

New Record of *Neotrichoporoides* (Hymenoptera: Eulophidae) from Georgia with some Taxonomic and Biogeographical Notes

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ABSTRACT

Here, two species of *Neotrichoporoides* Girault, 1913, are recorded from Georgia (in the Transcaucasia) for the first time: *N. dispersus* Graham and *N. viridimaculatus* (Fullaway). A difference to separate this genus from others in the Tetrastichinae is provided. A list of species in the genus in the Caucasus is given.

Key words: Georgia, Tetrastichinae, Caucasus, *Neotrichoporoides*.

INTRODUCTION

The Lagodekhi reserve was established in 1912. The Lagodekhi Protected Areas is one of the world's best-preserved, primitive areas, with a diversity of natural landscapes and is located in the region of Lagodekhi, in the extreme North-Eastern part of the southern slopes of the Caucasus Mountains, the preserve extending from 590-3500 m. The Lagodekhi Protected Areas include both the Lagodekhi Nature Reserve (19749 ha) and the Managed Reserve (4702 ha) (Agency of Protected Areas, 2016).

The genus *Neotrichoporoides* Girault (Hymenoptera: Chalcidoidea, Eulophidae) was erected by Girault (1913) based on the material collected in Australia, is a monotypic genus, *Neotrichoporoides uniguttata* Girault. Graham (1986) described *N. mediterraneus* and *N. dispersus* from Spain and Madeira. Later Graham (1987) and Bouček (1988) synonymized many genera (= *Aprostoceroideus* Girault, 1913; *Tetrastichomorpha* Girault, 1913; *Trichaporoidella* Girault, 1913; *Paraprostocetus* Girault, 1915; *Burksia* Fullaway, 1955; *Dubiostalon* Szelenyi, 1981; *Neogaleopsomyia* Narendran, 2005) with *Neotrichoporoides* Girault and updated the number of species assigned to the genus. This large genus has a wide distribution, and is especially species rich in Africa, Asia, and Australia (Graham, 1987). According to Noyes (2016)

19 species are recorded from Europe. Species belonging to the genus are parasitoids of Muscidae and Diopsidae (Diptera) on coarse grasses (Poaceae).

Few specimens of *Neotrichoporoides* have been collected; Graham (1987) in his revision, found only 139 females and 48 males in European museums and collections. Types of eight species are described in the Graham's monography (Graham, 1987), coming from a study of 41 females and 14 males. The most well collected species in European museums was *N. dispersus* Graham, with 37 females and 13 males. Most specimens of *N. biogradensis* Graham (5 females and 3 males) were collected by Bouček during a single week (13-19.07.1968) in Dalmatia, Biograd na moru, Croatia.

In 2003, in plum orchards in Prietokskiy, Georgievskiy district of Stavropolskiy Krai (Russia), sweeping netting from mid-July to mid-August by Kostjukov, Kosheleva and Khomchenko recovered 129 females and 26 males of following species: *Neotrichoporoides szelenyii* (Erdős), *N. viridimaculatus* (Fullaway), *N. cavigena* Graham, *N. dispersus* Graham, and *N. mediterraneus* Graham (Kostjukov *et al.*, 2004). Malaise traps set in the same area from June to October (2013), however, failed to capture any *Neotrichoporoides* species. This study represents part of the material collected in Lagodekhi reserve, using malaise traps during the whole growing season of 2014, to study biodiversity of Hymenopterans in Lagodekhi protected areas.

MATERIAL AND METHODS

To investigate the Hymenoptera biodiversity of the Lagodekhi protected areas in Georgia, Malaise traps were used during the entire growing season of 2014 in a range of habitats over an altitudinal gradient. Malaise traps (one per site) were set in: (1) low altitude forest (450-750 m), (2) middle altitude forest (750-1250 m), (3) high altitude forest (1250-1800 m), (4) subalpine forest (1800-2000 m), (5) subalpine fields and shrublands (2000-2500 m), and (6) the alpine zone (>2500 m).

Collecting began on 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 at those altitudes. Collected material was retrieved every 10 (\pm 2) days and placed at first in 96% Ethanol, and later sorted, dried, mounted and labeled according to methods described by Noyes (2016). Identification was done by the second, third and fourth authors, using modern keys (Graham, 1987) and papers giving original descriptions (Kostjukov, 2004; Yegorenkova and Kostjukov, 2006), 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/>). Information about the biology and distribution of species captured is given in the Universal Chalcidoidea Database (Noyes, 2016). All voucher specimens were deposited in the Entomological collection of Agricultural University of Georgia, Tbilisi, Georgia (IEAUG).

RESULTS

Diagnosis for genus *Neotrichoporoides*:

Female:

Length: 1.4-3.3 mm.

Thorax weakly arched 1.6-2.1x as long as broad. Pronotum conical, at least about half as long as mesoscutum. Scutellum usually at least as long as broad and nearly or almost as long as mesoscutum, occasionally a little broader than long or distinctly shorter than mesoscutum. Propodeum medially at least very slightly, but often much longer than dorsellum; callus with 3-7 setae.

Forewing 2.5-2.95x as long as broad, with costal cell narrow; SM (Submarginal vein) with 3-8 dorsal setae; M (Marginal vein) 5.5-9.5x length of ST (Stigmal vein), the latter very short. Antenna with 4 anelli, funicular segments usually moderately to strongly elongate (2.8-5.5x as long as broad), rarely short (1.2-1.5x as long as broad). Sensilla very numerous in 3-5 rows on each funicular segments.

Fovae of malar sulcus small or moderate, extending 0.33-0.75 length of malar space. Body usually with distinct metallic tints on dark parts, but some predominantly or completely yellow species without metallic tints.

Male:

Length: 1.2-2.8 mm.

