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**Iranian Aphelinidae (Hymenoptera: Chalcidoidea)****Shaaban Abd-Rabou\*, Hassan Ghahari, Svetlana N. Myartseva & Enrique Ruíz-Cancino****ABSTRACT**

Aphelinidae is one of the most important families in biological control of insect pests at a worldwide level. The following catalogue of the Iranian fauna of Aphelinidae includes a list of all genera and species recorded for the country, their distribution in and outside Iran, and known hosts in Iran. In total 138 species from 11 genera (Aberus, Aphelinus, Aphytis, Coccobius, Coccophagoides, Coccophagus, Encarsia, Eretmocerus, Marietta, Myiocnema, Pteroptrix) are listed as the fauna of Iran. Aphelinus semiflavus Howard, 1908 and Coccophagoides similis (Masi, 1908) are new records for Iran.

**Key words:** Hymenoptera, Chalcidoidea, Aphelinidae, Catalogue.**1. Introduction**

Aphelinid wasps (Hymenoptera: Chalcidoidea: Aphelinidae) are important in nature, especially in the population regulation of hemipterans on many different plants. These parasitoid wasps are also relevant in the biological control of whiteflies, soft scales and aphids<sup>[44]</sup>. Studies on this family have been done mainly in relation with pests of fruit crops as citrus and others. John S. Noyes has published an Interactive On-line Catalogue<sup>[78]</sup> which includes up-to-date published information on the taxonomy, distribution and hosts records for the Chalcidoidea known throughout the world, including more than 1300 described species in 34 genera at world level. However, there are publications and new data not included in the catalog that are presented herein. In this article, we gathered all the information on the Aphelinidae known to occur in Iran, in order to offer the most complete set of data on this family.

**2. Materials and Methods**

Published data on the Iranian Aphelinidae is summarized. Additionally, we include records representing new collections made from different regions of the country. This catalogue comprises the following data: the valid name of the taxa, published records with provincial distribution (see Fig. 1), or when this information is not available – “Iran (no locality cited)” is given, and synonyms of the species. The system, nomenclature, synonymy, and distribution data follow mainly<sup>[102, 46, 47, 48, 54, 27, 92, 8, 78, 77]</sup>.

**2.1. Acronyms of Museums and Depositories of Aphelinidae Types****BMNH:** British Museum of Natural History, London, UK.**CSS:** Cyprus Museum of National History.**EPPRI:** Plant Protection Research Institute, Ministry of Agriculture, Dokki, Giza, Egypt.**HMIM:** Hayk Mirzayans Insect Museum, Iranian Research Institute of Plant Protection, Tehran.**IEUN:** Istituto de Entomologia Agraria, Università degli di Napoli, Portici, Italy.**ISZAF:** Istituto Sperimentale per la Zoologia Agraria, Firenze, Italy.**MNCN:** Museo Nacional de Ciencias Naturales, Madrid, Spain.**MZH:** Zoological Museum of the University of Helsinki; Finnish Museum of Natural History**NMI:** National Museum of Ireland.**PPRII:** Plant Protection Research Institute, Agriculture Research Center, Egypt**QLD:** Queensland Museum South Bank, Australia.**UNLP:** Universidad Nacional de La Plata, Argentina.**UNP:** Università degli Studi di Napoli, Portici, Italy.

**USNMNH:** United States National Museum of Natural History, Washington, DC, USA.

**UTA:** University of Tel Aviv, Israel.

**ZDAMU:** Department of Zoology, Aligarh Muslim University, Aligarh, India.

**ZSIC:** Zoological Survey of India, Calcutta, India.

### 3. Results

In total, 138 species of Aphelinidae from 11 genera are listed in the fauna of Iran. The list of species is given below alphabetically together with synonymies, hosts and distribution data. Also two genera *Centrodora* Förster, and *Euryischia* Riley included unknown species, therefore we do not consider them as the fauna of Iran.

#### 3.1. Genus *Ablerus* Howard, 1894

*Ablerus* Howard 1894c. Type species *Centrodora clisiocampae* Ashmead, by original designation.

*Azotus* Howard 1898c. Type species *Azotus marchali* Howard, by monotypy; synonymy according to Girault 1913b.

*Dimacrocerus* Brethes 1914. Type species *Dimacrocerus platensis* Brethes 1914, by original designation.

*Myocnemella* Girault 1913. Type species *Myocnemella bifasciata* Girault 1913, by monotypy; synonymy according to Hayat 1994.

##### 3.1.1. *Ablerus aleuroides* (Hussain & Agarwal, 1994)

*Azotus aleuroides* Husain & Agarwal 1982b: 157. Holotype male. India, Aligarh, ex. whitefly on *Citrus medica*.

*Ablerus aleuroides* (Husain & Agarwal); Hayat 1994.

**Distribution in Iran.** Mazandaran <sup>[2]</sup>.

**Distribution outside Iran.** India, Pakistan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurocanthus spiniferus* Quaintance <sup>[2]</sup>.

##### 3.1.2. *Ablerus amarantus* Girault, 1932

*Ablerus amarantus* Girault, 1932.

**Distribution in Iran.** Isfahan <sup>[2]</sup>.

**Distribution outside Iran.** Australasian and Oriental Regions.

**Host in Iran.** Hemiptera: Diaspididae: *Quadraspidotus ceccoonii* (Leonardi) <sup>[2]</sup>

##### 3.1.3. *Ablerus aonidiellae* Hayat, 1974

*Ablerus aonidiellae* Hayat, 1974.

**Distribution in Iran.** Guilan <sup>[2]</sup>.

**Distribution outside Iran.** India.

**Host in Iran.** Hemiptera: Diaspididae: *Aonidiella orientalis* (Newstead) <sup>[2]</sup>.

##### 3.1.4. *Ablerus atomon* Walker, 1847

*Ablerus atomon* (Walker, 1847); *Azotus atomon* (Walker, 1847); *Encyrtus atomon* Walker, 1847; *Ooencyrtus atomon* (Walker, 1847).

**Distribution in Iran.** Mazandaran <sup>[2]</sup>.

**Distribution outside Iran.** Argentina, Austria, Azerbaijan, Caucasus, Czech Republic, Egypt, France, Georgia, Germany, Italy, Poland, Russia, Slovakia, Spain, Turkey, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Pseudaulacaspis pentagona* (Targioni-Tozzetti) <sup>[2]</sup>.

##### 3.1.5. *Ablerus bharathius* Subba Rao, 1984

*Ablerus bharathius* (Subba Rao, 1984); *Ablerus fumipennis* (Subba

Rao, 1984); *Azotus bharathius* Subba Rao, 1984; *Azotus fumipennis* Subba Rao, 1984.

**Distribution in Iran.** Golestan <sup>[2]</sup>.

**Distribution outside Iran.** India.

**Host in Iran.** Hemiptera: Diaspididae: *Melanaspis lauristanicus* Balachowsky-Kauss <sup>[2]</sup>.

##### 3.1.6. *Ablerus bifasciatus* Girault, 1913

*Ablerus bifasciatus* (Girault, 1913); *Myocnemella bifasciata* Girault, 1913.

**Distribution in Iran.** Kerman <sup>[2]</sup>.

**Distribution outside Iran.** Australasian and Oriental Regions.

**Host in Iran.** Hemiptera: Diaspididae: *Aspidaspis laperrinei* Balachowsky <sup>[2]</sup>.

##### 3.1.7. *Ablerus celsus* (Walker, 1839)

*Ablerus celsus* (Walker, 1839); *Azotus brittanicus* Alam, 1956; *Azotus celsus* (Walker, 1839); *Pteroptrix celsus* Walker, 1839.

**Distribution in Iran.** Markazi, Tehran <sup>[74, 2]</sup>

**Distribution outside Iran.** Bulgaria, Caucasus, Croatia, Czech Republic, France, Georgia, Italy, Moldova, Russia and adjacent countries (Federation of Independent States), Spain, Turkey, UK, Ukraine, former Yugoslavia.

**Host in Iran.** Hemiptera: Diaspididae: *Epidiaspis leperii* (Signoret), *Parlatoria oleae* (Colvée) <sup>[74, 2]</sup>

##### 3.1.8. *Ablerus chionaspidis* (Howard, 1914)

*Ablerus chionaspidis* (Howard, 1914); *Ablerus greatheadi* (Annecke & Insley, 1970); *Ablerus qadrii* (Agarwal, 1964); *Azotus chionaspidis* Howard, 1914; *Azotus greatheadi* Annecke & Insley, 1970; *Azotus qadrii* Agarwal, 1964.

**Distribution in Iran.** Fars <sup>[74, 2]</sup>

**Distribution outside Iran.** China, Egypt, India, Israel, Italy, Japan, Spain, Uganda, former Yugoslavia.

**Host in Iran.** Hyperparasitoid of *Coccobius reticulatus* (Compere & Annecke) (Aphelinidae) <sup>[74, 2]</sup>.

##### 3.1.9. *Ablerus chrysomphali* (Ghesquière, 1960)

*Ablerus chrysomphali* (Ghesquière, 1960); *Azotus chrysomphali* Ghesquière, 1960.

**Distribution in Iran.** Kerman <sup>[74, 2]</sup>, Tehran <sup>[2]</sup>.

**Distribution outside Iran.** Armenia, Egypt, Georgia, Morocco, Spain, Transcaucasus, Turkmenistan.

**Host in Iran.** Hemiptera: Diaspididae: *Lepidosaphes pistaciae* (Archangelskaya) (Diaspididae) <sup>[2]</sup>, *Aonidiella orientalis* (Newstead) in citrus orchards <sup>[20]</sup>. Also, hyperparasitoid of *Physcus testaceus* Masi (Aphelinidae) <sup>[2]</sup>.

##### 3.1.10. *Ablerus perspiciosus* Girault, 1916

*Azotus bimaculatus* (Khan & Shafee, 1976); *Ablerus kashmirensis* (Narayanan, 1961); *Ablerus perspiciosus* Girault, 1916; *Azotus bimaculatus* Khan & Shafee, 1976; *Azotus kashmirensis* Narayana, 1961; *Azotus perspiciosus* (Girault, 1916).

**Distribution in Iran.** Golestan <sup>[17]</sup>, Guilan <sup>[59]</sup>, Mazandaran <sup>[2]</sup>.

**Distribution outside Iran.** Argentina, China, Egypt, France, India, Israel, Italy, Japan, Thailand, Turkey, USA, former Yugoslavia.

**Host in Iran.** Hemiptera: Diaspididae: *Quadraspidiotus perniciosus* Comstock (Diaspididae) <sup>[2, 17]</sup>, and *Aleurolobus barodensis* (Maskell) (Aleyrodidae), unknown diaspidid <sup>[59]</sup>. Also, hyperparasitoid of *Encarsia berlesei* (Howard) and *Aphytis proclia* (Walker) (Aphelinidae) <sup>[17]</sup>.

### 3.1.11. *Ablerus promacchiae* Viggiani & Ren, 1993

*Ablerus promacchiae* Viggiani & Ren, 1993.

**Distribution in Iran.** Isfahan <sup>[2]</sup>.

**Distribution outside Iran.** China and adjacent countries.

**Host in Iran.** Hemiptera: Diaspididae: *Parlagena remaudierei* Kaussari <sup>[2]</sup>.

## 3.2. Genus *Aphelinus* Dalman, 1820

*Aphelinus* Dalman 1820. Type species *Entedon (Aphelinus) abdominalis* Dalman, by monotypy.

*Agonioneurus* Westwood 1833. Type species *Agonioneurus basalis* Westwood; synonymy according to Thomson 1836.

*Myina* Nees 1834. Type species *Myina abdominalis* Nees; synonymy according to Thomson 1876.

*Eriophilus* Haldeman 1851. Type species *Eriophilus mali* Haldeman, by monotypy; synonymy according to Howard 1881.

*Mesidia* Foerster 1856. Type species *Mesidia pumila* Mayr, by monotypy; as subgenus of *Aphelinus* by Hayat 1983.

*Anozus* Foerster 1856. Type species *Anozus siphonophorae* Ashmead, by monotypy; synonymy according to Peck 1951.

*Meroligodon* Rondani 1877. Type species *Encyrtus ultor* Rondani; synonymy according to Boucek 1974.

*Mesidiopsis* Novicky 1930. Type species *Agonioneurus subflavescens* Westwood, by monotypy; synonymy according to Hayat 1990.

*Paulianaphelinus* Risbec 1957. Type species *Paulianaphelinus mariscusae* Risbec, by monotypy; synonymy according to Polaszek & Hayat 1990.

*Indaphelinus* Hayat 1990. Type species *Aphelinus ancer* Hayat, by monotypy; as subgenus of *Aphelinus* by Hayat 1990.

### 3.2.1. *Aphelinus abdominalis* (Dalman, 1820)

*Agonioneurus basalis* Westwood, 1833;

*Agonioneurus polycyclus* Förster, 1861;

*Aphelinus abdominalis* (Dalman, 1820); *Aphelinus alius* Yasnosh, 1963; *Aphelinus basalis* (Westwood, 1833);

*Aphelinus bicolor* Yasnosh, 1963; *Aphelinus facialis* (Förster, 1841); *Aphelinus flaviceps* (Förster, 1841);

*Aphelinus flavipes* (Förster, 1841); *Aphelinus polycyclus* (Förster, 1861); *Aphelinus (Aphelinus) abdominalis* (Dalman, 1820);

*Aphelinus (Aphelinus) flavipes* (Förster, 1841); *Encyrtus ultor* Rondani, 1848;

*Entedon (Aphelinus) abdominalis* Dalman, 1820;

*Meroligon ultor* (Rondani, 1848); *Myina abdominalis* (Dalman, 1820); *Myina facialis* Förster, 1841; *Myina flaviceps* Förster, 1841;

*Myina flavipes* Förster, 1841.

**Distribution in Iran.** Mazandaran <sup>[41]</sup>.

**Distribution outside Iran.** Argentina, Australia, Azerbaijan, Belgium, Brazil, Canary Islands, Channel Islands (British Is), Chile, China, Croatia, Czech Republic, Denmark, Egypt, France, Georgia, Germany, Hungary, India, Iraq, Italy, Japan, Kazakhstan, the Netherlands, Pakistan, Poland, Portugal, Russia and adjacent countries (Federation of Independent States), Slovakia, South Africa, Spain, Sweden, Switzerland, Transcaucasus, Tselinograd Obl, UK, former Yugoslavia, Zimbabwe.

**Host in Iran.** Hemiptera: Diaspididae: *Macrosiphum euphorbiae* (Thomas) (Hymenoptera: Aphididae) <sup>[41]</sup>.

### 3.2.2. *Aphelinus albipodus* Hayat & Fatima, 1992

*Aphelinus albipodus* Hayat & Fatima, 1992.

**Distribution in Iran.** Kerman <sup>[41]</sup>, Iran (no locality cited) (Zareh et al. 1995).

**Distribution outside Iran.** Chad, China, India, Japan, Paraguay, Russia, USA.

**Host in Iran.** Hemiptera: Aphididae, *Diuraphis noxia* (Mordvilko) <sup>[106]</sup>, *Aphis fabae* Scopoli <sup>[41]</sup>.

### 3.2.3. *Aphelinus argiope* Walker, 1839

*Aphelinus argiope* Walker, 1839;

*Aphelinus (Mesidia) argiope* Walker, 1839;

*Coccophagus argiope* (Walker, 1839);

*Coccophagus argiope* (Walker, 1839); *Mesidia argiope* (Walker, 1839);

*Mesidia pumila* Mayr, 1904; *Myina argiope* (Walker, 1839).

**Distribution in Iran.** Golestan <sup>[41]</sup>.

**Distribution outside Iran.** Czech Republic, Germany, India, Slovakia, Sweden, UK, Ukraine.

**Host in Iran.** Hemiptera: Aphididae: *Aphis grossulariae* Kaltenschach <sup>[41]</sup>.

### 3.2.4. *Aphelinus asychis* (Walker, 1839)

*Aphelinus affinis* (Förster, 1841); *Aphelinus asychis* Walker, 1839;

*Aphelinus brachyptera* Kurdjumov, 1913;

*Aphelinus brevicar* Thomson, 1876;

*Aphelinus dubia* Kurdjumov, 1913; *Aphelinus euthria* Walker, 1839;

*Aphelinus (Aphelinus) asychis* Walker, 1839; *Myina affinis*, Förster, 1841.

**Distribution in Iran.** Guilan <sup>[41]</sup>, Tehran <sup>[74, 83]</sup>.

**Distribution outside Iran.** Angola, Argentina, Australia, Azerbaijan, Brazil, Canary Islands, Chile, China, Colombia, Croatia, Czech Republic, Egypt, France, Georgia, Germany, Greece, Hungary, India, Iraq, Israel, Italy, Japan, Kazakhstan, Mexico, Morocco, Nepal, the Netherlands, Pakistan, Portugal, Russia and adjacent countries (Federation of Independent States), Slovakia, South Africa, Spain, Sweden, Transcaucasus, Turkey, UK, Ukraine, USA.

**Host in Iran.** Hemiptera: Aphididae: *Chromaphis juglandicola* (Kaltenschach) <sup>[83]</sup>, *Therioaphis maculata* (Buckton), *Aphis craccivora* (Koch) <sup>[41]</sup>.

### 3.2.5. *Aphelinus desantisi* Hayat, 1972

*Aphelinus desantisi* Hayat, 1972;

*Aphelinus (Aphelinus) desantisi* Hayat, 1972.

**Distribution in Iran.** Isfahan <sup>[41]</sup>.

**Distribution outside Iran.** India.

**Host in Iran.** Hemiptera: Aphididae: *Longiungius pyrarius* Passerini <sup>[41]</sup>.

### 3.2.6. *Aphelinus flaviventris* Kurdjumov, 1913

*Aphelinus flaviventris* Kurdjumov, 1913;

*Aphelinus (Aphelinus) flaviventris* Kurdjumov, 1913.

**Distribution in Iran.** Fars <sup>[11, 74]</sup>, Khuzestan <sup>[74]</sup>, Zanjan <sup>[98]</sup>.

**Distribution outside Iran.** Azerbaijan, Croatia, Czech Republic, France, Georgia, Hungary, Kazakhstan, Moldova, Romania, Russia and adjacent countries (Federation of Independent States), Spain, Sweden, Transcaucasus, UK, USA, former Yugoslavia.

**Host in Iran.** Hemiptera: Aphididae: *Diuraphis noxia* (Mordvilko)<sup>[11, 74]</sup>, *Hyadaphis coriandri* (Das)<sup>[74]</sup>; Hemiptera: Pemphigidae: *Pemphigus spirothecae* Passeriini<sup>[98]</sup>.

### 3.2.7. *Aphelinus gossypii* Timberlake, 1924

*Aphelinus gossypii* Timberlake, 1924;  
*Aphelinus kashmiriensis* Hayat, 1972;  
*Aphelinus (Aphelinus) gossypii* Timberlake, 1924;  
*phelinus (Aphelinus) kashmiriensis* Hayat, 1972.

**Distribution in Iran.** Guilan<sup>[41]</sup>.

**Distribution outside Iran.** Brazil, Guadeloupe, Hawaii, India, Israel, Japan, Nepal, New Zealand, Réunion, South Africa, Tonga, Ukraine, USA.

**Host in Iran.** Hemiptera: Aphididae: *Aphis gossypii* (Glover)<sup>[41]</sup>.

### 3.2.8. *Aphelinus humilis* Mercet, 1927

*Aphelinus humilis* Mercet, 1927;  
*Aphelinus (Aphelinus) humilis* Mercet, 1927.

**Distribution in Iran.** Isfahan<sup>[41]</sup>.

**Distribution outside Iran.** Argentina, Belarus, Chile, Czech Republic, India, Moldova, the Netherlands, Portugal, Slovakia, Spain, Sweden, Ukraine, UK.

**Host in Iran.** Hemiptera: Aphididae: *Macrosiphum rosae* (Linnaeus)<sup>[41]</sup>.

### 3.2.9. *Aphelinus maidis* Timberlake, 1924

*Aphelinus maidis* Timberlake, 1924.

