

# Revision of the species Chalcidoidea (Insecta, Hymenoptera) deposited in the Museum of Natural History of the Scientific Institute in Rabat (Morocco)

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## Abstract

*Revision of the species Chalcidoidea (Insecta, Hymenoptera) deposited in the Museum of Natural History of the Scientific Institute in Rabat (Morocco).* This work presents the revision of twelve species of the superfamily of Chalcidoidea (Insecta, Hymenoptera) deposited in the National Museum of Natural History, Scientific Institute, Rabat, Morocco. Data on biology and hosts of these species are given and a map of their distribution in the North Africa region is provided.

Data published through [GBIF](#) (Doi: [10.15470/q0ya99](https://doi.org/10.15470/q0ya99))

Key words: Hymenoptera, Chalcidoidea, Revision, SI reference collection, Morocco

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## Resumen

*Revisión de las especies de Chalcidoidea (Insecta, Hymenoptera) conservadas en el Museo de Historia Natural del Instituto Científico de Rabat (Marruecos).* Este trabajo presenta la revisión de 12 especies de la superfamilia Chalcidoidea (Insecta, Hymenoptera) conservadas en el Museo de Historia Natural del Instituto Científico de Rabat (Marruecos). Se aportan datos referentes a la biología y huéspedes de dichas especies, así como un mapa de distribución de las mismas en el norte de África.

Datos publicados en [GBIF](#) (Doi: [10.15470/q0ya99](https://doi.org/10.15470/q0ya99))

Palabras clave: Hymenoptera, Chalcidoidea, Revisión, Colección de referencia del SI, Marruecos

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## Resum

*Revisió de les espècies de Chalcidoidea (Insecta, Hymenoptera) conservades al Museu d'Història Natural de l'Institut Científic de Rabat (Marroc).* Aquest treball presenta la revisió de 12 espècies de la superfamília Chalcidoidea (Insecta, Hymenoptera) conservades al Museu d'Història Natural de l'Institut Científic de Rabat (Marroc). S'aporten dades referents a la biologia i els hostes d'aquestes espècies, com també un mapa de distribució al nord d'Àfrica.

Dades publicades a [GBIF](#) (Doi: [10.15470/q0ya99](https://doi.org/10.15470/q0ya99))

Paraules clau: Hymenoptera, Chalcidoidea, Revisió, Col·lecció de referència de l'SI, Marroc

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## Introduction

The Chalcidoidea is a megadiverse superfamily of Apocrita (Hymenoptera) composed of 33 families. It includes around 25,000 known species and a total diversity estimated at more than 500,000 species, which means that most have not yet been discovered and described (Askew and Mifsud, 2016; Heraty et al., 2013). In addition, many species in this group of Hymenoptera are of great economic and agronomic importance because of their use as biological control agents.

Since 2012 in Morocco, we have been working on a research project focused on the inventory of Chalcidoidea, and have visited museums, including the National Museum of Natural History of the Scientific Institute (NMNH–SI), in Rabat. However, we found several specimens of the insect fauna recorded since the 1900s in the collection boxes had names that have not been updated and were even erroneous, never having been consulted or reviewed by specialists. This finding prompted us to revise all the species of this superfamily preserved in this former research institution.

The aim of this work therefore was to revise for the first time all the Chalcidoidea specimens from this old collection registered in the NMNH–SI in order to update and add to the diversity of the fauna of Morocco.

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## Material and methods

To review all the specimens deposited in the collection boxes belonging to the Chalcidoidea superfamily, each specimen was examined morphologically in detail with a Stereomicroscope Olympus SZX16 and identified by consulting specific and appropriate determination keys: Cresson (1972); Crawford (1910); Bouček (1952); Steffan (1950, 1959); Delvare (1992); Delvare and Bouček (1992); Bagnée and Vago (2006); Delvare et al. (2011); Lotfalizadeh et al. (2012); Toheed et al. (2018); Bouček (1974); Rizzo and Mitroiu (2010); Doğanlar (2011); Delvare and Huchet (2017); Janšta et al. (2017); Cruaud et al. (2019); Cruaud et al. (2020).

Acronyms used in the text

- SI, Scientific Institute
- NMNH–SI, National Museum of Natural History, Scientific Institute, Mohammed V University of Rabat, Morocco
- NMNH, National Museum of Natural History, Paris, France

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## Results

After revising the specimens from the NMNH–SI collection we identified 12 species in 9 genera and 5 families: Chalcididae (5 species), Encyrtidae (1 species), Leucospidae (3 species), Megastigmidae (1 species) and Pteromalidae (2 species).

### Annotated list of the species of the superfamily Chalcidoidea

The list below includes data on the species of Chalcidoidea from Morocco deposited at the NMNH–SI and classified by family, subfamily, tribe (where it exists), genus and species (see also the dataset published in [GBIF](#), Doi: [10.15470/q0ya99](https://doi.org/10.15470/q0ya99)).

#### Superfamily Chalcidoidea

##### Family Chalcididae

##### Subfamily Brachymeriinae

#### ***Brachymeria minuta* (Linnaeus, 1767)**

Examined material: 1♀, Morocco: Tangier, 1919, J. de Gaulle leg. [NMNH–SI, under the name *Chalcis minuta* (Linnaeus, 1767)].

Brief description: according to Delvare and Huchet (2017), the *Brachymeria minuta* species group has numerous characters that can be used to separate species. The Moroccan specimen of *Brachymeria minuta* is characterized by: a bright light yellow tegula; black scape with brown base and apex, brownish black pedicel; remaining antennal segments black; black coxae; black brownish trochanter; black femora with bright light yellow apices; brownish yellow anterior tibia with bright light yellow at the basal part and at the external apical part, and a long blackish spot at the median external part; shiny black mid-tibia with yellow base and apex; black posterior tibia with sub-basal spot and yellow apical part. Pubescence on grayish white body, hyaline wings with dark brown veins.

Comments: this species is distributed in the West Palearctic region and the U.S.A., and in Morocco (Kissayi et al., 2019) and Tunisia (Bouček, 1952) in the regions of North African. *Brachymeria minuta* is considered a parasitoid species of the primary type, hyperparasitoid or optional, pupae of Diptera (Calliphoridae, Sarcophagidae), Hymenoptera (Cimbicidae, Diprionidae), Lepidoptera (Arctiidae, Gelechiidae, Hesperidae, Lasiocampidae, Erebidae, Pieridae, Tortricidae, Yponomeutidae) (Thompson, 1955; Askew, 1962; Herting, 1975, 1976, 1977, 1978; Filatova, 1982; Shanower et al., 1992; Delvare and Huchet, 2017). In Morocco, Jourdan and Rungs (1934) observed this species flying around inflorescence of *Euphorbia terracina* (Linnaeus) (Euphorbiaceae), and also noted it on Rosaceae aphids *Macrosiphum rosae* (Linnaeus) (Hemiptera, Aphididae) at Meknes (pers. obs.) (Kissayi et al., 2019).

