

Encyrtid (Hymenoptera: Chalcidoidea, Encyrtidae) parasitoids of Coccidae (Hemiptera: Coccoidea) in Turkey*

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Summary

Parasitoid Encyrtids of coccids were surveyed in Isparta Province collections of Natural History Museum in London were investigated and literatūra data was studied during the years 2001 to 2006. Forty-five encyrtid species belonging to 21 genera were determined to be parasitoids of 28 species of coccids in Turkey. More than 78 species of coccids appear to be hosts of encyrtids listed in present paper. All synonyms recorded previously are given.

Key words: Chalcidoidea, Encyrtidae, Hemiptera, Coccidae, Turkey

Anahtar sözcükler: Chalcidoidea, Encyrtidae, Hemiptera, Coccidae, Türkiye

Introduction

Many scale insects (Hemiptera: Coccoidea) are notorious pests especially on perennial, fruit and nut trees, ornamental shade trees and shrubs, forest trees, and in greenhouse and indoor plantings (Kaydan et al., 2006). One of the potentially useful method to control harmful scales is to use natural enemies, especially from superfamily Chalcidoidea. The Hymenopteran superfamily Chalcidoidea is a hyperdiverse group of insects currently including some 22,000 described species worldwide (Noyes, 2006). The family of Encyrtidae is one of the most important groups in the biological control of agricultural pests (Noyes, 1985; Greathead, 1986). Thus the group is particularly important in parts of the world where natural control is preferable to pesticide use for ecological, financial or political reasons (Japoshvili & Noyes, 2005). The first comprehensive account of encyrtids from the area is that of

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Trjapitzin & Doğanlar (1997) recorded only 50 species from Turkey, but further 52 species were recorded by various authors (Tunçyürek, 1970; Japoshvili & Karaca, 2002a, b; 2004; Karaca & Japoshvili, 2002; Japoshvili et al., 2004; Uygun et al., 2004; Japoshvili, 2005; Japoshvili & Noyes, 2005, 2006). When compared with more than 230 species recorded from United Kingdom (Noyes, 2006), a relatively small area, it is likely that the recorded encyrtid fauna of these areas represents only a tiny fraction of the actual fauna (Japoshvili & Noyes, 2005).

Material and Methods

This paper is intended to summarise the published data concerning Encyrtidae in the region, and also to communicate new data resulting largely from survey work undertaken in the Natural History Museum, London UK and in Turkey by senior author during 2001-2006.

Abbreviations for depositories of specimens mentioned below are as follows: BMNH – Natural History Museum, London, UK; IZGAS – Georgian Institute of Zoology, Tbilisi, Georgia; ZIN – Zoological Institute, Russian Academy of Sciences, StPetersburg, Russia; AFSDU-Museum of Faculty of Agriculture, Süleyman Demirel University, Isparta, Turkey.

All species given in the list without material examined are taken from literature sources.

Results and Discussion

List of Encyrtidae parasitoids of coccidae in Turkey

Ageniaspis Dahlbom, 1857

Ageniaspis fuscicollis (Dalman, 1820)

Hosts: *Eulecanium caryae*, *Parthenolecanium corni* (Noyes, 2006).

Material examined: Turkey: Ankara (Çubuk) Ex Larva of *Hyponomeuta* sp. on Apple 28.VI.1960, 7♀♀, 1♂ (N. Dikyar); Ex Larva of *Hyponomeuta* sp. on Apple 06.VII.1960, 5♀♀, 5♂♂ (N. Dikyar) (BMNH). **Extralimital:** Iran, 1♀; England 19♀♀; 3♀♀ with label *Encyrtus fuscicollis* Dalman; Wales 49♀♀, 37♂♂, (BMNH).

Anagyrus Howard, 1896

Anagyrus shoenherri (Westwood, 1837)

Hosts: *Eulecanium douglasi*, *E. tiliae* (= *Lecanium coryli*) (Scalenet, 2006), *Phenacoccus aceris*, *Pulvinaria vitis* (Noyes, 2006).

Material examined: Turkey: Ankara, Ex *Phenacoccus aceris* on *Fraxinus* sp. 04.VII.2000, 3♀♀ (B. Kaydan) (Slides) (IZGAS); **Extralimital:** England, 11♀♀; Russia, 3♀♀, 4♂♂, (BMNH); Russia, 2♀♀, 2♂♂, (ZIN).

Variation: Mesoscutum and scutellum coloration from yellow until dark brown.

Aphycoides Mercet, 1921

Aphycoides clavellatus (Dalman, 1820)

Hosts: *Nemolecanium graniformis* (= *Eulecanium graniforme*) (Ben-Dov, 1993), *Physokermes abietis* (Probably this species name is incorrect, as much as neither in Ben-Dov's (1993) catalogue of soft scale of the world nor in Scalenet (2006) there is not species with this name), *P. fasciatus*, *P. hemicryphus*, *P. jezoensis*, *P. piceae*, *P. fasciatus* (Noyes, 2006).

