

**Orijinal araştırma (Original article)**

## Contributions to the Turkish Eulophidae (Hymenoptera, Chalcidoidea) with new records

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### Summary

This study was carried out to determine Eulophidae species, they have economical important for biological control, collected in various habitats in 2000 and between 2006-2008 in some provinces of Turkey. Specimens were collected with sweeping net and reared materials especially on Agromyzidae leafminer species (Diptera: Agromyzidae). By identifying of the specimens, 23 species of 8 genera were determined in different localities. Of these species, 8 are new records for Turkish Eulophidae fauna. These species are: *Diadocerus westwoodi* Westwood, 1832, *Pnigalio nemati* (Westwood, 1838), *Chrysocharis pubens* Delucchi, 1958, *Neochrysocharis aratus* (Walker, 1838), *Pediobius brachycerus* (Thomson, 1878), *P. eubius* (Walker, 1839), *P. flaviscapus* (Thomson, 1878), *Sympiesis viridula* (Thomson, 1878).

With this study, the number of Turkish eulophid species were updated to 199 species that was previously 189 species.

**Key words:** Eulophidae, new records, Turkey

**Anahtar sözcükler:** Eulophidae, yeni kayıt, Türkiye

### Introduction

The Eulophidae (Hymenoptera: Chalcidoidea) is one of the most diverse families of parasitoids wasps, currently containing 294 genera and 4288 species (Noyes, 2002). Most of the taxa can be easily identified as being eulophids

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because they have 4- segmented tarsi, four (or fewer) antennal funicular segments and a straight fore tibial spur (Boucek, 1988).

Usually the Eulophidae is subdivided into four subfamilies: Entedoninae, Euderinae, Eulophinae and Tetrastichinae (Boucek & Askew, 1968; Boucek, 1988; LaSalle & Schauff, 1994; Schauff et al., 1997; Gibson et al., 1999).

Eulophids are very small insects. Generally, their habitats are in all tropical and temperate regions and many species used in biological control. Parasitoid forms can be endoparasitoids or ectoparasitoids: idiobionts or koinobionts; solitary or gregarious; primary parasitoids, hyperparasitoids or facultative hyperparasitoids; or specialists or generalists. Eulophid species can attack eggs, larvae, pupae or even adults in a few cases (Yang & Xie, 1998).

Eulophidae species are parasitoids of many insect families which are: Chrysomelidae, Curculionidae (Coleoptera), Agromyzidae, Cecidomyiidae, Drosophilidae, Tephritidae (Diptera), Aleyrodidae, Aphididae (Hemiptera), Cimbicidae, Diprionidae, Pamphilidae, Tenthredinidae (Hymenoptera), Bucculatricidae, Coleophoridae, Gelechiidae, Gracillariidae, Heliozelidae, Lasiocampidae, Nepticulidae, Pyralidae, Yponomotidae (Lepidoptera) (Noyes, 2009).

Eulophids have provided a series of extremely valuable experimental model systems for investigating a wide variety of questions in ecology and evolution (Godfray, 1994). So far, 189 eulophid species are known to be recorded for Turkey (Öncüer, 1991; Yasarakinci & Hincal, 1997, 2000; Graham, 1987; Bulut & Gocmen, 2000; Ulgenturk, 2001; Civelek & Lasalle, 2005; Gencer, 2003a,b, 2004a,b, 2005; Doğanlar, 1982, 1985, 1993a,b,c; Doğanlar & Triapitsyn, 2007; Elekcioglu & Uygun, 2006; Doğanlar et al., 2009).

This study was carried out to determine Eulophidae species collected in various habitats. Eulophidae species were found in this study were collected with the leafminer samples during the number of the TUBITAK-106T122 project research.

## **Material and Method**

The materials of this study were collected by Z. A. Yefremova, H. S. Civelek, O. Dursun and A. Eskin from different localities in different province of Turkey in 2000 and between 2006-2008. Specimens were collected by using sweeping net (%79.2) or reared from hosts. (%21.8) These hosts are leafminer species. The leafminer species and its parasitoids were collected from both cultivated and non-cultivated plants in different areas. For this purpose, we carried out field studies in different cities and used A GPS (Global Positioning System) while the samples were being collected. The specimens were identified by Z. A. Yefremova and P. S. Boyadziev. The specimens dealt with are

deposited in the following collections: ZISP (Zoological Institute, St. Petersburg, Russia); ELUM (Entomology Laboratory, University of Mugla, Turkey).

## Results

In this study, we found 23 species in total. 8 species of them new records for Turkish Eulophidae fauna. With this study, the number of Turkish eulophid species are increased to 197 in total. These species are presented alphabetically with their distributions, hosts and habitat.

### Eulophinae

#### *Di cladocerus* Westwood, 1832

##### *Di cladocerus westwoodi* Westwood, 1832

Specimens examined: Kahramanmaraş, Göksun, Fındık, 38°04'N/36°44'E, 1400 m, 17-18.vi.2000, 1♂(SM); Muğla province, Gökseki, Dalaman rivulet, 36°55' N/ 28°56'E, 153 m, 7.iv.2007, 1♂(SM).

Hosts: *Phytomyza atricornis* Meigen 1838, *P.geniculata* Macquart 1835 (Agromyzidae: Diptera); *Panaxia dominula* L. (Arctiidae: Lepidoptera), *Carposina scirrhosella* Herrich-Schaffer, 1854 (Carposinidae: Lepidoptera), *Coleophora caespititiella* Zeller, 1839 *C.dahurica* (Meyrick, 1931), *C.laricella* Hübner, 1817, *C.taeniipennella* Herrich-Schaffer, 1855, *C.virgaureae* (Coleophoridae: Lepidoptera), *Evagora starki*, *Recurvaria nanella* (Gelechiidae: Lepidoptera), *Thaumetopoea pityocampa* (Notodontidae: Lepidoptera), *Archips oporanus*, *Croesia bergmanniana*, *Grapholitha tenebrosana*, *Gypsonoma aceriana*, *G.sociana*, *Laspeyresia roseticolana*, *Tortrix viridana*, *Zeiraphera diniana* (Tortricidae: Lepidoptera), *Argyresthia conjugella*, *Cedestis gysselinella*, *Prays oleae* (Yponomeutidae: Lepidoptera) (Noyes, 2009).

Distribution: Austria, Canada, Canary Islands, China, Croatia, Czech Republic, Denmark, England, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Madeira, Netherlands, Portugal, Russia, Scotland, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, United States of America, Yugoslavia (pre 1991) (Noyes, 2009).

