

# A new species of the Genus *Triodia* Hübner, [1820] from Turkmenistan (Lepidoptera, Hepialidae)

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## Abstract

A new species, *Triodia turkmenica* Knyazev, sp.n. from Turkmenistan, is described. A detailed description of the external characteristics of the male and female, as well as the structure of the genitalia, is provided. The new species is closely related to *Triodia laetus* (Staudinger, 1877) but is distinguished by its smaller size, lighter and more mottled coloring. There is also an external similarity with *Triodia amasinus* (Herrich-Schäffer, [1852]) from which the new species differs well in the structure of the genitalia. The female of the new species is similar to the female of *Triodia sylvina* (Linnaeus, 1761), but differs well from it in a strongly segmented wing pattern.

## Keywords

*Triodia turkmenica*, Lepidoptera, Hepialidae, Turkmenistan, biodiversity, new species

## Introduction

The genus *Triodia* Hübner, [1820] currently includes seven described species: *T. adriaticus* (Osthelder, 1931), *T. amasinus* (Herrich-Schäffer, [1852]), *T. froitzheimi* (Daniel, 1967), *T. laetus* (Staudinger, 1877), *T. mlokossevitschi* (Romanoff, 1884), *T. nubifer* (Lederer, 1853) and *T. sylvina* (Linnaeus, 1761). All of them inhabit Eurasia: *T. sylvina* is widespread in the Palearctic, *T. adriaticus* live in southeastern Europe, *Triodia amasinus* – in southeastern Europe and Asia Minor, two species *T. laetus*

and *T. mlokossevitschi* live in the Caucasus, *T. froitzheimi* inhabit Middle East and one species *T. nubifer* known from Altai in Russia and Kazakhstan (Freina de and Witt 1990; Knyazev 2019; Grehan and Knyazev 2019; Grehan et al. 2023; Knyazev 2025). A series of specimens belonging to none of the known species was found in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg.

## Materials and methods

The specimens are deposited in the following collections: Collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZISP); private collection of Svyatoslav Knyazev, Omsk, Russia (CSKO). The collectible specimens were photographed using a Canon EOS 5D Mark II camera with a Canon EF-100mm macro lens. The genital preparations were obtained by boiling in a 10% KOH solution. Genital preparations are stored in glycerol, pinned under the specimens. The images of the genitals were obtained using the equipment of the Laboratory of Insect Taxonomy of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg. The map was prepared in Adobe Photoshop 2020 using free-accessed background layer from: <https://freeworldmaps.net/asia/turkmenistan/turkmenistan-map-physical.jpg>.

The holotype and eleven paratypes (10 ♂♂ and 1 ♀) are kept in the collection of Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZISP); three paratypes (3 ♂♂) are stored in private collection of Svyatoslav Knyazev, Omsk, Russia (CSKO).

## Results

### *Triodia turkmenica* sp.n.

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Figs 1–3, 9–10

**Material. Holotype**, ♂ (Fig. 1) with the following labels separated by forward slashes: / Aidere [south-western Turkmenistan, Balkan Province, Magtymguly District, Aydere village, 38°24'N 56°45'E], Eylandt (printed black text with the black frame) / Кол. Вел. Кн. Николая Михайловича (collection of Grand Duke Nikolai Mikhailovich, printed black text) / 23/VIII (small square label with the text written in black ink) / HOLOTYPUS ♂, *Triodia turkmenica* S. Knyazev, 2025 (printed black text on the red paper) (ZISP); **Paratypes**, 13 ♂♂, 1 ♀ with the same data labels as for holotype but with the different collecting dates: 23/VIII (1 ♂), 23/8 (1 ♂), 24/VIII, GEN. PREP SK0098 (1 ♂, Fig. 3), 2/9 (1 ♂), 3/9 (1 ♂), 6/IX (1 ♂ with a broken abdomen, pinned under the specimen), 2.9.[18]93 (1 ♂ with additional label, the text

written in black ink on the green paper), Eylandt, without date, (1♂ with additional label, the text written in black ink on the green paper), one ♂ without date; 20.VII (1♂), 23.7.[18]93 (1♀, Fig 2) (ZISP), 23/VIII (2♂), 2/IX (1♂) (CSKO).