***Brachymeria tibialis* (Walker, 1834)**

*Chalcis tibialis* Walker, 1834: 29. Original description ♂. France, near Paris

= *Chalcis distinguenda* Walker, 1834: Bouček, 1992: 92

= *Chalcis intermedia* Nees, 1834: Bouček, 1992: 92

*Brachymeria intermedia* (Walker): Bouček, 1952: 18 (key), 22–23 (redescription, hosts); Steffan, 1959: 36 (key), 38 (hosts)

*Brachymeria tibialis* (Walker): Bouček, 1992: 92

Examined material: 1♀, Morocco: *Quercus suber*, (NMNH–SI, under *Chalcis intermedia* Nees, 1934); 5♀, 1♂, Maâmora forest, 1924, A. Théry leg., L. Berland det., 1♀, 18 VI 1925, (NMNH–SI, under *Chalcis flavipes* Panzer, 1801), 1♀, Maâmora [NMNH–SI, under *Chalcis minuta* (Linnaeus, 1767)].

Brief description: this species has frequently been reported using its junior synonym, *Brachymeria intermedia* (*Chalcis*); it has been described by Nees von Esenbeck (1834) and redescribed by Masi (1916) and Ruschka (1922). Crawford (1910) included it in a key, under the name of *Chalcis flavipes* Panzer, 1801. Ferrière (1927) mentions that several authors refer to *Brachymeria* under *Chalcis*. The revised specimens according to Crawford (1910) are characterized by their posterior femur and tibia showing yellow marks and the head presenting a keel in front of the malar space. Bouček (1952) provided a key to the genus with the description of *B. tibialis* characterized by right mandible with three teeth and left mandible with two teeth; posterior tarsi very robustly and compactly built, incisions between the segments weak. Steffan (1959) included the description of this species in a key to the *Brachymeria* species of France. *B. tibialis* is characterized by a third femur without internal basal tubercle, shiny disc, with a perfectly smooth integument between the setiger points; third femur black with large distal macule; third tibia yellow adorned with a black band along the outer ventral ridge.

Comments: *Brachymeria tibialis* is widespread in the Palearctic region. It is reported from three countries in the North African region (Algeria, Tunisia and Morocco). Commonly known to be polyphagous, the species is recognized as a primary or sometimes secondary parasitoid; solitary; endoparasitoid; hyperparasitoid or facultative; its larvae; nymphs or cocoons and even used in biological control. The primary hosts reported for this species are represented by Diptera (Cecidomyiidae, Tachinidae), Hymenoptera (Chalcididae, Cynipidae, Diprionidae), Lepidoptera (Arctiidae, Gelechiidae, Hesperidae, Lasiocampidae, Erebiidae, Noctuidae, Notodontidae, Nymphalidae, Oecophoridae, Papilionidae, Pieridae, Pyralidae, Saturniidae, Tortricidae, Zygaenidae) (Bouček, 1952; Bouček and Sedivy, 1954; Steffan, 1959; Peck, 1963; Carl, 1968; OILB, 1971; Grimble, 1976; Herting, 1976, 1977; Fry, 1989; Drost and Cardé, 1992; Dindo, 1993; Dindo and Luciano, 1995; Askew and Shaw, 2001; Stojanova, 2006; Bărbuceanu and Andriescu, 2012; Lotfalizadeh et al., 2012; Tikader, 2012; Bărbuceanu et al., 2020). It is also capable of behaving as a pseudohyperparasitoid (Obregón et al., 2015).

In Morocco, this species was found on *Tortrix viridana* (Linnaeus, 1758) and from *Acleris undulana* (Walsingham, 1900) (Lepidoptera, Tortricidae) (Mouna and Fabre, 2005). In addition, it was obtained from the biological community associated with *Lymantria dispar* (Linnaeus, 1758) (Lepidoptera, Erebiidae, Lymantriinae) (De Lépiney, 1930).

**Subfamily Chalcidinae*****Chalcis myrifex* (Sulzer, 1876) (fig. 1)**

Examined material: 1♀, Morocco: Tangier, 1914, Ernest André leg., NMNH–SI [under *Smicra myrifex* (Sulzer, 1776)].

Brief description: *Chalcis myrifex* (Sulzer) is distinguished by its black color; head with



Fig. 1. *Chalcis myrifex* (Sulzer, 1876): ♀, habitus, lateral view. (Photo by C. Villemant).

Fig. 1. *Chalcis myrifex* (Sulzer, 1876): ♀, habitus, vista lateral. (Foto de C. Villemant).

two yellow spots between the eyes; yellow tegula and petiole; black legs; yellow anterior femurs at ends; yellow posterior femur, upper base and black apex, with thirteen black teeth; fawn-colored anterior tibiae; posterior tibia yellow at extremities; tawny tarsi, with a dark point; dark wings.

Comments: *Chalcis myrifex* is a species that has been inventoried recently in the region of North Africa and specifically in Morocco and Tunisia (Bouček, 1952). Samples of this species from Morocco are deposited at the NMNH, Paris (pers. obs.).

The species are endoparasites of larvae or pupae of Diptera, Stratiomyidae (Bouček, 1952, 1977; Erdős, 1955; Schremmer, 1960; Askew, 1962; Herting, 1978).

### Subfamily Haltichellinae

#### ***Neochalcis fertoni* (Kieffer, 1899)**

*Euchalcis barbara* Benoist, 1921: 118–120.

Original description ♀♂. Morocco, Casablanca, ex nest *Anthidium lituratum* Panzer [now *Pseudoanthidium nanum* (Mocsáry, 1881)]. Holotype in NMHN, Paris.

= *Neochalcis fertoni* (Kieffer, 1899): Bouček, 1952: 43.

Examined material: 1♀, Morocco: Maâmora, IX 1919, R. Benoist leg. and det., NMNH–SI (under the name *Euchalcis barbara* Benoist, 1921 = *Neochalcis barbara* Benoist, 1921).

Comments: the result of a recent molecular phylogenetic study of the emblematic group Chalcididae using UCE showed that *Neochalcis fertoni* (described from Corsica) and *N. barbara* (described from Morocco) are different species (Cruaud et al., 2019, 2020). Furthermore, Bouček (1952) also reported this species from Algeria and Tunisia apart from the type from Morocco (Benoist, 1921).

In Morocco, this species was reared from *Anthidium lituratum* (Panzer, 1801) (Hymenoptera, Megachilidae) having established its nests in dried stems of *Thapsia garganica* Linnaeus, 1767 (Apiaceae) (Benoist, 1921).

