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A checklist of Chalcidoidea (Insecta: Hymenoptera) of Khuzestan in southwestern Iran

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ABSTRACT. The chalcid wasps (Hymenoptera: Chalcidoidea) is one of the largest groups of wasps with tremendous morphological, ecological, biological, and taxonomic diversity whose economic importance is being pest natural enemies or plant pests. The unknown chalcid fauna of Khuzestan province in southwestern Iran generated the execution of a faunistic study to elucidate its chalcidoid biodiversity. The material was collected by sweeping and trapping during 2014–2015 from fields, ranges and grasslands. This contribution lists 56 species belonging to 35 genera and 11 families (Agaonidae, Aphelinidae, Chalcididae, Encyrtidae, Eulophidae, Eupelmidae, Eurytomidae, Mymaridae, Pteromalidae, Signiphoridae and Trichogrammatidae). *Eupristina saundersi* Grandi, 1916 (Agaonidae) and *Dirhinus bakeri* (Crawford, 1914) (Chalcididae) are new records for the fauna of Iran, while *Euplectrus liparidis* Ferrière, 1941 and *Hemiptarsenus zilahisebessi* Erdős, 1951 (Eulophidae), *Eupelmus* sp. (Eupelmidae) and *Mymar taprobanicum* (Ward, 1875) and *Polynema* sp. (Mymaridae) are new for the Khuzestan province fauna.

Key words: Chalcidoidea, fauna, Iran, Khuzestan, new records.

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Introduction

The chalcid wasps (Hymenoptera: Chalcidoidea) are morphologically, ecologically, biologically and taxonomically diverse wasps. Morphologically, chalcid wasps are mostly minute insects (0.3–17 mm) which can be distinguished by presence of prepectus (a sclerite partly separating the mesopleuron from a more or less saddle-like or horseshoe-like pronotum; thus the pronotum normally does not touch the tegula) and occurrence of at most a single

complex vein, and, absence of any enclosed cells in fore wing. Ecologically, Chalcidoidea are found in all zoogeographic regions and in all ecosystems (Gibson 1993), though are more diverse in tropics (Noyes 2015). Biologically, most Chalcidoidea are parasitoids or, rarely, predators of the immature stages or, very rarely, of adults of 13 orders of Insecta (Coleoptera, Diptera, Homoptera, Hemiptera, Hymenoptera, Lepidoptera, Neuroptera, Odonata, Orthoptera, Plecoptera,

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Strepsiptera, Siphonaptera and Thysanoptera), three orders of Arachnida (Araneae, Pseudoscorpionida and Acari), and one family of Nematoda (Anguinidae), while a few chalcidoids are phytophagous, either as gall formers or seed feeders, or as inquilines within the galls of other species (Gibson 1993). Taxonomically, about 22000 species (Noyes 2015) are classified in 23 families based on a recent comprehensive combined morphological and molecular studies (Heraty *et al.* 2013; Noyes 2015).

Economically, Chalcidoidea are important for two reasons (Noyes 2015): as biological control agents of pests and as plant pests. Greathead (1986) stated that more than 800 chalcid species were incorporated in pest biocontrol programs worldwide representing about two-thirds of all biological control programs in which wasps were utilized, and about one-third of all accomplished biological control programs of insect pests; however, the statistics need updating. Several successful examples of Chalcidoidea include: a few chalcids belonging to some genera like *Aphytis* Howard, 1900, *Coccophagus* Westwood, 1833, *Encarsia* Förster, 1878 and *Eretmocerus* Haldeman, 1850 (Aphelinidae) were introduced into various areas of the world to control key pests such as whiteflies and scale insects (DeBach and Rosen 1991) and a number of chalcid wasps of different genera, namely *Anagrus* Haliday, 1833 (Mymaridae), *Aphytis*, *Encarsia* and *Eretmocerus*, *Metaphycus* Mercet, 1917 (Encyrtidae), *Muscidifurax* Girault and Sanders, 1910, *Nasonia* Ashmead, 1904 and *Spalangia* Latreille, 1805 (Pteromalidae) and *Trichogramma* Westwood, 1833 (Trichogrammatidae) are mass produced and sold around the world for controlling different pests in Hemiptera and Lepidoptera

(Chiappini 2008; Floate and Gibson 2008; Hoy 2008). The control of pests by Chalcidoidea is often disclosed merely when pesticide usage results the eradication of chalcid population and the consequent pest population release and damage (Noyes 2015). More than 80 species of Chalcidoidea are known to be plant pests (Noyes 2015). The best known instances are several species of *Bruchophagus* Ashmead, 1888, *Eurytoma* Illiger, 1807, *Systole* Walker, 1832 (Eurytomidae) and *Megastigmus* Dalman, 1820 (Torymidae) which are seed pests of a number of leguminous crops (e.g. lucerne), fruit trees (e.g. almond, apricot, hazel, pistachio and plum), various Apiaceae used as spices (e.g. coriander) and Pinaceae (Modarres Awal 2012; Noyes 2015).

However Modarres Awal (2012) and Noyes (2015) listed around 500 Chalcidoidea species placed in 17 families from Iran, the chalcid fauna of the whole land still requires much investigation. Comparatively, less attention has been devoted to the chalcids of several Iranian provinces including the south-western Khuzestan from which, to date, 46 species of Chalcidoidea are known (Eslamizadeh and Ebrahimi 2002; Mossadegh and Kocheili 2003; Fallahzadeh and Japoshvili 2010; Talebi *et al.* 2011; Modarres Awal 2012; Abd-Rabou *et al.* 2013; Alizadeh *et al.* 2013; Khadempour *et al.* 2014; Noyes 2015).

The diminutively explored chalcid fauna of Khuzestan as well as the economic significance of Chalcidoidea especially as potential natural enemies of pests encouraged the authors to trigger the implementation of a research whose first partial result is this contribution listing chalcidoid species including new reports.

Material and methods

Different methods have been elaborated for collecting Chalcidoidea that reviewed by Grissell and Schauff (1997a, b) and Noyes (1982, 2015) from which, sweeping and trapping were used by first author. In sweeping (Fig. 1), a fine mesh insect net was used for insect collection from fields, ranges and grasslands, and a portable vacuum powered by a rechargeable battery was utilized to suck the catch from the net into a jar containing a solution of water and hand-washing liquid. In laboratory, chalcid specimens of this container of water-mixed arthropods were collected by fine painting brush, a pair of pincers and/or tiny hook under magnification provided by employing a stereomicroscope. In trapping (Fig. 2), yellow pans filled with a solution of water and hand-washing liquid were placed outdoor for 1-2 days, then in laboratory,

the captured chalcids were collected as same as explained above.

The collected specimens were transferred to the vials containing ethanol 75%, and a label with necessary data (i.e. date, place and method of collection, collector's name, habitat and hierarchical taxonomy including scientific name) was attached on each vial. The material is maintained at the insect collection of Department of Plant Protection, Shahid Chamran University of Ahwaz.

Identification of Chalcidoidea was conducted by the first and third authors using the following literatures: Ferrière (1941), Bouček (1952, 1959, 1977, 1988), Burks (1971), Bouček and Narendran (1981), Hayat (1983), Bouček and Rasplus (1991), Wiebes (1992), Gibson (1995), Zerova (1995), Triapitsyn and Berezovskiy (2001), Abd-Rabou *et al.* (2005), Abd-Rabou and Ghahari (2007), Yefremova (2007), Huber *et al.* (2009) and Noyes (2015).