**Distribution in Iran.** Golestan<sup>[41]</sup>.

**Distribution outside Iran.** Hawaii, Malaysia, Myanmar (Burma), Pakistan, Taiwan, Thailand.

**Host in Iran.** Hemiptera: Aphididae: *Aphis* sp.<sup>[41]</sup>.

### 3.2.10. *Aphelinus mali* Haldeman, 1851

*Aphelinus mali* (Haldeman, 1851); *Aphelinus mali crocidolomiae* Risbec, 1951; *Aphelinus mali italica* Guercio, 1925;  
*Aphelinus varicornis* Girault, 1909;  
*Aphelinus (Aphelinus) mali* (Haldeman, 1851);  
*Aphidencyrthus rosae* (Ashmead, 1886); *Blastothrix rosae* Ashmead, 1886; *Eriophilus mali* Haldeman, 1851.

**Distribution in Iran.** Mazandaran<sup>[41]</sup>, Iran (no locality cited)<sup>[74]</sup>.

**Distribution outside Iran.** Argentina, Australia, Austria, Azerbaijan, Belgium, Bolivia, Brazil, Bulgaria, Canada, Canary Islands, Caucasus, Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Ecuador, Egypt, France, Georgia, Germany, India, Indonesia, Iraq, Israel, Italy, Japan, Korea, Lebanon, Malta, Mexico, Moldova, Morocco, Netherlands, New Zealand, Pakistan, Paraguay, Peru, Philippines, Poland, Portugal, Puerto Rico, Romania, Russia and adjacent countries (Federation of Independent States), Saudi Arabia, Senegal, Slovakia, South Africa, Spain, Sweden, Switzerland, Tadjikistan, Trinidad & Tobago, Turkey, UK, Ukraine, USA, Uruguay, Uzbekistan, Venezuela, former Yugoslavia, Zambia, Zimbabwe.

**Host in Iran.** Hemiptera: Pemphigidae: *Eriosoma lanigerum* (Hausmann)<sup>[74, 41]</sup>.

### 3.2.11. *Aphelinus paramali* Zehavi & Rosen, 1989

*Aphelinus paramali* Zehavi & Rosen, 1989.

**Distribution in Iran.** Khorasan<sup>[22]</sup>.

**Distribution outside Iran.** Palaearctic and Oriental Regions (Angola, Egypt, Israel).

**Host in Iran.** Hemiptera: Aphididae: *Aphis pomi* (de Geer)<sup>[22]</sup>.

### 3.2.12. *Aphelinus perpallidus* (Gahan, 1924)

*Aphelinus perpallidus* Gahan, 1924;

*Aphelinus (Mesidia) perpallidus* Gahan, 1924.

**Distribution in Iran.** Mazandaran<sup>[41]</sup>.

**Distribution outside Iran.** Canada, Europe, Israel, South Africa, USA.

**Host in Iran.** Hemiptera: Aphididae: *Brevicoryne* sp.<sup>[41]</sup>.

### 3.2.13. *Aphelinus semiflavus* Howard, 1908

*Aphelinus brevipennis* Girault, 1917;

*Aphelinus semiflavus* Howard, 1908.

**Material examined.** Guilan province: Lahijan, 2♀, 16 April 2010, parasitoid of *Aphis craccivora* Koch (Aphididae). **New record for Iran.**

**Distribution outside Iran.** Argentina, Brazil, Canada, Germany, Hawaii, India, Israel, Russia and adjacent countries (Federation of Independent States), Spain, Turkey, USA.

### 3.2.14. *Aphelinus varipes* (Förster, 1841)

*Aphelinus negritus* Howard, 1908;

*Aphelinus toxopteraphidis* Kurdjumov, 1913;

*Aphelinus varipes* (Förster, 1841); *Myina varipes* Förster, 1841.

**Distribution in Iran.** Ardabil<sup>[69]</sup>, Fars<sup>[41, 74]</sup>, Isfahan<sup>[41]</sup>.

**Distribution outside Iran.** Australia, Azores, Canary Islands, Croatia, Czech Republic, France, Georgia, Germany, Hungary, Israel, Italy, Japan, Kazakhstan, Madeira, Mexico, Morocco, Nepal, Netherlands, Pakistan, Paraguay, Portugal, Russia and adjacent countries (Federation of Independent States), Slovakia, South Africa, Spain, Sweden, Transcaucasus, Turkey, UK, Ukraine, USA, former Yugoslavia.

**Host in Iran.** Hemiptera: Aphididae: *Diuraphis noxia* (Mordvilko)<sup>[11, 74, 41]</sup>, *Aphis gossypii*<sup>[69]</sup>.

## 3.3. Genus *Aphytis* Howard, 1900

*Aphytis* Howard 1900. Type species *Aphytis chilensis* Howard, by monotypy.

*Prospaphelinus* De Gregorio 1914. Type species *Aphelinus (Prospaphelinus) silvestrii* De Gregorio, by monotypy; synonymy according to Mercet 1930.

*Paraphytis* Compere 1925. Type species *Paraphytis vittatus* Compere, by original designation; synonymy according to DeBach & Rosen 1976.

*Syediella* Shafee 1970. Type species *Syediella maculata* Shafee, by original designation; synonymy according to Hayat 1982.

### 3.3.1. *Aphytis africanus* Quednau, 1964

*Aphytis africanus* Quednau, 1964.

**Distribution in Iran.** Mazandaran<sup>[41]</sup>.

**Distribution outside Iran.** Argentina, Egypt, Israel, Mozambique, South Africa, Swaziland, USA, Zimbabwe.

**Host in Iran.** Hemiptera: Diaspididae: *Parlatoria zizyphi* (Lucas)<sup>[41]</sup>.

### 3.3.2. *Aphytis aonidiae* (Mercet, 1911)

**Distribution in Iran.** Guilan<sup>[59]</sup>, Hamadan<sup>[41]</sup>.

**Distribution outside Iran.** Argentina, Armenia, Caucasus, Chile, Cyprus, Czech Republic, Egypt, Europe, Georgia, Greece, Hungary, Israel, Italy, Japan, Moldova, Romania, Russia and adjacent countries (Federation of Independent States), Slovakia,

Spain, Turkey, Ukraine, USA, Uruguay, former Yugoslavia.

**Host in Iran.** Hemiptera: Diaspididae: *Diaspidiotus perniciosus* (Comstock) <sup>[41]</sup>, unknown Diaspididae <sup>[59]</sup>.

### 3.3.3. *Aphytis chrysomphali* (Mercet, 1912)

*Aphelinus chrysomphali* Mercet, 1912; *Aphelinus quaylei* Rust, 1915; *Aphytis chrysomphali* (Mercet, 1912); *Aphytis chrysomphali mazandaranica* (Kiriukhin, 1946); *Aphytis quaylei* (Rust, 1915); *Aphytis silvestrii* (De Gregorio, 1914); *Aphytis (Prospaphelinus) chrysomphali* (Mercet, 1912); *Prospaphelinus silvestrii* De Gregorio, 1914.

**Distribution in Iran.** East Azarbaijan <sup>[26]</sup>, Golestan <sup>[2]</sup>, Caspian Sea area and southern provinces <sup>[74]</sup>.

**Distribution outside Iran.** Afghanistan, Algeria, Argentina, Australasian, Australia, Belgium, Bermuda, Brazil, Caribbean (including West Indies), Caucasus, Chile, China, Costa Rica, Cuba, Cyprus, Dominican Republic, Egypt, El Salvador, Fiji, France, French Polynesia, Georgia, Germany, Greece, Guam, Guyana, Haiti, Hawaii, Hungary, India, Indonesia, Israel, Italy, Japan, Lebanon, Malaysia, Mauritius, Mexico, Morocco, New Caledonia, Panama, Peru, Philippines, Puerto Rico, Russia and adjacent countries (Federation of Independent States), Seychelles, Somalia, South Africa, Spain, Surinam, Swaziland, Taiwan, Tanzania, Trinidad & Tobago, Tunisia, Turkey, Ukraine, USA, Uruguay, former Yugoslavia, Zimbabwe.

**Host in Iran.** Hemiptera: Diaspididae: *Aonidiella aurantii* (Maskell) <sup>[74, 2]</sup>, *Aonidiella citrina* (Coquillett), *Aonidiella orientalis* (Newstead), *Chrysomphalus dictyospermi* (Morgan), *Parlatoria oleae* (Colvee), *Parlatoria zizyphi* (Lucas) <sup>[74]</sup>, *Sphaerolecanium prunastri* (Boyer de Fonscolombe) <sup>[26]</sup>. Also, *Chartocerus rozanovi* Sugonyaev (Signiphoridae) was reported as the hyperparasitoid of *A. chrysomphali* from Iran <sup>[2]</sup>.

### 3.3.4. *Aphytis hispanicus* (Mercet, 1912)

*Aphelinus argentinus* Brèthes, 1916; *Aphelinus bovelli* Malenotti, 1918; *Aphelinus maculicornis hispanica* Mercet, 1912; *Aphytis argentinus* (Brèthes, 1916); *Aphelinus bovelli* (Malenotti, 1918); *Aphytis hispanicus* (Mercet, 1912); *Aphytis (Prospaphelinus) bovelli* (Malenotti, 1918).

**Distribution in Iran.** Guilan <sup>[59]</sup>, Hamadan <sup>[41]</sup>.

**Distribution outside Iran.** Algeria, Argentina, Barbados, Brazil, Caucasus, Chile, China, Cook Islands, Czech Republic, Egypt, France, Georgia, Haiti, Hungary, India, Israel, Italy, Jamaica, Lebanon, Mexico, Morocco, Myanmar (Burma), South Africa, Spain, Sweden, Taiwan, Transcaucasus, Trinidad & Tobago, Turkey, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Diaspidiotus perniciosus* (Comstock) <sup>[41]</sup>, unknown Diaspididae <sup>[59]</sup>.

### 3.3.5. *Aphytis lepidosaphes* Compere, 1955

*Aphytis lepidosaphes* Compere, 1955.

**Distribution in Iran.** Isfahan <sup>[41]</sup>, Iran (no locality cited) <sup>[74]</sup>.

**Distribution outside Iran.** Argentina, Australia, Brazil, Chile, China, Costa Rica, Cyprus, Ecuador, Egypt, El Salvador, Fiji, France, Greece, Guadeloupe, Hawaii, India, Israel, Italy, Jamaica, Lebanon, Mexico, Myanmar (Burma), New Caledonia, Pakistan, Peru, Philippines, Puerto Rico, South Africa, Spain, Taiwan, Thailand, Trinidad & Tobago, Turkey, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Chrysomphalus dictyospermi* (Morgan) <sup>[41]</sup>.

### 3.3.6. *Aphytis libanicus* Traboulsi, 1969

*Aphytis libanicus* Traboulsi, 1969.

**Distribution in Iran.** Isfahan <sup>[74]</sup>.

**Distribution outside Iran.** Egypt, Israel, Italy, Lebanon, Turkey.

**Host in Iran.** Hemiptera: Diaspididae: *Lepidosaphes conchiformis* Gmelin <sup>[74]</sup>.

### 3.3.7. *Aphytis lingnanensis* Compere, 1955

*Aphytis lingnanensis* Compere, 1955.

**Distribution in Iran.** Golestan <sup>[41]</sup>.

**Distribution outside Iran.** Argentina, Australia, Bermuda, Bolivia, Brazil, Caribbean (including West Indies), Chile, China, Costa Rica, Cuba, Cyprus, Egypt, El Salvador, India, Indonesia, Israel, Italy, Jamaica, Japan, Malaysia, Mauritius, Mexico, Morocco, New Caledonia, Pakistan, Peru, Philippines, Puerto Rico, Solomon Islands, South Africa, Spain, Taiwan, Thailand, Trinidad & Tobago, Turkey, Uruguay, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Aonidiella orientalis* (Newstead) <sup>[41]</sup>.

### 3.3.8. *Aphytis maculicornis* (Masi, 1911)

*Aphelinus maculicornis* Masi, 1911; *Aphytis maculicornis* (Masi, 1911); *Aphytis (Prospaphelinus) maculicornis* (Masi, 1911).

**Distribution in Iran.** Fars, Isfahan, Markazi, Tehran, Caspian Sea area (Modarres Awal 1997).

**Distribution outside Iran.** Afghanistan, Algeria, Argentina, Armenia, Azerbaijan, China, Egypt, France, Georgia, Greece, India, Iraq, Israel, Italy, Mexico, Morocco, Pakistan, Russia and adjacent countries (Federation of Independent States), South Africa, Spain, Sweden, Tadjikistan, Transcaucasus, Turkey, Ukraine, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Aspidiotus hederae* (Vallot), *Chrysomphalus dictyospermi* (Morgan), *Parlatoria oleae* (Colvee), *Parlatoria pergandii* (Comstock) <sup>[74]</sup>.

### 3.3.9. *Aphytis melinus* DeBach, 1959

*Aphytis melinus* DeBach, 1959.

**Distribution in Iran.** Guilan <sup>[59]</sup>, Mazandaran <sup>[41]</sup>.

**Distribution outside Iran.** Argentina, Australia, Chile, China, Cyprus, France, Georgia, Greece, India, Israel, Italy, Mexico, Morocco, the Netherlands, Pakistan, Paraguay, Peru, South Africa, Spain, Turkey, Uruguay, USA, former Yugoslavia.

**Host in Iran.** Hemiptera: Diaspididae: *Aonidiella aurantii* (Maskell) <sup>[41]</sup>, unknown Diaspididae <sup>[59]</sup>.

### 3.3.10. *Aphytis mytilaspidis* (Le Baron, 1870)

*Agonioneurus albidus* Westwood, 1837; *Aphelinus albidus* (Westwood, 1837); *Aphelinus mytilaspidis* (Le Baron, 1870); *Aphytis albidus* (Westwood, 1837); *Aphytis diaspidioti* Chumakova, 1957; *Aphytis mytilaspidis* (Le Baron, 1870); *Aphytis mytilaspidis echinocacti* Traboulsi, 1969; *Aphytis mytilaspidis* (Le Baron, 1870); *Aphytis mytilaspidis ficus* Traboulsi, 1969; *Aphytis mytilaspidis hedericola* Traboulsi, 1969; *Aphytis mytilaspidis ulmi* Traboulsi, 1969; *Aphytis variolosum* Alam, 1956; *Aphytis (Prospaphelinus) mytilaspidis* (Le Baron, 1870); *Chalcis (Aphelinus) mytilaspidis* Le Baron, 1870.

**Distribution in Iran.** Caspian Sea area, Fars, Isfahan, Khuzestan, Semna, Tehran <sup>[74]</sup>, Kerman <sup>[104]</sup>, Lorestan <sup>[9, 10]</sup>, Markazi <sup>[74, 9, 10]</sup>.

**Distribution outside Iran.** Algeria, Argentina, 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 and adjacent countries (Federation of Independent States), Saudi Arabia, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Transcaucasus, Turkey, UK, Ukraine, USA, former Yugoslavia.

**Host in Iran.** Hemiptera: Diaspididae: *Lepidosaphes malicola* Borchsenius, *Parlatoria oleae* (Colvee), *Parlatoria blanchardi* (Targioni Tozzetti)<sup>[74]</sup>, *Lepidosaphes pistaciae* (Archangelskaya)<sup>[104, 74]</sup>, *Clidaspis asiatica* (Arch)<sup>[9, 10]</sup>.

### 3.3.11. *Aphytis proclia* (Walker, 1839)

*Aphelinus proclia* Walker, 1839; *Aphytis chowdhurii* (Kaul, 1974); *Aphytis proclia* (Walker, 1839); *Aphytis sugonjaevi* Yasnosh, 1972; *Aphytis zonatus* Alam, 1956; *Centrodora chowdhurii* Kaul, 1974.

**Distribution in Iran.** Fars, Guilan, Isfahan, Khuzestan, Markazi, Tehran<sup>[74]</sup>, Mazandaran<sup>[74, 16]</sup>.

**Distribution outside Iran.** Algeria, Argentina, Austria, 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 and adjacent countries (Federation of Independent States), Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Turkey, UK, USA, former Yugoslavia.

**Host in Iran.** Hemiptera: Diaspididae: *Pseudaulacaspis pentagona* Targioni<sup>[74, 16]</sup>, *Aonidiella aurantii* (Maskell), *Aonidiella orientalis* (Newstead), *ChrysoRmphalus dictyospermi* (Morgan), *Parlatoria oleae* (Colvee)<sup>[74]</sup>. Also *Ablerus perspicuosus* Girault (Aphelinidae) was recorded as the hyperparasitoid of *A. proclia*<sup>[17]</sup>.

### 3.4. Genus *Centrodora* Förster, 1878

*Centrodora* Foerster 1878. Type species *Centrodora amoena* Foerster, by original designation.

*Paraphelinus* Perkins 1906. Type species *Paraphelinus xiphidii* Perkins, by monotypy; synonymy according to Mercet 1918.

*Tumidiscapus* Girault 1911. Type species *Tumidiscapus flavus* Girault, by original designation; synonymy according to Hayat 1983.

*Plastocharella* Girault 1913. Type species *Plastocharella fuscipennis* Girault, by original designation; synonymy according to Hayat 1983.

*Microeupelmus* Otten 1941. Type species *Microeupelmus acridiphagus* Otten, by original designation; synonymy according to Ferrière 1965.

*Pechlaneria* Soyka 1948. Type species *Pechlaneria alpina* Soyka, by original designation; synonymy according to Ferrière 1965.

*Debachiella* Gordh & Rosen 1973. Type species *Debachiella pini* Gordh & Rosen, by original designation; synonymy according to Viggiani 1981.

*Oolathron* De Santis 1981. Type species *Oolathron mireyae* De Santis, by original designation; synonymy according to Viggiani 1985.

#### 3.4.1. *Centrodora* sp.

**Distribution in Iran.** Hamadan<sup>[74]</sup>.

**Host in Iran.** Hemiptera: Cicadidae: *Cicadatra ochreatea* (Melichar)<sup>[74]</sup>.

### 3.5. Genus *Coccobius* Ratzeburg, 1852

*Coccobius* Ratzeburg 1852. Type species *Coccobius annulicornis* Ratzeburg.

*Physcus* Howard 1895. Type species *Coccophagus varicornis* Howard, by monotypy; synonymy according to Hayat 1983.

*Encyrtophyscus* Blanchard 1948. Type species *Physcus flavoflagellatus* De Santis, by original designation; synonymy according to Hayat 1983.

*Physculus* Yasnosh 1977. Type species *Physculus danzigae* Yasnosh, by original designation; synonymy according to Hayat 1983.

#### 3.5.1. *Coccobius annulicornis* (Ratzeburg, 1852)

*Aphelinus annulicornis* (Ratzeburg, 1852); *Coccobius annulicornis* Ratzeburg, 1852; *Coccobius testaceus* (Masi, 1909); *Physcus testaceus* Masi, 1909.

**Distribution in Iran.** East Azarbaijan<sup>[26]</sup>, Golestan, Isfahan<sup>[41]</sup>.

**Distribution outside Iran.** Azerbaijan, Caucasus, China, Croatia, Czech Republic, Egypt, France, Georgia, Germany, Hungary, Italy, Lebanon, Moldova, Poland, Romania, Russia and adjacent countries (Federation of Independent States), Slovakia, Spain, Turkey, UK, Ukraine, USA, Uzbekistan, former Yugoslavia.

**Host in Iran.** Hemiptera: Diaspididae: *Chionaspis salicis* (Linnaeus), *Aspidiotus hederæ* (Vallot)<sup>[74]</sup>, *Sphaerolecanium prunastri* (Boyer de Fonscolombe)<sup>[26]</sup>.

#### 3.5.2. *Coccobius contigaspidis* (Yasnosh, 1968)

*Coccobius contigaspidis* (Yasnosh, 1968); *Physcus contigaspidis* Yasnosh, 1968.

**Distribution in Iran.** Kerman<sup>[20]</sup>.

**Distribution outside Iran.** Armenia, Russia and adjacent countries (Federation of Independent States).

**Host in Iran.** Hemiptera: Diaspididae: *Aonidiella orientalis* (Newstead) in citrus orchards<sup>[74]</sup>.

#### 3.5.3. *Coccobius danzigae* (Yasnosh, 1977)

*Coccobius danzigae* (Yasnosh, 1977); *Physculus danzigae* Yasnosh, 1977.