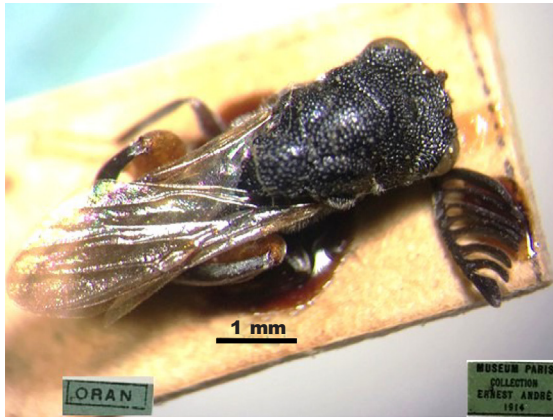


Fig. 2. *Chirocera pectinicornis* (Latreille, 1809): ♀, habitus, dorsal view. (Photo by K. Kissayi and Z. Bour.)

Fig. 2. *Chirocera pectinicornis* (Latreille, 1809): ♀, habitus, vista dorsal. (Foto de K. Kissayi y Z. Bour).

***Chirocera pectinicornis* (Latreille, 1809) (fig. 2)**

Examined material: 1♀, Algeria: Oran, 1914, Ernest André leg. (NMNH–SI).

Comments: identification is confirmed for this species. It was mentioned for the whole region of North Africa by Bouček (1952) in Algeria with a specimen deposited at the NMNH–SI, Rabat and Tunisia as well as in Morocco (Steffan, 1957). Its biology is still unknown.

**Family Encyrtidae**  
**Subfamily Encyrtinae**

***Ooencyrtus kuvanae* (Howard, 1910)**

Examined material: 2♀, 1♂, Morocco: Maâmora Forest, NMNH–SI (labelled *Schedius kuvanae* Howard, 1910).

Comments: *Ooencyrtus kuvanae* is well known as an egg–parasite of *Lymantria dispar* (L.) (Lepidoptera, Erebidae, Lymantriinae). The labels of specimens deposited in the NMNH–SI show that some specimens were sent to North America as indicated by gypsy moth eggs of the Lepidoptera. Trjapitzin (1989) mentioned it from Algeria and Tunisia. The hosts cataloged for this species are Hemiptera (Coreidae, Fulgoridae), Lepidoptera (Lasiocampidae, Erebidae, Saturniidae) and Neuroptera (Chrysopidae) (Herting, 1976; Hérard, 1978; Prinsloo, 1983; Matteson, 1981; Huang and Noyes, 1994; Noyes and Hayat, 1994; Fraval et al., 1995; Villemant and Luciano, 1995; Trjapitzin and Paik, 1996; Fallahzadeh and Japoshvili, 2010; Kissayi and Benhalima, 2016; Liu and Mottern, 2017).

**Family Leucospidae**

***Leucospis brevicauda* Fabricius, 1804**

Examined material: 1♀, Morocco: Tangier, 1914, Ernest André leg., NMNH–SI.

Comments: in North Africa this species was reported in Algeria (Fabricius, 1804), Tunisia, Egypt and Morocco (Baur and Amiet, 2000; Madl and Schwarz, 2014). In addition, its geographic distribution is cited in France (mainland), Italy (mainland, Sardinia, Sicily), Malta, Portugal, Spain (mainland, Baleares), Turkey (Spinola, 1838; Öncüer, 1991; Madl and Schwarz, 2014).

***Leucospis dorsigera* Fabricius, 1775**

Material examined: 1♀, Morocco: Tangier, 1914, Ernest André leg., NMNH–SI.

Comments: This species, with palearctic distribution, is mentioned in North Africa in Algeria (Fabricius, 1804), Egypt (Spinola, 1838), Tunisia, Libya, and Morocco (Madl and Schwarz, 2014).

This species is quoted as a primary parasitoid or hyperparasitoid having primary hosts in Coleoptera (Bostrichidae, Cerambycidae), Hymenoptera (Megachilidae) (Herting, 1973; Fry, 1989; Baur and Amiet, 2000; Baur, 2005). The worldwide distribution is cited in Afghanistan, Albania, Austria, Azerbaijan, Belgium, Bulgaria, Croatia (mainland, Hvar, Krk, Losinj, Mljet, Rab, Susak), Cyprus, Czech Republic, France (mainland, Corsica), Georgia, Germany, Greece (mainland, Poros, Rhodes), Hungary, Iran, Iraq, Israel, Italy (mainland, Lampedusa, Sardinia, Sicily), Jordan, Kazakhstan, Lebanon, Luxembourg, Macedonia, Malta, Moldova, Montenegro, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain (mainland), Switzerland, Syria, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan (Hesami et al., 2005; Madl and Schwarz, 2014).

***Leucospis miniata* Klug, 1834**

Examined material: 1♀, Morocco: Middle Atlas, Ras El Ksar, 900 m, 12,13 VI 1929, F. Le Cerf leg.; 1♀, Aguelman Aberhane, VII 1954 (NMNH–SI).

Comments: this species has been cited by Bouček since 1959 in the North African region where it has a wide distribution and is mentioned from Egypt (Klug, 1934), Tunisia (Schmid–Egger, 2010), Algeria, Libya and Morocco (Bouček, 1974; Madl and Schwarz, 2014); and also from Italy (Lampedusa, Sicily) (Caleca et al., 1995); Malta (Casolari and Casolari Moreno, 1980) and Israel (Madl and Schwarz, 2014).

The identifications of the specimens at the NMNH–SI are correct. In addition, specimens of both these species of *Leucospis* from Morocco, Algeria and Tunisia are deposited at the NMNH, Paris (pers. obs.). Any hosts of this species are unknown (Bouček, 1974).

**Family Megastigmidae**

Megastigmidae were considered a subfamily of the Torymidae family until the work of Janšta et al. (2017) when the taxonomic level was raised to family status.

***Bootanomyia stigmatizans* (Fabricius, 1798) (fig. 3)**

Examined material: 1♀, Morocco: Cap Spartel, 1904, G. Buchet leg., NMNH–SI [labelled *Megastigmus stigmatizans* (Fabricius, 1798)].

Comments: *Bootanomyia stigmatizans* currently has a limited geographic distribution in North Africa, being reported only in Morocco (Delucchi, 1962: 14).

This species is a primary parasitoid or associated with galls of Cynipidae (Hymenoptera) living on *Quercus* Linnaeus, 1753 (Fagaceae) (Askew, 1966).

**Family Pteromalidae**

**Subfamily Pteromalinae**

***Dibrachys microgastris* (Bouché, 1834)**

Examined material: 3♀, Morocco: Maâmora forest, NMNH–SI [labelled as *Dibrachys boucheanus* (Ratzeburg, 1844)].

Comments: since *Dibrachys microgastris* (Bouché) was first described, several studies and revisions have been published and the identification of the specimens from the NMNH–SI is correct.