Material examined: Turkey: Ankara, Ex *Physokermes* on *Picea pungens* 08-09.VI.1998, 2♀♀ (B.Kaydan) (Slide); Ex *Physokermes* on *Picea pungens* 24.IV.1998, 1♀ (B. Kaydan) (Slide). **Extralimital:** Georgia: Tbilisi, Bot.Gard., Ex *P. hemicryphus* on *Picea*, 27.V.1998, 1♀ (G. Japoshvili) (Slide) (IZGAS).

Blastothrix Mayr, 1876

Blastothrix hungarica Erdös, 1959

Host: *Parthenolecanium persicae* (Sugonjaev, 1984; Trjapitzin, 1989; Noyes, 2006).

Blastothrix longipennis Howard, 1881

Hosts: *Brevicoryne brassicae* (Aphididae), *Eulecanium cerasorum* (= *Lecanium cerasorum*), *E. tiliae* (= *E. coryli*, *L. tiliae*), *Parthenolecanium corni* (= *E. corni*, *L. corni*, *L. tarsale*), *P. fletcheri* (= *L. fletcheri*), (= *E. fletcheri*), *P. pomeranicum*, *P. pruinosum* (= *L. pruinosum*), *P. quercifex* (= *L. quercifex*), *P. rufulum* (Noyes, 2006).

Material examined: Turkey: Ankara, Ex *P. rufulum* on *Quercus* sp. 27.IV.1998, 1♀ (S. Ülgentürk) (IZGAS). **Extralimital:** Italy, 2♀♀, (BMNH).

Blastothrix turanica Sugonjaev, 1964

Host: *Rhodococcus turanicus* (Sugonjaev, 1984)

Material examined extralimital: Tajikistan (ZIN), 1♀.

Blastothrix sericea (Dalman), 1820

Hosts: *Eulecanium ciliatum*, *E. douglasi*, *E. Franconicum* (= *E. slavum*), *E. rugulosum*, *E. tiliae* (= *E. coryli*, *L. coryli*), *Mesolecanium nigrofasciatum* (= *Lecanium nigrofasciatum*), *Nemolecanium graniformis* (= *E. giganteum*), *Parthenolecanium persicae* (= *Coccus persicae*, *Eulecanium persicae*), *P. corni* (= *E. corni*, *Lecanium corni*), *P. rufulum*, *P. pruinosum* (= *E. pruinosum*), *Pulvinaria betulae*, *P. vitis*, *Rhodococcus spiraeae* (= *E. spiraeae*), *R. turanicus* (= *E. turanicum*), *P. fletcheri*

(=*Lecanium fletcheri*), *Sphaerolecanium prunastri* (Ben-Dov, 1993, Scalenet, 2006, Noyes, 2006).

Cerapterocerus Westwood, 1833

Cerapterocerus mirabilis Westwood, 1833

Hosts: *Acantholecanium haloxyloni*, *Ceroplastes elytrapappi*, *Coccus hesperidum*, *C. pseudomagnoliarum*, *Didesmococcus unifasciatus*, *Eriopeltis festucae* (= *E. agropyri*, *E. araxis*), *E. lichtensteinii*, *E. sachalinensis*, *E. tiliae* (= *E. coryli*, *P. coryli*), *Gascardia rustica*, *Lichtensia viburni* (= *Filippia viburni*), *Luzulaspis grandis*, *Parthenolecanium corni* (= *E. corni*, *Lecanium corni*), *P. pruinatum* (= *Lecanium pruinatum*), *Sphaerolecanium prunastri* (= *E. prunastri*, *L. prunastri*), *Scythia aetnensis*, *Stotzia maxima* (Scalenet, 2006; Noyes, 2006).

Material examined: Turkey: Izmir, Ex *S. prunastri* 20.VI.1974, 4♀♀ (C. Öncüler) (BMNH); Isparta, Kuleönü, Ex *S. prunastri* on *Prunus* 01-04.VI.2001, 1♀, (G. Japoshvili); Egirdir, Ex *S. prunastri* on *Prunus* sp. 03-08.VII.2001, 2♀♀, 2♂♂ (G. Japoshvili); Kuleönü Ex *S. prunastri* on *Prunus* sp. 01-04.VI.2001, 1♀ (G. Japoshvili) (Slide); Cire (Jire), Ex also *Kermes palestiniensis* on *Quercus coccifera* 18-28.VI.2002, 1♂ (G. Japoshvili) (Slide). **Extralimital:** Spain, 1♀; France, 1♀, (BMNH).

