

New report of a rare species of the gall midge from the genus *Camptomyia* Kieffer, 1894 (Diptera: Cecidomyiidae)

Новое сообщение о редком виде галлиц из рода *Camptomyia* Kieffer, 1894 (Diptera: Cecidomyiidae)

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КЛЮЧЕВЫЕ СЛОВА: Diptera, Chironomidae, *Camptomyia*, *drymophila*, Россия, новая регистрация.

ABSTRACT. New data on the distribution of one rare species of the genus *Camptomyia* Kieffer, 1894: *C. drymophila* Mamaev et Zaitzev, 1998 in Russia are presented. The specimens were caught using an emergent trap installed on the territory of Moscow. The distribution of the species on the territory of the European part of Russia was proved using morphological and molecular methods.

РЕЗЮМЕ. Представлены новые данные о распространении редкого вида рода *Camptomyia* Kieffer, 1894: *C. drymophila* Mamaev et Zaitzev, 1998 на территории России. Экземпляры были отловлены при помощи эмергент-ловушки, установленной на территории Москвы. Распространение видов на территории европейской части России было доказано с использованием морфологического и молекулярного методов.

Introduction

The genus *Camptomyia* Kieffer, 1894 includes about 73 species. The greatest number of species is known from the territory of the Palearctic (53 species), less species are recorded in the Nearctic region (9), in the Oriental region (10) and 1 species is reported from the Neotropic

region [Gagne, Jaschhof, 2021]. Larvae of most species have previously been regarded as saproxylic and usually inhabit bark and surrounding tissues of woody plants and fruiting bodies of bracket fungi [Mamaev, Krivosheina, 2023]. The Holarctic representatives of *Camptomyia* have the following characters in common: scape with a dense cluster of setae medially, anteropronotum setose (except *C. regia* Spungis, 1989); veins CuA furcated and GA discrete, far apart from each other and distinct from postGA; ninth tergite with an apodeme that is either situated basally or along all of the longitudinal axis, posterior margin usually incised or emarginated medially; ejaculatory apodeme and aedeagus head together forming the copulatory organ, which is longer than the parameres, usually T-shaped basally and variously modified apically, often with a pair of processes [Jaschhof, Jaschhof, 2013]. Species identification is based on male genital structures, in particular the copulatory organ and parameres. It should be noted that the identification of gall midges to species is a very complex process and a reliable identification can only be made by a narrow circle of taxonomists for this family. Molecular-genetic studies carried out within the framework of the GBOL project [Hausmann *et al.*, 2020] have significantly simplified this task.

In the present paper we present the results of soil-zoological research, which made it possible to supplement

the data on the real distribution of one of the rare species of gall midges — *Camptomyia drymophila* Mamaev et Zaitzev, 1998 — on the territory of Russia.

Material and methods

The specimens were captured with the help of emergent trap. The emergent trap was designed to catch insects leaving the soil. It is a pyramid made of dense black cotton fabric with metal ribs, covering an area of 1 m², with a container fixed to the top, transparent to the sun's rays, with a fixing liquid - 96% ethyl alcohol. The trap was installed from 15.07. 2022 to 25.07.2022 on soil in a spruce forest (Fig.1). The specimens were determined using the key by M. & C. Jaschhof [2013]. The final determination was carried out using molecular methods.

DNA extraction was carried out from several legs of insects in 50 µl of lysis buffer (Protease K, mercaptoethanol, Tris-HCl, EDTA) for 1.5 hours at 65 °C with shaking. After that, mixture was incubated at 95 °C for 5 min for inactivate protease K. PCR was performed using the Encyclo Plus PCR kit (Evrogen, Russia) according to the manufacturer's protocol. For PCR, universal primers for the standard fragment of the mitochondrial COI gene were used: LepF1 (5'- ATTCAAC-CAATCATAAAGATAT-3') and LepR1 (5'-TAAACTTCT-GGATCCAAAAA-3') [Hebert *et al.*, 2004]. The obtained

products were visualized by electrophoresis in 1% agarose gel. If the product was available, the target fragment was separated from nonspecific amplification products using preparative electrophoresis in 2% agarose gel and purified using the CleanUp Mini kit (Evrogen, Russia). Sequencing was carried out at the "Center for Collective Use Genome". The analysis of the obtained chromatograms was carried out using the BioEdit program [Hall, 1999]. Identification of obtained sequences was carried out with NCBI and BOLD databases. No matches with any species were found according to the NCBI GenBank. According to BOLD database our sequence showed 99.39 % of similarity with the sequences of two specimens of the species *Camptomyia drymophila* (GBDTA9922-21 and GBDTA9923-21) from Germany. The sequence obtained have been submitted to GenBank with numbers PP834544.

The taxonomy of the genus and species follows data from M. & C. Jaschhoff [2013]. The examined specimens are kept in the Institute of Ecology and Evolution, Russian Academy of Sciences.

