

A contribution to the knowledge of family Chalcididae (Hymenoptera: Chalcidoidea) in Iran

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Abstract

In the course of this study, the number of recorded chalcidids (Hym.: Chalcididae) from Iran increased to 42 species (including one unidentified species of the genus *Lasiochalcidia* Masi), of which fifteen species and four genera are new to Iranian chalcidid fauna. The family Chalcididae is represented by three subfamilies in Iran as follows: Chalcidinae (16 species), Dirhininae (two species), and Haltichellinae (24 species). The genus *Varzobia* Nikol'skaya is here synonymized with *Tanycoryphus* Cameron and the type species transferred to that genus as *Tanycoryphus tibialis* (Nicol'skaya, 1960) **comb. n.** The species *Lasiochalcidia indescrita* Bouček, 1952 **stat. rev.** is removed from synonymy with *L. guineensis* (Steffan, 1951). The validity of the species *Peltochalcidia ferrierei* Steffan is restored, being removed from junior synonymy with *P. benoisti* Steffan, and transferred to the genus *Psilochalcis* Kieffer. The species *Peltochalcidia oranensis* Bouček, 1952 is here synonymized with *P. benoisti*. Complementary information on the biology, morphology and distribution of the species as well as a preliminary list of the Iranian chalcidid species are presented.

Key Words: Chalcididae, new combination, new records, fauna, Iran

چکیده

در طی این تحقیق، تعداد گونه‌های گزارش شده از زنبورهای خانواده‌ی Chalcididae از ایران به ۴۲ گونه (شامل یک گونه‌ی شناسایی نشده از جنس *Lasiochalcidia* Masi) افزایش پیدا کرد که از این تعداد، ۱۵ گونه و چهار جنس برای اولین بار از ایران گزارش می‌شوند. خانواده‌ی Chalcididae در ایران با سه زیرخانواده به شرح زیر شناخته می‌شود: Chalcidinae (با ۱۶ گونه)، Dirhininae (با دو گونه) و Haltichellinae (با ۲۴ گونه). در این بررسی، جنس *Varzobia* Nikol'skaya با جنس *Tanycoryphus* Cameron سینونیم و گونه‌ی تیپ آن به جنس اخیر منتقل شد، *Tanycoryphus tibialis* (Nicol'skaya, 1960) **comb. n.** گونه‌ی *Lasiochalcidia indescrita* Bouček, 1952 **stat. rev.** از سینونیمی با گونه‌ی *L. guineensis* (Steffan, 1951) خارج گردید. گونه‌ی *Peltochalcidia ferrierei* Steffan به‌عنوان یک گونه‌ی معتبر به جنس *Psilochalcis* Kieffer منتقل و از سینونیمی با گونه‌ی *P. benoisti* Steffan خارج شد. گونه‌ی *Peltochalcidia oranensis* Bouček, 1952 با گونه‌ی *P. benoisti* سینونیم گردید. اطلاعات تکمیلی در زمینه‌ی زیست‌شناسی، شکل‌شناسی و پراکنش هر کدام از گونه‌ها و همچنین فهرست اولیه‌ی گونه‌های موجود در ایران ارائه شده است. واژگان کلیدی: Chalcididae، ترکیب جدید، گزارش جدید، فون، ایران

Introduction

The family Chalcididae (Hymenoptera: Chalcidoidea) is a moderate sized family within the superfamily Chalcidoidea, including over 1500 species and 90 genera worldwide (Noyes, 2011). The family is widely distributed but is known to be more diversified in the tropical lowlands (Delvare & Bouček, 1992). Chalcidids are mostly parasitoids, including a minority

of hyperparasitoids on a wide range of holometabolous insect hosts such as Lepidoptera, Diptera, Hymenoptera, Coleoptera, Neuroptera and Strepsiptera as the chalcidid adults always emerge from the pupae, whenever the oviposition occurs (Hanna, 1934; Silvestri, 1943; Bouček, 1952; Steffan, 1959b; Habu, 1960; Narendran, 1986; Delvare & Bouček, 1992). Some species such as *Brachymeria tibialis* (Walker) are economically important for their role as parasitoids of destructive lepidopterous pests (Adeli, 1975).

The following five subfamilies are now recognized within the family: Chalcidinae, Dirhininae, Epitraninae, Haltichellinae and Smicromorphinae (Bouček, 1988; Delvare, 2004; Noyes, 2011). Recent phylogenetic studies, using molecular data (Munro *et al.*, 2011) or combined morphological and molecular data, have been conducted in the context of the Hymenoptera Tree of Life project (Heraty, 2003).

The family Chalcididae is easily recognizable by the combination of following characters: body robust mostly black and/or red with yellow markings or heavily sclerotized with coarsely punctured head and mesosoma (figs 1 & 4). Hind femur enlarged, ventrally toothed or serrulate (fig. 5); hind tibia arched to accommodate femur. Prepectus smaller than tegula, gena carinate posteriorly, propodeum mostly areolate (fig. 4), mesepisternum with a ventral shelf delimited anteriorly by epicnemial carina. Some of these characters are separately found in other families, such as Eurytomidae, Leucospidae and Torymidae but never in combination.

The phylogeny of the family was revised by Wijesekara (1997), using 34 morphological characters of 29 taxa. Bouček (1988) proposed a new classification for the family and provided a key to the subfamilies and genera of Australasian region. Bouček (1952, 1956, 1965, 1972, 1977) and Steffan (1950, 1951a, 1951b, 1951d, 1951e, 1953, 1957, 1959a, 1959b, 1976) extensively revised the West-Palaearctic species of Chalcididae. Nikol'skaya (1952, 1960) and Habu (1960) studied the species fauna of the former USSR and Japan respectively. Monographs on chalcidid species were presented by Narendran (1989) and Delvare & Bouček (1992) for the Oriental region and the New World respectively.

The studies on Iranian chalcidid fauna dates back to 1924, when Masi (1924) described two new species from Iran. Later, Bouček (1952, 1956) and Nikol'skaya (1952, 1960) added six new species and Haeselbarth (1983) listed the Iranian chalcidid species. The family is still poorly known in Iran, being represented only with 16 species in the Universal Chalcidoidea Database (Noyes, 2011), although three new species of economic importance have been recently described (Delvare *et al.*, 2011). The biological and ecological notes on several

Iranian species have been published by Askari & Copple (1977), Sepehr & Abai (1989), Maadani & Ladonni (1993), Dabiri *et al.* (1998) and Sabahi (2000).

Materials and methods

The Hayk Mirzayans Insect Museum (HMIM), Tehran, and additional samples used as the basis of this work. Different collecting techniques such as sweeping, Malaise trap and rearing of hosts were applied during this study. The identifications were made possible using Bouček (1952, 1956, 1988), Delvare *et al.* (1999), Habu (1960), Steffan (1950, 1951a, 1951b, 1951c, 1951d, 1951e, 1953, 1957, 1959a, 1959b, 1976). The third author (GD) examined the types of the species described by Förster (1859), Walker (1871), Masi (1931), Bouček (1948, 1952, 1956, 1972), Steffan (1948, 1951b, 1951c, 1951e), Nikolskaya (1952, 1960) and Nikol'skaya & Kyao (1954), housed in NHMW, BMNH, MSNG, NHMP, MNHN and ZISP, respectively (see below).

An Iranian list of chalcidid species and their hosts is given (table 1). In diagnosis sections, "mandibular formula 2.3" means the left mandible has 2 teeth, while the right one bears 3 teeth.

Acronyms and institutions

BMNH	Natural History Museum, London, UK
HMIM	Hayk Mirzayans Insect Museum, Tehran, Iran
MSNG	Museo Civica di Storia naturale di Genova, Italy
MNHN	Museum national d'Histoire naturelle de Paris, France
NHMP	Natural History Museum, Praha, Czech Republic
NHMW	Naturhistorisches Museum Wien, Austria
ZISP	Zoological Institute, St-Petersburg, Russia

Abbreviations

F	Funicular segments
M	Marginal vein
PM	Postmarginal vein
OOL	Distance between inner margin of compound eyes and lateral ocelli
ST	Stigmal vein
T	Gastral tergites

I- Subfamily Chalcidinae

Iranian chalcidines are represented by following species in four genera: *Brachymeria* Westwood, *Chalcis* Fabricius, *Cratocentrus* Cameron and *Trigonura* Sichel.

***Brachymeria ceratoniae* Delvare, 2011**

Material examined – Holotype ♀: Iran: Isfahan, Kashan, viii.2009, ex: *Apomyelois ceratoniae* (Zeller) (Lep.: Pyralidae) on *Ceratonia siliqua* (L. Talaeae).

Diagnosis – *Brachymeria ceratoniae* is very close to *B. confalonierii* Masi and its diagnostic characters are quoted in detail by Delvare *et al.* (2011).

Distribution – The species has been recently described by Delvare *et al.* (2011) from Iran as a parasitoid of the carob moth.

***Brachymeria excarinata* Gahan, 1925**

Material examined – Iran: Azarbaijan-e Sharghi, Khosroshahr, 1346 m, N 37° 58' 28" & E 46° 02' 55", 10.x-6.xi.2007, Malaise trap, (H. Lotfalizadeh), 1 ♀. Tehran, Karaj, 2 Km to Mohammadshahr, 25.viii.2006, ex: *Plutella xylostella* on *Brassica oleraceae*, (A. Golizadeh), 1 ♀.

Diagnosis – Body and tegula dark. Head with preorbital but without postorbital carina. Mandibles 2.3 with sharp teeth of equal length. F2-F5 slightly transverse. Mesonotum densely punctured. Frenal lobes not expanded, scutellum rounded at apex. Hind femur dull, with engraved network between the dense punctulation. Hind tibia dark with subbasal and dorsoapical pale spots, often reduced. Apical truncature of tibia distinctly emarginate. Gaster slightly shorter than mesosoma. T1 smooth dorsally, T2 punctulate.

Distribution – The species is known from Papua New Guinea and Japan (Joseph *et al.*, 1973), Egypt and Cameroon (Risbec, 1956; Descamps, 1956).

Remarks – *Brachymeria excarinata* is one of the smallest species of the genus and a natural enemy of an important pest of cruciferous crops, the diamondback moth *Plutella xylostella* (L.) (Lep.: Plutellidae). It is otherwise quoted from several families of moths such as Arctiidae, Crambidae, Gelechiidae, HesperIIDae, Noctuidae, Oecophoridae, Pyralidae, Tortricidae (Habu, 1960; Joy *et al.*, 1972; Joseph *et al.*, 1973; Gubbaiah, 1984; Narendran, 1986) and the beetle family of Chrysomelidae (Narendran, 1989). In some cases it was reported as a hyperparasitoid (Descamps, 1956; Risbec, 1956; Joseph *et al.*, 1973). This small form was described as the subspecies *plutellae* Joseph *et al.*, 1972, which was subsequently synonymized with the nominal species by Narendran (1989). The same author also synonymized *B. apantelesi* Risbec with *B. excarinata* without having access to its type series. This synonymy remains doubtful and needs further studies.