Choreia Westwood, 1833 (= *Parashediella* Hoffer)

Chorea maculata Hoffer, 1954 (= *Parashediella maculate*)

Hosts: *Eriopeltis festucae* (= *E. araxis*), *Scythia stipae* (Trjapitzin, 1989; Scalenet, 2006; Noyes, 2006).

Material examined: Turkey: Ankara, Ex *Eriopeltis* sp. on Graminae 01.VII.1999, 1♀, 1♂ (S. Ülgentürk) (Slide).

Cheiloneurus Westwood, 1833

Cheiloneurus claviger Thomson, 1876

Hosts: *Acanthopulvinaria orientalis*, *Ceroplastes japonicus*, *Coccus hesperidum*, *Didesmococcus unifasciatus*, *Eulecanium rugulosum*, *E. tiliae*, *Filippia viburni*, *F. follicularis*, *Parthenolecanium corni* (= *Eulecanium corni*), *P. persicae*, *P. rufulum*, *Physokermes fasciatus*, *P. hemicryphus*, *Pulvinaria vitis* (= *P. betulae*, *P. populi*), *P. idesiae*, *Rhodococcus turanicus*, *R. spiraeae*, *Saissetia oleae*, *Sphaerolecanium prunastri*, *Stotzia maxima* (Trjapitzin & Doganlar, 1997; Japoshvili & Noyes, 2005; Noyes, 2006; Scalenet, 2006).

Cheiloneurus paralia (Walker, 1837)

Hosts: *Cerococcus* sp. (Cerococcidae), *Ceroplastes floridensis*, *Coccus hesperidum*, *Eriopeltis festucae*, *Eulecanium ciliatum*,

E. franconicum, *E. tiliae* (= *Lecanium coryli*), *Luzulaspis bisetosa*, *Parthenolecanium corni* (= *E. corni*), *P. persicae* (= *E. persicae*), *P. rufulum* (= *E. rufulum*), *Physokermes hemicryphus*, *P. piceae*, *Pulvinaria vitis*, *Rhodococcus turanicus* (= *E. turanicus*), *Saissetia oleae*, *Sphaerolecanium prunastri*, *Stotzia maxima* (Kozar, 1998; Scalenet, 2006; Noyes, 2006).

Comperiella Howard, 1906

Comperiella bifasciata Howard, 1906

Hosts: *Aonidiella aurantii* (Japoshvili & Noyes, 2005), *Saissetia coffeae*, many diaspidid species (Kozar, 1998; Noyes, 2006).

Material examined: Turkey: Antalya, Adrasan, Ex *Aonidiella aurantii* on Cherry laurel 25.VIII-5.IX.2001, 24♀♀, 31♂♂ (G. Japoshvili) (Slides). Ex *A. aurantii* on Cherry laurel 25.VIII-5.IX.2001, 4♀♀, 4♂♂ (G. Japoshvili) (IZGAS). **Extralimital:** Pakistan, 6♀♀; India, 5♀♀, (BMNH).

Discodes Förster, 1856

Discodes coccophagus (Ratseburg, 1848)

Hosts: *Sphaerolecanium prunastri* (Trjapitzin, 1989; Karaca et al. 2003a; Noyes, 2006).

Material examined: Turkey: Isparta, Kuleönü, Ex *Sphaerolecanium prunastri* on *Prunus* sp. 01-04.VII.2001, 1♀, 1♂ (G. Japoshvili) (slide); Ex *S. prunastri* on *Prunus* sp. 08-09.VII.2001, 5♀♀, 3♂♂ Mehmet-Tönge (G. Japoshvili) (IZGAS, AFSDU).

Comments: The species was determined as a most effective in the number regulation of *S. prunastri* (Karaca et al. 2003a).

Discodes obscuriclavus Myartseva, 1981

Host: *Acanthopulvinaria orientalis* (Trjapitzin, 1989; Noyes, 2006)

Material examined: Turkey: Muğla, Fethiye 300m., Ölü deniz, 31. VIII. 1992, 1♀ (J. Noyes). **Extralimital:** Turkmenistan, 1♀, (BMNH).

Echthoplexiella Mercet, 1921

Echthoplexiella aeneiventris Mercet, 1921

Host: *Scythia stipae* (Trjapitzin, 1989; Noyes, 2006).

Material examined: Turkey: Muğla 44 km E. Fethiye, Fethiye-Korkuteli Rd, 1000m. 21.VIII.1992, 3♀♀ (J. Noyes). **Extralimital: Ukraine:** Odessa, 01.X.1928, 1♀ (A.N. Kiritchenko); **Greece:** Corfu, 600m Strinilas, 01-03.IX.1987, 2♀♀ (J. Noyes); Ano Kourakiane, 30.VIII.1987, 3♀♀ (Noyes) (BMNH).