#### *Hemiptarsenus* Westwood, 1833

##### *Hemiptarsenus ornatus* (Nees, 1834)

Specimens examined: Muğla, Ula, Arıcılar, 364 m, 7.iv.2007, 1♀(SM); Mersin, Mut, Yapıntı Village 36° 41'N / 33° 22' E, 148 m, 31.v.2007, 1♀(SM); Mersin, Mut Hocantı (Derinçay) village, 36° 43'N / 33° 19'E, 192m, vegetable, wild plant, 31.V.2007, 1♀(SM).

Hosts: *Hypurus bertrandi*, *Rhamphus oxyacanthae* (Curculionidae: Coleoptera); *Chromatomyia horticola*, *Liriomyza huidobrensis*, *L.trifolii*, *Phytoliriomyza variegata*, *P.atricornis*, *P.fuscula*, *P.melana*, *P.plantaginis*,

*P.ranunculi* (Agromyzidae: Diptera); *Heterarthrus nemoratus*, *H.ochropodus* (Tenthredinidae: Hymenoptera); *Elachista klimeschi*, *E.occulta* (Elachistidae: Lepidoptera); *Chrysoesthia sexguttella* (Gelechiidae: Lepidoptera); *Cameraria ohridella*, *Lithocolletis anderidae*, *L.helianthemella*, *Lithocolletis nigrescentella*, *L.sorbi*, *Phyllonorycter anderidae*, *P.medicaginella*, *P.nigrescentella* (Gracillariidae: Lepidoptera); *Stigmella aeneofasciella*, *S.aurella*, *S.cryptella*, *S.dryadella*, *S.nanivora* (Nepticulidae: Lepidoptera) (Noyes, 2009).

Distribution: Netherlands, North Africa, Portugal, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Taiwan, Turkey, Turkmenistan, United Arab Emirates, United States of America, USSR, Yugoslavia (pre 1991) (Noyes, 2009).

#### ***Hemiptarsenus unguicellus* (Zetterstedt, 1838)**

Specimens examined: Mersin, Kızkalesi 37° 06' N/ 28° 36' E, 12 m, 31.v.2007, beans, 1♀(SM).

Hosts: *Ceutorhynchus assimilis* (Curculionidae: Coleoptera); *Blastophagus piniperda*, *Myelophilus piniperda* (Scolytidae: Coleoptera); *Agromyza mobilis*, *A. oryzae*, *Cerodontha ireos*, *C. pygmaea*, *Chromatomyia fuscata*, *C. milii*, *Dizygomyza iridis*, *D. pygmaea*, *Phytobia iridis*, *P. fuscata*, *Phytomyza minuscula*, *P. nigra*, *P. ranunculi* (Agromyzidae: Diptera) *Hydrellia griseola* (Ephydriidae: Diptera); *Eriopeltis* sp. *Biselachista fulgens*, *Elachista adscitella*, *E. bisulcella*, *E. cerusella*, *E. griseella*, *E. megerella*, *E. poae*, *E. pollinariella* (Elachistidae: Lepidoptera); *Gortyna flavago* (*Xanthoecia flavago*) (Noctuidae: Lepidoptera); *Ostrinia nubilalis*, *Prays oleae* (Pyralidae: Lepidoptera) (Noyes, 2009).

Distribution: Afghanistan, Azerbaijan, Bulgaria, Canada, Canary Islands, China, Croatia, Czech Republic, England, Faeroe Islands, France, Germany, Hungary, India, Italy, Japan, Korea, Macedonia, Madeira, Moldova, Mongolia, Morocco, Netherlands, North Africa, Norway, Poland, Russia, Slovakia, Slovenia, Serbia, Spain, Sweden, Taiwan, Turkey, United States of America, (Noyes, 2009).

#### ***Pnigalio* Schrank, 1802**

##### ***Pnigalio nemati* (Westwood, 1838)**

Specimens examined: Mersin, Kızkalesi 36° 29' N / 34° 10' E 12 m, 31.v.2007, 1♀(SM).

Hosts: *Curculio salicivorus* (Curculionidae: Coleoptera), *Euura mucronata*, *Pontania bridgmanii*, *P. proxima*, *P. triandrae*, *P. viminalis* (Tenthredinidae: Hymenoptera) (Noyes, 2009).

Distribution: Britain, Czech Republic, Finland, Ireland, Russia Central, Slovakia, Germany, France, Hungary, Sweden (Noyes, 2009).

***Pnigalio soemius* (Westwood, 1838)**

Specimens examined: Muğla, Köyceğiz, 36° 49' N/ 28° 36' E), 53 m, 18.i.2007, 1♀(RM), Mersin, Kizkalesi, 36° 29' N / 34° 10' E, 12 m, 31.v.2007, 1♀(SM).

Hosts: Chrysomelidae, Curculionidae (Coleoptera); Agromyzidae, Anthomyiidae, Cecidomyiidae, Tephritidae (Diptera); Tenthredinidae (Hymenoptera); Elachistidae, Eriocraniidae, Gelechiidae, Gracillariidae, Lyonetiidae, Momphidae, Nepticulidae, Tischeriidae, Yponomeutidae (Lepidoptera) (Noyes, 2009).

Distribution: Austria, Bangladesh, Bulgaria, Canary Islands, China, Croatia, Czech Republic, England, France, Germany, Hungary, Iran, Iraq, Israel, Italy, Korea, Macedonia, Madeira, Moldova, Netherlands, Norway, Pakistan, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Syria, Ukraine, Turkey, USSR, (Noyes, 2009).

***Sympiesis Föerster, 1856***

***Sympiesis flavopicta* Boucek, 1958**

Specimens examined: Ankara, Beynam, 39° 41' N/ 32° 53' E, 1250 m, 21.vi.2000, 1♀ (SM).

Host: *Medicago sativa* (Noyes, 2009).

Distribution: Armenia, Austria, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Iraq, Kirgizia, Moldova, Pakistan, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Tadzhikistan, Turkey, Turkmenistan, USSR (Noyes, 2009).

***Sympiesis viridula* (Thomson, 1878)**

Specimens examined: Mersin province, Çamlıyayla, Cehennem Brook, 37° 07' N / 34° 31' E, 632 m, 1.vi.2007, 1♀(SM).

Distribution: Bosnia Hercegovina, Bulgaria, Canada, Croatia, Czech Republic, England, France, Germany, Hungary, Italy, Moldova, Netherlands, Poland, Romania, Russia, Slovakia, Sweden, Turkey, Ukrain, United States of America, USSR, Yugoslavia (pre 1991) (Noyes, 2009).

