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## **The Subfamilies Eulophinae, Entedoninae and Tetrastichinae in Iran, with description of new species (Hymenoptera: Eulophidae)**

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### **Abstract**

This paper reflects the current degree of research of Eulophidae and their hosts in Iran. A list of the species from Iran belonging to the subfamilies Eulophinae, Entedoninae and Tetrastichinae is presented. In the present work 47 species from 22 genera are recorded from Iran. Two species (*Cirrospilus scapus* **sp. nov.** and *Aprostocetus persicus* **sp. nov.**) are described as new. A list of 45 host-parasitoid associations in Iran and keys to Iranian species of three genera (*Cirrospilus*, *Diglyphus* and *Aprostocetus*) are included.

### **Zusammenfassung**

Dieser Artikel zeigt den derzeitigen Untersuchungsstand an eulophiden Wespen und ihrer Wirte im Iran. Eine Liste der für den Iran festgestellten Arten der Unterfamilien Eulophinae, Entedoninae und Tetrastichinae wird präsentiert. Mit vorliegender Arbeit werden 47 Arten in 22 Gattungen aus dem Iran nachgewiesen. Zwei neue Arten (*Cirrospilus scapus* **sp. nov.** und *Aprostocetus persicus* **sp. nov.**) werden beschrieben. Eine Liste von 45 Wirts- und Parasitoid-Beziehungen im Iran und ein Schlüssel für 3 Gattungen (*Cirrospilus*, *Diglyphus* und *Aprostocetus*) sind in der Arbeit enthalten.

## Introduction

Only few papers dealing with Iranian Eulophidae have so far been published. The first reported Eulophidae from Iran was *Tetrastichus epilachnae* (GIRARD, 1896) (KIRYUKHIN 1948; HERTING 1973). Different authors (including present author Z.A. YEFREMOVA) have mentioned about 33 species from 20 genera of Eulophidae from Iran until now. The subfamily Eulophinae was represented in Iran with 11 species in 6 genera: *Cirrospilus variegatus* (MASI, 1907) (HESAMI, YEFREMOVA & SEYEDEBRAHIMI 2007), *C. vittatus* WALKER, 1838, *Dichatomus acerinus* FÖRSTER, 1878 (OILB 1971), *Diglyphus crassinervis* ERDÖS, 1958, *D. isaea* (WALKER, 1838), *D. scapus* YEFREMOVA, 2006 (HESAMI et al. 2006), *Hemiptarsensis wailesellae* S. NOVICKY, 2003 (ZAHIRI, MOHARRAMPOUR & TALEBI 2003), *H. zilahisabessi* ERDÖS, 2005 (TALEBI et al. 2005; ASADI et al. 2006), *Pnigalio pectinicornis* (LINNAEUS, 1758) (HAESSELBARTH 1989), *Sympiesis gordius* (WALKER, 1839) and *S. sericeicornis* (NEES, 1834) (HAESSELBARTH 1985), the subfamily Entedoninae with 6 species in 4 genera: *Closterocerus aratus* (WALKER, 1838) (OILB 1971), *C. formosus* WESTWOOD, 1833 (OILB 1834) (GRAHAM 1991; HESAMI et al. 2006), *Derostenus persicus* GUMOVSKY, 2003 (GUMOVSKY 2003), *Entedon biroi* ERDÖS, 1944 (GUMOVSKY 1999), *E. ergias* WALKER, 1839 (ASKEW & BOUČEK 1968; HERTING 1973; BOUČEK 1977; TRIJAPITZIN 1978), *Pediobius illustris* (WATERSTON, 1915) (BOUČEK & ASKEW, 1968; WATERSTON 1915) and the subfamily Tetrastichinae with 16 species in 10 genera: *Aprostocetus beyazus* DOGANLAR, 1992 (DOGANLAR 1992), *A. lachares* (WALKER, 1839), *A. neglectus* (DOMENICHINI, 1957) (DOMENICHINI 1964; GRAHAM 1987), *A. zosimus* (WALKER, 1839), *Baryscapus evonymellae* (BOUCHÉ, 1834) (GRAHAM 1991), *B. pallidae* GRAHAM, 1991 (GRAHAM 1991), *Chouioia cunea* YANG, 1989 (REZAEI, MOHARRAMIPOR & TALEBI 2003), *Leptocybe invasa* FISHER & LASALLE, 2004 (MENDEL et al. 2004), *Melittobia acasta* (WALKER, 1839) (THOMPSON 1955), *Minotetrastichus platenellus* (MERCET, 1922) (HAESSELBARTH 1983), *Oomyzus brevistigma* (GAHAN, 1936) (AZMAYESH-FARD & ESMAILI 1981; DREISTADT & DAHLSTEN 1991), *O. gallerucae* (FONSCOLOMBE, 1832) (AZMAYESH-FARD & ESMAILI 1981; DREISTADT & DAHLSTEN 1991; DOMENICHINI 1964; OILB 1971; BOUČEK 1977; KOSTJUKOV 1978), *O. incertus* (RATZEBURG, 1844) (DOMENICHINI 1964; MONADJEMI 1975; KOSTJUKOV 1978; KAMALI, SOLEIMAN-NEJADIAN & BISHOP 1978; GRAHAM 1991), *Pronotalia orobanchiae* GRAHAM, 1991 (GRAHAM 1991), *Sigmophora brevicornis* (PANZER, 1804) (HESAMI et al. 2006) and *Tetrastichus epilachnae* (GIARD, 1896) (HERTING 1973).

This paper provides a list of eulophids from Iran belonging to the subfamilies Eulophinae, Entedoninae and Tetrastichinae. The text is arranged as follows: A brief generic and specific diagnosis (or full morphological description) and information of the known distribution and hosts (mentioned are only main hosts of the parasitoids). Additional comments are given where necessary. The present paper also provides keys to the Iranian species of three genera (*Cirrospilus*, *Diglyphus* and *Aprostocetus*) including the new species, described from Iran by the authors. These genera contain numerous species widely spread in the world.

## Material and Methods

The paper is based on eulophid specimens, collected in Iran by many different collectors from different parts of Iran, and sent to Insect Taxonomy Research Department, Teh-

ran. Some specimens of this paper were collected by the authors during the period 1990-2005. In total, 720 specimens are dealt with. Many species were collected directly from their hosts in the field or reared from hosts. Some species were obtained by sweeping over vegetation. The specimens were collected by different methods: Rearing from hosts = 621 specimens (86.25%) and sweeping by net = 99 specimens (13.75%).

The material is deposited in the Zoological Institution of Russian Academy of Science, St. Petersburg (ZISP), Hayk Mirzayans Insect Museum of Plant Pests and Diseases Institute, Tehran (HMIM) and the Natural History Museum, London (BMNH). The taxonomic arrangement of BOUČEK (1988) for subfamilies is followed in this paper. The morphological terminology follows GRAHAM (1987, 1991) and GIBSON (1997). Synonyms, combinations and misspelling (= "Combinations") are according NOYES (2006).

The abbreviations used in the text are as follows: F1 = first segment of antennal funicle, F2 = second segment, F3 = third segment, F4 = fourth segment, C1-C3 = claval segments, SMV = submarginal vein, MV = marginal vein, PMV = postmarginal vein, SV = stigmal vein. Sculpture terminology follows EADY (1968) and HARRIS (1979). Absolute measurements in millimetres (mm) are used for body and forewing length of specimens. For other dimensions measurements are given in  $\mu\text{m}$ .

## Species account

### Subfamily Eulophinae

Submarginal vein smoothly joining the parastigma, postmarginal vein as long as stigmal vein or longer, submarginal vein with many (3 or more) setae; antenna of male may have branches; axillae weakly advanced; the presence two or more pairs of setae on the scutellum. Funicle with 2, 3 or 4 segments; male funicle often with long branches.

The Eulophinae are solitary or gregarious ectoparasitoids of the larvae of leaf-miners, or galls. Many species are facultative or obligate hyperparasitoids.

### Genus *Aulogymnus* FÖRSTER

*Aulogymnus* FÖRSTER, 1851: 24. Type species: *Aulogymnus aceris* FÖRSTER, 1851 by monotypy.

Diagnosis: Scutellum convex, with longitudinal grooves distinct or not distinct; axillae slightly advanced; the stigmal vein is distinctly produced beyond the uncus.

Biology: Parasitoid in galls of Cynipidae (Hymenoptera) (ASKEW 1959, 1961).

Distribution: Holarctic, Australia.

Identification of species see: ASKEW & BOUČEK (1968) and TRJAPITZIN (1978).

*Aulogymnus gallarum* (LINNAEUS, 1761)

Combinations and synonyms. *Ichneumon gallarum* LINNAEUS, 1761: *Aulogymnus gallarum* (L.), *Chalcis gallarum* (L.), *Cyniphocotonus gallarum* (L.), *Cynips gallarum* (L.), *Cynipsichneumon gallarum* (L.), *Cynipsillum gallarum* (L.), *Diplolepis gallarum* (L.), *Olinx gallarum* (L.), *Olinx pulchra* (M.), *Olinx rotundiventris* THOMSON, 1878, *Olynx gallarum pulchra* MAYR, 1877, *Olynx pulchra* M., *Pteromalus gallarum* (L.).

Material examined: 1 ♀, 1 ♂, Iran, Ghazvin, August 1999, leg. ARBAB (ZISP).

Biology: Parasitoid of *Adleria* sp., *Andricus* sp., *Biorhiza* sp., *Cynips* sp. (Hymenoptera,

Cynipidae) (ASKEW 1959, 1961).

Distribution: Palearctic (Europe). This is a new record for the fauna of Iran.

### Genus *Cirrospilus* WESTWOOD

*Cirrospilus* WESTWOOD, 1832: 128. Type species: *Gyrolasella elegantissimus* WESTWOOD, 1832, by original designation and monotypy.

Diagnosis: Two-segmented funicle in both sexes. Notauli complete and above scuto-scutellar suture; scutellum relatively flat, with two sublateral grooves, though grooves often difficult to see due changes in colour pattern, stigma rounded, with uncus at apex. SMV with 3 or more setae, PMV present. Colour of body variable.

Biology: Ectoparasitoid of *Agromyza* sp. and *Phytomyza* sp. (Diptera, Agromyzidae) and genera of Lepidoptera (*Phyllonorycter* sp., *Phyllocnistis* sp., *Tischeria* sp., *Leucoptera* sp. and *Stigmella* sp.) or hyperparasitoid of Hymenoptera (ASKEW & BOUČEK 1968; TRJAPITZIN 1978).

Distribution: Cosmopolitan.

Identification: Keys to species of *Cirrospilus* have been provided by ASKEW (1968) for the fauna of Britain, BOUČEK (1959) and GRAHAM (1959) for that of Europe, TRJAPITZIN (1978) for Russia, KAMIJO (1992) for Japanese species, STOROZHEVA, KOSTJUKOV & YEFREMOVA (1995) for species of the Far East of Russia, and ZHU et al. (2002) gave a key to Chinese species. Iranian species identification is possible with the present key to 7 species of this genus.

#### Key to the species of *Cirrospilus* from Iran

(Females)

- 1 Body mainly yellow with black longitudinal stripes ..... 2
- Body yellow without longitudinal black stripes ..... 3
- 2 Forewing with dark markings on stigma and parastigma, dorsellum longer than propodeum; speculum large ..... *C. variegatus* (MAST)
- Forewing without dark markings, dorsellum as long as propodeum; speculum small and narrow ..... *C. vittatus* WALKER
- 3 Propodeum completely yellow ..... 4
- Propodeum dark or brown ..... 5
- 4 Gaster with transverse dark stripes; notauli complete to scutoscutellar line. .... *C. ingenuus* GAHAN
- Gaster with transverse yellow stripes; notauli complete to anterior margin of axilla; male with swollen scape ..... *C. scapus* sp. nov.
- 5 Thorax finely reticulate almost smooth; mesoscutum and scutellum with glance; SMV of forewing as long as MV ..... *C. staryi* BOUČEK
- Thorax strong reticulate; mesoscutum and scutellum without glance; SMV of forewing not equal MV ..... 6
- 6 PMV of forewing 1.3 times as long as SV; scutellum yellow . *C. viticola* (RONDANI)
- Postmarginal vein of forewing as long as SV; scutellum dark ... *C. lynceus* WALKER

*Cirrospilus ingenuus* GAHAN, 1932

Combinations and synonyms. *Cirrospilus ingenuus* GAHAN, 1932: *Cirrospilus quadristriatus* (S. R. & R.), *Scotolinx quadristriata* SUBBA RAO & RAMAMANI, 1966.