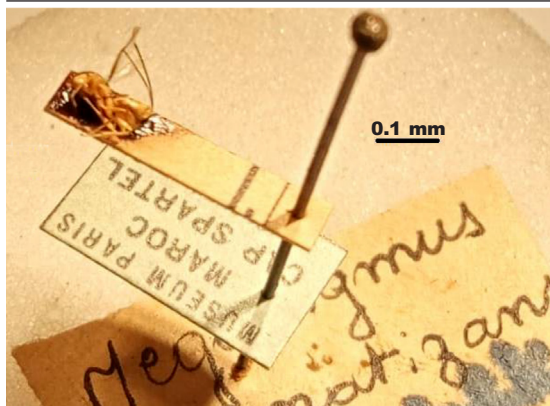


Fig. 3. *Bootanomyia stigmatizans*: ♀, habitus, lateral view. (Photo by K. Kissayi and Z. Bour).

Fig. 3. *Bootanomyia stigmatizans*: ♀, habitus, vista lateral. (Foto de K. Kissayi y Z. Bour).

For the North African region, the species is reported in Algeria (Thompson, 1958), Tunisia, Egypt, and Morocco (Peters and Baur, 2011).

*Dibrachys microgastri* (Gordh) is recognized as a primary parasitoid, solitary or gregarious, or larvae, nymphs, or facultative hyperparasitoid, ectoparasitoid or endoparasitoid. The species is also used in biological control (Hu, 1964; Herting, 1975; Chu, 1978; Gülel, 1982, 1988; Fry, 1989; Knight et al., 1992; Vidal, 1993; Askew and Shaw, 1997; Myartseva et al., 1999; Mitroiu, 2001; Bărbuceanu and Andriescu, 2009). The primary hosts belong to Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera and Neuroptera (Thompson, 1958; Peck, 1963; Herting, 1976, 1977, 1978; Burks, 1979; Peters and Baur, 2011). Other primary hosts reported for this species are the Araneae (Araneidae, Thomisidae) (Burks, 1979).

In Morocco, *D. microgastri* was collected from the *Thaumetopoea pityocampa* (Denis and Schiffermüller, 1775) caterpillar (Lepidoptera, Notodontidae) on *Cedrus atlantica* (Manetti ex Endlicher) Carrière, 1855 (Pinaceae) (Peters and Baur, 2011). It was collected from the biological complex of *Lymantria dispar* (Linnaeus, 1758) (De Lépiney, 1927).

#### ***Norbanus guyoni* (Giraud, 1870) (fig. 4)**

*Arthrolysis guyoni* Giraud, 1870: 484–485. Original description ♀♂. Algeria.

*Norbanus guyoni* (Giraud): Rizzo and Mitroiu: 239–241.

Examined material: 1♀, Algeria: Biskra, 1877, Giraud leg., NMNH–SI [under the name *Arthrolypis guyoni* (Giraud, 1870)].

Comments: Rizzo and Mitroiu (2010) revised the Palaearctic species of *Norbanus*, providing a key to identify the species; they redescribed *Arthrolypis guyoni* and transferred it to *Norbanus*. The specimen placed in the NMNH–SI agrees with this species. In addition to Algeria Rizzo and Mitroiu (2010) described it from Libya. It is recognized as a parasite of Lepidoptera Gelechiidae (Herting, 1975). The species was also described from *Oecocecis guynella* (Guenée) (Lepidoptera, Gelechiidae) galling the twigs of *Limoniastrum guyonianum* Boiss. (Plumbaginaceae) (Giraud, 1870).





Fig. 4. *Norbanus guyoni* (Giraud, 1870): ♀, habitus, lateral view. (Photo by K. Kissayi and Z. Bour).

Fig. 4. *Norbanus guyoni* (Giraud, 1870): ♀, habitus, vista lateral. (Foto de K. Kissayi y Z. Bour).

## Discussion

The Hymenoptera collection of the NMHN–SI is especially interesting as it includes ancient data, some of them 150 years old. It also includes a specimen of a type series of *N. guyoni*. The other Hymenoptera housed there belonging to several taxa such as the Tenthredinidae, Ichneumonoidea, Apoidea, Chrysoidea and Vespoidea, some of them not yet identified. This work allowed to check and correct, when necessary, the identifications, and to update the nomenclature, thus providing reliable data for the present and future databases. Further specimens are in the process of being added, following our project of studying the Chalcidoidea of the Maâmora forest.

This work in the NMHN–SI collection revealed the presence of 12 species of Chalcidoidea belonging to five families (table 1). Some of these samples have been deposited for more than century. The species names were often misspelled and, together with family names, descriptions were incorrect or outdated. Their spelling has now been corrected and updated and the nomenclature assigned to the species in the old collection has been revised and updated.

During this review, we found three specimens named *Chalcis flavipes* Panzer, *C. intermedia* Nees and *Brachymeria minuta* (Linnaeus). After examination, all three turned out to belong to a single species, *Brachymeria tibialis*, with *C. intermedia* being considered a junior synonym of *B. tibialis*. Concerning the encyrtid, it is an oophagous parasitoid that has been used for biological control of *Lymantria dispar* (Linnaeus) (Lepidoptera, Erebidae, Lymantriinae) since it was first introduced in Morocco in the 1920s (De Lépiney, 1927).

In summary, Leucospidae specimens of Morocco preserved at the NMNH–SI have now been correctly identified and labeled. Specimens of these species from the same period are also stored at NMNH, Paris, France (pers. obs.).

Megastigmidae is an updated family name and *Megastigmus stigmatizans* (Fabricius, 1798) is now named *Bootanomyia stigmatizans* (Fabricius, 1798). It is well identified as are the two Algerian species appearing in this collection represented by a Chalcididae and a Pteromalidae. All species (11), except *Norbanus guyoni* (Pteromalidae), have been mentioned from Morocco. Figure 5 illustrates the geographical distribution of the species examined during this study in North Africa: none have been recorded from Mauritania.

Table 1. Summary of the revision of Chalcidoidea from the NMNH–SI collection with the updated nomenclature and names of species and families as appearing of the labels of the collection.

Tabla 1. Resumen de la revisión de Chalcidoidea de la colección del MNHN–SI con la nomenclatura y nombres de las especies y familias actualizados según aparecen en las etiquetas de la colección.

