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# An updated checklist of encyrtid wasps (Hymenoptera, Encyrtidae) from Iraq

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## Abstract

This study presented the first an updated list of encyrtid species (Hymenoptera, Encyrtidae), which found in Iraq. The list contains the following two subfamilies, with genera and species count: Encyrtinae (seven species, six genera), and Tetracneminae (10 species, four genera). The synonyms and global distribution of the species were given based on the previous literature. The current list provides important information for researchers interested in the field of biological control.

**Keywords:** Biological Control; Chalcidoidea; Encyrtid Wasps; Hymenoptera; Parasitoids; Phenacoccus

## 1. Introduction

With over 4170 known species, the huge family Encyrtidae is a part of the Chalcidoidea superfamily and is found all over the world (1). It is among the most significant biological control of plant-harming insect species; they are effectively utilized in tandem with Aphelinidae to combat several pest species, especially scale insects (2). In addition to Noyes and Hayat (3), they confirmed that this family's members are an important wasp family since they reduce the numbers of numerous pests that affect cultivated plants in fields and forests. According to Guerrieri and Noyes (4), these wasps are well-known parasitizes (as primary end parasitoids or hyper parasitoids, whatever the case may be), a diverse range of host insects that include members of Diptera, Coleoptera, Hemiptera, Lepidoptera, Hymenoptera, Orthoptera, and Neuroptera, as well as Arachnida, primarily spiders and ticks. As a result, more than 400 species have been employed as biological control agents for numerous insect pests in studies conducted worldwide (5).

This family has little researches in Iraq; however, a few publications featuring generic checklists have been written about it; there were different references about this matter: (3, 6, 7, 8, 9, 10, and 11), all of whom identified one species. Four species were listed by in (12), however. *Aenasius arizonensis* (Girault, 1915) was recently identified by Abdul-Rassoul (13) from Iraq as a parasitoid on *Phenacoccus solenopsis* Tinsly, 1898, Noyes (5) compiled a list of 62 species for Iraq.

Based on recent literature, the goal of this study is to present a review with an updated list of Encyrtidae species, along with revealing to synonyms, basionyms, and global distribution.

## 2. Materials and Methods

This checklist, which is based on GBIF Secretariat (1), Noyes and Hayat (3), and Noyes (5, 14), includes the nomenclature, higher classification, basionyms, synonyms, and global distribution. Ordered alphabetically are the genera, species, and subfamilies. The list was presented based on the references available at the update of writing this article and referred to in the results.

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## 3. Results and Discussion

The species of encrypted wasps that distributed in Iraq are listed below:

### 3.1. Subfamily: Encyrtinae Madl, 2023

*3.1.1. Genus, Aenasius Walker, 1846*

Synonyms: *Neodiscodes* Compere, 1931
*Chalcaspis* Howard, 1895

*Aenasius arizonensis* (Girault, 1915)
Synonym: *Chalcaspis arizonensis* Girault, 1915
Distribution: Iraq (13). China, Pakistan, India, USA (14), and Iran (15).
Host: According to Noyes (14) this parasitoid is common on *Pseudococcus longispinus* (Targioni Tozzetti, 1867), and *Phenacoccus solenopsis* Tinsley, 1898.

*3.1.2. Genus, Blastothrix Mayr, 1876*

Blastothrix sp.
Distribution: This genus is widely distributed throughout the Palearctic Region (16). This genus was reported in Iraq without identified species Iraq (17).
Host: *Eulecanium tiliae* (L., 1758) (Hemiptera, Coccidae) (18).

*3.1.3. Genus, Cheiloneurus Westwood, 1833*

Synonyms: *Bekilyia* Risbec, 1952
*Chiloneurus* Förster, 1856
*Chrysopophagoides* Girault, 1915
*Chrysopophagus* Ashmead, 1894
*Epicheiloneurus* Girault, 1915
*Eusemionella* Girault, 1915
*Lepidoneurus* Hoffer, 1957
*Metacheiloneurus* Hoffer, 1957
*Procheiloneurus* Girault, 1920
*Saronotum* Perkins, 1906
*Cheiloneurus* sp.

