

## List of encyrtids (Hymenoptera: Encyrtidae) from subalpine and alpine zones of Lagodekhi protected areas with new records from Georgia and Transcaucasia

George JAPOSHVILI<sup>1,2,\*</sup>, Meri SALAKAIA<sup>2</sup>, Giorgi KIRKITADZE<sup>2</sup>, Marine BATSANKALASHVILI<sup>1</sup>

<sup>1</sup>Invertebrate Research Center, Tbilisi, Georgia

<sup>2</sup>Institute of Entomology, Agricultural University of Georgia, Tbilisi, Georgia

Received: 27.01.2016 • Accepted/Published Online: 29.06.2016 • Final Version: 04.04.2017

**Abstract:** Two genera, *Coelopencyrtus* Timberlake, 1919 and *Mayrencyrtus* Hincks, 1944, are reported here for the first time from Transcaucasia. Fourteen new records of encyrtid species from Georgia are reported. Except for 4 species (*Bothriothorax aralius* (Walker, 1837); *B. clavicornis* (Dalman, 1820); *B. trichops* Thomson, 1876; and *Cheilonurus submuticus* Thomson, 1876), all species are recorded for the first time from Transcaucasia.

**Key words:** Chalcidoidea, *Coelopencyrtus*, *Mayrencyrtus*, Transcaucasia, distribution

The family Encyrtidae represents one of the most important groups of biological control agents for insects occurring as plant pests. They are, together with the family Aphelinidae, successfully used against many pest species, especially scale insects (Hemiptera, Coccoidea) (Noyes, 1985; Nikolskaya and Yasnosh, 1966). Encyrtids are very small insects (about 0.8–2.5 mm) and therefore they are insufficiently studied, although they are a major component of many terrestrial ecosystems and may constitute up to 20% of all insect species (LaSalle and Gauld, 1991; Godfray, 1994; Memmott et al., 1994).

Encyrtids from Georgia were included in the list of encyrtids from Transcaucasia by Trjapitzin (1968), where 74 species were listed. Later Japoshvili (2000) updated the list of Encyrtidae and the number of encyrtids increased to 144, and then to 176 (Japoshvili and Noyes, 2005; Japoshvili 2007a, 2007b, 2015). Information about the host and distribution for each species can be found from Noyes (2015).

This study represents part of the material collected in the Lagodekhi protected areas using Malaise traps during the whole growing season of 2014. Malaise traps in the Lagodekhi protected areas were set following vertical zonal characteristics: 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). Here we present the encyrtid fauna of the subalpine and alpine zones in the Lagodekhi protected areas.

In collecting material, we concentrated on the alpine and subalpine areas, as the chance of novelty was higher. Collection began on 2 April 2014 and lasted until 7 November 2014, although in the alpine and subalpine areas collection 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 ( $\pm 2$ ) days and placed first in 96% alcohol, and then it was sorted, critical point-dried, and mounted according Noyes (2015). The subalpine site was located at 41°53.883'N, 46°20.033'E, elevation 2225 m; the alpine site was at 41°54.371'N, 46°20.004'E, elevation 2558 m.

Malaise traps were obtained from BandN Entomological Services (<http://www.entomology.org.uk/>). Containers were filled with 80% ethanol and were checked and replaced every 10 days. Material was then transferred to the laboratory and critical point-dried following Noyes (2015). Dry material was mounted on cards and then identified by the first author using the available keys (Trjapitzin, 1989; Gibson et al., 1997; Hayat, 2006; Guerrieri and Noyes, 2000, 2005). Data about biology and detailed distributions are given by Noyes (2015).

Species and genera recorded for the first time for Transcaucasia are marked with an asterisk. Genera and species recorded for the first time from Georgia are marked with two asterisks. All voucher specimens are deposited in the entomological collection of the Agricultural University of Georgia, Tbilisi, Georgia.