Material examined: 2 ♀♀, Iran, Bushehr, Faryab, ex larvae *Phyllocnistis citrella* STAINTON (Lepidoptera: Gracillariidae), 10 September 2004, leg. SADEGHI (HMIM); 2 ♀♀, Baluchestan, Iranshahr, ex larvae *Phyllocnistis citrella* STAINTON, August 2002, leg. MOTAMEDINIA (ZISP).

Biology: Larval parasitoid of *Phyllonorycter* sp., *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae) (THOMPSON 1955; BARROGA 1969; MORAKOTE & UJIYE 1992).

Distribution: Oriental region and Australia. New to Iran.

*Cirrospilus lyncus* WALKER, 1838

Combinations. *Cirrospilus lyncus* WALKER, 1838: *Atoposomoidea unifasciata* (F.), *Cirrospilus caudatulus* THOMSON, 1878, *Cirrospilus (Atoposomoidea) lyncus* W., *Cirrospilus unifasciatus* (F.), *Eulophus unifasciatus* FÖRSTER, 1841.

Material examined: 2 ♀♀, Iran, Mazandaran, Amol, 3 November 1997, leg. EBRAHIMI; 3 ♀♀, 1 ♂, Iran, Sari, ex larvae *Phyllocnistis citrella* STAINTON (Lepidoptera: Gracillariidae), 17 September 2004, leg. SADEGHI (1 ♀ HMIM).

Biology: Larval parasitoid of *Phyllonorycter* sp., *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae), *Tischeria* sp. (Lepidoptera, Tischeriidae) (ASKEW & BOUČEK 1968; SHENG & WANG 1992, 1993).

Distribution: Oriental region and Palearctic. This is a new record for the fauna of Iran.

***Cirrospilus scapus* YEFREMOVA sp. nov. (Figs 1-4)**

Holotype: ♀, Azarbaijan-e Gharbi, Uromia, ex larvae of *Liriomyza congesta* (Diptera, Agromyzidae), 11 April 1995, leg. JAFARZADEH (ZISP).

Paratypes: 3 ♀♀, 2 ♂♂ with the same label data as holotype (Zoological Institution of Russian Academy of Science, Russia; Hayk Mirzayans Insect Museum of Plant Pests and Diseases Institute, Iran). One female paratype on slide.

Diagnosis: Female: propodeum smooth, without median carina; PMV slightly shorter than SV; gaster 1.78 times as long as broad. Male: scape swollen, funicle 2-segmented, clava 3-segmented. Body entire yellowish golden.

Description: ♀ (Figs 1, 3, 4): Body length 1.50 mm. Forewing length 1.09 mm.

Body yellowish golden. Gaster with pale yellow stripe on 2, 3 tergites. Eye white. Ocelli yellow. Face yellowish golden. Antennal funicle yellow, scape white. Tegulae pale yellow. Colour of venation yellow. Legs pale yellow, except hind yellow golden proximal part of femora.

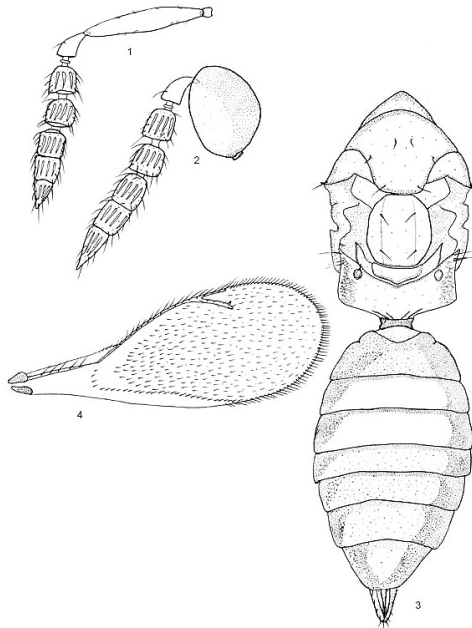
Head wider than high. Head height 17, head breadth 15, length of head 6. Face alutecous. Distance between eyes 6. Eyes with setae. Eye height 7, breadth 5. Malar sulcus slightly curved. Ocellar line present and distinct. Clypeal suture laterally present. Toruli placed slightly below the lower margin of eye. Antenna (Fig. 1) with scape (10.3 x 2.3 µm), pedicel short (2.5), one anellus. Funicle with two segments (F1 2.6, F2 2.5), clava 3-segmented (10.3 x 3.3 µm). First segment 1.04 times as long as pedicel.

Mesosoma (Fig. 3) (27 x 13 µm). Pronotum (6 x 10.2 µm) conical, alutecous. Mesoscutum (9 x 11 µm), mid lobe of mesoscutum with 3 pairs of long setae, notauli complete to anterior margin of axilla. Mesoscutum alutecous, scapulae slightly reticulate. Axillae

alutecous and placed slightly above scuto-scutellar line. Scutellum ( $7.2 \times 7 \mu\text{m}$ ) shorter than mesoscutum, smooth, with submedian grooves (distance between grooves  $4.1 \mu\text{m}$ ), and two pairs of setae (anterior setae as long as posterior). Dorsellum triangular, smooth. Propodeum smooth in median part and without median carina (Fig. 3), callus slightly reticulate with three long setae arranged densely into one row. Short posterior plicae present.

Fore wings (Fig. 4) ( $46 \times 17 \mu\text{m}$ ), 2.7 times as long as broad. Speculum absent. Costal cell with four setae. SMV with 5 setae. Relative measurements: SMV : MV : PMV : SV =  $14.3 : 24.5 : 4.6 : 6.5$ . Cubital line of hair slightly curved. Hind wing rounded.

Metasoma. Gaster ( $29 \times 14 \mu\text{m}$ ), 1.78 times as long as broad. Petiole very short, smooth, transverse. Cercal setae five. Laterotergites invisible. Sheaths of ovipositor slightly extended with many trichoid setae.



Figs 1-4. *Cirrospilus scapus* YEFREMOVA sp. nov. ♀ holotype and ♂ paratype: 1. right antenna, female; 2. right antenna, male; 3. mesosoma and metasoma, dorsal view, female; 4. left forewing, female.

♂ (Fig. 2): Length 1.15 mm.

Body colour the same as female but antenna with yellow swollen scape and pale yellow funicle and clava.

Antenna (Fig. 3) with two segments. Relative measurements: Scape ( $11 \times 8.5 \mu\text{m}$ ), pedicel (4.1), (F1 4.1, F2 3.6), clava 3-segmented ( $14.3 \times 3.4 \mu\text{m}$ ). First funicle segment as long as pedicel. Fore wing ( $45 \times 16.7 \mu\text{m}$ ), 2.7 times as long as broad. SMV with 5

setae. Speculum absent. Hind wing slightly pointed. Gaster (26 x 14 µm), 1.85 times as long as broad.

Length of body of males from type series 1.15 - 1.37 mm.

Host: Parasitoid of larvae of *Liriomyza congesta* (BECKER) (Diptera, Agromyzidae).

Distribution: Currently known from Iran.

Comments: The new species is similar to *Cirrospilus ingenuus* GAHAN, 1932, but differs from it by the presence of swollen scape in male, smooth propodeum (rugose in *C. ingenuus*) and the notauli complete to anterior margin of axilla (complete to scutoscutellar line in *C. ingenuus*). The colour of body of *Cirrospilus scapus* is also different (yellowish golden, and yellowish orange in *C. ingenuus*).

Etymology: The species name *scapus* refers to the shape of the scape of the male.

*Cirrospilus staryi* BOUČEK, 1959

Combinations. *Cirrospilus staryi* BOUČEK, 1959: *Cirrospilus (Atoposomoidea) staryi* BOUČEK, 1959.

Material examined: 2 ♀♀, 1 ♂, Iran, Bushehr, ex larvae *Phyllocnistis citrella* STANTON (Lepidoptera, Gracillariidae), May 2004, leg. SADEGHI (ZISP).

Biology: Parasitoid of *Phyllonorycter* sp. (Lepidoptera, Gracillariidae), *Stigmella* sp. (Lepidoptera, Nepticulidae) (ASKEW & BOUČEK 1968).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Cirrospilus viticola* (RONDANI, 1877)

Combinations and synonyms. *Omphale viticola* RONDANI, 1877: *Cirrospilus luteus* BUKOVSKI, 1938, *Cirrospilus (Atoposomoidea) luteus* B., *Cirrospilus setulosus* GRAHAM, 1959, *Cirrospilus simulator* MASI, 1933, *Cirrospilus subviolaceus* THOMSON, 1878, *Cirrospilus (Atoposomoidea) subviolaceus* T., *Cirrospilus viticola* (R.), *Entedon viticola* (R.).

Material examined: 2 ♀♀, Iran, Hormozgan, Rudan, ex larvae *Phyllocnistis citrella* STANTON (Lepidoptera, Gracillariidae), 17 April 1994, leg. EBRAHIMI (ZISP).

Biology: Larval parasitoid of many Lepidoptera: *Phyllonorycter* sp., *Phyllocnistis* sp. (Gracillariidae), *Tischeria* sp. (Tischeriidae), *Stigmella* sp. (Nepticulidae), *Rhynchaenus* sp. (Coleoptera, Curculionidae) (ASKEW & BOUČEK 1968; BOUČEK 1974; HERTING 1975; TRJAPITZIN 1978).

Distribution: Palearctic (Europe). This is a new record for the fauna of Iran.

### Genus *Diaulinopsis* CRAWFORD

*Diaulinopsis* CRAWFORD, 1912: 182. Type species: *Diaulinopsis callichroma* CRAWFORD, 1912, by original designation.

Diagnosis: PMV as long as SV; mesothorax dorsally with very fine longitudinal sculpture, propodeum smooth.

Biology: Parasitoid of Agromyzidae (BOUČEK 1959; ASKEW & BOUČEK 1968; THOMPSON 1955; GORD & HENDRICKSON 1979).

Distribution: Nearctic, Palearctic.

Identification of species see: ASKEW & BOUČEK (1968) and TRJAPITZIN (1978).

*Diaulinopsis arenaria* (ERDÖS, 1951)

Combinations. *Cycloscapus arenarius* ERDÖS, 1951: *Ceraninus arenarius* (E.), *Diaulinopsis arenaria* (E.).

Material examined: 37 ♀♀, 23 ♂♂, Kordestan, ex larvae of *Liriomyza congesta* BECKER, (Diptera, Agromyzidae), 3 June 2000, leg. EBRAHIMI (12 ♀♀, 4 ♂♂, HIMM; 25 ♀♀, 19 ♂♂, ZISP); 5 ♂♂, Lorestan, Azna, Tian, ex larvae of *Helicoverpa armigera* HÜBNER (Lepidoptera, Noctuidae), 13 July 1991, leg. PIRHADI (RMNH); 2 ♀♀, Tehran, Karaj, ex *Hypera postica* FABRICIUS (Coleoptera, Curculionidae), 23 May 1994, leg. EBRAHIMI (ZISP).

Biology: Ectoparasitoid of *Agromyza* sp. (Diptera, Agromyzidae) (BOUČEK 1959; ASKEW & BOUČEK 1968; THOMPSON 1955; GORD & HENDRICKSON 1979).

Distribution: Palearctic. This is a new record for the fauna of Iran.

**Genus *Diglyphus* WALKER**

*Diglyphus* WALKER, 1848: 409. Type species: *Cirrospilus chabrias* WALKER, 1838, designated by monotypy.

Diagnosis: Funicle in both sexes 2-segmented; notauli incomplete or very shallow; scutellum with 2 sublateral grooves; gaster sessile, elongate; body dark-coloured and metallic in coloration, SMV with 3 setae.

Biology: Ectoparasitoid of dipterous leaf miners: *Agromyza* sp., *Phytomyza* sp., *Liriomyza* sp., *Phytoagromyza* sp. (Diptera, Agromyzidae) and *Tortrix* sp., *Lithocolletis* sp. (Lepidoptera, Gracillariidae, Tortricidae, Nepticulidae, Lyonetiidae) (ASKEW & BOUČEK 1968). New host for the genus is *Syringopais temperatella* LEDER (Lepidoptera, Deoclonidae).

Distribution: Afrotropical, Nearctic, Neotropical, Oriental and Palearctic regions (NOYES 2006).

