

РОССИЙСКАЯ АКАДЕМИЯ НАУК
Южный научный центр

RUSSIAN ACADEMY OF SCIENCES
Southern Scientific Centre



Кавказский Энтомологический Бюллетень

CAUCASIAN ENTOMOLOGICAL BULLETIN

Том 20. Вып. 1
Vol. 20. Iss. 1



Ростов-на-Дону
2024

A new firefly species (Coleoptera: Lampyridae) from Lorestan, with a key to *Lampyris* s. str. Geoffroy, 1762 of Transcaucasia and Iran

© S.V. Kazantsev

Insect Centre, Donetskaya str., 13–326, Moscow 109651 Russia. E-mail: kazantss@mail.ru

Abstract. A new species of fireflies, *Lampyris* (s. str.) *lorestanica* sp. n., is described from the Iranian province Lorestan. The number of *Lampyris* Geoffroy, 1762 species of Iran is thus raised to five and the number of *Lampyris* s. str. species known in Transcaucasia and Iran to four. The aedeagi of *L.* (s. str.) *noctiluca* (Linnaeus, 1758), *L.* (s. str.) *orientalis* Faldermann, 1835 and *L.* (s. str.) *caucasica* (Motschulsky, 1854) are illustrated by photographs for the first time. A key to *Lampyris* s. str. species of the area is provided. The history of misinterpretation of *Lamprotomus caucasicus* Motschulsky, 1854 is briefly reviewed.

Key words: Coleoptera, Lampyridae, Lampyrinae, Lampyrini, *Lampyris*, new species, Palaearctic.

Новый вид светлячков (Coleoptera: Lampyridae) из Лорестана, с определительной таблицей видов *Lampyris* s. str. Geoffroy, 1762 Закавказья и Ирана

© С.В. Казанцев

Инсект-центр, ул. Донецкая, 13–326, Москва 109651 Россия. E-mail: kazantss@mail.ru

Резюме. Из иранской провинции Лорестан описан новый вид светлячков, *Lampyris* (s. str.) *lorestanica* sp. n. Число видов *Lampyris* Geoffroy, 1762 в Иране, таким образом, увеличивается до пяти, а число видов *Lampyris* s. str., известных из Закавказья и Ирана, до четырех. Впервые приводятся фотографии эдеагусов *L.* (s. str.) *noctiluca* (Linnaeus, 1758), *L.* (s. str.) *orientalis* Faldermann, 1835 и *L.* (s. str.) *caucasica* (Motschulsky, 1854). Дана определительная таблица видов *Lampyris* s. str. региона. Кратко изложена история неверной интерпретации вида *Lamprotomus caucasicus* Motschulsky, 1854.

Ключевые слова: Coleoptera, Lampyridae, Lampyrinae, Lampyrini, *Lampyris*, новый вид, Палеарктика.

Introduction

The firefly genus *Lampyris* Geoffroy, 1762, which is confined to the Palaearctic and Afrotropical realms, lists over 60 species [McDermott, 1966; Geisthardt, Satô, 2007], considering that some of them, coming from the Western Hemisphere, proved to belong, as consequent studies demonstrated, to a different genus [Geisthardt, 1986]. The Palaearctic *Lampyris* includes about 30 species, or 40 species-level taxa, if subspecies are also taken into consideration, the greater part of which occur in the Mediterranean region, with just a few taxa recorded east of it: three species in Central Asia, one species in Nepal and one species in northeastern China [Geisthardt, Satô, 2007; Kazantsev, 2010, 2011].

At the same time only three species of *Lampyris* have so far been registered in Transcaucasia. They are the old, eighteenth and nineteenth century *L. noctiluca* (Linnaeus, 1758), *L. orientalis* Faldermann, 1835 and *L. caucasica* (Motschulsky, 1854) [Geisthardt, Satô, 2007; Kazantsev, 2010, 2011]. Additionally, *L. turkestanica* Heyden, 1881 has been reported from Iran [Modarres Awal, 2012]. The latter species was recently referred to the subgenus *Bactrolychnia* Kazantsev, 2010, while the remaining three to *Lampyris* s. str. [Kazantsev, 2010].

