



Research Article

First record of *Nothoserphus mirabilis* Brues, 1940 (Hymenoptera: Proctotrupidae) from Pothwar, Pakistan

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Authors' Contributions

IB surveyed, collected and identified the species. AGF identified host beetles. MTR and MA took photographs of the specimens. AGF and AA wrote the manuscript.

Keywords

First report, *Nothoserphus mirabilis*, Proctotrupidae, Pothwar.

Abstract | *Nothoserphus mirabilis* Brues, 1940 (Hymenoptera: Proctotrupidae) is recorded for the first time as larval parasitoid of *Coccinella septempunctata* (Linnaeus, 1758) and *Menochilus sex maculata* (Fabricius, 1781) from various areas of Pothwar. Main identification characters of *N. mirabilis* supported with measurements and illustrations are provided here with notes on distributional range.

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Introduction

Coccinellids are most important group of insects and mainly found in any habitat from sea coast to mountain top and from city wastelands to windswept heathlands (Honek, 2012). Almost every garden will have at least one species (Majerus and Kearns, 1989). They comprise about 390 genera and 6000 species worldwide (Slipinki, 2007).

The members of family Coccinellidae are predators of economically important pest like mites, aphids and whiteflies etc., which are destructive pests of many important crops, fruit trees and vegetables (Vandenberg, 2002). Both the larval and adult stages of this group of beetles are predators. Due to their predatory nature many species are used in biological control programs. The significance of predaceous ladybird beetles lies in the fact that they are regulating the population of prey under control, thereby contributing to the ecosystem balance and control of natural pest by these bio-agents can minimize the dependence on chemical insecticides, which are considered harmful to the environment.

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and also promotes the resistance in pests (Irshad and Haq, 2010). The coccinellid beetles (Coleoptera: Coccinellidae) consist of two subfamilies including: Coccinellinae and Microweisinae (Seago *et al.*, 2011).

Ladybirds are attacked by different insect parasitoids. Some are specific for limited ranges of taxa within the Coccinellidae, while others are broadly polyphages. All the developmental stages of ladybirds are subject to attack from parasitoids, though parasitization of eggs and adult beetles is relatively rare and the former is restricted to phytophagous ladybirds of the tribe Epilachnini. Coccinellids are attacked in all life stages by nearly 100 species of parasitoids, which primarily belong to the orders Hymenoptera and Diptera (Ceryngier and Hodek, 1996). Ceryngier *et al.* (2012) listed around 160 parasitoids and about 40 hyperparasitoids of various families of lady bird beetles from parts of the world. They also gave a list of about 117 taxa, representing 3 dipteran and 8 Hymenopteran families as primary parasitoids of lady bird beetles.

On the other hand, the genus *Nothoserphus* Brues, 1940 (Hymenoptera: Proctotrupidae) occurs in Oriental and palaearctic regions, parasitizing the larvae of Coccinellidae (Townes and Townes, 1981). Genus *Nothoserphus* Brues (1940) was erected on the single species *N. mirabilis* Brues (1940) from Taiwan (Oriental region). Later on it was synonymized with *Thomsonina* Hellén (1941) from Europe (Western-Palaearctic). At present genus *Nothoserphus* is accepted as a separate genus (Townes and Townes, 1981). Townes and Townes, (1981) reviewed Serphidae (Proctotrupidae) and reported 7 species of genus *Nothoserphus* from various parts of the world. Of 11 species described so far, 5 have been found to be solitary parasitoids of lady-bird larvae (Ceryngier *et al.*, 2012). The genus is divided into three species groups (boops, affissae and mirabilis group); of which mirabilis - group parasitize Coccinellinae. Lin (1987) reported 7 species of genus *Nothoserphus* from Taiwan. Here we report *Nothoserphus mirabilis* Brues (1940) for the first time from Pakistan.

Materials and Methods

Larvae of *Coccinella septempunctata* and *Menochilus sexmaculata* along with their host aphid species were collected from two host plants, *Thuja orientalis* L. (*Cinara tujafilina* (del Guercio, 1909) and *Lagerstroemia indica* L. (*Tinocallis kaha-waluokalani* (Kirkaldy, 1907)). They were placed in petri plates. Aphids were daily provided till the emergence of parasitoids. Emerged parasitoids were identified by following the literature of Townes and Townes, (1981) under binocular microscope (Noif XSZ 107BN). Measurements were done using stage and ocular micrometer. Micrographs were prepared with the help of NIKON 1500 SMZ stereo microscope. Identified specimens have

been deposited in Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University Rawalpindi, Pakistan.

Results and Discussion

Identification of *Nothoserphus mirabilis* Group

Head contains a pair of erect blade-like processes. Side of pronotum coarsely rugose in and above the sulcus. Hind ends of notaulus separated by a narrow, wedge-shaped ridge (Townes and Townes, 1981).