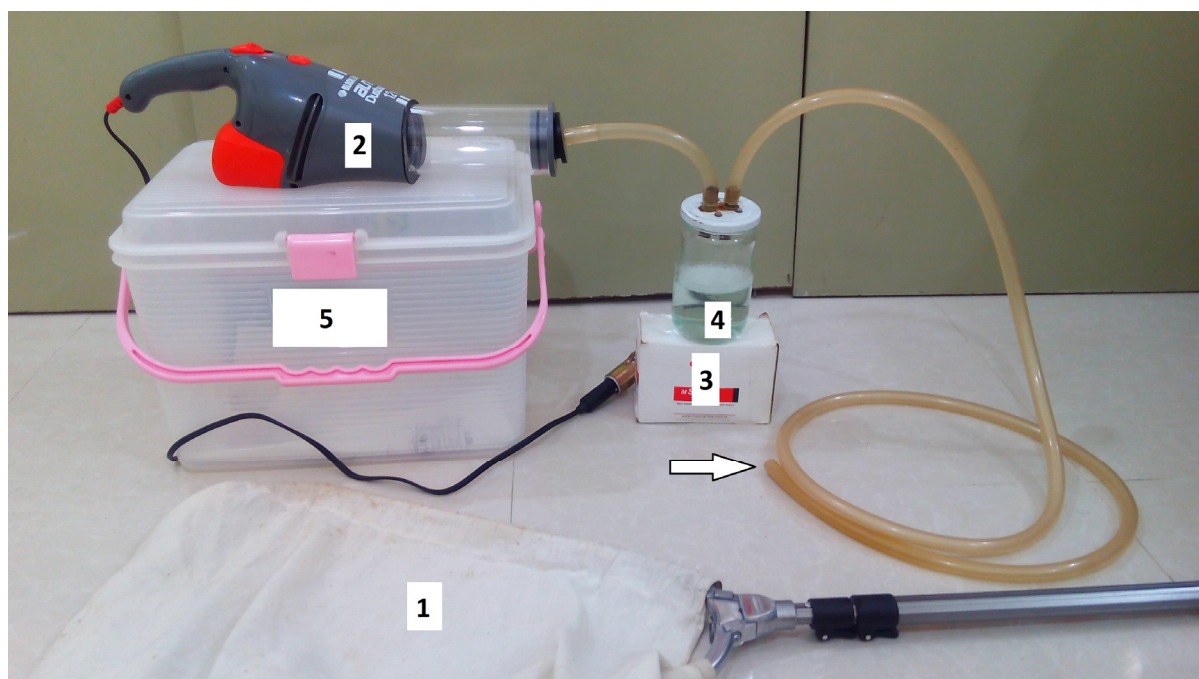


Figure 1. Sweeping equipment. 1. Insect net, 2. Portable vacuum, 3. Rechargeable battery, 4. Jar, 5. Box. When vacuum starts functioning, the net's catch is sucked in through free opening of tube (arrow) and then is soaked in a solution of hand-washing liquid in the jar.



Figure 2. A yellow pan trap, by which the chalcidoids were collected.

Results

According to previous studies and results of this study, 56 chalcid species belonging to 35 genera and 11 families are known from Khuzestan province in southwestern Iran. New records are marked by * and ** for the fauna of Iran and Khuzestan, respectively.

Family Agaonidae**

Blastophaga psenes (Linnaeus, 1758) and *Platyscapa awekei* Wiebes 1977 are known from Iran (Noyes 2015). Here, this family is recorded for the first time from Khuzestan province.

Genus *Eupristina* Saunders, 1882*

Diagnosis: The female is characterized by the presence of three ocelli; antenna 11-segmented and clavate, appendage of the third segment short, funicular segments subcylindrical, bearing sensilla linearia (not chaetica), reduced venation of the hyaline wings and the elongate spiracula of the

eighth urotergite. In most species the seventh segment of antenna is larger (especially wider), than eighth to tenth. male's head depressed; antenna with one anellus; thoracic tergites form a dorsal shield, consisting of pronotum, with an anterior collar, mesonotum and metanotum mostly fused, propodeum narrower than the thoracic terga. fore tarsi bimerous, mid and hind legs pentamerous, but some fusion may occur (Bouček 1988; Wiebes 1992).

Biology: Pollinators of figs (Moraceae) (Wiebes 1992).

Distribution: An Oriental-Australian genus with 18 nominal species (Noyes 2015). This genus is recorded here for the first time from Iran and Khuzestan.

Eupristina saundersi Grandi, 1916*

Material examined: Ahwaz: Shahid Chamran University campus: around College of Agriculture, collected by sweeping the foliage of Indian banyan (*Ficus*

benghalensis: Moraceae) as well as trapping, October 2015, 20 ♀♀, leg. S.A. Moravvej.

Diagnosis: Female (Fig. 3), head across the compound eyes nearly as long as wide, with three ocelli; compound eye and gena subequal; antennae clavate, 11-segmented, third segment with a short appendage, fourth segment small and nearly hidden, funicular segments subcylindrical bearing sensilla linearia (not chaetica), seventh segment is larger (especially wider) than eighth to tenth; mandible with a strong apical and a smaller subapical teeth, mandibular appendage large, containing seven ventral lamellae, the proximal three of which are partially fused with the axial teeth; fore tibia with three teeth in the dorso-apical comb which is unique of this species; mid tarsus shorter than tibia, hind tarsus almost twice as long as tibia; fore wings hyaline with reduced venation; spiracula of the eighth urotergite elongate; ovipositor and valves long.

Distribution in Iran: Khuzestan (current study), new record for the fauna of Iran.

General distribution: India (West Bengal) and Papua New Guinea (Wiebes 1992).

Host association: *Eupristina saundersi* has been recorded as a pollinator from *Ficus religiosa* (Grandi 1916) and *F. microcarpa* (Bouček 1988), both of which were questioned by Wiebes (1963, 1992). Here it is reported for the first time from *Ficus benghalensis* which is the second species of *Eupristina* that has been recorded from the Indian Banyan (Narendran and Sudheer 2005).

Family Aphelinidae

Ten species belonging to five genera are known from Khuzestan (Mossadegh and Kocheili 2003; Abd-Rabou *et al.* 2013; Khadempour *et al.* 2014).

Aphelinus flaviventris Kurdjumov, 1913

Distribution in Iran: Fars, Khuzestan and Zanjan provinces (Abd-Rabou *et al.* 2013).

General distribution: Republic of Azerbaijan, Croatia, Czech Republic, France, Georgia, Hungary, Kazakhstan, Moldova, Romania, Russia, Spain, Sweden, Transcaucasus, UK, USA and former Yugoslavia (Noyes 2015).

Host association in Iran: Parasitoid of *Diuraphis noxia* (Mordvilko) and *Hyadaphis coriandri* (Das) (Hemiptera: Aphididae), and *Pemphigus spirothecae* Passeriini (Hemiptera: Pemphigidae) (Abd-Rabou *et al.* 2013).

Aphytis mytilaspidis (Le Baron, 1870)

Distribution in Iran: Fars, Guilan, Isfahan, Khuzestan, Kerman, Lorestan, Markazi, Mazandaran, Semna and Tehran provinces (Abd-Rabou *et al.* 2013).

General distribution: Algeria, Argentina, Republic of Azerbaijan, Belgium, Bermuda, Bulgaria, Canada, Caucasus, Chile, China, Croatia, Cyprus, Czech Republic, Egypt, France, Georgia, Germany, Greece, Hungary, India, Indonesia, Iraq, Israel, Italy, Japan, Kazakhstan, Lebanon, Macedonia, Mauritania, Mauritius, Mexico, Moldova, Morocco, Netherlands, New Zealand, Poland, Romania, Russia, Saudi Arabia, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Transcaucasus, Turkey, UK, Ukraine, USA and former Yugoslavia (Noyes 2015).

Host association in Iran: Parasitoid of *Lepidosaphes malicola* Borchsenius, *Parlatoria oleae* (Colvee), *Parlatoria blanchardi* (Targioni Tozzetti), *Lepidosaphes pistaciae* (Archangel-skaya), and *Clidaspis asiatica* (Arch) (Hemiptera: Diaspididae) (Abd-Rabou *et al.* 2013).

Aphytis proclia (Walker, 1839)

Distribution in Iran: Fars, Guilan, Isfahan, Khuzestan, Markazi, Mazandaran and Tehran provinces (Abd-Rabou *et al.* 2013).

