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Turgut, S. & Turgut, A. 2000. Title of the Chapter. In: Turgut, A., Turgut, B. & Turgut, C. (Eds.), Title of Book. Publisher name and location, page range.

Book:
Turgut, A., Turgut, B. & Turgut, C. 2001. Title of Book, Publisher name and location, number of pages (e.g. 123 pp).

Internet resources:
Turgut, S. 2002. Title of website, database or other resources, Publisher name and location (if indicated), number of pages (if known). Available from: http://xxx.xxx.xxx/ (Date of access).

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A NEW CATALOGUE OF THE CERAMBYCIDAE (COLEOPTERA) OF ISRAEL WITH NOTES ON THEIR DISTRIBUTION AND HOST PLANTS

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[**Sama, G., Buse, J., Orbach, E., Friedman, A. L. L., Rittner, O. & Chikatunov, V.** 2010. A new catalogue of the Cerambycidae (Coleoptera) of Israel with notes on their distribution and host plants. Munis Entomology & Zoology, 5 (1): 1-51]

ABSTRACT: A new Catalogue of the Cerambycidae from Israel is proposed with details on their distribution and host plants. A total of 104 species representing 65 genera and 5 subfamilies are recorded. All taxa mentioned by previous authors are quoted and discussed; a list of species to be excluded from the Israeli Cerambycid fauna is provided. Seven species are regarded as new records for Israel.

KEY WORDS: Invertebrates, Coleoptera, Cerambycidae, Catalogue, Israel, east Mediterranean, new records.

Longhorn beetles (Cerambycidae) are a group of insects belonging to the most attractive taxa for collectors all over the world. To date more than 25,000 species of Cerambycidae have been described worldwide, and there are possibly many more. The Mediterranean region is known for its huge diversity (Cowling et al., 1996; Medail & Quezel, 1999) in particular in terms of species richness and rates of endemism in European longhorn beetles (Baselga, 2008; Bense, 1995). While Mediterranean Europe is relatively well studied with respect to the composition of insect fauna, the eastern Mediterranean area, particularly the Near East, has been less well studied, but is now increasingly attracting attention because of its diversity in a wide variety of habitats (e.g. Buse et al., 2008). Preliminary catalogues of the longhorn beetles of Jordan (Sama et al., 2002) and Lebanon (Sama & Rapuzzi, 2000; Sama & Rapuzzi, in print) have recently been presented. The first Cerambycidae from Israel were recorded by Reiche (1854), who listed 5 species collected by F. de Saulcy in "Syria", a term which included the current territory of Israel. A few years later, Reiche & Saulcy (1858) recorded 6 taxa collected during the same trip, among which *Phytoecia jezabel* [= *Musaria wachanrui* Mulsant, 1851)], *Phytoecia orbicollis* (now in *Helladia* Fairmaire, 1864), *Phytoecia bethseba* (= *Phytoecia caerulea* ssp. *bethseba*, *P. croceipes* (replacement name for *P. puncticollis* Mulsant & Wachanru, 1852) and *Agapanthia lais*) were regarded as new. Sahlberg & Saalas (1913) published a report of a trip to the western Mediterranean in which they included 20 Cerambycidae taxa collected in Israel. Early attempts to record the longhorn beetle fauna from Israel and the former Palestine were made by Bodenheimer (1937), who listed 49 taxa in addition to 24 further species which now have to be deleted from the catalogue of the Israeli fauna, and by Heyrovský (1948; 1950; 1954). A first catalogue of the Cerambycidae of Israel was published by Bytinski-Salz (1956) who listed 84 species occurring in Israel, but noted that several of these species stemmed from doubtful records of earlier collectors. In fact, 68 of the 84 species listed in Bytinski-Salz's catalogue are now known to belong to the Israeli Cerambycid fauna. A further important contribution was provided by Halperin & Holzschuh (1993) who recorded the host plants of 54 species and added 13 species recorded for the first time from Israel, two of which, however [*Crossotus subocellatus* (Fairmaire, 1886) and *Lygrus longicornis* Pic, 1895], were recorded by misidentification. Since this first checklist was published 50 years ago, the regions of Israel have been studied by a number of collectors both for taxonomic and faunistic purposes (e.g. Sama, 1993a, 1993b; Sama, 1996; Chikatunov et al., 1999; Sama, 2000a, 2000b; Finkel et al. 2002; Sama & Orbach 2003; Chikatunov et al., 2006; Friedman et al., 2008; Buse et al., 2008). These studies have enhanced our knowledge of species distribution and host plants used in Israel. In recent years more and more ecological research focusing on the patterns of biodiversity in different habitats and under different management conditions has been carried out; this has also resulted in new distribution data for longhorn beetle species in Israel. In the current paper, we present a new catalogue of the Cerambycidae of Israel that includes checked previous records, synonymies, updated nomenclature, details on distribution and host plants. Complete scientific names of host plants are given with author and family only when quoted for the first time.

SOURCES OF DATA AND PRESENT STATUS OF RESEARCH

In this paper we have used previously published data as well as material from museum collections and private collections. Localities in previously published works are not repeated when related specimens are found and checked in Bytinski's collection and listed among the "material examined" (e.g., the material, sent by Bytinski to Heyrovský and published by him later). If not stated otherwise, notes on distribution, host plants and biology are taken from authors' archives or personal observations.

Despite the growing knowledge of Cerambycidae in the Near East, regional or local surveys of the insect fauna are needed to establish nature reserves which are based not only on bird and mammal data. So far, spatial distribution and population trends are not known for most of the insects in this region. We suggest to initiate monitoring studies in selected areas for some important ecological groups. Monitoring of longhorn beetles would be of interest particularly with respect to climate change and altered forest management practices as these beetles represent a group of insects which are responsible for changes in woodland structure and composition. In general, monitoring would be beneficial in the construction of a red list of threatened species, as no such list has been compiled for any insect group in Israel to date.

CHECKLIST OF THE CERAMBYCIDAE FROM ISRAEL

New records to the Israeli Cerambycid fauna are marked with (*); endemic species are marked with (E).

Subfamily PRIONINAE
1) ***Prinobius myardi atropos*** Chevrolat, 1854
2) ***Rhaesus serricollis*** (Motschulsky, 1838)
3) ***Anthracocentrus arabicus*** (Thomson, 1877)
4) ***Mesoprionus besikanus*** (Fairmaire, 1855)

5) ***Monocladum aegyptiacum aegyptiacum*** (Guérin-Ménéville, 1844)

Subfamily LEPTURINAE
6) ***Cortodera kochi*** Pic, 1935**(E)**
7) ***Grammoptera baudii pistacivora*** Sama, 1996
8) ***Pseudovadonia livida*** (Fabricius, 1777)
9) ***Pedostrangalia riccardoi carmelita*** Sama, 1996 **(E)**
10) ***Paracorymbia benjamini benjamini*** (Sama, 1993) **(E)**
11) ***Stictoleptura cordigera cordigera*** (Fuesslins, 1775)
12) ***Stictoleptura heydeni*** (Ganglbauer, 1889)

Subfamily SPONDYLIDINAE
13) ***Alocerus moesiacus*** (Frivaldszky, 1838)
14) ***Arhopalus ferus*** (Mulsant, 1839)
15) ***Arhopalus syriacus*** (Reitter, 1895)

Subfamily CERAMBYCINAE
16) ***Xystrocera globosa*** (Olivier, 1795)
17) ***Icosium tomentosum atticum*** Ganglbauer, 1882
18) ***Cerambyx cerdo*** Linnaeus, 1758
19) ***Cerambyx dux*** (Falderman, 1837)
20) ***Cerambyx welensii*** (Küster, 1846)
[*Jebusaea hammerschmidti* Reiche, 1877**]**
21) ***Axinopalpis gracilis*** (Krynicki, 1832)
22) ***Stromatium unicolor*** (Olivier, 1795)
23) ***Hesperophanes sericeus*** **(**Fabricius, 1787)
24) ***Trichoferus griseus*** (Fabricius, 1792)
25) ***Trichoferus fasciculatus fasciculatus*** (Falderman, 1837)
26) ***Penichroa fasciata*** (Stephens, 1831)
27) ***Hylotrupes bajulus*** (Linnaeus, 1758)
28) ***Pseudobolivarita negevensis*** Sama & Orbach, 2003 **(E)**
29) ***Molorchus juglandis*** Sama, 1982
30) ***Glaphyra kiesenwetteri hircus*** Abeille, 1881 **(*)**
31) ***Stenopterus flavicornis*** Küster, 1846
32) ***Stenopterus rufus syriacus*** Pic, 1892
33) ***Lampropterus femoratus*** (Germar, 1824)
34) ***Procallimus distinctipes*** (Pic, 1906) **(*)**
35) ***Certallum ebulinum*** (Linnaeus, 1767)
36) ***Certallum thoracicum*** **(**Sharp, 1880) **(*)**
37) ***Deilus fugax*** (Olivier, 1790)
38) ***Aromia moschata ambrosiaca*** (Stevens, 1809)
39) ***Ropalopus ledereri ledereri*** Fairmaire, 1866
40) ***Poecilium lividum*** (Rossi, 1794) **(*)**
41) ***Poecilium fasciatum*** (Villers, 1789**) (*)**
42) ***Poecilium rufipes syriacum*** (Pic, 1891)
43) ***Phymatodes testaceus*** (Linnaeus, 1758)
44) ***Nathrius brevipennis*** (Mulsant, 1839)
45) ***Stenhomalus*** **(*Obriopsis*)** ***bicolor*** (Kraatz, 1862)
46) ***Lygrus becvari*** Sama, 1999
47) ***Turanoclytus raghidae*** (Sama & Rapuzzi, 2000)
48) ***Xylotrechus stebbingi*** Gahan, 1906
49) ***Clytus taurusiensis*** (Pic, 1903)

50) ***Clytus rhamni*** (Germar, 1817)
51) ***Clytus madoni*** (Pic, 1890)
52) ***Plagionotus bobelayei*** (Brullé, 1832)
53) ***Plagionotus floralis*** **(**Pallas, 1773)
54) ***Chlorophorus yachovi*** Sama, 1996
55) ***Chlorophorus gratiosus gratiosus*** (Marseul, 1868)
56) ***Chlorophorus sartor*** (Müller, 1766)
57) ***Chlorophorus trifasciatus*** (Fabricius, 1781)
58) ***Chlorophorus varius damascenus*** (Chevrolat, 1854)
59) ***Purpuricenus dalmatinus*** Sturm, 1843
60) ***Purpuricenus budensis*** (Goeze, 1883)
61) ***Purpuricenus interscapillatus interscapillatus*** Plavilstshikov, 1937
62) ***Purpuricenus desfontainii inhumeralis*** Pic, 1891
63) ***Phoracantha semipunctata*** (Fabricius, 1775)
64) ***Phoracantha recurva*** Newman, 1842

Subfamily LAMIINAE
65) ***Pedestredorcadion drusum*** **(**Chevrolat, 1870)
66) ***Batocera rufomaculata*** (DeGeer, 1775)
67) ***Crossotus katbeh*** Sama, 2000
68) ***Crossotus strigifrons*** (Fairmaire, 1886)
69) ***Crossotus xanthoneurus*** Sama, 2000
70) ***Niphona picticornis*** Mulsant, 1839
71) ***Deroplia genei genei*** (Aragona, 1830)
72) ***Apomecyna lameerei*** (Pic, 1895)
73) ***Anaesthetis anatolica*** Holzschuh, 1990
74) ***Pogonocherus perroudi perroudi*** (Mulsant, 1839)
75) ***Leiopus syriacus syriacus*** (Ganglbauer, 1884)
76) ***Calamobius filum*** **(**Rossi, 1790)
77) ***Agapanthia*** **(*Agapanthia*)** ***suturalis*** (Fabricius, 1787) **(*)**
78) ***Agapanthia*** **(*Agapanthia*)** ***frivaldszkyi*** Ganglbauer, 1884
79) ***Agapanthia*** **(*Agapanthia*)** ***lais*** Reiche & Saulcy, 1858
80) ***Agapanthia*** **(*Agapanthia*)** ***orbachi*** Sama, 1993 **(E)**
81) ***Agapanthia*** **(*Epoptes*)** ***kirbyi*** (Gyllenhal, 1817)
82) ***Agapanthia*** **(*Epoptes*)** ***pustulifera*** Pic, 1905
83) ***Agapanthia*** **(*Epoptes*)** ***sp.*** [***villosoviridescens*** (DeGeer, 1775) group]
84) ***Saperda quercus ocellata*** Abeille de Perrin, 1895
85) ***Oxylia argentata languida*** (Ménétriés, 1838)
86) ***Coptosia ganglbaueri*** Pic, 1891
87) ***Coptosia compacta sancta*** (Reiche, 1877)
88) ***Pilemia hirsutula hirsutula*** (Frölich, 1893)
89) ***Pilemia halperini*** (Holzschuh, 1999) **(E)**
90) ***Helladia armeniaca armeniaca*** (Frivaldszky, 1878) **(*)**
91) ***Helladia ferrugata*** (Ganglbauer, 1884)
92) ***Helladia insignata*** (Chevrolat, 1854)
93) ***Helladia alziari*** Sama, 1992
94) ***Helladia pontica*** (Ganglbauer, 1884)
[*Helladia orbicollis orbicollis* (Reiche & Saulcy, 1857)**]**
95) ***Musaria wachanrui*** (Mulsant, 1851)
[*Musaria astarte perrini* (Pic, 1891)**]**
96) ***Neomusaria waltli*** Sama, 1991
97) ***Opsilia coerulescens*** (Scopoli, 1763)

98) *Phytoecia caerulea bethseba* Reiche & Saulcy, 1858
99) *Phytoecia croceipes* Reiche & Saulcy, 1858
100) *Phytoecia geniculata* Mulsant, 1862
101) *Phytoecia manicata* Reiche & Saulcy, 1858
102) *Phytoecia pubescens* Pic, 1895
103) *Phytoecia virgula* (Charpentier, 1825)
104) *Blepisanis vittipennis vittipennis* (Reiche, 1877)

ANALYSIS

The present checklist comprises 104 species of Cerambycidae excluding the doubtful records which are displayed in parentheses and includes the following 7 species regarded as new records from Israel: *Glaphyra kiesenwetteri hircus*, *Procallimus distinctipes*, *Certallum thoracicum*, *Poecilium lividum*, *P. fasciatum*, *Agapanthia* (s.str.) *suturalis*, *Helladia armeniaca armeniaca*.