A possibility to study further firefly material allowed discovering a new species of *Lampyris* from Iran. Its study demonstrated that it is yet another species of *Lampyris* s. str.

The description of the new taxon is given below.

Material and methods

The studied beetles before the examination were relaxed in water; then, their detached abdomens were kept for several hours in 10% KOH at room temperature. The KOH treated aedeagi and terminal abdominal segments were then placed in microvials with glycerin for photographing.

MSP-1 stereoscopic microscope with 8–80× zoom magnification range was used for examination of diagnostic characters. Photographs were taken with a Canon EOS 6D camera equipped with Canon MP-E 65 mm lens and processed with Zerene Stacker and Adobe Photoshop software.

Transcaucasia is considered to include the territory of Georgia, Armenia and Azerbaijan.

The higher taxonomy of the family is given in accordance with Martin et al. [2019].

The body length is measured from the anterior part of head to the apices of elytra.

Family Lampyridae Rafinesque, 1815
Subfamily Lampyrinae Rafinesque, 1815
Tribe Lampyrini Rafinesque, 1815
Genus *Lampyris* Geoffroy, 1762
Subgenus *Lampyris* Geoffroy, 1762

Lampyris Geoffroy, 1762: 165 (type species *Cantharis noctiluca* Linnaeus, 1758 (subsequent designation by Motschulsky [1853])).

Lamprotomus Motschulsky, 1853: 46 (type species *Lampyris orientalis* Faldermann, 1835 (original designation)).

Lampyris (s. str.) *lorestanica* Kazantsev, **sp. n.**
(Figs 1–6)

Material. Holotype, ♂ (Insect Center, Moscow, Russia): “W Iran (Lorestan), 10 km SW Dorud, 1431 m, 33°26'N 49°00'E (lux), 9.VII.2004, M. Rejzek leg.”

Description. Male. Testaceous; antennae, maxillae, tibiae, tarsi and abdominal segments light brown (Figs 1, 2).

Eyes large, spherical, separated below labium by ca 0.16 eye length. Ultimate maxillary and labial palpomeres narrowed and flattened distally. Antennae filiform, attaining to mesocoxae, scapus narrow, elongate, ca 2.5 times longer than wide, pedicel (antennomere 2) elongate; antennomere length ratio: 2.1 : 1.05 : 1.45 : 1.7 : 1.17 : 1.17 : 1.13 : 1.1 : 1.05 : 1 : 1.3 (Figs 1, 2).

Pronotum ca 1.2 times wider than long, medially broadly sinuate posteriorly, rounded anteriorly, with minute obtuse posterior angles, densely covered with large punctures.

Scutellum trapezoidal, about as long as wide, truncate at apex (Fig. 1). Elytra relatively short, only 2.25 times longer than wide at humeri, distinctly narrowing distally, roughly punctate, with three noticeable, oblique, with regards to suture, almost attaining to suture (first) or elytral apex (second and third) costae and short, scarce, semi-erect vestiture (Fig. 1).

Hind tarsomere length ratio: 4.5 : 2.5 : 1.5 : 1 : 3.3 (Fig. 2).

Ultimate ventrite (ventrite 7) and tergite transverse, feebly convex medially at distal margin (Fig. 3). Sternite 9, constituting the ventral part of the invaginated genital capsule enveloping the aedeagus, slightly asymmetrical, with little sclerotised medially distal portion (Fig. 4).

Aedeagus elongate, narrowing distally, with noticeably constricted above the base median piece, equipped with laterally produced appendages before apex; parameres noticeably longer than median piece, not abruptly narrowed before apex, with outwardly bent, distally pointed inner tooth (Figs 5, 6).

Length: 9.3 mm. Width (at humeri): 2.9 mm.

Female unknown.

