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New Record of *Aprostocetus caudatus* Species Group (Hymenoptera, Eulophidae) from Georgia

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ABSTRACT

The following species of *caudatus* group of the genus *Aprostocetus* Westwood: *A. anodaphus* (Walker); *A. caudatus* Westwood; *A. ciliatus* (Nees); *A. eurystoma* Graham; *A. leucone* (Walker); *A. longicauda* (Thomson); *A. lysippe* (Walker); *A. menius* (Walker); *A. rhacius* (Walker); *A. terebrans* Erdös; *A. verutus* Graham and *A. zosimus* (Walker) were recorded from Georgia for the first time. Therefore all 12 species recorded from this genus are new for Lagodekhi (Sakartvelo) Protected areas too. A diagnosis for distinguishing this genus from other genera belonging to subfamily Tetrastichinae is provided. Three species *A. eurystoma* Graham; *A. lysippe* (Walker); *A. menius* (Walker,) and *A. rhacius* (Walker) are new for Transcaucasus.

Key words: Georgia, Tetrastichinae, Transcaucasus, new records.

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INTRODUCTION

The subfamily Tetrastichinae Förster, is the largest in the family Eulophidae. The Tetrastichinae are represented throughout the world by 97 genera and about 1800 species. The *Aprostocetus* Westwood, 1833 is one of the largest genus of Tetrastichinae. It currently contains about 800 species (Noyes, 2018). Graham (1987, 1991) published a revision of the European Tetrastichinae with 33 valid genera including *Aprostocetus* with 194 species, including 42 species of *caudatus* group. Species of belonging to genus *Aprostocetus* mainly are endo- and ectoparasitoids of Cecidomyiidae (Diptera).

MATERIAL AND METHODS

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 (450-750m), 2. Middle zone of forest (750-1250m), 3. High zone of forest (1250-1800m), 4. Subalpine forest (1800-2000m), 5. Subalpine fields and shrublands (2000-2500m), 6. Alpine zone (Above 2500m).

As the material was vast we had to concentrate at first on the alpine and subalpine areas, as the chance to have a novelty was higher. The subalpine site was located at 41° 53.883' N, 46° 20.033' E, elevation 2225m; the alpine site was at 41° 54.371' N, 46° 20.004' E, elevation 2558m.

Samplings was started in 02.04.2014 and lasted until 07.11.2014, although in alpine and subalpine areas collecting was started later (subalpine 05.05.2014; alpine 23.05.2014) and completed earlier (06.10.2014), due to climate conditions and altitude. Material was collected every 10 (±2) days and placed at first in 96% Ethanol, then it was sorted, dried, mounted and labeled according Noyes (2018). Identification was done by the second and third authors, using modern (Kostjukov, 1978, 1995; Graham, 1987) keys 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).

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 ten days. Material then was transferred to the laboratory and was critical point dried, following Noyes (1998) and mounted on cards.

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 (1991) and the Universal Chalcidoidea Database (Noyes, 2018), therefore we did not put this data in our paper, unless there were no additional data from authors side.

RESULTS

Diagnosis for *Aprostocetus caudatus* species group:

Female

Length. 0.7-3.6 mm

Head hardly or just as broad as mesoscutum, 2.3-2.4 times as broad as long. Eyes about 1.5 times as long as broad. Malar space 0.6 length of eye, sulcus weakly curved. Mouth 1.15 of malar space. Antenna with scape just or not reaching median ocellus; pedicellus plus flagellum hardly greater than breadth of mesoscutum; F1 1.6-2.7, F2 1.5-8, F3 1.2-3.0 times as long as broad; clava distinctly broader than F3, hardly or slightly longer than F2 plus F3, 2.2-2.6 times as long as broad. Thorax about 1.5 times as long as broad. Pronotum short, crescentic. Mid lobe of mesoscutum about as broad as long; median line fine; 2-4 adnotaular setae on each side. Scutellum about 1.25-1.6 times as broad as long. Forewing 2.1-2.5 times as long as broad; costal cell distinctly shorter than M, 11-15 times as long as broad; SM with 3-5 dorsal setae; M 3.3-4.5 times length of ST; cilia 0.33-0.75 length of ST. Hindwing obtuse or almost rounded; cilia about 0.25-1.00 breadth of wing. Legs moderately long, hind coxae somewhat more than twice as long as broad, with fine, hardly raised reticulation; hind femora about 4 times as long as broad; spur of mid tibia about 0.6-0.95 length of basitarsus, fourth tarsomere slightly shorter than basitarsus. Gaster lanseolate with curved sides, about as long as thorax, about 3.0-3.8 times as long as broad; longest seta of each circus twice length of next longest, slightly kinked.