***Brachymeria femorata* (Panzer, 1801)**

Material examined – Iran: Ardebil, Moghan, ix.1985, (Damanabi), 1 ♀. Azarbaijan-e Sharghi, Tabriz, iii.1987, (Argand), 1 ♀. Fars, 34 Km north of Nourabad, 6.viii.1975, (M. Abai), 1 ♂. Fars, Kuhmareh, Nodan, 1.xi.1989, (M. Abai), 1 ♂. Kerman, Jiroft - Bam Agriculture Research Centre, summer 1998, ex: pupa of *Heliothis* sp., v.1998, (Mohajeri), 3 ♀♀. Khuzestan, Andimeshk, Bidrubeh, Galerizeh, 500 m, 30.iv.2001, (E. Gilasian, A. Hajesmailian and M. Mofidi-Neyestanak), 1 ♀. Tehran, Evin, 17.vii.1978, (M. Abai), 1 ♂.

Diagnosis – This species belongs to the same nominal species group in which the body is partly red, mandibular formula 2.2, teeth being acute and of same length, postorbital carinae absent or obliterated, scutellum quite convex, strongly bilobed at apex and densely setose, epicnemial carina with two elevated submedian lobes in front of ventral shelf on mesepisternum, hind tibia slightly emarginate on apical truncation, first gastral tergite dorsally smooth, second and following densely setose. In *B. femorata* the body is black – partly red in some southern specimens – the pale spots on tegula and legs are bright yellow, postorbital carinae present, tibiae entirely and hind femur at both ends yellow; femur otherwise densely punctured, gaster shortly acute. The extent of the black part on the disk of the hind femur is variable and led to the description of several forms (Habu, 1960) which were all found in the material from Iran.

Distribution – This species is distributed from northwest to southwest of Iran and first reported from Iran by Davatchi & Chodjai (1968). Bouček (1956) and Steffan (1959b) mentioned this species as a common species in the Mediterranean region as a pupal parasitoid of various butterflies, mostly Pieridae. It is widely distributed in the Old World, from western Europe to Indonesia (Noyes, 2011).

***Brachymeria lasus* (Walker, 1841)**

Material examined – Iran: Fars, Kazerun, Nowdan, Kuhmareh, 26.vi.1975, (M. Abai), 1 ♀. Fars, Shiraz - Arsanjan, 21.ix.1996, (M. Abai), 1 ♀. Kerman, Rafsanjan, 18.x.1974, on *Tamarix*, 1 ♀ and 1 ♂. No label, 1 ♀.

Diagnosis – This species belongs to the *annulata* species group with mandibular formula 2.3, teeth acute, postorbital carinae generally present, epicnemial carina forms ventrally raised two submedian lobes in front of the ventral shelf on mesepisternum, hind coxa generally bears a tooth or tubercle in female, apical truncation of hind tibia straight to hardly emarginate. In *B. euploae* frons with dense and thick setation masking integument and

frenal carina moderately expanded, scutellum subtruncate at apex, first gastral tergite smooth and second has very small piliferous points and faint punctulation. Hind tibia pale yellow with a short basal spot and dark stripe along the ventral margin.

Distribution – *Brachymeria lasus* is found in the Palaearctic, Oriental and Australasian regions (Habu, 1960; Joseph *et al.*, 1973; Bouček, 1988; Narendran, 1989) as a parasitoid or sometimes hyperparasitoid of numerous Lepidoptera species (Habu, 1960). It is first reported from Iran.

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

Material examined – Iran: Kohkiloye-Boyer-Ahmad, Bahram-Beighi, summer 1994, ex: *Lymanteria dispar* (Lep.: Lymanteridae), 3 ♀♀ and 1 ♂. Fars, Kazerun, Nowdan, Kuhmareh, 8.xi.1989, (M. Abai), 1 ♀. Sistan-Baluchestan, Sarbaz, vii.1970, (Salavatian), 1 ♀.

Diagnosis – *Brachymeria minuta* gives its name to a special species group whose mandibles are long, both 2-toothed with blunt teeth and lower tooth longer than upper; head quite transverse in frontal view with distance separating the eyes always greater than their own height; frenal lobes generally well expanded on scutellum that usually emarginate posteriorly and bilobed. The epicnemial carina without submedian ventral lobes on mesepisternum; apical truncation of hind tibia distinctly emarginate. Pale parts bright yellow, scutellum moderately convex and emarginate at apex, hind femur broad, finely punctured, without alutaceous network.

Distribution – Bouček (1952) reported this species from Iran (Kurdistan, Badawa Orbil) (possibly Iraq) and Nikol'skaya (1952) mentioned it from northern part of Iran. The species is widely distributed from the Australasian to the western Palaearctic regions (Bouček, 1952, 1988; Narendran, 1989) including north Africa (Noyes, 2011).

Hosts – This species is parasitic on dipteran Muscoidea especially Muscidae developing on feces. The adults can be seen flying around excrements to find their hosts (GD, personal observation). The reports concerning Lepidoptera evidently concerns individuals developing as hyperparasitoids at the expense of parasitic Diptera such as Tachinidae and Sarcophagidae (Steffan, 1959b; Habu, 1960; Bouček, 1977; Andriescu, 1988).

***Brachymeria obtusata* (Förster, 1859)**

Material examined – Iran: Mazandaran, Noshahr, 25.viii.1987, (M. Abai), 4 ♀♀. M. Abai personal collection, not labelled, 2 ♀♀.

Diagnosis – This species belongs to the *minuta* species group for which a diagnosis is given above. It can be separated from other Palaearctic species by the following combination of characters: scutellum never or slightly convex, moderately emarginate at apex; hind femur broad, $\times 1.7-1.75$ as long as wide, densely punctured, mostly red on disk between black basal and yellow apical spots in female, teeth on ventral margin of femur closely set; light parts on tegula and legs pale yellow.

Distribution – *Brachymeria obtusata* is widely reported from north Africa, west Europe and Japan (Noyes, 2011).

Hosts – Although this species is common and widely distributed in southern parts of Palaearctic, very little is known about its biology. Györfi (1939) recorded this species from *Eristalis tenax* (Linnaeus) (Syrphidae) in Hungary. Steffan (1959b) examined a female reared from a Diptera, probably *Sarcophaga* sp. (Sarcophagidae), having developed within the shell of a snail (*Helix* sp.).

Remarks – This species was originally described as *Chalcis vicina* (Walker, 1834). Later, the name changed to *Brachymeria walkeri* by Dalla Torre (1898) because of its primary homonymy with *Chalcis vicina* Fonscolombe (1832). *Chalcis obtusata* Förster, 1859 was recognized as the same species as *Chalcis vicina* Walker by Bouček (1952) and Graham (1992) finely fixed the species through the designation of a neotype.

***Brachymeria persica* (Masi, 1924)**

Distribution – This species was collected from central region of Iran (Kerman) by G. Doria (Masi, 1924, 1951).

Remarks – Masi (1924) named this species as *Chalcis persica* from Iran based on a unique female specimen. It was later transferred into the genus, *Brachymeria* (Masi, 1951). From comparison with *B. tibialis* and *B. femorata*, Masi (1924) concluded that this species belongs to another species group.

***Brachymeria rufigaster* (Masi, 1924) comb. n.**

Chalcis rufigaster Masi, 1924

Distribution – This species was originally described based on a unique male specimen from Kerman, Iran collected by G. Doria. Its type is deposited in the Museum of Genoa (Masi, 1924).

Remarks – Masi (1924) included this species in the *minuta* species group.

***Brachymeria rugulosa* (Förster, 1859)**

Material examined – Syntypes: the two remaining syntypes in the Förster's collection (NHMW). Other material: Iran: Yazd, Ardakan, Samad-Abad, summer 1991, ex: *Apomyelois ceratoniae* (Zeller) (Lep.: Pyralidae), (Ahmadian), 1 ♀.

Diagnosis – Mandibular formula 2.3, teeth acute, postorbital carinae absent, mesonotum fairly densely punctured but interspaces not raised, scutellum broadly rounded on apical margin, epicnemial carina not raised into submedian lobes in front of ventral shelf of mesepisternum, hind femur moderately densely punctulate, shiny between points, hind tibia testaceous at base with apicodorsal spot, gaster oval acute, T1 smooth, T2 finely punctulate dorsally.

Distribution – The species is distributed from Europe to Turkmenistan (Noyes, 2008).

Hosts – *Brachymeria rugulosa* attacks various small moths (microlepidoptera) and the specimen examined from Iran was reared from the carob moth on pomegranate.

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

Material examined – Iran: Azarbaijan, 25.vi.1966, ex: *Pandemis*, 1 ♀ (identified by J. R. Steffan). Fars, Kuhmareh, Nodan, 6.xi.1989, (M. Abai), 1 ♀. Kerman, Rafsanjan, xii.1995, ex: *Ocneria joeniteris* (Lep.: Lymantriidae) on *Tamarix*, 1 ♀. Kerman, Jiroft, Dehbakri, iv.1995, ex: *Ocneria terebinthina* on terebinthin tree (*Pistacia atlantica* subsp. *mutica*), (Akbari), 2 ♀♀ and 1 ♂. Mazandaran, Rudbarak, 1750 m, 14.vii.2007, (H. Lotfalizadeh), 1 ♀. Mazandaran, Nowshahr, 25.viii.1987, (M. Abai), 4 ♀♀.

Diagnosis – This species also belongs to the *annulata* species group, diagnosed above. Postorbital carinae often irregular or incomplete, setation on frons is not especially dense and does not mask the integument, scutellum hardly emarginate at apex, hind coxal tooth acute in female, relevant femur with variable broad apical pale spot, hind tibia yellow with a more or less expanded median stripe, gaster moderately long, T1 smooth, T2 with dorsal piliferous punctures at base together with fine punctulation.

Askew & Shaw (2001) showed a few slight morphological differences between the specimens reared from *Zygaena* spp. and those reared from other Lepidoptera. They argued that primary parasitoids of Zygaenidae must avoid the cyanogenic glucosides found in the body content of these moths. This contradicts the broad spectrum of hosts of *B. tibialis*. It is therefore possible that another species is involved and a molecular study is presently carried out at Montpellier to solve the problem.

Distribution – This common species was frequently reported from Iran as its junior synonym, *B. intermedia* (Nees) (Adeli, 1975; Tremewan, 1976; Haeselbarth, 1983; Abai & Faseli, 1986; Fry, 1989; Askew & Shaw, 2001; Nikdel *et al.*, 2004). The material examined shows that this species is widely distributed in Iran from north to south. *B. tibialis* is otherwise widely distributed in the Oriental and Palaearctic regions (Noyes, 2011).

