. Length of body (without antennae) 6.5 mm; length of forewing 5.5 mm; length of hindwing 4.5 mm.

ETYMOLOGY. Species name is after *volucer*, the Latin for flying (because of forewing with straight fore margin and narrow pre-radial field indicating good flight abilities).

**Genus *Stereosylva* Aristov, 2002**

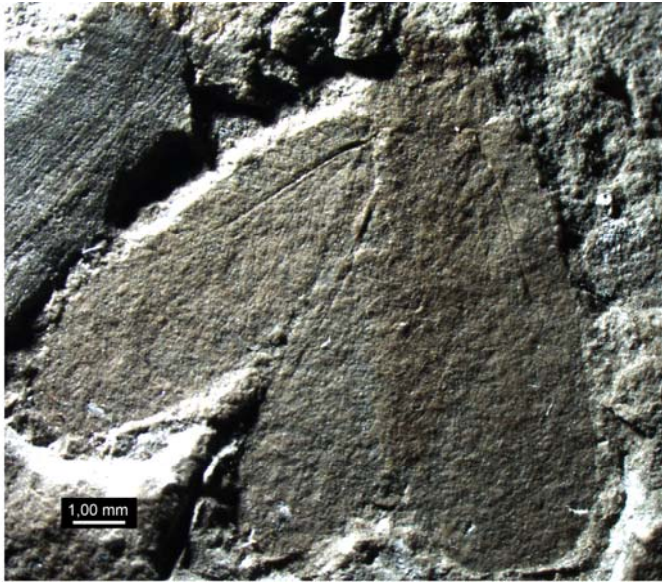
*Stereosylva* Aristov, 2002: 253; 2004: 84.

Type species: *Stereosylva singularis* Aristov, 2002, by original designation.

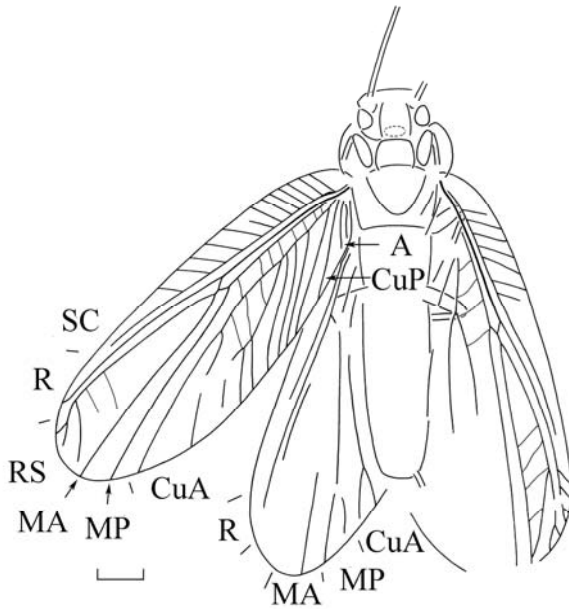
DESCRIPTION. Head widened before eyes. Paranotal side lobe slightly narrower than pronotum. Forewing with fore margin straight near midlength. Costal field 4.5 times as wide as subcostal one in basal wing quarter. *SC* reaching distal wing quarter. *RS* starting before wing midlength, fusing with *MA* shortly after base, with two branches at wing apex and one meeting *MA* near its apex. *RS* field with simple cross-veins. *M* branching at level of *RS* base. *CuA* branching from its base, with four simple, S-like branchlets forming dense posterior comb, farther distal branching irregularly. *CuP* straight. Anal veins and cross-veins simple. Hind wing incompletely known, apparently with *RS* and *MA* anastomosing, possibly also with *CuA* branches not numerous.

SPECIES INCLUDED. Type species only.

3



4



Figs 3, 4. General appearance of *Stereosylva singularis* Aristov, 2002, holotype PIN No 4987/820. Scale bar 1 mm.

