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Research Article

First record of the subfamily Lycorininae (Hymenoptera: Ichneumonidae) from Iran

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Abstract: The present study is based on the material collected from East Azerbaijan province (Northwestern Iran) between July-August 2019. The specimens were collected using Malaise traps from a variety of habitats. *Lycorina triangulifera* Holmgren, 1859 were collected and identified. This species is the first record of the subfamily Lycorininae Cushman and Rohwer, 1920 (Hymenoptera: Ichneumonidae) in Iran. Morphological descriptions, as well as detailed illustrations of this species, are presented.

Keywords: Lycorininae, new record, distribution, Iran

Introduction

Lycorininae Cushman and Rohwer, 1920 is a small subfamily of Ichneumonidae, encompassing the single genus *Lycorina* Holmgren 1859 and 34 described species distributed in almost all biogeographical regions (Yu *et al*. 2016). The subfamily can be easily distinguished by central triangular areas delimited by deep lateral grooves on tergites 2–4 and the expanded anterolateral corner of the propodeum engaging the metanotum with a small hook (Gauld *et al*., 1997; Quicke *et al*., 2009). *Lycorina* species are koinobiont ectoparasitoids of various concealed micro-sized lepidopteran caterpillars (Coronado-Rivera *et al*. 2004; Shaw, 2004). Some species have been reared from Crambidae in leaf rolls or webs (Doerksen and Neunzig, 1974; Finlayson, 1976) and Tortricidae (Chao, 1980; Shaw, 2004).

Faunal studies on the family Ichneumonidae have recently been carried out in various parts of Iran (Amiri *et al*., 2015a, b, 2016a, b, 2017; Barahoei *et al*., 2012; Hooshyar *et al*. 2014; Mohammadi-Khoramabadi, 2015; Mohammadi Khoramabadi and Talebi, 2013; Mohammadi-Khoramabadi *et al*., 2011, 2013a, b; Riedel *et al*., 2019; Zardouei Heydari *et al*., 2020a, b, c, d)which led to the identification of about 580 species and 27 subfamilies. *Lycorina triangulifera* is recorded for the first time from Iran in the present study.

Materials and Methods

The examined specimens were collected from the Arasbaran protected area of East Azerbaijan province, northwestern Iran, bearing a high mountainous region ranging from 256 m to 2896 m above sea level. Arasbaran encompasses part of the Caucasus mountains with diverse natural landscapes, including highlands, steep valleys, high and steep mountainsides, forests, rivers, and agricultural rangelands (Mohammadi Fazel, 2020) (Fig. 1A-D). The specimens were collected using

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Malaise traps. The captured specimens were extracted from the collecting jars, then treated with a mixture of ethanol(60%) /xylene (40%) for two days, followed by amyl acetate for two days (AXA), and finally placed on filter paper for drying (van Achterberg, 2009). Photographs were taken using a stereomicroscope (Olympus SZH, Tokyo, Japan) equipped with a 650D Canon digital camera. Most morphological terms are defined on the HymaToL website (http://www.hymatol.org). The identifications were mainly carried out using reliable keys (Chao, 1980; Gauld, 1984; Gauld *et al*., 1997; Kasparyan, 2007; Rousse and van Noort, 2013, 2014; Choi *et al*., 2014). All examined specimens are deposited in the Insect Taxonomy Research Department of the Iranian Research Institute of Plant Protection(Hayk Mirzayans Insect Museum, HMIM). The geographical and biological records are extracted from the Taxapad (Yu *et al*., 2016).