**Distribution in Iran.** Kermanshah<sup>[58]</sup>.

**Distribution outside Iran.** Russia and adjacent countries (Federation of Independent States).

**Host in Iran.** Hemiptera: Diaspididae: *Diaspidiotus gigas* (Thiem & Gerneck)<sup>[58]</sup>.

#### 3.5.4. *Coccobius diaspidis* (Howard, 1907)

*Coccobius diaspidis* (Howard, 1907); *Encarsia diaspidis* Howard, 1907; *Physcus diaspidis* (Howard, 1907).

**Distribution in Iran.** Kermanshah<sup>[41]</sup>.

**Distribution outside Iran.** South Africa.

**Host in Iran.** Hemiptera: Diaspididae: *Diaspis boisduvalii* Signoret<sup>[41]</sup>.

#### 3.5.5. *Coccobius flaviceps* (Girault & Dodd, 1915)

*Coccobius flaviceps* (Girault & Dodd, 1915); *Physcus flaviceps* Girault & Dodd, 1915.

**Distribution in Iran.** West Azarbaijan<sup>[41]</sup>.

**Distribution outside Iran.** Australasian and Oriental Regions.

**Host in Iran.** Hemiptera: Diaspididae: *Lepidosaphes conchiformis* (Gmelin)<sup>[41]</sup>.

### 3.5.6. *Coccobius flaviventris* (Howard, 1910)

*Coccobius flaviventris* (Howard, 1910); *Physcus flaviventris* Howard, 1910.

**Distribution in Iran.** Mazandaran <sup>[41]</sup>.

**Distribution outside Iran.** Pakistan, Philippines, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Aonidiella aurantii* (Maskell) <sup>[41]</sup>.

### 3.5.7. *Coccobius fulvus* (Compere & Annecke, 1961)

*Coccobius fulvus* (Compere & Annecke, 1961); *Coccobius mcdonaldii* Shafee, Siddiqui & Rizvi, 1988; *Physcus albipodus* Agarwal, 1964; *Physcus fulvus* Compere & Annecke, 1961.

**Distribution in Iran.** Guilan, Khorasan <sup>[41]</sup>.

**Distribution outside Iran.** Afghanistan, China, France, India, Japan, Taiwan, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Chionaspis asiatica* Archangelskaya, ex *Aulacaspis rosae* (Bouché) <sup>[41]</sup>.

### 3.5.8. *Coccobius fusciventris* (Girault, 1913)

*Coccobius fusciventris* (Girault, 1913); *Physcus fusciventris* Girault, 1913.

**Distribution in Iran.** Isfahan <sup>[41]</sup>.

**Distribution outside Iran.** Australasian and Oriental Regions.

**Host in Iran.** Hemiptera: Diaspididae: *Parlatoria blanchardii* (Targioni-Tozzetti) <sup>[41]</sup>.

### 3.5.9. *Coccobius indefinitus* (Yasnosh & Myartseva, 1972)

*Coccobius indefinitus* (Yasnosh & Myartseva, 1972); *Physcus indefinitus* Yasnosh & Myartseva, 1972.

**Distribution in Iran.** Golestan, Mazandaran <sup>[41]</sup>.

**Distribution outside Iran.** Armenia, Russia and adjacent countries (Federation of Independent States), Tadjikistan, Turkmenistan.

**Host in Iran.** Hemiptera: Diaspididae: *Quadraspidiotus zonatus* (Frauenfeldt) <sup>[41]</sup>.

### 3.5.10. *Coccobius multicolor* (Girault, 1915)

*Coccobius multicolor* (Girault, 1915); *Physcus multicolor* Girault, 1915.

**Distribution in Iran.** Mazandaran <sup>[41]</sup>.

**Distribution outside Iran.** Australasian and Oriental Regions.

**Host in Iran.** Hemiptera: Diaspididae: *Parlatoria oleae* (Colvee) <sup>[41]</sup>.

### 3.5.11. *Coccobius nigriceps* (Girault, 1913)

*Coccobius nigriceps* (Girault, 1913); *Physcus nigriceps* Girault, 1913.

**Distribution in Iran.** Hamadan <sup>[41]</sup>.

**Distribution outside Iran.** Australasian and Oriental Regions.

**Host in Iran.** Hemiptera: Diaspididae: *Lepidosaphes granati* Koroneos <sup>[41]</sup>.

### 3.5.12. *Coccobius pullus* Prinsloo, 1995

*Coccobius pullus* Prinsloo, 1995.

**Distribution in Iran.** Kermanshah <sup>[41]</sup>.

**Distribution outside Iran.** Namibia (South West Africa), South Africa.

**Host in Iran.** Hemiptera: Diaspididae: *Melanaspis inopinata* Leonardi <sup>[41]</sup>.

### 3.5.13. *Coccobius reticulatus* (Compere & Annecke, 1961)

*Coccobius reticulatus* (Compere & Annecke, 1961); *Physcus*

*gunturensis* Ahmad & Shafee, 1978; *Physcus oriensis* Husain & Agarwal, 1982; *Physcus reticulatus* Compere & Annecke, 1961.

**Distribution in Iran.** Fars <sup>[65,74,2]</sup>.

**Distribution outside Iran.** India, Oman, Pakistan.

**Host in Iran.** Hemiptera: Diaspididae: *Aonidiella orientalis* (Newstead) <sup>[65,74]</sup>. Also, *Ablerus chionaspidis* (Howard) (Aphelinidae) was recorded as the hyperparasitoid of *C. reticulatus* <sup>[2]</sup>.

### 3.5.14. *Coccobius testaceus* Masi, 1909

*Aphelinus annulicornis* (Ratzeburg, 1852); *Coccobius annulicornis* Ratzeburg, 1852; *Coccobius testaceus* (Masi, 1909); *Physcus testaceus* Masi, 1909.

**Distribution in Iran.** Chaharmahal & Bakhtiari, Hamadan, Isfahan, Markazi <sup>[74]</sup>, Kerman <sup>[104]</sup>, Tehran <sup>[74,2]</sup>.

**Distribution outside Iran.** Azerbaijan, Caucasus, China, Croatia, Czech Republic, Egypt, France, Georgia, Germany, Hungary, Italy, Lebanon, Moldova, Poland, Romania, Russia and adjacent countries (Federation of Independent States), Slovakia, Spain, Turkey, UK, Ukraine, USA, Uzbekistan, former Yugoslavia.

**Host in Iran.** Hemiptera: Diaspididae: Unknown species <sup>[104]</sup>, *Lepidosaphes malicola* Borchsenius, *Parlatoria olea* (Colvee), *Tecaspis asiatica* Balachowsky <sup>[74]</sup>. Also, *Ablerus chrysomphali* (Ghesquière) was recorded as the hyperparasitoid of *P. testaceus* <sup>[2]</sup>.

### 3.5.15. *Coccobius viggianii* (Yasnosh, 1974)

*Coccobius viggianii* (Yasnosh, 1974); *Physcus* sp.; *Physcus viggianii* Yasnosh, 1974.

**Distribution in Iran.** Golestan, Kerman <sup>[41]</sup>.

**Distribution outside Iran.** Palaearctic Region (Europe).

**Host in Iran.** Hemiptera: Diaspididae: *Leucaspis ulmi* (Linnaeus), and *Lepidosaphes pistaciae* (Archangelskaya) <sup>[41]</sup>.

### 3.5.16. *Coccobius varicornis* (Howard, 1881)

*Coccobius varicornis* (Howard, 1881); *Coccophagus varicornis* Howard, 1881; *Physcus varicornis* (Howard, 1881); *Coccobius varicornis* (Howard, 1881); *Coccophagus varicornis* Howard, 1881; *Physcus varicornis* (Howard, 1881).

**Distribution in Iran.** Kerman, Mazandaran <sup>[41]</sup>, Lorestan, Markazi <sup>[9,10]</sup>.

**Distribution outside Iran.** Canada, Italy, Sri Lanka, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Lepidosaphes ulmi* (Linnaeus) <sup>[9,10]</sup>, *Parlatoria asiatica* Borchsenius, *Odonaspis secreta* (Cockerell) <sup>[41]</sup>.

## 3.6. Genus *Coccophagoides* Girault, 1915

*Coccophagoides* Girault 1915. Type species *Coccophagus abnormicornis* Girault, by original designation.

*Diaspiniphagus* Silvestri 1927. Type species *Prospalta similis* Masi, by original designation; synonymy according to Mercet 1928.

*Primaprospaltella* DeBach & La Salle 1981. Type species *Prospalta murtfeldiae* Howard, by original designation; synonymy according to Hayat 1983.

### 3.6.1. *Coccophagoides similis* (Masi, 1908)

*Aphelinus moeris* Walker, 1839; *Coccophagoides moeris* (Walker, 1839); *Coccophagoides moeris* (Walker, 1839); *Coccophagoides parvipennis* Ferrière, 1955; *Coccophagoides similis* (Masi); *Coccophagoides similis* (Masi); *Coccophagoides similis* (Masi);



1908); *Coccophagus moeris* (Walker, 1839); *Diaspiniphagus moeris* (Walker, 1839); *Diaspiniphagus similis* (Masi, 1908); *Prospalta similis* Masi, 1908; *Prospaltella ilicis* Mercet, 1921; *Prospaltella silwoodensis* Alam, 1956; *Pteroptrix janius* Walker, 1839.

**Material examined.** Kermanshah province: Ravansar, 2♀, 1♂, unknown date, parasitoid of *Diaspidiotus ostreaformis* (Curtis) (Diaspididae). **New record for Iran.**

**Distribution outside Iran.** Austria, Azerbaijan, Bulgaria, Caucasus, Czech Republic, Egypt, France, Georgia, Germany, Hungary, Italy, Poland, Russia and adjacent countries (Federation of Independent States), Spain, Sweden, Switzerland, Turkey, UK, USA, Uzbekistan.

### 3.7. Genus *Coccophagus* Westwood, 1833

*Coccophagus* Westwood 1833. Type species *Entedon scutellaris* Dalman, by monotypy.

*Aneristus* Howard 1895. Type species *Aneristus ceroplastae* Howard, by monotypy; synonymy according to Hayat 1983.

*Paracharitopus* Brèthes 1913. Type species *Paracharitopus lecanii* Brèthes, by monotypy; synonymy according to Timberlake 1931.

*Ataneostigma* Girault 1914. Type species *Ataneostigma pulchra* Girault, by original designation; synonymy according to Hayat 1983.

*Prococcophagus* Silvestri 1915. Type species *Prococcophagus varius* Silvestri, by original designation; synonymy according to Shafee, Azim & Khan 1985.

*Taneostigmoidella* Girault 1915. Type species *Taneostigmoidella nympa* Girault, by original designation; synonymy according to Shafee, Azim & Khan 1985.

*Onophilus* Brèthes 1918. Type species *Onophilus caridei* Brèthes, by monotypy; synonymy according to Mercet 1928.

*Parencarsia* Mercet 1930. Type species *Coccophagus krygeri* Mercet, by original designation; synonymy according to De Santis 1946.

*Heptacritus* De Santis 1960. Type species *Coccophagus semiatratus* De Santis, by original designation; synonymy according to Hayat 1983.

*Aclerdaephagus* Sugonjaev 1969. Type species *Aclerdaephagus planus* Sugonjaev, by original designation; synonymy according to Hayat 1992.

*Polycoccophagus* Sugonjaev 1976. Type species *Coccophagus rosae* Sugonjaev & Filipjuk, by original designation; as subgenus of *Coccophagus*.

#### 3.7.1. *Coccophagus bivittatus* Compere, 1931

*Coccophagus bivittatus* Compere, 1931.

**Distribution in Iran.** Mazandaran <sup>[41]</sup>.

**Distribution outside Iran.** Argentina, Egypt, India, Israel, Italy, South Africa.

**Host in Iran.** Hemiptera: Coccidae: *Ceroplastes floridensis* Comstock on citrus <sup>[41]</sup>.

#### 3.7.2. *Coccophagus ceroplastae* (Howard, 1895)

*Aneristus ceroplastae* Howard, 1895; *Aneristus ceroplastae modesta* (Silvestri, 1915); *Aneristus fumosipennis* Girault, 1915; *Coccophagus ceroplastae* (Howard, 1895); *Coccophagus citri* Agarwal, 1964; *Coccophagus delhiensis* Subba Rao & Rai, 1969; *Coccophagus diaspidis* Agarwal, 1964; *Coccophagus orientalis* Howard, 1896; *Prococcophagus orientalis* (Howard, 1896).

**Distribution in Iran.** Kerman <sup>[41]</sup>.

**Distribution outside Iran.** Australia, Bangladesh, Benin, Bermuda, Caribbean (including West Indies), China, Cuba, Dominican Republic, Fiji, France, Haiti, Hawaii, India, Indonesia, Israel, Jamaica, Japan, Malaysia, Mauritius, Micronesia, New Caledonia, Pakistan, Panama, Philippines, Puerto Rico, South Africa, Sri Lanka, Taiwan, USA, Vietnam, Virgin Islands.

**Host in Iran.** Hemiptera: Coccidae: *Chloropulvinaria aurantii* Cockerell <sup>[41]</sup>.

#### 3.7.3. *Coccophagus cowperi* Girault, 1917

*Coccophagus cowperi* Girault, 1917.

**Distribution in Iran.** Khorasan, Tehran <sup>[41]</sup>.

**Distribution outside Iran.** Greece, India, Israel, Italy, Morocco, Papua New Guinea, South Africa, Uganda, USA, Venezuela.

**Host in Iran.** Hemiptera: Coccidae: *Coccus floccifera* Westwood, and *Pulvinaria* sp. <sup>[41]</sup>.

#### 3.7.4. *Coccophagus differens* Yasnosh, 1966

*Coccophagus differens* Yasnosh, 1966.

**Distribution in Iran.** Guilan <sup>[41]</sup>.

**Distribution outside Iran.** Georgia, Moldova, Transcaucasus, Turkey, Ukraine.

**Host in Iran.** Hemiptera: Coccidae: *Sphaerolecanium prunastri* (Boyer de Fonscolombe) <sup>[41]</sup>.

#### 3.7.5. *Coccophagus lutescens* Compère, 1931

*Coccophagus lutescens* Compere, 1931.

**Distribution in Iran.** Kermanshah <sup>[41]</sup>.

**Distribution outside Iran.** India, Kenya, South Africa.

**Host in Iran.** Hemiptera: Coccidae: *Ceroplastes sinensis* Del Guercio <sup>[41]</sup>.

#### 3.7.6. *Coccophagus lycimnia* (Walker, 1839)

*Aphelinus lycimnia* Walker, 1839; *Coccophagus ater* Howard, 1881; *Coccophagus californicus* Howard, 1889; *Coccophagus coccidis* Girault, 1917; *Coccophagus cognatus* Howard, 1881; *Coccophagus corni* Alam, 1956; *Coccophagus lecanii* (Fitch, 1859); *Coccophagus lycimnia* (Walker, 1839); *Coccophagus taxi* Alam, 1956; *Coccophagus vividus* Howard, 1885; *Eulophus scutellaris* Nees, 1834; *Platygaster lecanii* Fitch, 1859.

**Distribution in Iran.** East Azarbaijan <sup>[26]</sup>, Kerman <sup>[104]</sup>, Lorestan, Markazi <sup>[9,10]</sup>, Guilan <sup>[23,24]</sup>, West Azarbaijan <sup>[41]</sup>.

**Distribution outside Iran.** Argentina, Armenia, Australia, Azerbaijan, Belgium, Bermuda, Brazil, Bulgaria, Canada, Caucasus, Chile, China, Colombia, Croatia, Cuba, Cyprus, Czech Republic, Egypt, El Salvador, France, Georgia, Germany, Greece, Hawaii, Hungary, India, Indonesia, Israel, Italy, Jamaica, Japan, Kazakhstan, Mexico, Moldova, Montenegro, the Netherlands, Peru, Poland, Portugal, Puerto Rico, Romania, Russia and adjacent countries (Federation of Independent States), Serbia, Slovakia, South Africa, Spain, St Vincent & Grenadines, Sweden, Switzerland, Taiwan, Trinidad & Tobago, Turkey, Uganda, UK, Ukraine, USA, Uzbekistan, former Yugoslavia.

**Host in Iran.** Hemiptera: Diaspididae: *Lepidosaphes pistaciae* (Archangelskaya) <sup>[104]</sup>, *Sphaerolecanium prunastri* (Boyer de Fonscolombe) <sup>[23,24, 9,10, 26]</sup>; Hemiptera: Coccidae: Unknown Coccidae <sup>[104]</sup>, *Coccus hesperidum* (Linnaeus), and *Eulecanium coryli* (Linnaeus) <sup>[23,24]</sup>, *Didesmococcus unifasciatus* (Archangelskaya) <sup>[23,24, 9,10, 1]</sup>, *Eulecanium tiliae* (Linnaeus) <sup>[9,10]</sup>, *Pulvinaria betulae* (Linnaeus) <sup>[41]</sup>.



**3.7.7. *Coccophagus proximus* Yasnosh, 1966**

*Coccophagus proximus* Yasnosh, 1966; *Coccophagus proximus* Yasnosh, 1966.

**Distribution in Iran.** Guilan <sup>[41]</sup>.

**Distribution outside Iran.** Azerbaijan, Georgia, Moldova, Romania, Turkey.

**Host in Iran.** Hemiptera: Pseudococcidae: *Planococcus vovae* (Nasonov) <sup>[41]</sup>.

**3.7.8. *Coccophagus pseudococci* Compere, 1933**

*Coccophagus coogensis* Subba Rao & Rai, 1969; *Coccophagus indicus* Agarwal, 1964; *Coccophagus manii* Agarwal, 1964; *Coccophagus pseudococci* Compere, 1933; *Coccophagus zebratulus* Subba Rao & Rai, 1969.

**Distribution in Iran.** Fars <sup>[28, 51]</sup>.

**Distribution outside Iran.** Afghanistan, Bangladesh, China, India, Pakistan.

**Host in Iran.** Hemiptera: Pseudococcidae: *Nipaecoccus viridis* (Newstead) <sup>[51]</sup>, and *Maconellicoccus hirsutus* (Green) <sup>[28]</sup>.

**3.7.9. *Coccophagus rusti* Compère, 1928**

*Coccophagus rusti* Compère, 1928.

**Distribution in Iran.** Semnan <sup>[41]</sup>.

**Distribution outside Iran.** Israel, Kenya, Mexico, Peru, South Africa, Uganda, USA.

**Host in Iran.** Hemiptera: Coccidae: *Coccus* sp. <sup>[41]</sup>.

**3.7.10. *Coccophagus scutellaris* (Dalman, 1825)**

*Aphelinus scutellaris* (Dalman, 1826); *Caecophagus scutellaris* (Dalman, 1826); *Myina semicircularis* Foerster, 1841; *Coccophagus australiensis* Girault, 1917; *Coccophagus scutellaris* (Dalman, 1826); *Encyrtus scutellaris* (Dalman, 1826); *Entedon scutellaris* Dalman, 1826; *Encyrtus xanthostictus* Ratzeburg, 1852; *Coccophagus lunulatus* Howard, 1894.

**Distribution in Iran.** Guilan, Mazandaran <sup>[41]</sup>, Kerman <sup>[104]</sup>, East Azarbaijan <sup>[41]</sup>.

**Distribution outside Iran.** Afghanistan, Afrotropical, Argentina, Australia, Bermuda, Brazil, Canada, Canary Islands, Caucasus, China, Czech Republic, Dominican Republic, Egypt, France, Georgia, Germany, Greece, Hungary, Israel, Italy, Japan, Lebanon, Madeira, Mexico, Morocco, Poland, Portugal, Puerto Rico, Russia and adjacent countries (Federation of Independent States), Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, Ukraine, USA, Uruguay, Venezuela, former Yugoslavia.

**Host in Iran.** Hemiptera: Coccidae: Unknown Coccidae <sup>[104]</sup>, *Coccus hesperidum* (Linnaeus), *Pulvinaria betulae* (Linnaeus) and *Pulvinaria vitis* (Linnaeus) <sup>[41]</sup>.

**3.7.11. *Coccophagus silvestrii* Compere, 1931**

*Coccophagus silvestrii* Compere, 1931.

