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An Annotated Catalogue of the Iranian Charmontinae, Ichneutinae, Macrocentrinae and Orgilinae (Hymenoptera: Braconidae)

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ABSTRACT

The fauna of Charmontinae, Ichneutinae, Macrocentrinae and Orgilinae (Hymenoptera, Braconidae) of Iran is reviewed and the data on their host associations are summarized. Thirty-four species belonging to 7 genera are listed. *Macrocentrus nidulator* (Nees, 1834) (Macrocentrinae) and *Orgilus leptocephalus* (Hartig, 1838) (Orgilinae) are new records to the Iranian fauna while *Orgilus jennieae* Marsh, 1979 (Orgilinae) is considered here a doubtful record and has been excluded from the fauna of Iran. The distribution of all species in the different localities of Iran and their overall distribution are also provided.

Key words: Ichneumonoidea, Braconidae, fauna, distribution, hosts, Iran.

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INTRODUCTION

Charmontinae van Achterberg, 1979 are a small subfamily of Braconidae that is distributed in almost all parts of the world except Antarctica (Yu, van Achterberg & Horstmann, 2016). Currently, it comprises ten species in three genera, i.e. *Charmon* Haliday, 1833, *Charmontina* van Achterberg, 1979 (Charmontini) and the fossil genus *Palaeocharmon* Belokobylskij, Nel, Waller & De Plöeg, 2010 (Palaeocharmontini). The majority of the species belong to the genus *Charmon*, with eight species (Rousse, 2013; Sabahatullah, Mashwani, Tahira, & Inayatullah, 2014; Yu et al, 2016). They are koinobiont endoparasitoids of the concealed larvae of about 16 lepidopterous families (Shaw & Huddleston, 1991; Yu et al, 2016). The genus *Charmon* has been placed in Orgilini by Mason (1974). In 1979, van Achterberg included it in the tribe Charmontini (in his new subfamily Homolobinae), but it was later upgraded to the subfamily level (Quicke & van Achterberg, 1990).

Members of the subfamily Charmontinae are easily diagnosed by the following combination of characters: slender bodies with very long, longitudinally ridged ovipositor; occipital carina present; r-m of forewing absent, forewing with only two submarginal cells; hind wing with anal cross vein (van Achterberg 1979; Shaw & Huddleston 1991; Rousse 2013). Charmontinae was first reported in the Iranian fauna by Masnady-Yazdnejad (2010), who recorded *Charmon extensor* (Linnaeus, 1758) from the West Azarbaijan province. Samin, van Achterberg & Çetin Erdoğan(2016) added *C. cruentatus* Haliday, 1833 from the Kordestan province.

Ichneutinae Foerster, 1863 are a small cosmopolitan subfamily of the family Braconidae, with only 11 genera and 89 currently valid species (Fischer, Tucker, & Sharkey, 2015; Yu et al, 2016) in two tribes, Ichneutini Foerster, 1863 and Muesebeckiini Mason, 1969 (Chen & van Achterberg, 2019). Proteropinae van Achterberg, 1976 are either excluded (Quicke & van Achterberg, 1990), or included (Sharkey & Wharton, 1994 repsctively) in the Ichneutinae.

The Ichneutinae have received considerable attention because of its confused taxonomic history (Sharkey & Wharton, 1994; He et al, 1997). Members of this subfamily are medium-sized and rather stout braconids, the 1-M vein of their fore wing curves abruptly at the anterior end (Shaw & Huddleston, 1991; van Achterberg, 1993b). They are unique since they are one of a few braconid subfamilies that include species known as koinobiont ovo-larval endoparasitoids of sawfly larvae especially of the families Tenthredinidae and Argidae (Tobias, 1986; Shaw & Huddleston, 1991; He et al, 1997; Sharanowski & Sharkey, 2007). A few genera parasitize leaf-mining lepidopteran hosts (Sharkey & Wharton, 1994; He et al, 1997).

Ichneutinae have been suggested as a sister group to the microgastroid complex (Quicke & van Achterberg, 1990; Belshaw, Fitton, Herniou, Gimeno & Quicke, 1998, Belshaw, Dowton, Quicke & Austin, 2000; Belshaw & Quicke, 2002; Dowton, Belshaw, Austin & Quicke, 2002; Shi et al, 2005; Pitz et al, 2007; Murphy, Banks, Whitfield & Austin 2008), a fact that is also strongly supported by Sharanowski et al (2011) due to lack of polydnaviruses.

Macrocentrinae Förster, 1863 is a rather large subfamily of Braconidae, with a worldwide distribution (Yu et al, 2016). Currently, it comprises 237 species in eight genera (Akhtar, Singh, & Ramcmurthy, 2014; Yu et al, 2016). Among them, the genus *Macrocentrus* Curtis, 1833 is the largest, with 191 described species (81% of the total number of species) (Akhtar et al, 2014; Yu et al, 2016). Macrocentrines are easily identified by the following characters: presence of cluster of small pegs on anterior side of all trochantelli (exceptionally on hind trochantellus only); metasoma connected to propodeum somewhat above hind coxae; head conspicuously transverse; occipital carina absent; median lobe of mesoscutum somewhat protruding above lateral lobes; ovipositor longitudinally ridged (Shaw & Huddleston, 1991; van Achterberg, 1993a; Chen & van Achterberg, 2019). Species of Macrocentrinae are solitary or gregarious endoparasitoids of both macro- and micro-lepidopteran larvae (Sharanowski, Zhang, & Wanigasekara, 2014). Numerous species have been reported from multiple hosts (Yu et al, 2016). van Achterberg & Haeselbarth (1983) revised the European species of the genus *Macrocentrus*, while Macrocentrinae of the Palaearctic region have been keyed by van Achterberg (1993b). The Iranian Macrocentrinae are represented by 13 species, all belong to the genus *Macrocentrus* (Farahani et al, 2012b), of which *M. nidulator* is recorded here for the first time for the Iranian fauna.

Orgilinae Ashmead, 1900 are a small cosmopolitan subfamily of Braconidae that is distributed in almost all parts of the world (Yu et al, 2016). It comprises 356 described species belonging to 13 genera (Yu et al., 2016) and three tribes, i.e. Antestrigini van Achterberg, 1987, Mimagathidini Enderlein, 1905 and Orgilini Ashmead, 1900 (Yu et al, 2016; Chen & van Achterberg, 2019). The majority of the species belong to the genus *Orgilus* Haliday, 1833, that includes 254 described species (71% of the total number of species) (Yu et al, 2016). A sister relationship, Orgilinae (Homolobinae + Microtypinae) has been suggested by a number of authors (for example van Achterberg, 1984, 1992), based on larval and adult morphology and biology. This relationship has also been strongly supported by Sharanowski, Dowling, & Sharkey (2011) through a phylogenetic study using molecular data. Furthermore, Orgilinae have been included within the helconoid complex (macrocentroid subcomplex) (Sharanowski et al, 2011).

Species of this subfamily are mainly diagnosed by the following combination of characters: slender, medium-sized bodies (4.0-5.0 mm); usually with a somewhat long ovipositor; occipital carina reduced dorsally, meeting hypostomal carina a distance above base of mandible; prepectal carina developed, but sometimes partly or largely reduced; discoidal cell of forewing sessile, forewing 2-1A vein is somewhat developed; head narrow, face and clypeus strongly protuberant; hind tibia usually with pegs near base of spurs (van Achterebrg, 1987, 1993a; Tobias, 1986; Shaw & Huddleston, 1991).

Individuals of Orgilinae are koinobiont endoparasitoids of the concealed microlepidopteran larvae mainly of the families Coleophoridae, Gelechiidae, Gracillariidae, Oecophoridae, Pyralidae and Tortricidae (van Achtereberg, 1987; Sharanowski et al, 2014), some species are considered as potential biocontrol agents (van Achterberg, 1987). The genera of the subfamily Orgilinae were revised and a key was provided by van Achterberg (1987), with a subsequent addition by van Achterberg &

Quicke (1992) and van Achterberg (1992, 1994). The Palaearctic species of the genera *Kerorgilus* and *Orgilus* have been studied by van Achterberg (1985) and Taeger (1989) respectively. In the present study, *O. leptocephalus* is first recorded for the Iranian fauna.

Studies on fauna and taxonomy are based on the results of the overall evidences, which should be reviewed and updated. This paper is a continuation of the series of checklists of Braconidae of Iran (Gadallah & Ghahari, 2013a, b, 2015; Gadallah, Ghahari, Fischer, & Peris-Felipo, 2015, Gadallah, Ghahari & Peris-Felipo, 2015; Gadallah, Ghahari, Peris-Felipo, & Fischer 2016; Gadallah, Ghahari, & van Achterberg 2016; Beyarslan, Gadallah & Ghahari, 2017). In the present study we present all Charmontinae, Ichneutinae, Macrocentrinae and Orgilinae species that have been recorded from Iran as well as their host associations and overall distribution.

MATERIAL AND METHODS

All data on the subfamilies Charmontinae, Ichneutinae, Macrocentrinae and Orgilinae from Iran are carefully summarized. The specimens of two new country records were collected by the second author from Guilan and Mazandaran provinces (northern Iran) by using Malaise trap. Identification of species were done with the help of van Achterberg & Belokobylskij (1987), van Achterberg (1993b) for *Macrocentrus* species and Taeger (1989) for *Orgilus* species, and confirmed by M. Fischer (Naturhistorisches Museum, Austria) and J. Papp (Hungarian Natural History Museum, Hungary). Classification of the different taxa follows Yu et al. (2016) and Chen & van Achterberg (2019). The valid genera are listed alphabetically within tribes, and valid species' names are listed alphabetically within genera. The following data are included: valid taxa names published records within a provincial distribution, general distribution and host records. When a locality is unknown, the remark "Iran (no specific locality)" is provided.

RESULTS

Thirty-four species belonging to 7 genera and four subfamilies are listed: Charmontinae (2 species, 1 genus), Ichneutinae (3 species, 3 genera), Macrocentrinae (13 species, 1 genus) and Orgilinae (16 species, 2 genera). Two species, *Macrocentrus nidulator* (Nees, 1834) (Macrocentrinae) and *Orgilus leptocephalus* (Hartig, 1838) (Orgilinae) are new records for the fauna of Iran. The distribution of all species in the different localities of Iran and their world distribution are also provided.

