

Eolamprohiza andrushchenkoi gen.n., sp.n., a new firefly
from Baltic amber, with a checklist of fossil Lampyridae
(Insecta: Coleoptera)

Eolamprohiza andrushchenkoi gen.n., sp.n., новый светлячок
из балтийского янтаря, со списком ископаемых
Lampyridae (Insecta: Coleoptera)

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КЛЮЧЕВЫЕ СЛОВА: Coleoptera, Lampyridae, Lamprohizinae, новый род, новый вид, балтийский янтарь, палеоэнтомология, эоцен.

ABSTRACT. A new fossil genus of fireflies, *Eolamprohiza* gen.n., and a new species, *E. andrushchenkoi* sp.n., are described from Eocene Baltic amber. The new taxon is placed in Lamprohizinae, making it the first amber representative of the subfamily. *Eolamprohiza* gen.n. stands out among the other lamprohizines by the conspicuously more stout humeral elytral costa. Provided also is a checklist of fossil Lampyridae.

РЕЗЮМЕ. Из балтийского эоценового янтаря описывается новый ископаемый род светлячков, *Eolamprohiza* gen.n., с новым видом, *E. andrushchenkoi* sp.n. Новый таксон помещается в Lamprohizinae, что делает его первым янтарным представителем этого подсемейства. *Eolamprohiza* gen.n. отличается от прочих лампрохизин заметно более утолщённым плечевым ребром надкрылий. Приводится также список ископаемых Lampyridae.

Introduction

First fireflies were reported from amber more than a hundred years ago, before World War I [Klebs, 1910]. However, it was not until the XXI century that the first two amber lampyrid taxa were actually described [Kazantsev, 2012a, 2012b] — *Electotreta* Kazantsev, 2012, placed in the subfamily Ototretinae, and *Eoluciola* Kazantsev, 2012, in the Luciolinae, both from Baltic Eocene amber.

Another lucioline genus, *Protoluciola* Kazantsev, 2015 was discovered shortly afterwards in Burmese amber [Kazantsev, 2015], which significantly extended the proven age of the group, as Burmite is considered to be formed during the Cretaceous, ie some 100 million years ago [e.g., Shi *et al.*, 2012].

A possibility to study further amber material allowed finding another apparently firefly amber inclusion. Its study revealed that it is yet another new genus and species of lampyrids from Baltic amber, this time a Lamprohizinae, as the available identification keys and diagnoses demonstrated, at the same time not attributing it to any of the existent genera [Kazantsev, 2010; Martin *et al.*, 2019].

The description of the new taxon is given below.

Taxonomy

Family Lampyridae Latreille, 1817

Subfamily Lamprohizinae Kazantsev, 2010

Eolamprohiza Kazantsev gen.n.

Type species: *Eolamprohiza andrushchenkoi* Kazantsev sp.n.

DESCRIPTION. **Male.** Alate, flattened, elongate. Head relatively small, transverse, completely concealed under pronotum. Eyes large, spherical, noticeably separated. Labrum small, transverse, triangularly incised at apex. Palps relatively

small; ultimate palpomeres conspicuously widened distally. Antennal sockets small, separated by narrow lamina. Antenna 11-segmented, narrow and short, slightly compressed; scapus elongate, narrow, pedicel (antennomere 2) noticeably shorter than antennomere 3; antennal pubescence short and decumbent (Figs 2, 3).

Pronotum transverse, narrowing anteriorly from posterior angles, roughly punctate, with explanate sides and anterior margin and rounded posterior angles, with distinct narrow median suture; pronotal 'windows' oblique, relatively narrow, not reaching anterior margin. Scutellum rounded at apex. Elytra elongate, flattened, almost parallel-sided at most of their length, with prominent humeral costa, attaining to elytral apices, densely punctate. Metathoracic wings fully developed (Figs 1–3).

Legs slender; coxae and trochanters elongate, narrow, hind coxae distinctly separated; femurs and tibiae straight, slightly flattened, subequal in length, tibial spurs small, but apparent; tarsi relatively short, tarsomeres 1–3 almost parallel-sided, without plantar pads, tarsomere 4 distally widened, with prominent plantar pad, claws simple (Figs 2–4).