Species name		Family name	
Updated	In the collection	Updated	In the collection
<i>Brachymeria tibialis</i> (Walker, 1834)	<i>Chalcis flavipes</i> (Panzer, 1801)	Chalcididae	Braconidae
<i>Brachymeria tibialis</i> (Walker, 1834)	<i>Chalcis intermedia</i> (Nees, 1834)	Chalcididae	Braconidae
<i>Brachymeria tibialis</i> (Walker, 1834)	<i>Brachymeria minuta</i> (Linnaeus, 1767)	Chalcididae	Braconidae
<i>Brachymeria minuta</i> (Linnaeus, 1767)	<i>Chalcis minuta</i> (Linnaeus, 1767)	Chalcididae	Braconidae
<i>Chalcis myrifex</i> (Sulzer, 1876)	<i>Smicra muriflex</i> (Sulzer, 1876)	Chalcididae	Braconidae
<i>Chirocera pectinicornis</i> Latreille, 1809	<i>Chirocera pectinicornis</i> Latreille, 1809	Chalcididae	Chalcididae
<i>Neochalcis fertoni</i> (Kieffer, 1899)	<i>Neochalsis barbara</i> Benoist, 1921	Chalcididae	Braconidae
<i>Ooencyrtus kuvanae</i> (Howard, 1910)	<i>Schedius kuoanae</i> Howard, 1910	Encyrtidae	Braconidae
<i>Leucospis brevicauda</i> Fabricius, 1804	<i>Leucopis breicauda</i> Fabricius, 1804	Leucospidae	Chalcididae
<i>Leucospis dorsigera</i> Fabricius, 1775	<i>Leucopis dorsigera</i> Fabricius, 1775	Leucospidae	Chalcididae
<i>Leucospis miniata</i> Klug, 1834	<i>Leucopis miniata</i> Klug, 1834	Leucospidae	Chalcididae
<i>Bootanomyia stigmatizans</i> (Fabricius, 1798)	<i>Megastigmus stigmatyans</i> (Fabricius, 1798)	Megastigmidae	Chalcididae
<i>Dibrachys microgastris</i> (Bouché, 1834)	<i>Dibraehys boucheanus</i> (Ratzeburg, 1844)	Pteromalidae	Chalcididae
<i>Norbanus guyoni</i> (Giraud, 1899)	<i>Arthrolypis guyoni</i> (Giraud, 1870)	Pteromalidae	Chalcididae

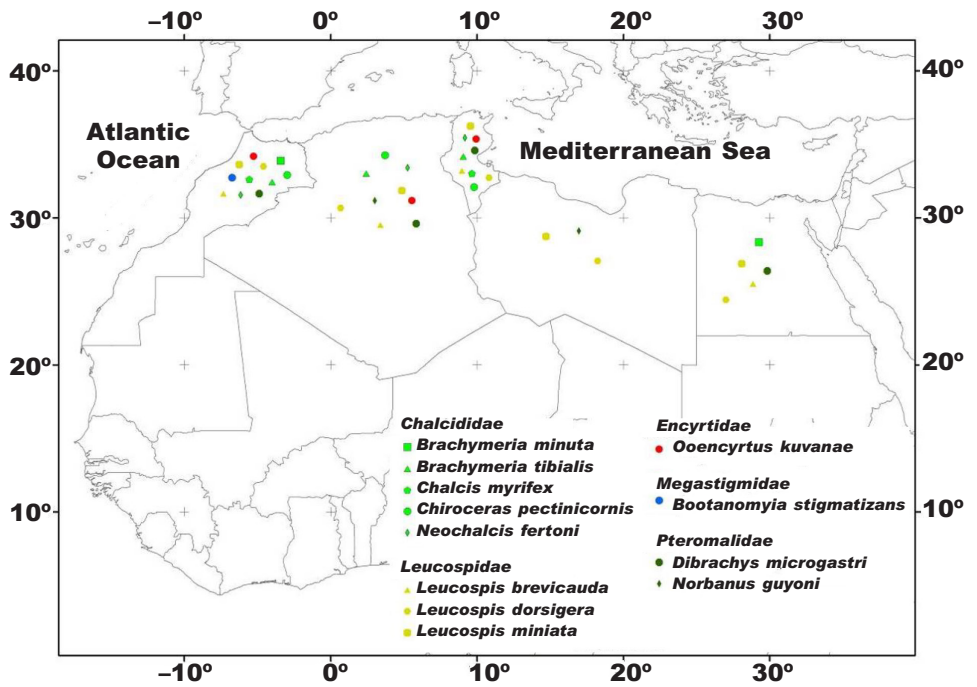


Fig. 5. Distribution map of the studied Chalcidoidea specimens deposited at the NMNH–SI.

Fig. 5. Mapa de distribución de los especímenes estudiados de Chalcidoidea conservados en el MNHN–SI.

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## References

- Askew, R. R., 1962. Chalcidoidea (Hymenoptera) in the Manchester Museum (Part 1). *Entomologist*, 95: 97–99.
- 1966. Observations on the British species of *Megastigmus* Dalman (Hym. Torymidae) which inhabit cynipid oak galls. *Entomologist*, 99: 124–128.
- Askew, R. R., Mifsud, D., 2016. A preliminary check-list of the Chalcidoidea (Hymenoptera) of the Maltese Islands. *Bulletin of the Entomological Society of Malta*, 8: 47–72.
- Askew, R. R., Shaw, M. R., 1997. *Pteromalus apum* (Retzius) and other pteromalid (Hym.) primary parasitoids of butterfly pupae in western Europe. *Entomologist's Monthly Magazine*, 133: 67–72.
- 2001. *Brachymeria tibialis* (Walker, 1834) (Hymenoptera: Chalcididae), a parasitoid of *Zygaena* Fabricius, 1777, and other Lepidoptera. *Entomologist's Gazette*, 52(4): 263–268.
- Bărbuceanu, D., Andriescu, A., 2009. Species of chalcidoids (Insecta: Hymenoptera), primary parasitoids of *Sparganothis pilleriana* (Den. et Schiff.) (Insecta: Lepidoptera) in vineyards in southern Romania. *Bulletin of the Natural History Museum in Belgrade*, 2: 121–130.
- Bărbuceanu, D., Andriescu, I., 2012. *Brachymeria tibialis* (Walker) (Hymenoptera: Chalcididae), an important parasitoid of the pupae of *Sparganothis pilleriana* (Denis and Schiffermuller) (Lepidoptera: Tortricidae) in the vineyards of southern Romania. *Analele Stiintifice ale Universitatii "Al. I. Cuza" din Iasi (Biologie)*, 58: 85–92.
- Bărbuceanu, D., Bărbuceanu, M., Andriescu, I., 2020. Parasitoids of *Sparganothis pilleriana* (Den. Et Schiff.) (Lepidoptera: Tortricidae) in southern vineyards of Romania. *Current Trends in Natural Sciences*, 9(17): 307–316.
- Baugnée, J.–Y., Vago, J.–L., 2006. Note sur la présence en Belgique de *Chalcis myrifex* (Sulzer, 1776) (Hymenoptera : Chalcididae). *Notes fauniques de Gembloux*, 59(4): 219–220.
- Baur, H., 2005. Determination list of entomophagous insects nr 14. *Bulletin Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique*, 28(11): 1–71.
- Baur, H., Amiet, F., 2000. The Leucospidae (Hymenoptera: Chalcidoidea) of Switzerland, with a key and data on the European species. *Revue Suisse de Zoologie*, 107(2): 359–388.
- Benoist, R., 1921. Description d'une espèce nouvelle du genre *Euchalcis*. *Bulletin de la Société Entomologique de France*, 26(8): 118–120.
- Bouček, Z., 1952. The first revision of the European species of the family Chalcididae (Hymenoptera). *Sborník Entomologického Oddelení Národního Musea v Praze*, 27(Supplement 1): 1–108.
- 1974. A revision of the Leucospidae (Hymenoptera: Chalcidoidea) of the world. *Bulletin of the British Museum (Natural History) Entomology*, 23(supplement): 1–241.
- 1977. A faunistic review of the Yugoslavian Chalcidoidea (Parasitic Hymenoptera). *Acta Entomologica Jugoslavica*, 13(supplement): 1–145.
- Bouček, Z., Sedivy, J., 1954. Die Hymenopteren–Parasiten von *Hyphantria cunea* Drury in der Tschechoslowakei. *Folia Zoologica Entomologica*, 3: 169–189.