Encyrtus Latreille, 1809

Encyrtus aurantii (Geoffroy, 1785) (= ***E. lecaniorum*** (Mayr, 1876))

Hosts: *Ceroplastes rusci*, *C. sinensis*, *Coccus hesperidum* (= *Lecanium hesperidum*), *C. pseudomagnoliarum*, *C. viridis*, *Eucalymnatus tessellatus*, *Eulecanium tiliae*, *Parthenolecanium corni* (= *Lecanium corni*), *P. fletcheri* (= *Lecanium fletcheri*), *Pulvinaria psidii*, *P. floccifera* (= *P. camelicola*), *Saissetia coffeae*, *S. oleae*, *S. privigna*, *Parasaissetia nigra* (= *Saissetia nigra*), *Sphaerolecanium prunastri* (Trjapitzin, 1989; Kozar, 1998; Noyes, 2006).

Encyrtus infidus (Rossi, 1790)

Hosts: *Eulecanium caraganae*, *E. caryae* (= *L. caryae*), *E. ciliatum*, *E. douglasi* (= *L. zebrinum*), *E. franconicum*, *E. kunoense* (= *L. kunoensis*), *E. rugulosum*, *E. tiliae* (= *E. coryli*, *Lecanium coryli*), *E. transcaucasicum* (Trjapitzin, 1989; Noyes, 2006)

Material examined: Turkey: Kalacık, Ex *E. ciliatum* on *Prunus* 10.VI.1999, 1♀ (B. Kaydan) (IZGAS).

Epitetracnemus Girault, 1915 (= ***Anabrolepis*** Timberlake)

Epitetracnemus intersectus (Fonscolombe, 1832) (= ***Anabrolepis zetterstedti*** (Westwood, 1837), ***E. zetterstedti***)

Hosts: *Ceroplastes rubens*, *Parthenolecanium rufulum* (= *Eulecanium rufulum*), *Sphaerolecanium prunastri* (Kozar, 1998; Noyes, 2006).

Material examined: Turkey: Burdur, Tefenni, on *Malus* sp. 25.V.1998, 1♀ (B. Kaydan) (Slide) (IZGAS). **Extralimital:** England, 3♀♀, 1♂, (BMNH).

Homalotylus Mayr, 1876

Homalotylus flaminius (Dalman, 1820)

Hosts: *Parthenolecanium corni* (= *Eulecanium corni*), *Saissetia oleae* (Noyes, 2006)

Material examined: Turkey: Menemen, Izmir, Ex Syrphid *Chenopodium* aphid, 28.V.1975, 2♀♀, 1♂ (E. Erkin); **Extralimital:** Czech Republic-Slovakia, 1♀; Egypt, 3♀♀; Italy, 2♀♀; India, 1♀, 1♂, (BMNH).

Homalotylus quaylei Timberlake, 1919

Host: *Parthenolecanium persicae* (= *Eulecanium persicae*) (Trjapitzin, 1989; Kozar, 1998; Noyes, 2006).

Material examined: Turkey: Ankara, Keçiören Atatürk Bahçesi, Ex *Planococcus vovae* on *Juniperus* sp. 06.VIII.2003, 4♀♀ (B. Kaydan) (IZGAS).

Hoploopsis De Stefani, 1889

Hoploopsis minuta (Fabricius, 1793)

Hosts: *Parthenolecanium corni* (= *Eulecanium corni*), *Lecanopsis subterranean* (= *Lecanopsis festucae*) (Trjapitzin, Doganlar, 1997; Japoshvili, Noyes, 2005; Scalenet, 2006; Noyes, 2006).

Leptomastidea Mercet, 1916

Leptomastidae abnormis (Girault, 1915)

Host: *Saissetia oleae* (Trjapitzin, 1989; Scalenet, 2006; Noyes, 2006).

Metaphycus Mercet, 1917

Metaphycus asterolecanii Mercet, 1923

Host: *S. oleae* (Trjapitzin, 1989; Guerrieri, Noyes, 2000; Noyes, 2006).

Material examined: **Turkey:** Ankara, Ex *Asterodiaspis* sp. on *Quercus* sp. 20.V.1998, 1♀ (G. Japoshvili) (Slide); **Extralimital:** England, 6♀♀, 3♂♂; Italy, 1♀; Spain, 1♀; France, 1♀, 2♂♂; Greece, 3♀♀; Andorra, 4♀♀, 5♂♂; Poland, 1♂, (BMNH).