General distribution: Algeria, Argentina, Austria, Republic of Azerbaijan, Bermuda, Bulgaria, Canada, Caucasus, Chile, China, Croatia, Cyprus, Czech Republic, El Salvador, France, Georgia, Germany, Grenada, Hawaii, Hungary, India, Italy, Japan, Kazakhstan, Korea, Macedonia, Mexico, Moldova, Morocco, Myanmar (Burma), Netherlands, Pakistan, Poland, Portugal, Russia, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Turkey, UK, USA and former Yugoslavia (Abd-Rabou *et al.* 2013).

Host association in Iran: Parasitoid of *Pseudaulacaspis pentagona* Targioni, *Aonidiella aurantii* (Maskell), *Aonidiella orientalis* (Newstead), *Chrysomphalus dictyospermi* (Morgan), and *Parlatoria oleae* (Colvee) (Hemiptera: Diaspididae) (Abd-Rabou *et al.* 2013).

***Encarsia acaudaleyrodis* Hayat, 1976**

Distribution in Iran: East Azarbaijan, West Azarbaijan, Guilan, Isfahan, Khuzestan and Mazandaran provinces (Abd-Rabou *et al.* 2013).

General distribution: Egypt, India and Spain (Noyes 2015).

Host association in Iran: Parasitoid of *Acaudaleyrodes rachipora* Singh, *Trialeurodes vaporariorum* Westwood, *Bemisia tabaci* (Gennadius) and *Tetraleurodes hederæ* Goux (Hemiptera: Aleyrodidae) (Abd-Rabou *et al.* 2013).

***Encarsia inaron* (Walker, 1839)**

Material examined: Shushtar: Shoeybieh: sugarcane fields, collected by sweeping, November 2015, 8 ♀, 3 ♂, leg. S.A. Moravvej.

Distribution in Iran: East Azarbaijan, West Azarbaijan, Fars, Golestan, Guilan, Isfahan, Khuzestan, Markazi, Mazandaran and Tehran provinces (Abd-Rabou *et al.* 2013).

General distribution: Bulgaria, Egypt, England, France, Greece, India, Israel, Italy, Jordan, Pakistan, Taiwan, North America, Asia and Africa (Noyes 2015).

Host association in Iran: Parasitoid of *Acaudaleyrodes citri* Priesner & Hosny, *Aleyrodes singularis* Danzig, *Bemisia tabaci*, *Siphoninus phillyreae* (Haliday), *S. immaculatus* (Heeger), *Neomaskellia andropogonis* Corbett and *Trialeurodes vaporariorum* (Hemiptera: Aleyrodidae) (Abd-Rabou *et al.* 2013).

***Encarsia lutea* (Masi, 1909)**

Distribution in Iran: East Azarbaijan, West Azarbaijan, Fars, Golestan, Guilan, Isfahan, Mazandaran (Abd-Rabou *et al.* 2013), Khuzestan (Mossadegh and Kocheili 2003) and Teharan provinces (Talebi *et al.* 2000).

General distribution: China, India, Italy, Russia, Pakistan, Taiwan and Australia (Noyes 2015).

Host association in Iran: Parasitoid of *Aleurocanthus spiniferus* Quaintance, *Aleyrodes proletella* L., *A. marlattii* Quaintance, *Bemisia tabaci*, *B. ovata* Goux, *Bulgarialeurodes cotesii* Maskell, *Dialeurodes kirkaldyi* (Kotinsky) and *Trialeurodes ricini* (Misra) (Hemiptera: Aleyrodidae) (Talebi *et al.* 2000; Abd-Rabou *et al.* 2013).

***Eretmocerus delhiensis* Mani, 1941**

Distribution in Iran: Khuzestan province (Khadempour *et al.* 2014).

General distribution: India and Pakistan (Noyes 2015).

Host association in Iran: Parasitoid of *Neomaskellia andropogonis* Corbett (Hemiptera: Aleyrodidae) (Khadempour *et al.* 2014).

***Eretmocerus mundus* Mercet, 1931**

Material examined: Shushtar: Shoeybieh: sugarcane fields, collected by sweeping, November 2015, 5 ♀, 4 ♂, S. A. Moravvej, leg.

Distribution in Iran: East Azarbaijan, West Azarbaijan, Fars, Golestan, Isfahan, Khuzestan, Mazandaran and Tehran provinces (Abd-Rabou *et al.* 2013).

General distribution: Argentina, Canary Islands, Egypt, India, Israel, Italy, Kenya,

Madeira Islands, Spain, Turkmenistan, USA and Zimbabwe (Noyes 2015).

Host association in Iran: Parasitoid of *Aleurolobus* sp., *Aleyrodes lonicerae* Walker, *Bemisia afer* (Priesner & Hosny), *B. hancocki* Corbett, *B. tabaci*, *Bulgarialeurodes cotesii* (Maskell), *Rosanovia hulthemiae* Danzig, *Trialeurodes packardi* Morill, and *T. ricini* (Misra) (Hemiptera: Aleyrodidae) (Talebi *et al.* 2000; Abd-Rabou *et al.* 2013).

***Eretmocerus serius* Silvestri, 1927**

Distribution in Iran: West Azarbaijan, Fars and Khusestan provinces (Abd-Rabou *et al.* 2013).

General distribution: USA, Bahamas, Barbados, Cayman Islands, Costa Rica, Cuba, Haiti, Jamaica, Mexico, Panama, Oman, Kenya, South Africa, China, Japan, Bangladesh, India, Indonesia, Malaya, Malaysia, Myanmar (Burma), Pakistan, Singapore, South Korea, Sri Lanka, Thailand, Vietnam, Guam and Hawaii (Noyes 2015).

Host association in Iran: Parasitoid of *Aleurocanthus spiniferus*, *Aleurocanthus woglumi* Ashby and *Bemisia tabaci* (Hemiptera: Aleyrodidae) (Abd-Rabou *et al.* 2013).



Figure 3. Female *Eupristina saundersi* Grandi, 1916 (40 X)

***Marietta picta* André, 1878**

Distribution in Iran: Fars, Kerman, Kordestan and Tehran (Talebi *et al.* 2008; Abd-Rabou *et al.* 2013) and Khuzestan provinces (Mossadegh and Kocheili 2003).

General distribution: Armenia, Canada, China, Czech Republic, Egypt, France, Georgia, Germany, Greece, Hungary, India, Italy, Kazakhstan, South Korea, Mexico, Moldova, Peru, Romania, Russia, Slovakia, Spain, Transcaucasus, Turkey, Turkmenistan, UK, Ukraine and former Yugoslavia (Noyes 2015).

Host association in Iran: Parasitoid of *Agonoscena cisti* (Paton) (Hemiptera: Psyllidae), *Planococcus vovae* (Nasonov) and *Planococcus ficus* (Signoret) (Hemiptera: Pseudococcidae), and hyperparasitoid of *Anagyrus pseudococci* (Girault) and *A. dactylopii* (Howard) (Encyrtidae) on *Nipaecoccus filamentosus* (Cockerell) (Hemiptera: Pseudococcidae), *Agonoscena pistaciae* Burckhardt & Lauterer (Hemiptera: Psyllidae) (Abd-Rabou *et al.* 2013) and *Planococcus vovae* (Talebi *et al.* 2008).

Family Chalcididae

Four species in four genera have been reported from Khuzestan (Lotfalizadeh *et al.* 2012). Herein, two species are reported.

***Brachymeria* sp.**

Material examined: Ahwaz: Chamran University campus, collected by trapping, August 2014, 1 ♀, leg. S.A. Moravvej.

Host association: Parasitoid of Coleoptera, Diptera, Lepidoptera, Hymenoptera and Myriapoda (Noyes 2015).

***Brachymeria femorata* (Panzer, 1801)**

Distribution in Iran: Ardebil, East Azarbaijan, Fars, Kerman, Khuzestan and Tehran provinces (Lotfalizadeh *et al.* 2012).