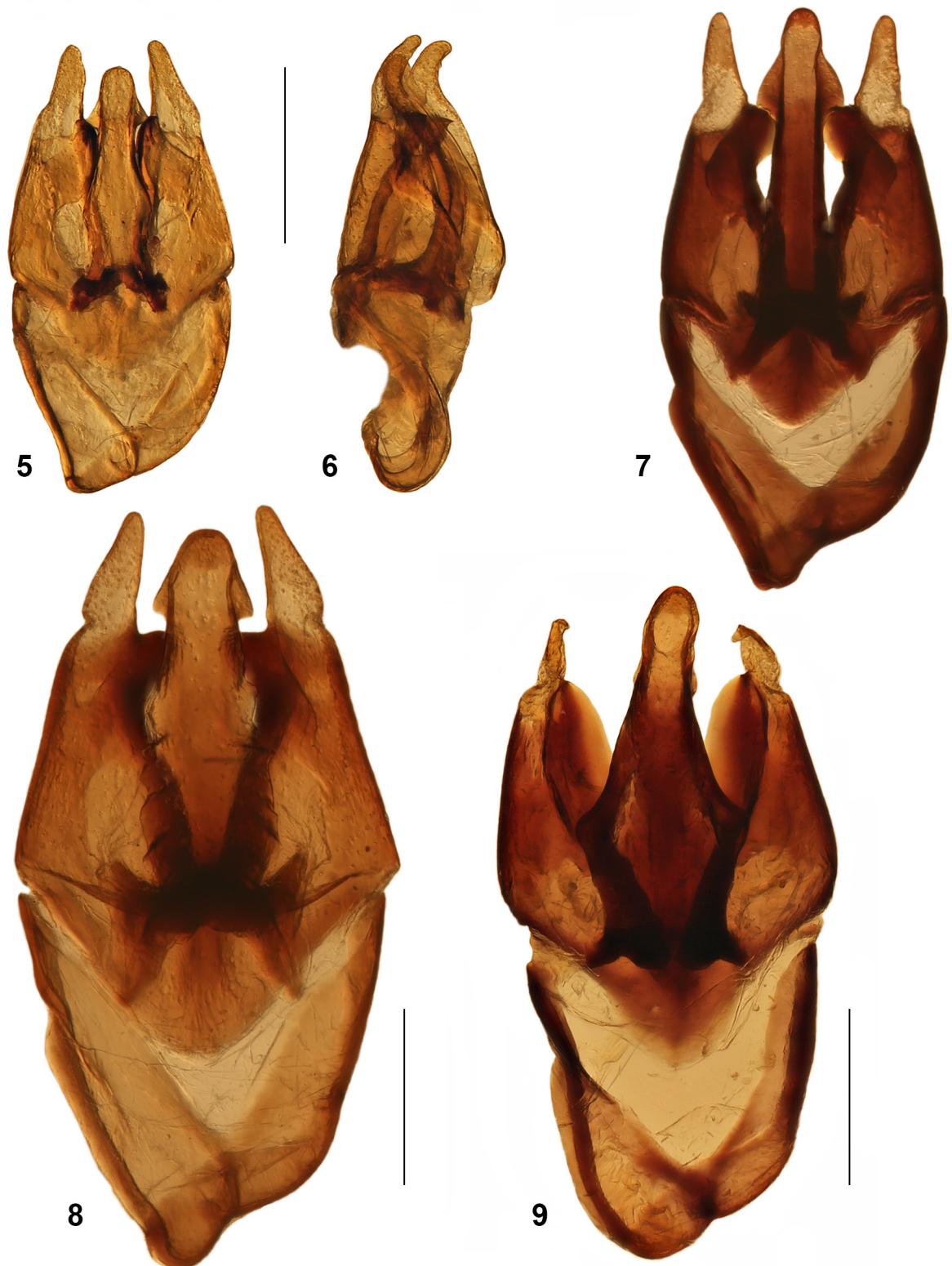


Figs 1–4. *Lampyris* (s. str.) *lorestanica* **sp. n.**, male, holotype, general view and details of structure.

1 – habitus, dorsally; 2 – habitus, ventrally; 3 – ultimate ventrite and tergite; 4 – invaginated genital capsule. Scale bars 0.5 mm.

Рис. 1–2. *Lampyris* (s. str.) *lorestanica* **sp. n.**, самец, голотип, общий вид и детали строения.

1 – габитус, сверху; 2 – габитус, снизу; 3 – верхинный вентрит и тергит; 4 – внутренняя генитальная капсула. Масштабные линейки 0.5 мм.



Figs 5–9. Aedeagi of *Lampyris* s. str.