***Stereosylva singularis* Aristov, 2002**

Figs 3, 4

*Stereosylva singularis* Aristov, 2002: 254, fig. 1 (holotype – PIN, No 4987/820, positive and negative imprints of entire insect; Russia, Perm Region, Suksun District, left bank of the Sylva River near the mouth of Tshekarda River, the northeastern slope of the Krasnaya Gora Mountain, Tshekarda locality; Lower Permian, Kungurian Stage, Iren' Horizon, Koshelevka Formation; in PIN; studied); Aristov, 2004: 84.

MATERIAL. Holotype.

LOCALITY AND HORIZON. Russia: Tshekarda locality; the Lower Permian, Kungurian Stage.

DESCRIPTION. Head wide, distinctly transverse, with fore margin almost straight, with eyes small, placed behind head midlength, between eyes with elevated area margined laterally with distinct impressed, almost parallel lines slightly curved outward (possibly these represent occipital sutures). Ocelli not apparent. Antenna narrow, not distinctly narrowing apically. Pronotum with deep fore excision enclosing head sides in part. Legs very short, with narrow tibiae. Fore femur half as long as head wide, twice as thick as tibia, much shorter but not much narrower than mid and hind ones. Meso- and metanotum transverse, mesoscutum triangular. Abdomen not widened toward apex, not reaching apices of closed wings. Cercus narrow, of unknown length. Costal field three times as wide as subcostal one at level of *RS* base. *SC* with fore branchlets straight, dense and slightly oblique in basal wing quarter and more spaced and oblique distal. *MA* and *MP* simple, *CuA* with 11 branches or more, Hind wing with fore margin straight, costal field twice as wide as subcostal one at *RS* base (at basal wing quarter), *MA* simple, *MP* and *CuA* forking.

MEASUREMENTS. Length of body (without antennae) 9.5 mm; length of forewing 9.0 mm; length of hindwing 8.0 mm.

**Genus *Poldarsia* Aristov et Rasnitsyn, gen. n.**

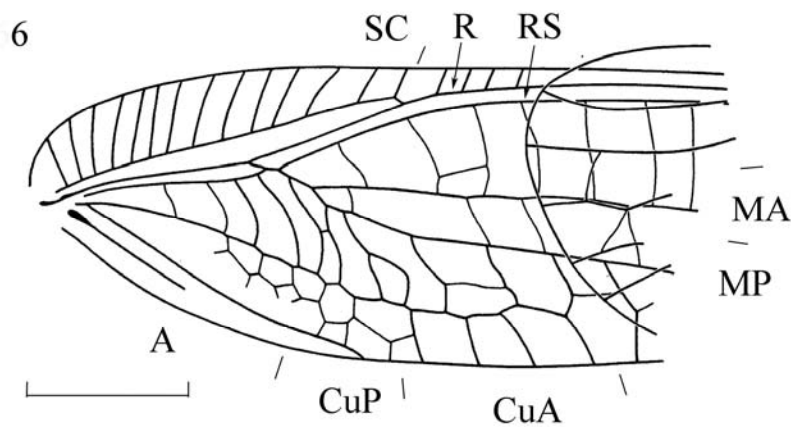
Type species: *Poldarsia relictaria* sp. nov.

DESCRIPTION. Small insects. Preradial field taking more than third of wing width at level of *RS* base. *SC* not reaching wing midlength, with fore branchlets vertical to slightly oblique. *RS* base at wing basal quarter, with short subbasal fusion with *M*, with short oblique fore branchlets. Interradial field very narrow, *RS* field very wide, with simple and H-like cross-veins. The only hind *RS* branch hardly distinct from cross-veins. *M* forking in basal wing third (beyond *RS* base). *M* field with cross-veins, strong, simple, Y- and H-like. *CuA* branching near wing hind margin, forming short backward comb. Anal area very narrow, annals simple.

SPECIES INCLUDED. Type species only.

ETYMOLOGY. Generic name is after Poldarsa Formation. Gender feminine.





Figs 5, 6. Forewing of *Poldarsia relictaria* sp. n., holotype PIN, No 3840/793. Scale bar 1 mm.