General distribution: Western Europe to Indonesia (Noyes, 2015).

Host association in Iran: Parasitoid of *Heliothis* sp. (Lepidoptera: Noctuidae) (Lotfalizadeh *et al.* 2012).

Genus *Dirhinus* Dalman, 1818**

Distribution and Taxonomy: A cosmopolitan genus with 62 nominal species (Noyes 2015) of which two are known from Iran (Lotfalizadeh *et al.* 2012). This genus is new for Khuzestan.

Host association: Parasitoid of Diptera (Bouček and Narendran 1981).

Dirhinus bakeri* (Crawford, 1914)

Material examined: Shadegan: garden of Department of Agriculture, collected by trapping, April 2015, 1 ♀, Leg. S.A. Moravvej.

Diagnosis: Female (Fig. 4) - body black, distal antennal scape, whole pedicel and two first segments of funicle, as well as distal of both fore and mid-femur and tibia reddish; head and thorax coarsely punctuated; facial margin of each horn with a weak and small tooth, tip of horn reaching much farther from eye than frontal tooth, inner dorsal carinate margin of horns raised; gena convex, longer than the maximum diameter of the eye; wings whitish, forewing pubescence reduced, especially in the middle; axillar furrows convergent at about over 90°; propodeum not very short: median areola elongate, distance between hind corners (on either side of petiole) subequal to distance between each corner to metanotum; area of four carinae on petiole about 2 times as broad as long; dense striae on first tergite forming broad area with convex hind margin and occupying more than a quarter of tergite length.

Distribution in Iran: Khuzestan (current study), new record for Iran.

Distribution: India, Sri Lanka, Malaysia, Philippines and Japan (Noyes 2015).

Host association: Reared from puparia of *Sargus metallinus* (Diptera: Stratiomyidae), and *Musca domestica* (L.) (Diptera: Muscidae) in poultry manure in India; and from the *Ptychomyia remota* (Diptera: Tachinidae) in Malaysia (Bouček and Narendran 1981). Sheela *et al.* (2003) reported *Dacus incisus* (Diptera: Tephritidae) as one of the hosts from India without details.

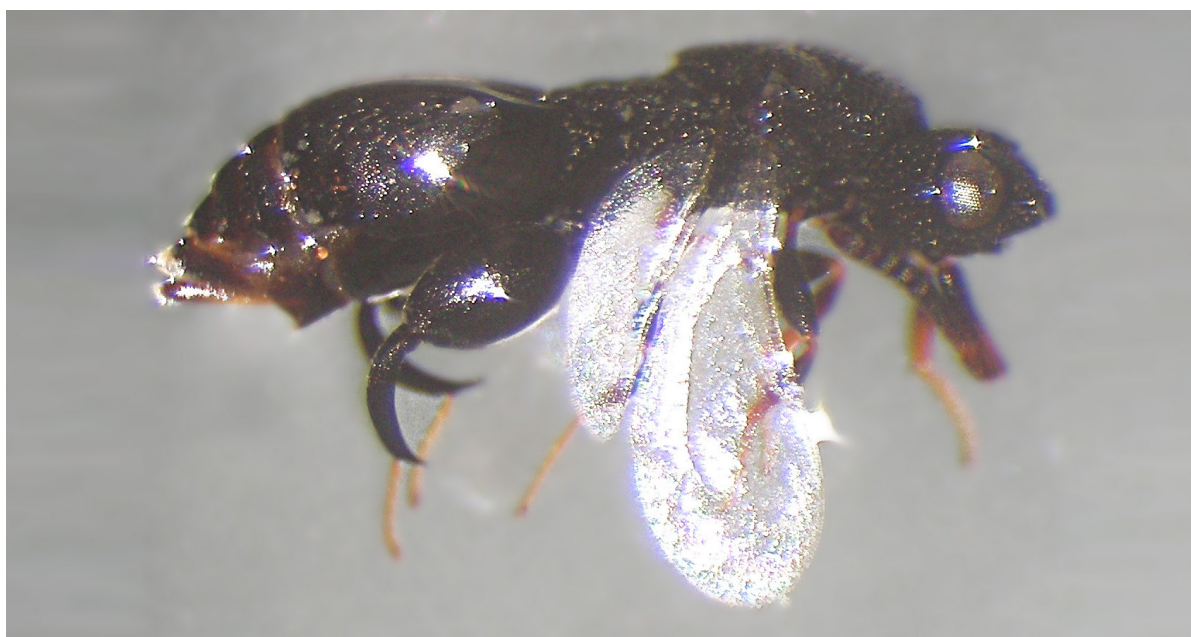


Figure 4. Female *Dirhinus bakeri* (Crawford, 1914) (16 X)

***Neohybothorax hetera* (Walker, 1834)**

Distribution in Iran: East Azarbaijan and Khuzestan provinces (Lotfalizadeh *et al.* 2012; Modarres Awal 2012).

General distribution: Caucasus to Europe (Noyes 2015).

Host association in Iran: Unknown.

***Proconura caryobori* (Hanna, 1934)**

Distribution in Iran: Khuzestan province (Lotfalizadeh *et al.* 2012).

General distribution: Sudan, India, Nepal and UK (Noyes, 2015).

Host association in Iran: Parasitoid of *Caryedon acaciae* (Gyllenhal) (Coleoptera: Bruchidae) (Lotfalizadeh *et al.* 2012).

***Psilochalcis subaenea* (Masi, 1929)**

Distribution in Iran: Khuzestan province (Lotfalizadeh *et al.* 2012).

General distribution: Mediterranean region from Spain to Kazakhstan (Noyes 2015).

Host association in Iran: Parasitoid of *Caryedon acaciae* (Gyllenhal) (Coleoptera: Bruchidae) (Lotfalizadeh *et al.* 2012).

Family Encyrtidae

About 15 species belonging to four genera are known from Khuzestan (Mossadegh and Kocheili 2003; Fallahzadeh and Japoshvili 2010; Alizadeh *et al.* 2013).

***Anagyrus* sp.**

Distribution in Iran: Khuzestan province (Mossadegh and Kocheili 2003; Alizadeh *et al.* 2013).

General distribution: Cosmopolitan (Noyes 2015).

***Anagyrus agraensis* Saraswat, 1975**

Distribution in Iran: Fars, Khuzestan and Tehran provinces (Fallahzadeh and Japoshvili 2010).

General distribution: Australia, China, Hawaii, India, Indonesia, Jordan, Pakistan, South Africa and Thailand (Noyes 2015).

Host associations in Iran: Parasitoid of *Maconellicoccus hirsutus* (Green) and *Nipaeococcus viridis* (Newstead) (Hemiptera: Pseudococcidae) (Fallahzadeh and Japoshvili 2010).

***Anagyrus dactylopii* (Howard, 1898)**

Distribution in Iran: Fars, Khuzestan, Mazandaran and Tehran provinces (Fallahzadeh and Japoshvili 2010).

General distribution: Australia, Barbados, China, Fiji, Hawaii, India, Indonesia, Iraq, Jordan, Oman, Peru, Philippines, Taiwan, Thailand and Turkey (Noyes 2015).

Host associations in Iran: Parasitoid of *Maconellicoccus hirsutus*, *Nipaecoccus viridis* and *Planococcus citri* (Rissio) (Hemiptera: Pseudococcidae) (Fallahzadeh and Japoshvili 2010).

***Anagyrus diversicornis* (Howard, 1894)**

Distribution in Iran: Fars, Khuzestan and Tehran provinces (Fallahzadeh and Japoshvili 2010).

General distribution: Argentina, Bangladesh, Barbados, Benin, Brazil, Burundi, Central African Republic, Chile, Colombia, Costa Rica, Democratic Republic of Congo, Dominica, Equatorial Guinea, French Guiana, Guadeloupe, Guinea, Guyana, India, Kenya, Malawi, Mozambique, Nigeria, Paraguay, Rwanda, Sierra Leone, Togo, Trinidad and Tobago, UK, USA and Zambia (Noyes 2015).