Subfamily Charmontinae van Achterberg, 1979

Tribe Charmontini van Achterberg, 1979

Genus *Charmon* Haliday, 1833

Charmon cruentatus Haliday, 1833

Distribution in Iran: Kordestan (Samin et al, 2016).

General distribution: Austria, Belgium, Bulgaria, Canada, China, Czech Republic, Denmark, France, Germany, Hungary, Ireland, Italy, Mexico, Mongolia, Netherlands, Norway, Poland, Russia, Slovakia, South Africa, South Korea, Sweden, Switzerland, United Kingdom, United States of America (introduced) (Yu et al, 2016), Iran (Samin et al, 2016).

Host records: *Acleris variana* (Fernald), *Ancylis comptana* (Frölich), *Choristoneura fumiferana* (Clemens), *C. rosaceana* (Harris), *Cydia pomonella* (Linnaeus), *Epinotia lindana* (Fernald), *Grapholita molesta* (Busck), *Spilonota ocellana* (Denis & Schiffermüller) (Lepidoptera: Tortricidae), *Agonoptrix nervosa* (Haworth) (Lepidoptera: Depressariidae), *Gelechia hippophaella* (Schrank) (Lepidoptera: Gelechiidae) (Marshall, 1874; Hellén, 1938; Knowlton & Harmston, 1939; Allen, 1962; Graham, 1965; van Achterbeg, 1979; Čapek, Hladil, Sedivy, 1982; Evenhuis & Vlug, 1983; Fernández-Triana & Huber, 2010).

***Charmon extensor* (Linnaeus, 1758)**

Distribution in Iran: Fars (Samin et al, 2016), West Azarbaijan (Masnady-Yazdinejad, 2010).

General distribution: Austria, Azerbaijan, Belgium, Bulgaria, Canada, China, Croatia, Cyprus, Czech Republic, Democratic Republic of Congo, Finland, France, Germany, Hungary, India, Iran, Ireland, Italy, Japan, Latvia, Lithuania, Mexico, Moldova, Mongolia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, South Korea, Spain, Sweden, Switzerland, United States of America (introduced) (Yu et al, 2016).

Host records: It is a larval koinobiont parasitoid species on a wide range of lepidopteran hosts mainly of the families Gelechiidae, Geometridae, Tortricidae, Yponomeutidae (Billups, 1897; van Achterberg, 1979; Belokobylskij & Tobias, 1998). It also parasitizes some coleopteran hosts mainly belonging to the families Cerambycidae and Bostrichidae (Lozan, Spitzer, Jaroš, Khalaim, Rizzo, Guerriere, & Bezděk, 2011).

Subfamily Ichneutinae Förster, 1863

Genus *Ichneutes* Nees, 1816

***Ichneutes reunitor* Nees, 1816**

Distribution in Iran: Chaharmahal & Bakhtiari (Samin et al, 2016).

Genral distribution: Azerbaijan, Belgium, former Czechoslovakia, Finland, France, Georgia, Germany, Hungary, Iran, Ireland, Italy, Japan, Kazakhstan, Lithuania, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Serbia, Sweden, Switzerland, Turkey, United States of America, Ukraine, United Kingdom (Yu et al, 2016).

Host records: *Amauronematus* sp., *Aneugmenus padi* (Linnaeus), *Tenthredo compressicornis* Fabricius , 1823, *Croesus septentrionalis* (Linnaeus), *Hemichroa crocea* Geoffroy in Fourcroy, *Nematus leucotrochus* Hartig, *N. melanaspis* Hartig, *N. ribesii* (Scopoli), *N. salicis* (Linnaeus), *Nematus* sp., *Pontania* sp., *Pontania proxima* (Lepeletier), *P. viminalis* (Linnaeus), *Priophorus padi* Linnaeus, *Pristiphora abietina*

(Christ), *P. compressa* (Hartig), *P. melanocarpa* (Hartig), *P. politivaginatus* (Takeuchi), *Trichiocampus viminalis* Fallén (Hymenoptera: Tenthredinidae), *Neodiprion sertifer* (Geoffroy) (Hymenoptera: Diprionidae), *Ips typographus* (Linnaeus) (Coleoptera: Curculionidae) (Rudow, 1918; Watanabe, 1937; Bouček, Pulpan & Sedivy, 1953; Györfi, 1959; Aubert, 1966; Zinnert, 1969; Tobias, 1976, 1986).

Genus *Proterops* Wesmael, 1835

***Proterops nigripennis* Wesmael, 1835**

Distribution in Iran: Khuzestan (Samin et al, 2016).

General distribution: Austria, Azerbaijan, Belgium, China, former Czechoslovakia, Denmark, Finland, France, Georgia, Germany, Hungary, Iran, Ireland, Italy, Kazakhstan, Korea, Mongolia, Netherlands, Norway, Poland, Russia, Sweden, Switzerland, Turkey, United Kingdom (Yu et al, 2016).

Host records: *Arge berberidis* Schrank, *A. enodis* (Linnaeus), *A. gracilicornis* (Klug), *A. ochropus* (Gmelin in Linnaeus), *A. rustica* (Linnaeus), *A. simillima* (Smith) (Hymenoptera: Argidae), *Atalia rosae* (Linnaeus), *Nematus* sp. (Hymenoptera: Tenthridinidae) (Marshall, 1888, 1893; Watanabe, 1937; Shenefelt, 1973; Tobias, 1976; Pschorn-Walcher & Altenhofer, 2000).

Genus *Pseudichneutes* Belokobylskij, 1996

***Pseudichneutes atanassovae* van Achterberg, 1997**

Distribution in Iran: Alborz (Farahani, Talebi, Rakhshani, & van Achterberg, 2012a).

General distribution: Bulgaria, Montenegro (Yu et al, 2016), Iran (Farahani et al, 2012a).

Host records: Unknown.

Subfamily Macrocentrinae Förster, 1863

Genus *Macrocentrus* Curtis, 1833

***Macrocentrus bicolor* Curtis, 1833**

Distribution in Iran: Fars (Ghahari, Fischer, Hedqvist, Çetin Erdoğan, van Achterberg, & Beyarslan, 2010; Samin, 2015), Guilan (Farahani, Talebi, & Rakhshani, 2012b).

General distribution: Albania, Andorra, Austria, Azerbaijan, Belarus, Bulgaria, China, Czech Republic, France, Georgia, Germany, Greece, Hungary, Iran, Ireland, Italy, Japan, Korea, Lithuania, Moldova, Netherlands, Norway, Poland, Romania, Russia, Serbia, South Korea, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom (Yu et al, 2016).

Host records: *Anacampsis populella* (Clerck) (Lepidoptera: Gelechiidae), *Diurnea lipsiella* (Denis & Schiffermueller) (Lepidoptera: Lypusidae), *Leucoptera lustratella* (Herrich-Schaeffer) (Lepidoptera: Lyonetiidae), *Depressaria* spp. (Lepidoptera: Oecophoridae), *Acrobasis consociella* (Hübner) (Lepidoptera: Pyralidae), *Archips*

rosana (Linnaeus), *A. xylosteana* (Linnaeus), *Pandemis cinnamomeana* (Treitschke), *Tortricodes alternella* (Denis & Schiffermueller) (Lepidoptera: Tortricidae), *Morophaga choragella* (Denis & Schiffermueller), *Trixomera parasitella* (Hübner) (Lepidoptera: Tineidae), *Phyllonorycter scopariella* (Zeller) (Lepidoptera: Gracillariidae) (Ratzeburg, 1848; Haeselbarth, 1978; Čapek et al, 1982; van Achterberg & Haeselbarth, 1983; Tobias, 1986; van Achterberg, 1993b; Vidal, 1997; Vetter, 1999; Lelej, 2012).

***Macrocentrus blandus* Eady & Clark, 1964**

Distribution in Iran: Alborz, Guilan, Mazandaran (Farahani et al, 2012b).

General distribution: Andorra, Austria, Belarus, Bulgaria, former Czechoslovakia, Finland, France, Germany, Hungary, Iran, Ireland, Japan, Kazakhstan, Korea, Lithuania, Moldova, Mongolia, Netherlands, Norway, Russia, South Korea, Serbia, Sweden, Switzerland, Turkey, United Kingdom (Yu et al, 2016).

Host records: *Agrotis segetum* (Denis & Schiffermueller), *Dasypolia templi* (Thunberg), *Hydraecia petasitis* Doubleday, *H. micacea* (Esper), *Mesapamea secalis* (Linnaeus) (Lepidoptera: Noctuidae), *Zeiraphera griseana* (Hübner) (Lepidoptera: Tortricidae) (Eady & Clark, 1964; Delucchi, 1982; Tobias, 1986; van Achterberg, 1993b).

***Macrocentrus cingulum* Brischke, 1882**

Distribution in Iran: Guilan, Mazandaran (Farahani et al, 2012b).

General distribution: Azerbaijan, Belarus, Bulgaria, Canada, China, Czech Republic, France, Georgia, Germany, Hungary, India (introduced), Iran, Italy, Japan, Lithuania, Moldova, Netherlands, Norway, Poland, Russia, Slovakia, South Africa (introduced), South Korea, Switzerland, Ukraine, United Kingdom (Yu et al, 2016).

Host records: *Anadevidea peponis* (Fabricius) (Lepidoptera: Noctuidae), ; *Anania hortulata* (Linnaeus), *Bissetia steniellus* (Hampson), *Chilo auricilius* Dudgeon, *C. infuscatellus* Snellen, *C. sacchariphagus* (Bojer), *C. tumidicostalis* (Hampson), *Ostrinia nubilalis* (Hübner), *O. furnacalis* (Guenée), *Scirpophaga excerptalis* (Walker), *Patania ruralis* (Scopoli), *Sitochroa verticalis* (Linnaeus) (Lepidoptera: Crambidae), *Orgyia antica* (Linnaeus) (Lepidoptera: Lymantridae), *Sesamia infrens* (Walker), *Clostera anachoreta* (Denis & Schiffermueller) (Lepidoptera: Notodontidae), *Vanessa atalanta* (Linnaeus) (Lepidoptera: Nymphalidae) (Tobias, 1976, 1986; van Achterberg, 1993b; Tereshkin & Lobodenko, 1997; Inglis, Lawrence, & Davis, 2000; Lelej, 2012).