- Burks, B. D., 1979. Torymidae (Agaoninae) and all other families of Chalcidoidea (excluding Encyrtidae). In: *Catalog of Hymenoptera in America North of Mexico 1: 748–1043* (K. V. Krombein, P. D. jr. Hurd, D. R. Smith, B. D. Burks, Eds.). Smithsonian Institution Press, Washington, D.C.
- Caleca, V., Lo Verde, G., Massa, B., 1995. *Leucospis miniata* Klug from Lampedusa (Hymenoptera Chalcidoidea Leucospidae). *Naturalista Siciliano*, 19(Supplemento): 773–775.
- Casolari, C., Casolari Moreno, R., 1980. *Cataloghi I – Collezione imenoterologica di Massimo SPINOLA*. Museo Regionale di Scienze Naturali, Torino.
- Carl, K. P., 1968. *Thymelicus lineola* (Lepidoptera: Hesperiiidae) and its parasites in Europe. *Canadian Entomologist*, 100(8): 785–801.
- Chu, H. F., 1978. Strategies and tactics of pest management with special reference to Chinese cotton insects. *Acta Entomologica Sinica*, 21(3): 297–308.
- Crawford, J. C., 1910. Technical results from the gipsy moth parasite laboratory. II. Descriptions of certain Chalcidoid parasites. *US Department of Agriculture Bureau of Entomology Bulletin (technical series)*, 19(2): 13–24.
- Cresson, E. T., 1972. Synopsis of the North American species belonging to the genera *Leucospis*, *Smicra* and *Chalcis*. *Transactions of the American Entomological Society*, 4: 29–60.
- Cruaud, A., Delvare, G., Nidelet, S., Sauné, L., Ratnasingham, S., Chartois, M., Blaimer, B. B., Gates, M., Brady, S. G., Faure, S., van Noort, S., Rossi, J.-P., Rasplus, J.-Y., 2020. Ultra-Conserved Elements and morphology reciprocally illuminate conflicting phylogenetic hypotheses in Chalcididae (Hymenoptera, Chalcidoidea). *Cladistics*: 1–35, <https://doi.org/10.1111/cla.12416>
- Cruaud, A., Nidelet, S., Arnal, P., Weber, A., Fusu, L., Gumovsky, A., Huber, J., Polaszek, A., Rasplus, J.-Y., 2019. Optimized DNA extraction and library preparation for minute arthropods: application to target enrichment in chalcid wasps used for biocontrol. *Molecular Ecology Resources*, 19(3): 702–710.
- De Lépiney, J., 1927. Les insectes nuisibles du Chêne-liège dans la forêt de la Mamora (Maroc). *Annales Epiphyties*, 13: 145–174.
- 1930. Contribution à l'étude du complexe biologique de *Lymantria dispar* L. *Mémoires de la Société des Sciences Naturelles du Maroc*, 23: 1–100.
- Delucchi, V. L., 1962. Hyménoptères chalcidiens du Maroc: I. Pteromalidae. *Al Awamia*, (MA): 113–135.
- Delvare, G., 1992. A reclassification of the Chalcidini with a checklist of the New World species. *Memoirs of the American Entomological Institute*, 53: 119–441.
- Delvare, G., Bouček, Z., 1992. On the New World Chalcididae (Hymenoptera). *Memoirs of the American Entomological Institute*, 53. Associated Publishers, Gainesville, U.S.A.
- Delvare, G., Huchet, J. B., 2017. *Brachymeria mochica*, a new Neotropical species of Chalcididae (Hymenoptera: Chalcidoidea) discovered on the archaeological site of Huacas de Moche, Peru with a review of related species. *Zootaxa*, 4290(1): 43–60.
- Delvare, G., Talaee, L., Goldansaz, S. H., 2011. New Chalcididae (Hymenoptera: Chalcidoidea) of economic importance from Iran. *Annales Zoologici*, 61(4): 789–801.
- Dindo, M. L., 1993. Effetti dell'età dell'ospite *Trichoplusia ni* Hb. (Lep. Noctuidae) sulla sua accettabilità e idoneità nei confronti del parassitoide *Brachymeria intermedia* (Nees) (Hym. Chalcididae). *Bollettino dell'Istituto di Entomologia "Guido Grandi" della Università degli Studi di Bologna*, 47: 69–77.
- Dindo, M. L., Luciano, P., 1995. Possibilities of culturing *Brachymeria intermedia* (Nees) (Hym. Chalcididae), a solitary pupal gipsy moth parasitoid, on artificial diets. In: *Integrated Protection in Cork Oak Forests*: 95–99 (P. Luciano, Ed.). *IOBC wprs Bulletin*, 18(6).
- Doğanlar, M., 2011. Review of Palearctic and Australian species of *Bootanomyia* Girault 1915 (Hymenoptera: Torymidae: Megastigminae), with description of new species. *Turkish Journal of Zoology*, 35(2): 123–157.
- Drost, Y. C., Cardé, R. T., 1992. Use of learned visual cues during habitat location by *Brachymeria intermedia*. *Entomologia Experimentalis et Applicata*, 64(3): 217–224.