Body black, with rather weak metallic tints which are usually bluish or olive. Coxae, and femora colored like body, tibiae yellow or testaceous, infuscate medially. Tegulae fuscous, or yellow anteriorly or wholly yellow. Wing venation testaceous to brown.

Male

Length. 0.65-2.1 mm.

Differs from female as follows: antenna with the number of funicular segments one greater, than in the female, with ventral plaque, it about 0.20-0.75 length of scape, funicular segments and segments of clava with long setae.

Differential diagnosis:

Aprostocetus caudatus species group			The other species of subfamily Tetrastichinae	
Female and male			Female and male	
1	Length 0.7-3.6mm.		1	Length 0.4-5.0mm.
2	SM with 4-8 dorsal setae, frons always without trapezieform surface.		2	SM with 2-7 dorsal setae, if with 1 then frons with trapezieform surface.
3	Propodeum without plica which extend from hind margin to near each spiracle.		3	Propodeum often with plica which extend from hind margin to near each spiracle.
4	Eyes without setae.		4	Eyes often with setae, 0.4-0.7 OD.
5	Setae of vertex short 0.1-0.3 length of OD.		5	Setae of vertex long, length about 0.7-1.0 OD.
6	Pronotum and mid lobe of mesoscutum with short and decumbent setae.		6	Pronotum and mid lobe of mesoscutum with strong and long setae.
7	Parasites of forming gall species of Cecidomyiidae (Diptera) on various plants.		7	Parasites of gall forming insectes, (usually Cecidomyiidae), also Aranei, Acarina (Arachnida) and Tylenchida (Nematoda).

Species list of *Aprostocetus caudatus* species group distributed in Lagodekhi reserve (Georgia)

Aprostocetus anodaphus (Walker, 1839)

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 51.149' N, 46˚ 17.266' E, 666m asl (above sea level), malaise trap, 25.07-05.08.2014, 5 ♀♀, G. Japoshvili and G. Kirkitadze.

Distribution: Europe, *Georgia, Russia (Stavropolskiy Kray and Primorskiy Kray) (Graham, 1987; Kostjukov, 1995; Kostjukov, Khomchenko, & Kosheleva, 2004; Noyes, 2018).

Host: *Rhopalomyia ptarmicae* (Diptera, Cecidomyiidae) (Graham, 1987).

Aprostocetus caudatus Westwood, 1883

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 51.149' N, 46˚ 17.266' E, 666m asl, malaise trap, 25.07-05.08.2014, 7 ♀♀, G. Japoshvili and G. Kirkitadze; Lagodekhi reserve, Mt Kudigora, 41˚ 51.351' N, 46˚ 17.564' E, 647m asl, malaise trap, 05-14.09.2014, 3 ♀♀, G. Japoshvili.

Distribution: Europe, China (Guangxi), *Georgia, Russia (Moscow Oblast', Ul'yanovsk Oblast', Stavropolskiy Kray, Dagestan and Primorskiy Kray), Turkey (Graham, 1987; Kostjukov & Gunasheva, 2004; Kostjukov et al, 2004, Kostjukov, Kosheleva, & Nagornyi 2006; Yegorenkova, Yefremova, & Kostjukov, 2007; Noyes, 2018).

Host: Unknown. Probably some species of Cecidomyiidae (Diptera) on grasses (Graham, 1987).