***Macrocentrus collaris* (Spinola, 1808)**

Distribution in Iran: Alborz, Guilan, Qazvin (Farahani et al, 2012b), Fars (Al-e-Mansour & Moustafavi, 1993), Kerman (Asadizade, Mahriyan, Talebi, & Esfandiarpour, 2014), Mazandaran (Ghahari, Fischer, Çetin Erdogan, Beyarslan, & Havaskary, 2009; Farahani et al, 2012b), Iran (no locality cited) (Aubert, 1966; Fallahzadeh & Saghaei, 2010; Beyarslan & Aydoğdu, 2012).

General distribution: Afghanistan, Albania, Andorra, Argentina, Austria, Azerbaijan, Azores, Belarus, Belgium, Bulgaria, China, Croatia, Cyprus, Czech Republic, Ethiopia, Finland, France, Macedonia, Germany, Greece, Hungary, India, Iran, Israel, Italy,

Kazakhstan, Latvia, Libya, Lithuania, Moldova, Mongolia, Montenegro, Morocco, Netherlands, New Zealand (introduced), Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Tajikistan, Tunisia, Turkmenistan, Ukraine, United Kingdom, Turkey, Uzbekistan, Yemen (Yu et al, 2016).

Host records: *Acronicta tridens* (Denis & Schiffermueller), *Agrotis clavis* (Hufnagel), *A. exclamationis* (Linnaeus), *A. ipsilon* (Hufnagel), *A. segetum* (Denis & Schiffermueller, 1775), *Apamea sordens* (Hufnagel), *Helicoverpa armigera* (Hübner), *Mamestra brassicae* (Linnaeus), *Chalciope mygdon* (Cramer), *Chrysodeixis chalcites* (Esper), *Diloba caeruleocephala* (Linnaeus), *Euxoa cursoria* Hufnagel, *Heliothis viriplaca* (Hufnagel), *Noctua pronuba* (Linnaeus), *Polymixis xanthomista* (Hübner), *Spodoptera littoralis* (Boisduval), *S. litura* (Fabricius) (Lepidoptera: Noctuidae), *Polygonia c-album* (Linnaeus) (Lepidoptera: Nymphalidae), *Eupoecilia ambiguella* (Hübner), *Notocelia roborana* (Denis & Schiffermueller), *Tortrix viridana* Linnaeus (Lepidoptera: Tortricidae), *Lymantria monacha* (Linnaeus) (Lepidoptera: Erebidae), *Yponomeuta malinella* (Zeller) (Lepidoptera: Yponomeutidae), *Agriotes lineatus* Linnaeus (Coleoptera: Elateridae), *Anobium punctatum* De Geer (Coleoptera: Anobiidae) (Kemner, 1915; Morley, 1915; Meyer, 1934; Fahringer, 1942; Hellén, 1958; Györfi, 1959; Risbec, 1960; De Santis, 1967; Tobias, 1971, 1976, 1986; Ingram, 1981; Koponen, 1992; van Achterberg, 1993a; Vidal, 1993; Balevski, 1995, 1999; Tuncer & Avci, 2015).

***Macrocentrus equalis* Lyle, 1914**

Distribution in Iran: Mazandaran (Farahani et al, 2012b).

General distribution: Belarus, Bulgaria, Finland, Germany, Hungary, Iran, Japan, Korea, Lithuania, Mongolia, Netherlands, Russia, Turkey, United Kingdom (Yu et al, 2016).

Host records: *Agrotis segetum* Denis & Schiffermueller, *Nycteola revayana* (Scopoli), *Orthotaenia undulana* (Denis & Schiffermueller), *Xestia ditrapezium* (Denis & Schiffermueller), *X. triangulum* (Hufnagel) (Lepidoptera: Noctuidae), *Adoxophyes orana* (Fischer), *Pandemis heparana* (Denis & Schiffermueller) (Lepidoptera: Tortricidae) (Lyle, 1914; Tobias, 1971, 1976, 1986; Koponen, 1992; van Achterberg, 1993a; Papp, 1994).

***Macrocentrus flavus* Vollenhoven, 1878**

Distribution in Iran: Iran (no locality cited) (van Achterberg, 1993a; Fallahzadeh & Saghaei, 2010; Beyarslan & Aydoğdu, 2012; Farahani et al, 2012b).

General distribution: Armenia, Austria, Azerbaijan, Belarus, Bulgaria, Czech Republic, France, Germany, Greece, Hungary, Iran, Italy, Kazakhstan, Moldova, Netherlands, Poland, Russia, Slovakia, Tajikistan, Turkey, Ukraine (Yu et al, 2016).

Host records: *Pseudotelphusa paripunctella* (Thunberg) (Lepidoptera: Gelechiidae), *Acrobasis consociella* (Hübner), *A. glaucella* Staudinger, *A. fallouella* (Ragonot), *A. sodalella* Zeller, (Ragonot) (Lepidoptera: Pyralidae), *Apotomis lutosana* (Kennel), *Exapate congelatella* (Clerck) (Lepidoptera: Tortricidae) (Tobias, 1971, 1986; Čapek, 1972; van Achterberg, 1982, 1993a; van Achterberg & Haeselbarth, 1983).

***Macrocentrus infirmus* (Nees, 1834)**

Distribution in Iran: Kuhgiloyeh & Boyerahmad (Samin et al, 2016).

General distribution: Austria, Belarus, Belgium, Bulgaria, China, Croatia, Czech Republic, Denmark, Faeroe Islands, Finland, France, Germany, Hungary, Iran, Ireland, Italy, Kazakhstan, Korea, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Sweden, Switzerland, Turkey, United Kingdom, former Yugoslavia (Yu et al, 2016).

Host records: *Agrotis* spp., *Apamea monoglypha* (Hufnagel), *Hydraecia micacea* (Esper) (Lepidoptera: Noctuidae), *Blastesthia turionella* (Linnaeus), *B. mughiana* (Zeller)*, Clavigesta sylvestrana* (Curtis), *Cydia pactolana* (Zeller), *Gypsonoma aceriana* (Duponchel) (Lepidoptera: Tortricidae), *Zeuzera pyrina* (Linnaeus) (Lepidoptera: Cossidae) (Billups, 1891; Morley, 1907; Schimitschek, 1938; Hellén, 1958; Hedwig, 1962; Fulmek, 1968; Tobias, 1971, 1976, 1986; van Achetrebrg, 1993a).

***Macrocentrus kurnakovi* Tobias, 1976**

Distribution in Iran: Guilan (Ghahari, 2016).

General distribution: Azerbaijan, former Czechoslovakia, Georgia, Germany, Hungary, Italy, Japan, Korea, Netherlands, Poland, Russia, Turkey (Yu et al, 2016), Iran (Ghahari, 2016).

Host records: *Archinemapogon yildizae* Koçak, *Morophaga choragella* Denis & Schiffermueller from dead *Betula*-stem, *Morophagoides ussuriensis* (Caradja) (Lepidoptera: Tineidae) (Čapek et al, 1982; Haeselbarth & van Achterberg, 1981; van Achterberg, 1993a).

***Macrocentrus marginator* (Nees, 1811)**

Distribution in Iran: Guilan (Farahani et al, 2012b).

General distribution: Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Canada, China, Croatia, Czech Republic, Denmark, Finland, France, Georgia, Germany, Hungary, Italy, Japan, Kazakhstan, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, South Korea, Switzerland, Sweden, Turkey, Ukraine, United Kingdom, United States of America (Yu et al, 2016).

Host records: *Neozephyrus quercus* (Linnaeus) (Lepidoptera: Lycaenidae), *Leucoma salicis* (Linnaeus) (Lepidoptera: Erebidae), *Sesia apiformis* (Clerck)*, Parathrene tabaniformis* (Rottemburg), *Synanthedon cephiformis* (Ochsenhaimer), *S. culiciformis* (Linnaeus), *S. formicaeformis* Esper, *S. myopaeformis* (Borkhausen) , *S. spheciformis* (Denis & Schiffermüller), *S. tipuliformis* Clerck, *S. vespiformis* (Linnaeus) (Lepidoptera: Sesiidae), *Epinotia caprana* (Fabricius), *E. cruciana* (Linnaeus), *Gypsonoma aceriana* (Duponchel), *Zeiraphera rufimitrana* (Herrisch-Schaeffer) (Lepidoptera: Tortricidae) (Prebble, 1943; van Achterberg, 1993a; Georgiev & Samuelian, 1999; Georgiev, 2000; Lelej, 2012).

***Macrocentrus nidulator* (Nees, 1834)**

Material examined: Mazandaran province, Chalus (Mijlar), 36°28′N 51°11′E, 2♀, 14.vi.2004. New record for Iran.

General distribution: Armenia, Austria, Azerbaijan, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Lithuania, Moldova, Mongolia, Montenegro, Netherlands, Norway, Poland, Russia, Slovakia, Spain, Switzerland, Ukraine, United Kingdom (Yu et al, 2016), Iran (new record).

Host records. *Batia lambdella* (Donovan) (Lepidoptera: Oecophoridae), *Eucosma hohenwartiana* (Denis & Schiffermuller) (Lepidoptera: Tortricidae), *Metzneria metzneriella* (Stainton) (Lepidoptera: Gelechiidae), *Yponomeuta malinella* (Zeller) (Lepidoptera: Yponomeutidae) (Tobias, 1971, 1976, 1986; Čapek & Hofmann, 1997).

***Macrocentrus oriens* van Achterberg & Belokobylskij, 1987**

Distribution in Iran: Fars (Hasanshahi, Gharaei, Mohammadi-Khoramadi, Abbasipour & Papp, 2016)

General distribution: Russia (Yu et al, 2016), Iran (Hasanshahi et al, 2016).

Host records: Unknown.

Comments: Hasanshahi et al (2016) has erroneously recorded *M. oriens* in association with pistachio gall aphids, *Forda hirsuta* and *Slavum* sp. (Hemiptera: Aphididae) on *Pistacia atlantica* (Anacardiaceae).

