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An Annotated Catalogue of the Superfamily Diaprioidea (Hymenoptera) in the Middle East

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ABSTRACT

A review of the genera and species of the superfamily Diaprioidea reported so far from the Middle East is provided with available host information. Data presented here is based on a review of existing literature by the authors, and reexamination of available specimens. Forty-eight species and 18 genera in two families (Diapriidae and Ismaridae) are recorded from the Middle East, with special reference to the Iranian fauna as being the more diverse country with this group of parasitic wasps. One species, *Psilomma dubia* Kieffer, 1908 (Diapriidae) is newly recorded for the Middle East. Among the 48 recorded species, 17 (35.4%) are found to be endemic or subendemic to the Middle East.

Keywords: Species diversity, checklist, new record, Diapriidae, Ismaridae.

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INTRODUCTION

Diaprioidea Haliday, 1833 is a hymenopteran superfamily containing five extant families, Austroniidae, Diapriidae, Ismaridae, Maamingidae, and Monomachidae. These families were formerly included in the superfamily Proctotrupoidea (Sharkey et al., 2012). It was first proposed a separate superfamily by Sharkey (2007) including Diapriidae, Maamingidae and Monomachidae. Currently, only two families Diapriidae and Ismaridae are reported from the Middle East.

Diapriidae Haliday, 1833 is a speciose family of small parasitoid wasps with 2100 described species distributed in 194 genera (Johnson, 1992; Belokobylskij & Lelej, 2017; Johnson, Musetti, & Cora, 2021), and three subfamilies: Diapriinae, Belytinae and Ambositrinae (Comério, Perioto, & Rosa Lara, 2016). In total, 800 species of Diapriidae within 90 genera have been recorded from the Palaearctic region so far (Belokobylskij & Lelej, 2017). Diapriids are tiny wasps with an average length of body between 2.0-4.0 mm, never exceeding 8.0 mm, mainly black and shiny, with antennae inserted on a shelf or at some distance above the level of the clypeus; the scape is distinctly elongate and at least 2.5 times as long as wide; the fore wing has one closed cell (radial) or none, or sometimes it is almost veinless (Belokobylskij & Lelej, 2017). Diapriids shows considerable diversity of forms, with aptery, fairly common, sometimes in both sexes. Nearly all species exhibit noticeable sexual dimorphism, with most notable differences in the antennae (Masner, 1993; Perichot & Nel, 2008). They typically attack larvae and pupae of wide range of insects, principally of dipterans, but a number of species are closely associated with ant nests (Loiácono, Margaría, & Acquino, 2013).

Among the Diapriidae, the subfamilies Belytinae and Diapriinae have been recorded from some of the Middle Eastern countries. Diapriinae is a cosmopolitan subfamily including about 1000 described species (Johnson, 1992). Most species of this subfamily are pupal or puparial endoparasitoids of Diptera or more rarely Coleoptera or Formicidae (Notton, 2014). Diapriinae are often a major component of the microhymenopteran fauna attacking Diptera in a range of habitats, but despite this they remain poorly known (Notton, 2014). On the other hand, Belytinae may be the most primitive subfamily based on morphology and hosts (Masner in Goulet & Huber, 1993). Species inhabit mostly moist places. They appear to be restricted to Mycetophilidae and Sciaridae (Diptera) as hosts (Masner in Goulet & Huber, 1993). The members of the subfamily Ambositrinae being distributed in Australia, New Zealand, Africa and South America, but the others have almost worldwide distributions (Belokobylskij & Lelej, 2017).

The family Ismaridae Thomson, 1858 is a monogeneric family within the superfamily Diaprioidea (Sharkey et al., 2012), with 57 described species worldwide in a single widespread extant genus, *Ismarus* Haliday, 1835 (Kim, Copeland, & Notton, 2018b). Palaearctic Ismaridae comprises 13 species (Johnson, 1992; Belokobylskij & Lelej, 2017). These are small to medium-sized (1.5-3.5 mm) parasitoids with a

mainly dark body. Female antenna 15-merous, male antenna 14-merous; male antennomere 4 or rarely antennomeres 3 and 4 have tyloids; antennae inserted only slightly above clypeus; antennal shelf and notauli not developed; wing venation reduced, only a closed radial cell is developed; metasoma with one large basal tergite and 5 narrow segments beyond it (Belokobylskij & Lelej, 2017). It has been reported from all zoogeographical regions (Kim et al., 2018a), which some of them have wide distribution (Masner, 1976; Liu, Chen, & Xu, 2011). They prefer to inhabit higher elevations in wooded areas in warmer climatic zones, and at low elevations in cooler climatic zones (Kim et al., 2018a, b). From literature available, species of Ismaridae are hyperparasitoids of planthoppers (Hemiptera) via Dryinidae (Hymenoptera) (Chambers, 1955, 1981; Nixon, 1957; Wall, 1967; Kozlov, 1971; Masner, 1976; Jervis, 1979; Tussac & Tussac, 1991; Olmi, 2000). Ismaridae can also be parasitoids of cocoons of Dryinidae wasps, so Ismaridae may potentially be detrimental for biological control (Kim, Notton, Ødegaard, & Lee, 2018a).

