



New records of the family Ichneumonidae (Hymenoptera, Ichneumonoidea) to the fauna of Iran

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Received:
27 April, 2020

Accepted:
12 June, 2020

Published:
18 June, 2020

Subject Editor:
Ehsan Rakhshani

ABSTRACT. This study has been carried out to collect and identify Ichneumonidae species from northwestern Iran using Malaise traps during 2014. In total, fifteen species into 6 subfamilies are identified. Four species are recorded for the first time from Iran, i.e. *Hoplocryptus melanocephalus* (Gravenhorst, 1829), *Zoophthorus palpator* (Müller, 1776), *Exochus erythronotus* (Gravenhorst, 1820) and *Enicospilus cerebrator* Aubert, 1966. The geographical distribution data of the recorded species are provided.

Key words: Ichneumonidae, parasitoid, Iran, new record

Citation: Mohammadi-Khoramabadi, A., Lotfalizadeh, H. & Schwarz, M. (2020) New records of the family Ichneumonidae (Hymenoptera, Ichneumonoidea) to the fauna of Iran. *Journal of Insect Biodiversity and Systematics*, 6 (3), 229–237.

Introduction

Ichneumonidae (Hymenoptera: Ichneumonoidea) is the largest family of insects with more than 25285 described species in the world (Yu et al., 2016). In order to increase and complete knowledge on these abundant and important parasitoids of pests, researches on the their taxonomy, distribution and biology are ongoing throughout the world, even in some better studied areas such as Europe (Klopfstein et al., 2019; Vas, 2020).

Many studies in recent years have increased our knowledge on the fauna, distribution (Amiri et al., 2015a, 2015b, 2016a, 2016b; Hooshyar et al., 2018; Jahan et al., 2016; Mahyabadi et al., 2016; Mohammadi-Khoramabadi & Talebi, 2013; Mohammadi-Khoramabadi et al., 2013a; 2013b; Mohammadi et al., 2020; Riedel et al., 2019a; Sarafi et al., 2015; Shirzadegan et al., 2017, 2018a, 2018b) and bioecology of these important and abundant parasitoid wasps in forest, range and agricultural ecosystems of Iran (Akbarzadeh-Shoukat, 2012; Fathi et al., 2012; Kamangar et al., 2017; Mehrnejad & Basirat, 2009; Mohammadi-Khoramabadi et al., 2016a, 2016b, 2017; Pourhaji et al., 2016; Shamszadeh et al., 2015). Northwest of Iran is of great importance both in terms of animal genetic resources, which contains five national park and protection areas (Hanson et al., 2009; Zehzad et al., 2002) and in terms of its

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potency of agricultural products (Ebadzadeh et al., 2018). This region borders by Turkey, Azerbaijan and Armenia countries. The fauna of some subfamilies of Ichneumonidae in northwest of Iran is already studied and resulted in distributional extension of several species and also describing some new species to the world (Ghahari & Jussila, 2016; Pourhaji et al., 2016; Riedel & Aghadokht, 2017; Riedel et al., 2019a). In an ongoing collection and identification project of Iranian Ichneumonidae, here we present new data on the distribution of some Ichneumonidae species from northwest of Iran.

Material and methods

This study was carried out in East and West Azerbaijan provinces at northwest of Iran during July-August 2014. Sampling was done using Malaise traps (Table 1). The captured ichneumonid specimens were pinned or card mounted and then identified using relevant keys and descriptions available on Anomaloninae (Schnee, 2014), Campopleginae (Dbar, 1984; 1985; Kasparyan, 1981), Diplazontinae (Klopfstein, 2014), Metopiinae (Tolkanitz, 2007), Ophioninae (Broad & Shaw, 2016). The Cryptinae specimens were identified by the third author, Dr. M. Schwarz (A specialist on this subfamily). The general distribution of the identified species is followed Yu et al. (2016). The voucher specimens are deposited in the private collection of Dr. Schwarz (PCS) and Insect collection of Darab College of Agriculture and Natural Resources, Shiraz University (DCS).

Table 1. Geographical coordinates of sampling sites in northwest of Iran during 2014.

Malaise trap	Locality, Province	Geographical coordinates	Elevation a.s.l. (m)
M1	Basmanj, East Azerbaijan	46°28'17" N, 37°59'38" E	1748
M2	Kahriz, West Azerbaijan	44°58'15" N, 37°52'18" E	1370

Results

From a total of 176 captured specimens, distributional data of 15 species into 12 genera and 6 subfamilies are given as following. Four species are recorded for the first time from Iran, which are marked with an asterisk (*).