\* Correspondence: giorgij70@yahoo.com

List of new records (H5 = subalpine; H6 = alpine)

**\*\*Bothriothorax Ratzeburg, 1844**

**\*\*Bothriothorax aralius (Walker, 1837)**

**Material examined:** 25.07.–05.08.2014, 1♀, (H5).

**Distribution:** Palearctic.

**\*\*Bothriothorax clavicornis (Dalman, 1820)**

**Material examined:** 15–27.09.2014, 2♀♀, (H6); 25.06–05.07.2014, 3♀♀ (H6).

**Distribution:** Palearctic.

**\*\*Bothriothorax trichops Thomson, 1876**

**Material examined:** 05–15.07.2014, 1♀, (H5); 15–25.08.2014, 1♀, (H6).

**Distribution:** Europe and Transcaucasia.

**Cheiloneurus Westwood, 1833**

**\*\*Cheiloneurus submuticus Thomson, 1876**

**Material examined:** 15–25.07.2014, 1♀, (H5); 05–15.08.2014, 1♀.

**Distribution:** Palearctic.

**\*Coelopencyrtus Timberlake, 1919**

**\*Coelopencyrtus arenarius (Erdos, 1957)**

**Material examined:** 26.07–05.08.2014, 3♀♀, (H6); 25.07–05.08.2014, 2♀♀, (H6); 05–25.08.2014, 1♀, (H6).

**Distribution:** Europe

**\*Coelopencyrtus callidii (Jansson, 1957)**

**Material examined:** 15–25.07.2014, 1♀, (H5); 26.07–05.08.2014, 1♀♀, (H6); 05–15.08.2014, 5♀♀, 1♂, (H6).

**Distribution:** Palearctic.

**Ericydnus Haliday, 1832**

**\*Ericydnus karakalensis Myartseva, 1980**

**Material examined:** 05–15.08.2014, 1♀, (H6).

**Distribution:** Turkmenistan (Noyes, 2015).

**\*Mayrencyrtus Hincks, 1944**

**\*Mayrencyrtus imandes (Walker, 1837)**

**Material examined:** 15–25.08.2014; 1♀, (H5); 15–25.07.2014, 1♀, (H6).

**Distribution:** Europe.

**Metaphycus Mercet, 1917**

**\*Metaphycus maculipennis (Timberlake, 1916)**

**Material examined:** 15–25.06.2014, 3♀♀; 25.06.–05.07.2014, 2♀♀, (H5); 05–15.07.2014, 1♀, (H5); 25.06.–05.07.2014, 4♀♀, (H6); 26.07–05.08.2014, 3♀♀; 23.05–13.06.2014, 11♀♀, 2♂♂ (H6).

**Distribution:** Cosmopolitan.

**Microterys Thomson, 1876**

**\*Microterys zarina (Walker, 1837)**

**Material examined:** 26.07–05.08.2014, 3♀♀, (H6), 25.06–05.07.2014 (H6), 1♀.

**Distribution:** Europe.

**Ooencyrtus Ashmead, 1900**

**\*Ooencyrtus nigerrimus Ferrière and Voegelé, 1961**

**Material examined:** 15–25.07.2014, 1♀, (H6).

**Distribution:** Iran, Morocco (Noyes, 2015).

**Syrphophagus Ashmead, 1900**

**\*Syrphophagus annulipes (Thomson, 1876)**

**Material examined:** 23.05.–13.06.2014, 1♀, (H6).

**Distribution:** Europe.

**\*Syrphophagus orientalis (Myartseva, 1981)**

**Material examined:** 05–15.07.2014, ♀, (H5).

**Distribution:** Turkmenistan (Noyes, 2015).

**Tetracnemus Westwood, 1837**

**\*Tetracnemus diversicornis Westwood, 1837**

**Material examined:** 05–15.08.2014, ♀, (H6).

**Distribution:** Palearctic.

Besides the species listed above, the following 30 species were also found during our studies: *Adelencyrtus aulacaspidis* (H6); *Anagyrus galinae* (H5, H6); *Aphycus apicalis* (H6); *Blastothrix longipennis* (H6); *B. sericea* (H5); *Cerchysius subplanus* (H6); *Cheiloneurus claviger* (H6); *Copidosoma agrotis* (H5, H6); *C. cervius* (H5, H6); *C. floridanum* (H5, H6); *C. truncatellum* (H5, H6); *Dinocarsis alpina* (H6); *Ericydnus sipylus* (H5, H6); *E. strigosus* (H6); *Helegonatopus citripes* (H6); *Homalotylus flaminius* (H5, H6); *Metaphycus zebratus* (H5, H6); *Microterys nietneri* (H6); *M. tessellatus* (H5, H6); *Ooencyrtus telenomicida* (H6); *Prionomitus mitratus* (H5, H6); *Prochiloneurus bolivari* (H5); *P. pulchellus* (H6); *Syrphophagus aeruginosus* (H5, H6); *S. aphidivorus* (H5, H6); *S. ariantes* (H5, H6); *S. pertiades* (H5, H6); *Trichomasthus albimanus* (H5); *T. ivericus* (H5); *Zaomma lambinus* (H6).