The aim of this paper is to catalogue all the Diaprioidea (Diapriidae and Ismaridae) data of the Middle Eastern countries.

MATERIALS AND METHODS

The published data on the superfamily Diaprioidea (Hymenoptera) in the Middle East is summarized. The new specimens of this research were collected using Malaise traps placed at Chaharmahal & Bakhtiari, and Mazandaran provinces. The specimens were transferred to 75% ethanol for preserving, and studied by stereomicroscope; additionally, the specimens of Samin et al. (2018) which are deposited in her private collection were reexamined. The present checklist comprises the following data: 1/ the valid taxon name, 2/ published records for Iran with provincial distribution, 3/ distributional data (distribution in the Middle East and extralimital distribution), and 4/ host records. Classification and nomenclature are based on Johnson (1992) and Aguiar et al. (2013), and for distributional data, the related references are given. The provinces of Iran, and also the countries adjacent to Iran are represented in Figure 1.

Figure 1. Map of Iran with provincial boundaries, and adjacent countries (Ghahari, H., Gadallah, N.S., & Wahis, R. (2014)).

RESULTS

In this paper, a total of 45 diapriid species belonging to 18 genera and two subfamilies (Belytinae, and Diapriinae), and three ismarid species belonging to the genus *Ismarus* Haliday, 1835 are recorded from four Middle Eastern countries, Egypt, Iran, Syria, and Turkey. *Psilomma dubia* Kieffer, 1908 is recorded for the first time from the Middle East. An undetermined *Trichopria* sp. (of the *Trichopria keralensis* species group) was also first recorded for Saudi Arabia and Yemen by Kim, Notton, & Lee (2016).

Superfamily Diaprioidea Haliday, 1833

Family Diapriidae Haliday, 1833

Subfamily Belytinae Förster 1856

Genus *Acanopsilus* Kieffer, 1908

Acanopsilus Kieffer, 1908: 426. Type species: *Acanopsilus clavatus* Kieffer, 1908 *(= Belyta heterocera Haliday, 1857),* by monotypy.

Acanopsilus heterocera (Haliday, 1857)

Belyta heterocerus Haliday, 1857: 169, ♀.

Distribution in Iran: Golestan, Guilan, Mazandaran (Izadizadeh et al., 2023b).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023b).

Extralimital distribution: Austria, Azerbaijan, China, Czech Republic, Georgia, Germany, Greece, Hungary, Italy, Russia, South Korea, Sweden, Turkmenistan, Ukraine, United Kingdom, Uzbekistan (Chemyreva & Kolyada, 2021).

Host records: Unknown.

Genus *Acanosema* Kieffer, 1908

Acanosema Kieffer, 1908: 407. Type species: *Acanosema rufum* Kieffer, 1908, by original designation.

***Acanosema nervosum* (Thomson, 1859)**

Cinetus nervosus Thomson, 1859: 165, ♂.

Distribution in Iran: Golestan, Guilan, Mazandaran (Izadizadeh et al., 2023b).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023b).

Extralimital distribution: Abkhazia, Azerbaijan, Czech Republic, Hercegovina, Hungary, Italy, Moldova, Norway, Poland, Russia, Slovakia, Sweden, Ukraine, United Kingdom (Hellén, 1964; Macek, 1990; Chemyreva & Kolyada, 2021).

Host records: Larvae of Sciaridae and Mycetophilidae (Diptera) living in rotten Wood (Nixon, 1957).

Genus *Belyta* Jurine, 1807

Belyta Jurine, 1807: 311. Type species: *Belyta bicolor* Jurine, 1807, by monotypy.

***Belyta abrupta* Thomson, 1859**

Belyta abrupta Thomson, 1859: 168, ♂, ♀.

Distribution in Iran: Golestan, Guilan, Mazandaran (Izadizadeh et al., 2023a).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023a).

Extralimital distribution: Austria, Czech Republic, Finland, France, Germany, Italy, Slovakia, Sweden, Switzerland (Izadizadeh et al., 2023a), Russia (Chemyreva in Belokobylskij & Lelej, 2017).

Host records: Unknown.

***Belyta bicolor* Jurine, 1807**

Belyta bicolor Jurine, 1807: 311, plate 14, ♀.

Distribution in Iran: Guilan (Izadizadeh et al., 2023a).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023a).

Extralimital distribution: Czech Republic, England, Germany, Hungary, Sweden, Switzerland (Macek, 1996).

Host records: Unknown.