**Distribution in Iran.** Alborz <sup>[41]</sup>, Kerman <sup>[104]</sup>.

**Distribution outside Iran.** Bangladesh, China, Czech Republic, France, India.

**Host in Iran.** Hemiptera: Coccidae: Unknown Coccidae <sup>[104]</sup>, *Coccus hesperidum* (Linnaeus) <sup>[41]</sup>.

**3.8. Genus *Encarsia* Foerster, 1878**

*Encarsia* Foerster 1878: 65–66. Type species: *Encarsia tricolor* Foerster, designation by monotypy.

*Aspidiotiphagus* Howard 1894a: 229; *Prospalta* Howard 1894b: 6; *Prospaltella* Ashmead 1904a: 126; *Encarsiella* Hayat 1983: 85. For

a full list of generic synonyms see Schmidt & Polaszek 2007: 85–86.

**3.8.1. *Encarsia acaudaleyrodis* Hayat, 1976**

*Encarsia acaudaleyrodis* Hayat, 1976.

*Encarsia acaudaleyrodis* Hayat, 1976: 158. Holotype: ♀. ZSIC. India, Rajasthan, Sardar Samand, i.1974 (M. Hayat), ex *Acaudaleyrodes rachipora* (Singh) on *Prosopis juliflora*.

**Distribution in Iran.** East Azarbaijan, West Azarbaijan <sup>[41]</sup>, Guilan <sup>[89, 93]</sup>, Isfahan, Mazandaran <sup>[1]</sup>, Khuzestan <sup>[105]</sup>, Iran (no locality cited) <sup>[41]</sup>.

**Distribution outside Iran.** Egypt, India, Spain (Canary Islands).

**Host in Iran.** Hemiptera: Aleyrodidae: *Acaudaleyrodes rachipora* Singh <sup>[36]</sup>, *A. rachipora* on *Citrus medica* (Rutaceae) <sup>[1]</sup>, *A. rachipora* on *Ziziphus spinachristi* (Rhamnaceae) <sup>[1, 41]</sup>, *Trialeurodes vaporariorum* on *Cucurbita citrullus* (Cucurbitaceae) <sup>[93]</sup>, *A. rachipora* on *Morus alba* (Moraceae) <sup>[42]</sup>, *Bemisia tabaci* (Gennadius) on cucumber <sup>[105]</sup>, *Tetraleurodes hederæ* Goux on *Hedera helix* (Araleaceae) <sup>[42]</sup>.

**Species group placement.** *E. parvella*-group <sup>[6]</sup>.

**Comments.** *E. acaudaleyrodis* is very similar to *E. mineoi* Viggiani, but in latter species, body is completely yellow except for dark clypeus; flagellar segments longer; middle tibial spur half the length of basitarsus; ovipositor at most slightly longer (1.12 times) than middle tibia, but in *E. acaudaleyrodis* 1.26 times as long as the mid tibia. Extremely similarity of *E. acaudaleyrodis* and *E. mineoi* suggests that these two species are probably sympatric species. Two another species including, *E. americana* (De Bach & Rose) and *E. basicincta* Gahan are also close to *E. acaudaleyrodis*, but the morphological differences of these species were stated by Hayat (1989, 1998).

**3.8.2. *Encarsia alemansoori* Rasekh & Polaszek, 2010**

*Encarsia alemansoori* Rasekh & Polaszek, 2010: 225. Holotype: ♀. PPRII. Iran, Fars, Kazeroun, ex. *Aleuroclava jasmini* on *Aegle correa*.

**Distribution in Iran.** Fars <sup>[85]</sup>.

**Distribution outside Iran.** Endemic to Iran.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleuroclava jasmini* (Takahashi) on *Aegle correa* (Rutaceae), *Citrus reticulata*, *Citrus limettioides* (Rutaceae) <sup>[85]</sup>.

**Species group placement.** *E. perflava*-group <sup>[85]</sup>.

**3.8.3. *Encarsia aleurochitonis* (Mercet, 1931)**

*Encarsia aleurochitonis* Mercet, 1931: 663; Hulden, 1986: 17; Tryapitsin *et al.*, 1996: 61.

*Prospaltella aleurochitonis* Mercet, 1931: 663.

**Distribution in Iran.** East Azarbaijan, West Azarbaijan <sup>[42]</sup>, Golestan <sup>[3]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Georgia, Moldavia, Russia, Turkmenistan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurochiton aceris* Modeer <sup>[36, 3]</sup>, *A. aceris* on *Acer cappadocicum* (Aceraceae), *Aleurochiton pseudoplatani* Visnya on *Euonymus japonicus* (Celastraceae) <sup>[36]</sup>.

**Species group placement.** *E. lahorensis*-group <sup>[6]</sup>.

**Comment.** This species was raised from *A. aceris* in Russia, Moldova and Georgia, from *A. acerinus* Haupt in Moldova and from *A. pseudoplatani* in Turkmenistan. The antenna of female is variable with respect to the relative length of the pedicel and the first two funicular segments. One of the most important

characteristics for identification of *E. aleurochitonis* is presence of 6-7 setae at fore wing base under submarginal vein.

### 3.8.4. *Encarsia aurantii* (Howard, 1894)

*Coccophagus aurantii* Howard, 1894: 231. Syntypes: ♀♀, U.S.A., California, San Gabriel 9.v.1887 (D.W. Coquillett) ex *Aspidiotus aurantii* var. *citrinus*. ? USNM.

**Distribution in Iran.** East Azarbaijan, West Azarbaijan <sup>[42]</sup>, Fars <sup>[65, 74, 1]</sup>, Guilan <sup>[1, 89]</sup>, Mazandaran <sup>[1]</sup>, Iran (no locality cited) <sup>[74, 36]</sup>.

**Distribution outside Iran.** Virtually cosmopolitan.

**Host in Iran.** Hemiptera: Diaspididae: *Aonidiella aurantii* (Maskell) <sup>[36]</sup>, *Aonidiella citrina* on *Citrus limetta* (Rutaceae), *Lepidosaphes gloverii* on *Citrus medica*, *Parlatoria oleae* on *Olea europaea* (Oleaceae) <sup>[1]</sup>, *Aonidiella orientalis* (Newstead) <sup>[74]</sup>, *A. orientalis* on *Citrus* sp. (Rutaceae) <sup>[65, 1, 42]</sup>, *A. aurantii* on *Citrus* sp. (Rutaceae), *Jasminum fruticans* (Oleaceae) <sup>[42]</sup>.

**Species group placement.** *E. aurantii*-group <sup>[5]</sup>.

### 3.8.5. *Encarsia axacaliae* Abd-Rabou & Ghahari, 2007

*Encarsia axacaliae* Abd-Rabou & Ghahari, 2007: 163. Holotype female. EPPRI. Isfahan, Najaf-Abad, ex *Axacalia spiranthi* Danzing on *Convulvulus arvensis*.

**Distribution in Iran.** Isfahan <sup>[5]</sup>.

**Distribution outside Iran.** Endemic to Iran.

**Host in Iran.** Hemiptera: Aleyrodidae: *Axacalia spiranthi* Danzing on *Convulvulus arvensis* (Convolvulaceae) <sup>[5]</sup>.

**Species group placement.** *E. lahorensis*-group.

### 3.8.6. *Encarsia azimi* Hayat, 1980

*Trichapous indicus* Azim & Shafee, 1980: 335. Holotype female. ZDAMU. India, Tamil Nadu, Ootacamund, ex aleyrodid on *Nerium* (Apocynaceae). Preoccupied by *Prospaltella indica* Shafee, 1973: 255.

*Encarsia adrianae* Lopez-Avila, 1987: 425. Holotype female. BMNH. Pakistan, Rawalpindi, iv.1985 ex *B. tabaci* on *Lantana camara* [ex culture UK, Ascot, Silwood Park, ex *B. tabaci*]. Synonymy by Hayat, 1998: 202.

**Distribution in Iran.** East Azarbaijan, West Azarbaijan <sup>[42]</sup>, Fars <sup>[14, 12, 74, 1]</sup>, Guilan <sup>[89]</sup>, Isfahan <sup>[33, 34]</sup>, Kerman <sup>[1]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Australia, India, Japan, Pakistan, Italy, Spain, Taiwan, Fujian.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurolobus moundi* (David & Subramaniam), *Bemisia hancocki* Corbett <sup>[34, 35]</sup>, *Bemisia afer* (Priesner & Hosny) <sup>[36]</sup>, *Bemisia tabaci* (Gennadius) <sup>[14, 74]</sup>, *B. afer* on *Urtica dioica* (Urticaceae), *Bemisia confusa* Danzig on *Glycyrrhiza glabra* (Leguminosae), *B. tabaci* on *Gossypium hirsutum* (Malvaceae) <sup>[12, 1, 42]</sup>, *B. tabaci* on *Hibiscus esculentum* (Leguminosae) <sup>[1, 42]</sup>, *B. tabaci* on *Lycopersicum esculentum* (Solanaceae), *Rosa hemisphaerica* (Rosaceae) <sup>[42]</sup>.

**Species group placement.** *E. inaron*-group <sup>[6]</sup>.

**Comments.** *E. azimi* is an oligophagous parasitoid in different regions of Iran, and parasitizes various hosts. The reared parasitoids from different hosts indicated morphological and coloration variations, as head capsule width from *B. confusa* is smaller than from *B. tabaci* and also the latter species smaller than from *B. afer*. Also, mesosoma is pale yellow in the populations from *B. confusa*, but brown in the materials from *B. tabaci* and *B. afer*.

### 3.8.7. *Encarsia bennetti* Hayat, 1984

*Encarsia bennetti* Hayat, 1984: 399. Holotype female. BMNH.

India, Maharashtra, Nagpur, ex *Aleurocanthus woglumi* Ashby on Citrus.

**Distribution in Iran.** Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** India, Pakistan, Taiwan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurocanthus woglumi* Ashby <sup>[36]</sup>.

**Species group placement.** *E. merceti*-group <sup>[6]</sup>.

### 3.8.8. *Encarsia berlesei* (Howard, 1906)

*Prospalta berlesei* Howard, 1906: 291. Syntypes ♀♀, USA, Washington, D.C., vi.1906 ex [*Pseudaulacaspis* as] *Diaspis pentagona* (Targioni). USNM.

**Distribution in Iran.** East Azarbaijan, West Azarbaijan <sup>[42]</sup>, Golestan <sup>[17]</sup>, Guilan <sup>[74, 91, 89]</sup>, Mazandaran <sup>[16, 74, 42, 1]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Virtually cosmopolitan; Argentina, Brazil, China, Europe, Japan, Sri Lanka, Uruguay, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Pseudaulacaspis pentagona* (Targionii) <sup>[16, 74, 91, 36]</sup>, *Chrysomphalus dictyospermi* Morgan on *Cydonia oblonga* (Rosaceae), *Ilex spinigera* (Aquifoliaceae) *Salix alba* (Salicaceae) <sup>[42]</sup>, *C. dictyospermi* on *Citrus aurantium* (Abd-Rabou & Ghahari 2004), *P. pentagona* on *Morus nigra* (Moraceae), *Jasminum fruticans* (Oleaceae), *Citrus sinensis* (Rutaceae) <sup>[42]</sup>. Also, *Aberus perspicuosus* Girault (Aphelinidae) was recorded as the hyperparasitoid of *E. berlesei* <sup>[17]</sup>.

**Species group placement.** *E. berlesei*-group <sup>[6]</sup>.

### 3.8.9. *Encarsia bimaculata* Heraty & Polaszek, 2000

*Encarsia bimaculata* Heraty & Polaszek, 2000: 155-157. Holotype female. USNM. India, Tabarbhani (ex culture Gainesville, Florida).

**Distribution in Iran.** Isfahan <sup>[1]</sup>.

**Distribution outside Iran.** Australia, Hong Kong, India, Indonesia, Israel, Mexico, Papua New Guinea, Philippines, possibly Sudan, Thailand, USA.

**Host in Iran.** Hemiptera: Aleyrodidae: *Bemisia argentifolii* on *Magnolia grandiflora* <sup>[1]</sup>.

**Species group placement.** *E. strenua*-group <sup>[6]</sup>.

### 3.8.10. *Encarsia cibcensis* Lopez Avila, 1987

**Distribution in Iran.** Kerman, Khorasan <sup>[1]</sup>, Kermanshah <sup>[3]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Australia, Pacific Islands, Pakistan, Taiwan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleuroclava neolitseae* on *Calendula arvensis* (Compositae), *Bemisia tabaci* on *Amaranthus retroflexus* (Amaranthaceae) <sup>[1]</sup>, *Bemisia silvatica* Danzig <sup>[34, 3]</sup>.

**Species group placement.** *E. lahorensis*-group <sup>[6]</sup>.

**Comments.** *E. cibcensis* is characterized by the distinct bare area near the leading edge of the fore wing distally from the stigmal vein and continuing along the margin towards the hind margin.

### 3.8.11. *Encarsia citrina* (Craw, 1891)

*Coccophagus citrinus* Craw, 1891: 25. Syntypes: ♀♀, USA, California, San Gabriel Valley, 1889 [ex *Aspidiotus citrinus*] lost. Neotype ♀ designated by DeBach & Rose, 1981: 671, same data as syntypes. USNM.

**Distribution in Iran.** East Azarbaijan, West Azarbaijan <sup>[42]</sup>, Guilan <sup>[89, 59]</sup>, Mazandaran <sup>[84, 1]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Cosmopolitan species.

**Host in Iran.** Hemiptera: Diaspididae: *Nuculaspis abietis* Schrank <sup>[84]</sup>, *Parlatoria ziziphi* <sup>[36]</sup>, *Lepidosaphes beckii* on *Citrus medica* (Rutaceae), *P. ziziphi* on *Citrus sinensis* <sup>[1]</sup>, *Aonidiella citrina*

(Coquillett) on *Camellia* sp. (Teaceae), *L. beckii* on *Prosopis spicigera*, *Leucaspis pusilla* Loew on *Pinus* sp., *Leucaspis riccae* Targioni Tozzetti on *Nerium oleander* (Apocynaceae), *Parlatoria pergandii* Comstock on *Cerasus avium*, *Pinnaspis aspidistrae* Signoret on *Chamaerops* sp. <sup>[42]</sup>.

**Species group placement.** *E. citrina*-group <sup>[6]</sup>.

**Comments.** *E. citrina* shows morphological variations especially in the relative dimensions of antennal segments. Difference of morphological characters is probably resulted of host variation.

### 3.8.12. *Encarsia clypealis* (Silvestri, 1928)

**Distribution in Iran.** Golestan <sup>[3]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** India, Malaysia, Mexico, Pakistan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurocanthus ziziphi* Priesner & Hosny <sup>[36]</sup>; Diaspididae: *Lepidosaphes beckii* (Newman) <sup>[3]</sup>.

**Species group placement.** *E. opulenta*-group <sup>[6]</sup>.

**Comments.** *E. clypealis* is easily distinguishable from other species of *E. opulenta*-group by the presence of triangular 'tooth' on clypeus in both sexes, and the narrower frontovertex.

### 3.8.13. *Encarsia dialeurodis* Hayat, 1989

*Encarsia dialeurodis* Hayat, 1989: 75. Holotype female. BMNH. Paratypes 5 female, ex *Dialeurodes* sp. on *Ficus religiosa*, CIBC, Pakistan, Multan.

**Distribution in Iran.** Semnan <sup>[3]</sup>.

**Distribution outside Iran.** India, Pakistan, Turkmenistan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Dialeurodes kirkaldyi* (Kotinsky) <sup>[3]</sup>.

**Species group placement.** *E. strenua*-group <sup>[6]</sup>.

### 3.8.14. *Encarsia dialeuroporae* Viggiani, 1985

*Encarsia dialeuroporae* Viggiani, 1985b: 84. Holotype female, on slide. IEUN. Pakistan, Peshawar, ex *Dialeuropora decempunctata* (Quaintance & Baker) on *Rosa indica*.

**Distribution in Iran.** Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Afghanistan, Iraq, Pakistan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Dialeuropora decempunctata* Quaintance & Baker <sup>[36]</sup>.

**Species group placement.** *E. lutea*-group <sup>[6]</sup>.

### 3.8.15. *Encarsia elegans* Masi, 1911

*Encarsia elegans* Masi, 1911: 147. Holotype ♀, Italy, Catanzaro, v. ex *Aleurolobus olivinus* (Silvestri). IEUN.

*Encarsia bifasciifacies* Hayat, 1989: 58. Synonymised by Huang & Polaszek, 1998.

**Distribution in Iran.** East Azarbaijan, West Azarbaijan <sup>[42]</sup>, Golestan, Isfahan <sup>[61]</sup>, Guilan <sup>[3, 89]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** China, Egypt, India, Italy, Taiwan, Pakistan.

**Host in Iran.** Hemiptera: Diaspididae: *Aonidiella orientalis* (Newstead) <sup>[36]</sup>; Aleyrodidae: *Aleurolobus niloticus* Priesner & Hosny <sup>[61]</sup>, *A. niloticus* on *Amaranthus blitoides* (Amaranthaceae) and *Euphorbia glomerifera* (Euphorbiaceae), *Aleurolobus olivinus* (Silvestri) <sup>[61]</sup>, *Siphoninus immaculatus* (Heeger) on *Hedera helix* (Araliaceae) <sup>[42]</sup>, *Siphoninus immaculatus* (Heeger) <sup>[3]</sup>.

**Species group placement.** *E. elegans*-group <sup>[6]</sup>.

### 3.8.16. *Encarsia elongata* (Dozier, 1937)

*Prospaltella aurantii* (Howard): Silvestri, 1929: 902; 1931a: 49.

*Coccophagus herndoni* Girault, 1935: 3. Name proposed by Girault

for material misidentified by Silvestri, ♀♀ Foochow [Fuzhou], Changsha, Soochow [Suzhou]. IEUN.

*Prospaltella elongata* Dozier, 1937: 128. Holotype female. USNM. USA, New Orleans, ex *Lepidosaphes gloverii* (Packard) on *Euonymus* shrub.

**Distribution in Iran.** Caspian Sea area <sup>[74]</sup>, East Azarbaijan <sup>[42]</sup>, Golestan <sup>[1]</sup>, Guilan <sup>[89]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** China, India, Spain, Italy, Taiwan, Puerto Rico, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Lepidosaphes gloverii* <sup>[74]</sup>, *Chrysomphalus aonidium* (L.) <sup>[36]</sup>, *C. aonidium* on *Althea officinalis* (Malvaceae), *Euphorbia cyathophora* (Euphorbiaceae), *Chrysomphalus dictyospermi* Morgan on *Lanthana camara* (Verbenaceae) <sup>[42]</sup>; Aleyrodidae: *Aleurolobus niloticus* on *Amaranthus blitoides* (Amaranthaceae) <sup>[1]</sup>.

**Species group placement.** *E. aurantii*-group <sup>[6]</sup>.

### 3.8.17. *Encarsia fasciata* (Malenotti, 1917)

*Prospaltella fasciata* Malenotti, 1917: 195. Syntype female. ? ISZA. Italy, Florence, ex *Chrysomphalus dictyospermi* on *Sansevieria arborescens*.

**Distribution in Iran.** Caspian Sea area <sup>[74]</sup>, East Azarbaijan, West Azarbaijan <sup>[42]</sup>, Guilan <sup>[91, 89]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** China, France, Italy, Pakistan, Spain, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Aonidiella aurantii*, *Aonidiella citrina* <sup>[74]</sup>, *Pseudaulacaspis pentagona* (Targionii) <sup>[91]</sup>, *Chrysomphalus dictyospermi* (Morgan) <sup>[74, 36]</sup>, *Chionaspis lepinyei* Ballachowski on *Quercus libani* (Fagaceae), *Chionaspis parastigma* Ballachowski on *Quercus persica* (Fagaceae), *C. dictyospermi* on *Cercis griffithii* (Fabaceae), *Laurus nobilis*, *Malus* sp., *Punica* sp. (Punicaceae) <sup>[42]</sup>.

**Species group placement.** *E. aurantii*-group <sup>[6]</sup>.

### 3.8.18 *Encarsia formosa* Gahan, 1924

*Encarsia formosa* Gahan, 1924, 14. Syntypes ♀♀ (no holotype as mentioned by Polaszek *et al.* 1992) [USA] Idaho, Twin Falls. USNM.