Hosts: *Brachys tessellatus* (Buprestidae: Coleoptera); *Anacamptis populella*, *Phthorimaea operculella*, *Scrobipalpa suasella*, *Tachyptilia populella* (Gelechiidae: Lepidoptera); *Lithocolletis blancardella*, *Phyllonorycter blancardella* (Gracillariidae: Lepidoptera); *Leucoma salicis*, (Lymantriidae: Lepidoptera); *Gortyna flavago*, *Papaipema nebris*, *Sesamia cretica* (Noctuidae: Lepidoptera); *Ostrinia nubilalis*, *O. obumbratalis*, *O. penitalis*, *Pyrausta ainsliei*, *P. nubilalis*, *P. penitalis* (Pyralidae: Lepidoptera); *Cochylys posterana*, *Phalonia posterana*, *Tortrix viridana* (Tortricidae: Lepidoptera); *Eulophus abdominalis* (Eulophidae: Hymenoptera) (Noyes, 2009).

***Miotropis* Thomson, 1878**

***Miotropis unipuncta* (Nees, 1834)**

Specimens examined: Kahramanmaraş, Göksun, Nut, 38° 01' N /36° 30', 1400 m, 18.vi.20001, 1♀(SM).

Hosts: *Coleophora caespititiella*, *C. fuscadinella*, *C. glaucicolella*, *C. lutipennella*, *C. serratella*, *C. troglodytella* (Coleophoridae: Lepidoptera); *Elachista quadripunctella* (Elachistidae: Lepidoptera); *Agathis* sp. (Braconidae: Hymenoptera) (Noyes, 2009).

Distribution: Austria, Bulgaria, Croatia, Czech Republic, England, Germany, Hungary, Italy, Madeira, Moldova, Mongolia, Morocco, Netherlands, North Africa, Slovakia, Slovenia, Spain, Sweden, USSR, Serbia, Turkey (Noyes, 2009).

**Entedoninae**

***Chrysocharis* Förster, 1856**

***Chrysocharis illustris* Graham, 1963**

Specimens examined: Trabzon, Maçka, Sümela, 20.viii.2007, 40° 41' N/ 39° 39' E, ♀(SM).

Hosts: *Philophylla heraclei*, *Prionimera cognata*, *Trypeta artemisiae* (Tephritidae: Diptera) (Noyes, 2009).

Distribution: Czech Republic, Denmark, England, Finland, Germany, Poland, Sweden, Turkey (Noyes, 2009)

***Chrysocharis pentheus* (Walker, 1839)**

Specimens examined: Artvin, Hatila plateau, 41° 07' N / 41° 38' E, 1172 m, 24.viii.2007, 2♂♂ 3♀♀ (SM); Trabzon, Maçka, Sümela Monastery, 40° 41' N/ 39° 39' E, 1180m, 20.viii.2007, 3♀♀ (RM); Muğla, Kavaklıdere, Menteşe Yerküpe, Cave area, 37° 24' N/ 28° 25' E, 897m., 07.10.2006, 1♀ (SM); Rize, İkizdere Road, Gökçe Town, Vardarlı Plateu Road, 40° 48' N / 40° 27' E, 546 m, 21.viii.2007, 2♀♀ (SM); Muğla, Ula, Gökova, 37° 03' N / 28° 20' E, 10. XII. 2006, 1♂ (RM).

Hosts: Bruchidae, Curculionidae (Coleoptera); Agromyzidae, Cecidomyiidae (Diptera); Cynipidae, Tenthredinidae (Hymenoptera); Bucculatricidae, Coleophoridae, Elachistidae, Eriocraniidae, Gelechiidae, Gracillariidae, Heliozelidae, Lyonetiidae, Momphidae, Nepticulidae, Tischeriidae, Yponomeutidae (Lepidoptera) (Noyes, 2009).

Distribution: Austria, Bulgaria, Canada, Canary Islands, China Croatia, Cyprus, Czech Republic, Denmark, England, Finland, France, Germany, Greece, Hungary, Israel, Italy, Japan, Korea, Macedonia, Malaysia, Moldova,

Netherlands, Norway, Poland, Romania, Slovakia, Spain, Sweden, Switzerland, Taiwan, Turkey, Ukraine, United States of America, USSR, Serbia (Noyes, 2009).

***Chrysocharis phryne* (Walker, 1839)**

Specimens examined: Kocaeli, Değirmendere, 36° 32' N / 33° 13' E, 1175 m, 12.vi.2000, 1♀ (SM) (ZISP).

Hosts: Agromyzidae (Diptera) Gracillariidae) Lyonetiidae, Nepticulidae (Lepidoptera) (Noyes, 2009).

Distribution: Austria, Bulgaria, China, Czech Republic, Denmark, England, Finland, Germany, Hungary, Japan, Moldova, Netherlands, Norway, Poland, Sweden, Switzerland, Turkey, Ukraine, USSR, Serbia (Noyes, 2009).

***Chrysocharis polyzo* (Walker, 1839)**

Specimens examined: Mersin, Mut, Yerköprü natural monument, Göksu waterfalls, 36° 32' N / 33° 13' E, 247 m, 31.v.2007, 4♀♀ (SM).

Hosts: *Agromyza angulata*, *A. nana*, *A. nigripes*, *A. yanonis*, *Ceradontha incisa*, *C. caricicola*, *C. caricivora*, *C. incisa*, *C. ireos*, *C. okazakii*, *C. pygmaea*, *C. sasakawai*, *C. viridis*, *Chromatomyia fuscula*, *Dizygomyza atra*, *D. caricivora*, *D. incisa*, *D. iraeos*, *D. morosa*, *D. pygmaea*, *Phytobia angulata*, *P. atra*, *P. caricivora*, *P. incisa*, *P. pygmaea*, *P. fuscula*, *P. obscurella*, *Pseudonapomyza atra* (Agromyzidae: Diptera), *Phyllonorycter* sp. (Gracillariidae: Lepidoptera) (Noyes, 2009).

Distribution: Austria, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Dominica, England, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Korea, Macedonia, Moldova, Netherlands, Norway, Poland, Russia, Slovakia, Sweden, Transcaucasus, Turkey, [www.aaa.com](http://www.aaa.com) United States of America, Serbia, USSR (Noyes, 2009).

***Chrysocharis pubens* Delucchi, 1958a**

Specimens examined: Rize, Çamlıhemşin, Şenyuva Vilalge, Fırtınaderesi Valley 40° 59' N / 40° 57' E, 1622 m, 25.viii.2007, 1♀ (SM).

Hosts: *Ceradontha bisetiorbita*, *C. caricicola*, *Chromatomyia gentianae*, *C. suikazurae*, *C. millii*, *Dizygomyza bimaculata*, *D. soenderupi*, *Ophiomyia maura*, *Phytobia bimaculata*, *P. sonderupi*, *Phytomyza dryopterocola*, *P. heringiana*, *P. jucunda*, *Tropicomyia styricicola* (Agromyzidae: Diptera); *Lithocolletis blancardella* (Gracillariidae: Lepidoptera) (Noyes, 2009).