- Erdős, J., 1955. Magyarország Allatvilága. XII. Kötet. Hymenoptera II. 2. Füzet. Fémfűrészek I. Chalcidoidea I. *Fauna Hungariae*, 2(2): 1–48.
- Fabricius, J. C., 1804. *Systema Piezatorum secundum ordines, genera, species, adiectis synonymis, locis, observationibus, descriptionibus*. A. C. Reichard, Brunsvigae.
- Fallahzadeh, M., Japoshvili, G., 2010. Checklist of Iranian encyrtids (Hymenoptera: Chalcidoidea) with descriptions of new species. *Journal of Insect Science, Tucson*, 10(68): 1–24.
- Ferrière, Ch., 1927. Les parasite et hyperparasites de *Lymantria dispar* au Maroc. *Annales des Epiphyties, Paris*, XIII: 175–180.
- Filatova, I. T., 1982. On the tachinid *Phebelia glauca* Meig. (Diptera, Tachinidae) – a parasite of larvae of the larch birch sawfly. *Poleznye i vrednye nakeskomye Sibiri*: 222–228.
- Fraval, A., Villemant, C., Luciano, P., 1995. Biological control of *Porthetria dispar* (L.) (Lep. Lymntriidae) in Morocco. *Bulletin Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique*, 18(6): 83–86.
- Fry, J. M., 1989. Natural enemy databank, 1987. *A catalogue of natural enemies of arthropods derived from records in the CIBC Natural Enemy Databank*. CAB International, Wallingford, Oxford, UK.
- Giraud, J., 1870. Observations Hyménoptérologiques. *Annales de la Société Entomologique de France*, 4(9): 469–489.
- Grimble, D. G., 1976. Parasite release to suppress gypsy moth and reduce defoliation. *Applied Forestry Research Institute, State University of New York*, Report num. 32: 1–26.
- Gülel, A., 1982. Studies on the biology of *Dibrachys boarmiae* (Walker) (Hymen., Pteromalidae) parasitic on *Galleria mellonella* L. *Zeitschrift für Angewandte Entomologie*, 94(2): 138–149.
- 1988. Effects of quantitative food shortage on adult size and progeny production in the parasitoid *Dibrachys boarmiae* (Hymenoptera: Pteromalidae). *Doga Türk Zooloji Dergisi*, 12(1): 48–54.
- Hérard, F., 1978. Behaviour of adults of *Ooencyrtus kuvanae* (Howard) (Hym.: Encyrtidae) egg parasite of *Lymantria dispar* (L.) (Lep.: Erebidae) in the Mamora Forest (Morocco). *Annales de Zoologie–Écologie Animale*, 10: 603–612.
- Heraty, J. M., Burks, R. A., Cruaud, A., Gibson, G. A. P., Liljeblad, J., Munro, J., Rasplus, J.-Y., Delvare, G., Janšta, P., Gumovsky, A., Huber, J., Woolley, J. B., Krogmann, L., Heydon, S., Polaszek, A., Schmidt, S., Darling, D. C., Gates, M. W., Mottern, J., Murray, E., Dal Molin, A., Triapitsyn, S., Baur, H., Pinto, J. D., van Noort, S., George, J., Yoder, M., 2013. A phylogenetic analysis of the megadiverse Chalcidoidea (Hymenoptera). *Cladistics*, 29(5): 466–542.
- Herting, B., 1973. Coleoptera to Strepsiptera. In: *A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy*, 3. Commonwealth Agricultural Bureaux, Commonwealth Institute of Biological Control.
- 1975. Lepidoptera, Part 1 (Microlepidoptera). In: *A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy*. Commonwealth Agricultural Bureaux, Commonwealth Institute of Biological Control.
- 1976. Lepidoptera, Part 2 (Macrolepidoptera). In: *A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy*, 7. Commonwealth Agricultural Bureaux, Commonwealth Institute of Biological Control.
- 1977. Hymenoptera. In: *A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy*, 4. Commonwealth Agricultural Bureaux, Commonwealth Institute of Biological Control.
- 1978. Neuroptera, Diptera, Siphonaptera. In: *A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy*, 5. Commonwealth Agricultural Bureaux, Commonwealth Institute of Biological Control.
- Hesami, S., Akrami, M. A., Baur, H., 2005. *Leucospis dorsigera* Fabricius (Hymenoptera, Leucospidae) as a Hyperparasitoid of Cerambycidae (Coleoptera) through Xoridinae (Hymenoptera: Ichneumonidae) in Iran. *Journal of Hymenoptera Research*, 14(1): 66–68.

- Hu, T., 1964. Investigations on the biology and utilization of *Dibrachys cavus* (Walker). *Acta Entomologica Sinica*, 13(5): 689–714.
- Huang, D.–W., Noyes, J. S., 1994. A revision of the Indo-Pacific species of *Ooencyrtus* (Hymenoptera: Encyrtidae), parasitoids of the immature stages of economically important insect species (mainly Hemiptera and Lepidoptera). *Bulletin of the Natural History Museum (Entomology Series)*, 63(1): 1–136.
- Janšta, P., Cruaud, A., Delvare, G., Genson, G., Heraty, J., Křížková, B., Rasplus, J.–Y., 2017. Torymidae (Hymenoptera, Chalcidoidea) revised: molecular phylogeny, circumscription and reclassification of the family with discussion of its biogeography and evolution of life–history traits. *Cladistics*: 1–25.
- Jourdan, M. L., Rungs, C., 1934. Observations sur quelques Hyménoptères du Maroc. *Bulletin de la Société des Sciences Naturelles du Maroc*, 14(7–8): 204–213.
- Kissayi, K., Benhalima, S., 2016. Contribution à la connaissance des Encyrtidae (Hymenoptera: Chalcidoidea) du Maroc, nouvelles données et comparaison avec la faune d'Afrique du Nord. *Annales de la Société entomologique de France (N.S.)*, 52(6): 343–353.
- Kissayi, K., Benhalima, S., Bentata, F., Labhili, M., Benhoussa, A., 2019. New records for a catalogue of Chalcididae (Hymenoptera: Chalcidoidea) from Morocco. *Arxius de Miscel·lània Zoològica*, 17: 145–159, Doi: <https://doi.org/10.32800/amz.2019.17.0145>
- Knight, G. A., Lavigne, R. J., Pogue, M. G., 1992. The parasitoid complex of forest tent caterpillar *Malacosoma disstria* (Lepidoptera: Lasiocampidae) in eastern Wyoming shelterbelts. *Great Lakes Entomologist*, 24(4): 255–261.
- Klug, F., 1834. Pars zoologica II, Insecta. In: *Symbolae physicae, seu icones et descriptiones corporum naturalium novorum aut minus cognitorum quae ex itineribus per Libyam Aegyptum Nubiam Dongalam Syriam Arabiam et Habessiniam*, 3: 1829–1845 (C. G. Ehrenberg, Ed.). G. Reimer, Berlin.
- Liu, H., Mottern, J., 2017. An Old Remedy for a New Problem? Identification of *Ooencyrtus kuvanae* (Hymenoptera: Encyrtidae), an Egg Parasitoid of *Lycorma delicatula* (Hemiptera: Fulgoridae) in North America. *Journal of Insect Science*, 7(1): 1–6.
- Loffalizadeh, H., Ebrahimi, E., Delvare, G., 2012. A contribution to the knowledge of family Chalcididae (Hymenoptera: Chalcidoidea) in Iran. *Journal of Entomological Society of Iran*, 31(2): 67–100.
- Madl, M., Schwarz, M., 2014. Notes on Palaearctic species of the family Leucospidae (Hymenoptera, Chalcidoidea), with new records from North Africa and Middle East. *Linzer Biologische Beiträge*, 46(2): 1569–1580.
- Masi, L., 1916. Materiale per una fauna dell'Arcipelago Toscana. XI. Calcididi del Giglio. Prima serie: Toryminae, Leucospidinae, Chalcidinae, Eurytominae partim. (Tav. XII). *Annali del Museo Civico di Storia Naturale di Genova*, 47(3(7)): 54–122.
- Matteson, P. C., 1981. Egg parasitoids of hemipteran pests of cowpea in Nigeria and Tanzania, with special reference to *Ooencyrtus patriciae* Subba Rao (Hymenoptera: Encyrtidae) attacking *Clavigralla tomentosicollis* Stål (Hemiptera: Coreidae). *Bulletin of Entomological Research*, 71(4): 547–554.
- Mitroiu, M. D., 2001. Revision of the Chalcidoidea: Pteromalidae (Hymenoptera) collections of the Belgian Royal Institute of Natural Sciences and the discovery of 31 new species for Belgium. *Bulletin de la Société Royale Belge d'Entomologie*, 137(7–12): 91–97.
- Mouna, M., Fabre, J.–P., 2005. Pests insects of cedars: *Cedrus atlantica* Manetti, *C. libani* A. Richard and *C. brevifolia* Henry in the Mediterranean area. In: *Entomological Research in Mediterranean Forest Ecosystems*: 89–104 (F. Lieutier, D. Ghaïoule, Eds.). INRA Editions, Science Update Series, INRA, Paris.
- Myartseva, S. N., Kokanova, E. O., Durdeyev, S. K., 1999. Complex of parasitoids on *Apotomis lutozana* Kenn. in Central Asia. *Selevinia*, 1996–1997: 17–20.
- Nees von Esenbeck, C. G. D., 1834. *Hymenopterorum ichneumonibus affinium monographiæ, genera Europæa et species illustrantes*, V. 2. Stuttgart and Tübingen.