***Macrocentrus resinellae* (Linnaeus, 1758)**

Distribution in Iran: Chaharmahal & Bakhtiari (Samin et al, 2016).

General distribution: Andorra, Austria, Azerbaijan, Belarus, Bulgaria, Belgium, China, Czech Republic, Finland, France, Georgia, Germany, Greece, Hungary, Italy, Japan, Kazakhstan, Latvia, Lithuania, Moldova, Netherlands, Poland, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, United Kingdom (Yu et al, 2016), Iran (Samin et al., 2016).

Host records: *Exoteleia dodecella* (Linnaeus) (Lepidoptera: Gelechiidae), *Dendrolimus tabulaeformis* Tsai & Liu (Lepidoptera: Lasiocampidae), *Dioryctria sylvestrella* Ratzeburg (Lepidoptera: Pyralidae), *Archips oporanus* (Linnaeus), *Adoxophyes orana* (Fischer), *Aleimma loeflingiana* (Linnaeus), *Ancylis laietana* (Fabricius), *Archips abiephaga* Yasuda, *A. crataegana* (Hübner), *A. oporana* (Linnaeus), *A. pulchra* (Butler), *Ariola* sp., *Blastesthia posticana* Zetterstedt, *B. turionella* (Linnaeus), *Blastopetrova keteleericola* Liu & Wu, *Barbara herrichiana* Obraztsov, *Choristoneura diversana* (Hübner), *Cydia pactolana* (Zeller), *Lozotaenia coniferana* (Issiki), *Petrova perangustana* Snellen, *Retinia cristata* (Walsingham), *R. resinella* (Linnaeus) (Lepidoptera: Tortricidae) (Linnaeus, 1758; Ratzeburg, 1848, 1852; Kudler & Hochmut, 1959; Cole, 1967; Watanabe, 1967, Tobias, 1971, 1976, 1986; Kamijo, 1982; van Achterberg, 1993a; Papp, 1994).

***Macrocentrus thoracicus* (Nees, 1811)**

Distribution in Iran: Chaharmahal & Bakhtiari, East Azarbaijan (Samin et al, 2016).

General distribution: Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, China, Croatia, Finland, France, Georgia, Germany, Greece, Hungary, Italy, Japan, Kazakhstan, Lithuania, Moldova, Netherlands, Poland, Russia, Serbia,

Slovakia, Spain, Sweden, Switzerland, Turkey, United States of America (introduced), Ukraine, United Kingdom (Yu et al, 2016).

Host records: *Agonopteryx heracliana* (Linnaeus), *Depressaria* sp., *Exaeretia culcitella* (Herrich-Schaeffer) (Lepidoptera: Depressariidae), *Brachmia macroscopa* Meyrick, *Recurvaria nanella* (Denis & Schiffermueller) (Lepidoptera: Gelechiidae), *Diurnea* sp. (Lepidoptera: Oecophoridae), *Acleris hippophaeana* (Heyden), *Cymolomia hartigiana* (Saxesen), *Grapholitha molesta* (Busck), *Hedya nubiferana* Haworth, *Gypsonoma dealban* Frölich, *Spilonota ocellana* (Denis & Schiffermueller), *Syndemis musculana* (Hübner) (Lepidoptera: Tortricidae) (Watanabe, 1967; van Achterberg & Haeselbarth, 1983; Tobias, 1986; van Achterberg, 1993a; Lelej, 2012).

Subfamily Orgilinae Ashmead, 1900

Tribe Orgilini Ashmead, 1900

Genus *Kerorgilus* van Achterberg, 1985

***Kerorgilus zonator* (Szépligeti, 1896)**

Distribution in Iran: West Azarbaijan (Samin et al, 2016).

General distribution: Azerbaijan, China, Germany, Greece, Hungary, Iran, Korea, Mongolia, Romania, Turkey (Yu et al, 2016).

Host records: Unknown.

Genus *Orgilus* Haliday, 1833

***Orgilus* (*Orgilus*) *abbreviator* (Ratzeburg, 1852)**

Distribution in Iran: Iran (no locality cited) (Taeger, 1989 as *Orgilus nanellae*; Fallahzadeh & Saghaei, 2010; Farahani, Talebi, van Achterberg, & Rakhshani, 2014; Güçlü & Özbek, 2015).

General distribution: Armenia, Bulgaria, Germany, Greece, Hungary, Iran, Turkey (Yu et al, 2016).

Host records: *Recurvia leucatella* (Clerck), *R. nanella* (Denis & Schiffermueller) (Lepidoptera: Gelechiidae) (Tobias, 1986; Taeger, 1989).

***Orgilus* (*Orgilus*) *hungaricus* Szépligeti, 1896**

Distribution in Iran: East Azarbaijan (Ghahari et al, 2009), Iran (no locality cited) (Farahani et al, 2014).

General distribution: Hungary, Iran, Kazakhstan, Romania, Serbia, Slovakia, Turkey (Yu et al, 2016).

Host records: Unknown.

***Orgilus* (*Orgilus*) *ischnus* Marshall, 1898**

Distribution in Iran: Alborz (Farahani et al, 2014).

General distribution: Austria, China, Czech Republic, Germany, Hungary, Iran, Mongolia, Netherlands, Norway, Poland, Russia, Switzerland, United Kingdom (Yu et al, 2016).

Host records: *Coleophora albitarsella* Zeller, *C. chalcogramella* Zeller, *C. frischella* (Linnaeus), *C. millefolii* Zeller, *C. peisoniella* Kasy (Lepidoptera: Coleophoridae), *Spilonota ocellana* (Denis & Schiffermueller) (Lepidoptera: Tortricidae) (Taeger, 1989; Papp, 1994).

***Orgilus* (*Orgilus*) *leptocephalus* (Hartig, 1838)**

Material examined: Guilan province, Astara (Sheykh-Mahalleh), 38°22′N 48°44′E, 2♀, 6.viii.2001. New record for Iran.

General distribution. Austria, Belgium, Canada (unspecified), Czech Republic, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, Mongolia, Netherlands, Poland, Russia, Sweden, Switzerland, United States of America, United Kingdom, former Yugoslavia (Yu et al, 2016), Iran (new record).

Host records: *Rhyaceonia buoliana* (Denis & Schiffermueller) (Lepidoptera: Tortricidae) (Taeger, 1989; Papp, 1994; Čapek & Hofmann, 1997).

***Orgilus* (*Orgilus*) *meyeri* Telenga, 1933**

Distribution in Iran: Alborz, Guilan, Mazandaran (Farahani et al, 2014), Tehran (Taeger, 1989), Iran (no locality cited) (Fallahzadeh & Saghaei, 2010; Güçlü & Özbek, 2015).

General distribution: Azerbaijan, Iran, Mongolia, Turkey, Uzbekistan (Yu et al, 2016).

Host records: Unknown.

***Orgilus* (*Orgilus*) *nitidior* Taeger, 1989**

Distribution in Iran: Alborz, Guilan, Qazvin, Tehran (Farahani et al, 2014).

General distribution: Azerbaijan, Iran (Yu et al, 2016).

Host records: Unknown.

***Orgilus* (*Orgilus*) *obscurator* (Nees, 1812)**

Distribution in Iran: Iran (no locality cited) (Sabzevari, 1968; Modarres Awal, 1997; Fallahzadeh & Saghaei, 2010; Farahani et al, 2014).

General distribution: Albania, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, Canada (introduced), Chile (introduced), China, Croatia, Czech Republic, Finland, France, Macedonia, Germany, Hungary, Iran, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Russia, Serbia, Slovakia, Slovenia, Sweden, Switzerland, Turkey, United States of America (introduced), Ukraine, United Kingfom (Yu et al, 2016).

Host records: *Loxostege sticticalis* (Linnaeus) (Lepidoptera: Crambidae), *Agonopterix conterminella* (Zeller), *A. kaekeritziana* (Linnaeus) (Lepidoptera: Depressariidae), *Aproaerema anthyllidella* (Hübner), *Dichomeris juniperella* (Linnaeus), *Exoteleia dodecella* (Linnaeus), *Recurvia nanella* (Denis & Schiffermueller), *Scrobipalpa acuminatella* (Sircom), *S. ocellatella* (Boyd) (Lepidoptera: Gelechiidae), *Coleophora alcyonipennella* (Kollar), *C. discordella* Zeller, *C. niveicostella* Zeller, *C. paripennella* Zeller, *C. pyrrhulipennella* Zeller (Lepidoptera: Coleophoridae), *Dendrolimus pini* (Linnaeus) (Lepidoptera: Lasiocampidae), *Epinotia cruciana*

(Linnaeus), *Gypsonoma aceriana* (Duponchel), *Lathronympha strigana* (Fabricius), *Stictea mygindiana* (Denis & Schiffermueller), *Tortrix viridana* Linnaeus (Lepidoptera: Tortricidae), *Mompha epilobiella* (Denis & Schiffermueller), *M. miscella* (Denis & Schiffermueller) (Lepidoptera: Momphidae), *Phalacropterix graslinella* (Boisduval) (Lepidoptera: Psychidae), *Rhyacionia buoliana* (Denis & Schiffermueller), *R. pinicolana* (Doubleday), *R. pinivorana* (Zeller), *R. resinella* (Lepidoptera: Tortricidae), *Scythris picaepennis* (Haworth) (Lepidoptera: Scythrididae), *Yponomeuta evonymella* (Linnaeus) (Lepidoptera: Yponomeutidae) (Marshall, 1874, 1890; Billups, 1891; Morley, 1907; Meyer, 1934; Hedwig, 1955; Hellén, 1958; Lemarie, 1961; Grönblom, 1964; Fulmek, 1968; Benedek, 1969; Tobias, 1971; Balevski, 1999; Georgiev & Samuelian, 1999).

***Orgilus pimpinellae* Niezabitowski, 1910**

Distribution in Iran: Guilan, Qazvin (Farahani et al, 2014), Mazandaran (Ghahari, Fischer, Çetin Erdoğan, Beyarslan, & Ostovan, 2010b).