Distribution: Most of Europe, China, Taiwan, Japan, Fore USSR (Noyes, 2009).

### ***Chrysocharis pubicornis* (Zetterstedt, 1838)**

Specimens examined: Antalya, Kundu, 36° 52' N / 30° 54' E, wild plants, *Sonchus* sp., 2 m 24.i.2007, 2♀♀ (RM); Muğla, Ula, Arıcılar village, 37° 06' N / 28° 36', 364 m, 7.iv.2007, 1♀ (RM); Edirne, Uzunköprü, Karapınar village, 41° 06' N / 26° 38' E, 65 m, 17.v.2007, 1♀♂ (RM), Kırklareli, Pınarhisar, İslambey village, 41° 42' N / 27° 23' E, 354 m, clover, aquatic wild plants, 18.v.2007 1♀ (RM); Muğla, Ortaca, Dalyan, Eskiköy, 36° 52' N / 28° 40' E, 2m broad bean, broccoli, *Eruca sativae* 18.I.2007, 1♂ (RM); Mersin, Çamlıyayla, Cehennem brook, 37° 07' N / 34° 31' E, 632m, side of brook aquatic plants, 01.vi.2007, 2♀♀ (SM).

Hosts: Agromyzidae, Cecidomyiidae, Drosophilidae, Tephritidae (Diptera) Gracillariidae, Lyonetiidae, Nepticulidae, Tischeriidae, Tortricidae (Lepidoptera) (Noyes, 2009).

Distribution: Australia, Austria, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, England, Finland, France, Germany, Greece, Greenland, Hungary, India, Italy, Japan, Jordan, Korea, Libya, Malta, Moldova, Mongolia, Netherlands, New Zealand, Norway, Pakistan, Poland, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United States of America, USSR, Yemen, Yugoslavia (pre 1991) (Noyes, 2009).

### ***Chrysocharis viridis* (Nees, 1834)**

Specimens examined: Muğla, Köyceğiz, Toparlar waterfall, 36 ° 59'N / 28° 38'E, 53 m, 8.vi.2007, 1♀ (SM); Muğla, Kavaklıdere, Menteşe Yerküpe Cave area, 37° 24' N / 28° 25' E, 897m, 07.x.2006 1♀ (SM); Muğla, Yılanlı Mountain, Dokuzçam Village, 37° 26' N / 28° 33' E, 753m, 01.10.2006, 1♀ (SM); Rize, İyidere, 41° 00' N / 40° 21'E, 30 m, 21.viii.2007, 1♀(SM); Muğla, Marmaris, Günnücek, Forest Camping Area, 36° 50' N / 28° 17' E, 1 m, 02.xi.2007, 1♀ (SM); Rize, Çamlıhemşin, Şenyuva Village, 41° 00.' N / 40° 59' E, 1622 m, 25.viii.2007, 1♂♀ (SM); Rize, İyidere, 40° 58' N / 40° 21' E, wild plant 30m, 21.viii.2007, 1♀ (RM); Muğla, Kavaklıdere, Menteşe Yerküpe cave site, 37° 24' N / 28° 25' E, 897m, vegetable, wild plant, 07.x.2006, 1♀ (RM); Rize, Çamlıhemşin, Şenyuva village, 40° 59' N / 40° 57' E, Aquatic wild plants, 1622m, 25.viii.2007, 1♀ (RM); Muğla, Yılanlı mountain, Dokuzçam village, 37° 23' N / 28° 29' E, vegetable, weed, 753m, 01.x.2006, 1♀ (RM); Bingöl, Karlıova road turn, 38° 54' N / 40° 35' E, clover, 1079m, 08.ix.2006, 1♀ (RM).

Hosts: Agromyzidae (Diptera); Nepticulidae, Lyonetiidae (Lepidoptera) (Noyes, 2009).

Distribution: Austria, Bulgaria, Canada, China, Croatia, Czech Republic, Denmark, England, Finland, Germany, Hawaii, Hungary, Italy, Japan, Korea, Moldova, Mongolia, Netherlands, Norway, Poland, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan, Turkey, United States of America, USSR, (Noyes, 2009).



### ***Neochrysocharis* Kurdjumov, 1912**

#### ***Neochrysocharis aratus* (Walker, 1838)**

Specimens examined: Kırklareli, Üsküp, 41° 43' N / 27° 22' E, 284 m, 17.v.2007, 1♀ (SM); Giresun, Tirebolu, Tirebolu Beach, 41° 00' N / 38° 48' E, 10 m, 20.viii.2007, 1♀ (SM); Artvin, Hatila Plateau, 41° 07' N / 41° 38' E, 1172 m, 24.viii.2007, 1♀ (SM).

Hosts: *Chromatomyia fuscata* (Diptera: Agromyzidae), *Oscinella frit* (Diptera: Choloropidae), (Hansson, 1990), *Leucoptera coffeella* (Lepidoptera: Lyonetiidae) (Noyes, 2009).

Distribution: Bulgaria, Czech Republic, Danish mainland, Denmark, Finland, Germany, Great Britain, Greece, Holland, Hungary, Moldova, Norwegian mainland, Portuguese mainland, Spanish mainland, Sweden, Slovakia, The Netherlands, Ukraine, Yugoslavia (pre 1991) (Noyes, 2009) and (Hansson, 1990).

#### ***Neochrysocharis formosa* (Westwood, 1833)**

Specimens examined: Muğla, Yerkesik town, Damla Brook, 37° 06' N / 28° 15' E, 664 m, 8.x.2006, 1♀ (SM); Muğla, Köyceğiz, 36° 49' N / 28° 36' E, 53 m, 18.i.2007, 1♂ (SM); Muğla, Dalaman, Beyobasi, 36° 54' N / 28° 55' E, 121 m, 7.iv.2007, 1♀ (SM); Çanakkale, 40° 08' N / 26° 24' E, 54 m, 28.iv.2007, 1♂ (SM); Çanakkale, Terziler village, 40° 03' N / 26° 33' E, 122 m, 28.iv.2007, 1♀ (SM); Kırklareli, Pınarhisar, Istranca Mountains, 41° 45' N / 27° 40' E, 804 m, 18.v.2007, 1♀ 2♂♂ (SM); Kocaeli, Bayraktar village, 40° 47' N / 30° 05' E, 55 m, 19.v.2007, 1♀ (SM); Mersin, Mut, Yapıntı Village, 36° 41' N / 33° 22' E, 148 m, 31.v.2007, 1♀ (SM); Mersin, Kızkalesi, Akkum, 36° 29' N / 34° 10' E, 8 m, 2.vi.2007, 1♀ (SM); Trabzon, Akçaabat, 41° 02' N / 39° 33' E, 30 m, 20.viii.2007, 1♀ (SM); Artvin, Şavşat, Karagöl Natural park, 41° 18' N / 42° 29' E, 1642 m, 24.viii.2007, 1♂ (SM), 1♀(R) ; Muğla, Yılanlı Mountain, Yemişendere Village, 37° 14' N / 28° 30' E, 580m, 12.09.2006, 1♀(SM); Isparta, Eğirdir, Eğirdir Lake, 37° 50' N / 30° 51' E, 922m, wild plant, 27.x.2007, 1♂(RM); Muğla, Yılanlı mountain, Göktepe village, 37° 26' N / 28° 33' E, 436m, vegetable, grass, 01.x.2006, 2♀♀ (RM); Muğla, Yılanlı mountain, Dokuzçam village, (37° 23' N / 28° 29' E, 753m, vegetable, 01.1x.2006, 1♀ (RM); Mersin, Mut, Hocantı (Derinçay) village, 36° 43' N / 33° 19' E, 192m, vegetable, wild plant, 31.v.2007, 1♀ (RM); Artvin, Hatila Plateau, 41° 07' N / 41° 38' E, 1172m, wild plants, 24.08.2007, 2♀♀ (SM).

