

# ARTIGO / ARTÍCULO / ARTICLE

## A faunistic study on the subfamily Euphorinae (Hymenoptera: Ichneumonoidea, Braconidae) from Iran.

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**Abstract:** This paper deals with the species diversity of the subfamily Euphorinae (Hymenoptera: Braconidae) from different regions of Iran. In total 9 species belonging to 6 genera (*Dinocampus* Foerster, 1863, *Leiophron* Nees von Esenbeck, 1819, *Peristenus* Foerster, 1863, *Meteorus* Haliday, 1835, *Microctonus* Wesmael, 1835, and *Townesilitus* Haeselbarth & Loan, 1983) were collected and determined.

**Key words:** Hymenoptera, Braconidae, Euphorinae, fauna, distribution, host, Iran.

**Resumen:** Estudio faunístico de la subfamilia Euphorinae (Hymenoptera: Ichneumonoidea, Braconidae) de Irán. Este trabajo trata de la diversidad de especies de la subfamilia Euphorinae (Hymenoptera: Braconidae) en diferentes regiones de Irán. En total se capturaron e identificaron 9 especies pertenecientes a 6 géneros (*Dinocampus* Foerster, 1863, *Leiophron* Nees von Esenbeck, 1819, *Peristenus* Foerster, 1863, *Meteorus* Haliday, 1835, *Microctonus* Wesmael, 1835 y *Townesilitus* Haeselbarth & Loan, 1983).

**Palabras clave:** Hymenoptera, Braconidae, Euphorinae, fauna, distribución, hospedador, Iran.

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### Introduction

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The subfamily Euphorinae (Hymenoptera: Ichneumonoidea: Braconidae) comprises more than 1213 species in 55 genera and 14 tribes of which 456 species are known from the Palaearctic region (Yu *et al.* 2012). The subfamily possesses a wider host range than any other braconid subfamily, what is reflected in a large morphological diversity (Koldaş *et al.* 2013). They are solitary (and rarely gregarious) koinobiont endoparasitoids of Coleoptera (especially the families Chrysomelidae and Curculionidae), Lepidoptera, Hemiptera, Hymenoptera, Neuroptera, Psocoptera, and Orthoptera (Shaw 2004; Yu *et al.* 2012; Yilmaz *et al.* 2010).

The fauna of Iranian Braconidae was studied quite well and some subfamilies were already catalogued (e.g. Agathidinae and Brachistinae, with 28 and 17 species respectively, by Gadallah & Ghahari 2013a; Cheloninae, with 48 species, by Gadallah & Ghahari 2013b; Alysiniinae, with 55 species, by Khajeh *et al.* 2014 and after that 78 species by Gadallah *et al.* 2015; Braconinae, with 115 species and subspecies, by Gadallah & Ghahari 2015). About the Euphorinae, a total of 42 species belonging to 12 genera have been reported from Iran so far (Sedighi & Madjdzadeh 2015). The aim of this research is the faunistic survey on the Euphorinae species collected from some regions of Iran.

## Material and methods

The materials were collected from different regions of Iran by Malaise traps and sweeping net. The specimens were put in alcohol 75% or mounted on triangular labels and were examined with a stereoscopic binocular microscope. In this paper, classification, nomenclature, and distribution data suggested by Yu *et al.* (2012) have been followed. Host data were also taken from Yu *et al.* (2012); for later additions and changes, the exact references are given.

## Results

New distribution data for 9 euphorine species are given in this paper. All the species are new records for the related province. The list of species is given below with distribution and host data.