Aprostocetus ciliatus (Nees, 1834)

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 51.351' N, 46˚ 27.564' E, 847m asl, malaise trap, 05-14.09.2014, 3 ♀♀, G. Japoshvili; Lagodekhi reserve, Mt Kudigora, 41˚ 51.351' N, 46˚ 27.564' E, 847m asl, malaise trap, 15-27.09.2014, 3 ♀♀, G. Japoshvili

Distribution: Europe, China (Gansu, Guangxi), *Georgia, Russia (Moscow Oblast', Ul'yanovsk Oblast', Stavropolskiy Kray, Dagestan and Primorskiy Kray) (Graham, 1987; Kostjukov & Gunasheva, 2004; Kostjukov et al, 2004, 2006; Yegorenkova et al, 2007; Noyes, 2018).

Host: Unknown. Probably some species of Cecidomyiidae (Diptera) on grasses belonding to *Agrostis* and *Festuca* (Graham, 1987).

Aprostocetus eurystoma Graham, 1961

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 51.351' N, 46˚ 27.564' E, 847m asl, malaise trap, 05-14.09.2014, 2 ♀♀, G. Japoshvili; Lagodekhi reserve, Mt Kudigora, 41˚ 51.351' N, 46˚ 27.564' E, 847m asl, malaise trap, 15-27.09.2014, 3 ♀♀, G. Japoshvili

Distribution: Sweden, *Georgia, Russia (Ul'yanovsk Oblast' and Stavropolskiy Kray) (Graham, 1987; Kostjukov et al, 2004, Yegorenkova et al, 2007; Noyes, 2018).

Host: Unknown.

Aprostocetus leucone (Walker, 1839)

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 51.149' N, 46˚ 17.266' E, 666m asl, malaise trap, 25.07-05.08.2014, 7 ♀♀, G. Japoshvili and G. Kirkitadze; Lagodekhi reserve, Mt Kudigora, 41˚ 51.351' N, 46˚ 27.564' E, 847m asl, malaise trap, 05-14.09.2014, 8 ♀♀, G. Japoshvili.

Distribution: Europe, *Georgia, Russia (Stavropolskiy Kray and Primorskiy Kray), USA (Graham, 1987; Kostjukov et al, 2004, Noyes, 2018).

Host: Unknown. Probably some species of Cecidomyiidae (Diptera) on grasses (Graham, 1987).

Aprostocetus longicauda (Thomson, 1878)

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 51.149' N, 46˚ 17.266' E, 666m asl (above sea level), malaise trap, 25.07-05.08.2014, 4 ♀♀, G. Japoshvili and G. Kirkitadze.

Distribution: Europe, *Georgia, Russia (Moscow Oblast', Ul'yanovsk Oblast', Stavropolskiy Kray, Dagestan and Primorskiy Kray), USA (Graham, 1987; Kostjukov & Gunasheva, 2004; Kostjukov et al, 2004, 2006; Yegorenkova et al, 2007; Noyes, 2018).

Host: Unknown, but probably some species of Cecidomyiidae (Diptera) on grasses (Graham, 1987).

Aprostocetus lysippe (Walker, 1839)

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 51.351' N, 46˚ 27.564', E, 847m asl, malaise trap, 05-14.09.2014, 2 ♀♀, G. Japoshvili; Lagodekhi reserve, Mt Kudigora, 41˚ 51.351' N, 46˚ 27.564' E, 847m asl, malaise trap, 15-27.09.2014, 5 ♀♀, G. Japoshvili.

Distribution: Czech Republic, Germany, *Georgia, Great Britain, Netherlands, Russia (Stavropolskiy Kray), Sweden (Graham, 1987; Kostjukov et al, 2004, Noyes, 2018).

Host: *Dasineura crataegi* (Win.) (Cecidomyiidae, Diptera) on *Crataegus* sp. (Graham, 1987).

Aprostocetus menius (Walker, 1839)

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 52.288' N, 46˚ 18.692' E, 1351m asl, malaise trap, 05-15.07.2014, 6 ♀♀, G. Japoshvili and G. Kirkitadze.

Distribution: Europe, *Georgia, Russia (Ul'yanovsk Oblast' and Stavropolskiy Kray), (Graham, 1987; Kostjukov et al, 2004; Yegorenkova et al, 2007; Noyes, 2018).