Camptomyia drymophila Mamaev et Zaitzev, 1998
Fig. 2.

MATERIAL. Russia: 2 females, Moscow, village Pervomayskoe, 330 m from Zhiletovka river, spruce forest with hazel near Malinky biological station 55.457554° N, 037.180332° E,



Fig. 1. General view of the emergence trap.
Рис. 1. Общий вид эмерджентной ловушки.



Fig. 2. *Camptomyia drymophila* Mamaev et Zaitzev, 1998, male holotype specimen.
Рис. 2. *Camptomyia drymophila* Mamaev et Zaitzev, 1998, голотип, самец.

15–25.07.2022 (D. Vinogradov, A. Zuev, A. Tiunov); holotype, male, Russia, Far East, “Kedrovaya Pad” Reserve, netting, 17.VIII 1962 (O. Kovalev), ZMMU P-Di 0057 (Fig. 2).

MORPHOLOGY. The species was described from the 3 males caught in “Kedrovaya Pad” Reserve. The description was based on the following characters. Body yellow with brownish notum, length of wing 3.0 mm. Eye bridge 12–14 ommatidia-broad; antennae with 2+19 segments, basal enlargement of middle antennal segments subcylindric, 1.5 times as long as broad; stem almost 1.8 times as long as basal enlargement, base of stem covered with microtrichiae, horse-shoe-shaped sockets in one irregular row and in cluster on the frontal surface of segment; ring-shape sensoriae distinct; ultimate segment variable: cone-shaped or with long finger-shaped appendage; palpi 4-segmented, with ratio 1.0:1.5:2.4:2.4; wing venation of ordinary type, leg 2.1 times as long as wing, hind femur 1.2 times as long as tibia, tarsal claw bifid, empodium thick, protruded dorsally over tarsal claw. Coxites of male genitalia long, triangular with very deep incision separating tegmen; styles long tapering in distal half; with black claw; 9th tergite with shallow triangular incision; parameres short, slightly curved, genital rod weakly sclerotized, T-shaped basally, with transparent cup distally; roots of apodeme short, thick, weakly sclerotized

[Mamaev, Zaitzev, 1998]. The following diagnosis of the new species was given: new species is unique: stem of flagellar segments long, thin, covered with microtrichiae basally, style with entire (not pectinate) black claw, genital rod and roots of apodeme very weakly sclerotized. Similar species, *C. corticalis* (Loew, 1851) in contrast to new species with yellow notum and bare stems [Mamaev, Zaitzev, 1998]. However, the authors did not work out some key to *Camptomyia* species although they described 10 new species in this article. A key to 16 *Camptomyia* species distributed in Sweden was created by M. & C. Jaschhof [2013]. According to this key *C. drymophila* can be determined by the following characters: empodia rudimentary, parameres not fused, gonocoxites twice as broad as long, gonostylus elongate and slender, parameres not interlinked basally, apices touching, apices of parameres hidden behind copulatory organ, directed posteriad, pointed; gonocoxal emargination surrounded by setulae with conspicuously large, raised sockets [Jaschhof, Jaschhof, 2013]. The latter authors offer the following diagnosis: *C. drymophila* differs from the other species of the *corticalis* group by that the gonocoxal emargination surrounded by setulae with conspicuously large, raised sockets; parameres barely reach to the apex of the copulatory organ; the paramere processes are sclerotized, pointed apically and slightly curved ventrolater-

ad. Moreover all authors [Mamaev, Zaitzev, 1998; Jaschhof, Jaschhof, 2013] recognize *C. corticalis* as the closest species to *C. drymophila*.

PHENOLOGY. Imagoes were active in August in the Far East of Russia [Mamaev, Zaitzev, 1998] and in June-July in Sweden [Jaschhof, Jaschhof, 2013]. We collected our material in July in Moscow. The species was captured in spruce forest only.

BIOLOGY. Imagoes reared from litter and deeper soil and were caught using emergent trap. They inhabited soil together with *Porricondyla* sp. (Cecidomyiidae), *Scatopsciara atomaria* (Zetterstedt, 1851) and *Corynoptera inexpectata* Tuomikoski, 1960 (Siaridae), *Bicellaria intermedia* Lundbeck, 1910 (Hybotidae), *Rhagio lineola* Fabricius, 1794 (Rhagionidae), *Terrilimosina schmidtzi* (Duda, 1918) (Sphaeroceridae), *Megaselia* sp. (Phoridae).

DISTRIBUTION. The species was described for the Far East of Russia [Mamaev, Zaitzev, 1998]. Registered in Sweden [Jaschhoff, Jaschhoff, 2013; Gagne, Jaschhoff, 2021]. According to the data in BOLD database the species is also known from the 2 specimens caught in Germany, Munich suburbs and determined by M. Jaschhof. We prove the distribution of the species in European Part of Russia.

Competing interests. The authors declare no competing interests.

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