### Subfamily Euphorinae Foerster, 1863

#### Tribe Dinocampini Shaw, 1985

#### Genus *Dinocampus* Foerster, 1863

#### *Dinocampus coccinellae* (Schrank, 1802)

**Material examined:** Province of Razavi Khorasan: Bojnord, 37°35'N 57°20'E, 1084 m, (2♀♀), August 2012.

**Distribution outside Iran:** Albania, Algeria, Argentina, Australia, Austria, Azerbaijan, Belgium, Brazil, Bulgaria, Canada, Chile, China, Cyprus, Czech Republic, Denmark, Egypt, Fiji, Finland, France, Germany, Hungary, India, Ireland, Italy, Japan, Korea, Latvia, Lithuania, Mexico, Moldova, Netherlands, New Zealand, Norway, Peru, Poland, Russia, Serbia, Slovakia, Spain, Switzerland, Syria, Turkey, UK, Uruguay, USA, Vietnam (Yu *et al.* 2012).

**Host records:** Koinobiont endoparasitoid of adult Coccinellidae able to re-parasitize its host beetle (van Achterberg 2006). It is one of the best understood parasitoids of coccinellids (Riddick *et al.* 2009). Reported as parasitoid of the following species: *Sitona discoideus* Gyllenhal, 1834 (Coleoptera: Curculionidae), *Adalia bipunctata* (Linnaeus, 1758), *A. decimpunctata* (Linnaeus, 1758), *A. deficiens* Mulsant, 1850, *Anatis labiculata* (Say, 1824), *A. ocellata* (Linnaeus, 1758), *Brachiacantha ursine* (Fabricius, 1807), *Coccinella* spp., *Coelophora biplagiata* (Schönherr, 1808), *C. inaequalis* (Fabricius, 1775), *Coleomegilla maculata* (DeGeer, 1775), *Cycloneda munda* (Say, 1835), *C. sanguinea* (Linnaeus, 1763), *Eriopis connexa* Germar, 1824, *Exochomus quadripustulatus* (Linnaeus, 1758), *Halyzia quatordecimguttata* (Linnaeus, 1758), *Harmonia* spp., *Hippodamia* spp., *Illeis cincta* (Fabricius, 1798), *Macronaemia hauseri* (Weise, 1905), *Menochilus sexmaculatus* (Fabricius, 1781), *Micraspis discolor* Fabricius, 1798, *Myzia oblongoguttata* (Linnaeus, 1758), *Olla v-nigrum* (Mulsant, 1866), *Propylaea quatordecimpunctata* (Linnaeus, 1758), *Subcoccinella vigintiduopunctata* (Linnaeus, 1758), *Tytthaspis sedecimpunctata* Linnaeus, 1758 (Coleoptera: Coccinellidae), *Gelis areator* (Panzer, 1804) (Hymenoptera: Ichneumonidae), *Conura* spp., *Dibrachys microgastri* (Bouché, 1834) (Hymenoptera: Pteromalidae) (Yu *et al.* 2012). Tobias (1971) reported a number of coccinellids (Coleoptera: Coccinellidae) as hosts to this species: *Coccinella quinquepunctata* Linnaeus, 1758, *C. trifasciata* Linnaeus, 1758, *C. septempunctata* Linnaeus, 1758, *Harmonia axyridis* (Pallas, 1773), *Propylaea quatordecimpunctata* Linnaeus, 1758, *Hippodamia amoena* (Faldermann, 1835), *Brumus octosignatus* (Gebler, 1830). Adult parasitoid of *Coccinella septempunctata* Linnaeus, 1758 (Coleoptera: Coccinellidae) (Beardsley 1961; Bagheri 1998) and *Hippodamia variegata* (Goeze, 1777) (Coleoptera:

Coccinellidae) (Tobias 1971; Tavoosi Ajvad *et al.* 2014). It was also reared from *Coleophora inaequalis* (Fabricius, 1775) (Lepidoptera: Coleophoridae) in Hawaii (Beardsley 1961). In Australia, it was reported from *Hippodamia convergens* Guérin-Méneville, 1842, *H. quinquesignata* (Kirby, 1837), *Coccinella californica* (Mannerheim, 1843), *Coleomegilla maculata* (De Geer, 1775), *Cycloneda sanguinea* (Linnaeus, 1763), *C. trifasciata juliana* Mulsant, 1850 (Coleoptera: Coccinellidae) (Parrott 1953). In Brazil, it was reported in association with coccinellid species *Coleomegilla maculata* (De Geer, 1775), *Eriopis connexa* (Germar, 1824), and *Olla v-nigrum* (Mulsant, 1866) (Silva *et al.* 2012).