**Ethymology.** The specific name derived from Turkmenistan, the country where the new species is described from.

**Description. Male.** (holotype) The forewing length is 15 mm; wingspan is 30 mm; body length 11 mm; antenna length 4 mm. The coloration of the head, thorax, and abdomen is light ochreous. The antennae are comb-shaped. The main background of the wings is light pale-brown. The pattern is represented by light stripes and spots forming a V-shaped band characteristic of the genus. The outer part of this sling is approximately equal in thickness to the inner part. The hindwings are monotonous light-ochreous, with small light spots on the costal edge. The fringe is light-ochreous.

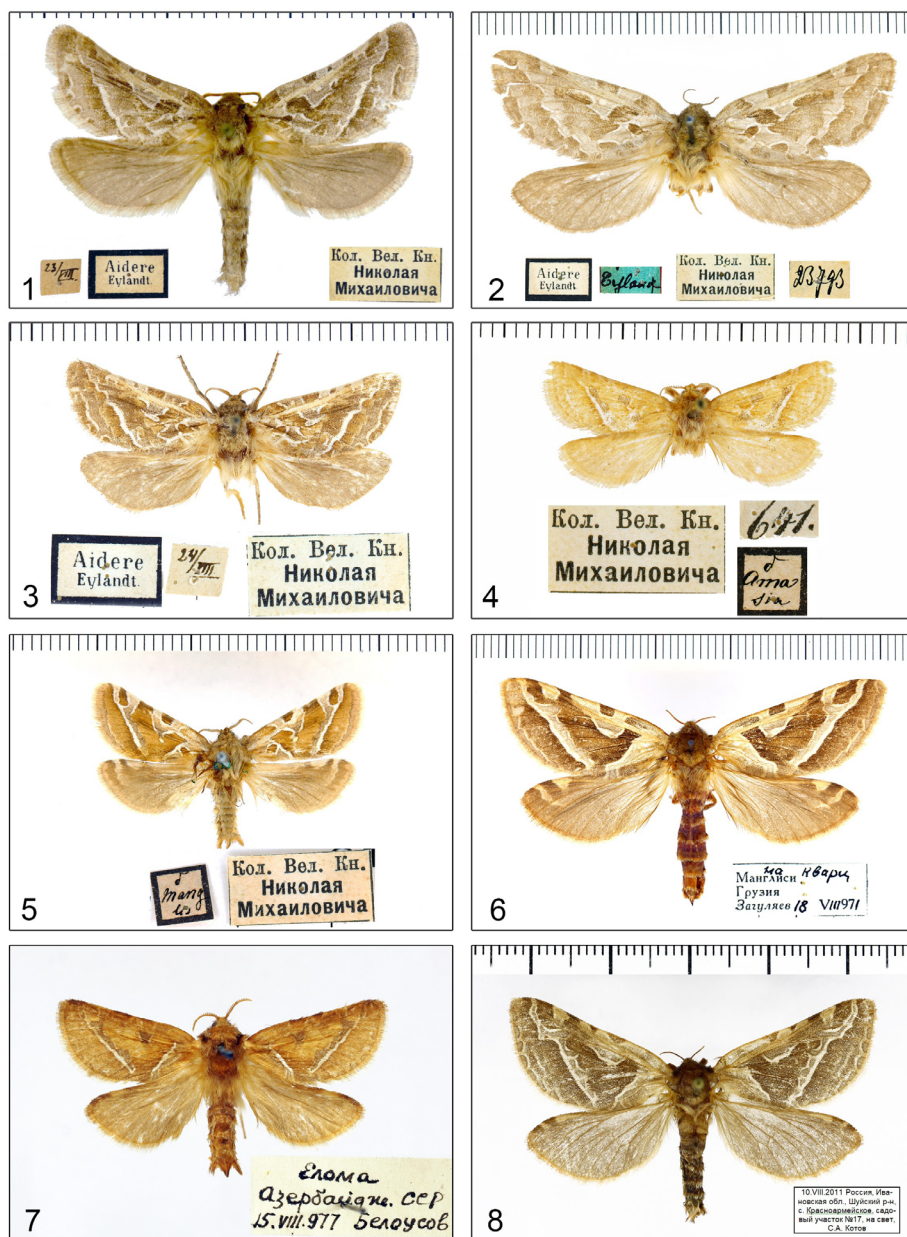
**Male genitalia.** The tegumen is wide, triangular in shape, with long hook-shaped outgrowths. The valves are simple, elongated, rounded at the outer edge, slightly curved, completely covered with hairs. The vinculum is wide, the saccus is massive, triangular in shape.