5–6 – *L. lorestanica* **sp. n.**, holotype; 7 – *L. noctiluca*; 8 – *L. caucasica*; 9 – *L. orientalis*. 5, 7–9 – ventrally; 6 – laterally. Scale bars 0.5 mm.

Рис. 5–9. Эдеагусы *Lampyris* s. str.

5–6 – *L. lorestanica* **sp. n.**, голотип; 7 – *L. noctiluca*; 8 – *L. caucasica*; 9 – *L. orientalis*. 5, 7–9 – снизу; 6 – сбоку. Масштабные линейки 0.5 мм.

Diagnosis. *Lampyrus* (s. str.) *lorestanica* **sp. n.** can be easily distinguished from all of the more common species of the area, i.e., *L. noctiluca*, *L. orientalis* and *L. caucasica*, by the shortened elytra (Fig. 1) and distally pointed inner tooth of the parameres (Figs 5, 6). It also differs from *L. angustula iraqi* Geisthardt, 1999, from Kurdistan in Iraq, the nearest location where *Lampyrus* s. str. species other than the above mentioned are known to occur [Geisthardt, Satô, 2007], in the distinctly shorter elytra and elongate antennomere 2 (Fig. 2) vs not shortened elytra and subquadrate antennomere 2 in *L. angustula iraqi* [Geisthardt, 1999], as well as robust and not concave laterally parameres with outwardly bent, distally pointed inner tooth (Figs 5, 6) vs slender and concave laterally parameres with not distally pointed inner tooth in *L. angustula iraqi* [Geisthardt, 1999].

Etymology. The new species is named after the province in Iran, where the unique specimen was collected.

Identification key to *Lampyrus* (s. str.) species of Transcaucasia and Iran

1. Ventrite 7 in male typically with rather narrow incision medially (Fig. 13). Parameres with short rounded inner tooth (Fig. 10). Female without vestiges of wings *L. (s. str.) noctiluca*
- Ventrite 7 in male with broad medial semicircular incision or almost straight (Figs 3, 14, 15). Parameres with acute and/or elongate inner tooth (Figs 5, 6, 8, 9). Female with vestigial elytra (females not known in *L. lorestanica* **sp. n.**) 2
2. Pronotum with translucent ‘windows’ near anterior margin (Fig. 11). Aedeagus with gradually narrowing distally in ventral view median piece; parameres with elongate, not bulging interiorly inner tooth (Fig. 9) *L. (s. str.) orientalis*
- Pronotum without translucent ‘windows’ near anterior margin (Figs 1, 12). Median piece of aedeagus with laterally produced in ventral view appendages near apex; parameres with bulging transverse or distally pointed inner tooth (Figs 5, 6, 8) 3
3. Elytra relatively long, ca 2.6 times longer than wide at humeri (Fig. 12). Male ventrite 7 with broad semicircular incision at distal margin, ultimate visible tergite distally almost straight (Fig. 15). Parameres with inwardly directed, distally rounded inner tooth (Fig. 8) *L. (s. str.) caucasica*
- Elytra short, only 2.25 times longer than wide at humeri (Fig. 1). Male ventrite 7 with almost straight distal margin, ultimate visible tergite inconspicuously convex medially (Fig. 3). Parameres with outwardly bent, distally pointed inner tooth (Figs 5, 6) *L. (s. str.) lorestanica* **sp. n.**