General distribution: Afghanistan, Austria, Bulgaria, Czech Republic, Germany, Greece, Hungary, Iran, Ireland, Italy, Kazakhstan, Korea, Lithuania, Moldova, Mongolia, Norway, Poland, Romania, Russia, Serbia, Switzerland, Turkey, Ukraine, United Kingdom, Uzbekistan (Yu et al, 2016).

Host records: *Agonopterix bipunctosa* (Curtis) (Lepidoptera: Elachistidae), *Anacampsis populella* (Clerck), *A. temerella* (Lienig & Zeller), *Caryocolum tricolorella* (Haworth), *Dichomeris juniperella* (Linnaeus), *Phthorimaea operculella* (Zeller), *Recurvia nanella* (Zeller), *Scrobipalpa ocellatella* (Boyd) (Lepidoptera: Gelechiidae), *Coleophora discordella* (Zeller), *C. serratella* (Linnaeus) (Lepidoptera: Coleophoridae), *Digitivalva arnicella* (Heyden) (Lepidoptera: Acrolepiidae) (Teager, 1989), *Mompha miscella* (Denis & Schiffermueller) (Lepidoptera: Momphidae), *Oncocera obductella* (Zeller) (Lepidoptera: Pyralidae), *Depressaria pimpinella* Zeller (Lepidoptera: Depressariida) (Tobias, 1976, 1986; Čapek et al, 1982; Taeger, 1989; Čapek & Hofmann, 1997; Quicke & Shaw, 2004).

***Orgilus* (*Orgilus*) *ponticus* Tobias, 1986**

Distribution in Iran: West Azarbaijan (Ghahari & Fischer, 2011), Iran (no locality cited) (Farahani et al, 2014 as *O. puncticus*).

General distribution: Albania, Greece, Hungary, Iran, Italy, Russia, Slovenia, Turkey (Yu et al, 2016).

Host records: Unknown.

***Orgilus* (*Orgilus*) *priesneri* Fischer, 1958**

Distribution in Iran: Fars (Lashkari Bod, Rakhshani, Talebi & Lozan, 2010, Lashkari Bod, Rakhshani, Talebi, Lozan & Žikić, 2011), Iran (no locality cited) (Farahani et al, 2014).

General distribution: Egypt, Iran, Israel, Jordan, Kazakhstan, Saudi Arabia (Yu et al, 2016).

Host records: Unknown.

***Orgilus* (*Orgilus*) *punctiventris* Tobias, 1976**

Distribution in Iran: Guilan (Farahani et al, 2014).

General distribution: Armenia, Azerbaijan, Iran, Turkey (Yu et al, 2016).

Host records: Unknown.

***Orgilus* (*Orgilus*) *punctulator* (Nees, 1812)**

Distribution in Iran: Kordestan (Samin et al, 2016).

General distribution: Armenia, Azerbaijan, Bulgaria, Croatia, former Czechoslovakia, France, Germany, Hungary, Iran, Italy, Kazakhstan, Lithuania, Moldova, Mongolia, Netherlands, Poland, Russia, Serbia, Sweden, Switzerland, Turkey, United Kingdom (Yu et al, 2016).

Host records: *Coleophora auricella* (Fabricius), *C. follicularis* (Vallot), *C. nigricella* Stephens, *C. saponariella* Heeger, *C. troglodytes* (Duponchel), *C. serratella* (Linnaeus) (Lepidoptera: Coleophoridae), *Ancylis apicella* (Denis & Schiffermueller) (Lepidoptera: Tortricidae), *Apterona helicoidella* (Vallot), *Megalophanes viciella* (Denis & Schiffermueller) (Lepidoptera: Psychidae), *Yponomeuta malinella* (Zeller), *Y. padella* (Linnaeus) (Lepidoptera: Yponomeutidae) (Hedwig, 1955, 1958; Györfi,, 1959; Anonymous, 1960; Friese, 1963; Čapek et al, 1982; Tobias, 1986; Taeger, 1989; Čapek & Hofmann, 1997; Stankovic et al, 2010).

***Orgilus* (*Orgilus*) *similis* Szépligeti, 1896**

Distribution in Iran: Kordestan (Ghahari, 2016).

General distribution: Bulgaria, Croatia, Hungary, Italy, Moldova, Mongolia, Russia, Turkey (Yu et al, 2016), Iran (Ghahari, 2016).

Host records: *Bijugis Bombycella* (Denis & Schiffermueller) (Lepidoptera: Psychidae) (Györfi,, 1959).

***Orgilus* (*Orgilus*) *temporalis* Tobias, 1976**

Distribution in Iran: Mazandaran (Farahani et al, 2014).

General distribution: Azerbaijan, Czech Republic, Finland, Germany, Hungary, Iran, Mongolia, Romania, Russia, Switzerland, Turkey (Yu et al, 2016).

Host records: Unknown.

***Orgilus* (*Orgilus*) *tobiasi* Taeger,1989**

Distribution in Iran: Iran (no locality cited) (Taeger, 1989, Fallahzadeh & Saghaei, 2010; Farahani et al, 2014, Güçlü & Özbek, 2015).

General distribution: Albania, Armenia, Czech Republic, Germany, Greece, Hungary, Iran, Ireland, Italy, Romania, Serbia, Spain, Switzerland, Turkey, United Kingdom (Yu et al, 2016).

Host records: Unknown.

Doubtful record

***Orgilus* (*Orgilus*) *jennieae* Marsh, 1979**

Distribution in Iran: Iran (no locality cited) (Khanjani, 2006, Fallahzadeh & Saghaei, 2010).

General distribution: Costa Rica (Marsh, 1979; Yu et al, 2016).

Host records: Parasitoid of *Phthorimaea operculella* (Zeller) (Lepidoptera: Gelechiidae) (Marsh, 1979; Khanjani, 2006).

DISCUSSION

The present study deals with four subfamilies of the Iranian Braconidae: Charmontine, Ichneutinae, Macrocentrinae, and Orgilinae. It represents our current knowledge about the diversity of such subfamilies in the Iranian fauna in the different Iranian provinces, and many more species are expected to exist. The present study revealed the presence of thirty-four species from seven genera of the studied subfamilies, of which two species, *Macrocentrus nidulator* (Macrocentrinae), and *Orgilus leptocephalus* (Orgilinae), are newly recorded for the Iranian fauna. It was found that the most diverse subfamily is Orgilinae that includes 16 species in 2 genera followed by Macrocentrinae with 13 species in single genus, Ichneutinae with 3 species in 3 genera and Charmontinae with 2 species in one genus. *Orgilus jennieae* has been doubtfully recorded from Iran by Khanjani (2006) and Fallahzadeh & Saghaei (2010), which was only reported from Costa Rica and introduced to India and California (Yu et al, 2016), so it should be excluded from the Iranian fauna. Furthermore, *Macrocentrus oriens* has been erroneously reported by Hasanshahi et al (2016) in association with pistachio gall aphids, *Forda hirsuta* and *Slavum* sp. (Hemiptera: Aphididae) on *Pistacia atlantica*.

In the present study, it was found that the Orgilinae is the most diverse subfamily in the Middle East fauna. Members of this subfamily are reported in most of the Middle East countries, where they comprise 9.26% of the total number of world species. The number of species in each country, based mainly on Yu et al (2016) as well as on the present study of the Iranian fauna, is as follows: Egypt (3 species), Iran (16 species), Israel (3 species), Jordan (2 species), Saudi Arabia (1 species), Turkey (25 species). This is followed by the Charmontinae, which is reported in three of the Middle East countries: Cyprus (1 species), Iran (2 species), and Turkey (1 species), representing 20% of the total number of species of this subfamily. But this paucity may be attributed to the very few number of species in this subfamily as a whole (10 world species) (Yu et al, 2016).

The remaining two subfamilies in this study, the Ichneutinae (3.37% of the total number of species) and the Macrocentrinae (7.17%), are the least diverse and have been reported in only two of the Middle East countries, Iran (2 and 11 species, respectively) and Turkey (3 and 15 species, respectively).

From these numbers it is concluded that the Orgilinae is the most widely distributed, followed by the Charmontinae, then the Macrocentrinae and Ichneutinae. It is worth

mentioning that both the Turkish (Yu et al, 2016) and the Iranian (present study) faunas are the most speciose of these subfamilies as well as of the entire Braconidae in the Middle East. More species are expected to occur in Iran, and so more collecting trips are needed to explore the diversity of this fauna.

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REFERENCES

Akhtar, M.S., Singh, L.R. & Ramcmurthy, V.V. (2014) New species of the genus *Macrocentrus* Curtis, 1833 (Hymenoptera: Braconidae) from India. *The Pan-Pacific Entomologist*, 90(1), 11-15.

Al-e-Mansour, H. & Moustafavi, M.S. (1993) The first record of Braconidae bees on forest and range vegetation in the Fars province. *Proceedinhs of the 11th Iranian Plant Protection Congress*, p. 236.

Allen, H.W. (1962) Parasites of the Oriental fruit moth in the eastern United States. *United States Department of Agriculture Technical Bulletin*, No. 1265, 139 pp.

Anonymuous. (1960) Secretariat du service d'identification des Entomophages. Liste d'identification *Entomophaga*, 5(3), 337-373.

Asadizade, A., Mahriyan, K., Talebi, A.A. & Esfandiarpour, I. (2014) Faunistic survey of parasitoid wasps family of Braconidae from Anar Region, Kerman province. *Proceedings of the 3rd Integrated Pest Management Conference* (IPMC), p. 629.

Aubert, J.F. (1966) Liste d'identification No. 6 (présentée par le service d'identification des Entomophages). *Entomophaga*, 11(1), 115-134.

Balevski, N.A. (1995). New phytophagous hosts of hymenopterous braconid parasitoids (Hymenoptera: Braconidae) in Bulgaria. *Acta Entomologica Bulgarica*, 1(2), 69-73.

Balevski, N.A. (1999). Catalogue of the braconid parasitoids (Hymenoptera: Braconidae) isolated from various phytophagous insect hosts in Bulgaria. Pensoft, Sofia & Moscow, 1999: i-iv, 1-126.

