

## First record of the genus *Mischotetrastichus* Graham, 1987 (Hymenoptera, Eulophidae) from Georgia, Transcaucasia

### Род *Mischotetrastichus* Graham, 1987 (Hymenoptera, Eulophidae): сообщение о первом нахождении в Закавказье

V.V. Kostjukov\*, O.V. Kosheleva\*, G. Japoshvili\*\*, \*\*\*  
В.В. Костюков\*, О.В. Кошелева\*, Г. Джапошвили\*\*, \*\*\*

\* All-Russian Research Institute of Biological Plant Protection, Krasnodar 350039 Russia. E-mail: salchia@ya.ru, kosheleva\_o@mail.ru.

\* Всероссийский научно-исследовательский институт биологической защиты растений, Краснодар 350039 Россия.

\*\* Institute of Entomology, Agricultural University of Georgia, David Agmashenebeli Alley 240, Tbilisi 0131 Georgia. E-mail: g.japoshvili@agruni.edu.ge.

\*\* Институт Энтомологии, Аграрный Университет Грузии, Давида Агмашенебели аллея 240, Тбилиси 0131 Georgia.

\*\*\* Invertebrate Research Center, Agladze Str. 26, Tbilisi 0119 Georgia. E-mail: giorgij70@yahoo.com.

\*\*\* Научно-исследовательский Центр Беспозвоночных, ул. Агладзе 26, Тбилиси 0119 Georgia.

**Key words:** Transcaucasia, Georgia, Tetrastichinae, *Mischotetrastichus*, diagnosis

**Ключевые слова:** Закавказье, Грузия, Tetrastichinae, *Mischotetrastichus*, диагноз.

**Abstract.** *Mischotetrastichus petiolatus* (Erdős) is the only species of the genus known from Europe. This species is found in Lagodekhi Natural Reserve, Georgia, for the first time and newly recorded for Transcaucasia. Differential diagnosis for congeners of subfamily Tetrastichinae is provided.

**Резюме.** В Лагодехском заповеднике (Грузия) обнаружен единственный европейский вид *Mischotetrastichus* Graham — *M. petiolatus* (Erdős). В Закавказье до наших исследований виды этого рода не были известны. Приведен дифференциальный диагноз, позволяющий отделять виды *Mischotetrastichus* от других тетрастихин.

### Introduction

Graham [1987] in reclassification of the European Tetrastichinae described nine new genera including *Mischotetrastichus* Graham, 1987 with type species *M. petiolatus* [Erdős, 1951].

Later Kostjukov [1995, 2000] described *M. nadezhdae* Kostjukov, 1995 from Primorskyi Krai and *M. danilovitschae* Kostjukov, 2000 from Kunashir Island.

Thereby at present *Mischotetrastichus* include 3 species: *M. petiolatus* from West Palearctic and *M. nadezhdae*, *M. danilovitschae* from East Palearctic.

### Material and methods

Lagodekhi reserve was established in 1912. Lagodekhi Protected Areas is one of the world's best-preserved, primitive area with diversity of natural landscapes — is located in Lagodekhi, in the extreme north-eastern part of Georgia on the southern slopes of the Caucasus and extends at an altitude of 590–3500 m.

Lagodekhi Protected Areas includes Lagodekhi Nature Reserve (19749 ha) and Managed Reserve (4702 ha) [APA, 2016].

This study represents part of the material collected in Lagodekhi protected areas, using Malaise traps, during the entire growing season of 2014. Malaise traps in Lagodekhi protected areas were set in the following vertical zonal sites: **1.** Low zone of forest (450–750 m), **2.** Middle zone of forest (750–1250 m), **3.** High zone of forest (1250–1800 m), **4.** Subalpine forest (1800–2000 m), **5.** Subalpine fields and shrublands (2000–2500 m), **6.** Alpine zone (above 2500 m).

General collecting was started in April 2, 2014 and lasted until November 7, 2014, although in alpine and subalpine areas collecting was started later (subalpine 5 May 2014; alpine 23 May 2014) and completed earlier (6 October 2014), due to climate conditions and altitude. Material was collected every 10 (±2) days and placed at first in 96 % Ethanol, and then it was sorted, dried, mounted and labeled according Noyes [2016].

Identification was done by the first author, using modern keys [Graham, 1987], and papers of original description, and the collections of the Zoological Institute of the Russian Academy of Sciences (St. Petersburg) and All-Russian Research Institute of Biological Plant Protection (Krasnodar). All voucher specimens are deposited to the Entomological collection of Agricultural University of Georgia, Tbilisi, Georgia.

Information about synonymy and biology is given in Graham [1987, 1991] and the Universal Chalcidoidea Database [Noyes, 2016].

Table 1. Differential diagnosis of *Mischotetrastichus* Graham, 1987  
Таблица 1. Диагностические признаки *Mischotetrastichus* Graham, 1987

The species of the genus <i>Mischotetrastichus</i>	The other species of subfamily Tetrastichinae
Female and male	Female and male
1. Length 0.7–1.2 mm	1. Length 0.4–5.0 mm
2. Combination of features: submarginal vein of forewing with 1 dorsal setae and gastral petiole conical 1.2–1.8 times as long as broad, with 3 longitudinal carinae.	2. Combination of features is another
3. Host. Leaf-mining Lepidoptera (Gracillariidae).	3. Host. Gall-forming insecta (usually Cecidomyiidae), Acary (Eriophyidae) and Nematoda; free-living larvae and eggs of insect, also Arachnida

## Results

*Diagnosis for the Mischotetrastichus. Female.* Frons with median longitudinal line. Mandibles tridentate. Antennal toruli distinctly above ventral edge of eyes; funicle and clava with 3 segments. Pronotum short. Mid lobe of mesoscutum with median line indicated at least posteriorly and with 1 or 2 adnotaular setae on each side. Scutellum with submedian lines and two pairs of setae. Propodeum medially (slightly) much longer than dorsellum, without median carina (present) or plicae; spiracles very small, suboval (sub-circular), nearly touching metanotum. Submarginal vein of forewing with 1 dorsal setae; postmarginal vein rudimentary. Gaster petiole piriform, slightly to distinctly longer than broad, with at least traces of three longitudinal carinae, one median and two lateral. Gaster elliptic or rhomboidal, hardly longer than thorax; cercal setae moderately long, but subequal in length. Body non-metallic, black.