Host associations in Iran: Parasitoid of *Nipaecoccus viridis* (Hemiptera: Pseudococcidae) (Fallahzadeh and Japoshvili 2010).

***Anagyrus mirzai* Agarwal et Alam, 1959**

Distribution in Iran: Fars and Khuzestan provinces (Fallahzadeh and Japoshvili 2010).

General distribution: Bangladesh, Congo, Gabon, India, Jordan, Malawi, Pakistan and South Africa (Noyes 2015).

Host associations in Iran: Parasitoid of *Nipaecoccus viridis* and *Maconellicoccus hirsutus* (Hemiptera: Pseudococcidae) (Fallahzadeh and Japoshvili 2010).

***Homalotylus albiclavatus* (Agarwal, 1970)**

Distribution in Iran: Khuzestan province (Fallahzadeh and Japoshvili 2010).

General distribution: India (Noyes 2015).

Host associations in Iran: Parasitoid of larva of Coccinellidae (Coleoptera) (Fallahzadeh and Japoshvili 2010).

***Homalotylus eytelweinii* (Ratzeburg, 1844)**

Distribution in Iran: Alborz and Khuzestan provinces (Fallahzadeh and Japoshvili 2010).

General distribution: Afghanistan, Austria, Azerbaijan, Bahamas, Brazil, Bulgaria, Colombia, Congo, Croatia, Czech Republic, Finland, France, Georgia, Germany, Guatemala, Hungary, India, Italy, Japan, Kazakhstan, Kenya, Malawi, Malaysia, Moldova, Mongolia, Montenegro, Myanmar (Burma), Netherlands, Romania, Russia, Serbia, Slovakia, South Africa, Spain, Sudan, Sweden, Switzerland, Tadjikistan, Thailand, Togo, Ukraine, Uzbekistan and ex-Yugoslavia (Noyes 2015).

Host associations in Iran: Parasitoid of larva of Coccinellidae (Coleoptera) (Fallahzadeh and Japoshvili 2010).

***Homalotylus quaylei* Timberlake, 1919**

Distribution in Iran: Khuzestan and Mazandaran provinces (Fallahzadeh and Japoshvili 2010).

General distribution: Armenia, Azerbaijan, Brazil, Bulgaria, Canary Islands, Egypt, Gabon, Georgia, India, Israel, Italy, Jordan, Mauritania, Spain, Turkey, Turkmenistan, ex-USSR, Uzbekistan and Venezuela (Noyes 2015).

Host associations in Iran: Parasitoid of *Nephus includens* Kirsch and *Scymnus subvillosus* (Goeze) (Coleoptera: Coccinellidae) (Fallahzadeh and Japoshvili 2010).

***Prochiloneurus* sp.**

Distribution in Iran: Khuzestan province (Mossadegh and Kocheili 2003).

General distribution: Cosmopolitan (Noyes 2015).

***Prochiloneurus aegyptiacus* (Mercet, 1929)**

Distribution in Iran: Fars and Khuzestan provinces (Alizadeh *et al.* 2013).

General distribution: Afghanistan, Algeria, Congo, Egypt, Eritrea, Ethiopia, Gabon, Ghana, India, Iraq, Israel, Italy, Ivory Coast, Namibia, Nigeria, Saudi Arabia, South Africa, Tanzania, Togo, Turkmenistan, ex-USSR and Yugoslavia (Noyes 2015).

Host associations in Iran: Parasitoid of *Homalotylus quaylei* Timberlake and *Anagyrus* spp. (Hymenoptera: Encyrtidae) (Fallahzadeh and Japoshvili 2010).

***Prochiloneurus bolivari* Mercet, 1919**

Distribution in Iran: Fars and Khuzestan provinces (Fallahzadeh and Japoshvili 2010; Alizadeh *et al.* 2013).

General distribution: Afghanistan, Algeria, Armenia, Austria, Azerbaijan, Bulgaria, Congo, Croatia, Czech Republic, Congo, Egypt, Finland, France, Georgia, Hungary, India, Israel, Italy, Japan, Lithuania, Moldova, Mongolia, Nigeria, Poland, Romania, Russia, Sao Tomé and Príncipe, Slovakia, South Africa, Spain, Sweden, Transcaucasus, Turkey, Turkmenistan, Ukraine, UK, ex-USSR, Uzbekistan and ex-Yugoslavia (Noyes 2015).

Host associations in Iran: Parasitoid of *Planococcus ficus* (Signoret) (Hemiptera: Pseudococcidae) (Fallahzadeh and Japoshvili 2010).

***Prochiloneurus indicus* Shafee, Alam et Agarwal, 1975**

Distribution in Iran: Khuzestan province (Fallahzadeh and Japoshvili 2010).

General distribution: India (Noyes 2015).

Host associations in Iran: Hyperparasitoid of *Nipaecoccus viridis* (Hemiptera: Pseudococcidae) (Fallahzadeh and Japoshvili 2010).

***Prochiloneurus pulchellus* Silvestri, 1915**

Distribution in Iran: Khuzestan province (Fallahzadeh and Japoshvili 2010).

General distribution: Cameroon, Congo, Egypt, Eritrea, Ethiopia, Gabon, Gambia, Georgia, Ghana, Guinea-Bissau, India, Israel, Italy, Madagascar, Malawi, Nigeria, Oman, Rwanda, Saudi Arabia, Seychelles, South Africa, Thailand, Togo, Turkmenistan and Uzbekistan (Noyes 2015).

Host associations in Iran: Parasitoid of *Pseudococcus* sp. (Hemiptera: Pseudococcidae) (Fallahzadeh and Japoshvili 2010).

***Syrphophagus aphidivorus* (Mayr, 1876)**

Distribution in Iran: Kerman, Khuzestan, Tehran and Sistan-and-Baluchistan provinces (Rezaei *et al.* 2006 (as *Aphidencyrtus aphidivorus* Mayr); Fallahzadeh and Japoshvili 2010).

General distribution: Argentina, Armenia, Austria, Azerbaijan, Brazil, Bulgaria, China, Chile, Croatia, Cuba, Czech Republic, Egypt, France, Georgia, Germany, Greece, Hawaii, Hungary, India, Iraq, Italy, Jordan, Kenya, Mexico, Moldova, Mongolia, Montenegro, Nearctic, Netherlands, Pakistan, Peru, Poland, Portugal, Puerto Rico, Romania, Russia, Saudi Arabia, Serbia, Slovakia, Spain, Sudan, Sweden, Turkey, Turkmenistan, Ukraine, UK, USA, ex-USSR and ex-Yugoslavia (Noyes 2015).

Host associations in Iran: Hyperparasitoid of *Agonoscena pistaciae* (Burckhardt and Lauterer) (Hemiptera: Psyllidae), *Aphis craccivora* Koch., *A. gossypii* (Glover) and *Chromaphis juglandicola* (Hemiptera: Aphididae), *Pauesia antennata* (Mukerji) (Hymenoptera: Braconidae: Aphidiinae) (Fallahzadeh and Japoshvili 2010) and *Pterochloroides persicae* (Chol.) (Hemiptera: Aphidoidea: Lachnidae) (Rakhshani *et al.* 2005).

***Syrphophagus arundinicola* Hoffer, 1965**

Distribution in Iran: Khuzestan province (Rezaei *et al.* 2006 (as *Aphidencyrtus arundinicola* Hoffer)).

General distribution: Armenia, Bulgaria, Czech Republic, Georgia, Italy, Moldova, Russia and Slovakia (Noyes 2015).

Host associations in Iran: Hyperparasitoid of *Sitobion avenae* (Fabricius) (Hemiptera: Aphididae) (Rezaei *et al.* 2006).

Family Eulophidae

Three species in three genera have been reported from Khuzestan (Talebi *et al.* 2011), for which this approach adds three species.