Identification: The European species of *Diglyphus* WALKER are keyed by ASKEW & BOUČEK (1968), TRJAPITZIN (1978), YEFREMOVA & SHROLL (1996), the Chinese species by ZHU, LASALLE & HUANG (2000). Two species of *Diglyphus*, *D. scapus* YEFREMOVA, described from Iran (HESAMI et al. 2006) and *D. bulbosus* YEFREMOVA & UBaidillah, described from neighboring territory of Kazakhstan (near Caspian Sea) (UBaidillah & YEFREMOVA 2001) are included in the present key to the Iranian species.

Key to the species of *Diglyphus* from Iran

(Females)

- 1 Forewing long and narrow, speculum very narrow or absent, cubital line of hair curved basally, veins yellow ..... *D. isaea* (WALKER)
- Forewing normal, speculum present, cubital line of hair not curved, veins dark ... 2
- 2 Male scape normal ..... 3
- Male scape swollen ..... 5
- 3 Propodeum with complete median carina; male wing veins normal ..... 4
- Propodeum with non complete median carina; male wing veins swollen. .... *D. crassinervis* ERDÖS
- 4 Scape 3.0 times as long as broad; forewing 1.5 times as long as broad, scutellum with purpurish shine ..... *D. minoeus* (WALKER)



- Scape 3.5 times as long as broad; forewing 2.0 times as long as broad, scutellum green with metallic tint . . . . . *D. chabrias* (WALKER)
- 5 F1 longer than F2 (female), male scape 26 x 35; body dark metallic green. . . . .  
. . . . . *D. bulbus* YEFREMOVA & UBAIDILLAH
- F2 longer than F1 (female), male scape 50 x 25; body brown with violet tint on mesoscutum and propodeum . . . . . *D. scapula* YEFREMOVA

*Diglyphus chabrias* (WALKER, 1838)

Combinations. *Cirrospilus chabrias* WALKER, 1838: *Asecodes chabrias* (W.), *Diglyphus chabrias* (W.).

Material examined: 1 ♀, Lorestan, Abestan, ex larvae of *Syringopais temperatella* LEDER (Lepidoptera, Deoclonidae), 5 May 1992, leg. PIRHADI (ZISP).

Biology: Ectoparasitoid of leaf-mining Diptera: *Agromyza* sp., *Liriomyza* sp., *Phytomyza* sp. (Diptera, Agromyzidae) (ASKEW & BOUČEK 1968).

Distribution: Oriental, Palaearctic. This is a new record for the fauna of Iran.

*Diglyphus isaea* (WALKER, 1838)

Combinations and synonyms. *Cirrospilus isaea* WALKER, 1838: *Asecodes bisannulatus* (F.), *Asecodes isaea* (W.), *Asecodes ornatus* (F.), *Cirrospilus lycophron* WALKER, 1838, *Cirrospilus medidas* WALKER, 1838, *Diglyphus bisannulatus* FÖRSTER, 1861, *Diglyphus clavicornis* WALKER, 1872, *Diglyphus isaea* (W.), *Diglyphus ornatus* FÖRSTER, 1861, *Diglyphus viri-dis* (T.), *Elachistus phytomyzae* RONDANI, 1877, *Entedon gracilis* GOU-REAU, 1851, *Solenotus isaea* (W.), *Solenotus viridis* THOMSON, 1878.

Material examined: 19 ♀♀, 5 ♂♂, Chaharmahal-Bakhtiari, Kuhrang, Hiregan, 2305 m 32°20'N, 50°26'E, 7 June 2005, leg. YEFREMOVA (8 ♀♀, 5 ♂♂, HMIM; 9 ♀♀, 3 ♂♂, ZISP).

Biology: Ectoparasitoid of leaf-mining Diptera: *Agromyza* sp., *Liriomyza* sp., *Phytomyza* sp., *Napomyza* sp., *Phytoagromyza* sp., *Cerodonta* sp., and *Chromatomyza* sp. (Diptera, Agromyzidae) (ASKEW & BOUČEK 1968).

Distribution: Cosmopolitan.

*Diglyphus minoëus* (WALKER, 1838)

Combinations and synonyms. *Cirrospilus minoëus* WALKER, 1838: *Asecodes minoëus* (W.), *Asecodes myron* (W.), *Asecodes smilis* (W.), *Cirrospilus myron* WALKER, 1839, *Cirrospilus smilis* WALKER, 1839, *Diglyphus minoëus* (W.), *Elachertus minoëus* (W.), *Eulophus amelon* WALKER, 1839, *Tetrastichus smilis* (W.).

Material examined: 1 ♀, Iran, Esfahan, Kashan, Niasar, 15 km SW from Kashan, 33°58'N, 51°07'E, 1 June 2005, leg. YEFREMOVA (ZISP).

Biology: Ectoparasitoid of leaf-mining Diptera: *Agromyza* sp., *Liriomyza* sp. (Diptera, Agromyzidae), rarely of Gracillariidae (Lepidoptera) (ASKEW & BOUČEK 1968).

Distribution: Nearctic, Oriental and Palearctic regions. This is a new record for the fauna of Iran.

### Genus *Elachertus* SPINOLA

*Elachertus* SPINOLA, 1811: 151. Type species: *Diplolepis lateralis* SPINOLA, 1808, by monotypy.

Diagnosis: Funicle 4-segmented in both sexes; SMV with 3 or more setae. PMV longer

than SV; notauli complete, scutellum with two sublateral grooves, which continue posteriorly and meet medially; propodeum with median carina and without plicae.

Biology: Gregarious ectoparasitoid of *Coleophora* sp. (Coleophoridae), *Exotelia* sp. (Gelechiidae), *Rhyacionia* sp., *Grapholita* sp. (Tortricidae), *Lymantria monacha* L. (Lymantriidae), *Leucoptera* sp. (Lyonetiidae) (Lepidoptera) (ASKEW & BOUČEK 1968).

Distribution: Holarctic.

Identification of species see: ASKEW & BOUČEK (1968) and TRJAPITZIN (1978).

*Elachertus gallicus* ERDÖS, 1958

Material examined: 1 ♀, Fars, Jahrom, ex larvae *Phyllocnistis citrella* STANTON (Lepidoptera, Gracillariidae), 2 June 1995, leg. EBRAHIMI (ZISP).

Biology: Unknown. *Phyllocnistis citrella* STANTON is a new host.

Distribution: Palearctic. This is a new record for the fauna of Iran.

### Genus *Euplectrus* WESTWOOD

*Euplectrus* WESTWOOD, 1832: 128. Type species: *Euplectrus maculiventris* WESTWOOD, 1832, by monotypy.

Diagnosis: Pronotum short with transverse dorsal carina, with long setae along posterior margin. Scutellum without longitudinal grooves; propodeum with distinct carina. Petiole as long as broad, sculptured dorsally. Fore wing large, MV slightly longer than SMV. The longest hind tibial spur as long as the first two tarsal joints together or less.

Biology: Ectoparasitoid of *Anomis* sp., *Plecoptera* sp., *Heliothis* sp., *Feralia* sp., *Spodoptera* sp., *Tortrix* sp. and *Euproctis* sp. (Lepidoptera) (ASKEW & BOUČEK 1968).

Distribution: Cosmopolitan.

Identification: For a key to the African species see: FERRIERE (1941).

*Euplectrus liparidis* FERRIERE, 1941

Material examined: 4 ♀♀, 2 ♂♂, Iran, Azarbaijan-e Gharbi, Orumieh, ex larvae of *Leucania (Acantholeucania) loreyi* DUPONCHEL (Lepidoptera), 11 April 1995, leg. NASERI (ZISP).

Biology: Larval parasitoid of *Lymantria dispar* L. (FERRIERE 1947).

Distribution: Palearctic (North-East Africa). This is a new record for the fauna of Iran.

### Genus *Hemiptarsenus* WESTWOOD

*Hemiptarsenus* WESTWOOD, 1833: 122-123. Type species: *Hemiptarsenus fulvicollis* WESTWOOD, 1833, designation by WESTWOOD 1839.

Diagnosis: Torulus high on head, above lower margin of eye, hence apex of scape extending above level of vertex. Fore wing and costal cell long and narrow. Mesoscutum with incomplete notauli and without longitudinal grooves on the scutellum. Antennal funicle 4-segmented in the female and with 3 branches in male. The propodeum without the median carina.

Biology: Larval parasitoid of dipterous leaf-miners (ASKEW & BOUČEK 1968).

Distribution: Cosmopolitan.

Identification of species see: ASKEW & BOUČEK (1968), TRJAPITZIN (1978).

*Hemiptarsenus varicornis* (GIRAULT, 1913)

Combinations and synonyms. *Eriglyptoideus varicornis* GIRAULT, 1913: *Hemiptarsenus antennalis* MASI, 1917, *Hemiptarsenus brevipedicellus* SHAFEE & RIZVI, 1988, *Hemiptarsenus ophiomyzae* RISBEC, 1957, *Hemiptarsenus semialbiclavus* (G.), *Hemiptarsenoideus semialbiclava secundus* GIRAULT, 1916, *Hemiptarsenoideus semialbiclava* GIRAULT, 1916, *Hemiptarsenus semialbiclavatus* (GIRAULT), *Hemiptarsenus semialbiclava* (G.), *Hemiptarsenus varicornis* (G.), *Neodimmockia agromyzae* DODD, 1917.

Material examined: 7 ♀♀, 5 ♂♂, Iran, Hormozgan, Bandar-e Abbas, 17 April 1994, leg. EBRAHIMI (4 ♀♀, 1 ♂, HMIM; 2 ♀♀, 4 ♂♂, ZISP); 1 ♂, Bandar-e Abbas, Nazdasht, ex larvae of *Liriomyza trifolii* BURGESS (Diptera, Agromyzidae), 31 May 1990, leg. EBRAHIMI, (ZISP).

Biology: Parasite of *Agromyza* sp., *Liriomyza* sp., *Ophiomia* (Diptera, Agromyzidae) (ASKEW & BOUČEK, 1968; LIN & WANG, 1992; VIRAKTAMATH, TEWARI, SRINIVASAN & GUPTA 1993; BORDAT, COLY & ROUX-OLIVER 1995; SAITO, IKEDA & OZAWA 1996).

Distribution: Afrotropical, Australasian, Oriental, Palearctic. This is a new record for the fauna of Iran.

**Genus *Hyssopus* GIRAULT**

*Hyssopus* GIRAULT, 1916: 119. Type species: *Hyssopus thymus* GIRAULT, 1916, by original designation.

Diagnosis: Pronotum large semiglobose, mesoscutum with 4 setae. Propodeum with median carina.

Biology: Larval parasitoid of *Lymantria* sp., *Cydia* sp., *Proteoteras* sp. (Lepidoptera) (ASKEW & BOUČEK, 1968).

Distribution: Nearctic, Neotropical and Palearctic regions.

Identification of species: Keys to species of *Hyssopus* are published by ASKEW & BOUČEK (1968), GRAHAM (1959) and TRJAPIZIN (1978).

*Hyssopus geniculatus* (HARTIG, 1838)

Combinations and synonyms. *Eulophus geniculatus* HARTIG, 1838: *Crataepoides russoi* ZINNA, 1955, *Elachertus geniculatus* (H.), *Entedon geniculatus* (H.), *Hyssopus geniculatus* (H.).

Material examined: 1 ♀, Iran. Mazandaran, Nowshahr, ex larvae *Phyllocnistis citrella* STANTON (Lepidoptera, Gracillariidae), 29 May 1993, leg. EBRAHIMI (ZISP).

Biology: Larval parasitoid of *Phyllonorycter* sp. and *Diorycta* sp. (Lepidoptera) (ASKEW & BOUČEK 1968).

Distribution: Europe. Palearctic. This is a new record for the fauna of Iran.

**Genus *Necremnus* THOMSON**

*Necremnus* THOMSON, 1878: 307. Type species: *Eulophus leucarthros* NEES, 1834, by designation.

Diagnosis: Female: Notauli incomplete; funicle 3-segmented, clava 3-segmented; scutellum without sublateral grooves; propodeum more or less convex, median carina present. Male: antenna has three long or short branches.

Biology: Ectoparasitoid of Chrysomelidae and Curculionidae (Coleoptera) and Coleo-

phoridae and Tortricidae (Lepidoptera) (ASKEW & BOUČEK, 1968).

Distribution: Palearctic.

Identification of species see: ASKEW & BOUČEK (1968), TRJAPITZIN (1978).