Hosts: Chrysomelidae, Curculionidae (Coleoptera) Agromyzidae, Cecidomyiidae, Drosophilidae, Tephritidae (Diptera); Aleyrodidae, Aphididae (Hemiptera) Cimbicidae, Diprionidae, Pamphiliidae, Tenthredinidae (Hymenoptera) Bucculatricidae, Coleophoridae, Elachistidae, Gelechiidae, Gracillariidae, Heliozelidae, Lasiocampidae, Lyonetiidae, Momphidae, Nepticulidae, Pyralidae, Yponomeutidae (Lepidoptera) (Noyes, 2009).

Distribution: Austria, Bulgaria, Canada, Canary Islands, China, Croatia, Czech Republic, Denmark, England, Eritrea, Ethiopia, Finland, France, Germany, Greece, Guam, Hawaii, Hungary, Indonesia, Iran, Iraq, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Macedonia, Malaysia, Mexico, Moldova, Netherlands, North Africa, Norway, Poland, Romania, Russia, Slovakia, South Africa, Spain, Sudan, Sweden, Switzerland, Taiwan, Turkey, Turkmenistan, Ukraine, United Arab Emirates (Noyes, 2009).

***Pediobius* Walker, 1846**

***Pediobius brachycerus* (Thomson, 1878)**

Specimens examined: Kocaeli, Bayraktar village, 40° 45' N / 30° 06' E, 55 m, 19.v.2007 (ZISP). 1♀ (SM).

Host: *Araneus solitaria*, *Argiope aurantia*, *Argiope bruennichi*, *Metargiope bruennichi* (Araneidae: Araneae); *Clubiona japonicola* (Clubionidae: Araneae); *Tetragnatha extensa* (Tetragnathidae: Araneae); *Latrodectus tredecimguttatus* (Theridiidae: Araneae); *Tromatobia* sp. (Ichneumonidae: Hymenoptera); *Arachnoleter stagnalis*, *Gelis* sp. *Pimpla aquilonia*, *Pimpla* sp. *Tromatobia rufopectus*, *Tromatobia oculatoria*, *Polysphincta* sp., *Zaglyptus iwatai* (Ichneumonidae: Hymenoptera, these are parasitoids) (Noyes, 2009).

Distribution: Britain, Croatia, Czech Republic, Germany, Hungary, Moldova, Russia, Slovakia, Sweden, Ukraine, (Noyes, 2009).

***Pediobius cassidae* Erdős, 1951**

Specimens examined: Mersin, Çamlıyayla (Namrun) 10 km East, 37° 10' N / 34° 36' E, 1200 m, 11.vi.2000, (ZISP) 1♀ (SM); Ankara, Beynam, 39° 41' N / 32° 53' E, 1250 m, 21.vi.2000 (ZISP), 1♀ (SM); Kırklareli, Üsküp, 41° 43' N / 27° 22' E, 284 m, 17.v.2007, 1♀ (SM); Kırklareli, Pınarhisar, İslambey village, 41° 42' N / 27° 37' E, 354 m, 18.v.2007, 3♀♀ (SM); Kırklareli, Pınarhisar, Yenice Köyü 41° 41' N / 27° 37' E, 346 m, 18.v.2007 2♀♀ (SM); Kocaeli, Bayraktar village 40° 47' N / 30° 05' E, 55 m, 19.v.2007, 2♀♀ (RM); Rize, Çamlıhemşin, Şenyuva Village, 40° 59' N / 40° 57' E, 1622 m, 25.viii.2007, 1♂ (RM); Muğla, Kavaklıdere, Menteşe Yerküpe Caves area, 37° 24' N / 28° 25' E, 897m., 07.10.2006, 1♀ (SM); Muğla, Kötekli, Muğla universty Campus area, 37° 10' N / 28° 22' E, 645 m, 14.v. 2007 1♀ (SM).

Hosts: *Leiopus* sp. (Cerambycidae: Coleoptera); *Cassida deflorata*, *Cassida nebulosa*, *C. rubiginosa*, *C. viridis* (Chrysomelidae: Coleoptera); *Apechthis rufata*, *Phytodietus polyzonias*, *Diadegma trochanterata*, *Ephialtes rufatus*, *Phytodietus polyzonias*, *Scambus calobatus* (Ichneumonidae: Hymenoptera); *Apanteles melanoscelus*, *Macrocentrus abdominalis*, *Microgaster meridiana*, *M. tibialis* (Braconidae: Hymenoptera); *Lymantria dispar* (Lymantriidae: Lepidoptera); *Haritala ruralis*, *Sylepta ruralis* (Pyralidae: Lepidoptera); *Archips rosanus*, *A. xylosteanus*, *Cacoecia rosanus*, *Tortrix*

*viridana* (Tortricidae: Lepidoptera); *Yponomeuta cognatellus* (Yponomeutidae: Lepidoptera); *Zygaena* sp. (Zygaenidae: Lepidoptera) (Noyes, 2009).

Distribution: Austria, Croatia, Czech Republic, England, France, Germany, Hungary, Iran, Italy, Macedonia, Moldova, Netherlands, Russia, Slovakia, Slovenia, Sweden, Transcaucasus, Turkey, Ukraine, Yemen, Serbia (Noyes, 2009).