Metaphycus dispar (Mercet, 1921)

Hosts: *Ceroplastes rusci*, *Ericerus pela*, *Eulecanium ciliatum*, *E. douglasi*, *E. kunoense* (= *Lecanium kunoensis*), *E. rugulosum*, *E. secretum*, *E. tiliae*, *Parthenolecanium corni*, *P. persicae*, *Pulvinaria vitis*, *Rhodococcus turanicus*, *Sphaerolecanium prunastri* (Trjapitzin, 1989; Guerrieri, Noyes, 2000; Scalenet, 2006; Noyes, 2006).

Metaphycus flavus (Howard, 1881)

Hosts: *Ceroplastes floridensis*, *Coccus capparidis*, *C. hesperidum*, *C. viridis*, *Eulecanium kunoense*, *E. perinflatum* (= *Lecanium perinflatum*), *Filippia follicularis*, *F. oleae*, *Megapulvinaria maxima* (= *P. maxima*), *Milviscutulus mangiferae* (= *Coccus mangiferae*), *Parthenolecanium corni* (= *Eulecanium corni*), *P. perlatum* (= *Coccus deltae*, *C. perlatum*, *Lecanium deltae*, *Mesolecanium deltae*), *P. persicae* (= *E. persicae*, *Lecanium persicae*), *Philephedra tuberculosa*, *Protopulvinaria pyriformis*, *Pulvinaria acericola*, *P. convexa*, *P. elongata*, *P. flavescens*, *P. floccifera*, *P. iceryi*, *P. minuta*, *P. platensis*, *P. psidii*, *P. pyriformis*, *Saissetia coffeae*, *S. oleae*, *Parasaissetia nigra* (= *S. nigra*), *Toumeyella liriodendri* (Trjapitzin, 1989; Kozar, 1998; Guerrieri, 2000; Scalenet, 2006; Noyes, 2006).

Metaphycus helvolus (Compere, 1926)

Hosts: *Ceroplastes destructor*, *C. helichrysi*, *C. sinensis*, *Chloropulvinaria urbicola*, *Coccus hesperidum*, *C. pseudomagnoliarum*,

***C. viridis*, *Eucalymnatus tessellatus*, *Marsipococcus proteae* (= *Coccus proteae*), *Parasaissetia litorea*, *P. nigra* (= *Saissetia nigra*), *Parthenolecanium corni* (= *Eulecanium corni*, *Lecanium corni*), *P. persicae* (= *Eulecanium persicae*, *Lecanium persicae*), *Protopulvinaria pyriformis*, *Pulvinaria aethiopica* (= *Coccus aethiopicus*), *P. psidii* (= *Chloropulvinaria psidii*), *P. urbicola*, *Pulvinariella mesembryanthemi* (= *Pulvinaria mesembryanthemi*), *Saissetia coffeae* (= *Saissetia hemisphaerica*), *S. nigrella*, *S. oleae*, *S. somereni* (Trjapitzin, 1989; Guerrieri & Noyes, 2000; Scalenet, 2006; Noyes, 2006).**

Metaphycus insidiosus (Mercet, 1921)

Hosts: *Eulecanium tiliae* (= *E. coryli*) *E. crudum*, *Parthenolecanium corni* (= *E. corni*), *P. persicae*, *P. Pomeranicum* (= *E. pomeranicum*, *E. taxi*), *P. rufulum* (= *E. rufulum*), *Pulvinaria vitis* (= *P. betulae*, *P. populi*), *Sphaerolecanium prunastri* (Guerrieri & Noyes, 2000; Noyes, 2006).

Metaphycus melanostomatus (Timberlake, 1916)

Hosts: *Coccus pseudomagnoliarum*, *Eulecanium franconicum*, *E. rugulosum*, *E. tiliae* (= *E. mali*, *Lecanium coryli*, *L. fuscum*) *Parthenolecanium corni* (= *Lecanium corni*), *Pulvinaria regalis*, *P. vitis* (Guerrieri & Noyes, 2000; Noyes, 2006).

Metaphycus silvestrii Sugonjaev, 1960

Hosts: *Parthenolecanium corni* (= *Eulecanium corni*), *Sphaerolecanium prunastri* (Trjapitzin, 1989; Guerrieri, Noyes, 2000; Noyes, 2006).

Metaphycus stagnarum Hoffer, 1954

Hosts: *Parthenolecanium corni* (= *Eulecanium corni*), *Physokermes piceae*, *Pulvinaria floccifera*, *P. hydrangeae*, *P. vitis* (= *P. betulae*) (Trjapitzin, 1989; Guerrieri, Noyes, 2000; Noyes, 2006).