Belokobylskij, S.A. & Tobias, V.I. (1998). Family Braconidae In: Lehr, P.A. (ed.), Key of the insects of Russian Far East (Neuropteroidea, Mecoptera, Hymenoptera), 4(3). Dal'nauka, Vladivostok, 708 pp.

Belshaw R. & Quicke D.L.J. (2002). Robustness of ancestral state estimates: evolution of life history strategy in ichneumonoid parasitoids. *Systematic Biology*, 51, 450-477.

Belshaw, R., Fitton, M., Herniou, E., Gimeno, C. & Quicke, D.L.J. (1998). A phylogenetic reconstruction of the Ichneumonoidea (Hymenoptera) based on the D2 variable region of 28S ribosomal RNA. *Systematic Entomology*, 23, 109-123.

Belshaw, R., Dowton, M., Quicke, D.L.J. & Austin, A. (2000) Estimating ancestral geographical distributions: a gondwanan origin for aphid parasitoids? *Proceedings of the Royal Society of London B: Biological Sciences*, 267, 491-496.

Benedek, P. (1969) Causes of the collapse of a *Dendrolimus pini* outbreak. A zoocenological study. *Acta Phytologica Academiae Scientiarum Hungaricae*, 4(4), 305-311.

Beyarslan, A. & Aydoğdu, M. (2012) A preliminary Study of the *Macrocentrus* Curtis, 1833 (Hymenoptera: Braconidae: Macrocentrinae) fauna of Turkey, with zoogeographical remarks. *Journal of the Entomological Research Society*, 14(1), 83-90.

Beyarslan, A., Gadallah, N.S. & Ghahari, H. (2017) An annotated catalogue of the Iranian Microtypinae and Rogadinae (Hymenoptera: Braconidae). *Zootaxa*, 4291(1), 99-116.

Billups, T.R. (1891) Notes on the hymenopterous and dipterous parasites, bred by members of the South London Entomological and Natural History Society during the years 1889 and 1890. *Proccedings of the South London Entomological and Natural History Society*, 1891, 157-164.

Billups, T.R. (1897) Additional notes on the hymenopterous and dipterous parasites, bred by members of the South London Entomological and Natural History Society during the years 1891 and 1892. *Proceedings of the South London Entomological and Natural History Society*, 1896, 80-87.

Bouček, Z., Pulpan, J. & Sedivy, J. (1953). Notizen über die parasitischen Hymenoptera des Fichtenborkenkäfers *Ips typographus* L. in CSR. Zoologicke Listy. *Folia Zoologica Entomologica*, 2, 145-158.

Čapek, M. (1972). Verzeichnis der aus Schädlingsinsekten erzogenen parasiten. Teil.V.-Die Brackwespen (Braconidae, Hymenoptera). *Entomologicke Problemy*, 10, 125-140.

Čapek, M., Hladil, J. & Sedivy, J. (1982). Verzeichnis der aus verschiedenen Insekten erzogenen parasitschen Hymenopteren- Teil VI. *Ent. Probl. Bratislava*, 17, 325-371.

Čapek, M. & Hofmann, C. (1997). The Braconidae (Hymenoptera) in the collections of the Musée cantonal de Zoologie, Lausanne. *Litterae Zoologicae* (Lausanne), 2, 25-162.

Chen, X.-X. & van Achterberg, C. (2019). Systematics, phylogeny, and evolution of braconid wasps: 30 years of progress. *Annual Review of Entomology*, 64, 1-24.

Cole, L.R. (1967). A study of the life-cycles and hosts of some Icneumonidae attacking pupae of the green oak leaf roller moth *Tortrix viridana* (L.) (Lepidoptera: Totricidae) in England. *Transactions of the Royal Entomological Society of London*, 119, 267-281.

Delucchi, V. (1982). Parasitoids and hyperparasitoids of *Zeiraphera diniana* (Lep., Tortricidae) and their role in population control in outbreak areas. *Entomophaga*, 27(1), 77-92.

De Santis, L. (1967). Catalogs de los Himenopteros Argentinos de la Serie Parasitica, incluyendo Bethyloidea. Comision de Investigaciones Cientificas, Provincia de Buenos Aires Gobernacion, La Plata, 337 pp.

Dowton, M., Belshaw, R., Austin, A.D. & Quicke, D.L.J. (2002). Simultaneous molecular and morphological analysis of braconid relationships (Insecta: Hymenoptera: Braconidae) indicates independent mt-tRNA gene inversions within a single wasp family. *Journal of Molecular Evolution*, 54, 210-226.

Eady, R.D. & Clark, J.A.J. (1964). A revision of the genus *Macrocentrus* Curtis (Hymenoptera: Braconidae) in Europe with descriptions of four new species. *Entomologists Gazette*, 15, 97-127.

Evenhuis, H.H. & Vlug, H.J. (1983). The hymenopterous parasites of leaf-feeding apple tortricid (Lepidoptera: Tortricidae) in the Netherlands. *Tijdschrift voor Entomologie*, 126(6), 109-135.

Fahringer, J. (1942). Zur kenntnis der Parasiten der Nonne (*Lymantria monacha* L.). *Zeitschrift für Angewandte Entomologie*, 28(1941), 335-358.

Fallahzadeh, M. & Saghaei, N. (2010). Checklist of Braconidae (Insecta: Hymenoptera) from Iran. *Munis Entomology and Zoology*, 5(1), 170-186.

Farahani, S., Talebi, A.A., Rakhshani, E. & van Achterberg, C. (2012a). New record of *Pseudichneutes atanassovae* (Hymenoptera: Braconidae: Ichneutinae) from Iran. *Proceedings of the 20th Iranian Plant Protection Congress*, p. 118.

Farahani, S., Talebi, A.A. & Rakhshani, E. (2012b). First records of *Macrocentrus* Curtis 1833 (Hymenoptera: Braconidae: Macrocentrinae) from Northern Iran. Zoology and Ecology, 22(1), 41-50.

Farahani, S., Talebi, A.A., van Achterberg, C. & Rakhshani, E. (2014) A taxonomic study of Orgilinae and Microtypinae from Iran (Hymenoptera, Braconidae). *Spixiana*, 37(1), 93-102.

Fernández-Triana, J.L. & Huber, J.T. (2010). Braconid parasitoids (Hymenoptera: Braconidae) of Nearctic *Choristoneura* species (Lepidoptera: Tortricidae), with a summary of other parasitoid families attacking *Choristoneura. Canadian Entomologist*, 142, 295-343.

Fischer, J., Tucker, E. & Sharkey, M. (2015). *Colemanus keeleyorum* (Braconidae: Ichneutinae s.l.): a new genus and species of Eocene wasp from the Green River Formation of western North America. *Journal of Hymenoptera Research*, 44, 57-67.

Friese, G. (1963). Die Parasiten der paläarktischen Yponomeutidae (Lepidoptera, Hymenoptera, Diptera). *Beiträge zur Entomologie*, 13, 311-326.

Fulmek, L. (1968). Parasinsekten der Insektengallen Europas. *Beiträge zur Entomologie*, 18, 719-952.

Gadallah, N.S. & Ghahari, H. (2013a). An annotated catalogue of the Iranian Agathidinae and Brachistinae (Hymenoptera: Braconidae). *Linzer Biologische Beiträge*, 45(2), 1873-1901.

Gadallah, N.S. & Ghahari, H. (2013b). An annotated catalogue of the Iranian Cheloninae (Hymenoptera: Braconidae). *Linzer Biologische Beiträge*, 45(2), 1921-1943.

Gadallah, N.S. & Ghahari, H. (2015). An annotated catalogue of the Iranian Braconinae (Hymenoptera: Braconidae). *Entomofauna*, 36, 121-176.

Gadallah, N.S., Ghahari, H., Fischer, M. & Peris-Felipo, F.J. (2015a). An annotated catalogue of the Iranian Alysiinae (Hymenoptera: Braconidae). *Zootaxa*, 3974(1), 001-028.

Gadallah, N.S., Ghahari, H. & Peris-Felipo, F.J. (2015b). Catalogue of the Iranian Microgastrinae (Hymenoptera: Braconidae). *Zootaxa*, 4043(1), 1-069.

Gadallah, N.S., Ghahari, H., Peris-Felipo, F.J. & Fischer M. (2016a). Updated checklist of Iranian Opiinae (Hymenoptera: Braconidae). *Zootaxa*, 4066(1), 1-40.

Gadallah, N.S., Ghahari, H. & van Achterberg, C. (2016b). An annotated catalogue of the Iranian Euphorinae, Gnamptodontinae, Helconinae, Hormiinae and Rhysipolinae (Hymenoptera: Braconidae). *Zootaxa*, 4072(1), 1-38.

Georgiev, G. (2000). Studies on the larval parasitoids of *Paranthrene tabaniformis* (Rott.) (Lepidoptera: Sesiidae) on urban poplars (Populus spp.) in Sofia, Bulgaria. *Annals of Forest Science*, 57(2), 181-186.

Georgiev, G. & Samuelian, S. (1999). Species composition, structure and impact of larval parasitoids of popular twig borer, *Gypsonoma aceriana* (Dup.) (Lepidoptera: Tortricidae) on poplar ornamental trees in Sofia. *Anzeiger für Schädlingskunde*, 72(1), 1-4.

Ghahari, H. (2016). Fine new records of Iranian Braconidae (Hymenoptera: Ichnemonoidea) for Iran and annotated catalogue of the subfamily Homolobinae. *Wuyi Science Journal*, 32, 35-43.

Ghahari, H. & Fischer, M. (2011). A contribution to the Braconidae (Hymenoptera: Ichneumonoidea) from north-western Iran. *Calodema*, 134, 1-6.

Ghahari, H., Fischer, M., Erdoğan, Ö.Ç., Tabari, M., Ostovan, H. & Beyarslan, A. (2009a). A contribution to Braconidae (Hymenoptera) from rice fields and surrounding grasslands of Northern Iran. *Munis Entomology and Zoology*, 4(2), 432-435.

Ghahari, H., Fischer, M., Çetin Erdogan, O., Beyarslan, A. & Havaskary, M. (2009b). A Contribution to knowledge of the braconid-fauna (Hymenoptera, Ichneumonoidea, Braconidae) of Arasbaran, Northwestern Iran. *Entomofauna*, 30, 329-336.