***Belyta depressa* Thomson, 1859**

Belyta depressa Thomson, 1859: 169, ♂, ♀.

Distribution in Iran: Alborz, Golestan, Guilan, Mazandaran, Qazvin (Izadizadeh et al., 2023a).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023a).

Extralimital distribution: Austria, Belgium, Czech Republic, Finland, France, Germany, Italy, Malta, Poland, Slovakia, Sweden, United Kingdom (Nixon, 1957; Hellén, 1964; Wall, 1993; Macek, 1996; Notton & Mifsud, 2019), Russia (Chemyreva in Belokobylskij & Lelej, 2017).

Host records: Unknown.

***Belyta elongata* Thomson, 1859**

Belyta elongata Thomson, 1859: 174, ♀.

Distribution in Iran: Mazandaran (Izadizadeh et al., 2023a).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023a).

E*xtralimital distribution:* Austria, Czech Republic, Finland, France, Germany, Ireland, Italy, Slovakia, Sweden, United Kingdom (Nixon, 1957; Hellén, 1964; Wall, 1993; Macek, 1996), Poland (Macek, 1996), Russia (Chemyreva in Belokobylskij & Lelej, 2017).

Host records: Unknown.

***Belyta rugosicollis* Kieffer, 1909**

Belyta (*Belyta*) *rugosicollis* Kieffer, 1909: 490, ♀.

Distribution in Iran: Golestan, Guilan, Mazandaran (Izadizadeh et al., 2023a).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023a).

Extralimital distribution: Austria, Czech Republic, France, Germany, Ireland, Sweden, Switzerland, United Kingdom (Nixon, 1957; Wall, 1967; Macek, 1996).

Host records: Unknown.

***Belyta sanguinolenta* Nees, 1834**

Belyta sanguinolenta Nees, 1834: 431, ♂, type lost.

Distribution in Iran: Golestan, Guilan, Mazandaran (Izadizadeh et al., 2023a).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023a).

Extralimital distribution: China, Czech Republic, Finland, France, Germany, Hungary, Japan, Malta, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, United Kingdom (Nixon, 1957; Hellén, 1964; Wall, 1993; Macek 1996; Notton & Mifsud, 2019), Taiwan (Macek, 1996).

Host records: Unknown.

***Belyta validicornis* Thomson, 1859**

Belyta validicornis Thomson, 1859: 168, ♂.

Distribution in Iran: Alborz, Golestan, Mazandaran (Izadizadeh et al., 2023a).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023a).

Extralimital distribution: Austria, Czech Republic, Finland, Germany, Hungary, Italy, Slovakia, Sweden, Switzerland, United Kingdom (Nixon, 1957; Wall, 1993; Macek, 1996), Russia (Chemyreva in Belokobylskij & Lelej, 2017).

Host records: Unknown.

Genus *Diphora* Förster, 1856

Diphora Förster, 1856: 140. Type species: *Diphora westwoodi* Förster, 1856, by monotypy.

***Diphora westwoodi* Förster, 1856**

Diphora westwoodi Förster, 1856: 141, ♀.

Distribution in Iran: Golestan, Guilan, Mazandaran (Izadizadeh et al., 2023b).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023b).

Extralimital distribution: Austria, France, Germany, Romania, Switzerland, United Kingdom (Kieffer, 1916; Wall, 1967; Fabricius, 1980).

Host records: Unknown.

Genus *Pantolyta* Förster, 1856

Pantolyta Förster, 1856: 128. Type species: *Pantolyta atrata* Förster, 1861, by subsequent monotypy of Förster, 1861 .

***Pantolyta nixoni* Macek, 1993**

Pantolyta nixoni Macek, 1993: 46, ♂, ♀.

Distribution in Iran: Mazandaran (Izadizadeh et al., 2021a).

Distribution in the Middle East: Iran (Izadizadeh et al., 2021a).

Extralimital distribution: Azerbaijan, Czech Republic, Germany, Hungary, Poland, Russia, Sweden (Macek 1993; Chemyreva & Kolyada, 2019a).

Host records: Unknown.

***Pantolyta pallida* Kieffer, 1908**

Pantolyta pallida Kieffer, 1908: 430, ♂, ♀.

Distribution in Iran: Guilan (Izadizadeh et al., 2021a).

Distribution in the Middle East: Iran (Izadizadeh et al., 2021a).

Extralimital distribution: Armenia, Czech Republic, England, Georgia, Germany, Hungary, Japan, Kazakhstan, Mongolia, North Korea, Poland, Russia, South Korea, Sweden, Tajikistan, Turkmenistan, Ukraine (Macek, 1993; Chemyreva & Kolyada, 2019a).

Host records: Unknown.

Genus *Psilomma* Förster, 1856

Psilomma Förster, 1856: 132. Type species: *Psilomma fusciscapis* Förster, 1861, by subsequent monotypy of Förster, 1861: 43.