Material examined: Turkey: Isparta, Ex *P. vitis* on *Cydonia* 16-17.IX.2002, 3♀♀ (G. Japoshvili) (Slide); Halikent, Ex *P. vitis* on *Cydonia* 19-22.IX.2002, 1♀ (B. Aslan) (Slide); Ex *P. vitis* on *Cydonia* 14-22.X.2002, 2♀♀ (G. Japoshvili) (Slide); Ex *P. vitis* on *Cydonia* 16-17.IX.2002, 2♀♀ (G. Japoshvili); Ex *P. vitis* on *Cydonia* 14-22.X.2002, 6♀♀, 1♂ (G. Japoshvili) (IZGAS). **Extralimital:** Russia (Sakhalin), 1♀; Belgium, 4♀♀; England, 13♀♀, 7♂♂; Wales, 3♀♀, (BMNH).

Microterys Thomson, 1876

Microterys bellae Trjapitzin, 1968

Hosts: *Rhodococcus perornatus*, *R. spiraeae*, *R. rosaeluteae*, *Eulecanium caraganae*, *E. sachalinense*, *E. secretum* (Trjapitzin, 1989; Karaca et al. 2003b; Noyes, 2006).

Material examined: Turkey: Isparta, Ex *R. perornatus* on *Rosa damascene* 05-20.VI.2001, 1♀ (O. Demirözer) (Slide); Ex *R. perornatus* on *Rosa damascene* 05-20.V.2001, 10♀♀, 10♂♂ (O. Demirözer); Ex *R. perornatus* on *Rosa damascene* 05-20.VI.2001, 7♀♀, 3♂♂ (O. Demirözer) (IZGAS).
Extralimital: Holotype. ♀ (ZIN).

Comment: First author supposes that *Microterys bellae* can be synonym of *Microterys lunatus*.

Microterys cneus Trjapitzin et Sugonjaev, 1976

Host: *Pulvinaria vitis* (= *P. betulae*) (Trjapitzin, 1989; Scalenet, 2006; Noyes, 2006).

Material examined: Turkey: Isparta, Halikent Ex *P. vitis* on *Cydonia* 19-22.IX.2002, 1♂ (G. Japoshvili); Halikent Ex *P. vitis* on *Cydonia* 16-17.IX.2002, 1♂ (B. Aslan) (IZGAS).

Comment: By the first authors opinion BMNH collection material 1♀ from Suomi, 09.VIII.1983, Koponen, probably *M. subcupratus*, no doubt it is not *M. cneus*.

Microterys darevskii Trjapitzin, 1968

Host: *Stotzia maxima* (Trjapitzin, 1989; Noyes, 2006).

Material examined extralimital: Turkey: Sögüt-Burdur, Ex *Puto* sp. on *Graminae*, Gellium-Medikogo, 30.V.2000, 1♀ (B. Kaydan) (BMNH).

Microterys hortulanus Erdos, 1957

Hosts: *Didesmococcus unifasciatus*, *Eulecanium ciliatum*, *Sphaerolecanium prunastri* (= *E. prunastri*) Trjapitzin, 1989; (Scalenet, 2006; Noyes, 2006).

Material examined: Turkey: Isparta, Mehmet-Töngce, Ex *S. prunastri* on *Prunus* sp. 08-09.VII.2001, 1♂ (G. Japoshvili) (Slide); Kuleönü, Ex *S. prunastri* on *Armeniaca vulgaris* 10.V.2002, 1♀ (O. Demirözer) (Slide); Kuleönü, Ex *S. prunastri* on *Armeniaca vulgaris* 10.V.2002, 1♀ (O. Demirözer) (IZGAS); Izmit Ex Coccid on *Prunus* sp. 14.V.1974, 17♀♀, 2♂♂ (C. Öncüer); Karsiyaka, Ex *S. prunastri* on Plum 20.VI. 1974, 2♀♀ (C. Öncüer); Ex *S. prunastri* on Plum 26.VI.1974, 1♀ (H. Giray); Afyon Ex *S. prunastri* on Cherry 24.V.1999, 1♀ (S. Ülgentürk) (BMNH).

Microterys lunatus (Dalman, 1820)

Hosts: *Eulecanium tiliae* (= *E. coryli*, *Parthenolecanium coryli*), *Filippia follicularis*, *P. corni* (= *Lecanium corni*), *Physokermes hemicryphus*, *P. piceae*, *P. sugonjaevi*, *Pulvinaria vitis*, *Saissetia oleae*, *Sphaerolecanium prunastri* (= *L. prunastri*) (Trjapitzin, 1989; Noyes, 2006).

Material examined extralimital: Azerbaijan: Baku Ex *Ceroplastes japonicus* On Quince 03.VII.2000, 1♀ S. Ibadova (Slide) (IZGAS); Czech Republic, 1♀; Sweden, 2♀♀; Italy, 2♀♀; England, 2♀♀; Russia, 1♀ (BMNH).