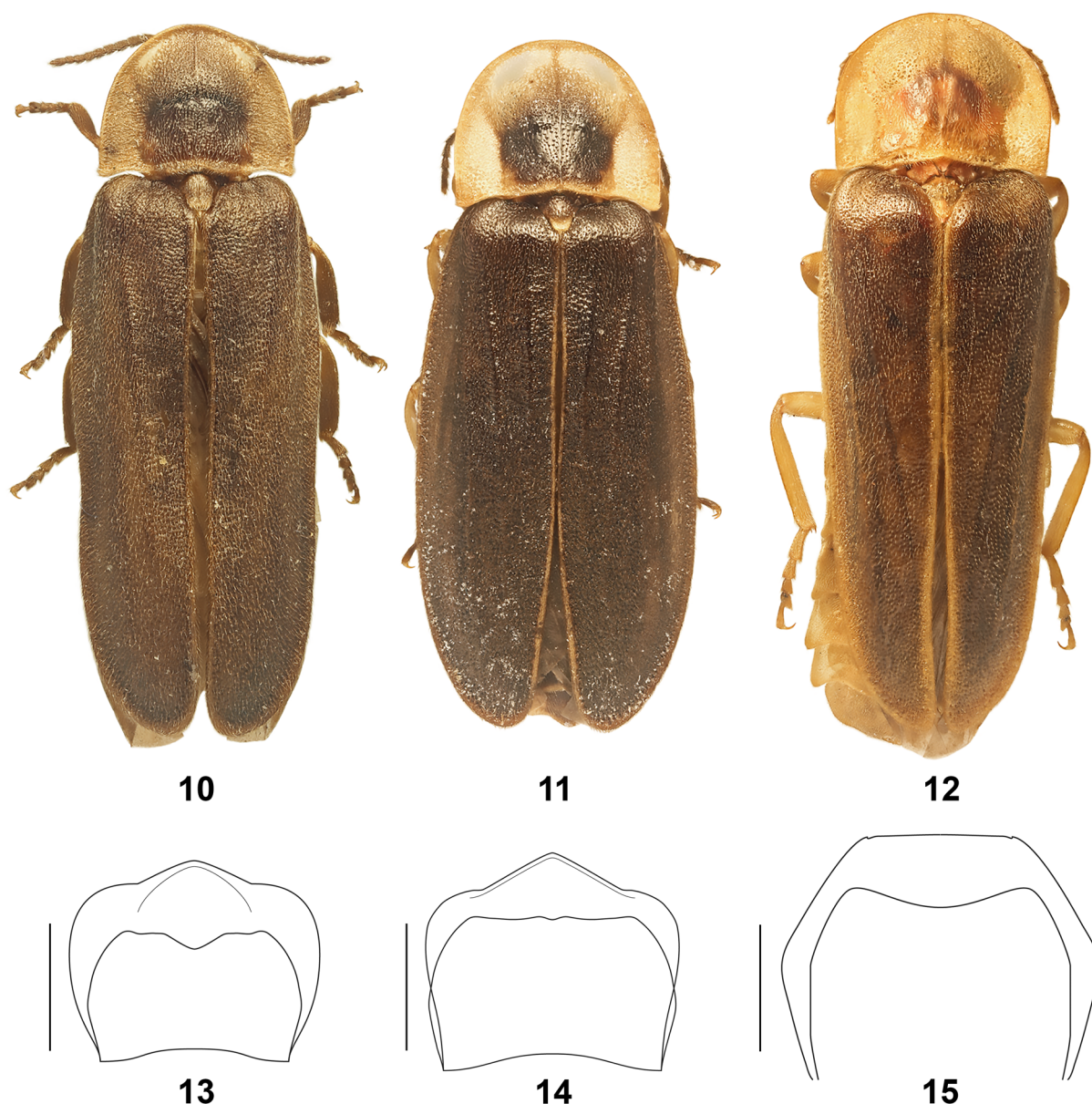
The history of misinterpretation of *Lamprotomus caucasicus* Motschulsky, 1854

While the identity of *Lampyrus noctiluca* and *L. orientalis* raised no doubts [Geisthardt, 1999; Kazantsev, 2010], *L. caucasica* proved to be a “hard nut to crack”,