Almost 50 % of recorded species have an east-Mediterranean distribution (Fig. 1). Species distributed throughout the Mediterranean in general represent almost 75 % of the longhorn beetle fauna of Israel. Six longhorn beetle taxa are so far considered to be endemic to Israel, five of which have been described in the last 20 years: *Cortodera kochi* Pic, 1935, *Pedostrangalia riccardoi carmelita* Sama, 1996, *Paracorymbia benjamini benjamini* (Sama, 1993), *Pseudobolivarita negevensis* Sama & Orbach, 2003, *Agapanthia* (s.str.) *orbachi* Sama, 1993, *Pilemia halperini* (Holzschuh, 1999). Two species (*Pedostrangalia riccardoi* Holzschuh, 1984 and *Paracorymbia benjamini* Sama, 1993) are represented by one subspecies in Jordan and Lebanon respectively.

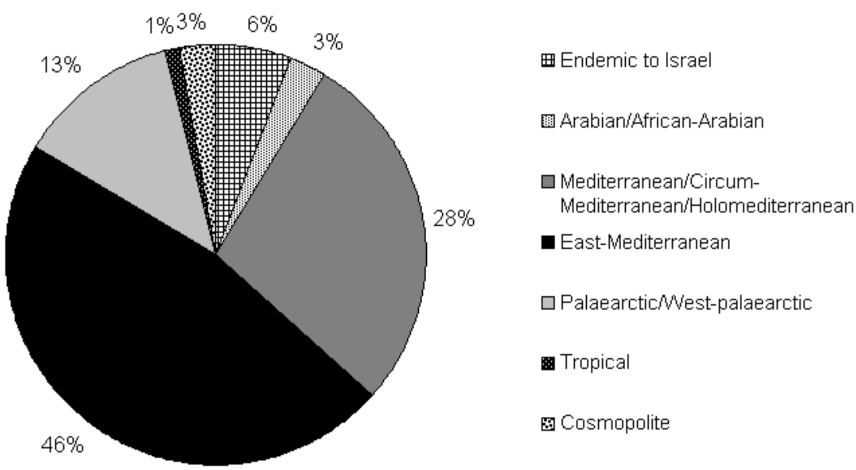

Fig. 1. Biogeographical composition of the longhorn beetle fauna of Israel. When particular subspecies are recorded for Israel, then the distribution of the subspecies is considered.

Recent surveys of the Cerambycidae from neighbouring countries, Jordan (Sama et al., 2002); Sama, in preparation) and Lebanon (Sama & Rapuzzi, in preparation), recorded the occurrence in those areas of 64 (1 endemic) and 109

(11 endemic) species respectively. It should be noted that 51 species (79,6 %) of Jordan also occur in Israel while only 30 species (27,5%) found in Lebanon are known to occur in Israel; 38 species are currently known in these three countries.

The most important host plants for the listed species are known, but in many cases the full spectrum of host plants is not very well studied. However, there are only 9 longhorn beetle species for which no host plant is recorded. The majority of Israel's longhorn beetle species develop in broadleaved trees or shrubs, among them at least 5 species exclusively in oaks, whereas the larvae of only 5 species feed on coniferous trees (4 exclusively on *Pinus*, 1 on *Cupressus*). A further 2 species live on *Eucalyptus* and were introduced with those trees in the past, 40 species (33 belonging to the subfamily Lamiinae) develop in herbs or herbaceous plants, 2 are ecologically associated with various species of *Acacia* in desert areas. The remaining species develop in broadleaved trees, often using a relatively broad spectrum of host plants.

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ABBREVIATIONS AND ACRONYMS

References

Frequently used references are abbreviated as follows.

B56 = Bytinski-Salz, 1956
H48 = Heyrovský, 1948
H54 = Heyrovský, 1954
HH93 = Halperin & Holzschuh, 1993
S13 = Sahlberg, 1913

Collections examined

BMNH = British Museum of Natural History, London, England
BO = Benjamin Orbach private collection (Haifa, Israel)
CPS = Coll. Peter Schurmann (now in coll. G. Sama)
CRP = Coll. Roger Pettersson (Umea, Sweden) det. by G. Sama
ET = Eylon Orbach private collection (Kiryat Tiv'on, Israel)
GS = Gianfranco Sama private collection (Cesena, Italy)
JB = Jörn Buse private collection (Mainz, Germany)
MSF = Museo della Specola, Firenze (Italy)
NMP = Narodni Museum, Praha (Natural History) (Coll. L. Heyrovský)
NMS = Naturkunde Museum Stuttgart (Germany) det. by G. Sama
OR = Oz Rittner private collection (Rishon-Lezion, Israel)
TAU = Tel Aviv University Entomological collection, Israel

Collectors

The name of collectors, when repeated in the text more than two times, are abbreviated as follows. If not stated otherwise (see below under "Collections examined"), specimens collected by these peoples are preserved by the Tel Aviv University Collections.

AF = leg. A. Freidberg
AM = leg. A. Maklakov
AS = leg. A. Schwartz
ASH = leg. A. Shlagman
Asw = leg. A. Swirski
BO = leg. B. Orbach
BS = leg. H. Bytinski-Salz
CB = leg. C. Blondheim
CH = leg. V. Chikatunov
CL = leg. Ch. Lewinsohn
DF = leg. D. Furth
DG = leg. D. Gerling
DS = leg. D. Simon
ESH = leg. E. Shney-Dor
EY = leg. E. Orbach
FK = leg. F. Kaplan
FN = F. Nachbar
GI = leg. G. Ilani
GS = leg. G. Sama
GT = leg. G. Tsabar
JK = J. Krystal
IY = Y. Yarom
JB = leg. J. Buse
JH = leg. J. Halperin
JM = leg. J. Margalit
JK = leg. J. Kugler
JW = leg. J. Wahrman
KY = leg. K. Yefenof
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TO = T. Osten (NMS)
TP = leg. T. Pavlicek
YD = Y. Dorchin
VK = V. Kravchenko
YW = J. Werner

Subfamily PRIONINAE

Prinobius myardi atropos Chevrolat, 1854

Prionobius atropos Chevrolat, 1854, Rev.Mag. Zool.,(2) 6: 482. Type locality: "env. de Beyrouth".
= *Prionus scutellaris* Germar, 1817 (nec Olivier, 1795, *Pyrodes*)
Prionobius cedri Marseul, 1856, Rev. Mag. Zool., (2) 8: 48. Type locality: "La Syrie" [probably Lebanon].
Macrotoma scutellaris: Bodenheimer, 1937: 145; Heyrovský, 1954: 394; Bytinski-Salz, 1956: 210; Bytinski-Salz & Sternlicht, 1967: 134; Halperin & Holzschuh, 1993: 23; Chikatunov et al., 2006 : 317.

Distribution: The true taxonomical value of populations related to *Prinobius myardi* Mulsant, 1842 still constitutes an unsolved question. According to Sama (2002) all described taxa fall within the variability of *P. myardi*. According to Drumont (pers. comm.), genetical analysis would prove that some of them belong in fact to distinct subspecies [such as *P. atropos* (Chevrolat, 1854), described from Lebanon and *P. proksi* Sláma, 1982, from Crete] or even to distinct species (*P. samai* Drumont & Rejzek, 2008, from Western Iran). *P. myardi atropos* is known from the Near orient: Cyprus, Syria, Lebanon, Jordan and Israel (A. Drumont, pers. comm.).

ISRAEL: **Mt. Hermon**: 1700m, 16.VI.1993 (CH); idem, 2000m, 6.VII.1987 (AF); **Golan Heights**: Panyas, 11.VI.1993 (CH); **Carmel Ridge**: Haifa, 7.VII.1946 (BS); **Upper Galilee**: Dan, (B56); Dafna, 13.VIII.1945, 20.X.1975 (BS); Nahal Admonit, 17.VII.1967 (DG); Elon, 24.VII.1946 (BS); **Lower Galilee**: Qiryat Tiv'on, 15.IX.1948 (BS); 18.VI.1988, 19.VIII.1993 (EY); Kefar haHoresh, 19.VII.1971 (AS); **Northern Coastal Plain**: 'Akko (B56); Qiryat Mozkin (B56); 'Atlit, 20.VII.1946 (BS); 17.VII.1996 (EY); Hadera (B56); **Central Coastal Plain**: Pardes Hanna, 14.VII.1936, 15.V.1943 (BS); Kefar Saba [Kfar Sava] (B56); Tel Aviv, 15.VI.1970 (BS); 4 miles N of Jaffa, 9.VIII.1918 "in tent at night", Major E.E. Austen (NHML); Yafo [Jaffa] (B56); Southern Coastal Plain: Miqwe Israel (B56); Rishon leZiyyon, 19.VII.1970 (DG); Neta'Im, 11.VII.1972 (CL); Lod [Lydda] (B56); Rehovot, 21.VIII.1946 (BS); 12.IX.1978 (DF); **Jordan Valley**: Ginnosar, 16.VII.1967 (AB); Tirat Zevi, 25.VIII.1989, leg. D. Shahak; **Judean Foothills**: Ben Shemen, 13.III.1953 (CL); **Judean Hills**: Yerushalayim [Jerusalem], 5.VII.1964 (GT); Bet Lehem, 26.VII.1955 (JW); Hevron (B56), **Northern Negev**: common everywhere north of Be`er Sheva (HH93); ? Magra (B56).

Host plants: Polyphagous on many deciduous trees, chiefly recorded from *Quercus* (Fagaceae), *Fraxinus* (Oleaceae), fruits trees; *Acacia* (Fabaceae), *Ceratonia siliqua* L., (Fabaceae), *Fraxinus syriaca* Boiss., *Populus* (Salicaceae), *Eucalyptus* (Myrtaceae), *Citrus* (Rutaceae), *Casuarina* (Casuarinaceae), *Quercus calliprinos* Webb, *Q. ithaburensis* Decne., *Morus alba* (Moraceae) L. (Bytinski - Salz, 1956; Bytinski - Salz & Sternlicht, 1967; Avidov and Harpaz, 1969; Halperin & Holzschuh, 1993).

Rhaesus serricollis (Motschulsky, 1838)

Prionus serricollis Motschulsky, 1838, Bull. Soc. Nat. Mosc., 9, 2: 187. Type locality: Georgia.

Rhesus serricollis: Bodenheimer, 1937: 145 ; Bytisnski-Salz, 1956: 210; Bytinski-Salz & Sternlicht, 1967: 134; Halperin & Holzschuh, 1993: 25; Chikatunov et al., 2006: 317.

Remark: *Rhesus caesariensis* (Pic, 1918), previously regarded as a synonym of *R. serricollis*, has recently been associated with *Eurynassa australis* (Boisduval, 1835) from Australia (Tavakilian et al. (2007). The type locality mentioned by Pic ("Syrie: Caesarée") is therefore regarded as wrong.

Distribution: Balkan peninsula from Dalmatia to the Southern Greece, Bulgaria Turkey, Caucasus, Iran, Syria, Israel, Cyprus (Heyrovský, 1940; Sama, 1994a; Althoff & Danilevsky, 1997).

ISRAEL: **Golan Heights**: Merom Golan, 8.XII.1982, leg. Y. Zvik; Panyas, 3.VIII.1978 (DS); **Upper Galilee**: Dan (B56), Dan, 12.II.1971 (BS); Dafna, 6.IX.1942 (BS); Kefar Szold, 5.V.1998, R. Ortal; Sede Nehemya, VII.1979 (JH); Hula Valley (HH93).

Host plants: Polyphagous on deciduous trees like *Platanus* (Platanaceae), *Ficus* (Moraceae), *Quercus ithaburensis* (Bytinski -Salz, 1956: 210); *Q. calliprinos* (Bytinski-Salz & Sternlicht, 1967); *Platanus orientalis* L., *Populus* (Halperin & Holzschuh, 1993).

Anthracocentrus arabicus (Thomson, 1877)

Acanthophorus arabicus Thomson, Rev. Mag. Zool.: 266. Type locality: Djeddah.

= *Acanthophorus vicarius* Lameere, 1912, Mém. Soc. ent. Belg., 21: 173. Type locality: Egypte.