*Necremnus tidius* (WALKER, 1839)

Combinations and synonyms. *Eulophus tidius* WALKER, 1839: *Entedon cyrinus* GOU-REAU, 1851, *Eulophus hippia* WALKER, 1839, *Eulophus mamurius* WALKER, 1848, *Eulophus metanira* WALKER, 1839, *Eulophus zeugma* WALKER, 1839, *Necremnus duplicatus* GAHAN, 1941, *Necremnus tidius* (W.).

Material examined: 73 ♀♀, 22 ♂♂, Iran, Esfahan, on *Cephus pygmeus* L. (Hymenoptera, Cephidae), June 1992, leg. PIRHADI (19 ♀♀, 4 ♂♂, HMIM; 54 ♀♀, 18 ♂♂, ZISP); 1 ♀, 2 ♂♂, Lorestan, Abestan, on larvae of *Syringopais temperatella* LEDER (Lepidoptera, Deoclonidae), 5 May 1992, leg. PIRHADI (ZISP).

Biology: Parasitoid of *Apion* sp. (Coleoptera), *Psylliodes napi* FABRICIUS (Coleoptera, Chrysomelidae), *Phytomyza* sp. (Diptera, Agromyzidae) (ASKEW & BOUČEK 1968).

Distribution: Palearctic. This is a new record for the fauna of Iran.

### Genus *Pnigalio* SCHRANK

*Pnigalio* SCHRANK, 1802: 412. Type species: *Icheumon pectinicornis* LINNAEUS, 1758, by designation and monotypy.

Diagnosis: Propodeum with median carina and complete lateral plicae and transverse costula extending from each plica to median carina; face smooth and shining; mid lobe of mesoscutum with numerous setae. PMV 2.5 X as long as SV.

Biology: Ectoparasitoid of *Agromyza* sp., *Liriomyza* (Diptera), *Phyllonorycter* sp., *Phyllonocnistis* sp. and *Cameraria* sp. (Lepidoptera) (ASKEW & BOUČEK 1968).

Distribution: Cosmopolitan.

Identification of species see: ASKEW & BOUČEK (1968), TRJAPITZIN (1978).

*Pnigalio agraulis* (WALKER, 1839)

Combinations and synonyms. *Eulophus agraulis* WALKER, 1839: *Eulophus barbarus* FÖRSTER, 1841, *Eulophus populifoliellae* ERDÖS, 1954, *Pnigalio agraulis* (W.), *Pnigalio agraulis* (W.) (sic!), *Pnigalio agraulis* (W.) (sic!), *Pnigalio mediterraneus* FERRIER & DELUCCHI, 1957, *Pnigalio populifoliellae* (E.), *Spartiophilus orchestricida* RONDANI, 1877, *Tineophaga tischeriae* RONDANI, 1868.

Material examined: 5 ♀♀, 2 ♂♂, Iran, Khuzestan, Dezful, ex larvae *Phyllonocnistis citrella* STANTON (Lepidoptera, Gracillariidae), 13 April 1996, leg. MALEKZADEH; 8 ♀♀, 1 ♂, Iran, Esfahan, Kashan, Niasar, 15 km SW from Kashan, 33°58'N, 51°07'E, 1 June 2005, leg. YEFREMOVA (ZISP).

Biology: Ectoparasitoid of *Phyllonorycter* sp. (Lepidoptera, Gracillariidae), *Tischeria* sp. (Lepidoptera, Tischeriidae) (ASKEW & BOUČEK 1968; TRJAPITZIN 1978).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Pnigalio pectinicornis* (LINNAEUS, 1758)

Combinations and synonyms. *Icheumon pectinicornis* LINNAEUS, 1758: *Chalcis pectinicornis* (L.), *Cynipsichneumon pectinicornis* (L.), *Diplolepis pectinicornis* (L.), *Entedon pectinicornis* (L.), *Eulophus pectinicornis* (L.), *Eulophus pectinicornis viduus* (R.), *Eulo-*

*phus pectinicornis pilicornis* (R.), *Eulophus pennicornis* (LINNAEUS), *Eulophus pilicornis* RATZEBURG, 1844, *Eulophus plumicornis* FÖRSTER, 1841, *Eulophus subcutaneus* RATZEBURG, 1852, *Eulophus tarandicornis* FÖRSTER, 1841, *Eulophus viduus* RATZEBURG, 1844, *Haltichella pectinicornis* (L.), *Ichneumon aeneus ramicornis* RETZIUS, 1783, *Ichneumon fuscus ramicornis* RETZIUS, 1783, *Pnigalio coecilius* (WALKER, 1839), *Pnigalio lucumo* (WALKER, 1839), *Pnigalio pectinicornis* (L.).

Material examined: 1 ♀, Iran, Lorestan, Khoramabad, Abestan, ex larvae *Phyllonorycter corylifoliella* HAW., 9 July 1991, leg. SHEKARIAN (ZISP).

Biology: Ectoparasitoid of *Agromyza* sp., *Liriomyza*, (Diptera), *Phyllonorycter* sp. (Lepidoptera, Gracillariidae), *Leucoptera* sp. (Lepidoptera, Lyonetiidae), *Rhynchaenus* sp. (Coleoptera, Curculionidae) (ASKEW & BOUČEK 1968; HERTING 1975).

Distribution: Australian/Pacific, Palearctic (Europe).

*Pnigalio rotundiventris* (ERDÖS, 1954)

Combinations. *Eulophus rotundiventris* ERDÖS, 1954: *Pnigalio rotundiventris* (E.).

Material examined: 7 ♀♀, 2 ♂♂, Iran, Mazandaran, Sari, ex larvae *Phyllonorycter corylifoliella* HAW., 3 September 2004, leg. SADEGHI (ZISP).

Biology: Unknown.

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Pnigalio soemius* (WALKER, 1839)

Combinations and synonyms. *Eulophus soemius* WALKER, 1839: *Eulophus flavipes* ERDÖS, 1954, *Eulophus meriones* WALKER, 1839, *Eulophus nigroaeneus* ERDÖS, 1954, *Eulophus prothenor* WALKER, 1839, *Eulophus punctiscuta* THOMSON, 1878, *Pnigalio soemius* (W.), *Pnigalio nigroaeneus* (E.).

Material examined: 2 ♀♀, 2 ♂♂, Bushehr, 10 September 2004, leg. SADEGHI; 8 ♀♀, 11 ♂♂, Mazandaran, Sari, ex larvae *Phyllocnistis citrella* STANTON (Lepidoptera, Gracillariidae), 17 September 2004, leg. SADEGHI (ZISP).

Biology: Ectoparasitoid of *Agromyza* sp., *Liriomyza*, (Diptera), *Phyllonorycter* sp. (Lepidoptera, Gracillariidae), *Rhynchaenus* sp. (Coleoptera, Curculionidae) (ASKEW & BOUČEK 1968).

Distribution: Palearctic. This is a new record for the fauna of Iran.

### Genus *Rhiconopelte* FÖRSTER

*Rhiconopelte* FÖRSTER, 1878: 45. Type species: *Rhiconopelte fulviventris* FÖRSTER, 1878, by original designation and monotypy.

Diagnosis: Funicle 3-segmented, clava 2-segmented thick, funicle segments stalked. Eyes large. Scutellum surrounded by deep groove on both sides and on hind margin.

Biology: Hyperparasitoid of *Apanteles* sp. (Hymenoptera, Braconidae), *Scotia* sp. (Lepidoptera) (ASKEW & BOUČEK 1968).

Distribution: Afrotropical, Palearctic.

Identification of species see: ASKEW & BOUČEK (1968), TRJAPITZIN (1978).

*Rhiconopelte crassicornis* (NEES, 1834)

Combinations and synonyms. *Elachestus crassicornis* NEES, 1834: *Rhiconopelte crassicornis* (N.), *Rhiconopelte fulviventris* FÖRSTER, 1878.

Material examined: 7 ♀♀, 1 ♂, Iran, Gilan, Rezvanshahr, ex larvae *Hyphantria cunea* DRURY (Lepidoptera, Arctiidae), August 2002, leg. REZAI (HMIM, ZISP).

Biology: Gregarious ectoparasitoid of *Agrotis* sp., *Eugraphe sigma* DENIS & SCHIFFERMÜLLER (Lepidoptera) (ASKEW & BOUČEK 1968).

Distribution: Europe, Palearctic. This is a new record for the fauna of Iran.

### Genus *Stenomesius* WESTWOOD

*Stenomesius* WESTWOOD, 1833: 343. Type species: *Stenomesius pulchellus* WESTWOOD, 1833, designation by WESTWOOD 1839.

Diagnosis: Propodeum with a pair of strong median carinae well separated, bowed inwards and joined by a transverse carina (in H-shape of X-shape). Funicle 4-segmented, gaster elongate, first tergite short.

Biology: Ectoparasitoids of various leaf-miners of Lepidoptera as *Stigmella* sp. (Nepticulidae) (ASKEW & BOUČEK 1968; TRJAPITZIN 1978), *Phyllocnistis* and *Phyllonorycter* species (Lepidoptera, Gracillariidae) (NOYES 2006).

Distribution: Cosmopolitan.

Identification of species see: ASKEW & BOUČEK (1968), TRJAPITZIN (1978).

*Stenomesius rufescens* (RETZIUS, 1783)

Combinations and synonyms. *Ichneumon rufescens* RETZIUS, 1783: *Aphelinus nemoranae* (R.), *Cirrospilus acesius* WALKER, 1839, *Cirrospilus pulchellus* (W.), *Cleonymus rufescens* (R.), *Diplolepis rufescens* (R.), *Elachertus rufescens* (R.), *Elachistus rufescens* (R.), *Eulophus maculatus* (W.), *Eulophus rufescens* (R.), *Misina nemoranae* RONDANI, 1870, *Myina nemoranae* (R.), *Stenomesius maculatus* WESTWOOD, 1833, *Stenomesius pulchellus* WESTWOOD, 1833, *Stenomesius rufescens* (R.).

Material examined: 1 ♀, Hormozgan, Bandar-e Lengeh, ex larvae *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae), 11 April 2002, leg. AMERI (ZISP).

Biology: Ectoparasitoid of *Stigmella* and *Ectoedemia* species (Lepidoptera, Nepticulidae), *Cnephasia* sp. (Lepidoptera, Tortricidae) (ASKEW & BOUČEK 1968; HERTING 1975; TRJAPITZIN 1978).

Distribution: Nearctic, Palearctic. This is a new record for the fauna of Iran.

### Genus *Sympiesis* FÖRSTER

*Sympiesis* FÖRSTER, 1856: 74-76. Type species: *Eulophus sericeicornis* NEES, 1834, by original designation.

Diagnosis: Female with 4 funicular segments, male have branched antennae; body long, PMV 2.0 times as long as SV.

Biology: Solitary or gregarious ectoparasite of mainly lepidopterous larvae mining leaves and *Agromyza* sp. (Diptera, Agromyzidae) and hyperparasitoid of *Apanteles* sp. (Hymenoptera, Braconidae), *Heterarthrus* sp., *Fenusa* sp. (Hymenoptera, Tenthredinidae) (ASKEW & BOUČEK 1968).

Distribution: Cosmopolitan.

Identification of species see: ASKEW & BOUČEK (1968), TRJAPITZIN (1978), STOROZHEVA (1982).

*Sympiesis angustipennis* (ERDÖS, 1954)

Combinations. *Eulophus angustipennis* ERDÖS, 1954: *Sympiesis* (*Cladosympiesis*) *angustipennis* (E.), *Sympiesis angustipennis* (E.).

Material examined: 1 ♀, 1 ♂, Chaharmahal-Bakhtiari, Kuhrang, Hiregan, 2305 m 32°20'N, 50°26'E, 7 June 2005, leg. YEFREMOVA (ZISP).

Biology: Parasitoid of grass miners (ASKEW & BOUČEK 1968).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Sympiesis gordius* (WALKER, 1839)

Combinations and synonyms. *Eulophus gordius* WALKER, 1839: *Entedon padellae* (R.), *Eulophus alaparus* WALKER, 1839, *Eulophus bulmerincqii* RATZEBURG, 1848, *Eulophus cervicornis* FÖRSTER, 1841, *Eulophus laevissimus* RATZEBURG, 1848, *Eulophus padellae* RATZEBURG, 1844, *Eulophus pisenor* WALKER, 1839, *Eulophus stramineipes* THOMSON, 1878, *Pnigalio stramineipes* (T.), *Sympiesis gordius* (W.).