***Poldarsia relictaria* Aristov et Rasnitsyn, sp. n.**  
Figs 5–9

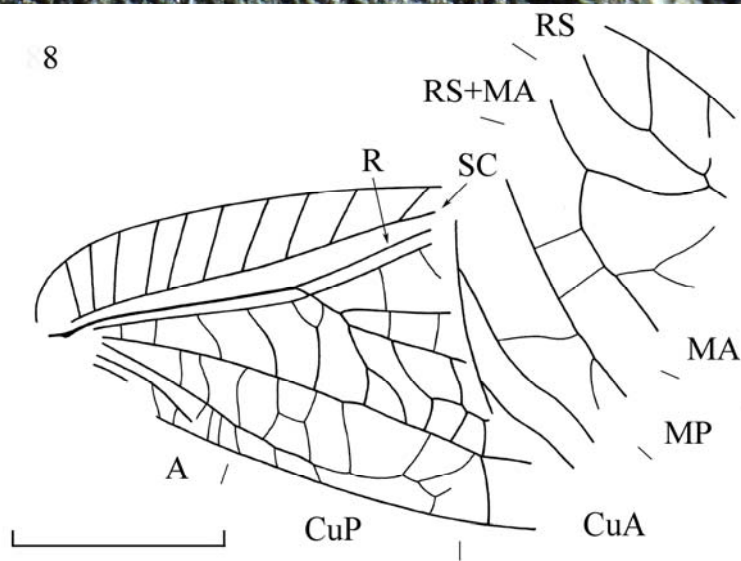
**MATERIAL.** Holotype: PIN, No 3840/793; positive and negative imprints of forewing; Russia, Vologda Region, Velikiustyug District, left bank of Sukhona River in 1 km upstream of Isady village, Isady locality; Upper Permian, Severodvinian Stage, Upper Severodvinian Substage, Poldarsa Formation, Kitchuga Member. Paratype: PIN, No 3840/2040 from same locality; in PIN.

**LOCALITY AND HORIZON.** Russia: Isady locality; the Upper Permian, Upper Severodvinian Substage.

**DESCRIPTION.** Forewing fore margin slightly impressed at wing midlength. Costal field 2.5 times as wide as subcostal one. *SC* with simple, dense fore branchlets.



*R* with simple, slightly oblique fore branchlets. *RS* with three fore branchlets bent toward fore and apical margin and with longer hind branch meeting wing apex or *MA* near apex. *MA* and *MP* simple, or *MP* with a backward comb of five branches hardly distinguishable from cross-veins. *CuA* with hind comb of four or five short,



Figs 7, 8. Forewing of *Poldarsia relictaria* sp. n., paratype PIN, No 3840/2040. Scale bar 1 mm.

almost vertical branches. *CuP* slightly S-like bent toward apex. *A*<sub>1</sub> and *A*<sub>2</sub> simple; *A*<sub>1</sub> incrassate basally. Cross-veins simple or H-like, may form double cell row intercutably. Wing membrane dark.

MEASUREMENTS. Length of forewing about 5 mm.

ETYMOLOGY. Species name *relictaria* is the Latin for relict.

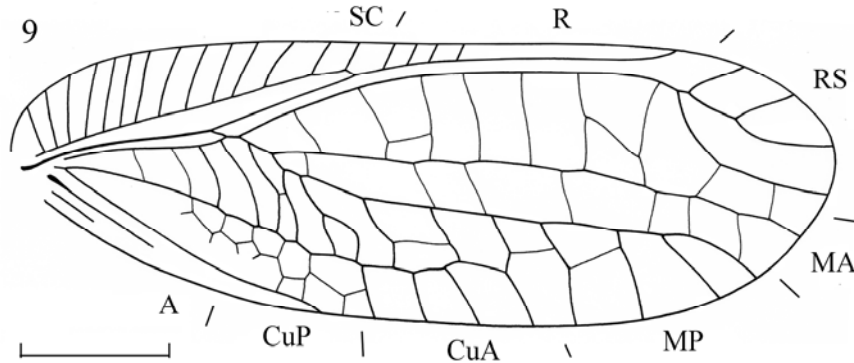


Fig. 9. Reconstruction of forewing of *Poldarsia relictaria* sp. n., based on holotype and paratype. Scale bar 1 mm.