*Male.* Length 0.7–1.0 mm. Differs from female as follows: antenna with ventral plaque situated on the scapus with 4 segmented funicle; in relatively longer gastral petiole.

Differential diagnosis of *Mischotetrastichus* is given in table 1.

## The list of species in *Mischotetrastichus* distributed in Lagodekhi reserve

### *Mischotetrastichus petiolatus*

**Material.** 7♀♀, 2♂♂ Lagodekhi reserve, Mt Kudigora, 41°51.149' N, 46°17.266' E, 666 m asl (above sea level) malaise trap, 5–14.IX.2014, Leg. G. Japoshvili et G. Kirkitadze; 3♀♀, 1♂, Lagodekhi reserve, Mt Kudigora, 41°52.288' N, 46°18.692' E, 1351 m asl, malaise trap, 15–27.IX.2014, Leg. G. Japoshvili et G. Kirkitadze; 4♀♀, 1♂, Lagodekhi reserve Mt Kudigora, 41°52.288' N, 46°18.692' E, 1351 m asl, malaise trap, 27.IX–6.X.2014, Leg. G. Japoshvili et G. Kirkitadze.

**Distribution.** Czech Republic, Hungary, Japan, Russia (Leningradskaya Oblast', Pskovskaya Oblast'), Sweden [Kostjukov, 1978; Graham, 1987; Kamijo, Ikeda, 1997; Noyes, 2016].

**Host.** *Phyllonorycter rajella* (L.), *Ph. carpini* (Kumata), *Ph. hancola* (Kumata), *Ph. issikii* (Kumata) on *Alnus*, *Carpinus* (Betulaceae), *Quercus* (Fagaceae) and *Salix* (Salicaceae) [Graham, 1987; Kamijo, Ikeda, 1997].

## Discussion

Single European species of *Mischotetrastichus* — *M. petiolatus* was founded in Lagodekhi reserve (Georgia). Before our study *Mischotetrastichus* for Transcaucasia was not known. *M. petiolatus* is parasitoid of *Phyllonorycter rajella* (L.), *Ph. carpini* (Kumata), *Ph. hancola* (Kumata), *Ph. issikii* (Kumata) on *Alnus*, *Carpinus* (Betulaceae), *Quercus* (Fagaceae) and *Salix* (Salicaceae). Probably as others Eulophids — parasitoids of leaf-mining Lepidoptera. *M. petiolatus* has large trophic relationships and develops on several *Phyllonorycter* on *Alnus* spp.

## Acknowledgements

We would like to thank the Rustaveli National Science Foundation for their financial supports under ref: FR/221/7-110/13. We express our gratitude to Mr Meri Salakaia and Mr. Marine Batsankalashvili for their kind helps in sorting material.

## References

- APA. 2016. Lagodekhi protected areas. <http://apa.gov.ge/en/> [Last accessed: 8 January 2016]
- Erdős J. 1951. Eulophidae novae // Acta biologica Academiae Scientiarum Hungaricae. Vol.2. P.169–237.
- Graham M.W.R. de V. 1987. A reclassification of the European Tetrastichinae (Hymenoptera: Eulophidae), with a revision of certain genera // Bulletin of the British Museum (Natural History). Entomology. Vol.55. No.1. P.1–392.
- Graham M.W.R. de V. 1991. A reclassification of the European Tetrastichinae (Hymenoptera, Eulophidae): Revision of the remaining genera // Memoirs of the American Entomological Institute. Vol.149. P.1–323.
- Kamijo K., Ikeda E. 1997. A revision of *Citrostichus* and *Mischotetrastichus* (Hymenoptera: Eulophidae), with descriptions of a new genus and new species // Japanese Journal of Entomology. Vol.65. No.3. P.562–582.
- Kostjukov V.V. 1978. 5. Subfam. Tetrastichinae. Medvedev G.S. (Ed.) [Keys to insects of European part of USSR]. L.: Nauka. Vol.3. No.2. P.430–467. [In Russian].
- Kostjukov V.V. 1995. Subfam. Tetrastichinae. Lehr P.A. (Ed.) [Keys to Insects of the Russian Far East. Part 2: Neuroptera, Mecoptera, and Hymenoptera.]. Vladivostok: Dalnauka. Vol.4. P.350–505 [in Russian].
- Kostjukov V.V. 2000. 46. Fam. Eulophidae. Lehr P.A. (Ed.) [Keys to Insects of the Russian Far East. Part 4: Neuroptera, Mecoptera, and Hymenoptera.]. Vladivostok: Dalnauka. Vol.4. P.582–601 [in Russian].
- Noyes J.S. 2016. Universal Chalcidoidea Database — World Wide Web electronic publication. Available from: <http://www.nhm.ac.uk/entomology/chalcidoidea/index.html> [Last accessed: 19 September 2016].