Material examined: 1 ♀, Esfahan, Niasar, 15 km SW from Kashan, 33°58'N, 51°07'E, 1 June 2005, leg. YEFREMOVA (ZISP).

Biology: Parasitoid of *Phyllonorycter* sp., *Caloptilia* sp. (Lepidoptera, Gracillariidae), *Phyllocnistis* sp. (Lepidoptera, Phyllocnistidae), *Grizelda* sp. (Lepidoptera, Tortricidae); secondary parasitoid of *Apanteles* sp. (Braconidae), *Achrysocharoides* sp. (Eulophinae) (ASKEW & BOUČEK 1968).

Distribution: Nearctic and Palearctic regions.

*Sympiesis gregori* BOUČEK, 1959

Combinations and synonyms. *Sympiesis gregori* BOUČEK, 1959: *Sympiesis* (*Cladosympiesis*) *gregori* B., *Sympiesis* (*Cladosympiesis*) *linifoliellae* DELUCCHI, 1962.

Material examined: 1 ♀, Esfahan, Niasar, 15 km SW from Kashan, 33°58'N, 51°07'E, 1 June 2005, leg. YEFREMOVA; 2 ♀♀, 1 ♂, Lorestan, Khoramabad, Abestan, ex larvae *Phyllonorycter corylifoliella* HAW. (Lepidoptera, Gracillariidae), 9 July 1991, leg. SHEKARIAN (reared together with *Chelonus* sp., Braconidae, det. S. BELOKOBILSKY 2006) (ZISP).

Biology: Parasite of *Phyllonorycter* sp., *Aspilapteryx* sp., *Dialectica* sp. (Lepidoptera, Gracillariidae), *Ectoedemia* sp. (Lepidoptera, Nepticulidae) (ASKEW & BOUČEK 1968).

Distribution: Palearctic. This is a new record for the fauna of Iran.

### Genus *Zagrammosoma* ASHMEAD

*Zagrammosoma* ASHMEAD, 1904: 354. Type species: *Hippocephalus multilineatum* ASHMEAD, 1888, by original designation.

Diagnosis: Funicle 2-segmented in both sexes. Vaulted vertex in live specimens. Notaular grooves curving out to the narrow axillae and not reaching scuto-scutellar suture; scutellum with two sublateral grooves. Body often yellow with pattern of dark longitudinal lines.

Biology: Ectoparasitoid that attacks a number of mainly lepidopterous and dipterous leaf-miners (ASKEW & BOUČEK 1968).

Distribution: Cosmopolitan.

Identification of species see: ASKEW & BOUČEK (1968), TRJAPITZIN (1978), BOUČEK (1988).

*Zagrammosoma talitzkii* (BOUČEK, 1961)

Combinations. *Cirrospilus talitzkii* BOUČEK, 1961: *Cirrospilus (Zagrammosoma) talitzkii* B., *Zagrammosoma talitzkii* (B.).

Material examined: 2 ♀♀, 1 ♂, Azarbaijan-e Sharghi, Marand, ex larvae *Leucoptera scitella* ZELL., 11 April 1995, leg. JAFARZADAH (ZISP).

Biology: Parasitoid of *Phyllonorycter* sp. (Lepidoptera, Gracillariidae), *Holocacista* sp. (Lepidoptera, Heliozelidae), *Leucoptera* sp. (Lepidoptera, Leucopteriidae) (BOUČEK 1965; YEFREMOVA 1995).

Distribution: Palearctic. This is a new record for the fauna of Iran.

### Subfamily Entedoninae

Notauli not complete, deep and curved; face very often with frontal grooves; scutellum with 1 pair of setae; submarginal vein with 2 setae; mesoscutal midlobe with 2 pairs of setae; male scape with sensory pores on ventral edge; propodeum with a subspiracular tubercle; marginal vein relatively long; stigmal vein relatively short.

The Entedoninae are principally solitary or gregarious primary or secondary endoparasites of concealed larvae. The species could attack beetles, parasitize lepidopterous, dipterous and hymenopterous leaf-miners. A few species appear to have become specialized as hyperparasitoids.

### Genus *Chrysocharis* FÖRSTER

*Chrysocharis* FÖRSTER, 1856: 152. Type species: *Chrysocharis femoralis* FÖRSTER, 1861, by original designation and monotypy.

Diagnosis: Funicle usually with 3 funicle segments and distinct clava; third anellus enlarged and triangular. Antennal scape less than 7 times as long as wide.

Biology: Parasite of many Diptera (Agromyzidae: *Phytomyza* sp. and Cecidomyiidae) and Lepidoptera (*Phyllonorycter* sp., *Cameraria* sp., *Perileucoptera* sp.) (ASKEW & BOUČEK 1968; HANSSON 1985).

Distribution: Cosmopolitan.

Identification of species see: ASKEW & BOUČEK (1968), TRJAPITZIN (1978), HANSSON (1985).

*Chrysocharis amyite* (WALKER, 1839)

Combinations and synonyms. *Entedon amyite* WALKER, 1839: *Chrysocharis amyite* (W.), *Chrysocharis seiugata* DELUCCHI, 1954, *Chrysocharis (Chrysocharis) seiugata* D., *Chrysocharis seiuncta* DELUCCHI, 1954, *Chrysocharis (Chrysocharis) seiuncta* D., *Chrysocharis sejuncta* D. (sic!), *Derostenus filicornis* THOMSON, 1878.

Material examined: 2 ♀♀, Iran, Esfahan, Niasar, 15 km SW from Kashan, 33°58'N, 51°07'E, 1 June 2005, leg. YEFREMOVA (ZISP).

Biology: Endoparasitoid of *Liriomyza* sp., *Phytomyza* sp., *Phytobia* sp. (Diptera, Agromyzidae) (TRJAPITZIN 1978).

Distribution: Nearctic and Palearctic regions. This is a new record for the fauna of Iran.



### Genus *Closterocerus* WESTWOOD

*Closterocerus* WESTWOOD, 1833: 414. Type species: *Closterocerus trifasciatus* WESTWOOD, 1833, by designation and monotypy.

Diagnosis: Mesopleuron with transepimeral sulcus weakly curved or straight. Fore wing usually with a single line of setae extending apically from stigma. Funicle with capitate big sensillae rounded apically (mushroom shaped) (sensilla visible only in slide).

Biology: Parasitoid of *Agromyza* sp. (Diptera, Agromyzidae), *Phyllonorycter* sp., *Phyllocnistis* sp., *Coleophora* sp., *Cameraria* sp., *Leucoptera* sp. (Lepidoptera) and *Diprion pini* L. (Hymenoptera) (ASKEW & BOUČEK 1968; BENE 1989).

Distribution: Neotropical, Oriental and Palearctic.

Identification of species see: ASKEW & BOUČEK (1968), TRJAPITZIN (1978).

*Closterocerus formosus* WESTWOOD, 1833

Combinations and synonyms. *Closterocerus formosus* WESTWOOD, 1833: *Achrysocharis camilli* GIRAULT, 1917, *Achrysocharella formosa* (W.), *Achrysocharis formosa* (W.), *Chrysonotomyia formosa* (W.), *Chrysonotomyia (Achrysocharella) formosa* (W.), *Entedon formosus* (W.), *Neochrysocharis formosa* (W.).

Material examined: 37 ♀♀, 17 ♂♂, Iran, Tehran, Varamin, ex larvae of *Liriomyza trifolii* BURGESS (Diptera, Agromyzidae), 3 August 1999, leg. FAROKHI; 9 ♀♀, 3 ♂♂, Esfahan, Niasar, 15 km SW from Kashan, 33°58'N, 51°07'E, 1 June 2005, leg. YEFREMOVA; 5 ♀♀, 3 ♂♂, Tehran, Varamin, ex larvae of *Liriomyza strigata* MEIGEN (det. V. ZLOBIN), 1 August 1997, leg. FAROKHI; 11 ♀♀, 4 ♂♂, Tehran, Varamin, ex *Liriomyza trifolii* BURGESS, 20 July 1999, leg. FAROKHI; 1 ♀, Baluchestan, Iranshahr, ex *Phyllocnistis citrella* STANTON, August 2002, leg. MOTAMEDINIA; 7 ♀♀, 4 ♂♂, Azarbaijan-e Sharghi, Marand, ex larvae of *Leucoptera scitella* (Lep.) 10 June 1995, leg. JAFARZADEH (ZISP).

Biology: Solitary larval endoparasitoid of lepidopterous and dipterous leaf-miners (*Liriomyza* species) (SCHREINER, NAFUS & BJORK 1986; LASALLE & PARELLA 1991; SAITO, IKEDA & OZAWA 1996; NEALE et al. 1995; DUCA, MASSA & RIZZO 2002).

Distribution: Cosmopolitan.

### Genus *Pediobius* WALKER

*Pediobius* WALKER, 1846: 184. Type species: *Entedon imbreus* WALKER, 1846, designation by ASHMEAD 1904.

Diagnosis: Propodeum medially with 2 subparallel carinae diverging posteriorly and with distinct plicae. Frontofacial sutures distinct, petiole in most species with ventrally pointed extension.

Biology: Parasitoid of *Phytomyza* sp. (Diptera), *Lymantria* sp., *Phyllonorycter* sp. (Lepidoptera) (ASKEW 1963; BOUČEK 1965; ASKEW & BOUČEK 1968; KHAN & SHAFEE 1983).

Distribution: Cosmopolitan.

Identification of species: Keys to species of *Pediobius* are published by ASKEW & BOUČEK (1968), TRJAPITZIN (1978).

*Pediobius cassidae* ERDŐS, 1951

Material examined: 1 ♀, Iran, Chaharmahal-Bakhtiari, Kuhrang, Hiregan, 2305 m

32°20'N, 50°26'E, 7 June 2005, leg. YEFREMOVA (ZISP).

Biology: Parasitoid of *Archips* sp., *Tortrix* sp. (Lepidoptera, Tortricidae), *Cassida* sp. (Coleoptera, Chrysomelidae), *Leiodus* sp. (Coleoptera, Cerambycidae) and hyperparasitoid of Ichneumonidae and Braconidae (Hymenoptera) (ASKEW & BOUČEK 1968).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Pediobius crassicornis* (THOMSON, 1878)

Combinations and synonyms. *Pleurotropis crassicornis* THOMSON, 1878: *Asecodes albitarsis* ASHMEAD, 1888, *Asecodes crassicornis* (T.), *Holcopelte tarsalis* ASHMEAD, 1894, *Horismenus tarsalis* (A.), *Pediobius crassicornis* (T.), *Pediobius howardi* (C.), *Pediobius tarsalis* (A.), *Pleurotropis albitarsis* (A.), *Pleurotropis ashmeadi* CRAWFORD, 1912, *Pleurotropis howardi* CRAWFORD, 1910, *Pleurotropis tarsalis* (A.).

Material examined: 1 ♀, Iran, Bushehr, ex larvae *Philocnistis citrella* STANTON (Lepidoptera, Gracillariidae), 10 September 2004, leg. SADEGHI (ZISP).

Biology: Parasite of *Tortrix* sp., *Archips* sp. (Lepidoptera, Tortricidae), *Tenthredo* sp. (Hymenoptera, Tenthredinidae), hyperparasite of *Eulophus* sp. (Hymenoptera, Eulophidae) and *Glyptapanteles* sp. (Hymenoptera, Braconidae) (ASKEW & BOUČEK 1968).

Distribution: Nearctic, Palearctic. This is a new record for the fauna of Iran.

*Pediobius italicus* BOUČEK, 1968

Material examined: 3 ♀♀, 1 ♂, Fars, Jahrom, ex larvae *Philocnistis citrella* STANTON (Lepidoptera, Gracillariidae), 2 June 1995, leg. KOLAHI (ZISP).

Biology: Parasitoid of *Acrocercops* sp., *Spulerma* sp. (Lepidoptera, Gracillariidae) (ASKEW & BOUČEK 1968).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Pediobius lysis* (WALKER, 1839)

Combinations and synonyms. *Entedon lysis* WALKER, 1839: *Cynips albitarsis* FONSCOLOMBE, 1840, *Diplolepis albitarsis* (F.), *Elachestus cyniphidum* RATZEBURG, 1848, *Entedon corytus* WALKER, 1839, *Entedon sosarmus* WALKER, 1839, *Pediobius lysis* (W.), *Pleurotropis cribrifrons* THOMSON, 1878, *Pleurotropis cyniphidum* (R.), *Pleurotropis naso* ERDŐS, 1951.