#### EOBLATTIDA INCERTAE FAMILIAE

#### Genus *Letopala* Aristov et Rasnitsyn, gen. n.

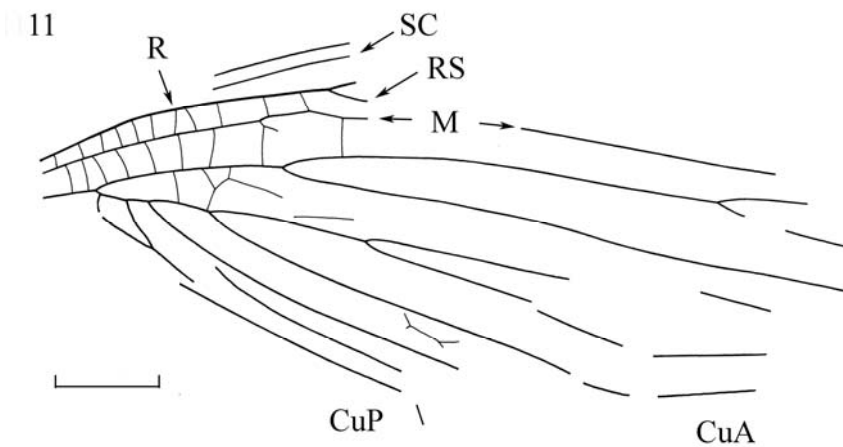
Type species: *Letopala costalis* sp. n.

DESCRIPTION. Medium size insect. Preradial field narrow, costal one narrower than subcostal field. *RS* starting beyond first *CuA* fork. *M*<sub>3</sub> absent. *CuA* with two fusing hind branchlets, with no individualised *CuA*<sub>2</sub> branch, branching irregularly just beyond its base, taking some two third of wing width. *CuP* simple, straight. Convex veins (at least *CuA* and possibly some others) changing into concave beyond line running anterior-apicad from visible apex of fused *CuA* hind branchlets. Cross-veins simple and forming double cell rows.

DIAGNOSIS. *CuA* abundantly branched and with hind branchlets recall *Lobeatta* Béthoux, 2005 from the Carboniferous (Pennsylvanian) Mazon Creek (Illinois, USA) which differs in having costal field much wider, *M*<sub>3</sub> present, *CuA* with many hind branchlets and taking some half wing width at about half wing midlength (Béthoux, 2005; Béthoux, 2008). Incomplete preservation of the new genus does not permit its more precise placement within the order Eoblattida.

SPECIES INCLUDED. Type species only.

ETYMOLOGY. Generic name is after Letopala River near the type locality. Gender feminine.



Figs 10, 11. Forewing of *Letopala costalis* sp. n., holotype PIN, No 117/617. Scale bar 1 mm.

***Letopala costalis* Aristov et Rasnitsyn, sp. n.**

Figs 10, 11

**MATERIAL.** Holotype: PIN, No 117/617; imprint of incomplete forewing; Russia, Arkhangelsk Region, Mezen' District, right bank of the Soyana River, 56–60 km upstream of its mouth, Soyana locality; Middle Permian, Lower Kazanian Substage, Iva-Gora beds; in PIN.

**LOCALITY AND HORIZON.** Russia: Soyana locality; the Middle Permian, Lower Kazanian Substage.

**DESCRIPTION.** Costal field some 0.7 as wide as subcostal one at *RS* base. *M* not branching at or before *RS* base. *CuA* with 10 branches or more, with hind branchlets two in number, strongly bent, fusing, and ending blind. Cross-veins simple or intercubitally branching in basal wing half.

MEASUREMENTS. Length of forewing about 35 mm.  
ETYMOLOGY. Species name is after *costa*, the Latin for rib.

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