Fourteen new species records from Georgia are given, and among them ten are also new records from Transcaucasia. Two new genera for Transcaucasia are recorded as well. The number of encyrtids of Georgia thus increases to 191, although this is just part of our study and more new records will be obtained after examination and identification of all the material, which will be published in future papers. More new records (7) and more species (39) were recorded from the alpine site; 5 new records are represented from both sites and 3 species from only the subalpine site; the total number of species recorded from the subalpine site was 25. Finally, 44 species were recorded from both the subalpine and alpine sites.

#### Acknowledgments

We would like to express our gratitude to Dr Benjamin Normark (Department of Biology, University of Massachusetts, Amherst, MA, USA) for his kind help to improve the paper and correct the English. Special thanks to Mr Giorgi Sulamanidze, director of the Lagodekhi protected areas (Georgia) for his kind help during the survey and to Dr Khatuna Tsiklauri (Agency of Protected Areas, Georgia) for her support in obtaining permission to work in the reserve. This study was done with the financial support of the Shota Rustaveli National Science Foundation (Ref. FR221/7-110/13).

## References

- Gibson GAP, Huber JT, Woolley JB (1997). Annotated Keys to the Genera of Nearctic Chalcidoidea (Hymenoptera). Ottawa, Canada: NRC Research Press.
- Godfray HCJ (1994). Parasitoids: Behavioral and Evolutionary Ecology. Princeton, NJ, USA: Princeton University Press.
- Guerrieri E, Noyes JS (2000). Revision of European species of genus *Metaphycus* Mercet (Hymenoptera: Encyrtidae), parasitoids of scale insects. *Syst Entomol* 25: 147-222.
- Guerrieri E, Noyes JS (2005). Revision of the European species of *Copidosoma* Ratzeburg (Hymenoptera: Encyrtidae), parasitoids of caterpillars (Lepidoptera). *Syst Entomol* 30: 97-174.
- Hayat M (2006). Indian Encyrtidae (Hymenoptera; Chalcidoidea). Aligarh, India: Department of Zoology of Aligarh Muslim University.
- Japoshvili G (2007a). New records of Encyrtidae (Hymenoptera, Chalcidoidea) with the description of three new species from Georgia. *Caucasian Entomological Bulletin* 3: 81-84.
- Japoshvili G (2007b). New data on a species of *Syrphophagus* (Hymenoptera: Encyrtidae) from Transcaucasus and Turkey. *Ann Entomol Soc Am* 100: 683-687.
- Japoshvili G (2015). New records of Hymenopterans for Georgia from Mtirala National Park. *J Entomol Res Soc* 17: 89-92.
- Japoshvili G, Noyes JS (2005). Checklist and new data on Encyrtidae (Hymenoptera: Chalcidoidea) of the Transcaucasus and Turkey. *Zoosyst Ross* 14: 135-145.
- Japoshvili GO (2000). Checklist of encyrtids (Hymenoptera: Chalcidoidea: Encyrtidae) in Georgia. *Proceedings of the Institute of Zoology of the Georgian Academy of Science* 20: 162-173.
- LaSalle J, Gauld ID (1991). Parasitic Hymenoptera and the biodiversity crisis. *Redia* 74: 315-334.
- Memmott J, Godfray HCJ, Gauld ID (1994). The structure of a tropical host-parasitoid community. *J Anim Ecol* 63: 521-540.
- Nikolskaya MN, Yasnosh VA (1966). Aphelinidae of the European part of USSR and Caucasus (Chalcidoidea, Aphelinidae). Leningrad, USSR: Nauka.
- Noyes JS (1985). Chalcidoids and biological control. *Chalcid Forum* 5: 5-10.
- Noyes JS (2015). Universal Chalcidoidea Database. London, UK: Natural History Museum. Available online at <http://www.nhm.ac.uk/chalcidoids>.
- Trjapitzin V (1968). A survey of the encyrtid fauna (Hym. Encyrtidae) of Caucasus. *Tr Vsesoyuz Entomol Obshch* 53: 43-125 (in Russian).
- Trjapitzin VA (1989). Parasitic Hymenoptera of the Fam. Encyrtidae of Palaearctics. *Opredeliteli po Faune SSSR*. Leningrad, USSR: Zoologicheskim Institutom Akademii Nauk SSR.