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A faunistic study on Ichneumonidae of Iran (Hymenoptera: Ichneumonoidea) with three new records

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Abstract

This paper deals with a faunistic survey on Ichneumonidae (Hymenoptera: Ichneumonidae) of Iran. In total, 10 species in 6 subfamilies were collected and identified: Cryptinae (3 species), Ichneumoninae and Tersilochinae (Each with 2 species), Metopiinae, Orthocentrinae, and Phygadeuontinae (Each with 1 species). Three species are new records for the fauna of Iran: *Megaplectes monticola* (Gravenhorst, 1829), *Phrudus monilicornis* Bridgman, 1886 and *Tycherus jucundus* (Wesmael, 1845).

Introduction

Ichneumonidae is the largest family of Hymenoptera, with 25,300 described species in 1601 genera worldwide (Yu *et al.*, 2016). Townes (1969) estimated that there could be about 60.000 ichneumonid species in the world, but because of the poor knowledge of the tropical fauna, species diversity of Ichneumonidae could be higher than 100.000 species (Gauld, 1997). The ichneumonid wasps have been used successfully as biological control agents, and given the largely undocumented fauna, there is a huge potential for their utilization in biocontrol and Integrated Pest Management (IPM) programs (Gupta, 1987; Neuenschwander *et al.*, 2003 and Radcliffe *et al.*, 2008).

Ichneumonidae represent one of the most poorly known insect groups, even in the Middle East fauna. Iranian ichneumonid wasp fauna is relatively well known, mainly due to recent works (e.g., Ghahari and Gadallah, 2017; Ghahari *et al.*, 2022; Karimi *et al.*, 2023, 2024; Kolarov *et al.*, 2024, 2025 and Jussila *et al.*, 2024). According to Yu *et al.* (2016), there are about 622 species reported from the country, which, as compared to the rich species of other Palearctic countries, is still an underestimation. Most probably, hundreds of species are still to be reported from Iran.

Materials and methods

The specimens of this paper, which are preserved in the insect collection of Qaemshahr Islamic Azad University, were

collected by sweeping nets and Malaise traps from different areas of Iran. The materials were sorted into subfamilies based on Broad (2015), and identifications to species level were done by the second author and also D.R. Kasparyan (Russia). Here we follow Yu *et al.* (2016) for nomenclature, classification, and distributional data, and in other cases, the related references are given.

Results and discussion

In total, 10 species of Ichneumonidae in 6 subfamilies, Cryptinae, Ichneumoninae, Metopiinae, Orthocentrinae, Phygadeuontinae, and Tersilochinae have been collected from different regions of Iran. Among them, three asterisk (*) species are new records for the fauna of Iran.

1. Subfamily Cryptinae Kirby, 1837

1.1. Genus *Aptesis* Förster, 1850

1.1.1. *Aptesis gravipes* (Gravenhorst, 1829)

Material examined: East Azarbaijan province, Marand, Darandash, 1♀, September 2016.

General distribution: Austria, Belgium, Bulgaria, Finland, France, Germany, Hungary, Lithuania, Netherlands, Poland, Spain, Sweden, United Kingdom (Yu *et al.*, 2016), Czech Republic (Holý and Zeman, 2018).

Host records: Unknown.

1.2. Genus *Listrognathus* Tschek, 1871

1.2.1. *Listrognathus pubescens*

(Fonscolombe, 1850)

Material examined: Ardabil province, Khalkhal, Andabil, 1♀, vii. 2015.

General distribution: Austria, France, Germany, Greece, Hungary, Italy, Moldova, Poland, Romania, Spain, Switzerland, former Yugoslavia (Yu *et al.*, 2016), Bulgaria (Kolarov, 2019), Croatia (Kolarov, 2008), the Czech Republic, and Slovakia (Holý and Zeman, 2018).

Host records: Unknown.

1.3. Genus *Megaplectes* Förster, 1869

1.3.1. *Megaplectes monticola* (Gravenhorst, 1829)*

Material examined: East Azarbaijan province, Azarshahr, Qeblehdagh, 2♀♀, vi. 2010.

General distribution: Austria, Belgium, Canada, Estonia, Finland, France, Germany, Hungary, Japan, Korea, Latvia, Poland, Russia, Sweden, Switzerland, United States of America, United Kingdom (Yu *et al.*, 2016), the Czech Republic, Slovakia (Holý and Zeman, 2018), and Ukraine (Varga, 2024).

Host records: *Clostera anachoreta* (Denis and Schiffermüller) (Lepidoptera: Notodontidae), *Gonepteryx rhamn* (Linnaeus) (Lepidoptera: Pieridae) (Yu *et al.*, 2016).

2. Subfamily Ichneumoninae Latreille, 1802

2.1. Genus *Asthenolabus* Heinrich, 1951

2.1.1. *Asthenolabus vitratorius* (Gravenhorst, 1829)

Material examined: Kuhgiloyeh & Boyerahmad province, Kakan, 1♀, ix. 2012.

General distribution: Austria, Belgium, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Netherlands, Norway, Poland, Romania, Spain, Sweden, Switzerland, United Kingdom (Yu *et al.*, 2016), the Czech Republic (Holý and Zeman, 2018). Ukraine (Varga, 2024).