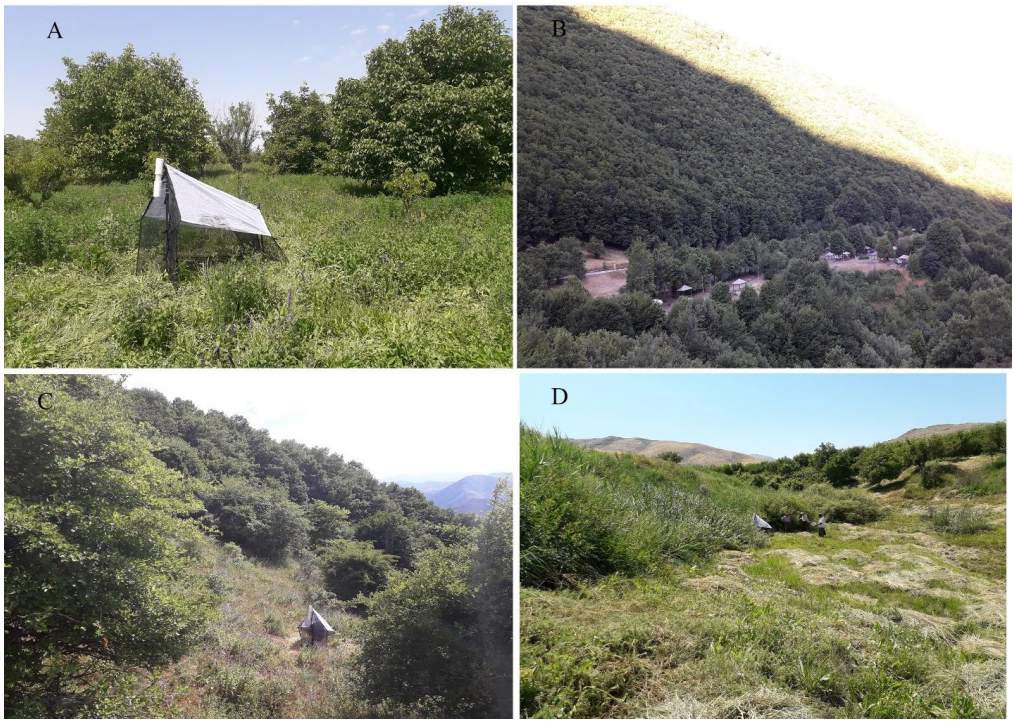

Figure 1 Field sampling with malaise traps in Iran East Azerbaijan Province. A) Orchards, Kaleybar; B) General view, Aynalo; C) Forest edge, Arasbaran Protected Area; D) Forests and pastures, Kaleybar.

Results

Two adults (female) of *L. triangulifera* were collected and identified. A morphological description is provided here.

***Lycorina triangulifera* Holmgren,1859**

Female: Body length 7.2 mm, forewing 6.0 mm, ovipositor 3.0 mm. Face moderately densely punctured, 1.3x wider than the high, central part of face convex in lateral view; clypeus moderately flat, with the round apical edge, separated from face by a transverse groove; malar space equal to the width of the mandible (Fig. 2A, D-F); frons with a longitudinal carina; scape 1.7x wider than the first flagellomere; flagellum with 29 flagellomeres, first flagellomere, 4.5 longer than wide, apical flagellomere square. Mesoscutum 1.3x longer than wide, mesonotum sparsely punctate; scutellum carinate and convex; notaulus shallow; epicnemial carina incomplete (Fig. 2F) Metasoma depressed, terga dorsally closely and coarse punctation; raised central triangular areas large and strongly transverse (Fig. 2 B-C). Ovipositor sheath1.7x as long as the hind tibia. Forewing with open areolet, 2m–cu with one bulla, pterostigma broadly triangular, marginal

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cell moderately long, hindwing with 1/Rs longer than r–m (Fig. 3A-B). Body black with the following exceptions: Clypeus, posterior orbits, and two spots on the face and hind part of scutellum yellow. Ovipositor and flagellum ventrally brown, the hind tibia and ovipositor sheath dark brown, hind trochantellus to femur reddish brown.

Male: Body length 7.0 mm, fore wing 6.0 mm, flagellum with 34 segments, all coxae and trochanters black; fore, mid, hind femora, tiba and tarsus dark brown (Fig. 2 D, B).

Material examined: Iran, East Azerbaijan Province, Arasbaran Protected Area (Kalaybar, Aynalo) July 16, 2019 (38°54'10.62"N 46°47'0.74"E), 1263 m, August, 1-19, 2019, Malaise trap, 1♂ 1♀, Leg.: A. Ameri.

Distribution: Austria, Azerbaijan, Belarus, Belgium, Bulgaria, China, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Korea, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Sweden, Ukraine, United Kingdom (Yu *et al*., 2016), Iran (New record).

Figure 2 *Lycorina triangulifera*, A) General habitus, female, lateral view; B) Metasoma, male, dorsal view; C) Metasoma, female, dorsal view; D) General habitus, male, lateral view; E) Head, frontal view; F) Head and Mesosoma, lateral view.