Abdomen with seven ventrites, ventrite 1 half interrupted by metathorax and metacoxae, ultimate ventrite (ventrite 7) symmetrical, in distal half triangular; ultimate tergite transverse, broadly rounded at apex; ventrites 5 and 6 with relatively narrow light organ; large spiracles located at sides of abdomen (Figs 2, 4).

Female. Unknown.

ETYMOLOGY. The name of the new genus is a combination of "Eocene" and the genus name "Lamprohiza". Gender feminine.

DIAGNOSIS. *Eolamprohiza* **gen.n.** differs from the two known lamprohizine genera, the extant West Palearctic *Lamprohiza* Motschulsky, 1853 and Nearctic *Phausis* Leconte, 1852, by the smaller pronotal 'windows', stout humeral elytral costa and narrower light organs on abdominal ventrites (Figs 1).

DISTRIBUTION. Only known from Baltic amber.

REMARKS. In addition to the symmetrical ultimate ventrite the Lamprohizinae are distinguished from Lampyrinae by the symmetrical aedeagus [Kazantsev, 2010], and are placed separately by the molecular analysis [Martin *et al.*, 2019]. As the latter character and the DNA approach are not applicable to amber specimens, the new taxon is referred to Lamprohizinae only tentatively, pending further studies that would possibly be carried out with access to the above-mentioned data.

Eolamprohiza andrushchenkoi Kazantsev **sp.n.**

Figs 1–4.

MATERIAL: Holotype, ♂, specimen No. B 6023, Eocene Baltic amber (Amber Museum, Kaliningrad).

DESCRIPTION. **Male.** Dark brown to black, with whitish yellow and dark yellow spot on penultimate ventrite.



Figs 1–2. General view of *Eolamprohiza andrushchenkoi* **gen.n., sp.n.**, holotype male: 1 — dorsally; 2 — ventrally. Scale bar: 2 mm.

Рис. 1–2. Общий вид *Eolamprohiza andrushchenkoi* **gen.n., sp.n.**, голотип, самец: 1 — сверху; 2 — снизу. Масштабная линейка: 2 мм.

Eyes large, spherical, separated in front by ca 0.5 eye diameter, above – by nearly eye diameter. Ultimate maxillary palpomere securiform, ca. 1.4 times longer than wide, widest before middle. Antennae attaining to metacoxae, scapus narrow, elongate, ca 2.7 times longer than wide; antennomere length ratio: 3 : 1 : 2 : 1.7 : 1.8 : 1.8 : 1.7 : 1.6 : 1.6 : 1.6 : 2 (Figs 2, 4).

Pronotum ca. 2 times as wide as long, bisinuate posteriorly, with broadly rounded posterior angles (Figs 1–3).

Elytra ca. 2.2 times as long as wide at humeri, with short, scarce, semi-erect vestiture (Fig. 1).

Hind tarsomere length ratio: 3.5 : 1.5 : 1 : 1.4 : 2 (Figs 1–4).

Ultimate ventrite (ventrite 7) broad, with median triangular process, almost truncate distally, light organ presumably occupying median fourth of ventrites 5 and 6 (Figs 1B, 3).

Length (from anterior pronotal margin to end of elytra): 10.4 mm. Width (at humeri): 3.5 mm.

Female. Unknown.

SYNINCLUSIONS. A piece of dentate antenna of another insect, probably coleopteran.

ETYMOLOGY. The new species is named after Mr. Konstantin Andrushchenko (Kaliningrad, Russia) through whose courtesy I was able to study this inclusion.

DIAGNOSIS. *Eolamprohiza andrushchenkoi* **sp.n.**, the only known representative of the genus, is distinguishable from other lamprohizines by the generic characters.

REMARKS. The inclusion is well preserved in a relatively large, 23.7×13×7.3 mm (1.9 g), mostly clear amber piece; however, its location in the piece prevents observing it at certain angles from above, and the underside is partly obscured by milky substance.

A checklist of fossil fireflies

Lampyridae Latreille, 1817

Lampyrinae Latreille, 1817

Lampyris Geoffroy, 1762

Type species: *Cantharis noctiluca* Linnaeus, 1767 (designated by Motschulsky, 1853).

†*Lampyris orciluca* Heer, 1865: 377. Upper Miocene Oeningen [Heer, 1865].

Pyropyga Motschulsky, 1853

Type species: *Lampyris nigricans* Say, 1823 (original designation).