Comments: Rearing from *C. japonicus* can be misidentification of *Microterys clauseni*.

Microterys masii Silvestri, 1919

Hosts: *Coccus hesperidum*, *Eulecanium tiliae* (= *E. coryli*), *Parthenolecanium corni* (= *Eulecanium corni*), *Filippia follicularis* (*Euphilippia olivine*, *Philippia oleae*, *Filippia oleae*), *Lichtensia viburni* (= *Filippia viburni*), *Pulvinaria floccifera*, *Sphaerolecanium prunastri* (Trjapitzin, 1989; Kozar, 1998; Scalenet, 2006; Noyes, 2006).

Microterys nietneri (Motschulsky, 1859) (= *M. flavus* Howard)

Hosts: *Ceroplastes cirripediformis*, *C. floridensis*, *C. japonicus*, *C. rubens*, *Coccus hesperidum*, *C. pseudomagnoliarum*, *C. viridis*, *Eucalymnatus tessellatus*, *Gascardia destructor*, *Maacoccus piperis* (= *Coccus piperis*, *Lecanium piperis*), *Milviscutulus mangiferae* (= *Coccus mangiferae*, *Protopulvinaria mangiferae*), *Parasaissetia nigra*, *Parthenolecanium corni* (= *L. corni*), *P. fletcheri* (= *Lecanium fletcheri*), *Protopulvinaria pyriformis*, *Pulvinaria polygonata* (= *Chloropulvinaria polygonata*), *P. floccifera*, *P. peregrina*, *P. vitis*, *P. psidii* (= *C. psidii*), *Pulvinariella mesembryanthemi*, *Saissetia coffeae* (= *S. hemisphaerica*), *S. miranda*, *S. oleae* (Trjapitzin, 1989; Noyes, 2006).

Material examined: Turkey: Mersin, Tece, Ex *C. japonicus* on *Laurus* 25.IX.2002, 1♀ (L. Erkilic) (IZGAS).

Microterys sylvius (Dalman, 1820)

Hosts: *Didesmococcus unifasciatus*, *Eulecanium tiliae* (= *E. coryli*, *Lecanium coryli*), *E. ficiphilum*, *E. nocivum*, *E. sericeum*, *Parthenolecanium corni* (= *E. corni*, *L. corni*), *P. persicae* (= *E. persicae*), *P. rufulum* (= *E. rufulum*), *Physokermes jezoensis*, *Rhodococcus perornatus* (= *R. bulgariensis*), *R. spiraeae*, *R. turanicus*, *Sphaerolecanium prunastri*, *Stotzia maxima* (Trjapitzin, 1989; Noyes, 2006).

Material examined: Turkey: Kuleönü Ex *Eulecanium* sp. on *Prunus* 05-16.VI.2002, 1♀ (G. Japoshvili) (Slide); Ex *Eulecanium douglasi* on *Prunus* sp. 05-16.VI.2002, 5♀♀ (G. Japoshvili); Ex *P. persicae* on *Prunus* sp. 05-16.VI.2002, 2♀♀, 1♂ (G. Japoshvili) (IZGAS). **Extralimital:** Sweden, 4♀♀ with scientific name, 12♀♀, 1♂; Italy, 4♀♀, 3♂♂, (BMNH).

Microterys tricoloricornis (De Stefani, 1886)

Hosts: *Coccus hesperidum*, *C. pseudomagnoliarum*, *Eulecanium ciliatum*, *E. diminutum*, *Pulvinariella mesembryanthemi* (= *Pulvinaria*

mesembryanthemi) *Saissetia oleae* (Trjapitzin, 1989; Scalenet, 2006; Noyes, 2006).

Monodiscodes Hoffer, 1953

Monodiscodes intermedius (Mayr, 1876) (= *M. maculipennis* Hoffer, 1970)

Hosts: *Eriopeltis festucae*, *Rhizopulvinaria armeniaca* (Trjapitzin, 1989; Noyes, 2006).

Material examined extralimital: Georgia: Tbilisi, Bot. Gard. On the grass 26.VII.1956, 1♀ (V.Yasnosh) (IZGAS); Italy, 3♀♀; France, 1♀; Bulgaria, 4♀♀; Spain, 15♀♀, 7♂♂; Sardinia, 2♀♀, 1♂ (BMNH).

Syrphophagus Ashmead, 1900 (= *Aphidencyrthus*)

Syrphophagus aeruginosus (Dalman, 1820)

Host: *Physokermes piceae* (Trjapitzin & Doganlar, 1997; Japoshvili, Noyes, 2005; Noyes, 2006).

Tetracnemus Westwood, 1837

Tetracnemus heydeni (Mayr, 1876) (= *Anusiella*)

Host: *Rhizopulvinaria armeniaca* (Noyes, 2006).