Hosts – Noyes (2011) quotes about 70 insect hosts, including Lepidoptera and tachinids. The species is therefore a facultative hyperparasitoid. It was introduced to North America to control the gypsy moth at the end of the nineteenth century. In Iran, Abai (1976) reared this species from the Lymantriids *Euproctis melania* Staudinger and *Leucoma wiltshirei* Collenette in southwest of Iran. Abai & Faseli (1986) mentioned the fig tree defoliator *Ocnerogyia amanda* Staudinger as another lymantriid host. Tremewan in 1997 reared a female specimen from *Zygaena haberhaueri* Lederer (Lep.: Zygaenidae) in Mazandaran province (Askew & Shaw, 2001). *Euproctis chrysorrhoea* (L.) was also quoted as its host in northwest (Nikdel *et al.*, 2004), *Parocneria terebynthina* (Staudinger) (Lep.: Lymantriidae) in central part (Kerman, Jiroft) and south of Iran (Fars province) (Sepehr & Abai, 1989; Sabahi, 2000). Sabahi (2000) reported 40.2% parasitism of *B. tibialis* on *P. terebynthina* pupae in the Fars province and the mean parasitism was 25.3%.

***Brachymeria vitripennis* (Förster, 1859)**

Material examined – Holotype ♂: from the Förster's collection (NHMW). Other material: Iran: Azarbaijan-e Sharaghi, Basmenj, xii.1995, (Damanabi), 1 ♂.

Diagnosis – *Brachymeria vitripennis* belongs to the *inermis* species group which includes parasitoids of Cassidinae. Mandibular formula 2.2, teeth sharp and subequal, postorbital carinae absent, malar space large, at least $\times 0.75$ eye height, faint preorbital carinae present, scutellum apically rounded, epicnemial carina not raised into submedian lobes in front of ventral shelf, apical truncation of hind tibia distinctly emarginate, gaster short and ovoid, T1 smooth, T2 with faint punctulation. Puncturation of the mesonotum dense, including subpolygonal points, hind femur sparsely and weakly punctulate, smooth between punctures, hind tibia with a basal pale spot.

Distribution – The species is known from southern Europe to Central Asia (Noyes, 2011). It has further eastern distribution than *Brachymeria inermis* (Fonscolombe), another parasitoid of *Cassida* spp. This is the first record of *B. vitripennis* from Iran.

Hosts – *Brachymeria vitripennis* is parasitic on *Cassida* spp. (Col.: Chrysomelidae: Cassidinae) (Györfi, 1942; Menozzi, 1947; Györfi, 1962).

***Chalcis biguttata* Spinola, 1808**

Material examined – Iran: Mazandaran, Behshahr - Ghalughah, Lemrask, 3.vii.2004, (Zarghami), 1 ♂.

Distribution – The species has been recorded from Europe to Caucasus and Iran (Bouček, 1952, 1966; Nikol'skaya, 1952, 1960).

Remarks – A male specimen of *C. biguttata* without hind legs is placed in the HMIM collection was identified according to its finely strigose and black petiole.

***Chalcis sispes* (Linnaeus, 1761)**

Diagnosis – This species is easily distinguishable from *C. biguttata* by its red hind femur and ornamentation of the ventral margin.

Distribution – The species is widely distributed in Europe (Bouček, 1952) as well as Central Asia and Iran (Nicol'skaya, 1960).

Hosts – Ruschka (1920) quoting Giraud mentioned the stratiomyid fly *Stratiomys chamaeleon* (Linnaeus) as host for this species. Schremmer (1960) studied its oviposition behavior. The adults usually fly near ponds or rivers or standing waters, looking here for their hosts.

***Cratocentrus tomentosus* (Nicol'skaya, 1952)**

Material examined – Syntypes ♀: "*Lepidochalcis tomentosus* Nik." / "Gourmouk, border between Persica (Iran), Afghanistan and Beloutchistan (Pakistan), 11.vi.1898, Zaroudni" [in Russian]. Syntypes ♂: "*Lepidochalcis tomentosus* Nik." / "Koucha-Liaroumba, Bampour, Iran (SE), 06-10.v.1901, Zaroudni" [in Russian].

Diagnosis – Female. Head, mesosoma, legs and antennae entirely reddish, scape darkened, mandibles black. Patches of dense, appressed and silvery setation masking the integument. Head without definite teeth on vertex, only low protrusions visible. F somewhat longer than wide, subequal. Pronotal collar with margins of punctures forming crests in middle; two blunt submedian teeth delimit a median furrow. Erect setae on mesonotum much longer than those of *Cratocentrus fastuosus* (Masi). Mesoscutum short, transverse, not longer than pronotal collar. Apical tooth of scutellum broad, triangular, rised upwards. Fore tibia

with acute apical spine. Mid tibia without apical spine, with subapical crests. T1 with sparse punctulation, interspaces much broader than points. Patches of appressed setation on T5 broadly separated. Basal part of syntergum, in front of cercal foveae, with lateral protrusions. Exserted part of ovipositor $\times 0.60$ mesosoma length.

Male. Syntergum deeply emarginate apically, between lateral projections.

This species would be keyed out using Steffan's key (1959b) as *C. fastuosus*. It differs from it in having great extension of reddish parts of body, low teeth on the vertex, submedian teeth on pronotal collar and characteristic morphology of the syntergum as described above.

Distribution – *Cratocentrus tomentosus* is known from India (Narendran, 1989) and Iran (Nikol'skaya, 1952).

Remarks – The species was originally described as *Lepidochalcis tomentosa* from northern part of Iran by Nikol'skaya (1952) and later transferred to *Cratocentrus* (Steffan, 1957).

***Trigonura ninae* (Nikol'skaya, 1952)**

Trigonura sphenopterae Nikol'skaya, 1960 **syn. n.**

Material examined – Lectotype ♀: here designated, "*Urochalcis ninae* sp. n. type Nikol'skaya det." / "Répétek, 26.VII.1925, V. Gussakovski" [in Russian]. Syntypes 4 ♀♀: "*Trigonura sphenopterae* Nik." / "Bakanass-Ak-Kohl, Alma-Ata region, VIII.53, V. Parfentev" [in Russian].

Diagnosis – Female. Mandibles tridentate. Frons with dense puncturation, sparsely on gena. Base of antennal toruli on lower ocular line. Interantennal projection narrow, as high as toruli diameter. Inner margins of eyes subparallel. Scape reaching height of median ocellus. Occiput strongly sloping and concave, vertically striolate. Mesoscutum short, half as long as broad. Scutellum moderately convex. Propodeum without anterolateral tooth, with broad, depressed and rugose median area delimited by sublateral costulae; lateral surface of propodeum rugose areolate. Disk of hind femur smooth between the sparse piliferous points; setae suberect; ventral margin with 8-10 teeth. Fore wing with only microtrichiae, lacking fringe. T1-T6 smooth dorsally, T6 densely punctured. Cerci at mid length of syntergum. Relative measurements: head $\times 1.75$ as broad as long, malar space $\times 0.75$ breadth of oral fossa and $\times 0.70$ eye height. Eyes separated by $4/3$ of their heights. OOL about as large as ocelli diameter. Pedicel+flagellum $\times 1.20-1.25$ width of head. Mesosoma $\times 1.60$ as long as wide.

Gaster $\times 1.50$ length of mesosoma, syntergum 1/3 as long as gaster. Body reddish with black parts.

Distribution – The species is known from Caucasus and Central Asia (Nikol'skaya, 1952, 1960) and Iran (Haeselbarth, 1983).

Hosts – *Trigonura ninae* was reared from a buprestid beetle by M. Abai in Tehran, Iran.

Remarks – The two species were distinguished by Nikol'skaya through their differences in coloration. The body of lectotype of *U. ninae* is entirely reddish while the paralectotypes are more or less black. The type series of *T. sphenopterae* is extensively black, especially the mesosoma. The relative length of the funicular segments also is somewhat variable, with a relatively longer flagellum in the type series of *T. sphenopterae*. One of the paralectotypes of *U. ninae* is identical with this series.

Trigonura ruficaudis (Cameron, 1913)

Material examined – Iran: Yazd province, Ardakan - Zarch and Taft, ex: *Chrysobothris* sp. (Col.: Buprestidae), summer 1991, (Ahmadian), 7 ♀♀ and 4 ♂♂. HMIM (no label), 1 ♀ and 1 ♂.

Distribution – This species had been known only from India (Narendran, 1989) before being reported from Iran by Lotfalizadeh & Khalghani (2008).

Remarks – One female of this species was determined by G.J. Kerrich in 1966 as *Trigonura ruficaudis* which is labelled "A252, Mousl/IRQ, leg. H. Knopf", indicating that it was collected from Iraq.

II- Subfamily Dirhininae

Dirhinus himalayanus Westwood, 1836

Distribution – This species is known from Japan to Central Asia (Noyes, 2011) and Iran with some biological studies (Maadani & Ladonni, 1993; Dabiri *et al.*, 1998).

Hosts – Maadani & Ladonni (1993) and Dabiri *et al.* (1998) concluded that this species through its competitive biological characters such as high number of produced eggs, great searching ability and possible cold storage can be an ideal biocontrol agent against synanthropic flies, especially the house fly.

Dirhinus wohlfahrtiae Ferrière, 1935

Material examined – Iran: Ilam, vi.2004, ex: dipterous puparia, (B. Gharali), 2 ♀♀.

Diagnosis – Head with broadly rounded horns. *Dirhinus wohlfahrtiae* and *D. himalayanus* are extremely close and further studies are needed – possibly the use of molecular data – to precisely separate the species.

Distribution – This species has been known from Egypt (El-Agoze, 1989), Saudi Arabia (Alahmed, 1999) and Sudan (Ferrière, 1935). This is the first record of this species from Iran.

Hosts – *Dirhinus wohlfahrtiae* was reared from puparia of Calliphoridae (Diptera) in Iran and is regarded as a biocontrol agent of house fly, *Musca domestica* L. Two other calyptrate Diptera, *Parasarcophaga aegyptiaca* (Salem) and *Wohlfahrtia nuba* (Wiedemann) have been reported as its hosts (Ferrière, 1935; El-Agoze, 1989; Alahmed, 1999).

III- Subfamily Haltichellinae

As in many Old World regions, Haltichellinae is the most diverse subfamily of Chalcididae in Iran (table 1).

Antrocephalus hypsopygiae Masi, 1928

Material examined – Iran: Mazandaran, Ghaemshahr, on *Oryza sativa*, 20.vii.2005, (S. Hesami), 1 ♀.

Distribution – *Antrocephalus hypsopygiae* was described from specimens from Turkmenistan (Masi, 1928) and has been reported from Central Asia to Cyprus (Bouček, 1956). GD examined additional specimens from southern France, Spain and Morocco. The genus *Antrocephalus* Kirby is recorded here for the first time from Iran.

Hosts – The examined specimen was collected in a rice field infested by rice stem borer, *Chilo suppressalis* Walker (Lep.: Crambidae) and green semilooper, *Naranga aenescens* Moore (Lepidoptera: Noctuidae) on the coastal area of Caspian Sea. It has been originally reared from Clover Hay worm, *Hypsopygia costalis* (Fabricius) (Lep.: Pyralidae) (Masi, 1928).

Belaspidia obscura Masi, 1916

Diagnosis – Body black. Malar space at least $\times 0.75$ height of eye and as long as width of oral fossa. Mesonotum with moderately deep puncturation. Gaster at most 1.4 times as long as the thorax. T3 dorsally bare or very sparsely setose (Delvare *et al.*, 1999).