†*Pyropyga prima* Wickham, 1912: 19. Lower Oligocene Florissant shales [Wickham, 1912].



Fig. 3. *Eolamprohiza andrushchenkoi* **gen.n., sp.n.**, holotype male, anterior part of body, ventrally. Scale bar: 3 mm.

Рис. 3. *Eolamprohiza andrushchenkoi* **gen.n., sp.n.**, голотип, самец, передняя часть тела, снизу. Масштабная линейка: 3 мм.



Fig. 4. *Eolamprohiza andrushchenkoi* **gen.n., sp.n.**, holotype male, posterior part of body, ventrally. Scale bar: 3 mm.

Рис. 4. *Eolamprohiza andrushchenkoi* **gen.n., sp.n.**, голотип, самец, задняя часть тела, снизу. Масштабная линейка: 3 мм.

Lamprohizinae Kazantsev, 2010

Phausis Leconte, 1852

Type species: *Lampyris reticulata* Say, 1825 (monobasic).

†*Phausis fossilis* Beier, 1952: 131. Upper Oligocene Lusice Halbopal [Beier, 1952].

† *Eolamprohiza* Kazantsev **gen.n.**

Type species: *Eolamprohiza andrushchenkoi* Kazantsev **sp.n.** (original designation).

†*Eolamprohiza andrushchenkoi* Kazantsev **sp.n.** Eocene Baltic amber.

Luciolinae Lacordaire, 1857

Luciola Laporte, 1833

Type species: *Luciola pedemontana* Motschulsky, 1853 (= *Lampyris italica* Linnaeus 1767) (designated by Motschulsky, 1853).

†*Luciola extincta* Heyden, 1862: 69. Lower Miocene or Upper Oligocene Rott brown coal [Heyden, 1862].

Luciola sp. Eocene Baltic amber [Klebs, 1910].

† *Eoluciola* Kazantsev, 2012

Type species: *Eoluciola varang* Kazantsev, 2012 (original designation).

†*Eoluciola varang* Kazantsev, 2012b: 319. Eocene Baltic amber [Kazantsev, 2012b].

† *Protoluciola* Kazantsev, 2015

Type species: *Protoluciola albertalleni* Kazantsev, 2015 (original designation).

†*Protoluciola albertalleni* Kazantsev, 2015: 283. Cretaceous Burmese amber [Kazantsev, 2015].

Ototretinae McDermott, 1964

† *Electotreta* Kazantsev, 2012

Type species: *Electotreta rasnitsyni* Kazantsev, 2012 (original designation).

†*Electotreta rasnitsyni* Kazantsev, 2012a: 62. Eocene Baltic amber [Kazantsev, 2012a].