### Tribe Euphorini Foerster, 1863

#### Genus *Leiophron* Nees von Esenbeck, 1819

##### *Leiophron (Euphoriana) deficiens* (Ruthe, 1856)

**Material examined:** Province of Guilan: Fuman, 37°13'N 49°19'E, 34 m, (1♀), September 2012.

**Distribution outside Iran:** Finland, Germany, Greece, Hungary, Kazakhstan, Korea, Moldova, Poland, Russia, Sweden, Turkey, Ukraine (Yu *et al.* 2012).

**Host records:** Parasitoid of *Campylomma diversicornis* (Reuter, 1878) (Hemiptera: Miridae) (Ghahari *et al.* 2012; Yu *et al.* 2012) and *Creontiades pallidus* (Rambur, 1839) and *Polymerus cognatus* (Fieber, 1858) (Hemiptera: Miridae) (Yu *et al.* 2012).

#### Genus *Peristenus* Foerster, 1863

##### *Peristenus pallipes* (Curtis, 1833)

**Material examined:** Province of Golestan: Gorgan, 36°50'N 54°30'E, 110 m, (2♂♂, 2♀♀), July 2011.

**Distribution outside Iran:** Albania, Armenia, Azerbaijan, Belgium, Bosnia-Herzegovina, Bulgaria, Canada, China, Croatia, Czech Republic, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Korea, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Serbia, Slovenia, Spain, Switzerland, Taiwan, Turkey, UK, Ukraine, USA (Yu *et al.* 2012).

**Host records:** A large number of hosts were reported: *Adelphocoris lineolatus* Goeze, 1778 (Yu *et al.* 2012), *A. rapidus* (Say, 1832), *Capsus ater* (Linnaeus, 1758), *Closterotomus norvegicus* (Gmelin, 1790), *Labops hirtus* Knight, 1922, *Leptopterna dolabrata* (Linnaeus, 1758), *Lygus* spp., *Notostira erratica* (Linnaeus, 1758), *Plagiognathus medicagus* Arrand, 1958, *Trigonotylus coelestialium* (Kirkaldy, 1902) (Hemiptera: Miridae). Others belonging to the order Coleoptera (Chrysomelidae): *Timarcha tenebricosa* (Fabricius, 1775) (Yu *et al.* 2012). It was also reported as a parasitoid of *Lygus lineolaris* (Palisot de Beauvois, 1818) (Hemiptera: Miridae) (Bilewicz-Pawinska, 1977, 1982). In Canada, this species was reported as parasitoid of a number of plant bugs (Hemiptera: Miridae): *Adelphocoris lineolatus* Goeze, 1778, *A. rapidus* (Say, 1832), *Leptopterna dolabrata* (Linnaeus, 1758), *Lygus lineolaris* (Palisot de Beauvois, 1818), *Capsus ater* Linnaeus, 1758 (Loan 1980).

### Tribe Meteorini Cresson, 1887

#### Genus *Meteorus* Haliday, 1835

##### *Meteorus cinctellus* (Spinola, 1808)

**Material examined:** Province of Qazvin: Takestan, 36°00'N 49°33'E, 1228 m, (1♀), April 2013.

**Distribution outside Iran:** Albania, Austria, Belgium, Bulgaria, China, Czech Republic, Finland, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Latvia, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, Switzerland, UK, Ukraine, former Yugoslavia (Yu *et al.* 2012).