= *Nothophysis rugosiceps* Pic, 1924, Bull. Soc. r. ent. Egypte: 404. Type locality: Abou Simbel (Egypt).

Notophysis rugosiceps: Bytinski-Salz, 1956: 210.

Acanthophorus arabicus: Halperin & Holzschuh, 1993: 25; Chikatunov et al., 2006 : 317

Distribution: Saudi Arabia, Egypt, Sudan, Djibouti, Yemen, Somalia, Ethiopia, Sahara (Mateu, 1972; Quentin & Villiers, 1983; Holzschuh, 1979), South Eastern Iran (Heyrovský, 1959, ssp. *hardei*); Israel (Bytinski-Salz, 1956).

ISRAEL: **Dead Sea Area**: Ne`ot HaKikkar, 5.XII.1986, leg. A. Ysnir; **Arava Valley**: 'En Hazeva [Ein Hazeva], 12.X ((B56); Hazeva, 26.VI.1997, 9.IX.1997 (AM); 'En Yahav, 1.IX.1993, leg. E. Hanani; 20.VIII.1981 (DG); Sappir, 15.VIII.1984 (GI); Nahal Qetura, 5.VIII.1970, leg. H. Kohan; Gerofit, 22.XII.1975 (GI); Samar, 4.VIII.1989, leg. I. Shimoni.

Host plants: *Acacia* spp.; *Tamarix articulata* Wahl (Tamaricaceae), *T. aphylla* (L.) H. Karst (Kocher & Reymond, 1954; Mateu, 1972).

***Mesoprionus besikanus* (**Fairmaire, 1855)

Prionus besikanus Fairmaire, 1855, Ann. Soc. ent. Fr., 3 (3): 319. Type locality: "Baie de Besika dans le Bosphore".

= *Prionus lefeburei* Marseul, 1856, Rev. Mag. Zool., (2), 8: 47. Type locality: "Syrie".

Prionus besicanus + *P. lefeburei* + *P. angustatus*: Bodenheimer, 1937: 145.

Prionus besicanus + *P. lefeburei*: Bytinski-Salz, 1956: 210; Halperin & Holzschuh, 1993: 25.

Prionus besicanus: Chikatunov et al., 1999: 104; Chikatunov et al., 2006: 317.

Prionus lefeburei: Heyrovský, 1948 : 19; 1954: 394; 1963: 258; Bytinski-Salz & Sternlicht, 1967: 134.

Distribution: East Mediterranean from Balkans to Turkey, Crete, Cyprus and the Middle East: Syria, Israel, Egypt (Sinai) (Alfieri 1976).

ISRAEL: **Mt. Hermon**: Har Hermon, 1800m, 3.VIII.1995 (CH); Newe Ativ, 7.VI.1993 (CH); **Golan Heights** Senir, 9.VII.1987, leg. Y. Zvik; 26.V.1999 (AF); Panyas, 5.VI.1993 (CH); Merom Golan, 17.VI.1972 (FN); Senir, 15.VI.1993, leg. R. Kasher, **Upper Galilee**: Dan, 14.VI.1978 (DF); Dafna [Daphne Oak] (B56); Kefar Blum [Kfar Blum] (B56); Hula, 23.VI.1954, leg. H. Shoham; Malkiyya, 6.VI.1985, leg. Z. Feler; Elon, 25.V.1948 (BS); **Lower Galilee** Qiryat Tiv'on, 12.VI.1984, 30.VI.2000 (EY); Tiv'on (B56); Nazerat, 4.V.1993 (CH); Kefar haHoresh [Kfar Hachoresch], 15.VI (YD); **Carmel Ridge** Haifa, 23.IV.1953 (Asw); Haifa, 1.V.1924 (OT); Har Karmel, 4.VI.1940, leg. T. Kushnir; Carmel (B56); Nahal Oren, 15.V.1995 (TP); 27.V.1997, 15.VII.1997 (PC); **Samaria** Me`Ammi, 30.V.1984, Y. Rosental; **Yizre'`el Valley**: Zomet ha'Amaqim (Jalame), 22.V.1993 (AF); Mizra', 12.V.1954 (CL); **Northern Coastal Plain**: Giv'at Ada (B56); Hadera (B56), **Central Coastal Plain**: Coastal Plain (HH93); Hadera, 3.VI.1943 (BS); Pardes Hanna, 23.V.1946 (BS) [Pardess Channh] (H54); Pardess Hanna (B56); Karkur, 4.IV.1944 (BS), 4.IV.47 (H54); Karkur (B56), Herzliyya, 5.VI.1997 (AF); Ramat haSharon, 27.V.1986, leg. D. Wool; Giv`at ha Shelosha, 3.V.1942 (BS); Rosh ha`Ayin, 15.X.1994 (CH); Tel Aviv, 5.VI.1938 (BS); 8.VI.1960 (LFH), 12.VI.1971 (BS); 2.IX.1974 (AF); 5.VI.1978 (DS); **Judean Foothills**: Latrun, 15.VII.1976, leg. G. Oren; Hulda, 31.III.1996 (CH); **Judean Hills**: Yerushalayim [Jerusalem], 27.V-19.VI.1946 (H48), 5.XII.1947 (BS); 16.VI.1957(MP), 17.VI.1957 (YW), 19.VI.1958 (PA); 26.VI.1962, leg. A. Katznelson; Zur Hadassa, 10.VII.1948, (BS); Hevron [Hebron] (B56); **Southern Coastal Plain**: Miqwe Yisra'El, 18.VI.1940 (BS); Ramat Gan, 19.V.1970 (BS); Neta'Im, 28.III.1963 (LEW); 26.VI.1972 (JK); Ramla, 12.V.1998, leg. N. Meltzer; Ben Zakkay, 20.V.1970 (GT); Nizzanim, 17.VI.1986 (AF); 7.VI.2007 (JB); Nirim, 25.IV.1984, leg. E. Raz**.**

Host plants: Polyphagous on decidous plants; in Israel on *Acacia mollissima* Willd. (Fabaceae), *Ligustrum ovalifolium* Hassk. (Oleaceae) (Halperin & Holzschuh, 1993); *Quercus ithaburensis* (Bytinski - Salz & Sternlicht, 1967).

Monocladum aegyptiacum aegyptiacum (Guérin-Méneville, 1844)

Polyarthron aegyptiacum Guérin-Méneville, 1844, Icon. Règne Anim. Ins.: 214. Type loc. “Egypte”.
= *Polyarthron unipectinatum* White, 1853, Cat. Long. Brit. Mus., 1: 21.Type locality: “West Africa”.
Prionus unipectinatus: Bytinski-Salz, 1956: 211.
Monocladum unipectinatus: Chikatunov et al., 2006 : 317 (lapsus).

Distribution: Libya (Schatzmayr, 1938); Egypt (Sinai, Alfieri, 1976); Jordan: Aqaba; Israel (B56).

ISRAEL: **Northern Negev**: Revivim, 11.IX.1947, leg. I. Joel; **Arava Valley**: 'Iddan, 12.IX.1999 (IY, VK); Nahal Shezaf, 9.IX.1997 (AM); 7.IX.1999, 10.X.1999 (IY, VK); Yotvata, 16.VIII.1999 (IY, VK); 3.IX.1991, leg. A. Eitam; Samar, 10.VII.1991, leg. A. Eitam; Hazeva, 2.IX.1976 (DS); 'En Yahav, 14.IX.1977 (DS); 'En 'Avrona, 24.XI.1992 (RH); Hai Bar natural reserve, 1.VIII.1997 (EY).

Host plants: It was recorded as a pest of *Phoenix dactilifera* L. (Arecaceae), but it was collected in biotopes, like the Hai Bar Natural Reserve, where this palm is totally lacking. Larvae probably attack roots parts of different trees (such as *Acacia* sp.), tunneling in the soil.

Subfamily LEPTURINAE

Cortodera kochi Pic, 1935 (Fig. 2, 3)

Cortodera kochi Pic 1935, Echange, 51 n°459: 4. Type locality: “Jerusalem: Kiryath Anauim”.
Cortodera kochi: Bodenheimer, 1937: 145; Sama & Orbach, 2003: 64.

Distribution: Apparently endemic in Israel.

ISRAEL: **Mt. Hermon**: 1800m, 25.V.1998 (CH); 1600m, 26.V.2007 (JB); Biq'at Man, 1450m, 10.V.1996 (GS, BO) (Sama & Orbach, 2003); **Upper Galilee** Har Meron, 920m, 3./4.V.2007 (JB); Mt. Kefir, 850m, 29.IV.1996, 11.V.1996 (EY); Kefir, Meron, 850m, 10/17.V.1996 (GS) (Sama & Orbach, 2003); **Judean Hills**: Qiryat 'Anavim (type loc.), idem, 5.IV.1941 (BS) (Sama & Orbach, 2003).

Host plants: Not recorded. Adults are usually found on flowers of Compositae.

Grammoptera baudii pistacivora Sama, 1996

Grammoptera baudii ssp. *pistacivora* Sama, 1996, Biocosme mésogéen, 12 (1995), 4: 94. Type locality: Upper Galilee: Har Meron, Sasa.

Distribution: The nominative subspecies was described from Cyprus; the ssp. *pistacivora* in Israel, Lebanon, southern Turkey, Syria (Sama & Rapuzzi, 1999) and Jordan (Ajloun nat. res., leg. G. Sama) **(A new record to Jordan)**.

ISRAEL: **Mt. Hermon**: Har Hermon, 750/1000, *ex larva* from *Pistacia palaestina*, emergence 29.III/14.IV.1995 (GS)**; Golan Heights**: Nimrod, 1200m (GS); **Upper Galilee**: Har Meron-Sasa, 28.III.1995 (GS); Nahal Ziv'on, 30.III.1995, 15.IV.1995 (EY); Nahal HaAri, 800m (dead adult in pupal cell) (GS).

Host plants: Monophagous on *Pistacia palaestina* Boiss. (Anacardiaceae)(Sama, 1996).

Pseudovadonia livida (Fabricius, 1777)

Leptura livida Fabricius, 1777, Gen. Ins.: 233. Type locality: "In flloribus Chilonii" (Kiel, Germany)
Leptura (Vadonia) livida: Sahlberg & Saalas, 1913: 232.
Pseudovadonia livida: Chikatunov et al., 1999: 105.

Distribution: Europe (except Fennoscandia), Asia Minor, Middle East (Syria, Lebanon, Israel), Transcaucasia, Siberia (Sama, 2002).

ISRAEL: **Golan Heights**: Mezudat Nimrod, 10.VI.1976 (DS); **Upper Galilee**: Mt. Kefir: Nahal HaAri, 800m, 26.V/2.VI/95 (EY), Har Meron: Shefer, 750m, 25.V.91 (EY); Harashim, 31.V.1998 (EY); Mt. Kefir, 31.V.1998 (EY); Har Meron, 26.V.1999 (AF); 10.V.2007 (JB); Ziv'on, 23.V.2007 (JB); **Carmel Ridge**: Mt. Carmel: Beit Oren, 18.V.93 (EY); Nahal Oren, 16.V.1997 (PC).

Host plants: Larvae tunnel freely in the soil feeding externally between dead or dying roots and root stalks of grasses and among white micelium of the fungus *Marasmius oreades* (Bolton) Fr., which seems an indispensable component of his food (Burakovsky, 1979).

Pedostrangalia riccardoi carmelita Sama, 1996

Pedostrangalia riccardoi ssp. carmelita Sama, 1996, Biocosme Mésogéen, 12 (1995), 4: 94. Type locality: Carmel Ridge: Daliyat el Karmil (Israel).
Pedostrangalia riccardoi carmelita: Chikatunov et al., 1999: 105; Finkel et al., 2002: 213.

Distribution: The nominative subspecies was described from Jordan, the ssp. *carmelita* is endemic to Israel.

ISRAEL: **Mt. Hermon**: Har Hermon, 1000m, 15.VI.2007 (JB); Har Hermon, 1300m, 9.VI.1976 (AF); 1800m, 12.VI.1996 (AF); **Golan Heights**: Mezudat Nimrod, 5.VI.1976 (AF); **Upper Galilee**: Elqosh, Matat reserve, 10./21.V.2007 (JB); 2 km W Ga'ton, 6.VI.1990 (EY); Har Meron, 30.V.1972 (JK); 5.V.1974 (DF); 26.V.1999, 16.VI.1999 (LF); 22.V.1998, 26.V.1999 (AF); 27.V.1999 (CH); Meron, 18.V.1996 (GS); Har Kefir, 21.V.1995, 23.V.1996, 12.V.1998, 22.V.1999 (EY); Har Kefir, Nahal HaAri, 800/900m, 26.V-2.VI.1995 (EY); **Lower Galilee**: Basmat Tab`un, 14.IV.1999 (LF); Yodefat, 18.V.2000 (EY); Kefar haHoresh [Kfar Hahoresch] (YD); **Carmel Ridge**; Daliyat 1,5 km NW Galed, 8.IV.1994, on *Quercus* (EY); el Karmil, *ex larva* from *Q. calliprinos*, IV.1995 (GS); Lower Nahal Oren (Chikatunov et al., 1999); 1.5 km NW Zomet Elyaqim, 13.V.1995 (EY); Nahal Oren, 11.V.1995 (AF); **Samaria**: 2 km SW Umm el Fahm, 9.V.1995 (EY); **Jordan Valley**: Nahal Yarmoukh, 12.V.1971 (BS); 31.V.1961 (JK).