***Achrysocharoides niveipes* (Thomson, 1878)**

Distribution in Iran: Khuzestan province (Modarres Awal 2012 (as *Enaysma niveipes* Thomson)).

General distribution: Bulgaria, Czechoslovakia, Germany, Hungary, Italy, Moldova, Netherlands, Romania, Sweden, Switzerland, Ukraine and UK (Noyes 2015).

Host associations in Iran: Parasitoid of insects (Modarres Awal 2012).

Genus *Euplectrus* Westwood, 1832**

Distribution and Taxonomy: A worldwide genus with ca. 201 nominal species (Noyes 2015) of which four are known from Iran (Talebi *et al.* 2011; Shafiee *et al.* 2015). This genus is new for Khuzestan.

Host associations: Parasitoids of Lepidoptera (Noyes 2015).

Euplectrus liparidis* Ferrière, 1941*

Material examined: Susa [Shush]: a corn - mung bean field, collected by sweeping, 30.9.2014, 4 ♀, 1 ♂, leg. S.A. Moravvej.

Host associations: Larval or nymphal ectoparasitoid of *Lymantria dispar* L. (Lepidoptera: Lymantriidae), *Agrapha agnate* Staudinger, *Leucania loreyi* Duponchel and

Plusia agnata Staudinger (Lepidoptera: Noctuidae) (Noyes 2015).

Distribution in Iran: West Azerbaijan province (Yefremova *et al.* 2007), Khuzestan (current study).

General distribution: Canada, Algeria, Europe, Japan, South Korea, China and Yemen (Noyes 2015).

Genus *Hemiptarsenus* Westwood, 1833**

Distribution and Taxonomy: an Old World genus with 33 nominal species (Noyes 2015) of which four are known from Iran (Talebi *et al.* 2011; Shafiee *et al.* 2015). This genus is new for Khuzestan.

Host associations: Parasitoid of several species of Diptera and Lepidoptera (Noyes 2015).

Hemiptarsenus zilahisebessi* Erdős, 1951*

Material examined: Susa: a corn - mung bean field, collected by sweeping, 30.9.2014, 3 ♀, leg. S.A. Moravvej.

Diagnosis: Female; Lower face, vertex, legs, pronotum, prepectus, mesoscutum, and gaster (except narrow margins and a varying median stripe) tawny; antennal flagellum fully blackish, filiform, scape only slightly exceeding front ocellus; pronotum and mesoscutum with a metallic spot; scutellum delicately reticulate, not grooved; propodeum distinctly sloping, nearly flat, finely and equally reticulate, without plicae, rather short; abdominal petiole very short, hidden, without wrinkles and dents.

Host associations: Parasitoid of *Hypurus bertrandi* Perris (Coleoptera: Curculionidae), *Chromatomyia horticola* (Goureau) and several *Liriomyza* spp. (Diptera: Agromyzidae) and *Stigmella agrimoniae* (Frey) (Lepidoptera: Nepticulidae) (Noyes 2015).

Distribution in Iran: Tehran, Fars (Talebi *et al.* 2011) and Khuzestan provinces (current study).

General distribution: South Korea, China, Russia, Europe, Egypt, Jordan and Turkey (Noyes 2015).

***Pnigalio agraulis* (Walker, 1839)**

Distribution in Iran: Fars, Khuzestan and Mazandarn provinces (Talebi *et al.* 2011).

General distribution: Australia, Austria, Bosnia Herzegovina, Bulgaria, Canary Islands, Croatia, Czech Republic, France, Germany, Greece, Hungary, Italy, Macedonia, Moldova, Netherlands, New Zealand, Norway, China, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, England, Scotland, ex-USSR and former Yugoslavia (Noyes 2015).

Host associations in Iran: Parasitoid of *Phyllocnistis citrella* Stainton and *Phyllonorycter corylifoliella* (Hübner) (Lepidoptera: Gracillariidae) (Talebi *et al.* 2011).

***Tetrastichus* sp.**

Material examined: Andimeshk: Mongereh: a pomegranate garden, collected by sweeping, November 2014, 1 ♀, Leg. S.A. Moravvej.

Distribution in Iran: Khuzestan province (Mossadegh and Kocheili 2003).

Host associations: The species of the genus *Tetrastichus* Haliday, 1844 parasitize Acarina, Araneae, Coleoptera, Dictyoptera, Diptera, Hemiptera, Hymenoptera, Neuroptera, Lepidoptera, Orthoptera and Nematoda (Noyes 2015).

Family Eupelmidae**

Twenty species are known from Iran (Noyes 2015; Gibson and Fusu 2016). Here, this family is recorded for the first time from Khuzestan.

Genus *Eupelmus* Dalman, 1820**

Distribution and Taxonomy: a worldwide distributed genus with ca. 350 nominal species of which 15 species are known from Iran (Noyes 2015; Gibson and Fusu 2016). This genus is new for Khuzestan.

Host associations: Parasitoid of Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepido-

ptera, Neuroptera and Orthoptera (Noyes 2015).

Eupelmus* sp.*

Material examined: Dezfoul: Safi-abad: Dez riverside, collected by sweeping, April 2015, 1 ♀, leg. S.A. Moravvej.

Family Eurytomidae

Three species belonging to three genera are known from Khuzestan (Mossadegh and Kocheili 2003; Rezaei *et al.* 2006).

***Bruchophagus gibbus* (Boheman, 1836)**

Material examined: Behbahan: Tashan area: an alfalfa field, collected by sweeping, November 2015, 13 ♀, 5 ♂, leg. S. A. Moravvej; Behbahan: Sar Dasht Zeydoun: an alfalfa field, collected by sweeping, November 2015, 7 ♀, 3 ♂, leg. S. A. Moravvej; Hendidjan: Cham Morad village: an alfalfa field, collected by sweeping, September 2015, 5 ♀, leg. S. A. Moravvej; Masjed-Soleyman: Cham-Asiab village: an alfalfa field, collected by sweeping, April 2015, 10 ♀, leg. S.A. Moravvej.

Diagnosis: Female; anterior width of head a little over 1.4x distance between front ocellus and clypeal margin; face with radiating carinae from mouth; antenna with 1 anellus, 5 funicular segments and 3-segmented clava, scape black, scape hardly reaching front ocellus, a little shorter than 3x first funicular segment (F1), pedicel a little longer or subequal to length of F1, F2 shorter than F1 but subequal to F3, F4 subequal to F3 in length, F5 longer and wider than F4, club longer than combined length of preceding two segments; thorax shorter than gaster; propodeum with broad median concave microsculptured area; gaster a little shorter than combined length of head and thorax, 4th abdominal tergum longest from dorsal view; ovipositor sheath tilted upwards. Male; similar to female except in having plumose antennal flagellum,

pedicellate funicular segments, swollen scape and pedicel shorter than half of F1.

Distribution in Iran: Khuzestan province (Eslamizadeh and Ebrahimi 2002).

General distribution: Argentina, Australia, Austria, Azerbaijan, Bulgaria, Canada, Chile, Finland, Germany, Hungary, India, Iraq, Italy, Netherlands, New Zealand, China, Peru, Romania, Russia, Sweden, Ukraine, UK and USA (Noyes 2015).

Host associations in Iran: a seed-feeder of alfalfa (Eslamizadeh and Ebrahimi 2002).

Eurytoma sp.

Distribution in Iran: Khuzestan province (Rezaei *et al.* 2006).

Tetramesa comatae (Phillips, 1936)

Distribution in Iran: Khuzestan province (Rezaei *et al.* 2006 (as *Harmolita comatae* Phillips)).

General distribution: USA (Noyes 2015).

Host associations in Iran: Parasitoid of *Sitobion avenae* (Hemiptera: Aphididae) (Rezaei *et al.* 2006).

Family Mymaridae

One undetermined species have been documented for Khuzestan (Mossadegh and Kocheili 2003). This approach adds two new records.

Anaphes sp.

Distribution in Iran: Khuzestan (Mossadegh and Kocheili 2003 (as *Patasson* Walker)).