Distribution – Delvare *et al.* (1999) reported this species from western part of the Mediterranean Basin (from Europe to Middle East), and Tudor (1962) reported it from Iran.

Hosts – No definitive host is known for this species. The recorded hosts in the databases (Noyes, 2011) are the results of its misidentification with *Belaspidia nigra*.

***Belaspidia nigra* (Siebold, 1856)**

Material examined – Iran: Azarbaijan-e Sharghi, Marand, Payam, 28.vi.2007, (H. Lotfalizadeh), 1 ♂. Esfahan, Esfahan, summer 1994, ex: Psychidae (Lep.), (Erfani), 6 ♀♀ and 3 ♂♂.

Diagnosis – Female. Body black. Malar space $\times 0.6$ height of eye, shorter than width of oral fossa ($\times 0.8$ in female and $\times 0.75$ in male). Mesonotum with moderately deep puncturation. Gaster $\times 1-1.15$ mesosoma length.

Distribution – *Belaspidia nigra* has been reported from Spain, Turkey and Azerbaijan (Delvare *et al.*, 1999) and also from Iran (Nicol'skaya, 1952).

Hosts – The species is a parasitoid of psychid moths, especially of the genus *Apterona* Millière.

***Hockeria* near *bifasciata* Walker, 1834**

Material examined – Iran: Mazandaran, Ghaemshahr, 20.vii.2005, swept in rice field, (S. Hesami), 1 ♀.

Diagnosis – Its coloration is identical to *erdoesi* form Bouček (1952). Compared with *H. bifasciata*, it differs in having narrower hind femur, less projecting basal tooth. More specimens are needed for a certain identification.

Remarks – The above specimen was collected from rice field on the coastal area of Caspian Sea (in the same condition as for *A. hypopygiae*). It is a parasitoid of moths (Lepidoptera).

***Hockeria confusa* Nikol'skaya, 1960**

Material examined – Holotype ♀: "*Hockeria confusa* sp. n. type, det. Nikol'skaya" / by monotypy labelled "Iran, Gassmar, Tehran, VII.1955, Daftari" [in Russian].

Diagnosis – Species is close to *H. bifasciata*. Puncturation of vertex and mesonotum sparse, median lobe of mesoscutum interspaces double of points width, very small. Frenal

lobes strongly narrow, scutellum hardly emarginate. Anellus, F1 and legs reddish with fore and hind coxae darkened basally as well as hind tibia along ventral margin.

Distribution – Originally described from a single specimen and is known only from Iran (Nicol'skaya, 1960).

***Hockeria unicolor* Walker, 1834**

Material examined – Lectotype ♂: collected in France (BMNH type 5-293). Other material: Iran: Ilam, Shirvan - Chardavol, v.2003, Malaise trap in the field of safflower (*Carthamus oxycantha* M. B.), (B. Gharali), 1 ♀.

Distribution – The species is common and widely distributed in the Palaearctic region from Canary Islands (Báez & Askew, 1999) to Central Asia (Nikolskaya, 1978).

Hosts – *Hockeria unicolor* is known as a pupal parasitoid of microlepidoptera of the families Tortricidae, Cosmopterigidae, Pyralidae (Bouček, 1952, 1977; Nicol'skaya, 1960; Blasco-Zumeta, 2000). The mention of a Curculionidae (Menozi, 1947) results probably from a misidentification.

***Kriechbaumerella gracilis* (Nicol'skaya, 1952) comb. n.**

Material examined – Holotype ♀: labelled "*Antrocephalus gracilis* sp. n. type Nicol'skaya det." / "Tavriz [Tabriz] Persica [Iran] 12 VI '14 P. Andrievski" [in Russian].

Diagnosis – Legs reddish except black coxae and brownish hind tarsus. Basal four antennomeres reddish, rest of antenna dark brown to black. The species is extremely close to *Kriechbaumerella mansues* (Nicol'skaya, 1952) but differs from in having the following characters: interspaces between points on mesonotum coriaceous and dull; scutellum with dorsal outline mostly straight, strongly sloping in front of frenal carina, relevant submedian lobes very short; apical margin of scutellum very shallowly emarginate; pale spot on fore wing larger, reaching apex of postmarginal vein; infuscation not reaching apex of wing; basal cell mostly bare except one row of setae behind submarginal vein; gaster slender, $\times 2.5$ as long as broad.

Distribution – The species was described from Iran and is still known only from this country (Nicol'skaya, 1952).

Remarks – *Kriechbaumerella gracilis* was originally described as *Antrocephalus gracilis* by Nicol'skaya (1952) and later transferred to *Eucepsis* Steffan (Nicol'skaya, 1960). It

is here transferred to *Kriechbaumerella* Dalla Torre, the senior synonym of *Eucepsis* (Bouček, 1988).

***Kriechbaumerella hofferi* (Bouček, 1952)**

Antrocephalus goliath Nikol'skaya, 1952 [synonymized by Bouček (1956: 239)]

Material examined – Lectotype ♀: here designated, a pinned female labelled "*Antrocephalus goliath* sp. n. type, det. Nikol'skaya" / "Kopet-Dag Komarovsk, Caspian Region, Turkmen. [istan], 24.VI.1928, V. Gussakovski" [in Russian].

Diagnosis – Eyes without distinctive pubescence. Antennae black. Flagellomeres relatively long, F1 ×2.5 as long as broad. Wing infuscated beyond parastigma with a pale spot below stigmal vein, inner margin delimited; infuscation still visible beyond venation. Hind femur black, contrasting with the relevant tibia which is reddish.

Distribution – The species is known from Europe to Central Asia. Nikol'skaya (1952) mentions it from Kazakhstan, Iran and Afghanistan nevertheless all the syntypes examined and labelled as such by her came from Turkmenistan. It is quoted from China as a parasitoid of *Caligula japonica* Moore (Lep.: Saturniidae) (Sheng, 1986).

Remarks – *Kriechbaumerella hofferi* was described in the genus *Eucepsis* (Bouček, 31/05/1952) and later transferred to *Kriechbaumerella* by Kalina (1989). *Antrocephalus goliath* was described from Turkmenistan by Nikol'skaya (30/06/1952) and later synonymized with *K. hofferi* by Bouček (1956).

***Lasiochalcidia cincticornis* (Walker, 1871)**

Euchalcis rubripes Kieffer, 1899 [synonymized by Steffan (1966)]

Material examined – Syntype ♀: *Lasiochalcidia rubripes*, labelled "Bonifacio 1896 Ferton" / "*Lasiochalcidia cincticornis* (Walker), J.-R. Steffan det.", from the Ferton's collection itself (Steffan, 1951b). Other material: Iran: Sistan-Baluchestan, Bampur, 10.viii.1961, 1 ♀.

Diagnosis – This species belongs to the *dargelasii* species group which is mostly defined negatively: both apical spurs of hind tibia expanded as usual, apical serrulate lobe on hind femur not conspicuously expanded. Within this species group it can be distinguished by the male scape without tooth, anellus distinctly shorter than pedicel in female, sides of pronotum convex in dorsal view and strongly converging anteriorly, mesoscutum with irregular and moderately dense puncturation, scutellum slightly shorter than broad, shortly

truncate anteriorly and with evidently convex dorsal outline in lateral view, propodeum with the two lateral teeth appearing as broad and moderately protruding lobes. Otherwise the gaster is black, the legs are reddish with mid coxa and base of hind one reddish.

Distribution – The distribution mentioned in Noyes (2011) should be revised through re-examination of the collections as superficially similar species appears to be mixed by previous authors. *Lasiochalcidia cincticornis* itself might be restricted to the Mediterranean Basin, but has been recorded from Central Asia to Europe and North Africa.

Hosts – Bouček (1956) reported Lepidoptera pupae as hosts for *Lasiochalcidia* spp. but this is very doubtful as all known hosts for the genus are neuropteran Myrmeleontidae. Steffan (1958, 1959c, 1961, 1966) precisely studied the oviposition behaviour of several species and found that they tend to discover hidden hosts. The perception of the presence of a host occurs from the moving of sand subsequent to that of the antlion larva and the antennae bears special mechanoreceptor for that.

Remarks – The above female is considered here as a syntype because it bears the same information as quoted in the original description of *E. rubripes* by Kieffer (1899). Kieffer did not elaborate on the number of available specimens when he described the species, but most likely he had only a single female. *Euchalcis rubripes* has been variously interpreted since (Masi, 1916; Bouček, 1949, 1952, 1956; Steffan, 1951b, 1966). Steffan (1966) discussed those interpretations and concluded that *Halticella cincticornis* Walker and *E. rubripes* were synonyms. We confirm here Steffan's opinion. Firstly, the both species were described from Corsica. Walker (1871) mentioned in the original description of *H. cincticornis* "Antennae slender ... / ... first joint slender; second much longer than the third". The two species which were initially mixed but can easily be separated using the morphology of the male scape. That of *L. cincticornis* is unarmed while in the alternate [= *L. rubripes* sensu Masi, 1916 and Bouček, 1956] it bears a sharp ventral tooth. In the female of this second species anellus is hardly shorter than pedicel ($\times 0.85$) in contradiction with the type of *E. rubripes* and original description of *H. cincticornis*.

***Lasiochalcidia indescripta* Bouček, 1952 stat. rev.**

Material examined – Paratype ♂: labelled "*Lasiochalcidia indescripta* Bouček Paratypus ♂ Z. Bouček 49" / "Szabotika Leg: A. Taubert" / "8.VII.1923 A. Taubert" / "*Lasiochalcidia indescripta* Bouček Bouček det. 1949". Other material: Iran: Gholestan, Gholestan National Park, Sulgerd, 1150 m, 20-21.vii.1996, (E. Ebrahimi), 1 ♀.

Diagnosis – *Lasiochalcidia indiscripta* can be recognized through the following characters: puncturation of mid lobe of mesoscutum progressively coarser from base to apex; scutellum with strongly convex dorsal outline in lateral view; lobes of frenal carina obviously raised upwards; metafemur entirely reddish; hind basitarsus short, $\times 3.5-3.8$ as long as wide; gaster $\times 1.55-1.60$ as long as wide; T2 slightly concave posteriorly.

Distribution – This new record expands the distribution of *L. indiscripta* to Iran. The species was also known from central Europe (Bouček, 1952). GD examined specimens from southern France.

Hosts – Steffan (1966) studied the host recognition and oviposition behaviour. The hosts quoted by Steffan are Myrmeleontidae building traps such as *Myrmeleon inconspicuus* Ramur and *Neuroleon nostras* (Fourcroy).

Remarks – *Lasiochalcidia indiscripta* was synonymized with *L. guineensis* (Steffan) by Steffan (1953). The examination of the type, as well as other material, including both sexes, from southern France, showed that they are good species. Therefore, *L. indiscripta* is here removed from synonymy.

Lasiochalcidia sparsibarbis Bouček, 1956

Material examined – Holotype ♀: labelled "Teheran Keredj" / "F. Brandt" / "Holotypus" / "*Lasiochalcidia sparsibarbis* Bouček sp. n. Det. Z. Bouček 1953".