**Female.** The forewing length is 23 mm, wingspan 48 mm. The coloration of the head, thorax, and abdomen is grey or grayish-ochreous. The antennae are saw-toothed. The pattern of the wings is the same as that of the male, but the V-shaped band consists of strongly segmented light and dark areas slightly offset from each other. The hindwings are monotonous pale-gray. The fringe is plain, pale-brown.

**Female genitalia.** The dorsal plate is smooth, slightly sclerotized. Lamella antevaginalis lobes small, triangular in shape.

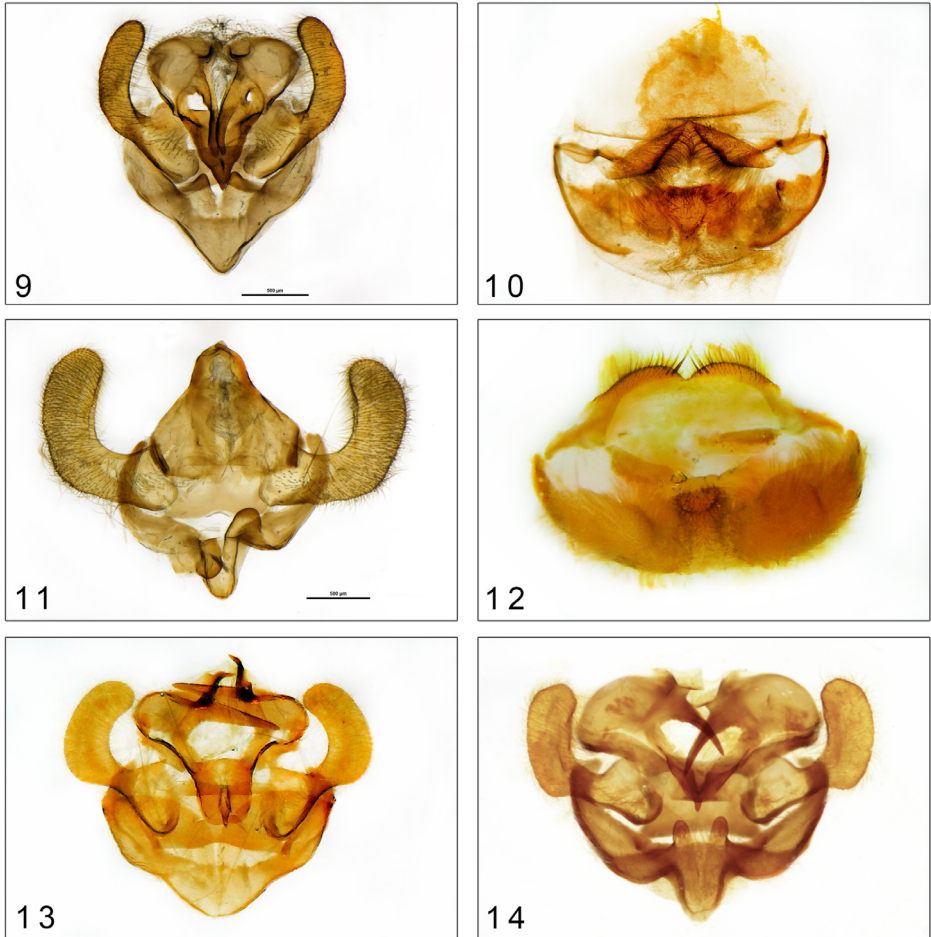
**Individual variability.** In general, the species is quite slightly variable. The coloration of the wings may sometimes be somewhat lighter than that of the holotype. The forewing length of males varies from 11 to 15 mm, wingspan – from 23 to 30 mm.

**Diagnosis.** The male of *T. turkmenica* (Figs 1, 3) is similar to the male of *T. laetus* (Fig. 5). It differs well in the pattern and coloring of the wings as well as the structure of the genitals. There is also an external similarity with *Triodia amasinus* (Fig. 4) from which the new species differs well in the larger size and structure of the genitals. The valves of *T. turkmenica* (Fig. 9) are narrower and longer than in *T. laetus* (Fig. 11), they also differ well from *T. amasinus* (Fig. 13), in which they are short, wide, constricted at the base, and look like beans; a different form of tegumen: the new species has a tegumen with large hook-shaped outgrowths, unlike the small outgrowths in *T. amasinus* and their complete absence in *T. laetus*. A pointed triangular mesosome distinguishes the new species from others. The new species also has good differences in the triangular shape of the saccus, in contrast to the circumferential wide saccus in *T. amasinus* and the strongly narrowed circle in *T. laetus*. The new species differs well from *T. sylvina* (Figs 7, 14) in wing pattern and genitalia (the shape of valva and saccus). The female of the new species is similar to the female of *T. sylvina* (Figs 8, 10) and *T. laetus* (Figs 6, 12), but differs well from them in a strongly segmented wing pattern and genitalia structures.