Ghahari, H., Fischer, M., Hedqvist, K.J., Çetin Erdoğan, Ö., van Achterberg, C. & Beyarslan, A. (2010a). Some new records of Braconidae (Hymenoptera) for Iran. *Linzer Biologische Beiträge*, 42(2), 1395-1404.

Ghahari, H., Fischer, M., Çetin Erdoğan, Ö., Beyarslan, A. & Ostovan, H. (2010b). A contribution to the braconid wasps (Hymenoptera: Braconidae) from the forests of northern Iran. *Linzer Biologische Beiträge*, 42(1), 621-634.

Graham, A.R. (1965). A preliminary list of natural enemies of Canadian agricultural pests. Canada Department of Agriculture. Research Institute. *Belleville Information Bulletin*, No. 4, 179 pp.

Grönblom, T. (1964). Einige aus Schmetterlingszuchten hervogegangene Schlupfwespen (Hym., Ichneumonoidea). Annales Entomologici Fennici, 30, 104-111.

Güçlü, C. & Özbek H. (2015). A study of Orgilinae (Hymenoptera: Braconidae) from Turkey with new records. *Journal of the Entomological Research Society*, 17(1), 61-69.

Györfi, J. (1959). Beiträge zur Kenntnis der Wirte verschiedener Braconiden-Arten (Hymenoptera, Braconidae). *Acta Zoologica Hungarica*, 5, 49-65.

Haeselbarth, E. (1978). Notizen zur Gattung *Macrocentrus* Curtis (Hymenoptera: Braconidae). II. Zur Trennung von *M. bicolor* Curtis, *M. thoracicus* (Nees) und einiger verwandter Arten. *Nachrichtenblatt der Bayerischen Entomologen*, 27, 25-32.

Haeselbarth, E. & van Achterberg, C. (1981). *Macrocentrus rossemi* sp. n., eine neue Art der thoracicus-Gruppe (Hymenoptera, Braconidae). *Entomologische Berichten*, 41, 157-160.

Hasanshahi, G., Gharaei, A.M., Mohammadi-Khoramadi, A., Abbasipour, H. & Papp, J. (2016). First record of parasitoid wasp *Macrocentrus oriens* (Hymenoptera: Braconidae, Macrocentrinae) from Iran. *Journal of Entomological Society of Iran*, 36(1), 77-78.

He, J., Chen, X. & van Achterberg, C. (1997). Five new species of the subfamily Ichneutinae (Hymenoptera: Braconidae) from China and Europe. *Zoologische Mededelingen Leiden*, 71(2), 9-23.

Hedwig, K. (1955). Mittleuropäische Schulpwespen und ihre Wirte. *Nachrichten des Naturwissenschaften Museums der Stadt Aschaffenburg*, 47, 43-56.

Hedwig, K. (1958). Mittleuropäische Schulpwespen und ihre Wirte. *Nachrichten des Naturwissenschaften Museums der Stadt Aschaffenburg*, 58, 21-37.

Hedwig, K. (1962). Mittleuropäische Schulpwespen und ihre Wirte. *Nachrichten des Naturwissenschaften Museums der Stadt Aschaffenburg*, 68, 43-97.

Hellén, W. (1938). Für die Fauna Finnlands neue Braconiden (Hym.). *Notulae Entomologicae*, 18, 108-114.

Hellén, W. (1958). Zur Kenntnis der Braconiden (Hym.) Finnlands. II. Subfamilia Helconinae. *Fauna Fennica*, 4, 3-37.

Inglis, G.D., Lawrence, A.M. & Davis, F.M. (2000). Pathogens associated with southwestern corn borers and southern corn stalk borers (Lepidoptera: Crambidae). *Journal of Economic Entomology*, 93(6), 1619-1626.

Ingram, W.R. (1981). The parasitoids of *Spodoptera littoralis* (Lepidoptera: Noctuidae) and their role in population control in Cyprus. *Entomophaga*, 26, 23-37.

Kamijo, K. (1982). Some pteromalids (Hymenoptera) associated with forest pests in Japan with descriptions of two new species. *Kontyu*, 50(1), 67-75.

Kemner, N.A. (1915). De ekonomiskt viktiga gande anobierna. Meddelande Centralanstalten Försöks Stockholm. Jordb. 108 (Entomolgia Avdelning), 45 pp.

Khanjani, M. (2006). Vegetable pests in Iran. Bu-Ali Sina University, No. 205. 467 pp. [in Persian]

Knowlton, G.F. & Harmston, F.C. (1939). Some entomophagous Utah Hymenoptera. *Proceedings of the Utah Academy Sciences*, 16, 59-63.

Koponen, M. (1992). Contributions to the knowledge of the Braconidae of Finland (Hymenoptera). *Entomologica Fennica*, 2, 193-208.

Kudler, J. & Hochmut, R. (1959). *Cacoecia cratageana* Hb. Al derzeitiger Großschädling mährischen. *Zeitschrift für Pflanzenkankheit*, 66, 142-149.

Lashkari, Bod, A., Rakhshani, E., Talebi, A.A. & Lozan, A. (2010). Introduction of twelve newly recorded species of Braconidae (Hymenoptera) from Iran. *Proceedings of the 19th Iranian Plant Protection Congess*, p. 161.

Lashkari Bod, A., Rakhshani, E., Talebi, A.A., Lozan, A. & Žikić, V. (2011). A contribution to the knowledge of Braconidae (Hym., Ichneumonoidea) of Iran. *Biharean Biologist*, 5(2), 147-150.

Lelej, A. (2012). Annotated catalogue of the insects of Russian Far East. Volume I. Hymenoptera. Vladivostok: Dalnauka, 635 pp.

Limarie, J. (1961). Beitrag zur Kenntnis der parasite des Kiefernknospentriebmotte *Exoteleia* (*Heringia*) *dodecella* L. Teil 4. Ichneumonidae, Braconidae, Chalcidoidea, Bethyloidea. *Zoologicke Listy*, 10(24), 119-126.

Linnaeus, C. von. (1758). Systema naturae per regna tria naturae, secundum classes, ordines, genera, species cum characteribus, differentiis, synonymis locis. Tomus I. Editio decimal, reformata laurnetii Salvii, Holmiae, 824 pp.

Lozan, A.I., Spitzer, K., Jaroš, J., Khalaim, A., Rizzo, M.C., Guerriere, E. & Bezděk, A. (2011). Parasitoids (Hymenoptera) of the leaf-spinning moths (Lepidoptera) feeding on *Vaccinium uliginosum* L. along an ecological gradient in central European peat bogs. *Entomologica Fennica*, 21, 343-353.

Lyle, G.T. (1914). Contributions to our knowledge of British Braconidae. 2. Macrocentridae, with descriptions of two new species. *The Entomologist*, 47, 257-290.

Marsh, P.M. (1979). Description of new Braconidae (Hymenoptera) parasitic on the potato tuberworm and related Lepidoptera from Central and South America. *Journal of the Washington Academy of Sciences*, 69(1), 12-17.

Marshall, T.A. (1874). New British species, corrections of nomenclature, etc. (Cynipidae, Ichneumonidae, Braconidae, and *Oxyura*). Entomologist's Annual, 1874, 114-146.

Marshall, T.A. (1888). A monograph of British Braconidae. Part III. *Transactions of the Entomological Society of London*, 1889, 149-211.

Marshall, T.A. (1890). Les Braconides. In André E (ed.) "Species des Hyménoptères d'Europe et d'Algerie". Tome 4. 609 pp. Beaune 1888.

Marshall, T.A. (1893). Les Braconides: in E.D. André, species des Hyménoptères d'Europe et d'Algerie, 5, 211.

Masnady-Yazdinejad, A. (2010). The first braconid species record of subfamily Charmontinae from Iran: *Charmon extensor* (L.) (Hymenoptera: Braconidae: Charmontinae). *Proceedings of the 7th International Congress of Hymenopterists*, 20-26 June, 2010, Köszeg, Hungary, pp. 96-97.

Mason, W.R.M. (1974). A generic synopsis of Brachistini (Hymenoptera: Braconidae) and recognition of the name *Charmon* Haliday. *Proceedings of the Entomological Society of Washington*, 76(3), 235-246.

Meyer, N.F. (1934). Schlupfwespen die in Russland in den Letzten Jahren aus Schädlingen gezogen sind. *Zeitschrift für Angewandte Entomologie*, 20, 611-618.

Modarres Awal, M. (1997). Family Braconidae (Hymenoptera), pp. 265-267. In: Modarres Awal, M. (ed.), List of agricultural pests and their natural enemies in Iran. Ferdowsi University Press, 427 pp.

Morley, C. (1907). Hymenoptera Parasitica in west Sufflok and at Eastbourne. *Entomologist's Monthly Magazine*, 43, 85-86.

Morley, C. (1915). The Rev. T.A. Marshall's localities. *Entomologis*, 48, 23-24.

Murphy, N., Banks, J., Whitfield, J.B. & Austin, A. (2008). Phylogeny of the parasitic microgastroid subfamilies (Hymenoptera: Braconidae) based on sequence data from seven genes, with an improved time estimate of the origin of the lineage. *Molecular Phylogeny and Evolution*, 47, 378-395.

Papp, J. (1994). Contribution to the braconid fauna of Hungary, 10. Homolobinae, Macrocentrinae, Orgilinae and Microtypinae (Hymenoptera: Braconidae). *Folia Entomologica Hungarica*, 55, 287-304.

Pitz, K., Dowling, A.P.G., Sharanowski, B.J., Boring, C.A.B., Seltmann, K.C. & Sharkey, M.J. (2007). Phylogenetic relationships among the Braconidae (Hymenoptera: Ichneumonoidea) as proposed by Shi *et al*.: a reassessment. *Molecular Phylogeny and Evolution*, 43, 338-343.

Prebble, L.M. (1943). *Stilpnotia salicis* L., report on parasitism by *Apanteles solitarius* and *Meteorus versicolor* in Canada. *Canadian Insect Pest Review*, 21, 155-156.