Material examined: Turkey: Muğla, Fethiye 21-31.VIII.1992, 43♀♀, 8♂♂ (J. Noyes).

Trichomasthus Thomson, 1876

Trichomasthus albimanus Thomson, 1876

Hosts: *Coccus hesperidum*, *C. pseudomagnoliarum*, *Eriopeltis festucae* (= *E. araxis*), *E. lichtensteinii*, *Eulecanium tiliae*, *Luzulaspis luzulae*, *P. bituberculatum* (= *Eulecanium bituberculatum*), *Parthenolecanium corni*, *P. pomeranicum*, (= *Eulecanium corni*), *Phyllostroma myrtilli*, *Pulvinaria regalis*, *P. vitis* (= *P. ribesiae*), *Pulvinariella mesembryanthemi*, *Rhodococcus spiraeae* (Trjapitzin, 1989; Noyes, 2006).

Trichomasthus cyaneus (Dalman, 1820)

Hosts: *Eriopeltis festucae* (= *E. araxis*, *E. agropyri*), *E. lichtensteinii*, *Parafairmairia gracilis*, *Pulvinaria vitis* (Trjapitzin, 1989; Japoshvili & Noyes, 2005; Noyes, 2006).

Zaomma Ashmead, 1900 (= *Apterencyrtus* Ashmead)

Zaomma lambinus (Walker, 1838) (= *Apterencyrtus*
(= *Chiloneurinus*) *microphagus* Mayr)

Hosts: *Mesolecanium nigrofasciatum* (= *Eulecanium nigrofasciatum*, *Lecanium nigrofasciatum*), *Phyllostroma myrtilli* (Trjapitzin, 1989; Kozar, 1998; Scalenet, 2006; Noyes, 2006).

Material examined extralimital: Turkey: Isparta, Eğirdir Ex *Diaspidiotus ostreaformis* on *Platanus* 16-18.VIII.2001, 1♀ (G. Japoshvili) (Slide); Zelve-Nevşehir Ex *L. ulmi* on *Juglans regia* VIII.2000, 1♀ (B. Kaydan) (IZGAS).

Comments: Host *Leucopis vorax* (Diptera: Chamaemyiidae) probably a diaspidid scale being fed on by *Leucopis vorax* larva (Noyes, 2006).

Discussion

By this work 21 genera and 45 species of Encyrtidae were recorded on Coccidae from Turkey. On the other hand, *Acanthopulvinaria orientalis*, *Ceroplastes floridensis*, *C. helichrysi*, *C. japonicus*, *C. rubens*, *C. rusci*, *C. sinensis*, *Coccus hesperidum*, *C. pseudomagnoliarum*, *Eriopeltis festucae*, *Eulecanium ciliatum*, *E. nocivum*, *E. rugulosum*, *E. tiliae*, *Filippia viburni*, *F. follicularis*, *Lichtensia viburni*, *Palaeolecanium bituberculatum*, *Parthenolecanium corni*, *P. persicae*, *P. pruinatum*, *P. rufulum*, *Physokermes piceae*, *Pulvinaria floccifera*, *P. vitis*, *Pulvinariella mesembryanthemi*, *Rhodococcus perornatus*, *Saissetia coffeae*, *S. oleae*, *S. privigna*, *Sphaerolecanium prunastri* were recorded as a host coccid species of listed encyrtids. this brings the total number to 31 species. While the encyrtids recorded in the paper appear to be parasitoids of more 78 species of coccids throughout the world.

Sphaerolecanium prunastri is recorded as a most important pest for fruit orchards of Turkey and *Discodes coccophagus* as a most effective encyrtid species in the number regulation of this pest (Karaca et al., 2003).

Özet

Türkiye’de Coccidae (Hemiptera: Coccoidea) Familyasının Encyrtid (Hymenoptera: Chalcidoidea, Encyrtidae) parazitoitleri

Isparta İli’nden 2001 – 2006 yıllarında toplanan coccidlerden elde edilen encyrtid parazitoitler Londra (İngiltere) Natural History Museum’daki koleksiyon ile karşılaştırılarak teşhis edilmiştir. Ayrıca, daha önce Türkiye’den toplanarak bu müzeye gönderilen örnekler de incelenerek listeye dahil edilmiştir. Söz konusu veriler literatür bilgisi ile de desteklenmiştir. Çalışma sonucunda 21 cinse bağlı toplam 45 encyrtid türün, Coccidae familyasına ait 31 tür ile ilişkili olduğu saptanmıştır. Bununla birlikte 78’den fazla coccid türünün listelenen parazitoitlerin konukçusu olabileceği bulunmuştur. Daha önce bildirilen tüm sinonimler verilmiştir.

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