***Pediobius metallicus* (Nees, 1834)**

Specimens examined: Kocaeli, Değirmendere, 36° 32' N / 33° 13' E, 1175 m, 12.vi.2000, (ZISP), 1♀ (SM); Nevşehir, Ortahisar, 1400 m, 19.vi.2000, (ZISP), 2♀♀ (SM); Ankara, Beynam, 39° 41' N / 32° 53' E, 1250 m, 21.vi.2000, (ZISP), 3♀♀ (SM); Muğla, Ula, Geyik canyon 37° 07' N / 28° 35' E, 421 m 15.x.2006, 1♂ (SM); Çanakkale, Gelibolu Peninsula, 40° 12' N / 26° 20' E, 19 m, 27.iv.2007, (ZISP), 1♀♂ (SM); Kırklareli, Üsküp, 41° 43' N / 27° 22' E, 284 m, 17.v.2007, 2♂♂ (SM); Kırklareli, Pınarhisar, Istranca Mountains, 41° 45' N / 27° 40' E, 804 m, 18.v.2007, 1♀ (SM); Kırklareli, Pınarhisar, Yenice village, 41° 41' N / 27° 37' E, 346 m, 18.v.2007, 1♂ (SM); Kocaeli, Bayraktar village, 40° 45' N / 30° 06' E, 55 m, 19.v.2007, 2♀♀ (SM); Mersin, Mut, Yapıntı village, 36° 41' N / 33° 22' E, 148 m, 31.v.2007, 1♂ (SM); Rize, Çamlıhemşin, Şenyuva Village, 40° 59' N / 40° 57' E, 1622 m, 25.viii.2007, 1♂ (RM); 1♂ (SM), Trabzon, Sürmene, Gülen village, 40° 49' N / 40° 14' E, 40 m, 21.viii.2007; 1♀ (SM); Muğla, Marmaris, Sediradası, 36° 59' N / 28° 12' E, 2 m, 12.v.2007 1♂ (SM).

Hosts: Agromyzidae (Civelek, 2002), Anthomyiidae, Cecidomyiidae, Chloropidae (Diptera); Tenthredinidae, *Pholetesor phaetusa* Braconidae; *Chrysocharis pubicornis* Eulophidae; *Itoplectis alternans* Ichneumonidae; *Cyrtogaster vulgaris*, *Sphegigaster flavicornis* Pteromalidae (Hymenoptera); Elachistidae, Gracillariidae, Nepticulidae, Pyralidae, Tortricidae (Lepidoptera); (Hymenoptera) (Noyes, 2009).

Distribution: Austria, Azerbaijan, Bulgaria, Canada, Canary Islands, China, Croatia, Czech Republic, England, Ethiopia, Germany, Hungary, India, Iraq, Italy, Japan, Jordan, Korea, Macedonia, Madeira, Moldova, Netherlands, New Zealand, Pakistan, Russia, Scotland, Serbia, Slovakia, Slovenia, Spain, Sweden, Turkey, Ukraine, United States of America, USSR, Yemen, Yugoslavia (pre 1991) (Noyes, 2009).

***Pediobius eubius* (Walker, 1839)**

Specimens examined: Ankara, Beynam, 39° 41' N / 32° 53' E, 1250 m, 21.vi.2000, 1♀♂ (SM), ZISP.

Hosts: *Hylesinus crenatus* (Scolytidae: Coleoptera); *Agromyza parvicornis* (Agromyzidae: Diptera); *Mayetiola* sp. (Cecidomyiidae: Diptera);

*Cephus cinctus*, *C. infuscatus* (Cephidae: Hymenoptera); *Eurytoma collaris*, *E. suecica*, *E. tapio*, *Tetramesa angustipennis*, *T. calamagrostidis*, *T. angustipennis*, *T. eximia*, *T. fulvicollis*, *T. hyalipennis*, *T. linearis*, *T. petiolata* (Eurytomidae: Hymenoptera) (Noyes, 2009).

Distribution: Austria, Britain, Croatia, Czech Republic, Finland, Germany, Hungary, Macedonia, Moldova, Russia, Russia Northwest, Slovakia, Slovenia, Spanish mainland, Sweden, The Netherlands, Yugoslavia (Noyes, 2009).

#### ***Pediobius flaviscapus* (Thomson, 1878)**

Specimens examined: Kirklareli, Pınarhisar, Yenice village, 41° 41' N / 27° 37' E, 346 m, 18.v.2007, 1♀ (SM).

Hosts: *Phytobia flavifrons*, *P. incisa*, *Phytomyza ranunculi*, *P. rufipes*, *P. sphondylii* (Agromyzidae: Diptera); *Scaptomyza flava* (Drosophilidae: Diptera); *Eupithecia tripunctaria* (Geometridae: Lepidoptera); *Nepticula arifoliella* (Nepticulidae: Lepidoptera) (Noyes, 2009).

Distribution: Austria, Denmark, Danish Mainland, Germany, Moldova, Sweden (Noyes, 2009).

#### ***Pediobius nigratarsis* (Thomson, 1878)**

Specimens examined: Ankara, Beynam, 39° 41' N/ 32° 53' E, 1250 m, 21.vi.2000, 2♀♀ (SM).

Hosts: *Mayetiola destructor*, *Phytophaga destructor* (Cecidomyiidae: Diptera); *Cephus cinctus*, *C. pygmaeus*, *C. tabidus* (Cephidae: Hymenoptera); *Trachelus tabidus* (Tenthredinidae: Hymenoptera); *Euplexia lucipara* (Noctuidae: Lepidoptera) (Noyes, 2009).

Distribution: Canada, Czech Republic, England, Finland, France, Germany, Hungary, India, Italy, Netherlands, Russia, Sweden, Switzerland, Turkey, United States of America, USSR (Noyes, 2009).

## **Conclusion**

With this study, the number of Turkish eulophids is increased to 197. It is important to have recorded the existence of ten new records in terms of showing the biodiversity of Turkey. In addition to new record species, 15 species were found and their informations about distribution, host, habitat were given.

As known several species of eulophids are important in biocontrol programmes throughout the world. Some of our new records are parasite of some economically important species. For example; *Dicladocerus wetswoodi* Westw, 1832 species has biological control importance because of parasiting *Coleophora laricella* (Hübner, 1817) pest (Anonymous, 2009). The other hosts are for this species; *Thaumetopoea pityocampa* (Denis & Schiffermüller, 1775)

(Lepidoptera: Notodontidae) and *Bactorocera oleae* (Gmel, 1790) (Lepidoptera: Hyponomeutidae) (Noyes, 2009). *T.pityocampa* is one of the main pest of some forest trees as *Juniperus excelsa*, *Pinus brutia*, *P.halepensis* *P.nigra*, *P.maritima*, *P.silvestris*, *P.pinea*, *Cedrus libani* (Anonymous, 2009). The other host of this species is *Prays oleae* that is economically important pest especially at the isolated olive plantations and at some microclimates where intensive pesticide applications are done and where the natural balance is destroyed (Bozbuğa & Elekçioğlu, 2008).