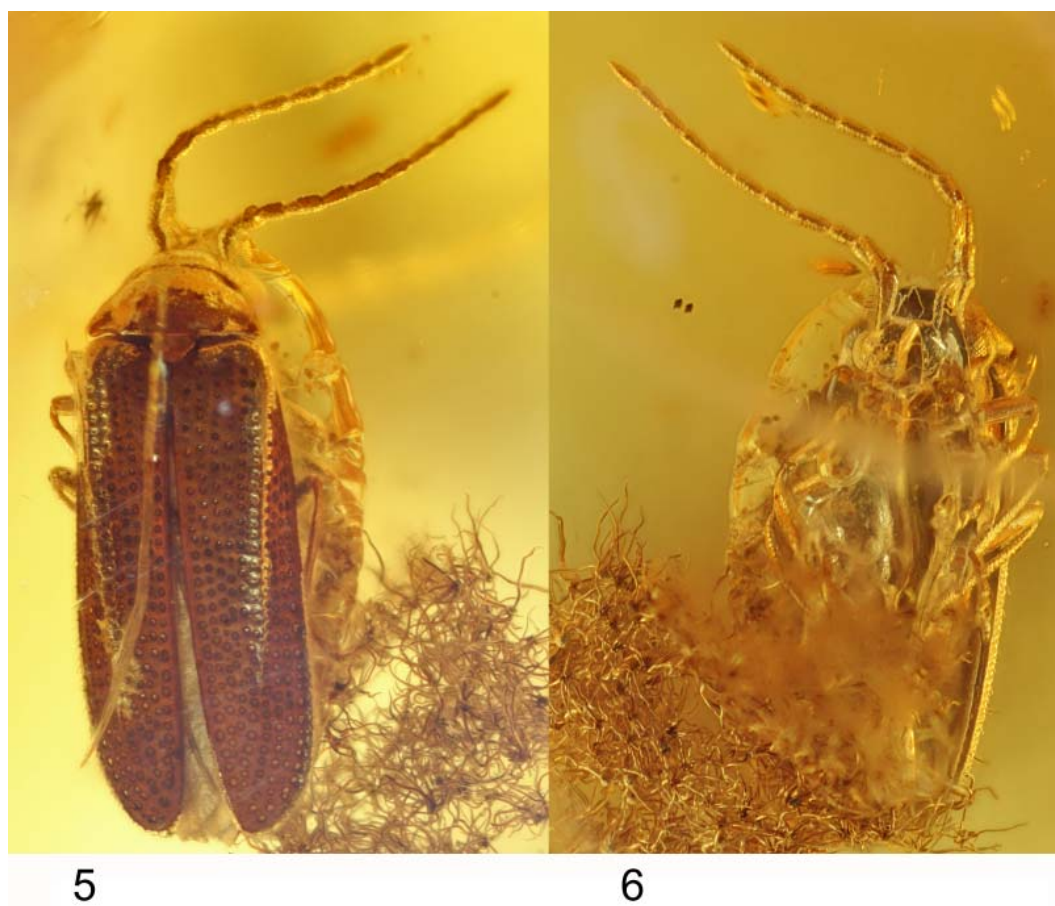
Discussion

The four currently known amber firefly taxa, *Electotreta*, *Eoluciola*, *Protoluciola* and *Eolamprohiza* **gen.n.**, coming from Baltic and Burmese ambers, be-

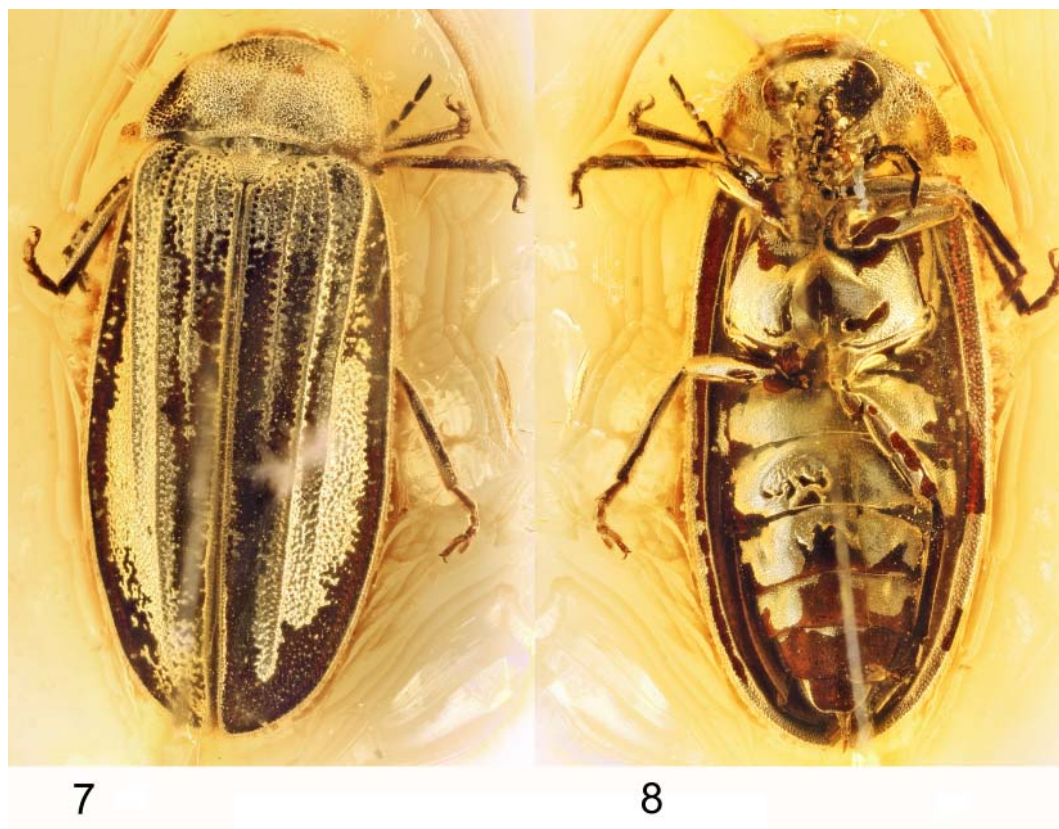
long in three subfamilies, Ototretinae (*Electotreta*), Luciolinae (*Eoluciola* and *Protoluciola*) and Lamprohizinae (*Eolamprohiza* **gen.n.**). The fossil Luciolinae also include a *Luciola* Laporte, 1833 species from Lower Miocene or Upper Oligocene Rott brown coal [Heyden, 1862], while the Lamprohizinae, as a *Lamprohiza* Motschulsky, 1853 (= *Phausis* Leconte, 1852 pro parte) species, previously was reported only from Upper Oligocene Lusice Halbopal [Beier, 1952]. The fourth firefly subfamily known in fossils is Lampyrinae, with a *Lampyrus* Geoffroy, 1762 and a *Pyropyga* Motschulsky, 1853 species described from Upper Miocene Oeningen and Lower Oligocene Florissant shales, respectively [Heer, 1865; Wickham, 1912]. It should be noted, however, that the true identity of the fossil *Lampyrus* and *Luciola* described back in the middle of the nineteenth century needs verification.