Differs from female as follows. Antennae with ventral plaque of scape usually extending most of length of scape, occasionally short and placed in upper or lower half, or in the middle; funicle with 4 segments; segments of clava, especially C₁, tending to be separated by strong constriction.

Differential diagnosis between *Neotrichoporoides* and other Tetrastichinae is given in the table 1.

Species list of *Neotrichoporoides* from Lagodekhi reserve (Georgia)

Neotrichoporoides dispersus Graham, 1986

Material examined: Lagdekhi reserve, Mt. Kudigora, 41° 54.371' N, 46° 20.004' E, 2558 m alt, malaise trap, 26.07.2014-5.08.2014, 1♀, G. Japoshvili and G. Kirkitadze.

Distribution: Croatia, Italy, Moldova, Portugal (Madeira), Russia (Stavropolski Krai), Serbia, Spain (Canary Islands) (Graham, 1987, Kostjukov *et al.*, 2004, Noyes, 2016).

Neotrichoporoides viridimaculatus (Fullaway, 1955)

Material examined: Lagdekhi reserve, Mt. Kudigora, 41° 51.149' N, 46° 17.266' E, 666 m alt, malaise trap, 23.04.2014-03.05.2014, 1♀, G. Japoshvili and G. Kirkitadze.

Distribution: Argentina, Bermuda, Bulgaria, Caribbean, Colombia, Cuba, Czech Republic, France, Hawaii, Hungary, India, Italy, Portugal (incl. Madeira), Russia

(Krasnodarskii Krai, Stavropolskiy Krai, Karachai-Cherkess AR), Slovakia, Sweden, Turkey, USA (Graham, 1987; Kostjukov *et al.*, 2004; Noyes, 2015).

Table 1. Differential diagnosis of *Neotrichoporoides* and other Tetrastichinae.

The species of genus <i>Neotrichoporoides</i>	The other species of subfamily Tetrastichinae
Female	Female
1. Length 1.4-3.3mm	1. Length 0.5-4.5mm
2. Pronotum conical, at least about half as long as mesoscutum.	2. Pronotum not conical much shorter than 0.5 length of mesoscutum; if pronotum conical then fore tibia with 2 spur (<i>Crataepus</i>) or SM with 2 dorsal setae (some <i>Ootetrastichus</i>) or funicular segments quadrate (<i>Syntomosiphium</i>) or mid lobe of mesoscutum with numerous setae (<i>Melittobia</i>).
3. Antenna with funicular segments usually moderately to strongly elongate (2.8-5.5x as long as broad) with sensillae very numerous in 3-5 rows on each funicular segments.	3. Antenna with funicular segments transverse, quadrate or 1.1-2.5x as long as broad, with sensillae in 1-2 rows on each funicular segments; if funicular segments moderately or strongly elongate, then funicle with 4 segments (<i>Hyperteles</i>) or SM with 2 dorsal setae (some <i>Ootetrastichus</i>) or pronotum not conical, scutellum broader than long and distinctly shorter than mesoscutum (<i>Kolopterna</i> and some <i>Aprostocetus</i>). Anterior margin of clypeus distinctly bidentate.
4. SM of forewing with 3-8 dorsal setae.	4. SM of forewing with 1-2 dorsal setae; if with 3-8 dorsal setae then pronotum not conical or funicular segments not moderately to strongly elongate or funicle with 4 segments.
Male	Male
1. Length 1.2-2.8 mm	1. Length 0.5-4.0mm
2. Antenna with segments of clava tending to be separated by strong constriction.	2. Antenna with segments of clava not separated by strong constrictions, often not distinctly segmented, 2 segmented or solid; if clava segments separated by strong constrictions then malar sulcus with fovea below the eye (<i>Hyperteles</i> , <i>Kolopterna</i> , <i>Ootetrastichus</i> , some <i>Aprostocetus</i>).
3. Hosts Muscidae and Diopsidae (Diptera) species on coarse grasses (Gramineae).	3. Hosts Cecidomyiidae (Diptera) species on coarse grasses (Gramineae), other insects, Eriophyiidae (Arachnida) and gall forming Nematodes (Nematoda).

DISCUSSION

These recoveries of specimens within the genus *Neotrichoporoides* are a first record for Georgia; both species found in the Lagodekhi reserve are new for the fauna of Transcaucasia. Only one species *N. szelenyii* (Erdos, 1951) has been recorded from Azerbaijan (1♀, Baku, 02.07.1967, Bouček) before our study (Graham, 1987). Collections have been made in several locations: (1) The genus *Neotrichoporoides* is most diverse in protected areas of the greater Caucasus Mts. Five species (*N. cavigena* Graham, 1987, *N. dispersus* Graham, 1986, *N. mediterraneus* Graham, 1986, *N. szelenyii* (Erdos, 1951), and *N. viridimaculatus* (Fullaway, 1955)), have been recorded from around the health resort of Caucasus Mineralnye Vody (Georgievsk, Stavropolskiy Krai, Russia) (Kostjukov *et al.*, 2004). (2) Four species, *N. dispersus*, *N. mediterraneus*, *N. viridimaculatus*, and *N. trjapitzini* Kostjukov, 2004 (Kostjukov, 2004) were collected from the surroundings of city of Sochi. (3) In the territory of the All-Russian Research Institute of Biological Plant Protection (Krasnodar, Russia), four species (*N. cavigena*, *N. mediterranea*, *N. szelenyii* and *N. viridimaculatus*) have been recorded by the authors and (4) In the reserves of Tersko-Kumskoe Sands (Dagestan, Russia), four species were recorded: *N. dispersus*, *N. mediterraneus*, *N. szelenyii* and

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N. viridimaculatus (Gunasheva *et al.*, 2015). Thus in the Caucasus region, 6 species have been recorded.

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