***Psilomma dubia* Kieffer, 1908**

Psilomma dubia Kieffer, 1908: 426, ♂.

Distribution in Iran: Mazandaran province, Tonekabon, Jangal-e 3000, 2♂♂, leg. H. Ghahari, 14-16.viii.2011. New record for the fauna of Iran.

Distribution in the Middle East: Iran (new record).

Extralimital distribution: Czech Republic, England, France, Hungary, Ireland, Scotland, Sweden, Poland (Macek, 1990), Estonia, Poland, Russia, South Korea, Ukraine (Chemyreva & Kolyada, 2021).

Host records: Unknown.

Comments: This species is similar to *Psilomma fusciscapis* Förster, 1861, but differs from it by structure of antennae, produced base of macrosternite, homogenous basal striation of macrotergite and conspicuous pronotal shoulders (Macek, 1990).

***Psilomma fusciscapis* Förster, 1861**

Psilomma fusciscapis Förter, 1861: 43, ♂.

Distribution in Iran: Golestan, Guilan, Mazandaran (Izadizadeh et al., 2023b).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023b).

Extralimital distribution: Austria, Azerbaijan, Czech Republic, Hungary, Poland, Russia, Sweden (Macek 1990; Chemyreva & Kolyada, 2021).

Host records: Unknown.

Genus *Synacra* Förster, 1856

Synacra Förster, 1856: 134. Type species: *Diapria brachialis* Nees, 1834, designated by Ashmead (1893).

***Synacra sociabilis* (Kieffer, 1904)**

Neoropria sociabilis Kieffer, 1904: 53, ♂.

Distribution in Iran: Guilan (Izadizadeh et al., 2023b).

Distribution in the Middle East: Iran (Izadizadeh et al., 2023b).

Extralimital distribution: Austria, Bulgaria, Czech Republic, Finland, France, Germany, Hungary, Luxembourg, Mongolia, Netherlands, Russia, Slovakia, Ukraine, United Kingdom (Macek, 1995; Chemyreva & Kolyada, 2019b).

Host records: This species is associated with nests of Ants (Hymenoptera: Formicidae) of the genera *Formica* and *Lasius* (e.g., *Lasius brunneus* (Latreille)). Some species were reared from sciarid flies larvae in a mushroom (Macek, 1995). Chemyreva & Kolyada, (2019b) collected two specimens from nests of *Formica rufa* L.

Subfamily Diapriinae Haliday, 1833

Genus *Aneuropria* Kieffer, 1905

Aneuropria Kieffer, 1905: 35. Type species: *Aneuropria clavata* Kieffer, 1911 (= *Polypeza foersteri* Kieffer, 1910), first included species.

***Aneuropria foersteri* (Kieffer, 1910)**

Polypeza försteri Kieffer, 1910: 718, ♀ [♂].

Distribution in Iran: Golestan (Izadizadeh et al., 2020).

Distribution in the Middle East: Iran (Izadizadeh et al., 2020).

Extralimital distribution: Denmark, Germany, Finland, Ukraine, United Kingdom, Russia (Johnson, 2015).

Host records: Unknown.

Genus *Basalys* Westwood, 1833

Basalys Westwood, 1833: 343. Type species: *Basalys fumipennis* Westwood, 1833, by monotypy.

***Basalys steueri* (Kieffer, 1905)**

Loxotropa Steueri Kieffer, 1905: 108, ♀.

Distribution in the Middle East: Egypt (Kieffer, 1905, 1916 both as *Loxotropa steueri*).

Extralimital distribution: Known only from Egypt.

Host records: Recorded by Kieffer (1916) in association with the following ant species: *Camponotus silvaticus* (Olivier), *Monomorium clavicorne* André, and *Pheidole sinaitica* Mayr.

Genus *Coptera* Say, 1836

Coptera Say, 1836: 281. Type species: *Coptera polita* Say, 1836, by monotypy.

***Coptera depressa* (Kieffer, 1911)**

Galesus (*Schizogalesus*) *depressus* Kieffer, 1911a: 844, ♀.

Distribution in the Middle East: Syria (Chemyreva in Belokobylskij & Lelej, 2017).

Extralimital distribution: Europe, Russia (Chemyreva in Belokobylskij & Lelej, 2017).

Host records: Unknown.

***Coptera inaequalifrons* (Jansson, 1942)**

Galesus (*Schizogalesus*) *inaequalifrons* Jansson, 1942: 211, ♂, ♀.

Distribution in Iran: Guilan (Samin et al., 2018).

Distribution in the Middle East: Iran (Samin et al., 2018), Turkey (Petrov & Beyarslan, 1996).

Extralimital distribution: Sweden, United Kingdom (Nixon 1980 as *Psilus inaequalifrons*).