Agromyzidae family include economically important species and they cause important damage and yield loses on vegetables in greenhouses (Civelek et al., 2008). For example, *Liriomyza* spp. (*Liriomyza sativae* Blanchard, 1838, *L. trifolii* Burgess in comstock, 1880), *L. huidobrensis* (Blanchard, 1926), *L.strigata* (Meigen, 1830) the damage caused by this species on many hosts (Spencer, 1973). *Chrysocharis viridis* (Nees, 1834) is parasitoid of *Liriomyza congesta* (Becker, 1903) and *Chromatomyia horticola* (Goureau,1851) (Gençer 2009, Noyes, 2009). Also *Chrysocharis pubens* Delucchi, 1954, *Neochrysocharis aratus* (Walker, 1838) and *Pediobius flaviscapus* (Thomson, 1878) are parasitoids of the economically important Agromyzidae species.

The last important new record species is *Sympiesis viridula* (Thomson, 1878) because this species is parasitoid of *Ostrinia nubilalis* Hübner (Lepidoptera: Pyralidae) European corn-borer (Noyes, 2009).

This paper submits parasitoids as a list collected from previous studies which were collected by different researchers in Turkey. This paper ensures to researchers jointly knowledge about some new record species for Turkish Eulophidae fauna for their studies in future. Finally, making eight new records of eulophids have been important in terms of showing the biodiversity of Turkey and having knowledge about this species in Turkey have been important in agricultural and forestry production.

## Özet

### **Türkiye Eulophidae (Hymenoptera: Chalcidoidea) faunasına yeni kayıtlarla katkılar**

Bu çalışma Türkiye'nin bazı illerinden 2000 yılında ve 2006-2008 yılları arasında, çeşitli habitatlardan toplanan, biyolojik kontrol açısından ekonomik öneme sahip Eulophidae türlerini saptamak amacıyla gerçekleştirilmiştir. Örnekler 2006-2008 yılları arasında ve 2000 yılında atrap ve kültür materyali olarak özellikle Agromyzidae galeri sineği türleri üzerinden (Diptera: Agromyzidae) toplanmıştır. Örneklerin teşhislerinin yapılmasıyla, farklı lokalitelerden 8 cinsten 23 tür belirlenmiştir. Bu türlerden 8 tanesi Türkiye Eulophidae faunası için yeni kayıttır. Bu türler: *Chrysocharis pubens* Delucchi, 1958, *Dicladocerus westwoodi* Westwood, 1832, *Neochrysocharis aratus* (Walker,

1838), *Prigalio nemati* (Westwood, 1838), *Pediobius brachycerus* (Thomson, 1878), *P. eubius* (Walker, 1839), *P. flaviscapus* (Thomson, 1878), *Sympiesis viridula* (Thomson, 1878).

Bu çalışmayla, daha önce 189 olan Türkiye Eulophiae faunası tür sayısı 199'a çıkarılmıştır.

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### References

- Anonymous 2009. Republic of Turkey, ministry of enviroment and forestry, general directorate of forestry. <http://muglaobm.ogm.gov.tr/> [Date accessed 5-April-2009].
- Boucek, Z., 1958. A study of Central European Eulophidae, I: Eulophinae (Hymenoptera). **Sborník Entomologického Oddeleni Národního Musea v Praze** **33**: 117-170.
- Boucek, Z., 1988. Australasian Chalcidoidea (Hymenoptera): A Biosystematic Revision of Genera of Fourteen Families, with a Reclassification of Species. CAB International, Wallingford, UK, 832 pp.
- Bouček, Z. & R. R. Askew, 1968. Palaearctic Eulophidae sine Tetrastichinae. **Index of Entomophagous Insects**, **3**: 150.
- Bozbuğa, R. & Z. N. Elekçioğlu, 2008. Pests and natural enemies determined in olive orchards in Turkey. **Türk Bilimsel Derlemeler Dergisi**, **1** (1): 87- 97.
- Bulut, E. & H. Gocmen, 2000. Pests and their natural enemies on greenhouse vegetables in Antalya. Bulletin. **Section Regionale Ouest Palaeartique, Organisation Internationale de Lutte Biologique**, **23** (1): 33-37.
- Civelek, H. S. 2002. *Chromatomyia horticola* (Goureau, 1851) (Diptera : Agromyzidae) parazitoit faunası için yeni bir kayıt: *Pediobius metallicus* (Nees, 1834) (Hymenoptera : Eulophidae). **Türkiye Entomoloji Dergisi**, **26** (2) : 155-159.
- Civelek, H. S. & J. Lasalle, 2005. Checklist of leafminer (Diptera: Agromyzidae) parasitoids in Tukey, with two new records. **Mitteilungen Internationale Vereinigung für Theoretische und Angewandte**, **30(1-2)**: 21-28.
- Civelek, H. S., O. Dursun, A. Eskin & G. Taç, 2008. A study on Agromyzidae (Diptera) fauna of Turkey and species list. Anadolu University, **Journal of Science and Technology**, **9**:1- 16.
- Delucchi, V., 1958a. *Lithocolletis messaniella* Zeller (Lep. Gracillariidae). Analysis of some mortality factors with particular reference to its parasite complex. **Entomophaga**, **3** (3): 203-270.