mainly because the type specimen of the taxon described as *Lamprotomus caucasicus* has apparently been lost [Geisthardt, 1982a; Kazantsev, Nikitsky, 2008; Kazantsev, 2010]. First, it was erroneously attributed to the genus *Nyctophila* Olivier, 1884, which differs from *Lampyrus* in the presence of a median process at the distal margin of ultimate sternite [Olivier, 1884] – whereas in the description of *Lamprotomus* the author indicates that the distal margin of the ultimate upper (?) abdominal segment has a small median incision: ‘dernier segment du dessus de l’abdomen transversal, arrondi et un peu émarginé au milieu du bord postérieur’ [Motschulsky, 1853: 46]; the description of *Lamprotomus caucasicus* does not say a word about a median process at the distal margin of ultimate sternite either; instead, it indicates that the last abdominal segment, again, is medially feebly sinuate at its distal margin (‘dernier segment de l’abdomen presque elliptique, et faiblement sinué au milieu du bord postérieur’) [Motschulsky, 1854: 19]. As the actual shape of the distal margin of ultimate tergite/pygidium in both *Nyctophila* and *Lampyrus* is always convex, without any trace of median incision [Geisthardt, 1982a, b, 1999; Kazantsev, 2010], it does not allow referring *Lamprotomus caucasicus* to either of them (as *Lamprotomus* Motschulsky, 1853 is considered a junior synonym of the latter [McDermott, 1966]), if we presume that the said ‘ultimate abdominal segment’ is indeed the ultimate tergite. This is not probable, as there are no lampyrine species in the region, other than members of these two genera [Geisthardt, Satô, 2007; Kazantsev, 2010, 2011, 2022]. At the same time presuming that what Motschulsky [1854] meant under ‘segment de l’abdomen’ was in fact the ultimate ventrite, which is apparently the case, confidently brings *Lamprotomus caucasicus* to *Lampyrus*.

Not only was *Lamprotomus caucasicus* erroneously referred to *Nyctophila* [Olivier, 1884], it was later designated as type species of the latter genus [McDermott, 1964]! The correct type species, however, fixed already in the original description by Olivier [1884] was afterwards restored [Geisthardt, 1982b].

Then Geisthardt [1982a], although citing Motschulsky’s contradicting description of the taxon and mentioning the fact that Olivier had not seen its type, nevertheless designated a *Nyctophila* specimen from Iran (‘Kulek, Pers. sept.’) as neotype of *Lamprotomus caucasicus*, whereas the taxon had been described from the alpine zone of Mount Kazbek, in the centre of the Greater Caucasus (‘Alpes de Caucase. (Kasbeck)’) [Motschulsky, 1854]. In this respect, in accordance with Art. 75.3 of the International Code of Zoological Nomenclature, the designation of neotype by Geisthardt [1982a] was considered invalid, as there was evidence that the neotype was not consistent with what is known of the former name-bearing type from the original description and as there was evidence that the neotype did not come as nearly as practicable from the original type locality; instead a new neotype, representing a widespread, albeit rare, Caucasian *Lampyrus* species, matching the original description and occurring in the Central Caucasus as well, was fixed and deposited in the Motschulsky collection of Zoological Museum of Moscow State University (Moscow, Russia) [Kazantsev, 2010].



Figs 10–12. *Lampyris* s. str., males, general view and details of structure. 10, 13 – *L. noctiluca*; 11, 14 – *L. orientalis*; 12, 15 – *L. caucasica*. 10–12 – habitus; 13–15 – ultimate abdominal segments, ventrally. Scale bars 1 mm. 12 – after Kazantsev [2022], 13–15 – after Kazantsev [2010].

Рис. 10–12. *Lampyris* s. str., самцы, общий вид и детали строения. 10, 13 – *L. noctiluca*; 11, 14 – *L. orientalis*; 12, 15 – *L. caucasica*. 10–12 – габитус; 13–15 – вершинные сегменты брюшка, снизу. Масштабные линейки 1 мм. 12 – по [Kazantsev, 2022], 13–15 – по [Kazantsev, 2010].

Acknowledgements

It is my pleasant duty to express gratitude to Dr Andreas Kopetz (Eischleben, Germany) for the possibility to study the ample Asian ‘Cantharoidea’ material from his collection that included this remarkable specimen and to the reviewers that helped to improve the manuscript.

References

Geisthardt M. 1982a. Zur Kenntnis von *Nyctophila caucasica* (Motschulsky, 1854) und Beschreibung neuer Subspecies und einer Species aus