Material examined: 4 ♀♀, Golestan, Gorgan, Nowdeh, 15 June 1999, leg. AHMADI ex larvae of *Galerucella lineola* GYLLENHAL (Coleoptera, Chrysomelidae); 5 ♀♀, Golestan, Kordkuy, Deraznow, ex larvae of *Galerucella lineola* GYLLENHAL (Coleoptera, Chrysomelidae), 3 July 1999, leg. AHMADI (ZISP).

Biology: Parasitoid of *Andricus* sp., *Neuroterus* sp., *Trigonaspis* sp. (Hymenoptera, Cynipidae), *Phyllonorycter* sp. (Lepidoptera, Gracillariidae) (ASKEW & BOUČEK 1968).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Pediobius pyrgo* (WALKER, 1839)

Combinations and synonyms. *Entedon pyrgo* WALKER, 1839: *Derostenus nawai* ASHMEAD, 1904, *Elachestus complaniusculus* RATZEBURG, 1852, *Eulophus pyralidum* AUDOUIN, 1842, *Pediobius nawai* (A.), *Pediobius pyrgo* (W.), *Pleurotropis complaniuscula* (R.), *Pleurotropis nawai* (A.), *Pleurotropis (Rhopalotus) substrigosa* THOMSON, 1878, *Rhopalotus chalcidiphagus* SZELENYI, 1957, *Rhopalotus substrigosus* (T.).

Material examined: 4 ♀♀, 1 ♂, Kerman, Jiroft, ex larvae of *Philocnistis citrella* STAIN-

TON, August 2003, NAMVAR; 1 ♀, Kerman, Dehbakri, ex *Ocneria terebenthina* STGR. (Lep., Lymantriidae), August 2003, leg. ABAII; 2 ♀♀, 2 ♂♂, Iran, Bushehr, ex larvae *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae), 10 September 2004, leg. SADEGHI (HMIM; ZISP).

Biology: Larval/pupal parasitoid of *Tortrix* sp., *Archips* sp. (Lepidoptera, Tortricidae), *Phyllonorycter* sp. (Lepidoptera, Gracillariidae), *Yponomeuta* sp. (Lepidoptera, Yponomeutidae), *Biorhiza* sp. (Hymenoptera, Cynipidae), *Apanteles* sp. (Hymenoptera, Braconidae), *Cyclogastrella* sp. (Hymenoptera, Pteromalidae) (ASKEW & BOUČEK 1968).

Distribution: Europe, Nearctic, Oriental and Palearctic. This is a new record for the fauna of Iran.

*Pediobius saulius* (WALKER, 1839)

Combinations and synonyms. *Entedon saulius* WALKER, 1839: *Elachertus obscuripes* (R.), *Elachestus obscuripes* (R.), *Entedon linus* WALKER, 1839, *Eulophus obscuripes* RATZEBURG, 1844, *Pediobius grandii* FERRIERE, 1954, *Pediobius linus* (W.), *Pediobius saulius* (W.), *Pleurotropis obscuripes laeta* ERDÖS, 1956, *Pleurotropis obscuripes* (R.), *Pleurotropis strigiscuta* THOMSON, 1878.

Material examined: 1 ♀, Iran, Chaharmahal-Bakhtiari, Kuhrang, Hiregan, 2305 m 32°20'N, 50°26'E, 7 June 2005, leg. YEFREMOVA (ZISP).

Biology: Parasitoid of *Phyllonorycter* sp., *Phyllocnistis* sp., *Tischeria* sp. (Lepidoptera) (ASKEW 1963; ASKEW & BOUČEK 1968), hyperparasitoid of *Apanteles* sp. (Hymenoptera, Braconidae), *Sympiesis* sp. (Hymenoptera, Eulophidae) (TRJAPITZIN 1978).

Distribution: Palearctic. This is a new record for the fauna of Iran.

### Subfamily Tetrastichinae

Diagnosis: Submarginal vein not smoothly joining to parastigma, postmarginal vein absent. Scutellum with submedian and sublateral lines; female funicle with three segments, male funicle with four often with whorled setae.

Tetrastichinae are usually primary endoparasitoids of the eggs, larvae or pupae of Diptera, Hymenoptera or Lepidoptera. A number of species develop as ectoparasitoids or as facultative or obligate hyperparasitoids.

### Genus *Aprostocetus* WESTWOOD

*Aprostocetus* WESTWOOD, 1833: 443-445. Type species: *Aprostocetus caudatus* WESTWOOD, 1833, by designation and monotypy.

Diagnosis: Female: antennal funicle with all segments longer than host broad; meso-scutum with median line or without median line, with one and two rows of adnotaular setae, rarely with 3 rows. Scutellum normally with 2 pairs of setae; submedian lines usually distinct. Male: antennal funicle with 4 segments; funicle and clava with whorled long dark setae, scape with ventral plague.

Biology: Ectoparasitoids of Chrysomeliidae, Coccinellidae, Curculionidae (Coleoptera), Agromyzidae, Ceccidomyiidae, Tephritidae (Diptera), Coccidae (Homoptera), Cynipidae, Eulophidae (Hymenoptera), *Phyllocnistis* sp. (Lepidoptera) (GRAHAM, 1987).

Distribution: Cosmopolitan.

Identification: A key for identification of European species of *Aprostocetus* was given

by GRAHAM (1987). The identification of *Aprostocetus* spp. is very difficult in the unknown Iranian fauna, and it does not allow the user to identify a species reliably. The present key includes only 9 species although this genus contains numerous species. We realize that we need to study all species and describe the new ones of *Aprostocetus* from Iran before we write a complete key for the species in Iran.

Preliminary key to the species of *Aprostocetus* from Iran

(Females)

- |   |  |                                   |
|---|--|-----------------------------------|
| 1 | Ovipositor sheaths far exerted   | 2                                 |
| - | Ovipositor sheaths slightly exerted  | 4                                 |
| 2 | Cilia on forewing very short about 0.13 length of SV   | <i>A. beyazus</i> DOGANLAR        |
| - | Cilia on forewing normal   | 3                                 |
| 3 | PMV a short stub, funicular segments at least twice as long as broad   | <i>A. bucculentus</i> (KOSTJUKOV) |
| - | PMV a stub 0.3-0.5 length of SV, funicular segments less than twice as long as broad   | 5                                 |
| 4 | Cercal setae a little longer than the next longest seta, curved, pale  | <i>A. venustus</i> (GAHAN)        |
| - | Cercal setae 1.3-2.0 times as long as the next long seta, sinuate in middle part, dark   | <i>A. zosimus</i> (WALKER)        |
| 5 | Callus with 3-4 setae  | <i>A. neglectus</i> (DOMENICHINI) |
| - | Callus with 2 setae  | 6                                 |
| 6 | Thorax 1.3-1.4 times as long as broad  | <i>A. forsteri</i> (WALKER)       |
| - | Thorax 1.5-1.7 times as long as broad  | 7                                 |
| 7 | Pedicel plus all segments of funicle 1.3 times as long as mesoscutum   | <i>A. lachares</i> (WALKER)       |
| - | Pedicel plus all segments of funicle as long as mesoscutum   | 8                                 |
| 8 | Last tergite slightly longer than broad, the longest cercal seta 2.0 times as the next, kinked (Note: this species is unknown in Iran. It is included in the key for comparative purposes) | <i>A. balasi</i> (ERDÖS)          |
| - | Last tergite 1.4 X as broad as long; the longest cercal seta 1.5 times as the next, straight   | <i>A. persicus</i> sp. nov.       |

*Aprostocetus bucculentus* KOSTJUKOV, 1978

Combinations *Tetrastichus* (*Eutetrastichus*) *bucculentus* KOSTJUKOV, 1978: *Aprostocetus* (*Aprostocetus*) *bucculentus* (K.).

Material examined: 1 ♀, Iran, Chaharmahal-Bakhtiari, Kuhrang, Hiregan, 2305 m 32°20'N, 50°26'E, 7 June 2005, leg. YEFREMOVA (ZISP).

Biology: Parasitoid of *Eurytoma amygdali* ENDERLEIN, 1907 (Hymenoptera, Eurytomidae) (GRAHAM 1987; KOSTJUKOV 1978).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Aprostocetus forsteri* (WALKER, 1847)

Combinations. *Eulophus forsteri* WALKER, 1847: *Aprostocetus forsteri* (W.), *Aprostocetus* (*Aprostocetus*) *forsteri* (W.), *Tetrastichus forsteri* (W.).

Material examined: 8 ♀♀, Iran, Tehran, Karaj, ex larvae on larvae of *Cephus pygmaeus* L. (Hymenoptera, Cephidae), 13 March 1993, leg. GHADIRI (ZISP).

Biology: Parasitoid of *Aylax jaceae* SCHENCK (Hymenoptera, Cynipidae) (GRAHAM, 1978), *Aylax salviae* GIRAUD (Hymenoptera, Cynipidae) (DOMENICHINI 1964).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Aprostocetus lachares* (WALKER, 1839)

Combinations. *Cirrospilus lachares* WALKER, 1839: *Aprostocetus* (*Aprostocetus*) *lachares* (W.), *Aprostocetus lachares* (W.), *Tetrastichus lachares* (W.).

Material examined: 1 ♀, Esfahan, Kashan, Niasar, 15 km SW from Kashan, 33°58'N, 51°07'E, 1 June 2005, leg. YEFREMOVA; 1 ♀, Chaharmahal-Bakhtiari, Kuhrang, Hiregan, 2305 m 32°20'N, 50°26'E, 7 June 2005, leg. YEFREMOVA (ZISP).

Biology: Unknown.

Distribution: Palearctic.

### ***Aprostocetus persicus* YEFREMOVA & YEGORENKOVA sp. nov.** (Figs 5-8)

Holotype: ♀, Iran, Hormozgan, Minab, 100 m., ex *Bactrocera zonata* (SAUNDERS) on *Mango* sp., 19 November 1992, leg. Majid ASKARI (ZISP).

Paratypes: 32 ♀♀ and 35 ♂♂ with the same label data as holotype (5 ♀♀, 5 ♂♂, BMNH; 12 ♀♀, 15 ♂♂, ZISP; 5 ♀♀, 5 ♂♂, HMIM).

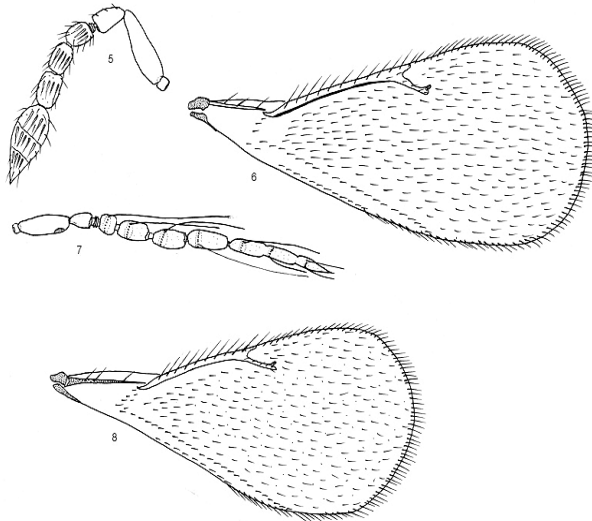
Diagnosis: Female: Antennal clava of both sexes with long apical longitudinal sensilla. Female antenna with 3 laminar anelli, funicle with three segments. Fore wings 2.1 - 2.3 x as long as broad. Speculum very small. SMV with 3 setae. Propodeum with distinct median carina. Callus with 2 long setae. Male: Antenna with 4 funicular segments with whorled long setae. Whorled setae of F1 reaching half of F4, whorls of F2 reaching base of clava. Scape with ventral plaque about 0.20 length of scape and placed in its proximal part.

Description. ♀ (Figs 5, 6): Body length 1.15 mm, fore wings 1.05 mm.

Body yellow-sandy, vertex and area surrounded foramen brown. Eye scarlet, ocellii red. Antennal funicle yellow (except dorsal brownish scape). Clypeus brownish, mandibles brown. Venation yellow. Fore wing hyaline. Legs yellow-sandy. Gaster yellow-sandy with transverse brown stripes.

Head height 14, head breadth 16. Face smooth. Eyes bare. Malar space with straight malar sulcus. Toruli placed in level of the lower margin of eyes. Antenna (Fig.5) with scape (10.2 x 3.2 m), pedicel (4.7) and 3 laminar anelli. Funicle with three segments (F1 4.1 x 2.7, F2 4.2 x 3, F3 4.6 x 2.8), clava 3-segmented (10.8 x 4.6 µm).