Host records: Recorded by Nixon (1980 as *Psilus inaequalifrons*) as being a parasitoid of the lonchaeid *Lonchaea fugax* Becker (= *Lonchaea cariecola* Czerny).

***Coptera silvestrii* (Kieffer, 1913)**

Galseus (*Schizogalesus*) *silvestrii* Kieffer, 1913: 91, ♂, ♀.

Distribution in Iran: Southern Khorasan (Amini, Sadeghi, Lotfalizadeh, & Notton, 2014).

Distribution in the Middle East: Iran (Amini et al., 2014).

Extralimital distribution: Nigeria (Kieffer, 1913 as *Galesus* (*Schizogalesus*) silvestrii).

Host records: Recorded by Kieffer (1913 as *Galesus silvestrii*) as a parasitoid of the tephritids *Ceratitis anonae* (Graham), *Ceratitis nigerrima* Bezzi, and *Ceratitis giffardi* Bezzi. In Iran, it has been recorded as a parasitoid of *Carpomya vesuviana* Costa (Diptera: Tephritidae) (Amini et al., 2014).

Genus *Diapria* Latreille, 1796

Diapria Latreille, 1796: 110. Type species: *Ichneumon conicus* Fabricius, 1775, designated by Latreille (1810).

***Diapria conica* (Fabricius, 1775)**

Ichneumon conicus Fabricius, 1775: 343, sex not cited.

Distribution in Iran: Guilan, Mazandaran (Izadizadeh et al., 2020).

Distribution in the Middle East: Iran (Izadizadeh et al., 2020).

Extralimital distribution: Austria, Czech Republic, Denmark, Finland, France, Sweden, United Kingdom, North America (Kozlov, 1978; Johnson, 2015).

Host records: Recorded by Kieffer (1916) and Nixon (1980) as being a parasitoid of the syrphid *Eristalis tenax* (Linnaeus).

Genus *Entomacis* Förster, 1856

Entomacis Förster, 1856: 121. Type species: *Diapria* (*Glyphidopria*) *platyptera* Haliday, 1857, designated by Muesebeck & Walkley (1951).

***Entomacis perplexa* (Haliday, 1857)**

Diapria (*Glyphidopria*) *perplexa* Haliday, 1857: 172, ♂, ♀.

Distribution in Iran: Lorestan (Samin et al., 2018).

New material examined: Chaharmahal & Bakhtiari province, Lordegan (Deh-Chenar), 2♀, leg. M. Shahi, 16.vii.2010.

Distribution in the Middle East: Iran (Samin et al., 2018).

Extralimital distribution: Austria, Canada, Czech Republic, Germany, Hungary, Japan, Moldova, Poland, Russia, Slovakia, USA (Chemyreva, 2015), China (Chemyreva in Belokobylskij & Lelej, 2017), Georgia (Japoshvili, 2022), Sweden,

United Kingdom (Kieffer, 1916 as *Hemilexis perplexa*).

Host records: Recorded by Nixon (1980) as a parasitoid of the ceratopogonid *Forcipomyi bipunctata* (Linnaeus) (= *F. picea* Winnertz).

Genus *Monelata* Förster, 1856

Monelata Förster, 1856: 123. Type species: *Diapria parvula* Nees, 1834, designated by Ashmead (1893).

***Monelata aegyptiaca* Priesner, 1953**

Monelata aegyptiaca Priesner, 1953: 451, 453, ♀.

Distribution in the Middle East: Egypt (Priesner, 1953).

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

Genus *Plagiopria* Huggert & Masner, 1983

Plagiopria Huggert & Masner, 1983: 67, 72. Type species: *Plagiopria passerai* Huggert & Masner, 1983, by original designation.

***Plagiopria besucheti* Huggert & Masner, 1983**

Plagiopria besuchetti Huggert & Masner, 1983: 74, 75, ♀.

Distribution in the Middle East: Turkey (Huggert & Masner, 1983).

Extralimital distribution: Known only from Turkey.

Host records: Unknown.

***Plagiopria huberi* Huggert & Masner, 1983**

Plagiopria huberi Huggert & Masner, 1983: 74, 76, ♀.

Distribution in Iran: Tehran (Huggert & Masner, 1983).

Distribution in the Middle East: Iran (Huggert & Masner, 1983).

Extralimital distribution: Known only from Iran.

Host records: Unknown.

Genus *Psilus* Panzer, 1801

Psilus Panzer, 1801: Heft 83, plate 11. Type species: *Psilus cornutus* Panzer, 1801, by monotypy.

***Psilus carinatus* (Kieffer, 1911)**

Galesus (*Galesus*) *carinatus* Kieffer, 1911a: 846, ♂.

Distribution in the Middle East: Syria (Kieffer, 1911a, 1916 both as *Galesus carinatus*).

Extralimital distribution: Known only from Syria.

Host records: Unknown.