Nothoserphus mirabilis Brues, 1940

Figure 1

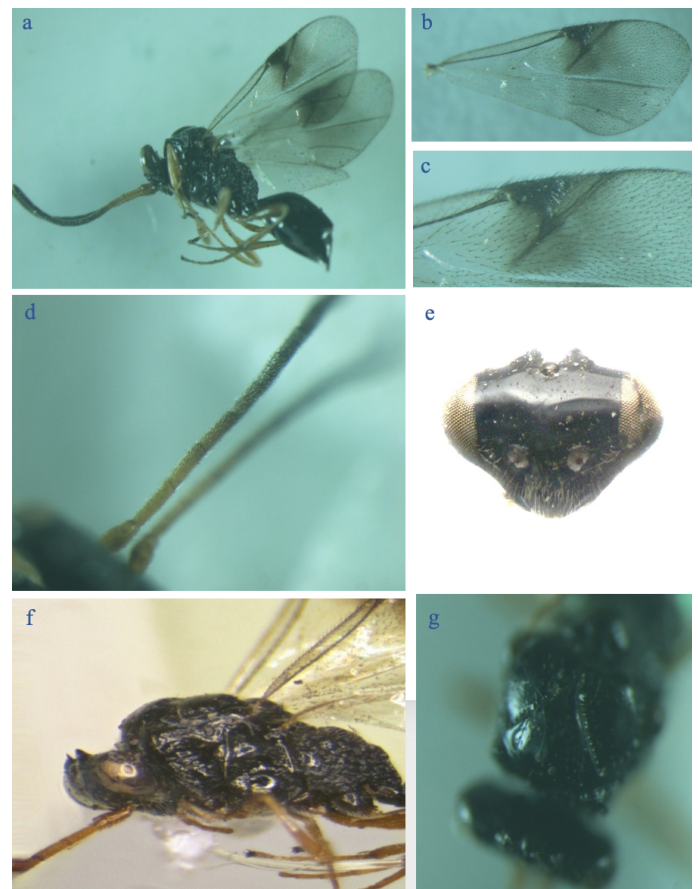


Figure 1: Morphology of *Nothoserphus mirabilis* Brues, 1940, Adult female, (a); Forewing, (b); Wing venation, (c); Antennae, (d); Head showing horns, (e); lateral view of thorax, (f); Dorsal view of pronotum, (g).

Nothoserphus mirabilis Brues, 1940
Nothoserphus mirabilis Masner, 1958
Nothoserphus mirabilis Pschorn-Walcher, 1958
Nothoserphus mirabilis Masner, 1966

Identifying characters

Body black about 3.5 mm. Scape, pedicel, maxillary palpus, and legs beyond coxae yellowish fulvous, the last segment of front and middle tarsi and all of hind tarsus brown. Head short and transverse; clypeus moderate size

and smooth. Flagellum yellowish fulvous basally, darkening to brown near middle and dark brown beyond middle. Antennae about 1.5 times shorter than body. Tyloids weak, small and situated near the bases of male antennal segment 4-7. Lower temple about 0.4-0.5 as long as eye. Median lobe of mesoscutum with a long and curved foveate groove. Tegula and coxae brown. Wings subhyaline, the rest weakly infusate, darkest near and below stigma. Fore wing 2.3 times longer than wider, while hind wing 4.4 times. Stigma, radius and subcosta dark brown. Costa pale brown.

Measurements

Length of male and female forewing: 3.3mm; lengths of antennal segments (female): 9.,3.1,13.2,11.2,10,10,10,9.4,9,9,8.5,7.8,11.4.

Material examined

6♂, 4♀, Islamabad: N35 40.527' E072 08.376' 1763 ft. elev., 13-04-2017; 2♂, 2♀, Rawalpindi: N33 38.929' E073 04.943' 1645 ft. elev., 01-01-2015; 2♂, 2♀, Murree: N33 55.341' E073 24.216' 6302 ft. elev., 09-03-2017; 9♂, 4♀, Islamabad: N33 42.558' E073 01.330', 1686 ft. elev., 20-11-2017 (Oriental Arborvitae); 6♂, 4♀, Rawalpindi: N33 38.612' E073 04.476' 1733 ft. elev., 03-04-2016 (Crepe myrtle); 10♂, 8♀, Islamabad: N33 43.929' E07302.179' 3836ft. elev., 17-03-2017.

Distribution

India, South-eastern China, Taiwan, Java and Nepal (Ceryngier and Hodek, 1996).

Remarks

Specimens collected from Pakistan were compared with published descriptions of Lin (1987) and Townes and Townes, (1981). They were found to be similar with their main identifying characters. This species is confined to the Oriental region and has been reared from aphidivorous coccinellid larva (Lin, 1987). In our study, this was also reared from the larvae of *Coccinella septempunctata* (Linnaeus, 1758) and *Menochilus sexmaculata* (Fabricius, 1781). Our result also confirm the first record of *Nothoserphus mirabilis* Brues, 1940 (Hymenoptera: Proctotrupidae) from Pothwar, Pakistan. These studies may be helpful for the researchers for successful rearing of lady bird beetles in laboratories.

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