Mesosoma. Pronotum short, finely granulate. Posterior margin of pronotum with numerous short light setae. Mesoscutum (10 x 11.3 µm) smooth and shiny, with median carina and 6 pairs yellow setae near notauli. Scutellum (7.7 x 9.8 µm) smooth, with sub-lateral and two submedian lines, the latter near to sublateral lines than each to other and with 2 setae. First pair's setae are placed in middle part of scutellum the second one to near hind margin. Dorsellum rounded. Propodeum (2.0 x 9.7 µm) with distinct median carina. Spiracle with paraspiracular carina. Callus with 2 long setae. Fore wings (Fig.6) (42 x 17.1 µm), 2.46 X as long as broad. Speculum very small. SMV with 3 setae. Relative measurements: costal cell: SMV: MV: SV = 16: 12: 24: 7.2. PMV a very short stub. Hind wing rounded. Tibial spurs on mid and hind legs present. Metasoma. Gaster (25 x 17 µm), 1.5 X as long as broad, 1.1 times as long as thorax. Apex of gaster rounded. The longest cercal setae straight and 1.5 times as long as the other two. Sheaths of ovipositor slightly extended.



Figs 5-8. *Aprostocetus persicus* YEFREMOVA & YEGORENKOVA sp. nov. ♀ holotype and ♂ paratype: 5. right antenna, female; 6. left forewing, female; 7 right antenna, male; 8. left forewing, male.

♂ (Figs 7, 8): Length 0.85 mm.

Body yellow-sandy almost the same as female but antennae yellow. Whorled seta on antenna brownish. Antenna (Fig.7) with 4 funicular segments with whorled long setae. Whorled setae of F1 reaching base of F4, whorls of F2 reaching about to tip of F4, whorls of F3 reaching base of clava, whorls of F4 reaching half of C3. Scape with ventral plaque about 0.20 length of scape and placed in its proximal part. Relative measurements: scape (10.1 x 3.4 µm), pedicel (4.5), anelli 2, F1 (3.0 x 3.0 µm), F2 (5.6 x 2.8 µm), F3 (5.8 x 2.8 µm), F4 (7.8 x 2.4 µm), clava 3-segmented (19.7 x 2.2 µm). Last claval segment with long terminal sensilla. Fore wing (Fig.8) (37.0 x 15.4 µm), 2.4 times as long as broad. Hind wing acute. SMV with 3 setae. Speculum almost absent. Costal cell: SMV: MV: SV = 17: 13.8: 16: 6.4. PMV a very short stub. Gaster (15.6 x 11.7 µm) 1.3 times as long as broad.

Variation: Length of body of paratypes 1.00 - 1.50 mm female. The colour of body from yellow-sandy to pale brown and colour of antennae vary from yellow to brownish. Male. 3-4 setae on SMV. Colour of gaster vary from yellow-sandy to brownish of 5, 6 and 7 tergites. Colour of whorls vary from yellow to brown. Size varies from 0.5 to 1.1 mm.

Host: The new species is parasitoid of *Bactrocera zonata* SAUNDERS (Diptera, Tephritidae).

Distribution: Iran.

Comments: The males are included in the type series because they were reared from the same host.

The new species is very similar to *Aprostocetus balasi* (ERDÖS, ???) that was described

from Hungary. It differs from *A. balasi* by the presence of the straight malar sulcus (curved malar sulcus in *A. balasi*). The gaster is oval (lanceolate in *A. balasi*); the last tergite is 1.4 times as broad as long (slightly longer than broad in *A. balasi*). The female gaster is 1.5 times as long as broad (2.7 - 4.0 times as long as broad in *A. balasi*). F1 is 1.6 times as long as broad (1.8 - 2.5 times as long as broad in *A. balasi*). The longest cercal seta is 1.5 times as long as the next and straight one (2 times as long as the next one and kinked in *A. balasi*). Whorls of F4 reaching to base of C3 (whorls of F4 reaching half to C3 in *A. balasi*). Plaque about 0.20 length of scape in *A. persicus* (about 0.25 length in *A. balasi*). Body *A. persicus* yellow-sandy (yellowish-brownish in *A. balasi*).

Etymology: The species name *persicus* refers to the ancient name of Iran (Persia), where the specimens were reared.

*Aprostocetus venustus* (GAHAN, 1914)

Combinations and synonyms. *Tetrastichus venustus* GAHAN, 1914: *Aprostocetus* (*Aprostocetus*) *venustus* (G.), *Aprostocetus venustus* (G.), *Tetrastichus aneurytus* ERDÖS, 1969.

Material examined: 1 ♀, Iran, Sistan-Baluchestan, Nikshar, ex larva of *Contarinia tritici* KIRBY (Diptera, Cecidomyiidae) on *Mango*, 3 May 1993, leg. TEYMURI (ZISP).

Biology: Parasitoid of *Bruchophagus gibbus* BOHEMAN, *B. roddi* GUSSAKOVSKI (Hymenoptera, Eurytomidae) (PECK 1963; ERDÖS 1968, 1971; GRAHAM 1978), *Contarinia sorghicola* COQUILLET (Diptera, Cecidomyiidae) (WISEMAN, GRASS & McMILLIAN 1978).

Distribution: Nearctic and Palearctic. This is a new record for the fauna of Iran.

### Genus *Baryscapus* FÖRSTER

*Baryscapus* FÖRSTER, 1856: 84. Type species: *Baryscapus centricolae* ASHMEAD, 1887 (subsequent monotypy). Type species of *Baryscapus* has been discussed by LASALLE & GRAHAM (1990).

Diagnosis: Body and tegula dark, varying from black to bright metallic blue or green. Propodeal spiracle with its whole rim exposed. Cercal setae subequal in length. Malar sulcus usually distinctly curved. SMV with 2 or more dorsal setae. Midlobe of mesoscutum often with more than a single row of adnotaular setae. Male funicle and clava often without whorls of long, dark setae; when present these whorls are relatively short.

Biology: Parasitoid of Lepidoptera, Hymenoptera, Coleoptera, Diptera (Tephritidae), rarely Neuroptera and Coccoidea. Hyperparasitoid of Ichneumonidae, Braconidae, Cynipoidea and Chalcidoidea (GRAHAM, 1991)

Distribution: Nearctic, Palearctic.

Identification of species see: GRAHAM (1991).

*Baryscapus conwentziae* (FERRIÈRE, 1959)

Combinations. *Tetrastichus conwentziae* FERRIÈRE, 1959: *Aprostocetus conwentziae* (F.), *Baryscapus conwentziae* (F.).

Material examined: 4 ♀♀, Iran, Sistan-Baluchestan, Iranshahr, ex *Phyllocnistis citrella* STANTON, July 2002, leg. MOTAMEDINIA (ZISP).

Biology: Parasitoid of *Conwentzia pineticola* ENDERLEIN (Neuroptera, Coniopterygidae) (DOMENICHINI 1964; GRAHAM 1991; HERTING 1978; KOSTJUKOV 1978; SELLER 1962), *Conwentzia psociformis* CURTIS (Neuroptera, Coniopterygidae) (AGEKYAN 1975).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Baryscapus endemus* (WALKER, 1839)

Combinations and synonyms. *Cirrospilus endemus* WALKER, 1839: *Aprostocetus encyrti* (F.), *Aprostocetus orchestidis* (B.), *Baryscapus endemus* (W.), *Eutetrastichus endemus* (W.), *Eutetrastichus orchestidis* (B.), *Geniocerus orchestidis* (B.), *Geniocerus tibialis* KURDJUMOV, 1913, *Tetrastichus cioni* ERDŐS, 1971, *Tetrastichus decius* WALKER, 1863, *Tetrastichus encyrti* FERRIERE, 1926, *Tetrastichus endemus* (W.), *Tetrastichus femoralis* ERDŐS, 1971, *Tetrastichus femoralis* (E.), *Tetrastichus orchestidis* BUKOVSKI, 1938, *Tetrastichus tibialis* (K.).

Material examined: 3 ♀♀, Baluchestan, Iranshahr, ex *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae), July 2002, leg. MOTAMEDINIA (ZISP).

Biology: Hyperparasitoid of Hymenoptera (Braconidae, Chalcidoidea, Eulophidae, Eurytomidae, Pteromalidae) and parasitoid of Lepidoptera (Tortricidae, Coleophoridae, Oecophoridae, Noctuidae, Heterogynidae, Geometridae, Tortricidae), Coleoptera (Curculionidae) (GRAHAM 1991; RANDALL 1982; THOMPSON 1955).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Baryscapus evonymellae* (BOUCHÉ, 1834)

Combinations and synonyms. *Eulophus evonymellae* BOUCHÉ, 1834: *Aprostocetus evonymellae* (B.), *Baryscapus evonymellae* (B.), *Entedon cribrellae* RONDANI, 1877, *Eutetrastichus evonymellae* (B.), *Geniocerus evonymellae* (B.), *Tetrastichus evonymellae* (B.).

Material examined: 8 ♀♀, 4 ♂♂, Sepidan Fars, ex larva *Yponomeuta malinella* ZELLER (Lepidoptera, Yponomeutidae), 1 June 1997, leg. HESAMI (5 ♀♀, 1 ♂, HMIM; 3 ♀♀, ZISP); 1 ♀, Ghaemshahr, by sweeping, 15 October 2002, leg. HESAMI; 6 ♂♂, Tang-Tizab, Sepidan Fars, ex larva *Yponomeuta rorrella* HBN., 10 July 2004, leg. HESAMI (3 ♂♂, HMIM; 3 ♂♂, ZISP); 7 ♀♀, Saadat, Shahr Fars, ex larvae gall of *Astragalus meridionalis*, September 2002, leg. HESAMI (7 ♀♀, ZISP).

Biology: Endoparasitoid of *Diadegma armillatum* GRAVENHORST and *Mesochorus confusus* HOLMGREN (Hymenoptera, Ichneumonidae) (DOMENICHINI 1964; KOSTJUKOV 1978; GRAHAM, 1991), *Diplolepis spinosa* GILLETTE (Hymenoptera, Cynipidae), *Leucoptera spartifoliella* HUEBNER (Lepidoptera, Lyonetiidae) (FRICK 1964; PARKER 1964; LASALLE 1994), *Yponomeuta* sp. (Lepidoptera, Yponomeutidae) (MICTULSKI & ANASIEWICZ 1976; THOMPSON 1955; HERTING 1975; GRAHAM 1991).

Distribution: Nearctic and Palearctic.

*Baryscapus hylesini* GRAHAM, 1991

Material examined: 10 ♀♀, Iran, Esfahan, Kashan, Niasar, 15 km SW from Kashan, 33°58'N, 51°07'E, 1 June 2005, leg. YEFREMOVA (ZISP, HMIM).

Biology: Larval parasitoid of *Agrilus suvorovi populneus* SCHAEF. (Coleoptera, Buprestidae), *Hylesinus fraxini* PANZER (Coleoptera, Curculionidae) (GRAHAM 1991).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Baryscapus nigroviolaceus* (NEES, 1834)

Combinations and synonyms. *Eulophus nigroviolaceus* NEES, 1834: *Baryscapus amethystinus* (R.), *Baryscapus nigroviolaceus* (N.), *Entedon amethystinus* RATZEBURG, 1848, *Entedon antisipilae* RONDANI, 1877, *Euterastichus amethystinus* (R.) (sic!), *Eutetrastichus amethystinus* (R.), *Geniocerus amethystinus* (R.), *Tetrastichus amethystinus* (R.).

Material examined: 2 ♀♀, 1 ♂, Khorasan, Mashad, ex pupae of *Hypera postica* FABRI-



CIUS (Coleoptera, Curculionidae), July 1994, leg. EBRAHIMI (ZISP).

Biology: Endoparasitoid of *Argyresthia fundella* FISCHER (Lepidoptera, Argyresthiidae), *Holocacista rivillei* STAINTON (Lepidoptera, Heliozelidae), *Lyonetia clerkella* (L.) (Lepidoptera, Lyonetiidae), *Phyllonorycter* sp. (Lepidoptera, Gracillariidae) (GRAHAM, 1991; GIBOGINI, ALMA & ARZONE 1996), *Rhynchaenus quercus* (L.) (Coleoptera, Curculionidae) (GRAHAM, 1991).

Distribution: Palearctic. This is a new record for the fauna of Iran.