Genus *Spilomicrus* Westwood, 1832

Spilomicrus Westwood, 1832: 129. Type species: *Spilomicrus stigmaticalis* Westwood, 1832, by monotypy.

***Spilomicrus formosus* Jansson, 1942**

Spilomicrus formosus Jansson, 1942: 215, ♂, ♀.

Distribution in Iran: Ardabil (Samin et al., 2018).

Distribution in the Middle East: Iran (Samin et al., 2018).

Extralimital distribution: Europe (Northern, Western, Eastern), Canada, Japan, Russia, USA (Chemyreva, 2018).

Host records: Unknown.

Genus *Trichopria* Ashmead, 1893

Trichopria Ashmead, 1893: 407, 431. Type species: *Trichopria pentaplasma* Ashmead, 1893, by original designation.

***Trichopria aegyptiaca* Priesner, 1940**

Trichopria aegyptiaca Priesner, 1940: 71, 72, ♂, ♀.

Distribution in the Middle East: Egypt (Priesner, 1940).

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

***Trichopria aegyptorum* (Priesner, 1953)**

Phaenopria aegyptorum Priesner, 1953: 444, 447, ♀.

Distribution in the Middle East: Egypt (Priesner, 1953 as *Phaenopria aegyptorum).*

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

Comments: Collected from detritus of an irrigation canal (Priesner, 1953).

***Trichopria alexandrina* (Priesner, 1940)**

Phaenopria alexandrina Priesner, 1940: 72, ♀.

Distribution in the Middle East: Egypt (Priesner, 1940, 1953, as *Phaenopria alexandrina).*

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

***Trichopria atomaria* (Priesner, 1953)**

Phaenopria atomaria Priesner, 1953: 446, 446, ♀.

Distribution in the Middle East: Egypt (Priesner, 1953 as *Phaenopria atomaria).*

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

***Trichopria bifoveata* Ashmead, 1895**

Trichopria bifoveata Ashmead, 1895: 898, ♀.

Distribution in the Middle East: Turkey (Petrov & Beyarslan, 1996).

Extralimital distribution: England, Germany, Sweden (Nixon, 1980).

Host records: Unknown.

***Trichopria cheopis* Priesner, 1940**

Trichopria cheopis Priesner, 1940: 71, 74, ♀.

Distribution in the Middle East: Egypt (Priesner, 1940).

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

Comments: This species was collected from detritus of the Nile inundation (Priesner, 1940).

***Trichopria crassifemur* Nixon, 1980**

Trichopria crassifemur Nixon, 1980: 38, ♂.

Distribution in the Middle East: Turkey (Petrov & Beyarslan, 1996).

Extralimital distribution: England, Sweden, Switzerland (Nixon, 1980).

Host records: Unknown.

***Trichopria delicatula* Priesner, 1940**

Trichopria delicatula Priesner, 1940: 71, 76, ♀.

Distribution in the Middle East: Egypt (Priesner, 1940).

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

Comments: Collected from detritus material (Priesner, 1940).

***Trichopria hannai* Priesner, 1940**

Trichopria hannai Priesner, 1940: 71, 77, ♀.

Distribution in the Middle East: Egypt (Priesner, 1940).

Extralimital distribution: Known only from Egypt.

Host records: Recorded by Priesner (1940) bred from pupae of *Drosophila* sp. (Diptera: Drosophilidae).

***Trichopria helouanensis* Priesner, 1940**

Trichopria helouanensis Priesner, 1940: 72, 81, ♀.

Distribution in the Middle East: Egypt (Priesner, 1940).

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

***Trichopria inermis* Kieffer, 1909**

Trichopria inermis Kieffer, 1909: 386, sex not stated.

Distribution in Iran: Khuzestan (Rabee et al., 1993; Modarres Awal, 2012).

Distribution in the Middle East: Iran (Rabee et al., 1993; Modarres Awal, 2012), Turkey (Petrov & Beyarslan, 1996 as *T. intermis*).

Extralimital distribution: France, Germany, Sweden, Switzerland, United Kingdom (Nixon, 1980).

Host records: Recorded as a parasitoid of the calliphorid *Lucilia sericata* (Meigen); the muscid *Mesembriana meridiana* (Linnaeus), and the sarcophagid *Brachicoma devia* (Fallén) (Nixon, 1980). In Iran, recorded as a hyperparasitoid of the tachinid *Linnaemya neavi* Curran (Rabee, Siahpoush, Nazemi, & Mozaffari, 1993; Modarres Awal, 2012).

***Trichopria longicornis* (Thomson, 1858)**

Diapria longicornis Thomson, 1858: 362, ♂.

Distribution in Iran: Kermanshah (Samin et al., 2018).

Distribution in the Middle East: Iran (Samin et al., 2018), Turkey (Petrov & Beyarslan, 1996).