Diagnosis – This species belongs to the same nominal species group which includes two strikingly close and apparently rare species from southern France and northeastern Spain. In this species group, the frons laterally to the antennal toruli shows relatively sparse setation which does not mask the integument. *Lasiochalcidia sparsibarbis* itself can be identified by its reddish hind leg, scape, pedicel and base of flagellum; a long malar space, slightly longer than width of oral fossa [$\times 1.07$ (45:42)]; lateral teeth of propodeum blunt and fairly protruding.

Distribution – This species is known only from the female holotype collected in Iran (Bouček, 1956).

Lasiochalcidia sp.

Material examined – Iran: Tehran, Varamin, Abardezh, 30.vi.1987, (M. Abai), 2 ♂♂.

Remarks – Two badly damaged males of *Lasiochalcidia* Masi run to *L. pubescens* (Klug, 1834) [= *L. igiliensis* (Masi)] according to Bouček's key (1952). Nevertheless several

characters led us to think that they belong to an undescribed species: (1) antenna with brown funicular segments (completely black in *L. pubescens*), (2) all funicular segments longer than wide (F5-F7 as long as wide in *L. pubescens*), (3) anellus less than ½ of length (wider than ½ of length in *L. pubescens*), (4) F1 ×1.5 as long as wide (×1.65 in *L. pubescens*), and (5) tibiae completely red (partly red in *L. pubescens*).

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

Material examined – Iran: Azarbaijan-e Sharghi, Marand, 1360 m, N 38° 25' 28" & E 45° 46' 59", 12.vii.2007, Malaise trap, (H. Lotfalizadeh), 1 ♂.

Diagnosis – Mesosoma entirely black, partly red or even nearly entirely red; gaster and legs black. Setation on head as usual, not especially long and erect. Interantennal projection high, strongly compressed, well visible in lateral view. Median areola of propodeum elongate, subelliptic. Epinemial carina without medioventral projection. Apical spurs of hind tibia broadly separated at their insertion, by a distance larger than outer spur.

Distribution – The species is widely distributed in western and central Europe (Bouček, 1952), Mediterranean Basin (Bouček, 1956, 1970) and Central Asia (Nikol'skaya, 1978). The genus *Neochalcis* Kirby is newly reported from Iran.

Hosts – *Neochalcis fertoni* is a parasitoid of hymenopteran Aculeate nesting in twigs and dry stems (Bouček, 1970). The holotype of *N. fertoni* was reared from *Leptochilus* (*Neoleptochilus*) *regulus* (Saussure, 1855) [as *Odynerus gallicus* Saussure].

***Neohybothorax hetera* (Walker, 1834)**

Material examined – Iran: Azarbaijan-e Sharghi, Marand, 1360 m, N 38° 25' 28" & E 45° 46' 59", 22-25.vii.2007, Malaise trap, (H. Lotfalizadeh), 1 ♀. Azarbaijan-e Sharghi, Khosroshahr, 1346 m, N 37° 58' 28" & E 46° 02' 55", 10.x-6.xi.2007, Malaise trap, (H. Lotfalizadeh), 1 ♀.

Distribution – The species has been recorded from Caucasus to Europe (Noyes, 2011).

Remarks – *Neohybothorax hetera* attacks Ascalaphidae (Neuroptera) (Sellenschlo & Tröger, 1993) but our specimens were collected beside of dead wood highly infested by xylophagous beetles of the families Scolytidae and Bostrichidae. This species is recognisable by its rusty legs except coxae, distinct teeth of hind femur (especially in the last quarter) and uniformly rounded scutellum. In Iranian specimens collected in the northwester area, all legs are rusty (or reddish) as in Bouček's redescription (1952) with a greatly dark hind femur,

reddish hind tibia with anterior longitudinal dark band; scape dark reddish and pedicel completely reddish.

***Proconura caryobori* (Hanna, 1934)**

Material examined – Paratype ♀: labelled "London, ex: *Caryoborus pallidus* in senna pods from Sudan". Other material: Iran: Khuzestan, Ahvaz, summer 1998, ex: *Caryedon acaciae* (Gyllenhal), (Mozafari), 3 ♀♀ and 1 ♂.

Diagnosis – Tegulae and scape reddish. Flagellum slender with anellus ×2. Punctuation of pronotum and mesonotum sparse, interspaces larger than points on mid lobe of mesoscutum. Propodeum with posteroventral projections. Gaster lanceolate with T6 hardly sloping.

Distribution – Sudan from seeds of *Cassia*; India, Nepal (Narendran, 1986, 1989) and UK.

Hosts – *Caryedon pallidus* (Olivier) (Col.: Chrysomelidae: Bruchinae) (on *Cassia*) was recorded as host (Hanna, 1934; Steffan, 1976; Bouček, 1988). *Caryedon acaciae* is a new host.

Remarks – This species was originally described from Sudan as *Euchalcidia caryobori* Hanna, but later transferred to the genus *Proconura* Dodd (Bouček, 1984). The biology and the effect of low temperatures on the fertility of this species were studied by Hanna (1934). Hence, *P. caryobori* is one of the few Chalcididae for which some detailed studies on the biology was carried out.

***Proconura incongruens* (Masi, 1932)**

Material examined – Iran: Kerman, Jiroft, 630 m, N 28° 28' 57" & E 57° 52' 08", 03.xi.2009, (Rajabi), 1 ♂.

Diagnosis – The male of this species can be easily recognized through deeply excavated scape on ventral side (Steffan, 1976: fig. 14, p. 59).

Distribution – The species was previously known only from Lybia. This new record hence greatly expands its distribution area.

***Proconura nigripes* (Fonscolombe, 1832)**

Material examined – Iran: Azarbaijan-e Sharghi, Khosroshahr, 1346 m, N 37° 58' 28" & E 46° 02' 55", 10.x-6.xi.2007, Malaise trap, (H. Lotfalizadeh), 2 ♂♂.

Diagnosis – Body and tegula dark. Malar space long. Flagellum slender, with anellus and F1 much longer than wide. Propodeum with lateral protrusions and posteroventral tooth; median areola long. Gaster oval, acute with T6 and T7 visible from above (Steffan, 1976). The male cannot be separated from males of *P. caryobori*.

Distribution – *Proconura nigripes* is widely distributed in the Palaearctic, having been reported from the Canary Islands (Baez & Askew, 1999), whole Europe (Steffan, 1951b; Bouček, 1952), North Africa (Masi, 1929) and Central Asia (Nikol'skaya, 1978).

Hosts – Davatchi reared this species from *Schneidereria pistaciicola* (Danilewski, 1955) (Lep.: Gelechiidae) in Iran (Davatchi, 1958).

***Proconura persica* Delvare, 2011**

Material examined – Holotype ♀: Iran: Isfahan, Kashan, viii.2009, ex: *Apomyelois ceratoniae* (Zeller) (Lep.: Pyralidae) on *Ceratonia siliqua* (L. Talaeae).

Distribution – The species was recently described (Delvare *et al.*, 2011) and is known only from Iran as a parasitoid of carob moth.

***Psilochalcis ceratoniae* Delvare, 2011**

Material examined – Holotype ♀: Iran: Isfahan, Kashan, viii.2009, ex: *Apomyelois ceratoniae* (Zeller) (Lep.: Pyralidae) on *Ceratonia siliqua*. Other material: Iran: Yazd, Ardakan, viii.1991, ex: same host as holotype, (Ahmadian), 2 ♀♀ and 1 ♂.

Distribution – The species was recently described (Delvare *et al.*, 2011) and is known only from Iran as a parasitoid of carob moth.

***Psilochalcis ligustica* (Masi, 1929)**

Material examined – Iran: Ilam, Shirvan - Chardavol, Malaise trap, vi.2003, (B. Gharali), 1 ♀. Qazvin, Juladak, N 36° 21' 53" & E 50° 32' 11", 14.vi.2007, (B. Gharali), 1 ♂.

Diagnosis – This species belongs to the same nominal species group, in which the mandibles are strongly incised on their ventral margin, suggesting an additional tooth.

Distribution – *Psilochalcis ligustica* was reported from Iran as *Invreia ligustica* Masi (Bouček, 1952, 1956), and from Kurdistan and Shakhawa. It is widely distributed in Palaearctic and India (Narendran, 1989).

***Psilochalcis subaenea* (Masi, 1929)**

Material examined – Iran: Khuzestan, Ahvaz, summer 1998, ex: *Caryedon acaciae* (Gyllenhal), (Mozafari), 4 ♀♀.

Diagnosis – Head with a short triangular frontal lobe below the antennal toruli, hind tibia with an additional external carina, coxae and femora black [*the usual ventral outer carina is visible near base of the hind tibia while the additional carina can be seen near the apex*].

Distribution – This species is distributed in the Mediterranean region from Spain to Kazakhstan (Masi, 1929; Bouček, 1952, 1956; Nikols'kaya, 1960) and is a new record for the Iranian fauna.

Hosts – The specimens were reared from *C. acaciae* in southwestern Iran.

Remarks – This species was originally described as *Invreia subaenea* and designated as the type species of the new genus *Invreia* by Masi (1929). It was later synonymized with *Psilochalcis* Kieffer by Bouček (1992). Biology of this species is unknown.

***Psilochalcis subjecta* (Nikol'skaya, 1960) comb. n.**

Material examined – Holotype ♀: labelled "Khorasa 3-4.VIII.1901 N. Zaroudni" [in Russian] / "*Invreia subjecta* sp. n. ♀ Nikols'kaya det." / "Holotypus ♀".

Diagnosis – Body and fore coxa black; tegula, rest of legs and antenna reddish. Gaster reddish-brown. Head long $\times 2$ with long temples merging to occiput without evident angulation. Carina delimiting clypeus dorsally not extended to triangular flange (it is extended in *P. subaenea*). Malar space slightly more than half as long as height of eyes. Antennal scrobes not reaching median ocellus. Pedicel elongate $\times 4$. Flagellum relatively long and slender: anellus $\times 2$, F1 $\times 1.6$. Propodeum with posterolateral angles broadly blunt, lateral and sublateral carinae subparallel, submedian hardly curved. Hind tibia with additional outer carina. Gaster acute, dorsal outline moderately sloping posteriorly.

Distribution – *Psilochalcis subjecta* is known only from Iran (Nikol'skaya, 1960).

Remarks – This is probably the female of *Psilochalcis miranda* (Nikol'skaya, 1960) which was described from the male; a paratype of which was examined by GD.

***Psilochalcis zarudnyi* (Nikol'skaya, 1960) comb. n.**

Material examined – Paratype ♀: labelled "Koucha-Liaroumba, Bampour Youv Persia Zaroudni 6-10 V 01" [in Russian] / "*Peltochalcidia zarudnyi* sp. n. ♀ Nikols'kaya det." / "Paratypus ♀".

Diagnosis – Legs, antennae and tegulae completely reddish. Mandibles with a distinct furcate carina on the disk, without subapical swelling on lower tooth. Frontal lobe broader than long, with a few thick basal setae. Head $\times 2$ in dorsal view with temples strongly converging. Posterior margin of propodeum forming obtuse but sharp posterolateral angles. Gaster ovoid, with T6 strongly sloping, almost vertical.