**Distribution in Iran.** Alborz, Fars <sup>[1]</sup>, East Azarbaijan (Ghahari *et al.* 2011), Golestan, Mazandaran <sup>[74, 1]</sup>, Guilan <sup>[89, 93]</sup>, Isfahan <sup>[74, 34, 35, 1]</sup>, Markazi <sup>[9, 10]</sup>, Tehran <sup>[74]</sup>, West Azarbaijan <sup>[1, 42]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** The species originated in the USA and Canada. It has spread all over the world through introduction (cosmopolitan).

**Host in Iran.** Hemiptera: Aleyrodidae: *Trialeurodes vaporariorum* Westwood <sup>[74, 34, 35, 36]</sup>, *Bemisia tabaci* (Gennadius) <sup>[74, 34, 35]</sup>, *Aleyrodes singularis* <sup>[9, 10]</sup>, *Aleyrodes lonicerae* Walker on *Solanum melongena* (Solanaceae), *Aleyrodes prolella* on *Raphanus raphanistrum* (Brassicaceae), *Bemisia tabaci* on *Gossypium hirsutum* (Malvaceae), *Trialeurodes vaporariorum* on *Phaseolus vulgaris* var. *contender* (Leguminosae), *B. tabaci* on *Amaranthus spinosus* (Chenopodiaceae), *Trialeurodes vaporariorum* on *Vicia faba* (Leguminosae), *Bemisia tabaci* on *Corchorus olitorius* (Tiliaceae) <sup>[1, 42]</sup>, *Trialeurodes vaporariorum* on *Cucurbita maxima* (Cucurbitaceae) <sup>[93]</sup>, *Bemisia tabaci* on *Lycopersicum esculentum* (Solanaceae), *Rosa* sp. (Rosaceae), *T. vaporariorum* on *Lycopersicum esculentum* (Solanaceae), *Verbena hybrida* (Verbenaceae) <sup>[42]</sup>.

**Species group placement.** *E. luteola*-group <sup>[6]</sup>.

**Comments.** *E. Formosa* is a successful agent for biological control

of *Trialeurodes vaporariorum* in the greenhouses, *Bemisia tabaci* in the fields, and probably other aleyrodids. *T. vaporariorum* is the main host, but the parasitoid is also known from some other species of whiteflies. *E. Formosa* was introduced into Iran between 1945 and 1950 for control of *T. vaporariorum* and *B. tabaci* in the greenhouses<sup>[94]</sup>. This efficient parasitoid is a cosmopolitan species in Iran.

### 3.8.19. *Encarsia gautieri* (Mercet, 1928)

*Encarsia gautieri* Mercet: Nikol'skaya & Jasnosh, 1966: 271.

**Distribution in Iran.** East Azarbaijan<sup>[40]</sup>.

**Distribution outside Iran.** Azerbaijan, Georgia, Turkey.

**Host in Iran.** Hemiptera: Aleyrodidae: *Pealius azaleae* (Baker & Moles) on *Azalea pontica* (Ericaceae)<sup>[40]</sup>.

**Species group placement.** *E. tricolor*-group<sup>[47]</sup>.

### 3.8.20. *Encarsia gigas* (Chumakova, 1957)

**Distribution in Iran.** Kermanshah<sup>[58]</sup>.

**Distribution outside Iran.** Italy, Lebanon.

**Host in Iran.** Hemiptera: Diaspididae: *Diaspidiotus gigas* (Thiem & Gerneck)<sup>[58]</sup>.

**Species group placement.** *E. aurantii*-group<sup>[6]</sup>.

### 3.8.21. *Encarsia hamata* Huang & Polaszek, 1998

**Distribution in Iran.** Fars<sup>[85,86]</sup>.

**Distribution outside Iran.** China, Japan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurolobus marlatti* on *Citrus aurantium*, *Aleuroclava jasmini* on *Citrus reticulata* and *Citrus limettioides*<sup>[85,86]</sup>, *A. jasmini* on *Aegle correa* (Rutaceae)<sup>[85]</sup>, *Bemisia tabaci* (Gennadius) on *Helianthus annuus* (Asteraceae), unknown aleyrodid on *Ziziphus spinachristi*<sup>[85]</sup>.

**Species group placement.** *E. lutea*-group<sup>[6]</sup>.

### 3.8.22. *Encarsia inaron* (Walker, 1839)

*Aphelinus inaron* Walker, 1839: 10. Lectotype female. NMI. [designated by Graham, 1976]; [UK] (Haliday).

*Encarsia partenopea* Masi, 1909: 32. Holotype female. UNP. Italy, Campania, Portici, ex aleyrodid on *Phillyrea*.

*Encarsia indifferentis* Mercet, 1929: 220. Holotype female. MNCN. Egypt: [?Giza].

*Trichaporus aleyrodidis* Mercet, 1930: 196. Syntype 4♂, 12♀. MNCN. France: ex *A. prolella*.

*Encarsia borealis* Hulden, 1986: 18. Holotype female. MZH. Finland, Ta, Lammi, ex *Pealius quercus* on *Corylus avellana*.

**Distribution in Iran.** East Azarbaijan, West Azarbaijan<sup>[42]</sup>, Fars<sup>[14, 12, 74, 1]</sup>, Golestan<sup>[74,60]</sup>, Guilan<sup>[89, 93]</sup>, Isfahan<sup>[34, 35, 1]</sup>, Khuzestan<sup>[73]</sup>, Markazi<sup>[9,10]</sup>, Mazandaran<sup>[1]</sup>, Tehran<sup>[74]</sup>, Iran (no locality cited)<sup>[36]</sup>.

**Distribution outside Iran.** Palaearctic region; Bulgaria, England, France, Greece, Israel, Italy, Jordan, Egypt, India, North Africa, Pakistan, Taiwan, introduced into North America, almost regions of Asia and Africa.

**Host in Iran.** Hemiptera: Aleyrodidae: *Acaudaleyrododes citri* Priesner & Hosny<sup>[34,35]</sup>, *Aleyrododes singularis* Danzig<sup>[12, 74, 34, 35]</sup>, *Bemisia tabaci* (Gennadius)<sup>[14, 74, 60]</sup>, *Siphoninus phillyreae* (Haliday)<sup>[12, 74, 36]</sup>, *B. tabaci* on *Gossypium hirsutum* (Malvaceae)<sup>[12]</sup>, *Trialeurodes vaporariorum* Westwood<sup>[74, 34, 35, 9, 10]</sup>, *Aleyrododes singularis* on *Euphorbia pulcherrima* (Euphorbiaceae)<sup>[42]</sup>, *Siphoninus immaculatus* (Heeger) on *Hedera helix* (Araliaceae), *S. phillyreae* on *Ulmus campestris* (Ulmaceae)<sup>[1]</sup>, *S. phillyreae* on *Ulmus carpiniifolia* var. *umbraculifera*, *Trialeurodes vaporariorum* on *Rosa beggariana* (Rosaceae)<sup>[1,42]</sup>, *Trialeurodes vaporariorum*

on *Cucurbita sativa* (Cucurbitaceae), *T. vaporariorum* on *Cucurbita citrullus* (Cucurbitaceae), *T. vaporariorum* on *Helianthus tuberosus* (Asteraceae)<sup>[93]</sup>, *Neomaskellia andropogonis* Corbett on sugarcane<sup>[73]</sup>.

**Species group placement.** *E. inaron*-group<sup>[6]</sup>.

**Comments.** *E. inaron* is a widespread species, and rather efficient parasitoid for control of the *Trialeurodes vaporariorum* in the greenhouses and *Siphoninus phillyreae* in nature. *E. inaron* constitutes a complex of cryptic species, which morphometric and molecular analysis of the *E. inaron* species-group was detailed studied by Manzari *et al.* (2002), and a new species was described as *E. estrellae* Manzari & Polaszek. Addition of the above synonyms, it appears that *E. longicornis* Mercet and *E. siphonini* Silvestri may also constitute the synonyms of *E. inaron*, but further study by advanced taxonomic methods is necessary to confirm this. Different populations of *E. inaron* show color differences, and this variety resulted to ambiguities. Hulden (1986) described *E. borealis* on the base of minor color differences from *E. aleyrodidis*. Polaszek *et al.* (1992) and Laudonia & Viggiani (1995) have discussed color variation in this species. Comprehensive studies of the biology of *E. inaron* have been performed in Iran<sup>[31,33]</sup>.

### 3.8.23. *Encarsia indigoferae* Polaszek & Manzari, 2008

*Encarsia indigoferae* Polaszek & Manzari, 2008: 134. Holotype female. HMIM. Iran, Sistan & Balouchestan, Chabahar, Nobandian, ex *Aleuromarginatus tephrosiae* Corbett on *Indigofera* sp.

**Distribution in Iran.** Sistan & Balouchestan<sup>[81]</sup>.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleuromarginatus tephrosiae* Corbett on *Indigofera* sp. (Fabaceae)<sup>[81]</sup>.

**Distribution outside Iran.** Oman.

**Species group placement.** *E. strenua*-group<sup>[81]</sup>.

### 3.8.24 *Encarsia inquirenda* (Silvestri, 1931)

*Prospaltella inquirenda* Silvestri, 1931a: 53. Syntypes female. IEUN. Fukian, Fuzhou, Guik Su; Japan: Okitsu, ex *Chrysomphalus aonidium* and *Parlatoria olea*.

**Distribution in Iran.** Guilan<sup>[59]</sup>.

**Distribution outside Iran.** Widespread in the Palaearctic Region.

**Host in Iran.** Hemiptera: Diaspididae: Unknown species<sup>[59]</sup>.

**Species group placement.** *E. aurantii*-group<sup>[6]</sup>.

### 3.8.25. *Encarsia lahorensis* (Howard, 1911)

*Prspaltella lahorensis* Howard, 1911: 132. Lectotype female. USNM. Pakistan, Lahore, (designated by Hayat, 1981: 466).

**Distribution in Iran.** Khorasan, Mazandaran<sup>[1,88]</sup>.

**Distribution outside Iran.** China, Egypt, India, Italy, Pakistan, Russia and adjacent countries (Federation of Independent States), Taiwan, USA.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleyrododes elevatus* Silvestri on *Corchorus trilocularis* (Tiliaceae), *Dialeurodes citri* (Ashmead) on *Citrus bigaradia* (Rutaceae)<sup>[88]</sup>.

**Species group placement.** *E. lahorensis*-group<sup>[6]</sup>.

**Comments.** This species is one of the efficient parasitoids of *Dialeurodes citri* and control successfully this pest in citrus plantations like as northern Iran and Mediterranean countries. The females of this parasitoid develop from fertilized eggs that were laid into 3<sup>rd</sup> and 4<sup>th</sup> instars of host larvae.

### 3.8.26. *Encarsia lehri* Yasnosh, 1989

*Encarsia lehri* Yasnosh, 1989: 112-113; Tryapitzin *et al.* 1996: 65.

**Distribution in Iran.** Khorasan <sup>[40]</sup>.

**Distribution outside Iran.** Caucasus, Russia and adjacent countries (Federation of Independent States).

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurolobus wuenni* on *Clematis vitalba* (Ranunculaceae) <sup>[40]</sup>.

**Species group placement.** *E. strenua*-group (Polaszek & Manzari 2008).

### 3.8.27. *Encarsia lipaleyrodes* Krishnan & David, 1996

*Encarsia lipaleyrodes* Krishnan & David, 1996: 19. Holotype female. India, Padappai, ex *Lipaleyrodes euphorbia* David & Subramaniam on *Phullanthus acidus*.

**Distribution in Iran.** Kerman <sup>[3]</sup>.

**Distribution outside Iran.** India, Pakistan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Lipaleyrodes euphorbiae* David & Subramaniam <sup>[3]</sup>.

**Species group placement.** *E. lahorensis*-group <sup>[48]</sup>.

**Comments.** *E. lipaleyrodis* is very close to *E. pseudococci*, but differs from the latter as follow. In *E. lipaleyrodis*, F1 about 1.5 times as long as broad or about 0.75 times of F2; basal cell with 2 setae; body yellow, with anterior margin of midlobe, propodeum, and petiole brown, and T1 of gaster with a dark brown band across base. In *E. pseudococci*, F1 slightly longer than broad and about 0.5 times of F2, or slightly longer; basal cell with 6 setae; body probably completely yellow.

### 3.8.28 *Encarsia longifasciata* Subba Rao, 1984

*Encarsia longifasciata* Subba Rao, 1984: 260. Holotype female. BMNH. India, Bangalore, ex blackfly on *Murraya*.

**Distribution in Iran.** Isfahan <sup>[40]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** China, India, Pakistan, Taiwan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleuroclava neolitsea* (Takahashi) <sup>[36]</sup>, *A. neolitsea* on *Ficus capensis* (Moraceae) <sup>[40]</sup>.

**Species group placement.** *E. longifasciata*-group <sup>[6]</sup>.

### 3.8.29. *Encarsia longivalvula* Viggiani, 1985

*Encarsia longivalvula* Viggiani, 1985b: 85. Holotype female. IEUN. Pakistan, Peshawar, ex *Dialeurodes decempunctata* on *Rosa indica*.

**Distribution in Iran.** Isfahan, Sistan & Baluchestan <sup>[40]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Afghanistan, Iraq, Pakistan, Taiwan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Dialeuropora decempunctata* (Quaintance & Baker) <sup>[36]</sup>, *D. decempunctata* on *Eucalyptus camalduleis* (Myrtaceae), *Bemisia tabaci* on *Malva neglecta* (Malvaceae) <sup>[40]</sup>.

**Species group placement.** *E. strenua*-group <sup>[6]</sup>.

### 3.8.30. *Encarsia lounsburyi* (Berlese & Paoli, 1916)

*Prospaltella lounsburyi* Berlese & Paoli, 1916: 305. Syntypes female. ? ISZA. Madeira, ex *Chrysomphalus dictyospermi* Morgan.

**Distribution in Iran.** East Azarbaijan, West Azarbaijan <sup>[42]</sup>, Guilan <sup>[89]</sup>, Mazandaran <sup>[1]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Cosmopolitan and widely distributed species.

**Host in Iran.** Hemiptera: Diaspididae: *Parlatoria asiatica* Borchsenius <sup>[36]</sup>, *Parlatoria pergandei* <sup>[1, 36]</sup>, *Parlatoria ziziphi* Lucas on *Hedera helix* (Araliaceae) <sup>[1, 42]</sup>, *Aspidiotus nerii* Bouche on *Aralia* sp., *Hemiberlesia lataniae* (Signoret) on *Ulmus campestris* (Ulmaceae), *P. asiatica* on *Ephedra* sp., *P. pergandei* on *Althea rosea* (Malvaceae), *Cammelia japonica* (Teaceae) <sup>[42]</sup>.

**Species group placement.** *E. citrina*-group <sup>[6]</sup>.

**Comments.** *E. lounsburyi* is very close to *E. citrina* (Craw). The main difference between the two species is the number of setae on the submarginal vein, one seta in *E. lounsburyi* but two in *E. citrina*. Also, fore wings of *E. lounsburyi* with longer marginal fringe than *E. citrina*, and petiole with fine sculpture.

### 3.8.31. *Encarsia lutea* (Masi, 1909)

*Prospaltella lutea* Masi, 1909: 25. Syntypes 2♀♀. IEUN. Italy, Campania, Portici.

**Distribution in Iran.** East Azarbaijan, West Azarbaijan <sup>[42]</sup>, Fars <sup>[14, 12, 74, 1]</sup>, Golestan <sup>[60]</sup>, Guilan <sup>[89]</sup>, Isfahan <sup>[34, 35, 1]</sup>, Mazandaran <sup>[1]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Italy, Russia and adjacent countries (Federation of Independent States); India, China, Pakistan, Taiwan, Palaearctic region; Australia and adjacent regions.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleyrodes prolella* L., *Bulgarialeurodes cotesii* Maskell, *Trialeurodes ricini* (Misra) <sup>[74, 34, 35]</sup>, *Bemisia tabaci* (Gennadius) <sup>[14, 74, 60, 36]</sup>, *Trialeurodes ricini* on *Ricinus communis* (Euphorbiaceae) <sup>[12]</sup>, *Bemisia tabaci* on *Gossypium hirsutum* (Malvaceae) <sup>[12, 1, 42]</sup>, *Aleurolobus marlatti* Quaintance on *Verbena officinalis* (Verbenaceae) and *Abutilon foliosum* (Malvaceae) <sup>[1, 42]</sup>, *Aleurocanthus spiniferus* Quaintance on *Ficus capensis* (Moraceae), *A. marlatti* on *Punica granatum* (Punicaceae), *Bemisia ovata* Goux on *Helianthus annuus* (Compositae), *B. tabaci* on *Cucumis sativus* (Cucurbitaceae), *Dialeurodes kirkaldyi* (Kotinsky) on *Juglans regia* (Juglandaceae) <sup>[42]</sup>.

**Species group placement.** *E. lutea*-group <sup>[6]</sup>.

**Comments.** There exists considerable color variations of *E. lutea*, as two or more species may be involved, but further studies are required to either confirm or refute this. Different populations of *E. lutea*, but populations from Australia and the Pacific Islands differ from each other by a single point mutation in the D2 expansion region of the 28S ribosomal DNA gene region <sup>[19]</sup>. Additionally coloration, this species shows variation in the dimensions of the antennal segments, and length of the marginal fringe compared to wing width <sup>[48]</sup>. The male of *E. lutea* was collected from eggs of *Heliothis zea* (Boddie) and *Trichoplosia ni* (Hubner) (Noctuidae) in Golestan province, northern Iran. *E. lutea* is the most important parasitoid on *Bemisia tabaci* in cotton fields of Iran <sup>[13, 96]</sup>.

### 3.8.32 *Encarsia luteola* Howard, 1895

*Encarsia lutea* Howard, 1895: 29. Holotype ♀. USNM. USA, Washington, DC.

*Encarsia angelica* Howard, 1895: 30. Holotype ♂, [USA: California, Los Angeles, (Coquillett)].

*Encarsia deserti* Gerling & Rivnay, 1984: 439. Holotype ♀, (UTA) syn. n.; Myartseva & Yasnosh, 1992: 19.

**Distribution in Iran.** Guilan (Sakenin et al. 2006a), West Azarbaijan <sup>[42]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Brazil, Guadeloupe, Mexico, Puerto Rico, USA, Israel, Russia and adjacent countries (Federation of Independent States).

**Host in Iran.** Hemiptera: Aleyrodidae: *Trialeurodes variabilis* Quaintance <sup>[36]</sup>, *Trialeurodes lauri* (Signoret) on *Laurus nobilis* (Lauraceae), *T. variabilis* Quaintance on *Cyperus rotundus* (Cyperaceae) <sup>[42]</sup>.

**Species group placement.** *E. luteola*-group <sup>[6]</sup>.

**3.8.33. *Encarsia macoensis* Abd-Rabou & Ghahari, 2007**

*Encarsia macoensis* Abd-Rabou & Ghahari, 2007: 165. Holotype female. EPPRI. West Azarbaijan, Maco, ex *Bemisia tabaci* (Genn.) on *Berberis vulgaris*.

**Distribution in Iran.** West Azarbaijan<sup>[5]</sup>.

**Distribution outside Iran.** Endemic to Iran.

**Host in Iran.** Hemiptera: Aleyrodidae: *Bemisia tabaci* (Gennadius) on *Berberis vulgaris* (family?)<sup>[5]</sup>.

**Species group placement.** *E. strenua*-group.

**3.8.34. *Encarsia macroptera* Viggiani, 1985**

*Encarsia macroptera* Viggiani, 1985a: 87. Holotype female. IEUN. Pakistan, Peshawar.

*Encarsia leptosoma* Hayat, 1989: 44. Holotype female. BMNH. India, Punjab.

**Distribution in Iran.** Isfahan<sup>[40]</sup>, Iran (no locality cited)<sup>[36]</sup>.

**Distribution outside Iran.** India, Pakistan, Turkmenistan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurolobus moundi* David & Subramaniam<sup>[36]</sup>, *A. moundi* on *Euphorbia glomerifera* (Euphorbiaceae)<sup>[40]</sup>.