**Figures 1–8. *Triodia*, adult specimens:**

1. *Triodia turkmenica*, holotype, with its labels, ♂, Turkmenistan, Aidere (ZISP);
2. *Triodia turkmenica*, paratype, with its labels, ♀, Turkmenistan, Aidere (ZISP);
3. *Triodia turkmenica*, paratype, with its labels, ♂, Turkmenistan, Aidere, SK0098 (ZISP);
4. *Triodia amasinus*, with its labels, ♂, Turkey (Amasia) (ZISP);
5. *Triodia laetus*, topotype, with its labels, ♂, Georgia, Manglisi (ZISP);
6. *Triodia laetus*, topotype, with its label, ♀, Georgia, Manglisi (ZISP);
7. *Triodia sylvina*, ♂, with its label, Azerbaijan, Eloma (ZISP);
8. *Triodia sylvina*, ♀, with its label, Russia, Ivanovo Region, Krasnoarmeiskoe (CSKO).



**Figures 9–14.** *Triodia*, genitalia:

9. *Triodia turkmenica*, male genitalia, paratype, Turkmenistan, Aidere, SK0098;
10. *Triodia turkmenica*, female genitalia, paratype, Turkmenistan, Aidere (without ductus bursa);
11. *Triodia laetus*, male genitalia, topotype, Georgia, Manglisi;
12. *Triodia laetus*, female genitalia, topotype, Georgia, Manglisi (without ductus bursa);
13. *Triodia amasinus*, male genitalia, Turkey (Amasia);
14. *Triodia sylvina*, male genitalia, Russia, Chechnya, Grozny.

**Biology and habitats.** Unknown.

**Distribution.** The species is known only from type locality in Turkmenistan (Kopetdag Range) (Fig. 15).



## Conclusion

The new species is the eighth in the genus *Triodia*. Based on the general distribution pattern of species of the genus, it can be assumed that there is a much wider distribution of species in Middle Asia, as well as the possibility of discovering new undescribed species in countries such as Uzbekistan, Tajikistan, and Kyrgyzstan. Considering the climatic preferences of Ghost moths in general and the genus *Triodia* in particular, we can say that they prefer warm and humid habitats. The described species *Triodia turkmenica* confirms this concept, as it was collected in the warm and humid Aidere gorge, in contrast to the dry Kopetdag mountains. It is necessary to search for possible new species in similar landscapes of other mountain systems in Middle Asia such as the Pamirs and Tien Shan.



**Figure 15.** Distribution map of *Triodia turkmenica*. Red circle – type locality (Aidere).

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## References

- Freina J de, Witt T (1990) Die Bombyces und Sphinges der West palaarktis (Insecta, Lepidoptera). Band 2. Edition Forschung & Wissenschaft Verlag GmbH, Munchen, 140 pp. [In German]
- Grehan JR, Mielke CGC, Turner JRG, Nielsen JE (2023) A revised world catalogue of Ghost Moths (Lepidoptera: Hepialidae) with taxonomic and biological annotations. ZooNova 28: 1–337.
- Grehan JR, Knyazev SA (2019) Potential influence of Mesozoic and Cenozoic tectonics on the evolution of European Hepialidae (Lepidoptera). Biogeographia 34: 17–32. <https://doi.org/10.21426/B634143499>
- Knyazev SA (2019) Hepialidae. In: Sinev SY (Ed.) Catalogue of the Lepidoptera of Russia. Second Edition. Zoological Institute RAS, St.Petersburg, 16–17. [In Russian]
- Knyazev SA (2025) *Triodia laetus* (Staudinger, 1877) – new species of ghost moths (Lepidoptera, Hepialidae) for the fauna of Russia, Armenia and Azerbaijan. Acta Biologica Sibirica 11: 249–257. <https://doi.org/10.5281/zenodo.14994833>