*Baryscapus oophagus* (OTTEN, 1942)

Combinations. *Tetrastichus oophagus* OTTEN, 1942: *Baryscapus oophagus* (O.), *Eute-trastichus oophagus* (O.).

Material examined: 15 ♀♀, 8 ♂♂, Iran, Sistan-Baluchestan, Iranshahr, ex *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae), July 2003, leg. MOTAMEDINIA (ZISP, HMIM).

Biology: Endoparasitoid of *Diprion pini* L. and *Neodiprion sertifer* GEOFFROY (Hymenoptera, Diprionidae) (DOMENICHINI 1964; GRAHAM 1991).

Distribution: Palearctic. This is a new record for the fauna of Iran.

### Genus *Citrostichus* BOUČEK

*Citrostichus* BOUČEK, 1988: 84, 696. Type species *Cirrospilus phyllocnistoides* NARAYANAN, 1960, designation by monotypy.

Diagnosis: Head and pronotum very densely and distinctly granulate. Body black, gaster with yellow spot. Foramen magnum situated very low. Lower face with large tentorial pits. Clypeal margin slightly produced. Male scape with plaque in distal part and whorled setae.

Biology: Ectoparasitoid of *Phyllonorycter citrella* STAINTON (Lepidoptera Gracillariidae) (GRAHAM 1991).

Distribution: Afrotropical, Australia, Oriental and Palearctic regions.

Identification of species see: BOUČEK (1988).

*Citrostichus phyllocnistoides* (NARAYANAN, 1960)

Combinations. *Cirrospilus phyllocnistoides* NARAYANAN, 1960: *Cirrospiloideus phyllocnistoides* (N.), *Citrostichus phyllocnistoides* (N.), *Tetrastichus phyllocnistoides* (N.).

Material examined: 2 ♀♀, 1 ♂, Jiroft, ex larvae of *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae), 23 July 2003, leg. NAMVAR; 2 ♀♀, 1 ♂, Sistan-Baluchestan, Iranshahr, ex larvae *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae), July 2002, leg. MOTAMEDINIA; 40 ♀♀, 46 ♂♂, Sistan-Baluchestan, Iranshahr, ex *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae), July 2003, leg. MOTAMEDINIA; 1 ♀, 1 ♂, Baluchestan, Iranshahr, ex *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae), July 2002, leg. MOTAMEDINIA; 2 ♀♀, 1 ♂, Sistan-Baluchestan, Iranshahr, ex *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae), July 2002, leg. MOTAMEDINIA (HMIM; ZISP).

Biology: Parasitoid of *Phyllocnistis citrella* STAINTON (Lepidoptera, Gracillariidae) (SUBBA & RAMAMANI 1966; HERTING 1975; BOUČEK 1988; BATRA & SANDHU 1980; QUILICI, FRANCK, VINCENOT & MONTAGNEAUX 1995; UJIYE & ADACHI 1995; ARGOV & RASSLER 1996).

Distribution: Oriental and Palearctic. This is a new record for the fauna of Iran.

### Genus *Pronotalia* GRADWELL

*Pronotalia* GRADWELL, 1957: 1. Type species: *Pronotalia trypitae* GRADWELL, 1957, by original designation.

Diagnosis: Frontal area quadrilateral, with length of upper margin much greater than distance between frontal area and eye. A suture present on vertex, running from eye to eye and immediately behind the ocellar triangle. Genae converging less strongly due to the head being less broad. Antenna scape 0.55 - 0.7 length of eye. Tip of hypopygium tending to be slightly less near to apex of gaster.

Distribution: Europe, Africa, North America.

Biology: Pupal parasitoid of Diptera (Tephritidae, occasionally Chloropidae and Agromyzidae). The species is gregarious parasite in the host puparia (GRAHAM, 1991).

Identification of species see: GRAHAM 1991.

*Pronotalia orobanchiae* GRAHAM, 1991

Material examined: 32 ♀♀, 1 ♂, Azarbaijan-e Gharbi: Orumieh, ex pupae of *Phytomyza orobanchiae* KALTENBACH (Diptera, Agromyzidae) 23 May 1996, JAFAEZADEH (18 ♀♀, HMIM; 14 ♀♀, 1 ♂, ZISP); 12 ♀♀, 1 ♂, Tehran, Shahryar, ex *Phytomyza orobanchiae* KALTENBACH (Diptera, Agromyzidae), April 2004, leg. Movahedi FAZEL (6 ♀♀, HMIM; 6 ♀♀, 1 ♂, ZISP).

Biology: *Phytomyza orobanchia* KALTENBACH (Diptera, Agromyzidae) (GRAHAM, 1991).

Distribution: Palearctic.

### Genus *Tamarixia* MERCET

*Tamarixia* MERCET, 1924: 57. Type species: *Tamarixia bicolor* MERCET, 1924, by original designation.

Diagnosis: Malar sulcus straight. Antenna of female with one transverse anellus. Mid lobe of mesoscutum with 2 setae on each side. Propodeum with median; plicae; spiracles small or moderate-sized. First segment of mid and hind tarsi as long as second. SMV of forewing with 1 dorsal seta. Hindwing acute. Gaster of female subcircular to ovate. Body black or partly yellow, non-metallic or weakly metallic.

Biology: Parasitoid of *Trioza eugeniae* FROGGATT (Hemiptera, Psyllidae) (MEAD 1994).

Distribution: Afrotropical, Neotropical and Palearctic.

Identification of species see: GRAHAM 1991.

*Tamarixia upis* (WALKER, 1839)

Combinations. *Cirrospilus upis* WALKER, 1839: *Aprostocetus upis* (W.), *Cirrospilus orsillus* WALKER, 1839, *Tamarixia upis* (W.), *Tetrastichus bermius* WALKER, 1848, *Tetrastichus orsillus* (W.), *Tetrastichus upis* (W.).

Material examined: 2 ♂♂, Iran, Sistan-Baluchestan, Iranshahr, ex *Phyllocnistis citrella* STANTON (Lepidoptera, Gracillariidae), November 2002, leg. MOTAMEDINIA (ZISP).

Biology: Endoparasitoid of *Bactericera femoralis* FÖRSTER (Hemiptera, Triozidae)

(BIN 1972), *Trioza urticae* (L.) (Hemiptera, Triozidae) (DOMENICHINI 1964; ONILLON 1970; BIN 1972; GRAHAM 1991; KOSTJUKOV 1978).

Distribution: Palearctic. This is a new record for the fauna of Iran.

### Discussion

This paper is based on 720 specimens that represent 47 species in 22 genera (two new species are described). Records of eight previously recorded species of Eulophidae are confirmed. Thirty-nine species are newly recorded for Iran so that the Eulophidae in Iran are represented by 73 species.

A newly described species of *Cirrospilus* from Iran is the first recorded species in this genus that displays sexual dimorphism in the male antenna (swollen scape).

A taxonomic analysis of generic diversity among three subfamilies is shown: 14 genera (25 species) of Eulophinae, 3 genera (8 species) of Entedoninae and 5 genera (14 species) of Tetrastichinae.

In the Eulophinae 298 specimens (41.38%), in the Tetrastichinae 294 specimens (40.83%) and in the Entedoninae 128 specimens (17.77%) were examined. The number of specimens examined in the genus *Closterocerus* is 101 or 78.90% of the Entedoninae, in *Necremnus* 98 or 32.88% of the Eulophinae, in *Citrostichus* 97 and in *Aprostocetus* 80 which represent 32.99% and 27.21% of the Tetrastichinae, respectively.

Zoogeographical analysis: Most of the genera occur commonly in the other zoogeographical regions (11 genera are cosmopolitan, 3 genera are distributed throughout the Holarctic region, one genus (*Necremnus*) occurs only in the Palaearctic region, 7 genera are distributed throughout the Palearctic region and in other zoogeographical regions. The fauna of Iran does not exhibit any specific characters.

35 species belonging to 20 genera of Eulophidae were reared for the first time in Iran. Previously recorded, 18 host-parasitoid associations were confirmed. Twenty-eight species in 14 genera (*Aprostocetus*, *Baryscapus*, *Cirrospilus*, *Closterocerus*, *Hyssopus*, *Diaulionopsis*, *Diglyphus*, *Elachertus*, *Euplectrus*, *Necremnus*, *Pediobius*, *Pnigalio*, *Rhichnopelte* and *Stenomomesius*) were reared from their hosts for the first time. 45 hosts and parasitoid associations are listed in Table 1.

The dangerous pest-species *Liriomyza strigata* MEIGEN was recorded from Iran for the first time together with its parasitoid *Closterocerus formosus* (Eulophidae). *Diglyphus chabrias* WALKER and *Necremnus tidius* WALKER were reared from the wheat-leafminer *Syringopais temperatella* LEDER, which represents a new taxonomic host-group. *Aprostocetus persicus* sp. nov. is a newly recorded parasitoid of *Bacterocera zonata* SAUNDERS that is sometimes a major pest in the southern part of Iran.

The present paper is a generalized report on the fauna of Eulophinae, Entedoninae and Tetrastichinae of the Iran and neighbouring countries in the Middle East. Although we realize that there are many more species of Eulophidae in Iran, this investigation reflects the current degree of research of the family and its hosts in that country.

Tabel 1: Hosts of eulophid wasp species in Iran.  
 (\* = species that were reared for the first time in Iran)

**Host species**

Diptera, Agromyzidae: Mining flies

*Liriomyza congesta*

*Liriomyza trifolii*

**Host species**

*Liriomyza strigata*

*Phytomyza orobanchiae*

Diptera, Tephritidae: *Bactrocera zonata*

Diptera, Cecidomyiidae: *Contarina tritici*

Lepidoptera, Gracillariidae: *Citrus-*  
 leafminer *Phyllocnistis citrella*

Lepidoptera, Gracillariidae: Leaf-  
 miner *Phyllonorycter corylifoliella*

Lepidoptera, Lyonetiidae: Leaf-  
 miner *Leucoptera scitella*

Lepidoptera, Noctuidae: *Helico-*  
*verpa armigera*

Lepidoptera, Noctuidae: *Leucania*  
*(Acantholeucania) loreyi*

Lepidoptera, Deoclonidae: Wheat-  
 leafminer *Syringopais temperatella*

Lepidoptera, Yponomeutidae: *Ypo-*  
*nomeuta malinella* and *rorella*

Lepidoptera, Lymantriidae: *Ocneria*  
*terebenthina*

**Parasitoid species**

*Cirrospilus variegatus*

\**Cirrospilus scapulae*

*Diaulinopsis arenaria*

*Closterocerus formosus*

*Hemiptarsenus varicornis*

**Parasitoid species**

\**Closterocerus formosus*

*Pronotalia orobanchiae*

\**Aprostocetus persicus*

\**Aprostocetus venustus*

\**Baryscapus conwentziae*

\**Baryscapus endemus*

*Cirrospilus ingenuus*

*Cirrospilus lyncus*

\**Cirrospilus staryi*

*Cirrospilus viticola*

*Citrostichus phyllocnistoides*

*Closterocerus formosus*

\**Elachertus gallicus*

\**Hyssopus geniculatus*

\**Pediobius crassicornis*

\**Pediobius pyrgo*

\**Pnigalio agraulis*

\**Pnigalio rotundiventris*

\**Pnigalio soemius*

\**Stenomesus rufescens*

*Sympiesis gregori*

\**Tamarixia upis*

*Pnigalio pectinicornis*

\**Pnigalio rotundiventris*

*Sympiesis gregori*

*Closterocerus formosus*

*Zagrammosoma talitzkii*

\**Diaulinopsis arenaria*

\**Euplectrus liparidis*

\**Diglyphus chabrias*

\**Necremnus tidius*

*Baryscapus evonimellae*

*Baryscapus evonimellae*

\**Pediobius pyrgo*

Lepidoptera, Arctiidae: Webworm	* <i>Rhiconopelte crassicornis</i>
<i>Hyphantria cunea</i>	
Hymenoptera, Cephidae:	* <i>Aprostocetus forsteri</i>
<i>Cephus pygmaeus</i>	* <i>Necremnus tidius</i>
Coleoptera, Curculionidae:	* <i>Baryscapus nigroviolaceus</i>
<i>Hypera postica</i>	* <i>Diaulinopsis arenaria</i>
Coleoptera, Chrysomelidae: <i>Gale- rucella lineola</i>	* <i>Pediobius lysis</i>

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Ein absolut gelungenes und sehr empfehlenswertes Buch.

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