**Host records:** *Meteorus cinctellus* is recorded as the parasitoid on the leaf roller moth *Gypsonoma neglectana* (Duponchel, 1843) (Lepidoptera: Tortricidae) (Yu et al. 2012; Stigenberg & Hansen 2013). It was also reared from *Crambus uliginosellus* Zeller, 1850, *Eudonia angustea* (Curtis, 1827), *Nomophila noctuella* (Denis & Schiffermüller, 1775), *Pyrausta purpuralis* (Linnaeus, 1758), *Scoparia ambigualis* (Treitschke, 1829), *Eudonia truncicolella* (Stainton, 1849) (Lepidoptera: Pyralidae) (Stigenberg & Shaw 2013).

#### ***Meteorus pendulus* (Müller, 1776)**

**Material examined:** Province of Golestan: Gonbad, 37°30'N 55°00'E, 4 m, (1♀), September 2013.

**Distribution outside Iran:** Austria, Azerbaijan, Belgium, Bulgaria, Canada, China, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, Turkey, UK, Ukraine, USA, Uzbekistan (Yu et al. 2012).

**Host records:** It is a solitary endoparasitoid on lepidopteran families (including Geometridae, Lasiocampidae, Lycaenidae, Lymantridae, Noctuidae, and Tortricidae) and emerges from the larval stage (Yu et al. 2012). Some specimens were collected from Ourmieh (province of West Azarbaijan) as the solitary endoparasitoid of *Spodoptera exigua* (Hübner, 1808) (Lepidoptera: Noctuidae) (Farahani & Talebi 2012). It was reared from *Plusia* sp. (Lepidoptera: Noctuidae) in Israel (Papp 2011-2012). It was also reared from *Orthosia stabilis* (Denis & Schiffermüller 1775), *Noctua triangulum* Linnaeus, 1758 (Lepidoptera: Noctuidae), *Ocneria dispar* Linnaeus, 1758 (Lepidoptera: Lymantriidae) (Marshall 1885). In Norway it was reared from larva/pupa of *Eupsilia transversa* (Hufnagel, 1766) (Lepidoptera: Noctuidae) on *Malus domestica* Borkh., 1803 (Stigenberg & Hansen 2013). The main hosts of the overwintering generation, such as *Mythimna Ochsenheimer*, 1816, *Noctua* Linnaeus, 1758 and *Xestia* Hübner, 1818 species (Stigenberg & Shaw 2013). It was also reared from ?*Apamea unaminis* (Hübner, 1813), *Agrochola lota* (Clerck, 1759), *Brachylomia viminalis* (Fabricius, 1776), *Ceramica pisi* (Linnaeus, 1758), *Cerapteryx graminis* (Linnaeus, 1758), *Conistra vaccinii* (Linnaeus, 1761), *Cosmia trapezina* (Linnaeus, 1758), *Dryobotodes eremita* (Fabricius, 1775), *Eremobia ochroleuca* (Denis & Schiffermüller, 1775), *Euplexia lucipara* (Linnaeus, 1758), *Eupsilia transversa* (Hufnagel, 1766), *Lacanobia oleracea* (Linnaeus, 1758), *Mythimna ferrago* (Fabricius, 1787), *M. impura* (Hübner, 1808), *Noctua orbona* (Hufnagel, 1766), *N. fimbriata* (Schreber, 1759), *Orthosia gracilis* (Denis & Schiffermüller, 1775), *Phlogophora meticulosa* (Linnaeus, 1758), *Thalpophila matura* (Hufnagel, 1766), *Xestia xanthographa* (Denis & Schiffermüller, 1775) (Lepidoptera: Noctuidae) (Stigenberg & Shaw 2013).

#### ***Meteorus versicolor* (Wesmael, 1835)**

**Material examined:** Province of Mazandaran: Ramsar, 36°47'N 50°32'E, 9 m, (1♂, 3♀♀), August 2012.

**Distribution outside Iran:** Armenia, Austria, Azerbaijan, Belgium, Bulgaria, Canada, China, Croatia, Czech Republic, Finland, France, Germany, Hungary, Israel, Italy, Japan, Korea, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Norway, Palestine, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Tajikistan, Turkey, UK, Ukraine, USA, Uzbekistan (Yu et al. 2012).