Host plants: reared from *Quercus calliprinos* (leg. G. Sama).

Paracorymbia benjamini benjamini (Sama, 1993)

Corymbia benjamini Sama, 1993b, Lambillionea, 93, 4: 470. Type locality: Meron: Har Kefir (Israel).

Distribution: The nominotypical subspecies in Israel, the ssp. *ehdenensis* Sama & Rapuzzi, 2000 in Lebanon.

ISRAEL: **Upper Galilee**: Har Meron, 28.V.1991 (EY); 20- 23.V.2007 (JB); 11-13.VI.2007 (JB); Har Kefir, 26.V.1995, 23.V.1996, 13.VI.1997, 31.V.1998, 22.V.1999 (EY); idem, 10/16.V.1996 (GS); Har Meron, Nahal HaAri, (EY, GS), Nahal Keziv, near 'Avdon, 30.V.1997 (BO).

Host plants: Not recorded, probably *Quercus*; adults on flowers (chiefly *Cistus* and *Rubus*).

Stictoleptura cordigera cordigera (Fuesslins, 1775)

Leptura cordigera Fuesslins, 1775, Verz. Schweiz. Ins.: 14. Type locality: "Luggaris" (Locarno, Switzerland).
Leptura cordigera: Bodenheimer, 1937: 145; Heyrovský, 1954: 394; Bytinski - Salz, 1956: 214; Bytinski-Salz & Sternlicht, 1967: 134.
Stictoleptura cordigera: Halperin & Holzschuh, 1993: 25.
Corymbia cordigera: Chikatunov et al., 1999: 104; Finkel et al., 2002: 213.

Distribution: Europe, Turkey, Caucasus, Transcaucasia, northern Iran, Syria, Lebanon, Iraq, Israel, Libya; replaced in Crete and SW Turkey by *S. cordigera anojaensis* Sláma, 1982.

ISRAEL: **Mt. Hermon**: Har Dov, 16.VI.1999, leg. H. Ackerman; **Golan Heights**: Majdal Shams, 3.VIII.1995 (CH); Panyas, 24.V.1978 (AF); Qazrin, 8.VI.1992 (JK); **Upper Galilee**: Tel Dan, 11.VI.1946, 17.VI.1971 (BS); Tel Dan [Tel el Kadi], 11.VI.1946 (H54); Bet Ushishkin, 28.V.2007 (JB); Hula Valley (HH93); HaGosherim, 16.VI.1971 (JK); Elon, 25.V.1948 (BS); Hanita, 14.V.1944 (BS); Har Meron, 11.VI.2007 (JB); Har Kefir, 31.V.1998 (EY); **Lower Galilee**: Alonim, 20.V.1987 (EY); **Jordan Valley**: Kapernaum, Jordanmündg, 20.V.2000 (TO) (NMS); Biq'at Bet Zayda [Betecha], 3.V.1973 (DF); **Carmel Ridge**: Lower Nahal Oren

(Chikatunov et al., 1999); Nahal Oren, 11.V.1996 (PC); Zikhron Ya'aqov, 22.V.1957 (CL); 10.III.1960 (LFH); Yagur, 7.VI.1946 (BS); **Yizre'`el Valley**: Zomet ha'Amaqim (Jalame), 27.V.1993 (AF); **North Coastal Plain**: Ma'agan Mikha`el, 3.VI.1990 (EY); Hadera, 25.V.1924 (OT); 17.V.1946 (BS); 24.V.1980 (FK); **Central Coastal Plain**: Pardes Hanna, 6.V.1946 (BS).
Host plants: Development in dead wood of stumps and trunks usually of broadleaf trees, mostly on *Quercus*; in Israel reared from *Pinus* (Bytinsky-Salz, 1956), *Quercus ithaburensis* and *Q. calliprinos* (Bytinski-Salz and Sternlicht,1967).

Stictoleptura heydeni (Ganglbauer, 1889)

Leptura heydeni Ganglbauer, 1889, in Marseul, Cat. Col.: 469, new name for *Leptura ustulata* Heyden, 1877 (nec Ménétriés, 1832). Type locality: "Caramanien" (southern Turkey).
? Leptura ustulata: Bodenheimer, 1937: 145.
Leptura rufa: Heyrovský, 1954: 394; Bytinski-Salz, 1956: 214 (misidentification).
Stictoleptura heydeni: Sama & Orbach, 2003: 64.
Distribution: Southern Turkey, Syria, Lebanon, Israel.
ISRAEL: **Central Coastal Plain**: "Pardes Channah, 7.IV.1946" (B56).
Host plants: Not recorded; development probably in dead parts of living trees of *Quercus*.

Subfamily SPONDYLIDINAE

Alocerus moesiacus (Frivaldszky, 1838)

Callidium moesiacus Frivaldszky, 1838, Magyar Turd.Tars.Euk., 3, 3: 177. Type locality: Macedonia.
Alocerus moesiacus: Chikatunov et al., 2006: 317.
Distribution: Mediterranean, recorded from North Africa and Iberian Peninsula to the Near East and Iran. **A new record to Israel**.
ISRAEL: **Carmel Ridge**: Daliyat el Karmel, *ex larva* from *Quercus calliprinos*, 14.V.1996, leg. G. Magnani (GS); Nahal Oren, 19.VI.1998 (PC).
Host plants: Larvae feed in dead wood of decayed parts of living decidous trees: *Quercus*, *Populus*, *Ficus*, *Platanus*, *Ulmus*; in Israel, one specimen emerged from *Quercus calliprinos* together with *Pedostrangalia riccardoi carmelita*. Adults are often attracted to light.

Arhopalus ferus (Mulsant, 1839)

Criocephalus rusticus var. ferus Mulsant, 1839, Hist. nat. Coléopt. France, Longic.: 64. Type locality: " Bordeaux, M.de Marsan" (France).
= *Callidium triste* Fabricus, 1787, Mant. Ins., 1: 154. Type locality: "Europa".
Criocephalus tristis: Bytinski-Salz, 1956: 211.
Arhopalus tristis: Halperin & Holzschuh, 1993: 25.
Arhopalus rusticus: Chikatunov et al., 1999: 106; Chikatunov et al., 2006: 317 (misidentification).
Arhopalus ferus: Buse et al., 2008: 61.
Distribution: Europe, Caucasus, Transcaucasia, Siberia, China, North Africa, Turkey, Syria, Jordan, Israel.
ISRAEL: **Upper Galilee**: Zefat, under stone, V.1996 (GS); Meron, m.450, ex pupa *in Pinus nigra*, V.1996 (GS); Tel Hay, 17.V.1976 (AF); Yehi'am, 8.X.1999, leg. E. & T. Orbach; **Lower Galilee**: Qiryat 'Amal, 7.X.1946 (BS); Qiryat Tiv'on, 8.IX.1985, 24.X.1988, 15.XI.1999, 5.VII.2000 (EY); **Carmel Ridge**: Haifa, 15.VIII.1948, 6.X.1948 (BS); 11.IX.1963 (JH); Nahal Oren, 16.IV.1996 (PC); Ramat haShofet, 12.VIII.1954 (LFH); Horeshat haArba'im [The Fourties], 29.VI.2007 (JB) (Buse et al., 2008); Nesher, V.1994 (EY); **Yizre'`el Valley**: Genigar [Ginegar], (B56); Mishmar Ha'emeq, (B56); Geva', (B56); Bet haShitta, 30.VII.1956 (LFH), [Beit Hashita] (B56); **Central Coastal Plain**: Tel Aviv, 7.VI.1962 (BS); 2.VIII.1977 (AF); Ramat Gan, 10.II.1960 (LFH); **Judean Hills**: Yerushalayim [Jerusalem], 18.VIII.1957 (YW).
Host plants: *Pinus* spp.

Arhopalus syriacus (Reitter, 1895)

Criocephalus syriacus Reitter, 1895, Wien. entomol. Zeit., 14(3): 86. Type locality: " Haifa; Akbes" (Israel; southern Turkey).
Criocephalus syriacus: Heyrovský, 1950: 14; Bytinski-Salz, 1956: 211; Chikatunov et al., 2006: 317.
Distribution: Widespread in the whole Mediterranean area from Portugal to Near East; Canary Islands, Madeira.
ISRAEL: **Golan Heights**: Qazrin, 14.V.1996 (CH); **Upper Galilee**: Har Meron, 450m, ex pupa in *Pinus nigra*, V.1996 (GS); **Lower Galilee**: Qiryat Tiv'on, 23.X.1988, 13.V.1990, 15.XI.1999 (EY); **Carmel Ridge**: Haifa (Reitter, 1895, type loc.); Haifa, 11.IX.1963, 1.X.1963

(JH); Daliyya, 27.V.1960 (JH); **Yizre'`el Valley** (Mishmar Ha'Emeq, 5.X.1945 (MC); **Central Coastal Plain**: Ra'anana, Ahuza [Ahuza], 7.VIII.1945 (BS); **Judean Hills**: Yerushalayim [Jerusalem], 3.IV.1956(MP).
Host plants: *Pinus halepensis* Miller, *Pinus nigra* J.F.Arnold.

Subfamily CERAMBYCINAE

Xystrocera globosa (Olivier, 1795)

Cerambyx globosus Olivier, 1795, Ent., 4, n°67: 27. Type locality: "env. de Batavia" (Jakarta, Indonesia).
Xystrocera sp.: Sama, 1996: 96.
Xystrocera globosa: Chikatunov et al., 2006: 318; Friedman et al., 2008: 243.
Distribution: A sub-cosmopolite species; originally from the Southeast Asia, introduced and established in many countries including Neotropical Region. Recorded since a long time from Egypt, where was regarded as a pest (Alfieri, 1916), it was discovered by Y. Dorchin (Sama, 1996, sub *Xystrocera* sp.) in Israel, where it seems to be established (Chikatunov et al., 2006; Friedman et al., 2008).
ISRAEL: **Southern Coastal Plain**: Rishon leZiyyon, 14.XII.2008 (OR); Gedera, 8.III.2006 (OR); Sederot [Shderot], V.1993; V.1994, two females attracted to light (YD) (Sama, 1996); idem, some specimens hatched from *Acacia* sp., 21.IX.1995 and VI.1996 (YD, GS); Nizzanim, 15.VI.2002, light trap (VK).
Host plants: Polyphagous in dead wood of several decidous trees; in Egypt it attacks *Albizia lebbeck* L. (Benth) (Alfieri, 1916; Clainpanain, 1917); for detailed biology and larval morphology see Duffy (1968).

Icosium tomentosum atticum Ganglbauer, 1882

Icosium tomentosum var. *atticum* Ganglbauer, 1882, Verh. zool.-bot. Ges. Wien, 31 (1881). Type locality: "Attica" (Greece).
Icosium tomentosum ssp. (?) *atticum*: Bytinski-Salz, 1956: 212.
Icosium tomentosum: Halperin & Holzschuh, 1993: 26; Chikatunov et al., 1999: 10; Chikatunov et al., 2006: 317.
Distribution: Mediterranean: the nominative subspecies occurs from North Africa and Iberian Peninsula to western Italy; *I. tomentosum atticum* is rather widespread throughout the Eastern Mediterranean, from eastern Italy and Malta to Syria, Jordan and Israel. One isolated population, is known from southern France.
ISRAEL: **Golan Heights**: Shamir, 25.V.1962 (BS); Mevo Hamma, 1.VI.1996 (GS); **Upper Galilee**: Bat Ya'ar Farm, VII.1995 (EY); **Carmel Ridge**: Haifa, 21.VI.1945 (BS); Carmel (B56: 211); Nahal Oren, 16.IV.1996 (PC); Zikhron Ya`aqov, 26.IV.1965 (KY); Dalya/Gal'ed (GS); **Central Coastal Plain**: Ilanot, (HH93); Herzliyya, 17.VIII.1987 (AF); Tel Aviv, (B56); Tel Aviv, 16.VI.1946, 1.VIII.1948 (BS); 28.VI.1961 (JW); 5.VIII.1986 (ASH); **Judean Hills**: Yerushalayim [Jerusalem], 29.V.1954, 2.VI.1961 (JW); 15.VI.1961, leg D. Leston; **Southern Coastal Plain**: Miqwe Yisrael, (HH93); Rishon leZiyyon, 15.VII.1946 (BS) [Rishon le Zion], (B56); Gevar`am, 10.V.1966 (JH); **Dead Sea Area**: Yeriho [Jericho], 200m, 1.7.56, leg. Klapperich (LE63).
Host plants: Development in Cupressaceae: *Cupressus* sp. (Bytinski-Salz, 1956); *Callitris propinqua* R.T.Baker, *Tetraclinis articulata* (Wahl) Masters (Halperin & Holzschuh, 1993); *Juniperus oxycedrus* L. (GS); in Israel usually in *Cupressus sempervirens* L. (GS).