**Species group placement.** *E. lahorensis*-group<sup>[6]</sup>.

**Comments.** Hayat (1998) examined and compared the paratypes of *E. leptosoma* and *E. macroptera* and determined very slight differences on the number of setae in basal cell and the length of marginal fringe. However, these species are considered synonym and it is appear that advanced taxonomic methods can eliminate the probable doubts.

**3.8.35. *Encarsia margaritiventris* (Mercet, 1931)**

**Distribution in Iran.** Ilam (Abd-Rabou et al. 2005a).

**Distribution outside Iran.** Finland, Moldavia, Poland, Russia and adjacent countries (Federation of Independent States), Turkey.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurotuba jelinekii* Frauenfeld<sup>[3]</sup>.

**Species group placement.** *E. inaron*-group<sup>[6]</sup>.

**Comments.** Hulden (1986) stated that *E. margaritiventris* is a monophagous parasitoid only on *Aleurochiton aceris* Modeer, but the present survey and other ones<sup>[76,99]</sup> indicated that, the species parasitizes another species of whiteflies. This species very similar to *E. inaron*, but differs from the latter by larger size (fore wing 0.84 mm against 0.62 mm for *E. inaron*) and the longer first funicular segment.

**3.8.36. *Encarsia maritima* Jasnosh, 1989**

*Encarsia maritima* Jasnosh, 1989: 114-116; Tryapitzin et al. 1996: 66.

**Distribution in Iran.** Khorasan<sup>[40]</sup>.

**Distribution outside Iran.** Caucasus, Russia and adjacent countries (Federation of Independent States).

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurolobus wunni* (Ryberg) on *Ranunculus arvensis* (Ranunculaceae)<sup>[40]</sup>.

**Species group placement.** *E. strenua*-group<sup>[81]</sup>.

**3.8.37. *Encarsia mineoi* Viggiani, 1982**

*Encarsia mineoi* Viggiani, 1982: 27. Holotype female. IEUN. Libya, Sidi Mesri, ex *B. tabaci*; Abd-Rabou & Viggiani, 1998: 12.

**Distribution in Iran.** East Azarbaijan, West Azarbaijan<sup>[42]</sup>, Khorasan<sup>[1]</sup>, Mazandaran<sup>[1,88]</sup>.

**Distribution outside Iran.** Australia, Egypt, Iraq, Israel, Libya, Palestine, Spain, Sudan, Syria.

**Host in Iran.** Hemiptera: Aleyrodidae: *Acaudaleyrodes rachipora*

(Singh)<sup>[88]</sup>, *A. rachipora* on *Citrus decumana* (Rutaceae)<sup>[1]</sup>, *Trialeurodes vaporariorum* on *Citrullus colocynthis* (Cucurbitacea)<sup>[1, 42]</sup>, *Siphoninus immaculatus* (Heeger) on *Populus nigra* (Salicaceae), *Siphoninus phillyreae* on *Fraxinus excelsior* (Oleaceae)<sup>[42]</sup>.

**Species group placement.** *E. parvella*-group<sup>[6]</sup>.

**Comments.** *E. mineoi* is very closed to *E. acaudaleyrodis* and perhaps these species are conspecific<sup>[80]</sup>. The most reliable difference is the ovipositor length, which is, in *E. mineoi*, shorter than, or up to 1.1 times the length of the middle tibia, and in *E. acaudaleyrodes* 1.2 times as long as the middle tibia<sup>[80]</sup>. There are many materials as *E. mineoi* in Israel; with due attention to their host (*Acaudaleyrodes citri*), it is possible that all of them are *E. acaudaleyrodis*. Re-examination of these materials is necessary for final statement. Males of *E. mineoi* were reared by Polaszek et al. (1999) and presumably as hyperparasitoids, from *Trialeurodes vaporariorum*.

**3.8.38. *Encarsia mohyuddini* Shafee & Rizvi, 1982**

*Encarsia mohyuddini* Shafee & Rizvi, 1982: 157. Holotype female. ZDAMU. Pakistan, Charsadda, ex *B. tabaci* on *Morus alba*.

**Distribution in Iran.** Khorasan<sup>[3]</sup>.

**Distribution outside Iran.** China, Pakistan.

**Host in Iran.** Hemiptera: Aleyrodidae: *Bemisia sugonjaevi* Danzig<sup>[3]</sup>.

**Species group placement.** *E. singularis*-group<sup>[101]</sup>.

**Comments.** Although, Hayat (1989) and Abd-Rabou & Ghahari (2007b) placed *E. mohyuddin* in *E. duorunga*-group, but this species could be assigned to the *E. singularis*-group, having a 4-segmented middle tarsus, plus a narrow fore wing with a long marginal fringe. It can be distinguished from species of *E. singularis*-group by its coloration. The known species in this group (*E. africana*, *E. liliyingae*, *E. singularis*), however, are the parasitoids of armored scales (Diaspididae).

**3.8.39. *Encarsia opulenta* (Silvestri, 1928)**

*Prospaltella opulenta* Silvestri, 1928: 30. Syntypes 3♀, 4♂. IEUN. [Vietnam:] Van Phu [Tonkin] ex *Aleurocanthus incertus* Silvestri.

**Distribution in Iran.** Sistan & Baluchestan<sup>[40]</sup>.

**Distribution outside Iran.** China, India, Jamaica, Malaysia, Mexico, Pakistan, Vietnam.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurocanthus spiniferus* (Quaintance) on *Hibiscus cannabinus* (Malvaceae)<sup>[40]</sup>.

**Species group placement.** *E. opulenta*-group<sup>[6]</sup>.

**Comments.** *E. opulenta* is very similar to *E. brasiliensis*, and on the base of Hayat (1989), these two species may be synonymous. But there are slight differences between them. In *E. brasiliensis*, terga IV - VI or V and VI are brown and flagellar segments are relatively shorter (F2 - F6 each less than 2 times as long as wide), where as in *E. opulenta* terga III - VI are brown to dark brown and flagellar segments are relatively longer. Silvestri (1928) recorded *Ablerus macrochaeta* Silvestri as the hyperparasitoid of *E. opulenta*.

**3.8.40. *Encarsia* sp. (nr. *perflava* Hayat, 1989)**

**Distribution in Iran.** Fars<sup>[86]</sup>.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleuroclava jasmini* on *Citrus aurantifolia* and *Citrus paradisi*<sup>[86]</sup>.

**3.8.41. *Encarsia pergandiella* Howard, 1907**

*Encarsia pergandiella* Howard, 1907: 78, Holotype female.

USNM. USA, Washington, D.C., ex *Aleyrodes* [probably *Trialeurodes* sp.] on *Xanthium strumarium*.

*Encarsia bemisiae* De Santis, 1981: 37. Preoccupied by *Encarsia bemisiae* Ishii, 1938. Holotype female. UNLP. Brazil, Sao Paulo, Campinas, *B. tabaci* (Lourencao).

**Distribution in Iran.** Guilan <sup>[93]</sup>, Isfahan <sup>[34,35,1]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Australia, Brazil, Colombia, Costa Rica, El Salvador, Grenada, Guadeloupe, Guatemala, Honduras, Israel, Italy, Mexico, Palestina, Puerto Rico, USA, Venezuela.

**Host in Iran.** Hemiptera: Aleyrodidae: *Trialeurodes vaporariorum* Westwood <sup>[45, 34, 35, 36]</sup>, *T. vaporariorum* on *Hibiscus trionum* (Malvaceae) <sup>[1]</sup>, *Trialeurodes vaporariorum* on *Cucumis sativa* (Cucurbitaceae), *T. vaporariorum* on *Cucurbita citrullus* (Cucurbitaceae), *T. vaporariorum* on *Cucurbita maxima* (Cucurbitaceae), *T. vaporariorum* on *Bidens bipinnata* (Asteraceae), *T. vaporariorum* on *Phaseolus vulgaris* (Fabaceae), *T. vaporariorum* on *Clerodendron bungei* (Verbenaceae), *T. vaporariorum* on *Abutilon theophrasti* (Malvaceae) <sup>[93]</sup>.

**Species group placement** *E. parvella*-group <sup>[48]</sup>.

**Comments.** Morphology, biology, and efficiency of this parasitoid on *T. vaporariorum* were studied by Hatami & Ghahari (2000) in Iran. *E. pergandiella* displays considerable variation both in coloration and in the length of antennal segments. This species is similar to *E. mineoi*, 5-segmented tarsal of the middle legs and a bare area near the leading edge of the forewing, but unlike in *E. mineoi*, the metasoma is completely dark brown.

### 3.8.42. *Encarsia perniciosi* (Tower, 1913)

*Prospaltella perniciosi* Tower, 1913: 125. ♀♂. MACA, USNM. USA: Amherst (Mass. State Col. Amherst), x.1912 [ex *Quadraspidiotus perniciosus* (Comstock)].

**Distribution in Iran.** East Azarbaijan, West Azarbaijan <sup>[42]</sup>, Guilan <sup>[74,1,89]</sup>, Mazandaran <sup>[1]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** India, Pakistan, China, Taiwan, Russia, USA; nearly cosmopolitan, having been widely introduced.

**Host in Iran.** Hemiptera: Diaspididae: *Quadraspidiotus perniciosus* Comstock <sup>[36,74]</sup>, *Q. perniciosus* on *Populus nigra nigra* (Salicaceae), *Robinia viscosa* (Papilionaceae) <sup>[1, 42]</sup>, *Q. perniciosus* on *Hedera helix* (Araliaceae), *Salix alba* (Salicaceae) <sup>[42]</sup>.

**Species group placement.** *E. aurantii*-group <sup>[6]</sup>.

**Comments.** *E. perniciosi* is one of the most efficient parasitoid on San Jose scale in different regions of the world. Our examining on different populations of this parasitoid indicated that there is variation in presence/absence of a longitudinal sensillum on F1. The reason of this variation that was seen in surveys of Huang & Polaszek (1998) can be the effect of different biotypes or races of hosts (armored scales) on the parasitoid or speciation of another *Encarsia* species.

### 3.8.43. *Encarsia porteri* (Mercet, 1927)

*Prospaltella citrella* Howard subsp. *porteri* Mercet, 1927: 130. Lectotype ♀. MNCN. Chile, San Bernardo "*Prospaltella citrella* subsp. *porteri* Mercet".

**Distribution in Iran.** Isfahan <sup>[34,35]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Holarctic.

**Host in Iran.** Hemiptera: Aleyrodidae: *Bemisia tabaci* (Gennadius) <sup>[34, 35, 90]</sup>, *Trialeurodes packardi* (Morill) <sup>[36]</sup>, *Trialeurodes vaporariorum* Westwood <sup>[90]</sup>. Lepidoptera: Noctuidae: eggs of *Heliothis armigera* Huebner on *Gossypium hirsutum* L. (Malvaceae) <sup>[90]</sup>.

**Species group placement.** *E. lahorensis*-group <sup>[6]</sup>.

**Comments.** *E. porteri* was originally described as a 'subspecies' of *E. citrella* (Howard), but Polaszek *et al.* (1992) believed that this species is not closely related to *E. porteri*. We have examined the available materials and compared them to the paratype and many specimens from Chile, and the presence of *E. porteri* in Iran is confirmed. Males of *E. porteri* have been recorded as facultative primary parasitoids in the eggs of various species of Lepidoptera <sup>[87,18]</sup>. Biology and efficiency of the parasitoid were studied on *Trialeurodes vaporariorum* and *Bemisia tabaci* in Iran <sup>[90]</sup>, and the results indicated that the second nymphal stage of *B. tabaci* and fourth nymphal stage of *T. vaporariorum* are preferred by the parasitoid. The mated females parasitized both 2nd nymphal stage of *B. tabaci* (or 4th of *T. vaporariorum*) and the eggs of *Heliothis armigera* Huebner (Lepidoptera: Noctuidae), but unmated females parasitized only moth's eggs.

### 3.8.44. *Encarsia protransvena* Viggiani, 1985

*Encarsia protransvena* Viggiani, 1985b: 89. Holotype female. IEUN. USA, Florida, Broward County. (C.R.R. Thompson) ex *Dialeurodes kirkaldyi*.

**Distribution in Iran.** Guilan <sup>[89]</sup>, Isfahan <sup>[1]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Australia, Cayman Islands, China, Taiwan, Colombia, Egypt, Fiji, French Polynesia, Hawaii, Honduras, Indonesia, Malaysia, Puerto Rico, Spain, Taiwan, USA, Vieques Island.

**Host in Iran.** Hemiptera: Aleyrodidae: *Trialeurodes packardi* on *Juglans regia* <sup>[1]</sup>, *Dialeurodes kirkaldyi* (Kotinsky) <sup>[36]</sup>.

**Species group placement.** *E. strenua*-group <sup>[6]</sup>.

**Comments.** *E. protransvena* can be distinguished from other species of *E. strenua*-group by the shorter ovipositor and third valvulae, more delicate antenna (clava only slightly broader than the funicle), and longer fore wing. The setae of the midlobe of the mesosoma are usually arranged in 4 pairs (rarely 3 or 5), whereas they are almost always arranged in 5 pairs in *E. citri* (Ishii), and the arrangement of setae (shorter and more apical) on the third valvulae is distinct from *E. citri*. The materials of *E. protransvena* from China <sup>[54]</sup> are nearly identical to those of Iran. The Taiwanese materials have a band of 14 setae in the basal area of the fore wing. Also, five pairs of setae on the midlobe of the mesosoma, which is rarely encountered in specimens from the New World (usually 4 pairs). The Chinese materials agree for all characters with *E. protransvena*, but it has a strongly and densely reticulate vertex, and the basal segment of the clava is more distinctly separated from the following segment. On the other hand, *E. protransvena* is very close to *E. armata* (Silvestri). The main difference between the two species appears to be in the ovipositor length, longer than half the combined length of the thorax and gaster in *E. armata*, shorter in *E. protransvena*. The lack of mandibular teeth in *E. protransvena* is probably an artifact. However, the identification of *E. protransvena* is rather difficult and the species has in the past been confused with *E. strenua*, *E. citri* and *E. armata*. The recent authors' studies on different materials of above species from different regions of the world, indicate that all the 4 species can be considered as distinct species, and these (possibly more) from a subgroup of rather cryptic species within the *strenua*-group. Surely, more materials will be needed to be examined before these can be included or excluded from *E. protransvena* with confidence.



**3.8.45. *Encarsia shutovae* Yasnosh, 1973**

*Encarsia shutovae* Yasnosh, 1973a: 582-583. Type data: CSS: Southern Kirgizia. Holotype female, by original designation. Type depository: St. Petersburg: (= Leningrad) Zoological Museum, Academy of Sciences, Russia. Described: both sexes. Illust.

**Distribution in Iran.** Golestan, Khorasan, Mazandaran <sup>[42]</sup>, Iran (no locality cited) <sup>[36]</sup>.

**Distribution outside Iran.** Russia and adjacent countries (Federation of Independent States).

**Host in Iran.** Hemiptera: Aleyrodidae: *Bemisia confusa* Danzig <sup>[36]</sup>, *B. confusa* on *Malva parviflora* (Malvaceae), and *Glycyrrhiza glabra* (Leguminosae), *B. tabaci* on *Vitex pseudo-negundo* (Verbenaceae) <sup>[42]</sup>.

**Species group placement.** *E. tricolor*-group <sup>[47]</sup>.

**3.8.46. *Encarsia smithi* (Silvestri, 1926)**

*Encarsia smithi* Silvestri, 1926: 179. Syntype ♀♀. China, Guangdong ex *Aleurocanthus spiniferus* and *A. woglumi* on *Citrus* sp. IEUN.

**Distribution in Iran.** Guilan <sup>[89]</sup>.

**Distribution outside Iran.** China, Fujian, India, Japan, Macao, Maldives, Mexico, Pakistan, Sri Lanka, Taiwan.

**Species group placement.** *E. smithi*-group <sup>[6]</sup>.

**Comments.** According to Hayat (1989), the ovipositor is slightly longer than the mid tibia plus basitarsus in *E. smithi*. On the base of several measurements of Huang & Polaszek (1998) on different specimens from China and also our measurements on Iranian ones, the ovipositor slightly (0.85-0.90 times) shorter. Although *E. smithi* is parasitoid of whiteflies, whereas *E. perniciosi* parasitoid of armored scales, but these two parasitoid are very close to each other. There are many slight differences between the species as below. In *E. perniciosi*, head yellow or testaceous; face, mouth margin and occiput brownish, with a distinct dark brown cross-band above toruli; ovipositor about as long as mid tibia. In *E. smithi*, head testaceous yellow; mouth margin and occiput dark brown; ovipositor slightly shorter than mid tibia.

**3.8.47. *Encarsia sophia* (Girault & Dodd, 1915)**

*Coccophagus sophia* Girault & Dodd, 1915[238]: 49, 56. Type data: Australia: QLD, Cairns. Syntypes, female. Type depository: Brisbane: Queensland Museum, Queensland, Australia; type no. Hy.2926. Described: female.

**Distribution in Iran.** Guilan <sup>[2,89]</sup>, Isfahan <sup>[1]</sup>.

**Distribution outside Iran.** Cosmopolitan in the old World, introduced in the New World. Australia and adjacent regions; Russia and adjacent countries (Federation of Independent States); Burundi, Cape Verde, China, Hong Kong, India, Indonesia, Ivory Coast, Japan, Morocco, Niger, Sierra Leone, Somalia, Spain, Hawaiian Islands, Pakistan, Sri Lanka, Taiwan, Thailand.

**Host in Iran.** Hemiptera: Aleyrodidae: *Trialeurodes ricini* on *Ricinus communis* (Euphorbiaceae) <sup>[1]</sup>. Also, hyperparasitoid of *Tamarix radiata* (Waterston) (Hymenoptera: Eulophidae) as the parasitoid of *Pseudococcus filamentosus* (Ck.) (Hem: Pseudococcidae) <sup>[2]</sup>.

**Species group placement.** *E. strenua*-group <sup>[81]</sup>.

**3.8.48. *Encarsia tricolor* Foerster, 1878**

*Encarsia tricolor* Foerster, 1878: 66. Holotype male, by monotypy. Described: male.

*Prospaltella conjugata* Masi, 1909: 146. Type data: Italy: Portici.. Type depository: UNP. Described: female. Synonymy by Mercet,

1930: 193.

**Distribution in Iran.** Khorasan (Abd-Rabou et al. 2005a).

**Distribution outside Iran.** Italy, Lebanon, Mediterranean basin, Palestine.

**Host in Iran.** Hemiptera: Aleyrodidae: *Bemisia salicaria* Danzig <sup>[3]</sup>.

**Species group placement.** *E. tricolor*-group <sup>[6]</sup>.

**3.9. Genus *Eretmocerus* Haldeman, 1850**

*Eretmocerus* Haldeman 1850. Type species *Eretmocerus corni* Haldeman, by monotypy.

*Ricinusa* Risbec 1951: 403. Type species *Ricinusa aleyrodiphaga* Risbec, by original designation; synonymy according to Ferrière 1965: 170.

**3.9.1. *Eretmocerus adustiscutum* Krishnan & David, 1996**

*Eretmocerus adustiscutum* Krishnan & David 1996: 161. Holotype female. IHAY. India, Coimbatore.

*Eretmocerus corni*; misidentification Hayat 1972: 112.

*Eretmocerus paulistis* Hempel; misidentification by Khan & Shafee 1980: 368 according to Hayat 1998: 112.

**Distribution in Iran.** Kerman, Khorasan <sup>[4,7]</sup>.

**Distribution outside Iran.** Oriental, Western Palaearctic.

**Host in Iran.** Hemiptera: Aleyrodidae: *Lipaleyrododes euphorbiae* David & Subramaniam on *Euphorbia pulcherrima* (Euphorbiaceae), *Bemisia tabaci* (Gennadius) complex on *Crataegus microphylla* (Rosaceae) <sup>[4,7]</sup>.

**Species group placement.** *Er. californicus*-group <sup>[6]</sup>.

**3.9.2. *Eretmocerus breviclavus* Subba Rao, 1984**

*Eretmocerus breviclavus* Subba Rao 1984: 257. Holotype female. NHM. India, Bangalore, ex. blackfly on curry leaves [*Murraya koenigii*]. Hayat 1998: 107.