Subfamily Anomaloninae Viereck, 1918

Anomalon chinense (Kokujev, 1915)

Material examined: M2, 3♂♂ 1♀, 6–23.VI.2014, Leg. H. Lotfalizadeh; (DCS).

Distribution in Iran: Kermanshah (Zardouei-Heydari et al., 2020) and West Azerbaijan provinces (current study).

General distribution: Palaearctic (Yu et al., 2016).

Anomalon cruentatum (Geoffroy, 1785)

Material examined: M2, 12♂♂ 29♀♀, 6–23.VI.2014, Leg. H. Lotfalizadeh; (DCS).

Distribution in Iran: Ardabil, East Azerbaijan, Sistan and Baluchestan, Yazd (Barahoei et al., 2012), Kermanshah, North Khorasan, South Khorasan, Khorasan-e-Razavi, Isfahan (Zardouei-Heydari et al., 2020) and West Azerbaijan provinces (Current study).

General distribution: Palaearctic (Yu et al., 2016).

Subfamily Campopleginae Förster, 1869*Cymodusa australis* (Smits Van Burgst, 1913)**Material examined:** M1, 1♀ 2♂♂, 25.VII.2014–5.VIII.2014, Leg. H. Lotfalizadeh; (DCS).**Distribution in Iran:** Fars (Amiri et al., 2017) and East Azerbaijan provinces (current study).**General distribution:** Western Palaearctic (Yu et al., 2016).*Cymodusa longiterebra* Dbar, 1985**Material examined:** M1, 2♀♀ 2♂♂, 25.VII.2014–5.VIII.2014, Leg. H. Lotfalizadeh; (DCS).**Distribution in Iran:** Fars (Amiri et al., 2017) and East Azerbaijan provinces (current study).**General distribution:** Western Palaearctic (Yu et al., 2016).*Diadegma maculatum* (Gravenhorst, 1829)**Material examined:** M1, 1♀, 25.VII.2014–5.VIII.2014, Leg. H. Lotfalizadeh; (DCS).**Distribution in Iran:** West Azerbaijan (Pourhaji et al., 2016), Khorasan-e-Razavi (Ghahari et al., 2014) and East Azerbaijan provinces (Current study).**General distribution:** Western Palaearctic (Yu et al., 2016).**Subfamily Diplazontinae** Viereck, 1918*Homotropus nigritarsus* (Gravenhorst, 1829)**Material examined:** M2, 2♀♀, 6–23.VI.2014, Leg. H. Lotfalizadeh; (DCS).**Distribution in Iran:** Guilan, Tehran, Alborz, Mazandaran, Qazvin, Yazd, Isfahan, Fars, Ardabil, Khuzestan, Markazi (Mohammadi-Khoramabadi et al., 2013b) and West Azerbaijan provinces (Current study).**General distribution:** Palaearctic, Nearctic, Neotropical (Yu et al., 2016).*Diplazon laetatorius* (Fabricius, 1781)**Material examined:** M2, 1♀, 6–23.VI.2014, Leg. H. Lotfalizadeh; (DCS).**Distribution in Iran:** Alborz, Guilan, Mazandaran, Qazvin, Tehran (Mohammadi-Khoramabadi et al., 2013b), Chaharmahal and Bakhtiari (Nourbakhsh et al., 2008), Isfahan (Barahoei et al., 2015; Rakhshani et al., 2010), Kerman (Bakhtiari et al., 2014), Sistan and Baluchistan (Barahoei et al., 2013), Yazd (Mohammadi-Khoramabadi et al., 2016b).**General distribution:** Cosmopolite (Yu et al., 2016).**Subfamily Cryptinae** Kirby, 1837*Mesostenus transfuga* Gravenhorst, 1829**Material examined:** M2, 3♀♀, 6–23.VI.2014; M1, 1♀, 25.VII.2014–5.VIII.2014, Leg. H. Lotfalizadeh; (PCS).**Distribution in Iran:** Fars, Guilan, Isfahan, Khorasan-e-Razavi, Mazandaran (Mahyabadi et al., 2016), West and East Azerbaijan provinces (current study).**General distribution:** Palaearctic (Yu et al., 2016).

Hoplocryptus melanocephalus (Gravenhorst, 1829)*

Material examined: M2, 3♀, 6–20.VI.2014, Leg. H. Lotfalizadeh; (PCS).

Distribution in Iran: West Azerbaijan province (current study).

General distribution: Western Palaearctic (Yu et al., 2016).

Trychosis priesneri Rossem, 1971

Material examined: M2, 1♀, 6–23.VI.2014, Leg. H. Lotfalizadeh; (PCS).

Distribution in Iran: Isfahan, Khorasan-e-Razavi, Sistan and Baluchistan (Mahyabadi et al., 2016) and West Azerbaijan provinces (current study).