Distribution – Nikol'skaya (1960) described the species based on material collected from Iran. It was apparently not collected again.

Remarks – Steffan (1951c) synonymized the species *Peltochalcidia ferrierei* Steffan with *Peltochalcidia benoisti* Steffan. The former species was described from Spain while *P. benoisti* was from north Africa. The examination of the holotypes of the two species, together with additional specimens, showed that the specimens distributed on each side of the Mediterranean Sea are morphologically different. The species remain valid while *Peltochalcidia oranensis* Bouček, 1952 is found to be a junior synonym of *P. benoisti* **syn. n.** The species *Psilochalcis ferrierei* (Steffan) is revalidated here, **stat. n. and comb. n.**

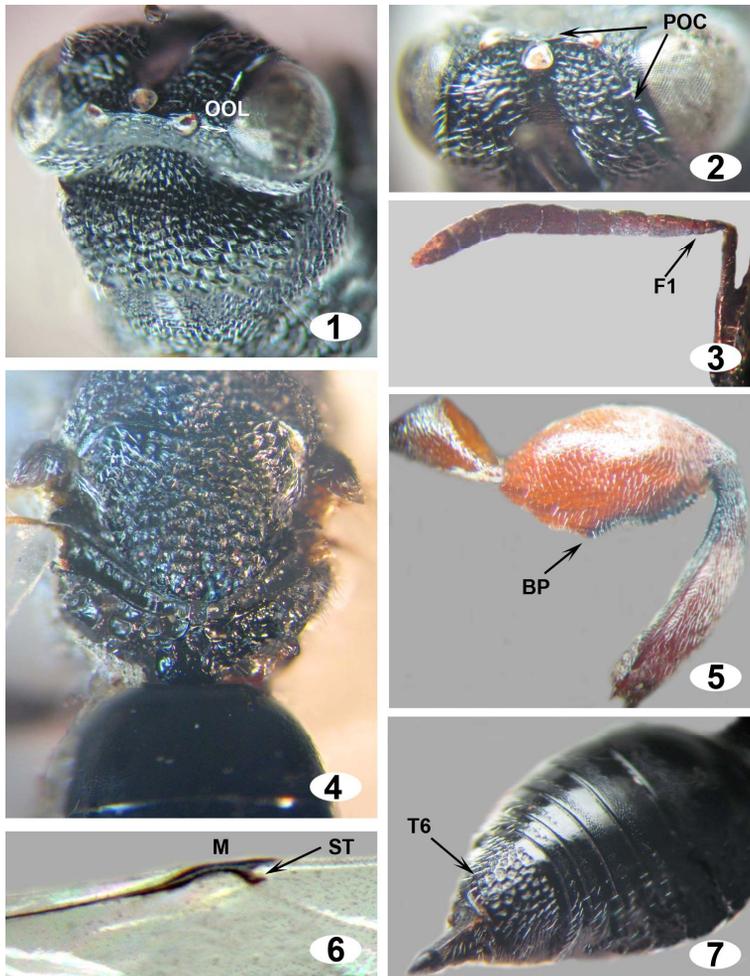
Psilochalcis zarudnyi belongs to the *benoisti* species group, in which a projecting frontal lobe overlaps the clypeus and the base of the mandibles. This species is very close to them, especially the frontal lobe, which has a similar habitus but is slightly longer.

***Tanycoryphus tibialis* (Nikol'skaya, 1960) comb. n.**

(Figs 1-7)

Material examined – Paratype ♀: labelled "Ou. Kondara 1100 m, D. Varzoba, Tadj. [ikistan] Gussakovskiy" [in Russian] / "*Varzobia tibialis* sp. n. ♀ Nikols'kaya det." / "Paratypus ♀". Other material: Iran: Tehran, Evin, 22.vi.2005, ex: Buprestidae (Coleoptera), on pine, (M. Abai), 4 ♀♀.

Diagnosis – Body and antenna black. Tegula, T1, T2, T3 laterally and syntergum reddish on examined paratype. Hind leg mostly reddish (fig. 5), fore and mid legs partly reddish on. Pre- and postorbital carinae and transverse blunt carina between lateral ocelli visible (fig. 2, POC). All F longer than wide, F1 $\times 2$ as long as pedicel (fig. 3, F1). Walls of punctures forming transverse crests only on mid lobe of mesoscutum. Dorsellum with a large median areola. Fore wing bearing only microtrichiae, without fringe. M $\times 3$ ST (fig. 6, M and ST). Hind femur with blunt basal tooth and one serrulate apical lobe. Additional outer carina of hind tibia complete although evanescent at base. Gaster $\times 1.85$. T6 densely punctured (fig. 7, T6). Postcercal $\times 1.5$ distance between cerci.



Figures 1-7. *Tancoryphus tibialis* (Nikol'skaya). 1. Head and pronotum in fronto-dorsal view; 2. head in dorsal view; 3. female antenna in lateral view; 4. mesonotum, propodeum and first gastral tergite in dorsal view; 5. hind leg in lateral view; 6. forewing venation; 7. female gaster in dorsal view. BP = basal projecting of hind femur; F1 = first funicular segment; M = marginal vein; OOL = ocellar-ocular distance; POC = pre-orbital carina; ST = stigmal vein; T6 = sixth gastral tergite.

Table 1. Preliminary list of the genera and species of the known chalcidids and their hosts present in Iran. New records from Iran are asterisked (*).

Subfamilies	Tribes	Genera	Species	Host
Chalcidinae	Brachymerini	<i>Brachymeria</i> Westwood	<i>B. ceratoniae</i> Delvare <i>B. excarinata</i> Galani * <i>B. femorata</i> (Panzer) <i>B. lasus</i> (Walker) * <i>B. minuta</i> (Linnaeus) <i>B. obtusata</i> (Förster) * <i>B. persica</i> (Masi) <i>B. ruficaeter</i> (Masi) comb. n. <i>B. rugulosa</i> (Förster) * <i>B. tibialis</i> (Walker)	<i>Apomyelois ceratoniae</i> (Lep.: Pyralidae) <i>Plutella xylostella</i> (Lep.: Plutellidae) <i>Heliolius</i> sp. (Lep.: Noctuidae) <i>Lymnoperia dispar</i> (Lep.: Lymanteridae)
			<i>B. viripennis</i> (Förster) * <i>C. biguttata</i> Spinola <i>C. sisypus</i> (Linnaeus) <i>C. tomentosus</i> (Nikol'skaya) <i>T. niinae</i> (Nikol'skaya) syn. n. <i>T. ruficaudis</i> (Cameron) * <i>D. himalayana</i> Westwood <i>D. wohlfihrhae</i> Ferrière * <i>A. hypopygiae</i> Masi * <i>B. obscura</i> Masi <i>B. nigra</i> (Siebold) <i>Hockeria</i> near <i>bifasciata</i> Walker <i>H. confusa</i> Nikol'skaya <i>H. unicolor</i> Walker * <i>K. gracilis</i> (Nikol'skaya) comb. n. <i>K. hofferi</i> (Bouček) <i>L. eintricornis</i> (Walker) * <i>L. indescrptia</i> (Bouček) stat. rev. * <i>L. sparsibarbis</i> Bouček <i>Lastochalcidia</i> sp. * <i>N. fertoni</i> (Kieffer) * <i>N. hetera</i> (Walker) <i>P. caryobori</i> (Hama) * <i>P. incongruens</i> (Masi) <i>P. nigripes</i> (Fonscolombe) <i>P. persica</i> Delvare <i>T. tibialis</i> Nikol'skaya comb. n. * <i>P. ceratoniae</i> Delvare <i>P. ligastica</i> (Masi) <i>P. subaenea</i> (Masi) <i>P. subjecta</i> (Nikol'skaya) comb. n. <i>P. zarudnyi</i> (Nikol'skaya) comb. n.	<i>Apomyelois ceratoniae</i> (Lep.: Pyralidae) <i>Euproctis chrysorrhoea</i> , <i>Euproctis melania</i> , <i>Leucoma wiltshirai</i> , <i>Oeneria</i> sp., <i>Paracneria terevithina</i> and <i>Euproctis melania</i> (Lep.: Lymanteridae), <i>Zygoena haberhaueri</i> (Lep.: Zygaenidae)
Dirhininae	Dirhinini	<i>Dirhinus</i> Dalman		Buprestidae (Col.) <i>Chrysobothris</i> sp. (Col.: Buprestidae) <i>Musca domestica</i> (Dip.: Muscidae) <i>Calliphoridae</i> (Dip.) <i>Chilo suppressalis</i> (Lep.: Crambidae) and <i>Naranga aeneascens</i> (Lep.: Noctuidae) ?
Haltichellinae	Haltichellini	<i>Antrocephalus</i> Kirby <i>Belaspidia</i> Masi <i>Hockeria</i> Walker		Psychidae (Lep.) <i>Chilo suppressalis</i> (Lep.: Crambidae) and <i>Naranga aeneascens</i> (Lep.: Noctuidae) ?
		<i>Kriechbaumerella</i> Dalla Torre <i>Lastochalcidia</i> Masi		
		<i>Neochalcis</i> Kirby <i>Neohydrobax</i> Nikol'skaya <i>Proconura</i> Dodd		<i>Caryedon acaciae</i> (Col.: Chrysomelidae)
Hybothoracini		<i>Tamycoryphus</i> Cameron <i>Psilochalcis</i> Kieffer		<i>Schneidereria pistacicola</i> (Lep.: Gelechiidae) <i>Apomyelois ceratoniae</i> (Lep.: Pyralidae) <i>Chrysobothris solteri</i> (Col.: Buprestidae) <i>Apomyelois ceratoniae</i> (Lep.: Pyralidae) <i>Caryedon acaciae</i> (Col.: Chrysomelidae)

Distribution – *Tanycoryphus tibialis* was originally described from Uzbekistan and later reported from Central Asia (Tajikistan & Turkmenistan) (Myartseva & Trjapitzin, 1993). This is first record of the genus from Middle East and Iran. It appears that *T. tibialis* is an endemic species in the Central Asia and some parts of Iran.

Hosts – The specimens were reared from the xylophagous buprestid beetle, *Chrysobothris solieri* Gory & Laporte on pine (*Pinus eldarica*). It is also a known parasitoid of *Chrysobothris affinis* (Fabricius) and *Sphenoptera kaznakovi* Jakovlev (Myartseva & Trjapitzin, 1993).

Remarks – The examination of a type of *V. tibialis*, the type species of the genus *Varzobia* Nikol'skaya, showed than it belongs to the genus *Tanycoryphus* Cameron. *Varzobia* is therefore synonymized here with *Tanycoryphus*, **syn. n.**

Acknowledgments

We thank Iranian Research Institute of Plant Protection (especially Dept. of Insect Taxonomy) for providing facilities for this research and our colleagues who generously lent us the specimens. Dr Sergey Belokobylskij from the Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia made the Nikol'skaya's collection of Chalcididae accessible to us, so we are extremely grateful to him for this. We also thank Mr Fabio Penati and Dr Roberto Poggi, from the Museo Civica di Storia Naturale di Genova, Italy, who kindly sent the types of the relevant species described by Masi. We are also obliged to Dr. Zimmermann for the loan of the Förster's types housed in the Naturhistorischen Museum, Wien. We are grateful to Dr. Petr Janšta (Faculty of Science, Department of Zoology, Charles University in Prague, Czech Republic) who kindly brought a series of types housed in the Natural History Museum of Praha for examination.