Distribution: This genus is widely distributed throughout the Palearctic Region. This genus was recoded in Iraq without determined the species (17).
Host: Eulecanium tiliae (Linnaeus, 1758) (Hemiptera, Coccidae) (18).

*3.1.4. Genus, Encyrtus Latreille, 1809*

Synonyms: Allorhopoideus Brethes, 1916
*Eucomys* Forster, 1856
*Howardia* Dalla Torre, 1897
*Prorhopoideus* Brethes, 1921

***Encyrtus* sp.**
Distribution: This genus is widely distributed throughout the Palearctic region (16). It was reported in Iraq without identified species (17).
Host: *Eulecanium tiliae* (18).

*3.1.5. Genus, Eusemion Dahlbom, 1857*

***Eusemion* sp.**
Distribution: This genus is widely distributed throughout the Palearctic region. In his survey, (17) noted this genus for Iraq under the unidentified species.
Host: *Eulecanium tiliae* (18).

***3.1.6.*** *Genus, Prochiloneurus Silvestri, 1915*

Synonyms: *Achrysopophagus* Girault, 1915
*Parachrysopophagus* Agarwal, 1965

***Prochiloneurus aegyptiacus*** (Mercet, 1929)
Basionym: *Achrysopophagus aegyptiacus* Mercet, 1929
Distribution: Afrotropical: Eritrea, Gabon, Ghana, Namibia, Nigeria, Congo, South Africa, Tanzania, and Togo; Oriental and Palaearctic regions (19). India (20).
Host: *Pseudococcus* sp. (Hemiptera, Pseudoccoccidae) (21).

Prochiloneurus io (Girault, 1920)
Synonym: Achrysopophagus io Girault, 1920
Distribution: Iraq (12); Puerto Rico, China, and Philippines (3, 22).
Host: According to (3), there were many hosts belonging to the Pseudococcidae for this species, including *Heliococcus* sp., *Nipaecoccus vastator*, *N. viridis*, *Planococcus citri*, and *Pseudococcus citri*.

**3.2. Subfamily: Tetracneminae Howard, 1892**

***3.2.1.*** *Genus, Anagyrus Howard, 1896*

Synonyms: *Anathrix* Burks, 1952
*Doliphoceras* Mercet, 1921
*Gyranusa* Mercet, 1921
*Heterarthrellus* Howard, 1898
*Paranusia* Brethes, 1913
*Protanagyrus* Blanchard, 1940
*Xiphomastix* De Santis, 1972
Host: The species of *Anagyrus* are parasitoids on Mealybug (Pseudococcidae) (23).

***Anagyrus abdulrassouli*** Myartseva, Sugonjaev & Trjapitzin, 1982
Distribution: This species is distributed in Iraq only (12).

***Anagyrus aligarhensis*** Agarwal & Alam, 1959
Synonyms: *Anagyrus diversicornis* Mercet, 1921
*Anagyrus opacus* (Mercet, 1921)
*Anagyrus punctulatus* Agarwal & Alam, 1959
Distribution: Bulgaria, France, Turkey, England, Spain, Russia, Portugal, Italy, Hungary, former Yugoslavia, Romania, China, Iran, India, Nepal, and Indonesia (3, 25, 26).
Host: *Pseudococcus viburni* (3, 25, 27).

***Anagyrus bohemani*** (Westwood, 1837)
Basionym: *Encyrtus bohemanni* Westwood, 1837
Synonyms: *Anagyrus mayri* Ruschka, 1923
*Anagyrus quercicola* Mercet, 1921
*Anagyrus singularis* Hoffer, 1953
*Blastothrix mayri* Ruschka, 1923
Distribution: Austria, Canary Islands, France, Spain, Czech Republic, Netherlands, Slovakia, Hungary, Madeira, Portugal, Morocco, Azerbaijan, Russia, Sweden, Ukraine, UK, Poland, and Russia (1).

***Anagyrus dactylopii*** (Howard, 1898)
Basionym: *Aphycus dactylopii* Howard, 1898
Synonyms: *Anagyrus citri* Agarwal, 1965
*Anagyrus scutomaculatus* Agarwal, 1965
Distribution: Oriental, South Africa, and Palaearctic regions, and India (28).
Host: *Nipaecoccus viridis* (29).