Cerambyx cerdo Linnaeus, 1758

Cerambyx cerdo Linnaeus, 1758, Syst. Nat., 10 (1): 392. Type locality: "Italia, Germania".
Cerambyx cerdo var. acuminatus: Bodenheimer, 1937: 145; Bytinski-Salz & Sternlicht, 1967: 134.
Cerambyx cerdo ssp. *acuminatus*: Bytinski-Salz, 1956: 211.
Cerambyx cerdo: Buse et al., 2008: 61.
Distribution: Europe, North Africa, Caucasus, Turkey, Iran, Syria, Jordan, Lebanon, Israel.
ISRAEL: **Golan Heights**: Mas'ada, 19.VII.1967 (JW); Quneitra, 14.VII.1967(MP); **Upper Galilee**: Dan (B56); Elon, 10.VII.1945 (BS) **Lower Galilee**: Allonim, 5.VI.1942 (BS); Alonim (B56); Tiv'on, (B56); Qiryat Tiv'on, 29.V.1995 (EY); Bet Qeshet [Beit Haqueshet] (B56);**Carmel Ridge**: Carmel (B56); Bet Oren, 17.VI.1944 (BS); 2 km N. Zomet Elyaqim, 16.VI.2001 (EY); Horeshat haArba'im [The Fourties], 29.VI.2007 (JB) (Buse et al., 2008); **Northern Coastal Plain**: Giv`at Ada, 17.V.1942 (BS); **Judean Foothills**: Kefar Uriyya, 12.VII.1958(MP);

Judean Hills: Yerushalayim [Jerusalem], 6.VI.1942 (BS); Qiryat 'Anavim, 17.VII.1957, leg. F. Gruber; Zur Hadassa, 10.VII.1946 (BS); Zakariya (Hebron) (B56).
Host plants: Ecologically associated to old trees of *Quercus*; it is reported, probably by occasional adaptation, for other broadleaf trees like *Fraxinus*, *Castanea*, *Ulmus*. Recorded in Israel on *Quercus ithaburensis* and *Q. calliprinos* (Bytinski - Salz, 1956; Bytinski - Salz & Sternlicht, 1967).

Cerambyx dux (Falderman, 1837)

Hammaticherus dux Faldermann, 1837, Fauna Transc., Col., 2: 263, Tav.7, Figg.5, 6. Type locality: Transcaucasia.
Cerambyx dux: Bodenheimer, 1937: 145; Bytinski-Salz, 1956: 212; Heyrovský, 1948: 19; 1963: 258; Halperin & Holzschuh, 1993: 24.
Distribution: East Mediterranean: Macedonia, Bulgaria, Ukraine, Central and South East Turkey, Syria, Lebanon, Jordan, Israel.
ISRAEL: **Mt. Hermon**: Har Hermon, 1400m, 4.VI.1974 (DF); 1500m, 6.VI.1975 (JK); 1600m, 16.VI.1971 (BS); 10.VII.1975 (AF); 1900m, 18.VII.1968 (DG); 2000m, 21.VI.1974, Y. Hadar; **Golan Heights**: Majdal Shams, 3.VI.1987 (EY); Mas'ada, 25.VI.1973 (GT); **Upper Galilee**: Dan, (B56); Amir, 9.VI.1945 (BS); Hula Valley (HH93); Malkiyya, 6.VI.1975, leg. Z. Feler; Har Meron, 30.VII.1977, leg. R. Kopan; Har Kefir, 22.V.1999 (EY); Zefat [Jami el Ahmar (Safed)], (B56); Rosh Pina, 26.V.1946 (BS); **Lower Galilee**: Allonim, 5.VI.1942 (BS); Qiryat Tiv'on, 18.VI.1988, 30.V.1991; **Carmel Ridge**: Haifa, (B56); Fureidis [Faradiye] (B56); **Northern Coastal Plain**: Nahariyya, 10.VI.1943 (BS) **Central Coastal Plain**: Bassa (B56); (Note: the name of this locality literary means "swamp"; several localities with this name were known throughout the Coastal Plain (e.i. Herzliyya, Ramle); **Southern Coastal Plain**: Miqwe Yisra'el, 3.VI.1948 (BS); Be`eri, 23.IV.1981 (BS) Ramle, (B56: 211); **Judean Hills**: Yerushalayim [Jerusalem], 1948: 19 (H48); 4.VI.1943 (BS); 18.VI.1950 (JW); 26.V.1953 (PA); Qiryat 'Anavim, 17.VI.1945 (BS); 17.VII.1957, leg. F. Gruber; Artas, (B56: 211); Hevron [Hebron], (B56: 211); Lavia, (B56: 211) = Qibbutz Lavi ?
Host plants: Usually on Rosaceae; "noxious to fruit of the genus *Prunus*" (Bytinski-Salz, 1956); *Cotoneaster*, *Crataegus*, *Pyracantha crenatoserrata* (Hance) Rehder (Halperin & Holzschuh, 1993).

Cerambyx welensii (Küster, 1846)

Hammaticherus welensii Küster, 1846, Käfer Eur., 2: 44. Type locality: "Illyrie, bei Triest (Italy)".
Cerambyx velutinus Brullé, 1832, Exped. Sci. Morée, Ins., 3: 252. Type locality: "env. de Marathonisi, Golfe de Laconie" (Greece) (nec *Cerambyx velutinus* Fabricius, 1775, now in Callichromatini).
Cerambyx velutinus var. *centurio*: Bytinski-Salz, 1956: 211; Bytinski-Salz & Sternlicht, 1967: 134.
Cerambyx velutinus: Chikatunov et al., 2006: 317.
Cerambyx welensii: Buse et al., 2008: 61.
Distribution: Europe, southern Turkey, Near East (Syria, Jordan, Lebanon, Israel).
ISRAEL: **Mt. Hermon**: 1600m, 7.VI.1993 (CH); **Golan Heights**: Senir, 17.V.1994, leg. I. Avino'am; 15.VI.1994, leg. R. Kasher; Panyas, 1.VIII.2008, pair in baits trap (OR); **Upper Galilee**: Dafna [Daphne Oaks] (B56); Har Meron, 18.VII.2007 (JB); Ya'ar Bar'am, 22.VII.2007 (JB) (Buse et al., 2008); **Lower Galilee**: Qiryat Tiv'on, 20.V.1985, VI.1994 (EY); **Carmel Ridge**: Khreibe Oaks (Carmel), (B56); Horeshat haArba'im [The Fourties], 29.VI.2007 (JB); **Central Coastal Plain**: Pardes Hanna, 17.V.1946 (BS); Ramot haShavim, 22.VII.1943 (BS).
Host plants: Development mostly on *Quercus ilex* L.; in Near East collected on *Q. ithaburensis* and *Q. Q. calliprinos* (Bytinski-Salz & Sternlicht, 1967).

[***Jebusaea hammerschmidti*** Reiche, 1877]

Jebusaea hammerschmidti Reiche, 1877, Ann. Soc. ent. Fr., (5), 7 (Bulletin): 154. Type locality: "Habitat in Palestina, in vicinis Jaffa, a Dom. Hammerschmidt (Abdullah Bey) capta".
= *Bagdatocerambyx drurei* Pic, 1901, Echange 18 (194): 11. Type locality: "Bagdad".
= *Jebusaea persica* Reitter 1907, Wien. Ent. Zeit., 26: 217. Type locality: "Persien, Buschir" (southern Iran).
Jebusaea hammerschmidti: Bodenheimer, 1937: 145.
Distribution: It was described from "Palestina" based on one specimen probably mislabelled or introduced and "after its original description not found again" (Bytinski-Salz, 1956). It is known from southern Iran, southern Iraq and Arabian Peninsula (Saudi Arabia, Bahrain, United Arab Emirates, Qatar, Oman).
ISRAEL: **Central Coastal Plain**: Yafo [Palestine, Jaffa] (type locality); **Southern Negev**: Eilat, 2.V.1962, leg. I. Kehat (two specimens, examined).

Remark: Specimens from Eilat constitute the first specimens apparently collected in Israel after Reiche's description. Determination is correct, but, lacking of any information about collecting circumstances, this single record must be regarded as wrong or casual (mislabelling or introduction) and the occurrence of this noxious species in Israel not proved. *Jebusaea hammerschmidti* is a large species (26-40 mm long), easily attracted to light, whose presence and damages would, therefore, unlikely escape the farmers attention.
Host plants: Monophagous on date palms (*Phoenix dactylifera*) it is regarded a serious destructive pest for plantations of this tree in most countries (Al-Azawi A.F., 1986; Howard & al (2001).

Axinopalpis gracilis (Krynicki, 1832)

Obrium gracile Krynicki, 1832, Bull. Soc. imp. Nat. Moscou, 5: 162. Type locality: "Ross. mer.: Charkov".
Axinopalpis gracilis: Chikatunov et al., 2006 : 317; Buse et al., 2008: 61.
Distribution: Europe, Asia Minor, Caucasus, Syria, Lebanon, Israel.
Israel: **Carmel Ridge**: Mt. Carmel (HH93); Horeshat haArba'im [The Fourties], 29.VI.2007 (JB) (Buse et al., 2008); Nahal Oren,19.VI.1998; one female, attracted to light trap (PC).
Host plants: Relatively polyphagous on deciduous trees: it prefers *Prunus* spp., *Juglans*, *Quercus* spp., *Rosa*, *Castanea*, *Acer*, *Ceratonia*, *Pistacia*, but also *Paliurus*, *Cydonia oblonga* Miller (Rosaceae); in Greece it develops in *Abies cephalonica* Loudon (Pinaceae).

Stromatium unicolor (Olivier, 1795)

Callidium unicolor Olivier, 1795, Entomologie, 4, 70: 58, Tav. 7, Fig. 84. Type locality: "Barbarie, Asie Mineure, Mésopotamie".
Cerambyx fulvus Villers, 1789, Linn. Entomol., 1: 256. Type locality : "Circa Nemausum" (Nîmes, France) (nec Scopoli, 1763).
Hesperophanes platyfemur Chevrolat, 1882, Ann. Soc. entomol. France (6), 2: 57. Type locality: "Syria".
Stromatium fulvum: Bodenheimer, 1937: 145; Bytinski-Salz, 1956: 213; Bytinski-Salz & Sternlicht, 1967: 134; Halperin & Holzschuh, 1993: 27; Chikatunov et al., 2006: 317.
Hesperophanes platyfemur: Chikatunov et al., 1999: 109.
Stromatium unicolor: Buse et al., 2008: 61.
Distribution: Mediterranean: Europe, North Africa, Caucasus, northern Iran, Middle East (Iraq, Jordan, Lebanon, Israel), Cyprus, Middle Asia; imported in U.S.A., Cuba, Brazil, Jamaica.
ISRAEL: Common everywhere (HH93); **Upper Galilee**: road to Qiryat Shemona (B56); **Lower Galilee**: Qiryat Tiv`on, 6.VII.1978 (DS); 7.VIII.1989 (EY); Sha'ar ha'Amaqim, 9.VIII.2000 (EY); **Carmel Ridge**: Haifa, 7.VIII.1946 (BS); 29.VII.1957 (JW); 8.VIII.1984 (EY); Horeshat haArba'im [The Fourties], 20.VII.2007 (JB) (Buse et al., 2008); Nahal Oren, 25.II.1997, 5.VII.1999 (PC); **Northern Coastal Plain**: Binyamina, 15.VI.1942 (BS); Qesarya, 13.IV.1988 (EY); **Central Coastal Plain**: Illanot, 20.VII.1971 (JH); Herzliyya, 15.VIII.1977, 13.VII.1987, 15.VIII.1993 (AF); Ra`ananna, 6.IX.1978, leg. Y. Hadar; Tel Aviv, 2.X.1947 (BS); 28.VI.1961 (JW); 4.VII.1972 (MK); 11.VII.1980, leg. R. Mopan; Ramat Gan, 3.VIII.1985 (DG); Bene Beraq, 6.VII.1980 (MK); **Southern Coastal Plain**: Yafo [Jaffa] (B56); Zafriyya, 3.VIII.1985 (DG); Rishon leZiyyon, 30.VI.1957 (JW); Giv`at Brenner, 6.VII.1971 (AS); Rehovot, 6.VII.1946 (BS); 26.VIII.1968 (DG); **Jordan Valley**: Teverya, 17.VII.1949 (BS); HaOn, 6.VIII.1956 (JW); Tirat Zevi, VI.1989, D. Shahak; **Judean Hills**: Yerushalayim [Jerusalem] (B56); Ramat Rahel, 15.VII.1971 (KY).
Host plants: Polyphagous, mostly on deciduous trees, but also on conifers; development in old dry wood of also seasoned timber, furniture, wooden structures such as roof timbers, fences; in Israel reported on *Acacia mollissima*, *Citrus*, *Morus alba*, *Cercis* sp., *Pistacia* spp., *Quercus ithaburensis* (Bytinski-Salz ,1956; Bytinski-Salz & Sternlicht, 1967) and *Quercus calliprinos*.