- Doğanlar, M., 1982. A new species of *Diglyphus* Walker (Hymenoptera: Eulophidae) from eastern Anatolia. **Türkiye Bitki Koruma Dergisi**, **6**: 75-78.
- Doğanlar, M., 1985. A new cotton pest of Turkey from Iğdir Plain, *Pexicopia malvella* (Hb.) (Lepidoptera; Gelechiidae) and its parasites. **Türkiye Bitki Koruma Dergisi**, **9** (3): 165-172.
- Doğanlar, M., 1993a. Notes on *Baryscapus* Förster, 1856, with description of four new species (Hymenoptera, Eulophidae, Tetrastichinae). **Entomofauna, Zeitschrift für Entomologie**, **14** (23): 382 – 384.
- Doğanlar, M., 1993b. Two new species of *Puklina* Graham, 1991 (Hymenoptera, Eulophidae, Tetrastichinae). **Entomofauna, Zeitschrift für Entomologie** **14** (23): 392-393.
- Doğanlar, M., 1993c. Notes on *Pronotalia* Gradwell, 1957, with description of two new species from Turkey (Hymenoptera, Eulophidae, Tetrastichinae). **Entomofauna, Zeitschrift für Entomologie**, **14** (23): 362-364.
- Doğanlar, M., J. Lasalle, E. Sertkaya & O. Doğanlar, 2009. A new species of *Quadrastichus* Girault, 1913, (Hymenoptera: Eulophidae: Tetrastichinae) from Hatay, Turkey, **Turkish Journal of Zoology**, **33**: 309-314.
- Doğanlar, M. & S. V. Triapitsyn, 2007. Review of *Ceranisis* (Hymenoptera: Eulophidae) of Turkey, with description of a new species. **European Journal of Entomology**, **104**: 105-110.
- Elekcioglu, N. Z. & N. Uygun, 2006. The parasitoid complex of the citrus Leafminer, *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae) in the East Mediterranean region of Turkey and their role in biological control. **Turkish Journal of Zoology**, **30**: 155-160.
- Förster, A., 1856. Hymenopterologische Studien. II Heft. Chalcidiae und Proctotrupii. Aachen, 156 pp.
- Gencer, L., 2003a, The chalcidoid parasitoids of *Diplolepis mayri* Schld. (Hymenoptera: Cynipidae), a pest of *Rosa canina* L. in Sivas province. **Türkiye Entomoloji Dergisi**, **27** (2): 108.
- Gencer, L., 2003b. The parasitoids of *Yponomeuta malinellus* Zeller (Lepidoptera: Yponomeutidae) in Sivas. **Turkish Journal of Zoology**, **27**: 43-46.
- Gencer, L., 2004 a. Contribution of the knowledge of the family Eulophidae (Hymenoptera: Chalcidoidea) from Turkey, with some new records. **Phytoparasitica**, **32** (3): 264-273.
- Gencer, L., 2004 b. A study on the Chalcidoid (Hymenoptera: Chalcidoidea) parasitoids of leafminers (Diptera: Agromyzidae) in Ankara Province. **Turkish Journal of Zoology**, **28**: 119-122.

- Gencer, L., 2005. Chalcidoid parasitoids of *Micrurapteryx sophorivora* [Lepidoptera: Gracillariidae] in Kuluncak, Turkey. **Phytoprotection**, **86** (2): 133-134.
- Gençer, L., 2009. Contribution to the knowledge of the chalcid parasitoid complex (Hymenoptera: Chalcidoidea) of agromyzid leafminers (Diptera: Agromyzidae) from Turkey, with new hosts and records. **Journal Of Plant Protection Research**, **Vol. 49**, No. 2 158- 161.
- Gibson, G. A. P., J. M Heraty & J. B. Woolley, 1999. Phylogenetics and classification of Chalcidoidea and Mymarommatoidea a review of current concepts (Hymenoptera, Apocrita). **Zoologica Scripta**, **28**, 87- 124.
- Godfray, H. C. J., 1994. Parasitoids: Behavioural and Evolutionary Ecology. Princeton University Press, Princeton, New Jersey, 473 pp.
- Graham, M. W. R. de V. 1963b. Additions and corrections to the British list of Eulophidae (Hym., Chalcidoidea). **Transactions of the Society for British Entomology** **15** (9): 167-275.
- Graham, M. W. R. de V., 1987. A reclassification of the European Tetrastichinae (Hymenoptera: Eulophidae), with a revision of certain genera. **Bulletin of the British Museum (Natural History) (Entomology)**, **55** (1): 270-353.
- Hansson, C., 1990. A taxonomic study on the Palearctic species of *Chrysonotomyia* Ashmead and *Neochrysocharis* Kurdjumov (Hymenoptera: Eulophidae). **Entomologica Scandinavica**, **21** (1): 29-52.
- LaSalle, J. & M. E. Schauff, 1994. Systematics of the tribe Euderomphalini (Hymenoptera: Eulophidae): parasitoids of whiteflies (Homoptera: Aleyrodidae). **Systematic Entomology**, **19**: 235- 258.
- Nees, C., 1834. Hymenopterorum Ichneumonibus affinium. **Monographia, genera Europaea et species illustrantes**, **2**: 448.
- Noyes, J. S., 2002. Interactive Catalogue of World Chalcidoidea (2001 - second edition). CD-Rom. Taxapad and The Natural History Museum, London, UK.
- Noyes, J. S., 2009. Universal Chalcidoidea Database. *World Wide Web electronic publication*, available at: <http://www.nhm.ac.uk/entomology/chalcidoids/index.html> [Date accessed 2-April- 2009].
- Öncüer C., 1991. A Catalogue of the Parasites and Predators of Turkey. Publication of University of Ege, Faculty of Agriculture No: 505, Izmir, 354 pp.
- Schauff, M. E., J. LaSalle & L. D. Coote, 1997. Eulophidae. Annotated Keys to the Genera of Nearctic Chalcidoidea (Hymenoptera) (ed. by G. A. P. Gibson, J. T. Huber and J.B. Woolley), **National Research Council Research Press, Ottawa**, 327- 429.
- Spencer, K. A., 1973. Agromyzidae (Diptera) of Economic Importance. Dr. W. Junk B. V. The Hague, The Netherlands, 418 pp.



- Thomson, C. G., 1878. Hymenoptera Scandinaviae 5. *Pteromalus* (Svederus) continuatio. – Lundae: 307 pp.
- Ülgenturk, S., 2001. Parasitoids and predators of Coccidae (Homoptera: Coccoidea) species on ornamental plants in Ankara, Turkey. **Acta Phytopathologica et Entomologica Hungarica** **36** (3/4): 369-375.
- Walker, F., 1838. Description of British of British Chalcidites. **Annals Magazine of Natural History** **1**: 449- 454.
- Walker, F., 1839. Monographia Chalciditum 1: 333pp.
- Walker, F., 1846. List of the Specimens of Hymenopterous Insects in the Collection of the British Museum. Part 1 Chalcidites, VII: 100 pp.
- Westwood, J. O., 1832. Descriptions of several new British forms amongst the parasitic hymenopterous insects. **Philosophical Magazine**, **1** (3): 127-129.
- Westwood, J. O., 1838. Description of *Eulophus nemati*. **Annals and Magazine of Natural History** **2**: 392-393.
- Yang, Z. Q. & E. K. Xie, 1998. Behavior of *Chouioia cunea* Yang (Hymenoptera: Eulophidae). **Chinese Journal of Biological Control**, **14**: 49- 52.
- Yasarakinci, N. & P. Hincal, 1997. Determining the pests and beneficial species and their population densities on tomato, cucumber, pepper and lettuce greenhouses in Izmir. **Bitki Koruma Bülteni** **37**(1/2): 79- 89.
- Yasarakinci, N. & P. Hincal, 2000. Studies on the pests, their natural enemies and population developments on protected eggplant in Izmir province. **Bitki Koruma Bülteni**, **40** (1/2): 29-48.
- Zetterstedt, J. W., 1838. Hymenoptera. – **Insecta Lapponica, Lipsiae**, **1** (2): 315-476.