References

- Abai, M.** (1976) *Porthesia melania* Stgr. (Lep.: Lymantriidae) in Iran. *Entomologie et Phytopathologie Appliquées* 41, 7-15.
- Abai, M. & Faseli, G.** (1986) Morphology, biology and control of the fig tree defoliator *Ocnerogyia amanda* Stgr. (Lep., Lymantriidae). *Journal of Entomological Society of Iran* 8(1-2), 31-44.
- Adeli, E.** (1975) *The oak tree pest Leucoma wiltshirei* Collen in Iran. Technical Publication, Research Institute of Forestry, Tehran, No 18.

- Alahmed, A. M.** (1999) Parasitoids that attack housefly (Diptera: Muscidae) at dairy farms in Riyadh region, Saudi Arabia. *Alexandria Journal of Agricultural Research* 44(3), 291-296.
- Andriescu, I.** (1988) The family Chalcididae in Rumania, a faunistic, biogeographical and economic study. *Advances in Parasitic Hymenoptera Research: Proceedings of the II Conference on the Taxonomy and Biology of Parasitic Hymenoptera*, pp. 259-263.
- Askari, A. & Coppel, H.** (1977) Courtship behavior and evidence for a sex pheromone in two hymenopterous gypsy moth parasitoids, *Meteorus pulchricornis* Wesmael (Braconidae) and *Brachymeris intermedia* (Nees) (Chalcididae). *Proceeding of the 6th Iranian Plant Protection Congress, University of Tehran*, p. 58.
- Askew, R. R. & Shaw, M. R.** (2001) *Brachymeria tibialis* (Walker, 1834) (Hymenoptera: Chalcididae), a parasitoid of *Zygaena* Fabricius, 1777, and other Lepidoptera. *Entomologist's Gazette* 52(4), 263-268.
- Báez, M. & Askew, R.R.** (1999) New records of Chalcidoidea (Hymenoptera) from the Canary Islands. *Boletín de la Asociación Española de Entomología* 23(1-2), 65-82.
- Blasco-Zumeta, J.** (2000) Contribution à l'étude de la faune associée à *Juniperus thurifera* L. dans Los Monegros (Aragon, Espagne). *Les Dossiers Forestiers* 6, 94-103.
- Bouček, Z.** (1952) The first revision of the European species of the family Chalcididae (Hymenoptera). *Acta Entomologica Musei Nationalis Pragae* 27(supplement 1), 1-108, pl. i-xvii.
- Bouček, Z.** (1956) A contribution to the knowledge of the Chalcididae, Leucospidae and Eucharitidae (Hymenoptera, Chalcidoidea) of the Near East. *Bulletin of the Research Council of Israel* 5B, 227-259.
- Bouček, Z.** (1965) A review of the Chalcidoid fauna of the Moldavian SSR, with descriptions of new species (Hymenoptera). *Acta Faunistica Entomologica Musei Nationalis Pragae* 11(97), 5-37.
- Bouček, Z.** (1966) Materialy po faune chalcid (Hymenoptera, Chalcidoidea) Moldavskoy SSR. 2. *Trudy Moldavskogo Nauchno-Issledovatel'skogo Instituta Sadovodstva, Vinogradarstva i Vinodeliya*. Kishinev 13, 15-38.
- Bouček, Z.** (1970) Contribution to the knowledge of Italian Chalcidoidea based mainly on a study at the Institute of Entomology in Turin, with descriptions of some new European species (Hymenoptera). *Memorie della Società Entomologica Italiana* 49, 35-102.

- Bouček, Z.** (1972) On some European Chalcididae (Hymenoptera) with the description of a new *Euchalcis* Dufour. *Entomologist's Gazette* 23(4), 237-242.
- Bouček, Z.** (1977) A faunistic review of the Yugoslavian Chalcidoidea (parasitic Hymenoptera). *Acta Entomologica Jugoslavica* 13, 1-145.
- Bouček, Z.** (1984) On *Schwarzella*, *Invreia* and some other Hybothoracini (Hym.: Chalcididae). *Bollettino del Laboratorio di Entomologia Agraria 'Filippo Silvestri', Portici* 41, 53-63.
- Bouček, Z.** (1988) *Australasian Chalcidoidea (Hymenoptera): a biosystematic revision of genera of fourteen families, with a reclassification of species*. 832 pp. Wallingford, U. K.: CAB International.
- Bouček, Z.** (1992) The New World genera of Chalcididae (Hymenoptera). *Memoirs of the American Entomological Institute* 53, 49-117.
- Dalla Torre, K. W. von** (1898) *Catalogus Hymenopterorum hucusque descriptorum systematicus et synonymicus. V. Chalcididae et Proctotrupidae*. 598 pp. Leipzig.
- Dabiri, F. Tirgari, S. & Ghassemi, M. J.** (1998) Complement laboratory studies on the biology of parasitoid wasp *Dirhinus himalayensis* Westwood, 1836 (Hym.: Chalcididae) with emphasis study of the average number of eggs laid by one mated female wasp and the sex ratio of progenies. *Proceeding of the 13th Iranian Plant Protection Congress, Karaj*, p. 259.
- Davatchi, A.** (1958) Étude biologique de la faune entomologique des Pistacia sauvages et cultivés. *Revue de Pathologie Végétale et d'Entomologie Agricole* 37, 1-166.
- Davatchi, A. & Chodjai, M.** (1968) Les Hymenopteres entomophages de l'IRAN - études faunistiques. *The 1st Iranian Plant Protection Congress, Tehran*, 89 pp.
- Delvare, G.** (2004) *Contribution à l'étude systématique des Chalcidoidea (Insecta, Hymenoptera): Phylogénie, complexes d'espèces chez les Chalcididae, Eurytomidae et Torymidae*. 81 pp. Dossier d'Habilitation à diriger des Recherches, Université Montpellier III Paul Valéry.
- Delvare, G. & Bouček, Z.** (1992) On the New World Chalcididae (Hymenoptera). *Memoirs of the American Entomological Institute* 53, 1-466.
- Delvare, G., Pujade-Villar, J. & Rasplus, J.-Y.** (1999) Révision des *Belaspidia* oust-Paléarctiques (Hymenoptera: Chalcididae). *Annales de la Société Entomologique de France (Nouvelle Série)* 35(3-4), 329-345.

- Delvare, G., Talaei, L. & Goldansaz S. H.** (2011) New Chalcididae (Hymenoptera: Chalcidoidea) of economic importance from Iran. *Annales Zoologici (Warszawa)* 61(4), 789-801.
- Descamps, M.** (1956) Insectes nuisibles au riz dans le Nord Cameroun. *L'Agronomie Tropicale* 11(6), 732-755.
- El-Agoze, M. M.** (1989) Biological studies on *Dirhinus wohlfahrtiae* Ferrière (Hymenoptera: Chalcididae). *Journal of the Egyptian Society of Parasitology* 19, 629-634.
- Ferrière, C.** (1935) Description de deux importants chalcidiens d'Égypte et du Soudan. *Bulletin de la Société Entomologique d'Égypte* 19, 365-370.
- Fonscolombe, E. L. J. H. Boyer de** (1832) Monographia chalciditum galloprovinciae circa aquas degentum. *Annales des Sciences Naturelles (1) (Zoologie)* 26, 273-307.
- Förster, A.** (1859) Zweite Centurie neuer Hymenopteren. *Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westfalens, Bonn* 16, 87-124.
- Fry, J. M.** (1989) *Natural enemy databank, 1987. A catalogue of natural enemies of arthropods derived from records in the CIBC Natural Enemy Databank.* 97 pp. CAB International, Wallingford, Oxford, UK.
- Graham, M. W. R. de V.** (1992) Hymenoptera collections of Boyer de Fonscolombe, with an account of his work and a description of the natural features of his estate. *Journal of Natural History* 26, 1089-1111.
- Gubbaiah** (1984) *Cryptoblabes gnidiella*, a fern-feeding caterpillar, and its parasites. *International Rice Research Newsletter* 9(6), 20-21.
- Györfi, J.** (1939) Beiträge zur forstlichen Bedeutung der Schlupfwespen. *Erdészeti Kísérletek* 41, 117-142.
- Györfi, J.** (1942) Die Ergebnisse meiner Schlupfwespen-Forschungen mit besonderer Berücksichtigung der Zwischenwirtfrage. *Erdészeti Kísérletek* 44, 89-165.
- Györfi, J.** (1962) Beiträge zur Kenntnis der Lebensweise der Chalcididen-Arten in Ungarn. *Zeitschrift für Angewandte Entomologie* 49, 207-223.
- Habu, A.** (1960) A revision of the Chalcididae (Hymenoptera) of Japan, with description of sixteen new species. *Bulletin the National Institute of Agricultural Sciences, Series C (Phytopathology and Entomology)* 11, 132-363.

- Haeselbarth, E.** (1983) Determination list of entomophagous insects. Nr. 9. *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 6(1), 1-49.
- Hanna, A. D.** (1934) The male and the female genitalia and the biology of *Euchalcidia caryobori* Hanna (Hymenoptera, Chalcidinae). *Transactions of the Royal Entomological Society of London* 82(1), 107-136.
- Heraty, J.** (2003) Phylogeny of Chalcidoidea / Hymenoptera Assembling the Tree Of Life - Initial Manifesto.
- Joseph K. J., Narendran, T. C. & Joy P. J.** (1972) New species of Oriental *Brachymeria* Westwood (Hymenoptera: Chalcididae) in the collections of Rijksmuseum van Natuurlijke Historie, Leiden. *Oriental Insects* 6(1), 45-54.
- Joseph, K. J., Narendran T. C. & Joy, P. J.** (1973) Oriental *Brachymeria*; a monograph on the Oriental *Brachymeria* (Hymenoptera: Chalcididae). *Zoological Monograph* 1, 1-215.
- Joy, P. J., Narendran T. C. & Joseph, K. J.** (1972) New records of *Brachymeria lasus* (Walker) and *Brachymeria excarinata* Gahan as pupal parasites of *Nephantis serinopa* Meyr., the black-headed caterpillar pest of coconut in South India. *Indian Journal of Entomology* 35(1) 69-70.
- Kalina, V.** (1989) Checklist of Czechoslovak Insects III (Hymenoptera, Chalcidoidea). *Acta Faunistica Entomologica Musei Nationalis Pragae* 19, 97-127.
- Kieffer, J. J.** (1899) Description de quelques chalcidites nouveaux suivie d'une étude sur le genre *Euchalcis* Duf. (*Allocera* Sich.). *Annales de la Société Entomologique de France* 68, 360-378.
- Lotfalizadeh, H. & Khalghani, J.** (2008) Hymenopterous parasitoids (Hym.: Chalcidoidea) of xylophagous beetles in Iran. *Entomofauna Zeitschrift für Entomologie* 29(19), 249-264.
- Maadani, A. & Ladonni, H.** (1993) First report on the occurrence of another pupal parasitoid of house fly and studies on its biology and mass culturing in Iran, *Dirhinus himalayensis* Westwood (Hym.: Chalcididae, Dirhininae). *Proceeding of the 11th Iranian Plant Protection Congress*, p. 298.
- Masi, L.** (1916) Materiali per una fauna dell'arcipelago toscana, xi, Calcididi del Giglio. *Annali del Museo Civico di Storia Naturale di Genova* 47, 54-122.