Host: Nematocerus dipteron (Graham, 1987).

Aprostocetus rhacius (Walker, 1839)

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 51.351' N, 46˚ 17.564' E, 847m asl, malaise trap, 15-25.05.2014, 7 ♀♀, Japoshvili and G. Kirkitadze.

Distribution: *Georgia, Great Britain, Netherlands, Russia (Ul'yanovsk Oblast' and Stavropolskiy Kray), Sweden (Graham, 1987; Kostjukov et al, 2004; Yegorenkova et al, 2007; Noyes, 2018)

Host: *Dasineura trifolii* (Low) (Diptera, Cecidomyiidae) (Graham, 1987).

Aprostocetus terebrans Erdös, 1954

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 51.351' N, 46˚ 27.564' E, 847m asl, malaise trap, 05-15.07.2014, 5 ♀♀, Japoshvili and G. Kirkitadze; Lagodekhi reserve, Mt Kudigora, 41˚ 52.288' N, 46˚ 18.692' E, 1351m asl, malaise trap, 05-15.07.2014, 8 ♀♀, G. Japoshvili and G. Kirkitadze

Distribution: Europe, *Georgia, Russia (Ul'yanovsk Oblast', Stavropolskiy Kray, Dagestan and Primorskiy Kray), Turkey, USA (Graham, 1987; Kostjukov & Gunasheva, 2004; Kostjukov et al, 2004; Yegorenkova et al, 2007; Noyes, 2018).

Host: Unknown. The species occurs on grasses (Graham, 1987).

Aprostocetus verutus Graham, 1961

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 52.288' N, 46˚ 18.692' E, 1351m asl, malaise trap, 05-15.07.2014, 4 ♀♀, G. Japoshvili and G. Kirkitadze.

Distribution: China (Gansu), *Georgia, Great Britain, Russia (Ul'yanovsk Oblast', Stavropolskiy Kray and Primorskiy Kray), Sweden (Graham, 1987; Kostjukov et al, 2004; Yegorenkova et al, 2007; Noyes, 2018).

Host: Unknown. Probably some species of Cecidomyiidae (Diptera) (Graham, 1987).

Aprostocetus zosimus (Walker, 1839)

Material examined: Lagodekhi reserve, Mt Kudigora, 41˚ 51.351' N, 46˚ 27.564' E, 847m asl, malaise trap, 15-25.07.2014, 7 ♀♀, G. Japoshvili and G. Kirkitadze; Lagodekhi reserve, Mt Kudigora, 41˚ 51.149' N, 46˚ 17.266' E, 666m asl, malaise trap, 05-14.09.2014, 5 ♀♀, G. Japoshvili and G. Kirkitadze.

Distribution: Europe, *Georgia, Iran, N Africa, New Zealand, Russia (Ul'yanovsk Oblast', Stavropolskiy Kray, Dagestan and Primorskiy Kray) (Graham, 1987; Kostjukov & Gunasheva, 2004; Kostjukov et al, 2004; Yegorenkova et al, 2007; Noyes, 2018).

Host: *Dasineura leguminicola* Lint., *Mayetiola destructor* Say., *M. phalaris* Bar. (Diptera, Cecidomyiidae) (Graham, 1987; Domenichini, 1966; Kostjukov, 1978).

DISCUSSION

The 12 species of *caudatus* group of the genus *Aprostocetus*: *A. anodaphus*, *A. caudatus*, *A. ciliates*, *A. eurystoma*, *A. leucone, A. longicauda*, *A. lysippe*, *A. menius*, *A. rhacius*, *A. terebrans*, *A. verutus*, *A. zosimus* are recorded new for the fauna of Georgia from the Lagodekhi reserve. Before our study *Aprostocetus eurystoma* was recorded only for Sweden, Central European part and North Caucasus of Russia; *A. lysippe* was recorded only for Czech Republic, Germany, Great Britain, Netherlands, Sweden and North Caucasus of Russia; *A. rhacius* was recorded for West and North Europe, Central European part and North Caucasus of Russia. All above listed species are new to Transcaucasus. Other 9 species are widely known in Europe and other regions of the world.

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