Host records: *Catarhoe cuculata* (Hufnagel), *Catarhoe rubidata* (Denis and Schiffermüller), *Xanthorhoe quadrifasciata* (Clerck) (Lepidoptera: Geometridae) (Yu *et al.*, 2016).

2.2. Genus *Tycherus* Förster, 1869

2.2.1. *Tycherus jucundus* (Wesmael, 1845)*

Material examined: Golestan province, Gorgan, Naharkhoran, 1♀, vi. 2016.

General distribution: Belgium, Finland, France, Germany, Hungary, Italy, Poland, Russia, Spain, Sweden, Tajikistan, United Kingdom (Yu *et al.*, 2016), Switzerland (Klopfstein *et al.*, 2019), Ukraine (Varga, 2024).

Host records: Unknown.

3. Subfamily Metopiinae Förster, 1869

3.1. Genus *Triclistus* Förster, 1869

3.1.1. *Triclistus aethiops* (Gravenhorst, 1829)

Material examined: Mazandaran province, Marzan-Abad, 3♀♀, vii. 2011, ex larvae of *Agonopterix* sp. (Lepidoptera: Depressariidae).

General distribution: Austria, Belgium, Bulgaria, Finland, Germany, Netherlands, Norway, Poland, Russia, Sweden, Switzerland, Ukraine, United Kingdom (Yu *et al.*, 2016), the Czech Republic (Holý and Zeman, 2018).

Host records: *Agonopterix hypericella* (Hubner), *Depressaria alpigenella* (Frey) (Lepidoptera: Depressariidae), *Lathronympha strigana* (Fabricius) (Lepidoptera: Tortricidae) (Yu *et al.*, 2016).

4. Subfamily Orthocentrinae Förster, 1869

4.1. Genus *Plectiscidea* Viereck, 1914

4.1.1. *Plectiscidea terebrator* (Förster, 1871)

Material examined: East Azarbaijan province, Maragheh, Yunjaloo, 1♀, viii.2016.

General distribution: Austria, Finland, Georgia, Germany, Hungary, Lithuania, Norway, Romania, Russia, Sweden, United Kingdom, former Yugoslavia (Yu *et al.*, 2016), and the Czech Republic (Holý and Zeman, 2018).

Host records: Unknown.

5. Subfamily Phygadeuontinae Förster, 1869

5.1. Genus *Grasseiteles* Aubert, 1965

5.1.1. *Grasseiteles punctus* (Holmgren, 1857)

Material examined: Ardabil province, Germe, Allah-Yarlu, 1♀, viii .2016.

General distribution: Finland, France, Germany, Poland, Sweden, United Kingdom (Yu *et al.*, 2016), and Georgia (Riedel *et al.*, 2023).

Host records: *Phylloneta sisypium* (Clerck) (Araneae: Theridiidae).

6. Subfamily Tersilochinae

Schmiedeknecht, 1910

6.1. Genus *Barycnemis* Förster, 1869

6.1.1. *Barycnemis gravipes* (Gravenhorst, 1829)

Material examined: Mazandaran province, Tonekabon, Jangal-e 2000, 2♂♂, viii. 2017.

General distribution: Austria, Belgium, Canada, Denmark, France, Germany, Hungary, Italy, Kazakhstan, Latvia, Netherlands, Norway, Poland, Romania, Russia, Sweden, Switzerland, Ukraine, United Kingdom (Yu *et al.*, 2016), the Czech Republic, and Slovakia (Holý and Zeman, 2018).

Host records: *Cephus pygmaeus* Norton (Hymenoptera: Cephidae) (Yu *et al.*, 2016).

6.2. Genus *Phrudus* Förster, 1869

6.2.1. *Phrudus monilicornis* Bridgman, 1886*

Material examined: Golestan province, Golestan National Park, 2♀♀, August 2012.

General distribution: Austria, Bulgaria, China, Czech Republic, Finland, France, Germany, Hungary, Ireland, Kyrgyzstan, Netherlands, Norway, Poland, Romania, Russia, Sweden, Switzerland, Ukraine, United Kingdom (Yu *et al.*, 2016), Belgium (Verheyde *et al.*, 2021).

Host records: Unknown.

In this faunistic research, 10 species in 6 subfamilies were collected from different regions of Iran. In total, 15 specimens were collected from 11 provinces of Iran: East Azarbaijan (3 species), Ardabil, Golestan, and Mazandaran (2 species), and Kuhgiluyeh and Boyerahmad (1species). The fauna of Iranian Ichneumonidae, although has not been studied completely, has several contributions in recent years that show that valuable continuous works are conducted on these parasitoid wasps in this country. However, to successfully establish biological control programs to control destructive

agricultural pests, sufficient knowledge of the fauna of natural enemies in the related area is needed (Burn *et al.*, 1987, and Hajek, 2004). Therefore, it is necessary that the faunistic surveys in Iran are continued systematically to determine the presence of these efficient parasitoids gradually and consequently taking initial steps towards biological control programs.

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