**Distribution in Iran.** Golestan <sup>[4,7]</sup>, Mazandaran <sup>[4,61,7]</sup>.

**Distribution outside Iran.** Oriental and Palaearctic Regions.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurocanthus woglumi* Ashby on *Citrus sinensis* (Rutaceae) <sup>[4,7]</sup>, *Aleurocanthus zizyphi* Priesner & Hosny on *Ficus carica* (Moraceae) <sup>[4,61,7]</sup>.

**Species group placement.** *Er. longipes*-group <sup>[6]</sup>.

**3.9.3. *Eretmocerus cadabae* Viggiani, 1982**

*Eretmocerus cadabae* Viggiani 1982: 30. Holotype female. UNP. Ethiopia: Melka Werer, ex. *Aleuroplatus cadabae*.

**Distribution in Iran.** East Azarbaijan <sup>[42]</sup>, Guilan <sup>[4,7,39]</sup>.

**Distribution outside Iran.** Afrotropical: Ethiopia, Western Palaearctic.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleuroplatus pectiniferus* Quaintance & Baker on *Ficus capensis* (Moraceae) <sup>[4,39,7,42]</sup>.

**Species group placement.** *Er. cadabae*-group <sup>[6]</sup>.

**3.9.4. *Eretmocerus corni* Haldeman, 1850**

*Eretmocerus corni* Haldeman 1850: 110. Syntypes [lost]. USNM. USA, Pennsylvania, White Clay, ex. *Trialeurodes morrilli* on *Impatiens biflora* [Neotype designated by Rose & Zolnerowich 1997: 8], reared from *Asterochiton* sp. on *Impatiens* sp. (Balsaminaceae), White Clay Creek, Pennsylvania, USA.

*Eretmocerus corni*; misidentification of *Eretmocerus dialeurolongae* Krishnan & David by Jesudasan et al. 1984 according to Hayat 1998: 109.

*Eretmocerus corni*; misidentification of *Eretmocerus ampliatus* Rose by Dozier (1932) according to Rose 2000: 14.

**Distribution in Iran.** Golestan, Khorasan <sup>[39]</sup>.

**Distribution outside Iran.** Nearctic and Palaearctic (introduced) Regions.

**Host in Iran.** Hemiptera: Aleyrodidae: *Acaudaleyrodes rachipora* Singh on *Punica granatum* (Punicaceae), *Trialeurodes packardi* (Morill) on *Fragaria vesca* (Rosaceae) <sup>[39]</sup>.

**Species group placement.** *Er. californicus*-group <sup>[6]</sup>.

### 3.9.5. *Eretmocerus debachi* Rose & Rosen, 1992

*Eretmocerus debachi* Rose & Rosen 1992: 200. Holotype female. USNM. USA, California, Orange County, Viejo, Rancho Mission, ex. *Parabemisia myricae* on valencia orange and lemons [*Citrus* spp., Rutaceae].

**Distribution in Iran.** Guilan <sup>[4, 7]</sup>, Isfahan <sup>[37, 4, 7]</sup>.

**Distribution outside Iran.** Nearctic and Palaearctic (introduced) Regions.

**Host in Iran.** Hemiptera: Aleyrodidae: *Parabemisia myricae* (Kuwana) <sup>[37]</sup>, *P. myrica* on *Citrus bigaradia* (Rutaceae), *P. myricae* on *Citrus aurantifolia* <sup>[4, 7]</sup>.

**Species group placement.** *Er. paulistus*-group <sup>[6]</sup>.

### 3.9.6. *Eretmocerus* sp. nr. *delhiensis* Mani, 1941

*Eretmocerus delhiensis* Mani 1941: 35. Cotypes (2 males). IARI. India, New Delhi, ex. *Neomaskiella bergii* on sugarcane [*Saccharum* sp., Poaceae]; lectotype designated by Hayat 1988: 127.

*Eretmocerus mashhoodi* Hayat 1972: 102. Holotype female. India, Aligarh, aleyrodes on grass, ZSI; Khan & Shafee 1980: 368; synonymy according to Hayat 1998: 111.

**Distribution in Iran.** Fars (Rasekh et al. 2010).

**Distribution outside Iran.** India, Pakistan.

**Host in Iran.** Hemiptera: Aleyrodidae: parasitoid of *Aleuroclava jasmini* on *Citrus reticulata* (Rasekh et al. 2010).

**Species group placement.** *Er. californicus*-group <sup>[6]</sup>.

### 3.9.7. *Eretmocerus diversiciliatus* Silvestri, 1928

*Eretmocerus diversiciliatus* Silvestri 1914: 366. Holotype female. IESP. Nigeria, Lagos, ex. Aleyrodidae.

**Distribution in Iran.** Kermanshah <sup>[4, 7]</sup>.

**Distribution outside Iran.** Afrotropical and Palaearctic Regions.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleuroclava similis* (Takahashi) on *Amaranthus retroflexus* (Amaranthaceae) <sup>[4, 39, 7]</sup>.

**Species group placement.** *Er. diversiciliatus*-group <sup>[6]</sup>.

### 3.9.8. *Eretmocerus eremicus* Rose & Zolnerowich, 1997

*Eretmocerus eremicus* Rose & Zolnerowich 1997. Holotype female. USA: Arizona, Phoenix, iii.1991, G. Butler, ex. *Bemisia tabaci* on *Gossypium hirsutum*. USNMNH.

**Distribution in Iran.** Guilan <sup>[93]</sup>.

**Distribution outside Iran.** Canary Islands, Egypt (introduced), USA.

**Host in Iran.** *Trialeurodes vaporariorum* on *Helianthus tuberosus* (Asteraceae) <sup>[93]</sup>.

### 3.9.9. *Eretmocerus flavus* Krishnan & David, 1996

*Eretmocerus flavus* Krishnan & David 1996: 32. Holotype female. IHAY. India, Palavanthangal, ex. *Lipaleyrodes euphorbiae* on *Phyllanthus acidus* (Euphorbiaceae).

**Distribution in Iran.** Isfahan <sup>[37, 4, 7]</sup>.

**Distribution outside Iran.** Oriental and Palaearctic Regions.

**Host in Iran.** Hemiptera: Aleyrodidae: *Lipaleyrodes euphorbiae*

David & Subramaniam <sup>[37]</sup>, *L. euphorbiae* on *Euphorbia prostrata* (Euphorbiaceae) <sup>[4, 7]</sup>.

An unknown species, *Eretmocerus* sp. nr. *flavus* was reported from Fars Province as the parasitoid of *Aleurolobus marlatti* on *Citrus aurantium* <sup>[86]</sup>.

**Species group placement.** *Er. longipes*-group <sup>[6]</sup>.

### 3.9.10. *Eretmocerus longiscapus* Hayat, 1972

*Eretmocerus longiscapus* Hayat 1998: 110. Holotype female. NHM. India, Uttar Pradesh, Sasni near Aligarh, ex. *Aleurolobus* sp. near *niloticus* on *Dalbergia sissoo* (Fabaceae).

*Eretmocerus haldemani*; misidentification Hayat 1972: 100, according to Hayat 1998: 110.

**Distribution in Iran.** Khorasan, Semnan <sup>[88, 4, 39, 7]</sup>.

**Distribution outside Iran.** Oriental and Palaearctic Regions.

**Host in Iran.** Hemiptera: Aleyrodidae: *Bemisia sugonjaevi* Danzig, *Aleurolobus marlatti* (Quaintance) <sup>[88]</sup>, *A. marlatti* on *Verbena officinalis* (Verbenaceae), *Aleurolobus vitis* Danzig on *Vitis vinifera* (Vitaceae) <sup>[4, 40, 7]</sup>.

**Species group placement.** *Er. californicus*-group <sup>[6]</sup>.

### 3.9.11. *Eretmocerus mundus* Mercet, 1931

*Eretmocerus mundus* Mercet 1931: 396. Type female. MNCN. Spain: Beas de Segura, an *Aleurodes* on eggplant, *Solanum melongena* (Solanaceae); lectotype designated by Rose & Zolnerowich (1998).

*Eretmocerus aligarhensis* Khan & Shafee 1980: 365. Type ♀. India, Uttar Pradesh, Aligarh, ex. *Aleyrodes* sp. on *Lantana camara*; synonymy according to Hayat 1998: 102.

*Eretmocerus corni* Masi 1909; Europe: ex aleyrodid on *Cystus salviaefolia* (nec *E. corni* Haldeman 1850).

*Eretmocerus longipilus* Khan & Shafee 1980: 366. Type female. India, Uttar Pradesh, Aligarh, ex. *Aleyrodes* sp. on *Lantana camara* (Verbenaceae); synonymy according to Hayat 1998: 102.

*Eretmocerus masii* Silvestri 1934. Type female. Italy: ex. *Bemisia tabaci*; nomen nudum.

**Distribution in Iran.** Generally distributed including, East Azarbaijan, West Azarbaijan <sup>[42]</sup>, Fars <sup>[14, 15, 12, 75, 4, 39, 7]</sup>, Golestan <sup>[74, 60, 4, 39, 7]</sup>, Isfahan <sup>[34, 35]</sup>, Khuzestan <sup>[105]</sup>, Mazandaran, Tehran <sup>[74, 4, 39, 7]</sup>.

**Distribution outside Iran.** Argentina, Canary Islands, Egypt, India, Israel, Italy, Kenya, Madeira Islands, Spain, Turkmenistan, USA, Zimbabwe.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurolobus* sp. on *Ziziphus spinachristi* <sup>[12]</sup>, *Bemisia hancocki* Corbett, *Trialeurodes packardi* Morill <sup>[34, 35]</sup>, *Aleyrodes lonicerae* Walker on *Crataegus microphylla* (Rosaceae), *Rosanovia hulthemiae* Danzig on *Ajuga gorganica* (Labiatae) <sup>[4, 39, 7]</sup>, *Bemisia afer* (Priesner & Hosny) on *Cynanchum acutum* (Lauraceae), *Bulgarialeurodes cotesii* (Maskell) on *Rosa canina* (Rosaceae), *Trialeurodes ricini* (Misra) <sup>[74]</sup>, *T. ricini* on *Ricinus communis* (Euphorbiaceae) <sup>[12, 42]</sup>, *Bemisia tabaci* (Gennadius) <sup>[13, 75, 74, 34, 35, 60]</sup>, *B. tabaci* on *Gossypium hirsutum* (Malvaceae) <sup>[15, 12, 4, 39, 7, 42]</sup>, *B. tabaci* on cucumber <sup>[105]</sup>, *B. tabaci* complex on *Hibiscus esculentum* (Malvaceae) <sup>[4, 7, 39, 42]</sup>.

**Comments.** *Eretmocerus mundus* is the dominant species in almost cotton fields in Iran <sup>[96]</sup>. Also *E. mundus* included two different strains in Iran which their morphology, biology, efficiency and behaviour was studied by Ghahari et al. (2005) and Ghahari & Ostovan (2006) on *Bemisia argentifolii*.

**Species group placement.** *Er. mundus*-group <sup>[6]</sup>.

**3.9.12. *Eretmocerus neobemisiae* Yasnosh, 1974**

*Eretmocerus neobemisiae* Yasnosh 1974: 713. Holotype female. ZIN. Georgia (former USSR): ex. *Neobemisia atraphaxis*.

**Distribution in Iran.** Golestan, Guilan <sup>[4,39,71]</sup>.

**Distribution outside Iran.** Palaearctic Region.

**Host in Iran.** Hemiptera: Aleyrodidae: *Asterobemisia atraphaxis* (Danzig) on *Atraphaxis spinosa* (Polygonaceae), *Asterobemisia carpini* (Koch) on *Corylus avellana* (Betulaceae) <sup>[4,39,71]</sup>.

**Species group placement.** *Er. paulistus*-group <sup>[61]</sup>.

**3.9.13. *Eretmocerus neomaskelliae* Abd-Rabou & Ghahari, 2005**

*Eretmocerus neomaskelliae* Abd-Rabou & Ghahari 2005, in Abd-Rabou et al. 2005: 169. Holotype female. EPPRI. Iran, Mazandaran (northern Iran) Ghaemshahr, on *Neomaskellia bergii* on *Sorghum halepense* (Poaceae).

**Distribution in Iran.** Mazandaran <sup>[4,39,71]</sup>.

**Distribution outside Iran.** Endemic to Iran.

**Host in Iran.** Hemiptera: Aleyrodidae: *Neomaskellia bergii* (Signoret) on *Sorghum halepense* (Graminae) <sup>[4,39,71]</sup>.

**Species group placement.** *Er. diversiciliatus*-group <sup>[61]</sup>.

**3.9.14. *Eretmocerus nikolskajae* Myartseva, 1973**

*Eretmocerus nikolskajae* Myartseva 1973: 81. Holotype female. ZIN. Turkmenistan [=USSR: Turkmenia], Ashabad, ex. *Bulgarialeurodes cotesi* on rose [*Rosa* sp., Rosaceae] leaves.

**Distribution in Iran.** East Azarbaijan <sup>[42]</sup>, Golestan <sup>[36]</sup>, Khorasan <sup>[4,39,71]</sup>, Mazandaran <sup>[4,39,71]</sup>.

**Distribution outside Iran.** Palaearctic Region.

**Host in Iran.** Hemiptera: Aleyrodidae: *Bulgarialeurodes cotesii* (Maskell) <sup>[37]</sup>, *B. cotesii* on *Rosa hemisphaerica* and *Rosa canina* (Rosaceae), *Tetralicia erianthi* Danzig on *Ranunculus arvensis* (Rununculaceae) <sup>[4,39,7,42]</sup>.

**Species group placement.** *Er. paulistus*-group <sup>[61]</sup>.

**3.9.15. *Eretmocerus ostovani* Ghahari & Abd-Rabou, 2005**

*Eretmocerus ostovani* Ghahari & Abd-Rabou 2005, in Abd-Rabou et al. 2005: 170. Holotype female. EPPRI. Iran, Mazandaran, Behshahr, ex. *Aleyrodes elevatus* on *Ficus religiosa* (Moraceae).

**Distribution in Iran.** Mazandaran <sup>[4,71]</sup>.

**Distribution outside Iran.** Endemic to Iran.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleyrodes elevatus* Silvestri on *Ficus religiosa* (Moraceae) <sup>[4,39,42]</sup>.

**Species group placement.** *Er. longipes*-group <sup>[61]</sup>.

**3.9.16. *Eretmocerus persiangulfus* Abd-Rabou & Ghahari, 2011**

*Eretmocerus persiangulfus* Abd-Rabou & Ghahari, 2011: 171-172. Holotype female. EPPRI. Iran, East Azarbaijan, Arasbaran, ex. *Parabemisia myricae* (Kuwana) on *Prunus persica* (L.) (Rosaceae).

**Distribution in Iran.** East Azarbaijan <sup>[71]</sup>.

**Distribution outside Iran.** Endemic to Iran.

**Host in Iran.** Hemiptera: Aleyrodidae: *Parabemisia myricae* (Kuwana) (Homoptera: Aleyrodidae) on *Prunus persica* (L.) (Rosaceae) <sup>[71]</sup>.

**Species group placement.** *Er. paulistus*-group <sup>[71]</sup>.

**3.9.17. *Eretmocerus serius* Silvestri, 1927**

*Eretmocerus serius* Silvestri 1927: 46. Holotype female. IESP. Singapore: ex. *Aleurocanthus woglumi*.

**Distribution in Iran.** Fars <sup>[4,71]</sup>, Khusestan <sup>[36,4,71]</sup> (Kocheili 1998; Abd-Rabou et al. 2005b; Abd-Rabou & Ghahari 2011), West Azarbaijan <sup>[4,7,42]</sup>.

**Distribution outside Iran.** USA; Neotropical (introduced) - Bahamas, Barbados, Cayman Islands, Costa Rica, Cuba, Haiti, Jamaica, Mexico, Panama; Western Palaearctic (introduced) - Oman; Afrotropical (introduced) - Kenya, South Africa; Eastern Palaearctic - China, Japan; Oriental - Bangladesh, India, Indonesia, Malaya, Malaysia, Myanmar (Burma), Pakistan, Singapore, South Korea, Sri Lanka, Thailand, Vietnam; Australasian (introduced) - Guam, Hawaii.

**Host in Iran.** Hemiptera: Aleyrodidae: *Aleurocanthus spiniferus* (Quaintance) on *Citrus bigaradia* (Rutaceae) <sup>[4,71]</sup>, *Aleurocanthus woglumi* Ashby on *Citrus aurantium* (Rutaceae), *Bemisia tabaci* (Kocheili 1998), *Bemisia tabaci* on *Hibiscus esculentum* (Malvaceae) <sup>[4,7,42]</sup>.

**Species group placement.** *Er. californicus*-group <sup>[61]</sup>.

**3.9.18. *Eretmocerus trialeurodis* Hayat, 1998**

*Eretmocerus trialeurodis* Hayat 1998: 108. Holotype female. NHM. India, Tamil Nadu, Madras [=Chennai], Tambaram, ex. *Trialeurodes ricini* on *Ricinus communis* (Euphorbiaceae).

**Distribution in Iran.** Kerman <sup>[4,71]</sup>.

**Distribution outside Iran.** Oriental and Western Palaearctic Regions.

**Host in Iran.** Hemiptera: Aleyrodidae: *Trialeurodes ricini* (Misra) on *Ricinus communis* (Euphorbiaceae) <sup>[4,71]</sup>.

Also, an unknown species, *Eretmocerus* sp. nr. *trialeurodis* was recorded from Fars province as the parasitoid of *Aleurolobus marlattii* on *Citrus aurantium* <sup>[86]</sup>.

**Species group placement.** *Er. californicus*-group <sup>[61]</sup>.

**3.10. Genus *Euryischia* Riley, 1889**

*Euryischia* Riley 1889. Type species *Euryischia lestophoni* Riley, by monotypy.

**3.10.1. *Euryischia* sp.**

**Distribution in Iran.** East Azarbaijan <sup>[68]</sup>.

**Host in Iran.** Diptera: Chamaemiidae: Unknown species <sup>[68]</sup>.

**3.11. Genus *Marietta* Motschulsky, 1863**

*Marietta* Motschulsky 1863. Type species *Marietta leopardina* Motschulsky, by monotypy.

*Perissopterus* Howard 1894. Type species *Aphelinus pulchellus* Howard, by original designation; synonymy according to Girault 1916.

*Pseudaphelinus* Brèthes 1918. Type species *Pseudaphelinus caridei* Brèthe, by original designation; synonymy according to De Santis 1946.

**3.11.1. *Marietta leopardina* Motschulsky, 1863**

*Marietta cheriani* (Mani, 1939); *Marietta exitiosa* Compere, 1936; *Marietta habrolepidis* Ghesquière, 1960; *Marietta javensis* (Howard, 1907); *Marietta javensis indi* Girault, 1932; *Marietta leopardina* Motschulsky, 1863; *Perissopterus cheriani* Mani, 1939; *Perissopterus javensis* Howard, 1907.

**Distribution in Iran.** Sistan & Baluchestan <sup>[70]</sup>.

**Distribution outside Iran.** Bangladesh, Congo, Egypt, Gambia, Guinea-Bissau, India, Indonesia, Israel, Japan, Kenya, Libya, Madagascar, Malaysia, Mauritius, Morocco, Namibia, Nigeria, Pakistan, Paraguay, Philippines, Saudi Arabia, Singapore, South Africa, Sri Lanka, Zaire.

**Host in Iran.** Hyperparasitoid of *Encarsia* sp. (parasitoid of *Aleuromarginatus tephrosiae* Corbett) <sup>[70]</sup>.

**3.11.2. *Marietta picta* (André, 1878)**

*Agonioneurus pictus* André, 1878; *Aphelinus pictus* (André, 1878); *Marietta picta* (André, 1878); *Marietta zebra* (Kurdjumov, 1912); *Marietta zebrata* (Mercet, 1916); *Perissopterus anglicus* Blood, 1929; *Perissopterus pictus* (André, 1878); *Perissopterus zebra* Kurdjumov, 1912; *Perissopterus zebra* Mercet, 1914; *Perissopterus zebratus* Mercet, 1916.