**Host records:** *Meteorus versicolor* is recorded as a parasitoid of 14 different lepidopteran families. There are also some records indicating that the species parasitizes Ichneumonidae or different families of Chalcidoidea (Yu et al. 2012). In the former USSR this species was reported as a parasitoid of *Lymantria monacha* Linnaeus, 1758, *L. salicis* Linnaeus, 1758, *Euproctis chrysorrhoea* (Linnaeus, 1758) (Lepidoptera: Lymantridae), *Thaumetopoea processionea* Linnaeus, 1758 (Lepidoptera: Thaumetopoeidae), *Cosmotriche lunigera* Esper, 1784 (Lepidoptera: Lasiocampidae),

*Autographa gamma* Linnaeus, 1758, *Nycteola asiatica* (Krulikowsky, 1904) (Lepidoptera: Noctuidae) (Tobias 1971). It was also bred from *Goemetra papilionaria* Linnaeus, 1758 (Lepidoptera: Geometridae), *Arctornis l-nigrum* (Müller, 1764), *Asteroscopus sphinx* (Hufnagel, 1766) (Lepidoptera: Noctuidae) (Marshall 1885). In Norway, it was reared from the larva of *Anarta myrtilli* (Linnaeus, 1761) and from the larva of *Coranarta cordigera* (Thunberg, 1788) (Lepidoptera: Noctuidae), both on *Calluna vulgaris* (Linnaeus, 1753) (Stigenberg & Hansen 2013). In addition, Stigenberg & Shaw (2013) reported this species from: *Dichomeris ustalella* (Fabricius, 1794) (Lepidoptera: Gelechiidae), *Callophrys rubi* (Linnaeus, 1758) (Lepidoptera: Lycaenidae), *Macrothylacia rubi* (Linnaeus 1758) (Lepidoptera: Lasiocampidae), *Agriopis aurantiaria* (Hübner, 1799), *A. marginaria* (Fabricius, 1776), *Apocheima pilosaria* (Denis & Schiffermüller, 1775), *Ematurga atomaria* (Linnaeus, 1758), *Epirrita* sp., *Eulithis testata* (Linnaeus, 1761), *Hydriomena ruberata* (Freyer, 1831), *Pachycnemia hippocastanaria* (Hübner, 1799), *Thera juniperata* (Linnaeus, 1758) (Lepidoptera: Geometridae), *Thaumetopoea pityocampa* Denis & Schiffermüller, 1775 (Lepidoptera: Thaumetopoeidae), *Agrochola haematidea* (Duponchel, 1827), *Anarta myrtilli* (Linnaeus, 1761), *Lycophotia porphyrea* (Denis & Schiffermüller, 1775), *Orthosia miniosa* (Denis & Schiffermüller, 1775), *Nycteola revayana* (Scopoli, 1772) (Lepidoptera: Noctuidae), *Orgyia antiquoides* (Hübner, 1822), *O. dubia* (Tauscher, 1806), *Euproctis chrysorrhoea*, *Calliteara pudibunda* (Linnaeus, 1758) (Lepidoptera: Lymantridae). Parasitoid of *Euproctis chrysorrhoea* (Lepidoptera: Lymantriidae) (Nikdel et al. 2004). In Iran, it was reared from the 3<sup>rd</sup> larval instar of *Hyphantria cunea* (Drury, 1773) (Lepidoptera: Arctiidae) (Nurieva 2002).

#### Tribe Perilitini Foerster, 1863

#### Genus *Microctonus* Wesmael, 1835

#### *Microctonus aethiops* Nees von Esenbeck, 1834

**Material examined:** Province of Semnan: Shahrud, Jangal-e Abr, 35°30'N 55°30'E, 1311 m, (1♀), September 2011.

**Distribution outside Iran:** Argentina, Armenia, Australia, Azerbaijan, Belarus, Belgium, Brazil, Bulgaria, Canada, Chile, China, Croatia, Czech Republic, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Kyrgyzstan, Latvia, Lithuania, Moldova, Mongolia, Morocco, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Serbia, Spain, Sweden, Switzerland, Tajikistan, Turkey, UK, Uruguay, USA, Uzbekistan (Yu et al. 2012).