A notable fact about the Eocene Baltic and Cretaceous Burmese amber Lampyridae, which are noticeably older than the rest of the fossil fireflies (e.g., Gaigalas & Halas [2009]; Shi *et al.* [2012]), is that all of them have a conspicuously raised humeral elytral costa (Figs 1–10) (also Kazantsev [2013a]), a morphological feature that is uncharacteristic to the extant members of

the three subfamilies where they belong. Interestingly, the same morphological feature is also manifest in all Baltic amber members of the related Lycidae, while being absent or rare in extant net-winged beetles from the same higher taxa, and also in the related, formerly ‘cantharoid’, extinct Berendtimiridae [Winkler 1987a, b; Kazantsev, 2013b, 2019, 2020b; Kazantsev, Bocak, 2022; Fanti *et al.*, 2023; Motyka *et al.*, 2023]. At the same time the amber soldier beetles, of the same ‘cantharoid’ clade, in most cases do not seem to possess similarly raised elytral costa running from the humerus, with rare exceptions, such as in the Baltic amber *Podosilis gedaniensis* Kazantsev, 2020 or Burmese amber *Burmomiles willerslevorum* Fanti *et al.*, 2018 [Fanti *et al.*, 2018; Kazantsev, 2020a; Motyka *et al.*, 2023], despite the intensive studies on the fossil history of the group in recent years. Given the sister group relationship between Lycidae, Cantharidae and Lampyridae established by a DNA based analysis, with Cantharidae occupying the intermediate position between the other two families (e.g., Kusy *et al.* [2018]), it is tempting to conclude that the (presumably more challenging) biological conditions the Lycidae and Lampyridae were evolving in at least from 100 to 35–50 Myr, that led to the appearance of a



Figs 5–6. General view of *Electotreta rasnitsyni*, holotype male: 5 — dorsally; 6 — ventrally (after Kazantsev, 2012a).
Рис. 5–6. Общий вид *Electotreta rasnitsyni*, голотип, самец: 5 — сверху; 6 — снизу (по: Kazantsev, 2012a).



Figs 7–8. General view of *Eoluciola varang*, holotype female: 7 — dorsally; 8 — ventrally (after Kazantsev, 2012b).
Рис. 7–8. Общий вид *Eoluciola varang*, голотип, самка: 7 — сверху; 8 — снизу (по: Kazantsev, 2012b).



Figs 9–10. General view of *Protoluciola albertalleni*, holotype male: 9 — dorsally; 10 — ventrally. Scale bar: 1 mm (after Kazantsev, 2015).
Рис. 9–10. Общий вид *Protoluciola albertalleni*, голотип, самец: 9 — сверху; 10 — снизу. Масштабная линейка: 1 мм (по: Kazantsev, 2015).

prominent humeral costa in their elytra as a reinforced upper shield for their wings, were significantly different from those of Cantharidae, where such character is come across on much rarer occasions.

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