Extralimital distribution: Sweden (Kieffer, 1916 as *Ashmeadopria longicornis*), United Kingdom (Nixon, 1980; Notton, 2004).

Host records: Recorded by Nixon (1980) as being taken flying over nest of ant *Formica rufa* Linnaeus.

***Trichopria major* (Priesner, 1953)**

Phaenopria major Priesner, 1953: 441, 448, ♂, ♀.

Distribution in the Middle East: Egypt (Priesner, 1953 as *Phaenopria major*).

Extralimital distribution: Europe, Russia (Chemyreva in Belokobylskij & Lelej, 2017).

Host records: Unknown.

***Trichopria masrensis* Priesner, 1940**

Trichopria masrensis Priesner, 1940: 72, 79, ♀.

Distribution in the Middle East: Egypt (Priesner, 1940).

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

Comments: Specimens of this species were collected in the detritus of an irrigation canal at Maadi (Priesner, 1940).

***Trichopria minor* (Priesner, 1953)**

Phaenopria minor Priesner, 1953: 443, 448, ♂, ♀.

Distribution in the Middle East: Egypt (Priesner, 1953 as *Phaenopria minor*).

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

***Trichopria myrmecobia* (Kieffer, 1911)**

Diapria (*Tropidopria*) *Myrmecobia* Kieffer, 1911b: 962, 978, ♂, ♀.

Distribution in Iran: West Azarbaijan (Samin et al. 2018).

Distribution in the Middle East: Iran (Samin et al., 2018), Turkey (Petrov & Beyarslan, 1996).

Extralimital distribution: Bulgaria (Petrov & Beyraslan, 1996), United Kingdom (Kieffer, 1916 as *Ashmeadopria myrmecobia*).

Host records: Recorded by Kieffer (with some doubt) (1916 as *A. myrmecobia*) in association with the *Formica* sp. (Hymenoptera: Formicidae).

***Trichopria revelata* (Priesner, 1953)**

Phaenopria revelata Priesner, 1953: 445, 447, ♀.

Distribution in the Middle East: Egypt (Priesner, 1953 as *Phaenopria revelata*).

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

***Trichopria simulatrix* (Priesner, 1953)**

Phaenopria simulatrix Priesner, 1953: 443, 448, ♂, ♀.

Distribution in the Middle East: Egypt (Priesner, 1953 as *Phaenopria simulatrix*).

Extralimital distribution: Known only from Egypt.

Host records: Unknown.

Comments: Specimens of this species were swept from Poaceae (= Graminaceae) and taken from detritus of an irrigation canal (Priesner, 1953).

Family Ismaridae Thomson, 1858

Genus *Ismarus* Haliday, 1835

Ismarus Haliday, 1835: 467. Type species: *Cinetus Dorsiger* Haliday, 1831, by monotypy.

***Ismarus dorsiger* (Haliday, 1831)**

Cinetus Dorsiger Haliday, in Curtis, 1831: 380, ♂.

Distribution in Iran: Guilan (Izadizadeh et al., 2021b).

Distribution in the Middle East: Iran (Izadizadeh et al., 2021b).

Extralimital distribution: Andorra, Bulgaria, China, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Montenegro, Netherlands, Norway, Russia, South Korea, Spain, Sweden, Switzerland, United Kingdom (Kim et al., 2018a), Georgia (Japoshvili, 2022).

Host records: Recorded as being a hyperparasitoid of the dryinid *Aphelopus serratus* Richards (Chemyreva in Belokobylskij & Lelej, 2017).

***Ismarus halidayi* Förster, 1850**

Ismarus halidayi Förster, 1850: 285, ♀.

Distribution in Iran: Mazandaran (Izadizadeh et al., 2021b).

Distribution in the Middle East: Iran (Izadizadeh et al., 2021b).

Extralimital distribution: Azerbaijan, Bulgaria, Canada, China, Czech Republic, Denmark, Finland, Georgia, Germany, Hungary, Ireland, Japan, Mongolia, Netherlands, North Africa, Norway, Russia (European, Far East, Siberia), Scotland, South Korea, Sweden, United Kingdom, USA (Kim et al., 2018a; Chemyreva in Belokobylskij & Lelej, 2017).

Host records: Recorded as a hyperparasitoid of the dryinids *Anteon jurineanum* Latreille (Chambers, 1955; Olmi, 2000; Chemyreva in Belokobylskij & Lelej, 2017), and *Anteon infectum* (Haliday) (Chambers, 1981).

***Ismarus rugulosus* Förster, 1850**

Ismarus rugulosus Förster, 1850: 284, ♀.

Distribution in Iran: Golestan (Izadizadeh et al., 2021b), Kermanshah, Northern Khorasan, Southern Khorasan (Rahmani et al., 2019).

Distribution in the Middle East: Iran (Rahmani et al., 2019; Izadizadeh et al., 2021b).