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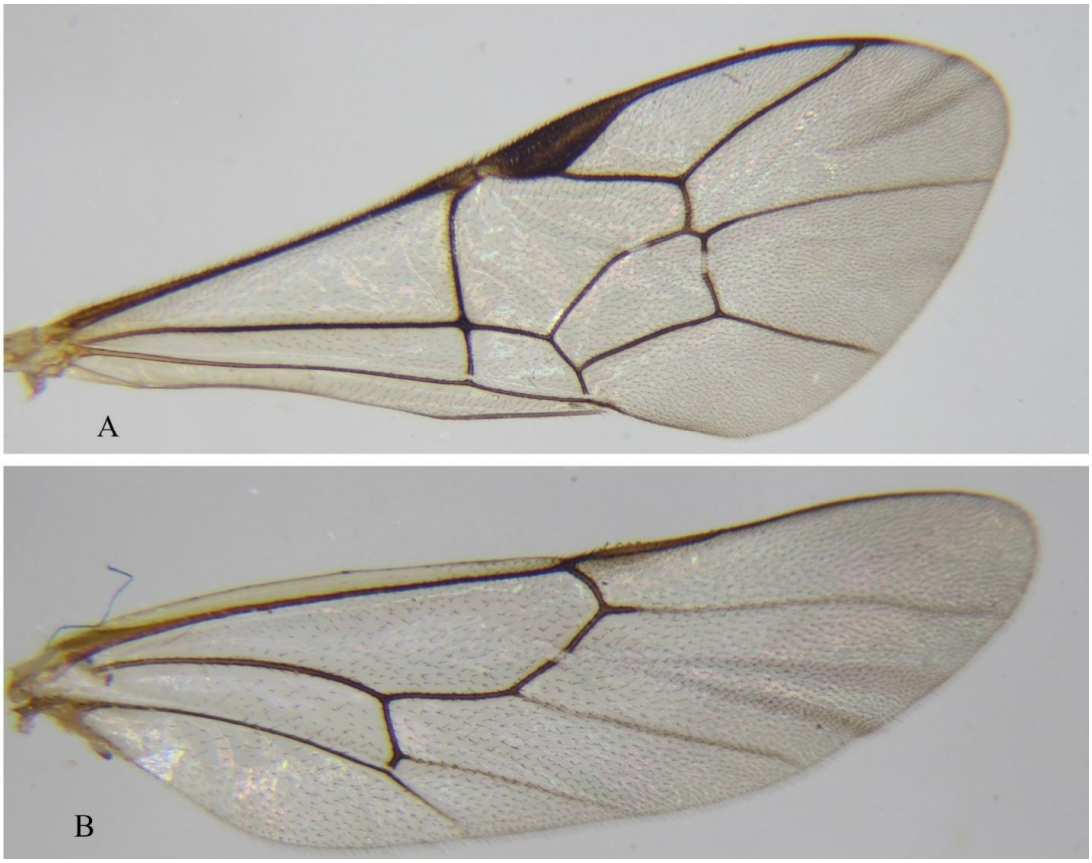

Figure 3 *Lycorina triangulifera*; A) Forewing, B) Hindwing.

Discussion

This species is the first record of the subfamily in Iran, bringing to 27 the number of recorded ichneumonid subfamilies (Barahoei *et al*. 2012; Hooshyar *et al*., 2014; Mohammadi-Khoramabadi, 2013, 2015; Riedel *et al*., 2019). Among neighboring countries, this species was so far known only from Azerbaijan (Abdinbekova, 1963).

The specimens collected in this study were captured using Malaise traps not to add host records. Some species of Lycorininae are known as parasitoids of Gelechiidae, Cerambycidae, and Tortricidae (Yu *et al*., 2016). Owing to its host range, this species is a parasitoid of some important agricultural pests and can be considered as a most potential biological control agent of *Yponomeuta malinella* Zeller, 1838 and *Archips rosana* (Linnaeus, 1758), which are important pests in orchard plants in Iran (Hatmaker, 1985; Alizadeh and Shayan, 2017).

Comparing the number of recorded species (current study) of the subfamily Lycorininae in Iran to some countries shows that more investigations are needed to obtain better knowledge. The number of Lycorininae is probably higher than presently known since several species from some countries can be expected to occur also in Iran (Yu *et al*., 2016). Most of the collections are made in the Arasbaran protected area of Iran, and the inadequate sampling coverage of southern and central parts of the country indicates that the number of Iranian species of Lycorininae could increase.

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اولین گزارش از زیرخانواده Lycorininae (Hymenoptera: Ichneumonidae) از ایران

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چکیده: مطالعه حاضر براساس نمونه‌های جمع‌آوری شده از استان آذربایجان شرقی (شمال غرب ایران) طی ماه‌های مرداد و شهریور سال ۱۳۹۸ انجام گردیده است. نمونه‌برداری با استفاده از تله مالیز در زیستگاه‌های مختلف انجام و گونه *Lycorina triangulifera* Holmgren, 1859 جمع‌آوری و شناسایی گردید. این اولین گزارش از زیرخانواده Lycorininae (Hymenoptera: Ichneumonidae) از ایران می‌باشد. خصوصیات شکل‌شناسی به‌همراه جزئیات اشکال ارائه شده است.

واژگان کلیدی: Lycorininae، گزارش جدید، پراکنش، ایران

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