dem Kaukasus (Coleoptera: Lampyridae: Lampyrini). 2. Beitrag zur Kenntnis der Gattung *Nyctophila* Olivier 1884. *Entomologische Blätter für Biologie und Systematik der Käfer*. 78(2–3): 66–74.
 Geisthardt M. 1982b. Beitrag zur Kenntnis der *Nyctophila* Olivier, 1884 (Coleoptera, Lampyridae). *Annales Historico-Naturales Musei Nationalis Hungarici*. 74: 115–128.
 Geisthardt M. 1986. *Pleotomodes* Green 1948 a valid genus, not a junior synonym of *Lampyris* Müller 1764 (Coleoptera: Lampyridae: Lampyrinae). *The Coleopterists Bulletin*. 40(4): 297–300.
 Geisthardt M. 1999. Neue paläarktische Lampyridae und Anmerkungen zu bekannten Arten (Coleoptera). *Mitteilungen des Internationalen Entomologischen Vereins*. 24(3/4): 95–109.
 Geisthardt M., Sató M. 2007. Family Lampyridae Latreille, 1817. In: Catalogue of Palaearctic Coleoptera. Vol. 4. Elateroidea – Derodontoidea – Bostrichoidea – Lymexyloidea – Cleroidea – Cucujoidea. Stenstrup: Apollo Books: 225–234.

- Geoffroy M. 1762. Histoire abrégée des insectes, qui se trouvent aux environs de Paris; dans laquelle ces Animaux sont rangés suivant un ordre méthodique. Tome première. Paris: Durand. [4] + xxviii + 523 + 1 p., 11 pls. DOI: 10.5962/bhl.title.14710
- International Commission on Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth edition. London: International Trust for Zoological Nomenclature, British Museum (Natural History), and University of California Press, U.S.A. 306 p.
- Kazantsev S.V. 2010. Fireflies of Russia and adjacent territories (Coleoptera: Lampyridae). *Russian Entomological Journal*. 19(3): 187–208 (in Russian). DOI: 10.15298/rusentj.19.3.06
- Kazantsev S.V. 2011. An annotated checklist of Cantharoidea (Coleoptera) of Russia and adjacent territories (To the centenary of the ninth issue of "Beetles of Russia and Western Europe" by Jacobson). *Russian Entomological Journal*. 20(4): 387–410. DOI: 10.15298/rusentj.20.4.05
- Kazantsev S.V. 2022. Elektronnyy opredelitel' zhukov-mygakotelok (Coleoptera, Cantharidae) evropeyskoy chasti Rossii i Severnogo Kavkaza [Electronic identification key to soldier-beetles (Coleoptera, Cantharidae) of the European part of Russia and the Northern Caucasus]. Livny: Mukhametov G.V. 110 p. (in Russian).
- Kazantsev S.V., Nikitsky N.B. 2008. Types of fireflies (Coleoptera, Lampyridae) in the Motschulsky collection. *Byulleten' Moskovskogo obshchestva ispytateley prirody. Otdel biologicheskii*. 113(5): 23–30 (in Russian).
- Martin G.J., Stanger-Hall K.F., Branham M.A., Da Silveira L.F.L., Lower S.E., Hall D.W., Li X.-Y., Lemmon A.R., Moriarty Lemmon E., Bybee S.M. 2019. Higher-level phylogeny and reclassification of Lampyridae (Coleoptera: Elateroidea). *Insect Systematics and Diversity*. 3(6): 1–15. DOI: 10.1093/isd/ixz024
- McDermott F.A. 1964. The taxonomy of the Lampyridae (Coleoptera). *Transactions of the American Entomological Society*. 90(1): 1–72.
- McDermott F.A. 1966. Lampyridae. Coleopterorum Catalogus Supplementa. Pars 9. Berlin: W. Junk. 149 p.
- Modarres Awal M. 2012. Family Lampyridae (Coleoptera). In: List of agricultural pests and their natural enemies in Iran. Third Edition. Mashhad: Ferdowsi University Press: 345.
- Motschulsky V. 1853. Lampyridae. In: Etudes entomologiques. Vol. 1. 1852. Helsingfors: Imprimerie de la Société de Littérature Finnoise: 25–58.
- Motschulsky V. 1854. Lampyridae (continuation). In: Etudes entomologiques. Vol. 3. Helsingfors: Imprimerie de la Société de Littérature Finnoise: 15–26.
- Olivier E. 1884. Essai d'une révision des espèces européennes & circuméditerranéennes de la famille des lampyridae. *Abeille, Journal d'Entomologie*. 22: 1–54 + [2] pp., 2 pls + Notes complémentaires, 1–4.

Received / Поступила: 10.05.2024

Accepted / Принята: 23.05.2024

Published online / Опубликовано онлайн: 16.07.2024