Extralimital distribution: Austria, Bulgaria, Canada, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Kazakhstan, Kyrgyzstan, Netherlands, Norway, Russia, Slovakia, Sweden, Ukraine, United Kingdom, USA (Kim et al., 2018a), Korea (Chemyreva in Belokobylskij & Lelej, 2017).

Host records: Recorded as a hyperparasitoid of the dryinids *Anteon pubicorne* (Dalman) (Waloff, 1975; Perkins, 1976), and *Lonchodryinus ruficornis* (Dalman) (Waloff, 1975; Olmi, 2000). It was also reared from female of cicadellid *Streptanus sordidus (*Zetterstedt) (Chemyreva in Belokobylskij & Lelej, 2017).

DISCUSSION

Taxonomic and faunistic knowledge of Diaprioidea in the Middle East is very poor due to the paucity of regional studies. The wasp fauna of most of the Middle Eastern countries is largely ignored despite of the rich and diverse flora in most of them. For example, for the fauna of Iran as the richest in the 18 Middle East countries, only two papers on Ismaridae (Rahmani et al., 2019; Izadizadeh et al., 2021b), and seven papers on Diapriidae (Rabee et al., 1993; Amini et al., 2014; Samin et al., 2018; Izadizadeh et al., 2020; Izadizadeh et al., 2021a, 2023a, b) have been published so far.

In the present checklist, totally 48 species of the superfamily Diaprioidea in 18 genera and two families (Diapriidae and Ismaridae), have been reported from four

of the Middle Eastern countries (Egypt, Iran, Syria, and Turkey). An undetermined *Trichopria* sp. (of the *Trichopria keralensis* species group) was also first recorded for Saudi Arabia and Yemen by Kim et al. (2016). *Psilomma dubia* Kieffer, 1908 is newly recorded for the Middle East. In total, 28 species of Diaprioidea in 15 genera and two families (Diapriidae: 25 species; Ismaridae: three species) have been reported from Iran so far. This is followed by Egypt with 15 species in three genera, Turkey with seven species in three genera, and Syria with two species in two genera (all in the family Diapriidae). Fourteen diapriid species are so far only known from Egypt (endemic or subendemic to Egypt): *Basalys steueri* (Kieffer), *Monelata aegyptiaca* Priesner, *Trichopria aegyptiaca* Priesner, *T. aegyptorum* (Priesner), *T. alexandrina* (Priesner), *T. atomaria* (Priesner), *T. cheopis* Priesner, *T. deliculata* Priesner, *T. hannai* Priesner, *T. helouanensis* Priesner, *T. masrensis* Priesner, *T. minor* Priesner, *T. revelata* (Priesner), and *T. simulatrix* (Priesner). On the other hand, only a single species, *Psilus carinatus* (Kieffer) is endemic to the Syrian fauna, and one species (*Plagiopria huberi* Huggert & Masner) is known to be endemic or subendemic to the Iranian fauna. Among the 18 genera of the Middle East Diaprioidea, the genus *Trichopria* (Diapriinae) with 18 recorded species is the most diverse, followed by *Belyta* (Belytinae) with seven species.

Among the countries adjacent to Iran, Russia with 153 species of Diapriidae in 29 genera, and nine species of Ismaridae in the genus *Ismarus* (Belokobylskij & Lelej, 2017) is more diverse than the other countries. Additionally, among the Middle East and adjacent countries to Iran, Russia shares the greatest number of species with Iran (14 species), followed by Turkey (four species), Azerbaijan (three species), Kazakhstan and Turkmenistan (each with two species), and Armenia (one species). None sharing between Iran and Egypt with 28 and 15 species, respectively proves a great difference between the fauna of these two countries which are located in two various geographically regions (Ethiopian and Palaearctic).

Among the 31 provinces of Iran, Diaprioidea have been recorded from 14 provinces (Alborz, Ardabil, Chaharmahal & Bakhtiari, Golestan, Guilan, Kermanshah, Khuzestan, Lorestan, Mazandaran, Northern Khorasan, Qazvin, Southern Khorasan, Tehran, and West Azarbaijan), in which Guilan with 14 species was found to be the richest, followed by Mazandaran and Golestan with 13 and 11 species, respectively. These results are biased towards the more sampled provinces, and without any faunistic survey in the most regions of Iran. Also, parasitoid-host relationships were recoreded for only two Iranian diapriid species: *Coptera silvestrii* as a parasitoid of *Carpomya vesuviana* Costa (Diptera: Tephritidae) (Amini et al., 2014), and *Trichopria inermis* as a hyperparasitoid of *Linnaemya neavi* Curran (Diptera: Tachinidae) (Rabee et al., 1993; Modarres Awal, 2012).

From the data provided, many more species are expected to occur in the Middle East countries. Therefore, further collections and studies are needed to clarify the distribution of this group of wasps in the other Middle Eastern countries.

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