Genus *Mymar* Curtis, 1829**

Distribution and Taxonomy: An Old World, Australian genus with 11 nominal species (Noyes 2015) of which one is known from Iran (Lotfalizadeh 2015). This genus is new for Khuzestan.

Ecology: Egg parasitoid of Hemiptera (Noyes 2015).

Mymar taprobanicum Ward, 1875**

Material examined: Ahwaz: Shahid Chamran University campus, September 2014, collected by trapping, 2 ♀♀, leg. S.A. Moravvej.

Diagnosis: Female; body appendages (antennae and legs) longer than body length; antennal flagellum clavate, consisting of 6-segmented funicle and 1-segmented clava; apical dark spot on forewing covering at most half length of the expansion; hindwing without apparent membrane, filamentous beyond the hamuli, abbreviated just beyond the hamuli and with one long apical seta.

Host associations: *Mymar taprobanicum* is the only species of the genus whose hosts are known as eggs of *Laodelphax striatella* Fallén, *Nilaparvata lugens* (Stål) (Hemiptera: Delphacidae) (Taguchi 1975; Subba Rao 1983) and *Nephotettix cincticeps* (Uhler) (Hemiptera: Cicadellidae) (Chandra 1980).

Distribution in Iran: Guilan, East-Azerbaijan (Lotfalizadeh 2015) and Khuzestan provinces (current study).

General distribution: Almost cosmopolitan but restricted largely to warmer climates (Triapitsyn and Berezovskiy 2001). It has been reported from Russia, southern Europe, Japan, southeastern Asia, Africa, Australasia, North and Central America, Colombia, India and the Arabian Peninsula (Noyes 2015).

Genus *Polynema* Haliday, 1833**

Distribution and Taxonomy: A cosmopolitan genus with 228 nominal species (Noyes 2015) which Lotfalizadeh (2015) reported three undetermined species from northwest of Iran. This genus is new for Khuzestan.

Host associations: Parasitoid of Hemiptera and Diptera (Noyes 2015).

Polynema sp.**

Material examined: Andimeshk: Mongereh, collected by sweeping, October 2014, 2 ♀♀, leg. S.A. Moravvej.

Comment: Soyka (1956) described many species from the Palaearctic without any illustration and prepared a determination key to species. The two collected specimen belongs to subgenus *Polynema* and resembles *nigriceps* from Finland but certain determination requires type examination that we were unable to obtain.

Family Pteromalidae

About eight species belonging to seven genera are known from Khuzestan (Mossadegh and Kocheili 2003; Modarres Awal 2012). Two species are added here.

Dinarmus basalis (Rondani, 1877)

Distribution in Iran: Khuzestan province (Modarres Awal 2012 (as *Bruchobius laticeps* Rondani)).

General distribution: Algeria, Bangladesh, Brazil, Burkina Faso, Caucasus, Colombia, Egypt, Fiji, France, India, Israel, Italy, Kazakhstan, Madagascar, Mauritius, Niger, Nigeria, Pakistan, Peru, Senegal, South Africa, Sri Lanka, Sudan, Thailand, Togo, Ukraine, USA, ex-USSR, Venezuela and West Africa (Noyes 2015).

Host associations in Iran: Parasitoid of some Coleoptera (Modarres Awal 2012).

Coelopisthia extenta (Walker, 1835)

Distribution in Iran: Khuzestan province (Modarres Awal 2012 (as *Dibrachoides druso* Walker)).

General distribution: Azerbaijan, Belgium, Bulgaria, Czech Republic, France, Germany, Hungary, Italy, Kazakhstan, Kirgizia, Moldova, Montenegro, Netherlands, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Transcaucasus, Ukraine, UK, USA and Uzbekistan (Noyes 2015).

Host associations in Iran: Parasitoid of *Hypera variabilis* (Herbst) (Coleoptera, Curculionidae) (Modarres Awal 2012).

Hypoteromalus sp.

Distribution in Iran: Khuzestan province (Mossadegh and Kocheili 2003 (erroneously as *Hypoteromalus* sp.)).

Host associations in Iran: Hyperparasitoid of *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae) (Mossadegh and Kocheili 2003).

Pachyneuron sp.

Material examined: Dezful: Shams-abad, collected by sweeping, November 2014, 1 ♀, leg. S.A. Moravvej.

Pachyneuron aphidis (Bouché, 1834)

Distribution in Iran: Ardabil, Chahar-Mahal-and-Bakhtiari, Kerman, Khuzestan, Tehran, West Azarbaijan and Zanjan provinces (Mossadegh and Kocheili 2003; Lotfalizadeh and Gharali 2008; Modarres Awal 2012).

General distribution: Worldwide (Noyes 2015).

Host associations in Iran: Parasitoid of *Aphis gossypii* Glover and *Brevicoryne brassicae* (Linnaeus) (Hemiptera: Aphididae), *Euphyllura olivina* (Costa) (Hemiptera: Psyllidae), *Aphelinus varipes* (Förster) (Hymenoptera: Aphelinidae), *Psyllaephagus pistaciae* Ferrière (Hymenoptera: Encyrtidae), *Diaeretiella rapae* (McIntosh) (Hymenoptera: Braconidae); hyperparasitoid of *Chromaphis juglandicola* (Kaltenbach) (Hemiptera: Aphididae) (Lotfalizadeh and Gharali 2008; Modarres Awal 2012) and *Pauesia antennata* (Mukerji) (Hymenoptera: Braconidae) on *Pterochloroides persicae* (Chol.) (Hemiptera: Aphidoidea: Lachnidae) (Rakhshani *et al.* 2005).

Pachyneuron muscarum (Linnaeus, 1758)

Distribution in Iran: Fars, Khuzestan, Semnan and Tehran provinces (Mossadegh and Kocheili 2003; Modarres Awal 2012).

General distribution: Armenia, Belgium, Bulgaria, Caucasus, China, Croatia, Czech

Republic, Denmark, France, Georgia, Germany, Greece, Hungary, India, Italy, Israel Italy, Kazakhstan, Moldova, Netherlands, Poland, Romania, Russia, Saudi Arabia, Serbia, Slovakia, Spain, Sweden, Switzerland, Taiwan, Turkey, Ukraine, UK and Yugoslavia (Noyes 2015).

Host associations in Iran: Parasitoid of *Agonoscena pistaciae* Burckhardt and Lauterer (Hemiptera: Psyllidae) and *Nipaeococcus viridis* (Newstead) (Hemiptera: Pseudococcidae) (Modarres Awal 2012) and hyperparasitoid of *Psylla pyricola* Förester (Hemiptera: Psyllidae), *Coccous hesperidum* L., *Eulecanium coryli* (L.), *E. tiliae* (L.), *Sphaerolecanium prunastri* (Fonscolombe) and *Didesmococcus unifasciatus* (Borchsenius) (Hemiptera: Coccidae) (Davoodi *et al.*, 2004; Lotfalizadeh and Gharali 2008).

Pteromalus puparum (Linnaeus, 1758)

Distribution in Iran: Golestan, Kerman, Khuzestan, Tehran and West Azarbaijan provinces (Modarres Awal 2012).

General distribution: worldwide (Noyes 2015).

Host associations in Iran: Parasitoid of *Lepidosaphes malicola* Borchsenius (Hemiptera: Diaspididae), *Lobesia botrana* (Denis and Schiffermüller) (Lepidoptera: Tortricidae), *Papilio demoleus* L. (Lepidoptera: Papilionidae), *Pieris brassicae* L. (Lepidoptera: Pieridae) and *Vanessa cardui* (Linnaeus) (Lepidoptera: Nymphalidae) (Modarres Awal 2012).

Spalangia sp.

Material examined: Andimeshk: Mongereh, collected by trapping, November 2014, 1 ♀, leg. S.A. Moravvej.

Spalangia cameroni Perkins, 1910

Distribution in Iran: Khuzestan province (Vazirianzadeh *et al.* 2008).