- Noyes, J. S., Hayat, M., 1994. Oriental mealybug parasitoids of the Anagyrini (Hymenoptera: Encyrtidae). CAB International, Oxon, UK.
- Öbregón, R., Shaw, M. R., Fernández-Haeger, J., Jordano, D., 2015. Parasitoid and ant interactions of some Iberian butterflies (Insecta: Lepidoptera). *SHILAP Revista de Lepidopterología*, 43(171): 439–454.
- OILB, 1971. *Liste d'identification des entomophages*, 8. OILB, Genève.
- Öncüer, C., 1991. *A catalogue of the parasites and predators of insect pests of Turkey*. Ofset Basımevi, Bornova–İzmir.
- Peck, O., 1963. A catalogue of the Nearctic Chalcidoidea (Insecta; Hymenoptera). *Canadian Entomologist*, 95(Supplement 30): 5–1092.
- Peters, R. S., Baur, H., 2011. A revision of the *Dibrachys cavus* species complex (Hymenoptera: Chalcidoidea, Pteromalidae). *Zootaxa*, 2937: 1–30.
- Prinsloo, G. L., 1983. A parasitoid–host index of Afrotropical Encyrtidae (Hymenoptera: Chalcidoidea). *Entomology Memoirs of the Department of Agriculture, Republic of South Africa*, 60: 1–35.
- Rizzo, M. C., Mitroiu, M.–D., 2010. Revision of the European, North–African and Central Asian species of the genus *Norbanus* Walker 1843 (Hymenoptera: Pteromalidae). *Journal of Hymenoptera Research*, 19(2): 228–243.
- Ruschka, F., 1922. Chalcididenstudien. III. Die Europäischen erten der gattung *Chalcis* Fabr. *Konowia, Ztschr. Systematische Insektenkunde*, 1: 221–233.
- Schremmer, F., 1960. Beiträge zur Biologie der in Stratiomyiden–larven parasitierenden Chalcididen der Gattung *Smicra* Spin. (*Chalcis* F.). *Entomologisches Nachrichtenblatt Österreichischer und Schweizer Entomologen*, 12(2): 83–89.
- Schmid–Egger, C., 2010. Order Hymenoptera, Family Leucospidae. *Arthropod Fauna of UAE*, 3: 319–324.
- Shanower, T. G., Wightman, J. A., Gutierrez, A. P., Rao, G. V. R., 1992. Larval parasitoids and pathogens of the groundnut leafminer, *Apoaerema modicella* (Lep.: Gelechiidae), in India. *Entomophaga*, 37(3): 419–427.
- Spinola, M., 1838. Compte rendu des Hyménoptères recueillis par M. Fischer pendant son voyage en Egypte, et communiqués par M. le docteur Watl à Maximilien Spinola. *Annales de la Société Entomologique de France*, 7: 437–546.
- Steffan, J.–R., 1950. Note sur la classification des Brachymeriinae [Hym. Chalcididae]. *Bulletin de la Société entomologique de France*, 55(10): 146–150.
- 1957. Révision des genres *Chirocera* Latr., *Tanyotorthus* Steff. Et *Tanyocoryphus* Cam. *Annales de la Société Entomologique de France*, 126: 139–158.
- 1959. Les espèces françaises du genre *Brachymeria* Westw. et commentaires sur leur biologie (Hym. Chalcididae). *Cahier des Naturalistes, Bulletin des Naturalistes Parisiens (N. S.)*, 15(2): 35–43.
- Stojanova, A., 2006. Chalcid wasps (Hymenoptera: Chalcidoidea) from the collection of Dr. L. Vassileva–Samnalieva at the Institute of Zoology, Bulgarian Academy of Sciences. *Acta Zoologica Bulgarica*, 58(1): 57–72.
- Thompson, W. R., 1955. *A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue, Part 3. Hosts of the Hymenoptera (Calliceratid to Evaniid)*. Commonwealth Agricultural Bureaux, Commonwealth Institute of Biological Control, Ottawa, Ontario, Canada.
- 1958. *A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue, Part 5*. Commonwealth Agricultural Bureaux, Commonwealth Institute of Biological Control, Ottawa, Ontario, Canada.
- Tikader, A., 2012. New record of *Brachymeria tibialis* (Walker) (Hymenoptera: Chalcididae) on *Cricula trifenestrata* (Helfer) from India. *Munis Entomology and Zoology*, 7(1): 222–225.
- Toheed, I., Sajjad, A., Maqsood, S., Amjad, U., Kamran, S., Kiran, S., 2018. Illustrated Key to the Genera of Family Chalcididae (Hymenoptera: Chalcidoidea) from Various



- Ecological Zones of Khyber Pakhtunkhwa, Pakistan. *International Journal of Agriculture and Biology*, 20(5): 1049–1054.
- Trjapitzin, V. A., 1989. Parasitic Hymenoptera of the Fam. Encyrtidae of Palaearctics. *Opredeliteli po Faune SSSR. Zoologicheskim Institutom Akademii Nauk SSR, Leningrad*, 158: 1–489.
- Trjapitzin, V. A., Paik, J. C., 1996. Notes on some Encyrtidae (Hymenoptera, Chalcidoidea) from Korean peninsula. *Korean Journal of Applied Entomology*, 35(2): 95–100.
- Vidal, S. (Ed.), 1993. Determination list of entomophagous insects, No 12. *Bulletin Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique*, 16(3): 1–56.
- Villemant, C., Luciano, P., 1995. Predator–dismantlers of egg masses of *Porthetria dispar* (L.) (Lep.: Lymantriidae) in Moroccan cork oak forests. *Bulletin Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique*, 18(6): 87–94.