- Masi, L.** (1924) Nuove species di *Chalcis* raccolte nella Persia da March. G. Doria. *Annali del Museo Civico di Storia Naturale Giacomo Doria, Genova* 10(50), 187-192.
- Masi, L.** (1928) Si due nuovi *Antrocephalus* del Turkestan (Hymen. Chalcididae). *Bollettino della Societa Entomologica Italiana* 60, 10-15.
- Masi, L.** (1929) Risultati zoologici della Missione inviata dalla R. Società Geografica Italiana per l'esplorazione dell'Oasi di Giarabub (1926-1927); Hymenoptera Chalcididae. *Annali del Museo Civico di Storia Naturale Giacomo Doria, Genova* 53, 195-240.
- Masi, L.** (1931) Sur quelques *Brachymeriinae* de l'Egypte (Hymen. Chalc.). *Bulletin de la Société Entomologique d'Egypte* 1930, 214-218.
- Masi, L.** (1951) Materiali per una monografia delle *Brachymeria* paleartiche (Hym. Chalcidoidea). *Eos Revista Española di Entomologia Madrid, Tomo extraordinario* 45, 27-58.
- Menozi, C.** (1947) *Animali e vegetali dannosi alla barbabietola da zucchero e mezzi per combatterli*. 206 pp. Societa Approvvigionamento Bietole e Vendita Zucchero, Genova.
- Munro, J. B., Heraty, J. M., Burks, R. A., Hawks, D., Mottern, J., Cruaud, A., Rasplus, J.-y. & Jansta, P.** (2011) A molecular phylogeny of the Chalcidoidea (Hymenoptera). *PLoS ONE* 6(11), e27023, 1-27.
- Myartseva, S. N. & Trjapitzin, V. A.** (1993) The parasitoid *Varzobia tibialis* Nikolskaya (Hymenoptera, Chalcididae) in the fauna of Turkmenistan. *Izvestiya Akademii Nauk Turkmenskoy SSR (Seriya Biologicheskikh Nauk)* 5, 73-74.
- Narendran, T. C.** (1986) Family Chalcididae. 11-41 in Subba Rao, B. R. & Hayat, M. (Eds). *The Chalcidoidea (Insecta: Hymenoptera) of India and the adjacent countries*. 430 pp. The Association for the Study of Oriental Insects, Oriental Insects, Vol. 20.
- Narendran T. C.** (1989) *Oriental Chalcididae (Hymenoptera: Chalcidoidea)*. *Zoological Monograph*. 441 pp. University of Calicut, Department of Zoology, Kerala, India.
- Nikol'skaya, M.** (1952) *Chalcids of the fauna of the USSR (Chalcidoidea)*. 575 pp. Opredeliteli po Faune SSSR 44; Moscow and Leningrad, Zoologicheskim Institutom Akademii Nauk SSSR. [In Russian].
- Nikol'skaya, M. N.** (1960) Chalcididae and Leucospidae in Central Asia (Hymenoptera, Chalcidoidea). *Trudy Zoologicheskogo Instituta, Akademiya Nauk SSSR, Leningrad* 27, 220-246. [In Russian].

- Nikolskaya, M. N.** (1978) Hymenoptera II. Chalcidoidea. 1. Chalcididae. *Opredelitel' Nasekomykh Evropeiskoi Chasti SSSR*, 40-51. [In Russian].
- Nikolskaya, M. N. & Kyao, N. N.** (1954) Chalcid fauna of the middle course of the river Ural and its economic importance. *Trudy Zoologicheskogo Instituta, Akademiya Nauk SSSR, Leningrad* 16, 404-416. [In Russian].
- Nikdel, M., Sadaghian, B. & Dordaei, A.** (2004) Collection and identification of brown-tail moth's natural enemies in Arasbaran forests. *The Joint Agriculture and Natural Resources Symposium, Tabriz-Ganja*.
- Noyes, J. S.** (2011) Universal Chalcidoidea Database. The Natural History Museum. Available on: <http://www.nhm.ac.uk/research-curation/projects/chalcidoids/> (accessed March 2011).
- Risbec, J.** (1956) Hyménoptères parasites du Cameroun. *Bulletin de l'Institut Français d'Afrique Noire* 18, 806-833.
- Ruschka, F.** (1920), Chalcididen-Studien. II. Die europäischen Arten der Gattung *Smicra* Spin. *Neue Beiträge zur Systematischen Insektenkunde* 1, 145-147.
- Sabahi, Q.** (2000) The biology of pistachio defoliator *Ocneria terebinthia* Stg. (Lep.: Lymanteriidae) in Fars province. *Proceeding of the 14th Iranian Plant Protection Congress, Vol. 1, Pests*, p. 59.
- Schremmer, F.** (1960) Beitrag zur Biologie der in Stratiomyiden-larven parasitierenden Chalcididen der Gattung *Smicra* Spin. (Chalcis F.). *Entomologisches Nachrichtenblatt Österreichischer und Schweizer Entomologen* 12, 83-89.
- Sellenschlo, U. & Tröger, E. J.** (1993) Nachweise von Erzwespen der Unterfamilie Hybothoracinae (Hymenoptera: Chalcididae) in Deutschland Parastioide bei Netzflüglern (Neuroptera). *Entomologische Zeitschrift, Frankfurt* 103(11), 207-210.
- Sepehr, K. & Abaii, M.** (1989) Some investigations on *Ocneria terebynthina* Stgr. (Lep.: Lymantriidae) in Fars province. *Proceeding of the 9th Iranian Plant Protection Congress, Mashhad*, p. 59.
- Sheng, J. K.** (1986) Two new species and a new record of *Antrocephalus* Kirby from Jiangxi China. *Acta Agriculturae Universitatis Jiangxiensis* 8(27), 19-21.
- Silvestri, F.** (1943) Studi sugli Strepsiptera Insecta. III Descrizione e biologia di specie italiane di Mengenilla. *Bollettino del Laboratorio di Zoologia Generale e Agraria della Facoltà Agraria in Portici* 32, 197-282.

- Steffan, J. - R.** (1950) Les Haltichellinae du groupe *Neochalcis* Kirby (Hym.: Chalcididae). *Bulletin du Muséum National d'Histoire Naturelle, Paris (2ème Série)* 22(6), 746-752.
- Steffan, J. - R.** (1951a) Note sur la classification des Brachymeriinae (Hym.: Chalcididae). *Bulletin de la Société Entomologique de France* 55(10), 146-150.
- Steffan, J. - R.** (1951b) Les espèces françaises d'Haltichellinae (Hyménoptères: Chalcididae). *Feuilles des Naturalistes* 6(1-2), 1-7.
- Steffan, J. - R.** (1951c) Contribution à l'étude des Haltichellinae du 'groupe *Euchalcidia*' (Hymenopt. Chalcididae) conservés au Muséum National d'Histoire Naturelle de Paris. *Mémoires du Muséum National d'Histoire Naturelle (N. S.) (A)* 4(2), 51-86.
- Steffan, J. - R.** (1951d) Les espèces françaises d'Haltichellinae (Hyménoptères: Chalcididae) (suite). *Feuille des Naturalistes* 6(9-10), 82-85.
- Steffan, J. - R.** (1951e) Remarques sur quelques genres d'Haltichellinae (Hym.: Chalcididae). *Bulletin du Muséum National d'Histoire Naturelle, Paris (2ème Série)* 23, 375-380.
- Steffan, J. - R.** (1953) Les espèces françaises d'Haltichellinae (Hyménoptères: Chalcididae) (suite). *Cahiers des Naturalistes, Bulletin des Naturalistes Parisiens (N. S.)* 8(1-2), 7-12.
- Steffan, J. - R.** (1957) Note synonymique sur les Cratocentrini et les Phagonophorini [sic] (Hym.: Chalcididae). *Bulletin de la Société Entomologique de France* 61, 238-242.
- Steffan J. - R.** (1958) Comportement de *Lasiochalcidia igiliensis* (Ms) et de l'espèce nouvelle *L. pugnatrix* (Hym. Chalcididae) parasites de fourmilions. *Bulletin du Muséum National d'Histoire Naturelle, Paris (2ème Série)* 30(6), 506-512.
- Steffan, J. - R.** (1959a) Révision de la tribu des Cratocentrini (Hymen.: Chalcididae). *Acta Entomologica Musei Nationalis Pragae* 33, 287-325.
- Steffan, J. - R.** (1959b) Les espèces françaises du genre *Brachymeria* Westw. et commentaires sur leur biologie (Hym.: Chalcididae). *Cahier des Naturalistes, Bulletin des Naturalistes Parisiens (N. S.)* 15(2), 35-43.
- Steffan J. - R.** (1959c) Les chalcidiens parasites de fourmilions. *Vie et Milieu* 10(3), 303-317.
- Steffan J. - R.** (1961) Comportement de *Lasiochalcidia igiliensis* Ms., chalcidide parasite de fourmilions. *Comptes-Rendus de l'Académie des Sciences (Série D)* 253, 1-3.
- Steffan, J. - R.** (1966) Les hôte de *Lasiochalcidia* MS. (Hym.: Chalcididae) de la faune de France. *Bulletin du Muséum National d'Histoire Naturelle* 38(4), 400-408.
- Steffan, J. - R.** (1976) Les *Euchalcidia* Masi du bassin méditerranéen (Hym. Chalcididae). *Bulletin de la Société Entomologique de France* 81(1/2), 52-63.

- Tremewan, W. G.** (1976) Further notes on *Zygaena* Fabricius (Lep.: Zygaenidae) from Iran. *Entomologist's Gazette* 27(4), 215-220.
- Tudor, C.** (1962) Contribution à l'étude des chalcidoïdes (Insecta-Hymenoptera) de la République Populaire Roumaine. *Comunicarile Academiei Republicii Populare Române, Bucuresti* 12, 63-70.
- Walker, F.** (1834) Monographia Chalciditum. *Entomological Magazine* 2, 13-39.
- Walker, F.** (1871) *Notes on Chalcidiae. Part III. Torymidae and Chalcididae.* pp. 37-54. Janson Publication, London.
- Wijesekara, G. A. W.** (1997) Phylogeny of Chalcididae (Insecta: Hymenoptera) and its congruence with contemporary hierarchical classification. *Contributions of the American Entomological Institute* 29(3), 1-61.

Received: 20 December 2010

Accepted: 20 November 2011