Hesperophanes sericeus (Fabricius, 1787)

Callidium sericeum Fabricius, 1787, Mant. Ins., 1: 152. Type locality: "Barbaria" (North Africa).
Hesperophanes sericeus: Bodenheimer, 1937: 145; Bytinski-Salz, 1956: 212; Halperin & Holzschuh, 1993: 26; Chikatunov et al., 1999: 109; Chikatunov et al., 2006: 317.
Distribution: Mediterranean area from North Africa (including Egypt) and Iberian Peninsula to southern France, Caucasus, Iran, southern Turkey, Iraq, Jordan, Israel, Cyprus.
ISRAEL: **Upper Galilee**: Ne'ot Mordekhai, 11.IX.1969, leg. Z. Shoham; Gonen, 18.VIII.1977 (JH); Gonen (Hula Valley) (HH93); Elon, 11.VI.1948 (BS); **Lower Galilee**: Kefar haHoresh, 14.VII.1970 (MK); **Carmel Ridge**: Carmel (B56: 212); Haifa, 6.VII.1948 (BS); Nahal Oren, 22.III.1997 (PC); **Yizre'`el Valley**: Mishmar ha'Emeq, 1.IV.1945 (BS); 15.X.1945 (MC);

Northern Coastal Plain: Binyamina, 15.V.1940 (BS); **Central Coastal Plain**: Kefar Saba, 25.IX.1978 (KY); Tel Aviv; **Judean Hills**: Yerushalayim [Jerusalem], 9.VIII.1959, leg. R. Lotan.
Host plants: Polyphagous, usually on deciduous trees: larvae in dead dry wood of many trees often at ground level or underground; also recorded for conifer trees: *Cupressus*, *Pinus* (Danilevsky & Miroshnikov, 1985); In Israel on apple twig (Bytinski-Salz, 1956; Halperin & Holzschuh, 1993) and *Ficus carica* (Bodenheimer, 1930).

Trichoferus griseus (Fabricius, 1792)

Callidium griseum Fabricius, 1792, Entomol. Syst., 1(2): 325. Type locality: "Barbaria" (North Africa).
Trichoferus griseus: Bytinski-Salz, 1956: 212 (partim); Halperin & Holzschuh, 1993: 27 (partim).
Distribution: Circum-Mediterranean species: southern Europe, North Africa, Egypt, Cyprus, southern Turkey, Iraq, Jordan, Israel.
ISRAEL: **Golan Heights**: Nimrod (CRP); **Upper Galilee**: Metulla (B56); **Lower Galilee**: Zippori, 13.VII.2000 (EY); Qiryat Tiv'on, 16.VI.1984, V.1990, 1.IX.1990 (EY); Kadoorie School (Tabor) (B56); **Carmel Ridge**: Carmel (Haifa), Haifa, 16.V.1948 (BS); Nahal Oren, 24.VI.1997, 25.VI.1999 (PC); Zikhron Ya'aqov, 10.VI.1948 (BS); **Samaria**: Jenin, 600m, 26.VI.57, leg. Klapperich (LE63); Tira, 16.VI.1941 (BS); **Northern Coastal Plain**: Haifa Bay, 23.IX.1999, leg. S. Reicher; Binyamina, 3.III.1945 (BS); **Central Coastal Plain**: Herzliyya, 1.VII.1978 (AF); Tel Aviv, 10.VII.1977 (DS); **Southern Coastal Plain**: Miqwe Israel (B56); Giv`ar Brenner, 6.VII.1971, leg. A. Schwartz; Holot Nizzanim, 4.VI.1009, light trap (EY); **Judean Hills**: Yerushalayim [Jerusalem]; **Judean Desert**: Nahal Perat [Wadi Qelt] (B56); **North Negev**: Hazerim, 21.V.1994, 29.VI.1994 (EY); **Central Negev**: 'En Avedat, 10.VI.1994 (CH). Birwa (B56) = Birya ?
Host plants: Usually monophagous on *Ficus carica*; records regarding different host plants (*Ceratonia siliqua, Populus euramericana* (Halperin & Holzschuh, 1993; Chikatunov et al., 1999) must be regarded as incorrect (probably referring to the following species) or casual.

Trichoferus fasciculatus (Falderman, 1837)

Hesperophanes fasciculatus Faldermann, 1837, Fauna Transcauc., 2: 266, Tav.8, Fig.1. Type locality: "Transcaucasia".
Trichoferus fasciculatus (partim): Bytinski-Salz, 1956: 212.
Trichoferus griseus: Chikatunov et al., 1999: 114 (misidentification).
Distribution: Circum-Mediterranean species, distribution similar to *T. griseus*, but more wisdespread in the east as far as Azerbaidzhan and northern Iran; also occurring in Canary Islands and Madeira.
ISRAEL: **Carmel Ridge**: Nahal Oren, 25.VI.1999 (PC); Horeshat haArba'im [The Fourties], 29.VI.2007 (JB); **Central Coastal Plain**: Coastal plain, Shefela, (HH93); Binyamina (B56, as *T. griseus*); Herzliyya, 1.VII.1979, 21.VI.1986 (AF); Tel Aviv, 15.III.1995 (CH); **Southern Coastal Plain**: 9.VI.1998 (LF); **Northern Negev**: Hazerim, *ex larva* from *Acacia* sp., 2.VII.94 (EY).
Host plants: Conspicuously polyphagous on nearly all deciduous trees, often on conifers: *Cedrus libani* A. Rich (Pinaceae), *Pinus pinea* L. (GS). Attacks dead and dry wood mostly of twigs and branches as well as living twigs. In Israel it is recorded on *Cedrus*, *Ceratonia siliqua*, *Dalbergia sissoo* Roxb ex DC. (Fabaceae), *Nerium oleander* L. (Apocynaceae), *Pistacia lentiscus* L. (Anacardiaceae), *Ulmus* spp., (Halperin & Holzschuh, 1993); also reported on *Ficus carica*, but the most part of records for this tree proved to refer to *T. griseus*.

Penichroa fasciata (Stephens, 1831)

Callidium fasciatum Stephens, 1831, Ill. Brit.entomol., Mand., 4: 250. Type locality: "Norwich" (nec Herbst, 1784, *Plagionotus floralis*) (maintained according to the I.C.Z.N, 1999, art. 23.9.5).
Penichroa fasciata: Bodenheimer, 1937: 145; Heyrovský, 1948: 19; Bytinski-Salz, 1956: 213; Heyrovský, 1963: 258; Halperin & Holzschuh, 1993: 26; Chikatunov et al., 1999: 112; Buse et al., 2008: 61; Chikatunov et al., 2006: 317.
Phymatodes testaceus: Bytinsky-Salz, 1956: 213 (misidentification).
Distribution: Europe, Caucasus, Azerbaidzhan, northern Iran, Asia Minor, Near East including Cyprus and Israel; North Africa, occasionally imported in North America.
ISRAEL: Common everywhere north of Be`er Sheva (HH93); **Mt. Hermon**: 1800m, 3.VIII.1995 (CH); **Golan Heights**: Nimrod (R. Pettersson in litt.); **Upper Galilee**: Elon, 23.V.1948 (BS) (Bytinski-Salz, 1956, as *Phymatodes fasciatus*); Elon, 15.V.1960 (LFH); **Lower Galilee**: Qiryat Tiv'on, 20.V.1987 (EY); **Carmel Ridge**: Haifa, leg. E. Reitter; 6.V.1940 (BS),

VI-VII.96, leg. Innocenti (MSF); Carmel (Haifa) (B56); Horeshat haArba'im [The Fourties] 08.VI.2007 (JB) (Buse et al., 2008); Nahal Oren, 22.VI.1997, 16.V.1999, 10.V.1999 (PC); Nesher, 18.V.1990 (EY); Nahal Siah, 19.V.2000 (EY); **Jordan Valley**: Nahal Yarmouk, 20.V.1959 (LFH); Gesher, 5.VI.90 (EY, GS); **Northern Coastal Plain**: Binyamina, 5.VI.1942 (BS); Qesarya, 24.V.1984, 14.X.1987 (EY); **Central Coastal Plain**: Pardes Hanna, 16.V.1948 (BS); Netanya (R. Pettersson in litt.); Herzliyya, 23.VI.1991 (AF); Ramat haSharon, 4.XI.1972 (DG); Tel Aviv, 5.VII.1941 (BS); 25.V.1974 (DF); Bene Beraq, 7.V.1976 (MK); **Judean Hills**: Ramallah, 19.6.57 (LH63); Yerushalayim [Jerusalem], 14.VI.1965, leg. E. Krasil; **Southern Coastal Plain**: Bat Yam, 2.VII.1980, leg. C. Oren; Miqwe Yisrael, 26.VI.1948 (BS); Miqwe Israel (B56); Rehovot (B56); Rehovot, 16.V.1946 (BS); 26.V.1979 (DF); Nizzanim, 3.VI.1997 (LF); **Northern Negev**: Be`er Sheva (HH93).

Host plants: Extremely polyphagous mostly on deciduous trees, sometimes on conifers (*Pinus halepensis* and *Thuya*); in Israel on *Cercis siliquastrum* L. (Fabaceae) (Heyrovský, 1948), *Morus* sp., *Poinciana regia* Bojer ex Hook. (Fabaceae) (Bytinski-Salz, 1956), *Acacia* spp., *Acer negundo* L. (Aceraceae), *Ceratonia siliqua, Crataegus aronia* (L.) Bosc. (Rosaceae), *Dalbergia sissoo, Eucalyptus camaldulensis* Dehnh.(Myrtaceae), *Melia azedarach* L. (Meliaceae), *Pistacia* spp., *Populus euphratica* Olivier (Salicaceae), *Pyrus* spp., *Quercus* spp., *Rhamnus alaternus* L. (Rhamnaceae), *Robinia pseudoacacia* L. (Fabaceae), *Ulmus* sp., *Ziziphus spina-christi* (L.) Desf. (Rhamnaceae) (Halperin and Holzschuh, 1993).

Hylotrupes bajulus (Linnaeus, 1758)

Cerambyx bajulus Linnaeus, 1758, Syst. Nat., 10(1): 396. Type locality: "Europa, America septentrionali".
Hylotrupes bajulus: Bodenheimer, 1937: 145; Bytinski-Salz, 1956: 215; Halperin & Holzschuh, 1993: 26; Chikatunov et al., 1999: 110.

Distribution: Europe, North Africa, Canary Islands, Madeira, Asia Minor, Middle East (Syria, Lebanon, Israel), Caucasus, Siberia, China. Introduced in several countries in the world such as North America, South Africa, Madagascar and Japan.

ISRAEL: **Golan Heights**: 'Aleiqa, 6.II.1967 (JH); **Upper Galilee**: Kefar Gil'adi (BS56); Har Meron, 14.VI.2007 (JB); **Lower Galilee**: Qiryat Tiv'on, 27.V.1986, 1.VI.1990 (EY); 'Afula, Kfar Yeladim (B56); **Carmel Ridge**: Haifa, 19.V.1944 (BS); Haifa, Carmeliyya, 31.V.1999, 23.IV.2001 (BO); Daliyya, 27.V.1960 (JH); **Samaria**: (HH93); **Northern Coastal Plain**: Nahariyya, 19.VI.1942 (BS); Binyamina, 7.VI.1944 (BS); **Central Coastal Plain**: Netanya, 3.VII.1979, leg. H. Oren; Tel Aviv; 5.X.1945, 24.VI.1962 (BS); 6.VI.1986, leg. G. Perry; Ramat Gan, 7.VII.1955 (LFH); Holon, 15.V.1979, leg. R. Gairon; **Judean Hills**: Yerushalayim [Jerusalem], 18.V.1942 (BS); 19.VI.1956 (PA).

Host plants: Development in dead stumps and fallen trunks of conifer trees (*Picea*, *Abies*, *Pinus*), but also in old dry wood of seasoned timber, furniture, wooden structures as roofs, fences. In Israel found on *Pinus halepensis* (Mt. Carmel, Har Meron) and *Pinus brutia* Ten. (Pinaceae) (Golan Heights); according to Halperin & Holzschuh (1993) also in *Populus*.

Pseudobolivarita negevensis Sama & Orbach, 2003

Pseudobolivarita negevensis Sama & Orbach, 2003, Quad. Studi Nat. Romagna, 17, suppl.: 66. Type locality: Israel, Negev: Hazeva.

Distribution: Only known from southern Israel. The female is unknown.

ISRAEL: **Dead Sea Area**: 'En Gedi, 16.VIII.1957, Hebr. Univ. (JW); **Central Negev**: 'En Zin, 27.II.2001 (CH); **Arava Valley**: Ne'ot haKikkar, light traps, 29.IX.2002 (YD); Hazeva, 3.IX.2000 (IY, VK).

Host plants: Host plants and morphology of immature stages are unknown; adults were collected by night, attracted to light traps.

Molorchus juglandis Sama, 1982

Molorchus juglandis Sama, 1982, Fragm. Entomol., 16(2): 219. Type locality: Alanya (Southern Turkey).
Molorchus juglandis Sama & Orbach, 2003: 66.

Distribution: Southern Turkey, Syria, Lebanon, Israel.

ISRAEL: **Upper Galilee**: Nahal Keziv, 5.III.1978 (MK); **Carmel Ridge**: Haifa, Nahal Siah, 19.III.2000, leg. E. &. B Orbach (Sama & Orbach, 2003).

Host plants: Larvae on dead small branches of decidous trees, reared from *Juglans regia* (preferred) and *Cornus* sp. (Turkey), *Prunus ursina* Kotschy (Rosaceae) and *Juglans regia* (Lebanon); in Israel emerged from *Morus nigra* L. (EY).

* ***Glaphyra kiesenwetteri hircus*** (Abeille de Perrin, 1881)

Molorchus hircus Abeille de Perrin, 1881, Nouv. Faits de l'Abeille, 2(34): 133. Type locality: " Bloudan (Anti Liban)" (southern Syria).