Pschorn-Walcher H. & Altenhofer, E. (2000). Langjährige Larvenaufsammlungen und Zuchten von pflanzenwespen (Hymenoptera: Symphyta) in Mittleuropa. *Linzer Biologische Beiträge*, 32(1), 273-327.

Quicke, D.L.J. & van Achterberg, C. (1990). Phylogeny of the subfamilies of the family Braconidae (Hymenoptera: Ichneumonoidea). *Zoologische Verhandelingen*, 258, 1-95.

Quicke, D.L.J. & Shaw, M.R. (2004). Cocoon silk chemistry in parasitic wasps (Hymenoptera: Ichneumonoidea) and their hosts. *Biological Journal of the Linnean Society*, 81(2), 161-170.

Ratzeburg, J.T.C. (1848). Die Ichneumonen der Forstinsecten in forstlicher und entomologischer Beziehung. Ein Anhang zu Abbildung und Beschreibung der Forstinsecten, Zeiter Band, 238 pp.

Ratzeburg, J.T.C. (1852). Die Ichneumonen der Forstinsecten und entomologischer Beziehung. Dritter Band, 272 pp.

Risbec, J. (1960). Les parasites des insects d'importance en Afrique tropicale et à Madagascar. *Agronomie Tropicale*, 15, 624-656.

Rousse, P. (2013). *Charmon ramagei* sp. nov., a new Charmontinae (Hymenoptera: Braconidae) from Reunion, with a synopsis of world species. *Zootaxa*, 3626(4), 583-588.

Rudow, F. (1918). Braconiden und ihre Wirte. *Entomologische Zeitschrift*, 32, 4, 7-8.

Sabahatullah, M., Mashwani, M.A., Tahira, Q.A. & Inayatullah, M. (2014). New record of the subfamily Charmontinae (Braconidae: Hymenoptera) in Pakistan with the description of a new species. *Pakistan Journal of Agricultural Research*, 27(4), 296-302.

Sabzevari, A. (1968). Lepidopterous pest on apricot. *Proceedings of the 1st Iranian Plant Protection Congress*, pp. 63-80.

Samin, N. (2015). A faunistic study on the Braconidae of Iran (Hymenoptera: Ichneumonoidea). *Arquivos Entomolóxicos*, 13, 339-345.

Samin, N., van Achterberg, C. & Çetin Erdoğan, O. (2016). A faunistic study on some subfamilies of Braconidae (Hymenoptera: Ichneumonoidea) from Iran. *Arquivos Entomolóxicos*, 15, 153-161.

Schimitschek, E. (1938) M. Seitner Bearbeitung der Insektenschädlinge der Zirbe in biozönotischer Darstellung. *Zeitschrift für Angewandte Entomologie*, 25, 111-124.

Sharanowski, B.J. & Sharkey, M.J. (2007). Description of three new species of *Helconichia* Sharkey & Wharton (Hymenoptera: Braconidae: Ichneutinae) with a revised key to all species. *Zootaxa*, 1502, 45-57.

Sharanowski, B.J., Dowling, A.P.G. & Sharkey, M.J. (2011). Molecular phylogenetics of Braconidae (Hymenoptera: Ichneumonoidea), based on multiple molecular genes, and implication for classification. *Systematic Entomology*, 36, 549-572.

Sharanowski, B.J., Zhang, Y.M. & Wanigasekara, R.W.U.M. (2014). Annotated checklist of Braconidae (Hymenoptera) in the Canadian Prairies Ecozone. In: Edited by Giberson, D.J. & Cárcamo, H.A. (eds), Arthropods of Canadian Grasslands (volume 4): Biodiversity and Systematics Part 2. Biological Survey of Canada, pp. 399-425.

Sharkey, M.J. & Wharton, R.A. (1994). A revision of the genera of the world Ichneutinae (Hymenoptera: Braconidae). *Journal of Natural History*, 28, 873-912.

Shaw, M.R. & Huddleston, T. (1991). Classification and biology of braconid wasps (Hymenoptera: Braconidae). *Handbook for the Identification of British Insects*, 7(11), 1-126.

Shenefelt, R.D. (1973). Braconidae 5. Microgastrinae and Ichneutinae. Hymenopterorum Catalogus (nova editio). Pars 9, 669-812.

Shi, M., Chen, X.X. & van Achterberg, C. (2005). Phylogenetic relationships among the Braconidae (Hymenoptera: Ichneumonoidea) inferred from partial 16S rDNA D2, 18S rDNA gene sequences and morphological characters. *Molecular Phylogenetics and Evolution*, 37, 104-116.

Shojai, M. (1968). Resultats de l'étude faunestiques des Hyménoptères parasites (Terebrants) en Iran et l'importance de leur utilization des la lute biologique. Proceedings of the 1st Iranian Plant Protection Congress, pp. 25-35.

Taeger, A. (1989). Die Orgilus-Arten der Paläarktis (Hymenoptera, Braconidae). Arbeit aus dem Institut für Pflanzenschutzforschung Kleinmachnow, Bereich Eberswalde. Akademie der Landwirtschaftswissenschaften der DDR, 260 pp.

Tereshkin, A.M. & Lobodenko, Y.S. (1997). Some results on rearing entophagous insects in Belarus Vyestsi Akademii Navuk Byelarusi Syeryya Biyalenhichnykh Navuk, 3: 99-103, 127.

Tobias, V.I. (1971). Obzor naezdnikov-brakonid (Hymenoptera) fauny SSSR. *Trudy Vsesoyeiznogo Entomologicheskojo Obshchestva*, 54, 156-268.

Tobias, V.I. (1976). Braconids of the Caucasus (Hymenoptera, Braconidae). Opred. Faune SSSR. Nauka Press. Leningrad, 110, 286 pp.

Tobias, V.I. (1986). Macrocentrinae and Xiphozelinae. In: Medvedev G.S. (ed.). Opredelitel Nasekomych Evrospeiskoi Tsasti SSSR 3, Peredpontdatokrylye 4. Opredeliteli po Faune SSSR, 145, 250-263.

Tuncer, I. & Avci, M. (2015). Damage, biology and natural enemies of the green oak moth *Tortrix viridana* L., 1758 (Lep.: Tortricidae) in Dinar district oak forests. *Suleyman Damirel Universitesi Orman Fakultesi Derisi Seri A*, 16(1), 11-19.

van Achterberg, C. (1979). A revision of the subfamily Zelinae auct. (Hymenoptera: Braconidae). *Tijdschrift voor Entomologie*, 122, 241-479.

van Acheterberg, C. (1982). Two species of *Macrocentrus* Curtis unknown from Austria (Hymenoptera: Braconidae). *Entomologische Berichten*, 42, 56-61.

van Achterberg, C. (1984). Essay on the phylogeny of Braconidae (Hymenoptera: Ichneumonoidea). *Entomologisk Tidskrift,* 105, 41-58.

van Achterberg, C. (1985). Notes on Braconidae I. *Kerorgilus* gen. nov., a new genus of Orgilinae (Hymenoptera: Braconidae) from the Palaearctic region. *Zoologische Mededelingen*, 59(15), 163-167.

van Achterberg, C. (1987). Revisionary notes on the subfamily Orgilinae (Hymenoptera: Braconidae). *Zoologische Verhandelingen*, 242, 1-111.

van Achterberg, C. (1992). *Bentonia* gen. nov. (Hymenoptera: Braconidae: Orgilinae) from Brazil. *Zoologische Mededelingen*, 66, 339-344.

van Achterberg, C. (1993a). Revision of the subfamily Macrocentrinae Foerster (Hymenoptera: Braconidae) from the Palaearctic region. *Zoologische Verhandelingen*, 286, 1-110.

van Achterberg, C. (1993b). Illustrated key to the subfamilies of the Braconidae (Hymenoptera: Ichneumonoidea). *Zoologische Verhandelingen*, 283, 1-189.

van Achterberg, C. (1994). Two new genera of the tribe Orgilini Ashmead (Hymenoptera: Braconidae: Orgilinae). *Zoologische Mededelingen*, 68(16), 173-190.

van Achterberg, C. and Belokobylskij, S.A. (1987). Revisionary notes on the Macrocentrinae from the Far East USSR (Hymenoptera, Braconidae). *Zoologische Mededelingen*, 61, 243-262.

van Achterberg, C. and Haeselbarth, E. (1983). Revisionary notes on the European species of *Macrocentrus* Curtis sensu strict (Hymenoptera, Braconidae). *Entomofauna*, 4, 37-59.

van Achterberg, C. & Quicke, D.L.J. (1992) *Declotila*, a new genus of Orgilinae (Hymenoptera: Braconidae) without occipital carina from the Australian region. *Zoologische Mededelingen*, 66, 317-321.

Vetter, C. (1999). Zur Habitatbindung baumpilzbesiedlnder Schmetterlinge der Familie Tineidae (Latreille, 1810). Dissertation zur Enlangung des Doktorgrades des Fachbereichs Biologie der Universitat Hamburg. Saker Verlag. Hamburg. Germany, 183 pp.

Vidal, S. (1993). Determination list of Entomophagous insects Nr. 12. *IOBC-WPRS Bulletin*, 16(3): 1-9.

Vidal, S. (1997). Determination list of entomophagous insects. Nr. 13. *IOBC-WPRS Bulletin*, 20(2), 1-8.

Watanabe, C. (1937). A contribution to the knowledge of the braconid fauna of the Empire of Japan. *Journal of the Faculty of Agriculture, Hokkaido Imperial University*, 42, 1-188.

Watanabe, C. (1967). Further revision of the genus *Macrocentrus* Curtis in Japan, with description of two new species (Hymenoptera, Braconidae). *Insecta Matsumurana*, 30(1), 1-16.

Yu, D.S., van Achterberg, C. & Horstmann, K. (2016). Taxapad 2016, Ichneumonoidea 2015, Database on flash-drive. www.taxapad.com, Nepean, Ontario, Canada.

Zinnert, K.D. (1969). Vergleichende Untersuchungen zur Morphologie und Biologie der larvenparasiten (Hymenoptera Ichneumonida und Braconidae) mitteleuropäischer Blattwespen aus der Subfamily Nematinae (Hymenoptera: Tenthredinidae). Teil I. *Zeitschrift für Angewandte Entomologie*, 64, 180-217.

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