General distribution: Worldwide (Noyes 2015).

Host associations in Iran: Parasitoid of *Musca domestica* L. (Diptera: Muscidae) (Vazirianzadeh *et al.* 2008).

Theocolax elegans (Westwood, 1874)

Distribution in Iran: Khuzestan province (Habibpour *et al.* 2002).

General distribution: Worldwide (Noyes 2015).

Host associations in Iran: Parasitoid of stored product pests (Habibpour *et al.* 2002).

Family Signiphoridae

One species belonging to one genus is known from Khuzestan (Mossadegh and Kocheili 2003).

Chartocerus kurdjumovi (Nikol'skaya, 1950)

Distribution in Iran: Fars and Khuzestan provinces (Mossadegh and Kocheili 2003; Modarres Awal 2012; Alizadeh *et al.* 2013).

General distribution: Central Asia, Hungary, India, Italy, Moldova, Russia, Sicily and Ukraine (Noyes 2003).

Host associations in Iran: Hyperparasitoid of *Maconellicoccus hirsutus* (Green), *Nipaeococcus viridis* (New.) and *Planococcus ficus* (Signoret) (Hemiptera: Pseudococcidae) (Alizadeh *et al.* 2013).

Family Trichogrammatidae

Only one species belonging to one genus is known from Khuzestan (Modarres Awal 2012).

Uscana cf. *senex*

Distribution in Iran: Khuzestan province (Modarres Awal 2012).

General distribution: Bulgaria, Chile, France, Hungary, Russia, Ukraine and ex-USSR (Noyes 2015).

Host associations in Iran: Egg parasitoid of *Caryedon prosopidis* Arora (Coleoptera: Bruchidae) (Modarres Awal 2012).

Discussion

Sixteen and 11 families of Chalcidoidea are known from Iran and Khuzestan, respectively whose statistics are shown in Table 1. Collection and determination of newly recorded species discovers a diversity of Chalcidoidea in Iran and Khuzestan which is certainly more diverse than known before and reported here; the extension of this faunistic survey is required to explore the actual chalcid biodiversity of the area, as well as to

affiliate its chalcid fauna to zoogeographical realms. Climatologically, high-temperature-having Khuzestan is divided into two climates: steppe (north to southeastern mountainous area) and the remaining desert (Kottek *et al.* 2006) therefore it is acceptable to have *Polynema* (Mymaridae) which is a steppe-dependent genus (Soyka 1956) and *Euplectrus* (Eulophidae) which is a mainly desert-distributed genus (Ferrière 1941).

Table 1. Statistics (number of recorded genera and species) of chalcid families of Iran and Khuzestan.

Family	Iran		Khuzestan		Reference(s)
	genera	species	genera	species	
Agaonidae	3	3	1	1	Noyes (2015), this study
Aphelinidae	11	138	5	10	Abd-Rabou <i>et al.</i> (2013)
Chalcididae	15	53	4	5	Noyes (2015)
Encyrtidae	45	132	4	15	Fallahzadeh and Japoshvili (2013)
Eucharitidae	1	3	0	0	Lotfalizadeh (2008)
Eulophidae	44	130	5	5	Hesami <i>et al.</i> (2011), Ghahari and Yefremova (2013)
Eupelmidae	4	21	1	1	Noyes (2015), Gibson and Fusu (2016), this study
Eurytomidae	7	47	3	3	Noyes (2015)
Leucospidae	1	4	0	0	Lotfalizadeh and Fakhrzadeh (2012)
Mymaridae	8	25	3	3	Lotfalizadeh (2015), this study
Ormyridae	1	11	0	0	Lotfalizadeh <i>et al.</i> (2012)
Perilampidae	1	1	0	0	Modarres Awal (2012)
Pteromalidae	50	104	7	8	Noyes (2015)
Signiphoridae	2	3	1	1	Modarres Awal (2012)
Torymidae	15	42	0	0	Noyes (2015)
Trichogrammatidae	5	15	1	1	Noyes (2015), this study

Agaonidae and Eupelmidae are recorded here for the first time from Khuzestan; this study proves their wider interior distribution and extends it to the southwestern Iran. *Eupristina saundersi* (Agaonidae) and *Dirhinus bakeri* (Chalcididae) are recorded here for the first from the Palearctic and the West Palearctics, respectively; the former may be introduced from India by its host (see

below) and the latter is known from the East Palearctics and Oriental. As well, the occurrence of the previously inland recorded *Euplectrus liparidis* and *Hemiptarsenus zilahisebessi* (Eulophidae), and *Mymar taprobanicum* and *Polynema* sp. (Mymaridae) in Khuzestan documents their broader distribution in Iran which certainly can be collected from other provinces from which they have not been

recorded yet. The alfalfa seed wasp, *Bruchophagus gibbus* (Eurytomidae), formerly known from Dezful (north of Khuzestan) was collected from Hendidjan, Behbahan and Masjed-Soleyman (south, southeast and northeast of Khuzestan, respectively) which indicates its wide distribution.

Eupristina saundersi is a pollinator of *Ficus* sp. (Moraceae) species which we swept a swarm of it over Indian banyan (*Ficus benghalensis*) imported from India some decades before thus this species may be introduced as well. *Bruchophagus gibbus* was collected from alfalfa fields demonstrating its close association with alfalfa which may be of economic significance as stated before (Eslamizadeh and Ebrahimi 2002; Mossadegh and Kocheili 2003). *Hemiptarsenus zilahisebessi* was collected from a mung bean field that was highly infested by leafminers which are known as host of it (Noyes 2015), both *Encarsia inaron* and *Eretmocerus mundus* (Aphelinidae) were obtained by sweeping from the sugarcane fields infested by whiteflies which are their common hosts, and *Spalangia* (Pteromalidae) whose hosts are true fly puparia (Gibson 2009) was gained by sweeping during this approach; it is proposed to study these putative associations for probable biological control of these pests specially because some species of *Encarsia*, *Eretmocerus* and *Spalangia* are used for augmentative releases (Hajek 2004).

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فهرست زنبورهای بالاخانواده Chalcidoidea (Insecta: Hymenoptera) استان خوزستان در جنوب غرب ایران

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چکیده: بالاخانواده Chalcidoidea زنبورهایی متنوع از نظر شکل، بیولوژی، اکولوژی و تاکسونومی می‌باشند که به دلیل مهار آفات و ایجاد خسارت بر برخی محصولات گیاهی اهمیت دارند. ناشناخته بودن فون این حشرات در استان خوزستان موجب شد تا مطالعه‌ای برای شناسایی تنوع گونه‌های آن انجام شود. نمونه‌برداری طی ۱۳۹۲-۹۴ از مزارع، باغات و اکوسیستم‌های مختلف با استفاده از تور و تشتک‌های زرد-رنگ انجام پذیرفت و زنبورهای جمع‌آوری شده در کلکسیون حشرات دانشگاه شهید چمران نگهداری می‌شوند. این مقاله ۵۶ گونه که به ۳۵ جنس و ۱۱ خانواده (Agaonidae, Aphelinidae, Chalcididae, Encyrtidae, Eulophidae, Eupelmidae, Eurytomidae, Mymaridae, Pteromalidae, Signiphoridae و Trichogrammatidae) تعلق دارند را لیست می‌کند. گونه‌های *Eupristina Dirhinus bakeri* (Crawford, 1914) و (*Agaonidae saundersi* Grandi, 1916) (*Chalcididae*) برای اولین بار از ایران و تاکسون‌های *Euplectrus liparidis* (Ferrière, 1941 و Erdös, 1951) (*Hemiptarsenus zilahisebessi*) (*Eulophidae*)، و *Mymar taprobanicum* (Ward, 1875) و (*Eupelmidae*) *Eupelmus* sp. (*Mymaridae*) *Polynema* sp. برای اولین بار از استان خوزستان گزارش می‌شوند.

واژگان کلیدی: Chalcidoidea، فون، گزارش جدید، ایران، خوزستان