Distribution: Turkey, Armenia, Azerbajdzhan, North Iran, Israel, Syria, Lebanon (Sama, 1995b).

ISRAEL: **Mt. Hermon**: Biq'at Man, 1450m, 14.V.1996, an adult running on a small branch of *Crataegus* sp. (GS); idem, *ex larva* from *Crataegus* sp. (GS); Nahal 'Ar'ar, 1600m, 28.V.2001 (EY).

Host plants: Development on dead twigs chiefly of Rosaceae such as *Crataegus* and *Prunus*.

Stenopterus flavicornis Küster, 1846

Stenopterus flavicornis Küster, 1846, Käf. Eur., 6: 75. Type locality: "Dalmatien".

Stenopterus flavicornis: Bytinski-Salz, 1956: 214; Heyrovský, 1963: 258; Bytinski-Salz & Sternlicht, 1967: 134; Halperin & Holzschuh, 1993: 26.

Distribution: Italy, South East Europe, Syria, Lebanon, Israel (Sama, 1995a).

ISRAEL: **Mt. Hermon**: Har Dov, 10.VI.1997 (EY); **Golan Heights**: Mezudat Nimrod, 8.VI.1975 (JK); 9.VI.1976 (DS); Hammat Gader, 8.V.1997 (LF); **Upper Galilee**: Kefar Shammay, 27.V.1980, leg. R. Kopan; Dafna [Daphne Oaks] (B56); Dafna, 17.VI.1971 (BS); Hula Valley (HH93); Dishon, 17.V.1973 (JK); 15.V.1979 (FN); Ramot Naftali, 17.V.1995 (AF); Avivim, 28.V.2007 (JB); Elon, 9.V.1971 (BS); Har Meron; 13.V.1973 (MK); Har Kefir, 19.V.1995, 7.VI.1996 (EY); Mizpe Harashim, 31.V.1998 (EY); **Lower Galilee**: Allonim, 20.V.1946 (BS); **Carmel Ridge**: Yagur, 10.VI.1991 (EY); Nahal Oren, 5.III.1996 (PC); **Northern Coastal Plain**: Nahariyya, 20.V.1962 (BS); **Yizre'`el Valley**: (HH93); **Jordan Valley**: Deganya, 19.IV.1941 (BS); Afiqim [NW Galilee, 3km S sea Genezareth: Afiquim], 5.V.2000 (TO) (NMS); Gesher, 8.V.1996 (GS); **Judean Hills**: Park Canada [Kubebeh b. Jerusalem], 13.6.58 (LH63); Ma'ale haHamisha, 28.V.1947 (BS); Yerushalayim [Jerusalem], 25.VI.1948 (BS); 26.VI.1983 (AF); Qiryat Anavim, 5.IV.1944 (BS).

Host plants: Polyphagous on decidous plants; in Israel recorded on *Ceratonia siliqua, Cercis siliquastrum, Citrus sinensis* (L.) Osbeck (Rutaceae)*, Cotoneaster franchetii* Bois. (Rosaceae)*, Pistacia atlantica* Desf. (Anacardiaceae) (Halperin & Holzschuh 1993); *Quercus ithaburensis, Q. calliprinos* (Bytinski-Salz 1956; Bytinski - Salz & Sternlicht 1967). Adults on flowers in spring.

Stenopterus rufus syriacus Pic, 1892

Stenopterus rufus v. syriacus Pic, 1892, Echange, 8: 22. Type locality: "Akbes" (Turkey).

Stenopterus rufus a. *syriacus*: Heyrovský, 1948: 19.

Stenopterus rufus ssp. syriacus: Bytinski-Salz, 1956: 214; Bytinski-Salz & Sternlicht, 1967: 134; Chikatunov et al., 1999: 114; Finkel et al., 2002: 214.

Stenopterus rufus: Halperin & Holzschuh, 1993: 27.

Sternopterus rufus syriacus: Chikatunov et al., 1999: 114 (lapsus).

Distribution: Eastern Mediterranean: Turkey, Syria, Lebanon, Israel, Cyprus (Sama, 1995a).

ISRAEL: **Mt. Hermon**: 1400m, 16.VI.1971 (BS); 3.IV.1985, leg. I. Nussbaum; **Golan Heights**: Mezudat Nimrod, 8.VI.1975 (JK); **Upper Galilee**: (HH93); Tel Dan, 8.V.1972 (JK); 15 km E. Qiryat Shemona, Hermon, Foothill, 16.V.1996, Hauser (NMS); NW Galilee, 4km E Küste, Shelomi, 3.V.2000 (TO) (NMS); Elon, 21.V.1962 (BS); Montfort, Nahal Keziv [NW Galilee, Wadi Keziv (Montfort)], 16.V.2000 (TO) (NMS); Har Meron [Jebel Jermak] 900m. (B56); Har Meron, 11.VI.1974 (FN); 29.V.1979 (JK); 27.V.1999 (CH); 16.VI.1999 (LF); 4./10.V.2007, 11.VI.2007 (JB); Har Kefir, 12.V.1995, 27.VI.1997 (EY); **Lower Galilee**: Allonim, 17.V.1940, 10.V.1948 (BS), [Alonim (Carmel)], 17.V.1942 (H48); Qiryat Tiv'on, 23.IV.1982 (EY); **Carmel Ridge**: Mt. Carmel, (HH93); Khreibe Oaks, 16.IV.1946 (BS); Nahal Oren, 16.IV.1996, 9.VI.1997, 18.V.1998 (PC); 24.V.1995 (AF); Oranim, 20.IV.1959 (LFH); Zikhron Ya'aqov, 11.V.1954 (LFH); 10.V.1973 (JK); 10.V.1973 (DF); **Yizre'`el Valley**: (HH93); Zomet ha'Amaqim (Jalame), 22.V.1993 (AF); **Samaria**: (HH93); 2 km SW Umm el Fahm, 9.V.1995 (EY); **Jordan Valley**: Nahal Yarmouk, 12.V.1944 (BS); Panyas, 6.VI.1984 (AF); **Northern Coastal Plain**: 12 km NE Haifa, Kfar Masaryik, 15.V.1996, leg. M. Hauser (NMS); Ma'agan Mikha`el, 4.V.1998 (AF); Binyamina, 15.V.1940, 7.IV.1946 (BS); **Central Coastal Plain**: Hadera, 24.V.1980 (FK); Yarqon river (B56).

Host plants: *Citrus sinensis, Cotoneaster franchetii, Pistacia* spp., *Quercus ithaburensis, Q. calliprinos* (Bytinski-Salz 1956; Bytinski - Salz & Sternlicht 1967). Adults on flowers in springtime.

Lampropterus femoratus (Germar, 1824)

Necydalis femoratus Germar, 1824, Col. Spec. Nov.: 519. Type locality: " Rossia merid.".
= *Callimus adonis* Abeille, 1881, Nouv. et Faits de l'Abeille, 2(35): 139. Type locality: "Caiffa".
= *Callimus narcissus* Abeille, 1881, Nouv. et Faits de l'Abeille, 2(35): 138. Type locality: Turkey.
Callimellum adonis: Bytinski-Salz, 1956: 214; Bytinski-Salz & Sternlicht, 1967: 134.
Lampropterus femoratus: Halperin & Holzschuh, 1993: 26; Chikatunov et al., 1999: 111; Chikatunov et al., 2006: 317.

Distribution: Eastern Mediterranean from southern Balkans to Bulgaria, Caucasus, Cyprus, Lebanon, Israel.

ISRAEL: **Mt. Hermon**: Har Hermon, *ex larva* from *Quercus*, VI.1995 (GS); **Upper Galilee**: Elon, 15.V.1948, 26.V.1962 (BS); Nahal Keziv, 5.V.1978 (DF); Mt. Meron, Sasa, *ex larva* from *Quercus* sp., 28.V.93 (GS); Har Meron, 11.VI.2007 (JB); Har Kefir, 28.V.1994, 3.VI.1994 (EY); Har Kefir [Mt.Kfir], Nahal HaAri, 26.V/2.VI.1995 (GS).**Carmel Ridge**: Haifa, 7.V. (BS); Nahal Oren, 9.VI.1997 (PC); Ben Dor, 9.VI.1988 (EY); Zomet Elyaqim, 16.V.1995 (EY); **Yizre`el Valley**: Zomet ha'Amaqim (Jalame), 26.V.1993 (AF); **Central Coastal Plain**: Tel Aviv, 2.V.1966 (BS).

Host plants: Development in dead branches of decidous trees: *Quercus ithaburensis, Q. calliprinos* (Bytinski-Salz & Sternlicht, 1967); *Delonyx regia, Ulmus* spp. (Halperin & Holzschuh, 1993).

* ***Procallimus distinctipes*** (Pic, 1906)

Callimus distinctipes Pic, 1906, Echange, 22, n° 254: 11. Type locality: "Bichfaya" (Lebanon).

Distribution: Jordan, Lebanon, Israel.

ISRAEL: **Upper Galilee**: Har Meron, 17.VI.2007, 01.VII.2007 (JB); Har Kefir, 800m, 3.VI.1994, 23.VI.1995 (BO); VII.1995 (GS); **Lower Galilee**: Yodefat, 9.VI.1998 (EY); **Carmel Ridge**: 2 km N. Zomet Elyaqim, *ex larva* from *Rhamnus palaestina*, 20/25.VI.1998 (GS).

Host plants: Development in living stems of *Rhamnus punctata* Boiss. (Lebanon) and *R. palaestina* Boiss. (Israel) (GS); adults on flowers of Apiaceae.

Certallum ebulinum (Linnaeus, 1767)

Cerambyx ebulinus Linnaeus, 1767, Syst.Nat.,12: 637. Type locality: "Gallia" (France).
Cartallum ebulinum: Baudi, 1894: 11; Sahlberg, 1913: 233; Bodenheimer, 1937: 145; Bytinsky, 1956: 214; Heyrovský, 1963: 258.
Cartallum ebulinum ruficolle: Heyrovský, 1948: 19; Chikatunov et al., 1999: 106.

Distribution: Europe, North Africa, Caucasus, Transcaucasia, northern Iran, Near East. Widespread everywhere in Israel and Palestine southwards to Central Negev.

ISRAEL: **Mt. Hermon**: Har Hermon, 1500m, 15.V.1980 (MR); Har Hermon, 10/17.V.1996 (GS); Biq'at Man, 1450m, 4.V.1990, 7.V.1991 (EY); Nahal Guvta, 1250m, 28.IV.1995 (EY); Newe Ativ, 26.IV.1978 (DF); **Golan Heights**: Mezudat Nimrod, 26.IV.1978 (DF); 24.IV.1982 (FK); Ya'ar Odem Reserve, 23.V.1998, Bartolozzi & Sforzi (MLSF); **Upper Galilee**: (B56); Dan, 3.VI.1993 (CH); Dafna, 8.III.1941 (BS); Hula, 7.IV.1978 (DF); Hanita, 27.III.1976 (DG); NW Galilee, 4km E Küste, Shelomi, 3.V.2000 (TO) (NMS); Monfort, IV.82, leg. M. Tedeschi (GS); 'En Zetim, 13.V.1998 (CH); Har Meron, 26.V.1999 (AF); Rosh Pina, 14.III.1941 (BS); **Lower Galilee**: Allonim, 27.III.1942 (BS); 17.IV.1950 (JW); Zippori, 1.V.1985 (EY); Kefar haHoresh [Kfar Hakoresh], 1.IV.1995 (GS); Nahal Tavor, 25.III.2001 (CH); HaSolelim, 16.III.1990 (EY); **Carmel Ridge**: Haifa, leg. E. Reitter; 25.III.1989 (JK); Nahal Oren, 18.III.1996, 1.IV.1997, 23.II.1998, 23.III.1998, 27.III.2000 (PC); Zikhron Ya`aqov, 29.III.1955 (LEW); 17.III.1958 (LFH); 1.5 km NW Gal'ed, 3.IV.1993 (EY); Zomet Elyaqim, III.1998 (EY); **Samaria**: NW Shekhem [NW Nablus], 6.IV.87, leg. W. Heinz (CPS); Upper part of Nahal Tirza [Upper part of Wadi Fari`a], 3.III.1973 (DF); Qedumim, 2.IV.1999 (LF); **Northern Coastal Plain**: 'Akko, 17.III.1952 (Asw); Binyamina, 25.III.1942 (BS); **Jordan Valley**: "*ad oppidum Hierichuntem et propre lacum Generazeth*, 27.III" (S13); Teverya, 16.IV.1945 (BS); 14.V.1979 (DF); Teverya [Tiberias] (B56), [Tiberias] (CRP); En Gev, 25.III.1995 (GS); Hammat Gader ['El Hamma], 18.IV.1941 (BS); 2.III.1978 (AF); 8.V.1997 (CH); Gesher, 10.II.1990 (BO); Bet She`an, [Beisan] (B56), 20.III.1974 (DF); Gilgal, 11.III.1973 (DF); Massu`a, 11.III.1985, leg. A. Hefetz, Massu`a [Messua] (CRP); Yeriho [Jericho], 28/40 Km N., 21.III.1995 (GS); **Central Coastal Plain**: Netanya, 31.III.1959 (JK); Netanya (CRP); Tel Aviv, 6.III.1955 (LFH); 19.III.1997 (LF); 9.III.2001 (CH); Ramat Gan, 3.III/30.IV; 27.V.1941 (H48); **Southern Coastal Plain**: Holon, 28.III.1948 (BS); Miqwe Israel (B56); Rehovot (B56); Be`eri, 2.III.1973 (DF); Segula, 9.III.1973 (DF); **Judean Hills**: Yerushalayim [Jerusalem], 25.III.1940, 18.IV.1940 (BS), (H48); Zomet