General distribution: Western Palaearctic (Yu et al., 2016).

Gelis areator (Panzer, 1804)

Material examined: M2, 1♀, 6–23.VI.2014, Leg. H. Lotfalizadeh; (PCS).

Distribution in Iran: Isfahan (Mahyabadi et al., 2016) and West Azerbaijan provinces (current study).

General distribution: Afrotropical (introduced), Oceanic, Oriental, Palaearctic (Schwarz, 2016; Yu et al., 2016).

Zoophthorus palpator (Müller, 1776)*

Material examined: M1, 1♀, 25.VII.2014–5.VIII.2014, Leg. H. Lotfalizadeh; (PCS).

Distribution in Iran: East Azerbaijan province (current study).

General distribution: Palaearctic (Yu et al., 2016).

Subfamily Metopiinae Förster, 1869*Exochus erythronotus* (Gravenhorst, 1820)*

Material examined: M1, 2♀ 3♂, 25.VII.2014–5.VIII.2014, Leg. H. Lotfalizadeh; (DCS).

Distribution in Iran: East Azerbaijan province (current study).

General distribution: Western Palaearctic (Yu et al., 2016).

Exochus gravipes (Gravenhorst, 1820)

Material examined: M1, 1♀, 25.VII.2014–5.VIII.2014, Leg. H. Lotfalizadeh; (DCS).

Distribution in Iran: East Azerbaijan province (current study).

General distribution: Holarctic (Yu et al., 2016).

Subfamily Ophioninae Shuckard, 1840*Enicospilus cerebrator* Aubert, 1966*

Material examined: M2, 1♀, 6–23.VI.2014, Leg. H. Lotfalizadeh; (DCS).

Distribution in Iran: West Azerbaijan province (current study).

General distribution: Western Palaearctic (Yu et al., 2016).

Discussion

This study added four new records, increasing the total number of Iranian Anomaloninae to 16, Campopleginae to 65, Cryptinae to 137, Diplazontinae to 19, Metopiinae to 11 and Ophioninae to 27 species (Table 2) (Amiri et al., 2015b, 2016a; Hooshyar et al., 2018; Mahyabadi et al., 2016; Mohammadi-Khoramabadi et al., 2013b; Mohammadi et al., 2020; Riedel et al., 2019a, 2019b; Schwarz, 2016; Zardouei-Heydari et al., 2020). Comparing the number of recorded species of the aforementioned subfamilies in Iran including the northwest provinces with the adjacent countries (Yu et al., 2016) (Table 2) show that more investigations are needed to obtain better knowledge on this family and unveil distribution range of Iranian Ichneumonidae.

Table 2. Current number of known species of the studied subfamilies of Ichneumonidae in the northwest of Iran and neighboring countries.

Subfamily	West Azer. prov.	East Azer. prov.	Northwest Iran	Iran	Azerbaijan	Turkey	Armenia
Anomaloninae	3	1	2	16	15	37	3
Campopleginae	11	5	15	65	67	124	29
Cryptinae	27	11	41	137	119	194	16
Diplazontinae	3	0	3	19	15	29	6
Metopiinae	0	2	3	11	16	58	13
Ophioninae	1	0	1	27	9	24	3

Acknowledgments

This work was supported by Shiraz University [grant number 95GRS0M2228]. We would like to express our cordially thanks to Anna Nuzhna (Schmalhausen Institute of Zoology, NAS of Ukraine, Kyiv, Ukraine) and Heinz Schnee (Birkenweg 18, D-04416 Markkleeberg) for their help with the identification of Anomaloninae species.

Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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گزارش‌های جدید از خانواده Ichneumonidae (Hymenoptera, Ichneumonoidea) برای فون ایران

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| تاریخ دریافت: ۸ اردیبهشت ۱۳۹۹ | تاریخ پذیرش: ۲۳ خرداد ۱۳۹۹ | تاریخ انتشار: ۲۹ خرداد ۱۳۹۹ |

چکیده: این مطالعه به جمع‌آوری و شناسایی گونه‌های خانواده Ichneumonidae از شمال غرب ایران با استفاده از تله مالیز در سال ۱۳۹۳ پرداخته است. در مجموع، پانزده گونه از شش زیرخانواده شناسایی شدند. چهار گونه شامل *Hoplocryptus Zoophthorus palpator* (Müller, 1776) *Exochus erythronotus melanocephalus* (Gravenhorst, 1829) برای اولین بار از ایران گزارش می‌شوند. داده‌های پراکنش جغرافیایی برای گونه‌های گزارش شده ارائه شد.

واژگان کلیدی: Ichneumonidae، پارازیتوئید، ایران، گزارش جدید