**Distribution in Iran.** Fars <sup>[52, 29]</sup>, Kerman <sup>[103, 74, 57]</sup>, Kordestan <sup>[2]</sup>, Tehran <sup>[74, 97]</sup>.

**Distribution outside Iran.** Armenia, Canada, China, Czech Republic, Egypt, France, Georgia, Germany, Greece, Hungary, India, Italy, Kazakhstan, South Korea, Mexico, Moldova, Peru, Romania, Russia and adjacent countries (Federation of Independent States), Slovakia, Spain, Transcaucasus, Turkey, Turkmenistan, UK, Ukraine, former Yugoslavia.

**Host in Iran.** Hemiptera: Psyllidae: *Agonoscena cisti* (Paton) <sup>[103]</sup>; Pseudococcidae: *Planococcus vovae* (Nasonov) <sup>[97]</sup>, *Planococcus ficus* (Signoret) <sup>[29, 30]</sup>. Hyperparasitoid of *Anagyrus pseudococci* (Girault) <sup>[74]</sup>, *Anagyrus dactylopii* (Howard) (Encyrtidae) on *Nipaecoccus filamentosus* (Cockerell) (Pseudococcidae) <sup>[4]</sup>, *Agonoscena pistaciae* Burckhardt & Lauterer (Psyllidae) <sup>[57]</sup>. In mulberry and citrus gardens, and hyperparasitoid of Braconidae, Encyrtidae, Eulophidae, Pteromalidae, Signiphoridae <sup>[52]</sup>.

**3.11.3. *Marietta zebrata* (Mercet, 1916)**

*Agonioneurus pictus* André, 1878; *Aphelinus pictus* (André, 1878); *Marietta picta* (André, 1878); *Marietta zebra* (Kurdjumov, 1912); *Marietta zebrata* (Mercet, 1916); *Perissopterus anglicus* Blood, 1929; *Perissopterus pictus* (André, 1878); *Perissopterus zebra* Kurdjumov, 1912; *Perissopterus zebra* Mercet, 1914; *Perissopterus zebratus* Mercet, 1916.

**Distribution in Iran.** Hamadan <sup>[82]</sup>, Zanjan <sup>[62, 74]</sup>.

**Distribution outside Iran.** Armenia, Canada, China, Czech Republic, Egypt, France, Georgia, Germany, Greece, Hungary, India, Italy, Kazakhstan, Korea, Mexico, Moldova, Peru, Romania, Russia and adjacent countries (Federation of Independent States), Slovakia, Spain, Sweden, Transcaucasus, Turkey, Turkmenistan, UK, Ukraine, former Yugoslavia.

**Host in Iran.** Hemiptera: Aphalaridae: *Euphyllura olivina* Costa <sup>[62, 74]</sup>; Psyllidae: *Psyllopsis repens* Loginova <sup>[82]</sup>.

**3.12. Genus *Myiocnema* Ashmead, 1900**

*Myiocnema* Ashmead, 1900: 349. Type species *Myiocnema comperei* Ashmead, by monotypy.

**3.12.1. *Myiocnema comperei* Ashmead, 1900**

*Euryischia aleurodis* Dodd, 1917; *Euryischia comperei* (Ashmead, 1900); *Euryischia shakespearei* Girault, 1913; *Myiocnema comperei* Ashmead, 1900.

**Distribution in Iran.** Mazandaran <sup>[2]</sup>.

**Distribution outside Iran.** Australia, India, Indonesia, USA.

**Host in Iran.** Hyperparasite of *Encarsia citrina* (Craw) (Aphelinidae) on *Aspidiotus nerii* Bouché (Diaspididae) <sup>[2]</sup>.

**3.13. Genus *Pteroptrix* Westwood, 1833**

*Pteroptrix* Westwood 1833. Type species *Pteroptrix dimidiatus* Westwood, by monotypy.

*Archenomus* Howard 1898. Type species *Archenomus bicolor* Howard, by monotypy; synonymy according to Novicky 1928.

*Casca* Howard 1907. Type species *Casca chinensis* Howard, by original designation; synonymy according to Novitzky 1962.

*Artas* Howard 1907. Type species *Artas koebelei* Howard, by original designation; synonymy according to Hayat 1983.

*Hispaniella* Mercet 1911. Type species *Archenopus lauri* Mercet, by original designation; synonymy according to Viggiani 1993.

*Pteroptrichoides* Fullaway 1913. Type species *Pteroptrichoides perkinsi*, by original designation; synonymy according to Mercet 1928.

*Apteroptrix* Girault 1915. Type species *Apteroptrix albifemur* Girault, by original designation; synonymy according to Viggiani 1993.

*Pseudopteroptrix* Fullaway 1918. Type species *Pseudopteroptrix imitatrix* Fullaway, by monotypy; synonymy according to Mercet 1928.

*Oa* Girault 1929. Type species *Archenomus biguttatus* Girault, by original designation; synonymy according to Viggiani 1993.

*Aphelosoma* Nikolskaya 1963. Type species *Aphelosoma plana* Nikolskaya, by original designation; synonymy according to Viggiani 1993.

*Archenomiscus* Nikolskaya 1966. Type species *Pteroptrix maritimus* Nikolskaya; synonymy according to Viggiani 1993.

**3.13.1. *Pteroptrix bicolor* Howard, 1898**

*Archenomus bicolor* Howard, 1898; *Archenomus caucasicus* (Yasnosh, 1955); *Pteroptrix bicolor* (Howard, 1898); *Pteroptrix callunae* Alam, 1956; *Pteroptrix caucasica* Yasnosh, 1955; *Pteroptrix caucasicus* Yasnosh, 1955; *Pteroptrix zonatus* Alam, 1956; *Pteroptrix (Archenomus) caucasicus* Yasnosh, 1955.

**Distribution in Iran.** East Azarbaijan, Isfahan, Kordestan, Markazi, Tehran <sup>[74]</sup>.

**Distribution outside Iran.** Argentina, Austria, Azerbaijan, Caucasus, China, Czech Republic, Egypt, France, Georgia, Germany, Hungary, Indonesia, Italy, Japan, Kazakhstan, Russia and adjacent countries (Federation of Independent States), Slovakia, Spain, Sri Lanka, Switzerland, Tunisia, Turkey, UK, Ukraine, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Diaspidiotus prunorum*; Coccidae: *Eulecanium coryli* (Linnaeus) <sup>[74]</sup>.

**3.13.2. *Pteroptrix bicolor* (Howard, 1898)**

*Archenomus bicolor* Howard, 1898; *Archenomus caucasicus* (Yasnosh, 1955); *Pteroptrix bicolor* (Howard, 1898); *Pteroptrix callunae* Alam, 1956; *Pteroptrix caucasica* Yasnosh, 1955; *Pteroptrix zonatus* Alam, 1959; *Pteroptrix (Archenomus) caucasicus* Yasnosh, 1955.

**Distribution in Iran.** Mazandaran <sup>[41]</sup>.

**Distribution outside Iran.** Argentina, Austria, Azerbaijan, Caucasus, China, Czech Republic, Egypt, France, Georgia, Germany, Hungary, Indonesia, Italy, Japan, Kazakhstan, North Africa, Russia and adjacent countries (Federation of Independent States), Slovakia, Spain, Sri Lanka, Switzerland, Tunisia, Turkey, UK, Ukraine, USA.

**Host in Iran.** Hemiptera: Diaspididae: *Salicicola kermanensis* (Lindinger) <sup>[41]</sup>.

**3.13.3. *Pteroptrix lauri* (Mercet, 1911)**

*Archenomus lauri* Mercet, 1911; *Hispaniella lauri* (Mercet, 1911); *Pteroptrix lauri* (Mercet, 1911).

**Distribution in Iran.** Kerman <sup>[41]</sup>.

**Distribution outside Iran.** Azerbaijan, Bulgaria, Caucasus, China, Czech Republic, Georgia, Italy, Moldova, Poland, Russia and adjacent countries (Federation of Independent States), Slovakia,

Spain, Turkey, former Yugoslavia.

**Host in Iran.** Hemiptera: Diaspididae: *Salicicola davatchii* (Balachowsky & Kaussari) <sup>[41]</sup>.

**3.13.4. *Pteroptrix macropedicellata* (Malac, 1947)**

*Casca macropedicellata* Malac, 1947; *Pteroptrix macropedicellata* (Malac, 1947).

**Distribution in Iran.** East Azarbaijan <sup>[26]</sup>.

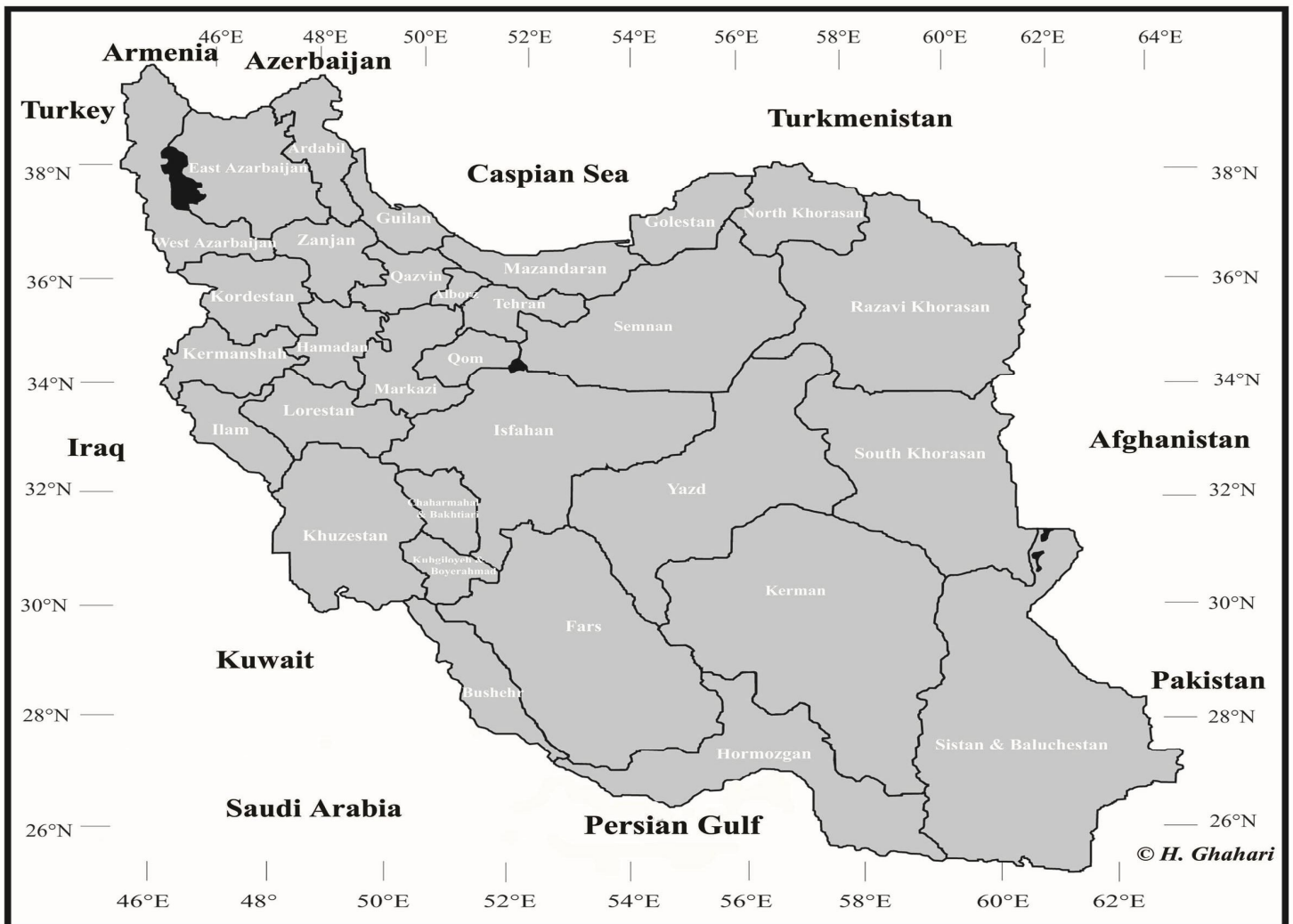
**Distribution outside Iran.** Azerbaijan, Caucasus, Czech Republic, Slovakia.

**Host in Iran.** Hemiptera: Diaspididae: *Sphaerolecanium prunastri* (Boyer de Fonscolombe) <sup>[26]</sup>.

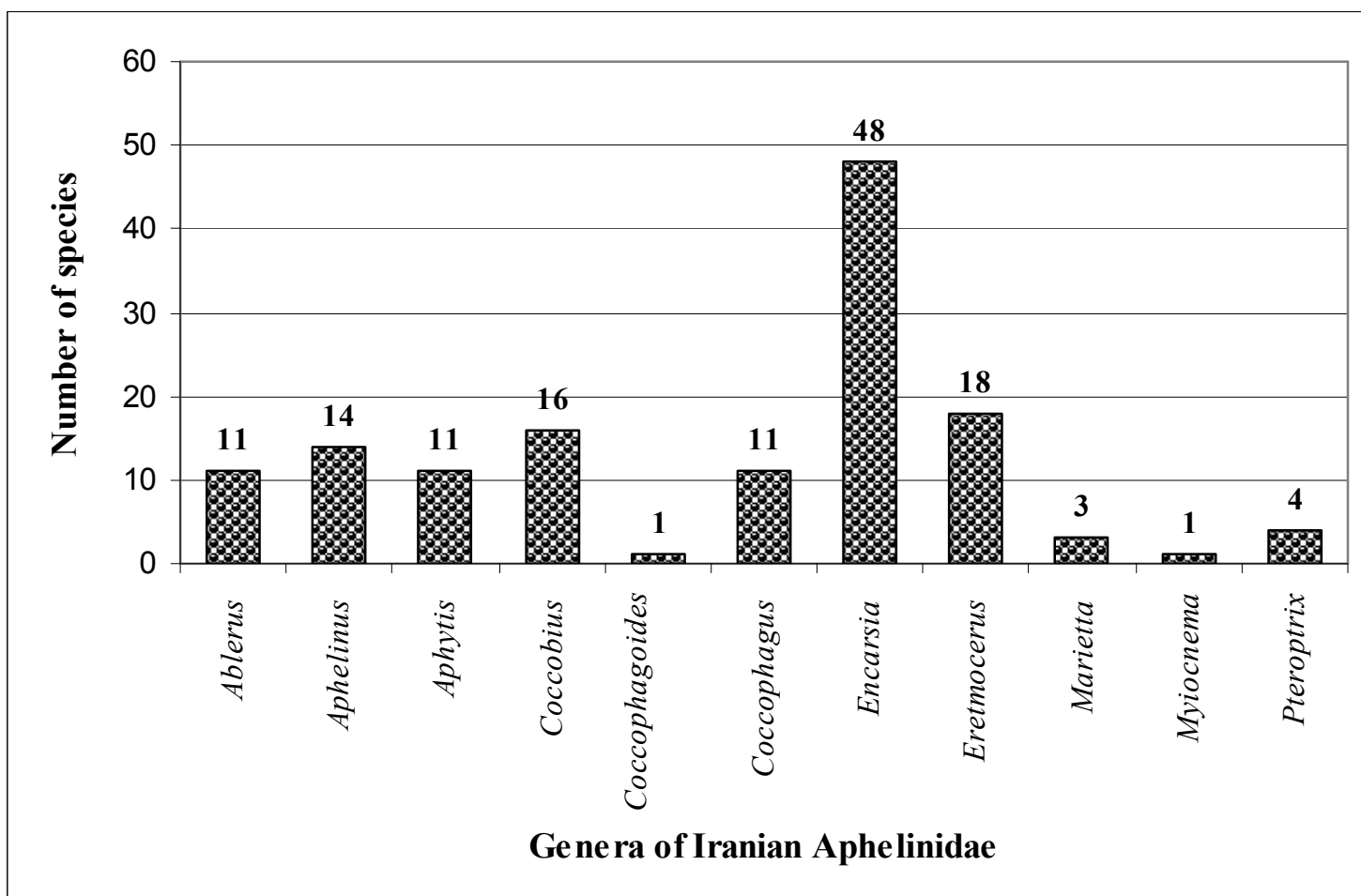
**4. Discussion**

The report of 138 species from 11 genera is an advance in the knowledge of the Aphelinidae in Iran. Among the different genera, *Encarsia* with 48 recorded species is more diverse than the others; *Eretmocerus*, *Coccobius*, and *Aphelinus* with 18, 16 and 14 species, respectively, are the following (Fig. 2). However, Iran is a large country with many unexplored and uncollected areas, and undoubtedly many more species must be present. As a comparison, in 2012, 184 species of 12 genera were recorded in Mexico, another country also with a high percentage of arid ecosystems <sup>[77]</sup>. Also among the Middle East countries, the fauna of Egyptian

Aphelinidae was studied well, as 81 species from 11 genera were recorded so far <sup>[81]</sup>. Most species of Iranian Aphelinidae are distributed widely in Palaearctic and Oriental regions, or are cosmopolitan or nearly so. Since Iran is located on the border of Eastern Palaearctic and Western Oriental regions and near to India and Pakistan with rich fauna, diverse fauna of insects is expectable for this country. For example, in the genus *Ablerus* from 11 species – 3 are Palaearctic, 2 are cosmopolitan and 6 are Oriental, *Aphelinus* from 14 species – 10 are cosmopolitan or nearly cosmopolitan, *Aphytis* from 11 species – 9 are cosmopolitan or nearly cosmopolitan, *Coccobius* from 16 species – 6 are Palaearctic and 6 are Oriental, *Coccophagus* from 11 species – 6 are nearly cosmopolitan, *Eretmocerus* from 18 species – 11 are distributed in the Palaearctic region or widely, *Encarsia* from 48 species – 8 species are widely distributed in the world or cosmopolitan, and 13 species are Oriental in their distribution. The following six species are described from Iran, and we suppose that they can be endemic to Iran: *Encarsia alemansoori* Rasekh & Polaszek, 2010, *E. axacaliae* Abd-Rabou & Ghahari, 2007, *E. macoensis* Abd-Rabou & Ghahari, 2007, *Eretmocerus neomaskelliae* Abd-Rabou & Ghahari, 2005, *Er. ostovani* Ghahari & Abd-Rabou, 2005 and *Er. persiangulfus* Abd-Rabou & Ghahari, 2011, even though they were recently described.



**Figure 1:** Map of Iran with boundaries of Provinces.



**Figure 2:** Species diversity of Iranian Aphelinidae.

Aphelinids, especially the members of subfamily Coccophaginae, have an efficient role in biological control of agricultural pests, especially whiteflies and coccids. Among these parasitoids, some species as *Encarsia Formosa*, which is cosmopolitan, is reared for releasing in various agroecosystems to control whiteflies, especially *Trialeurodes vaporariorum* <sup>153</sup>. In Coccophaginae, females are usually endoparasitoids of sternorrhynchous Hemiptera, such as scale insects, mealybugs, and whiteflies. Males of all but a very few species, however, develop in a manner different from females. In most cases, males are hyperparasitoids, developing in or on primary parasitoids, sometimes on conspecific females. Males of heteronomous species are not always hyperparasitic, however, and may develop on other hosts or as ectoparasitoids of the same host as females. In a few species in the subfamily, both sexes develop as primary endoparasitoids <sup>100, 561</sup>. Aphelinids can be powerful parasitoids in nature, if conserved. Conservation biological control involves manipulation of the environment to enhance the survival, fecundity, longevity, and behavior of natural enemies to increase their effectiveness <sup>143, 661</sup>. The best approach to preserving effective biological control by natural enemies is a combination of management tactics. By conserving and protecting natural enemies, we provide an opportunity for them to operate at their full potential as naturally occurring sources of biological control in the agricultural environment <sup>164, 211</sup>. Biological control fits well in combination with other IPM strategies. There are several factors (crop, pest complex, environment, etc.) that can influence the success of beneficial

organisms in reducing pest densities to manageable levels. In many situations, the biological control method will need to be utilized in concert with other tactics. Selecting the least disruptive management tactic is recommended by IPM (Integrated Pest Management) and should help conserve natural enemies <sup>132, 721</sup>.

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