*Anagyrus diversicornis* (Howard, 1894)
Basionym: *Copidosoma diversicornis* Howard, 1894
Synonyms: *Apoanagyrus diversicornis* (Howard, 1894)

*Litomastix diversicornis* (Howard, 1894)
Distribution: This species is nearly worldwide (1).
Host: Phenacoccus solenopsis (25).

***Anagyrus pseudococci*** (Girault, 1915)
Basionym: *Epidinocarsis pseudococci* Girault, 1915
Synonyms: *Anagirus pseudococci* (Girault, 1915)
*Epidinocarsis pseudococci* Girault, 1915
Distribution: China, Cyprus, Egypt, Italy, Mediterranean region of Europe (Catania, Sicily) California, Brazilian, Argentine (30, 24, 3). Pakistan, Saudi Arabia, former USSR. South Africa and USA (31). South America (32).

*3.2.2. Genus, Psyllaephagus Ashmead, 1900*

Synonyms: *Anagyropsis* Girault, 1917
*Anisodromus* Riek, 1962
*Calluniphilus* Erdos, 1961
*Calocerineloides* Girault, 1913
*Epanagyrus* Girault, 1915
*Kaszabicyrtus* Szelenyi, 1971
*Mercetia* Bakkendorf, 1965
*Metaprionomitus* Mercet, 1921
*Mirocerus* Ashmead, 1904
*Neanagyrus* Girault, 1915
*Ooencyrtoides* Hoffer, 1963
*Propsyllaephagus* Blanchard, 1964
*Psyllencyrtus* Tachikawa, 1955
*Shakespearia* Girault, 1928

***Psyllaephagus cellulatus*** Waterston, 1922
Distribution: Iraq, Croatia, Ghana, Iran and Montenegro (33, 34, 35, 36, 37).
Host: Psyllid species (Hemiptera) (38).

**3.3. Genus, *Syrphophagus*** Ashmead, 1900
Synonyms: *Aphidencyrtus* Ashmead, 1900
*Hexanusia* Girault, 1922
*Syrphidencyrtus* Blanchard, 1940

***Syrphophagus aphidivorus*** (Mayr, 1876)
Basionym**:** *Encyrtus aphidivorus* Mayr, 1876
Synonyms: *Syrphophagus aphidivorus* (Mayr, 1876)
*Aphidencyrtus aphidivorus* (Mayr, 1876)
*Aphidencyrtus megourae* (Ashmead, 1887)
*Aphidencyrtus websteri* (Howard, 1890)
*Syrphophagus aphidiphagus* Ashmead, 1887
*S. megourae* Ashmead, 1887
*S. psyllae* Kaul & Agarwal, 1986
*S. schizoneurae* Ashmead, 1885
*S. silvestrinus* Ghesquière, 1956
S. websteri Howard, 1890
Distribution: Holarctic Region; India, and recently recorded in KSA (38).
Hosts: Agromyzidae, Aleyrodidae, and Aphididae (14).

***Syrphophagus nigrocyaneus*** Ashmead, 1904
Distribution: Iraq (11); South Africa, Palaearctic Region, Afrotropical, China, and Japan (16).
Host: *Syrphus* species pupae (26).

*3.3.1. Genus, Apoleptomastix Kerrich, 1982*

***Apoleptomastix bicoloricornis*** (Girault, 1915)

Basionym: *Leptomastix bicoloricornis* Girault, 1915
Synonyms: *Apoleptomastix spoliata* Kerrich, 1982
*Xiphomastix ranchiensis* Shamim and Shafee, 1984
Distribution: Iraq (39). Australian and Oriental Regions (3, 40); Tajikistan, Egypt and Saudi Arabia (41).
Host: *Coccidohystrix insolita* (Green, 1908) (42); *Brevennia rehi* (43).

## 4. Conclusion

By reviewing the references, we can see the importance of studying this group of encyrtid wasps for the purpose of benefiting from them in biological control, especially since the diversity of these wasps somewhat a good in the Iraqi environment.

## Compliance with ethical standards

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*Disclosure of conflict of interest*

The authors have no conflicts of interest to declare.

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