**Host records:** *Phyllotreta nemorum* (Linnaeus, 1758), *P. vittula* (Redtenbacher, 1849) (Coleoptera: Chrysomeloidea), *Hypera brunneipennis* (Boheman, 1834), *H. melas* (Fabricius, 1792), *H. nigrirostris* (Fabricius, 1775), *H. postica* (Gyllenhal, 1813), *H. rumicis* (Linnaeus, 1758), *H. variabilis* (Herbst, 1795), *Irenimus aemulator* Broun, 1893, *I. aequalis* Broun, 1895, *I. duplex* (Broun, 1904), *I. egens* (Broun, 1904), *I. stolidus* Broun, 1886, *Listronus bonariensis* Kuschel, 1955, *Nicaeana cervinus* Boheman, 1840, *Prosayleus* sp., *Rhinocyllus conicus* Frolich, 1792, *Sitona bicolor* (Fahraeus, 1840), *S. crinita* (Herbst, 1795), *S. cylindricollis* (Fahraeus, 1840) (Yu et al. 2012), and *Coniocleonus excoriatus* (Gyllenhal, 1834) (Coleoptera: Curculionidae) (Papp 2011-2012). Tobias (1971) reported the following species as hosts to this species: *Sitona* sp., *Phytonomus meles* (Fabricius, 1792), and *Brachyderes incanus* (Linnaeus, 1758) (Coleoptera: Curculionidae).

#### *Microctonus stelleri* (Loan, 1972)

**Material examined:** Province of Mazandaran: Babol, 36°30'N 52°35'E, 25 m, (1♂, 1♀), June 2012.

**Distribution outside Iran:** Bulgaria, Denmark, France, Germany, Hungary, Israel, Lithuania, Mongolia, Russia, Sweden, Switzerland, Turkey (Yu et al. 2012).

**Host records:** *Hypera nigrirostris* (Fabricius, 1775), *H. postica* (Gyllenhal, 1813), and *H. variabilis* (Herbst, 1795) (Coleoptera: Curculionidae) (Yu et al. 2012).

## Genus *Townesilitus* Haeselbarth & Loan, 1983

### *Townesilitus bicolor* (Wesmael, 1835)

**Material examined:** Province of Golestan: Minudasht, 37°10'N 55°30'E, 31 m, (2♀♀), October 2012.

**Distribution outside Iran:** Albania, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Kazakhstan, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Romania, Russia, Serbia, Spain, Sweden, Switzerland, Turkey, UK (Yu et al. 2012).

**Host records:** *Apthona euphorbiae* (Schrank, 1781), *A. violacea* (Koch, 1803), *Chaetocnema aridula* (Gyllenhal, 1827), *C. hortensis* (Fourcroy, 1785), *Longitarsus ballotae* (Marsham, 1802), *Phratora vitellinae* (Linnaeus, 1758), *Phyllotreta armoraciae* (Koch, 1803), *P. atra* (Fabricius, 1775), *P. cruciferae* (Goeze, 1777), *P. diademata* Foudras, 1860, *P. nemorum* (Linnaeus, 1758), *P. striolata* (Fabricius, 1803), *P. undulata* (Kutschera, 1860), *P. vittula* (Redtenbacher, 1849), *Psylliodes attenuata* (Koch, 1803) (Coleoptera: Chrysomeloidea), *Dendrolimus pini* (Linnaeus) (Lepidoptera: Lasiocampidae) (Yu et al. 2012). In Israel, it was reported from *Coniocleonus excoriatus* (Gyllenhal) (Coleoptera: Curculionidae) (Papp 2011-2012).

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