HaEla, 4.IV.1999 (CH); **Judean Desert**: Ma`ale Adummim, 25.II.1979 (MK); Nahal Perat [Wadi Qelt], 26.II.1941 (BS), [Vadi et Kelt] (H48); **Dead Sea Area**: Mar-Saba (Baudi, 1894); Yeriho [Gerico] (Baudi, 1894); Yeriho [Jericho] (B56); Yeriho, 1.I.1942, 23.II.1942 (BS); 14.II.1974 (DF); 8.III.1976 (AF); Qalya, 8.III.1976 (MK); Nahal Qumeran, 24.III.1986, leg. G. Eldar; Nahal Qidron, 25.III.1987 (ASH); Mezoqe Deragot [Um Daraj], 16.III.1978 (DF); 'En Gedi, 25.III.1960 (LFH); 9.III.1967 (JM); **Northern Negev**: (B56); Be`er Sheva, 14.III.1948 (BS); Hazerim, 17.II.1987 (EY); Gevulot, 14.III.1987 (ESH); Ze`elim, 12.III.1974 (DF); Nir Yizhaq, 2.III.1973 (DF); Park Eshkol, 25.III.1991 (EY); **Central Negev**: Nahal Ye`elim (CH); 'Arad, 29.II.1956 (LFH); 12.IV.1963(MP); Mas`abbe Sade, 19.III.1978 (DF); Yeroham [Bir Rekhme], 13.III.1948 (BS); Yeroham, 28.III.1957 (JK); Sede Boqer, 12.III.1974 (DF); 'En Avedat, 16.IV.1997 (AF); Mizpe Ramon, 17.III.1995 (AF); **'Arava Valley**: Timna', 3.IV.1997 (CH).

Host plants: Larvae in living roots and stems of several herbaceous plants, chiefly Brassicaceae like *Psychine stylosa* Desf., *Erysinum grandiflorum* Desf., *Sisymbrum*, *Raphanus*, *Raphanistrum*. Adults on the host plants very early in the spring.

* *Certallum thoracicum* (Sharp, 1880)

Cartallum thoracicum Sharp, 1880, Ent. Month. Mag., 16: 247. Type locality: "Jeddah" (wrong locality).

Distribution: South-eastern Turkey, Iran, Syria, Iraq, Jordan, Lebanon, Israel.

ISRAEL: Galilea, Tel Abu Hamsir, 18.IV.1982, leg. H. Muhle (G.Sama collection).

Deilus fugax (Olivier, 1790)

Callidium fugax Olivier, 1790, Encycl. Méthod. Entom, 5 (Ins.): 253. Type locality: "Provence" (southern France).

Deilus fugax: Bytinski-Salz, 1956; Heyrovský, 1963: 258; Bytinski-Salz & Sternlicht, 1967: 134; Halperin & Holzschuh, 1993: 25; Chikatunov et al., 1999: 108; Finkel et al., 2002: 215; Chikatunov et al., 2006: 317.

Distribution: Europe eastward to the Urals and Ukraine, North Africa, Asia Minor, Caucasus, Cyprus, Near East.

ISRAEL: **Golan Heights**: Mezudat Nimrod, 23.IV.1975 (BS); Panyas [Banyas], Nahal Sa'ar, 28.IV.1995 (EY); **Upper Galilee**: Montfort, Nahal Keziv [Wadi Keziv (Montfort)], 16.V.2000 (TO) (NMS); Har Meron, Sasa, 29.III.1995 (GS); idem, *ex larva* from *Spartium junceum*, IV.1996 (GS), 10.V.2007 (JB); Shefer, 750m, 25.V.1991 (EY); **Lower Galilee**: Nahal Arbel, 17.III.2000 (EY); Yavne`el, 7.IV.2000 (EY); Basmat Tab`un, 14.IV.1999 (LF); Kefar haHoresh [Kfar Hakoresh], 1.IV.1995 (GS); **Carmel Ridge**: Khreibe Oaks (Carmel) (B56); Nesher, 9.V.1987 (EY); Bet Oren, 18.V.1993 (EY); Nahal Oren, 14.III.1973 (DF); 15.IV.1995, 29.III.1996, 1.IV.1997, 6.IV.1998 (PC); 26.IV.1999 (AF); Zikhron Ya`aqov, 1.V.1998 (AF); Dalya/Galed, 19-30.III.1995 (GS); 'En haShofet, 21.IV.1974 (DF); Nahal Si'ah, 16.IV.2000 (EY); 1.5 km NW Gal'ed, 9.IV.1994 (EY); 3 km NW Zomet Elyaqim, 30 III.1995 (EY); **Yizre'`el Valley**: Zomet ha'Amaqim (Jalame), 22.V.1993 (AF); **Northern Coastal Plain**: Binyamina, 13.IV.1947 (BS); **Southern Coastal Plain**: Shefela, (HH93); **Judean Hills**: Ramat Razi'el, 12.III.2001 (CH); **Dead Sea Area**: Qalya, 6.II.1978 (AF).

Host plants: Ecologically associated with Fabaceae; it attacks dying or recently dead twigs, small branches or shoots of *Spartium*, *Cytisus*, *Sarothamnus*, *Calycotome*, *Genista*. Records regarding *Quercus ithaburensis* and *Q. calliprinos* (Bytinski-Salz & Sternlicht, 1967) are uncorrect.

Aromia moschata ambrosiaca (Stevens, 1809)

Cerambyx ambrosiacus Steven, 1809, Mem. Soc. Nat. Mosc., 2: 40. Type locality: Russia.

= *Cerambyx thoracicus* Fischer, 1824, Ent. Ross., 2: 236. Type locality: Russia.

Aromia moschata var. ambrosiaca: Bodenheimer, 1937: 145.

Aromia moschata ssp. thoracica: Bytinski-Salz, 1956: 215.

Distribution: Southern and Eastern Mediterranean from Portugal and North Africa to Iran, eastwards to the Turkestan.

ISRAEL: **Golan Heights**: Panyas, 3.VI.1946 (BS); Aniam, 18.V.1983 (FK); **Upper Galilee**: Banyas river above Dan (B56); Dan (B56); Dafna, 17.VI.1945 (BS), [Daphne Oaks] (B56); HaGosherim, 20.VI.1961 (JW); Hula, 24.V.1922, leg. P.A. Buxton; 2.VII.1947 (BS); 23.VI.1952 (JW); Hulata (B56); **Samaria**: Mansura (B56); **Central Coastal Plain**: Tel Aviv, 30.II.1957.

Host plants: Ecologically strictly associated with willow (*Salix* spp.), occasionally on other broadleaf trees such as *Populus nigra*, *Sorbus*, *Alnus*, *Acer*. Larvae feed in living trunks and branches which they often seriously damage or kill.

Ropalopus ledereri ledereri Fairmaire, 1866 (Fig. 4)

Rhopalopus ledereri, Fairmaire, 1866, Ann. Soc. entomol. France, (4),6: 269. Type locality: "Bosz.Dagh (south-western Turkey).

Ropalopus ledereri: Halperin & Holzschuh, 1993:26.

Distribution: East-Mediterranean from western and southern Turkey to Jordan and Israel; replaced in northern Syria by *R. lederi* ssp. *wittmeri* Demelt, 1970 and in Lebanon by *R. eleonorae* Sama & Rapuzzi, 2002.

ISRAEL: **Mt. Hermon**: Har Hermon, 1450m, 12.VI.1992, on *Eriolobus trilobatus* (Halperin & Holzschuh, 1993); Biq'at Man, 1450m, 14.V.1996, adult in pupal cell in *Crataegus* sp. (GS); **Upper Galilee**: Har Meron, 5.VI.1973 (FN); [Miron], 450m, ex pupae from *Malus sylvestris*, 1.V.1995 (GS), 22.V.1999 (EY); Near Meron, 5.V.1997 (EY); Har Kefir, 850m, V.1995 (GS); Kefar Meron [Kfir Meron], 1000m, *ex larva* from *Crataegus* sp., emergence 7.V.1995, 20-26.IV.1996; 24.IV.1998 (GS); idem, adults in pupal cells, 15.V.1996 (GS).

Host plants: *Eriolobus trilobatus* (Labill. ex Poiret) Roem. (Rosaceae) (Halperin and Holzshuh, 1993); *Malus* sp., *Crataegus* sp., *Quercus calliprinos* (G. Sama). Larvae feeding in thin terminal twigs of living trees. Adults can be found by beating from the host plants (sometimes on flowering *Crataegus*) in spring.

****Poecilium lividum*** (Rossi, 1794)

Callidium lividum Rossi, 1794, Mant. Ins., 2, Append.: 98. Type locality: "Etruria" (Tuscany, Italy).

Distribution: Europe, North Africa, Caucasus, Transcaucasia, Turkey, Syria, Lebanon, Israel.

ISRAEL: **Golan Heights**: Odem, 10.V.1995 (GS); **Upper Galilee**: Har Meron, Sasa, 700m, *ex larva* from *Quercus calliprinos*, 15-30.IV.95 (GS) (Sama 1996); Nahal Ziv`on, 19.IV.1995, 28.IV.1996, 25.IV.1997 (EY); Har Kefir, 23.V.1996 (EY).

Host plants: Usually on *Quercus*; found in Israel on *Quercus calliprinos* (Sama, 1996).

****Poecilium fasciatum*** (Villers, 1789)

Cerambyx fasciatus Villers, 1789, Linn. Entomol., 1: 257. Type locality: not stated [probably France].

Distribution: Central and southern Europe, southern Turkey, Cyprus (Sama, 2002).

ISRAEL: **Upper Galilee**: Tel Dan, 19.III.2002 (PC).

Host plants: Larvae in dead twigs and shoots chiefly of *Vitis vinifera* L. (Vitaceae), but also reared from *Parthenocissus quinquefolia* (L.) Planch.(Vitaceae), *Clematis*, *Populus alba* L., *Quercus robur* L. and *Salix alba* L. (Sama, 2002).

Poecilium rufipes syriacum (Pic, 1891)

Callidium (Poecilium) rufipes v. syriacum Pic, 1891, Echange, 7, n° 83: 118. Type locality: "Akbes" (south – eastern Turkey).

Poecilium rufipes syriacum: Sama & Orbach, 2003: 67.

Distribution: The nominotypical subspecies is distributed from Europe to northern Turkey; *P. r. syriacum* in known in south-eastern Turkey, Syria, Lebanon and Israel.

ISRAEL: **Mt. Hermon**: Mt. Hermon,1800m; idem, 1600m, 20.VI.1993 (CH); Biq'at Man, 1450m, 14.V.1996, adult in pupal cell in *Crataegus* sp. (GS), 25.V.1999 (LF); Nahal `Ar'ar, 1450m, 25.V.2001 (BO); Mt. Hermon, June 2002 (EY).

Host plants: Larvae of nominative form develop in dead apical twigs of several broadleaf trees; the ssp. *syriacus* apparently prefers Rosaceae such as *Prunus* and *Crataegus*. Adults on flowering bushes (*Crataegus*) or flying in the evening around the host plants, mostly in May – June.

Phymatodes testaceus (Linnaeus, 1758)

Cerambyx testaceus Linnaeus, 1758, Syst. Nat., 10(1): 396.47. Type locality: "Europa".

Phymatodes testaceus: Bodenheimer, 1937: 145; Bytinski-Salz & Sternlicht, 1967: 134; Chikatunov et al., 1999: 113; Chikatunov et al., 2006: 317.

Phymatodes testaceus ab. *fulvipilis*: Heyrovský, 1948: 19.

Distribution: Europe, North Africa, Turkey, Caucasus, Middle East (Syria, Israel), Siberia, Japan, introduced in North America.

ISRAEL: **Mt. Hermon**: 1600m, 26.VI.1997 (AF); **Upper Galilee**: Nahal Ziv`on, 28.IV.1996 (EY); Ziv'on, 26.VI.2007 (JB); Har Meron, 06.VI.2007 (JB); **Judean Hills**: Yerushalayim [Jerusalem], 27.V.1941 (H48); **Carmel ridge**: Carmel, 6.IV (BS56).

Remarks: The specimen from Upper Galilee: Elon, 23.V.1948 (BS), recorded by Bytinski-Salz (1956) belongs, in fact, to *Penichroa fasciata* (Stephens, 1831). Distribution of *P. testaceus* in Israel needs verification.
Host plants: Polyphagous in deciduous plants, but *Quercus* is preferred; in Israel recorded on *Quercus ithaburensis and Q. calliprinos* (Bytinski-Salz & Sternlicht, 1967).

Nathrius brevipennis (Mulsant, 1839)

Leptidea brevipennis Mulsant, 1839, Hist. nat. Coléopt. France, Longic.: 105. Type locality: " Midi de la France".
Nathrius brevipennis: Halperin, 1986; Halperin & Holzschuh, 1993: 26; Chikatunov et al., 1999: 111.
Distribution: Holomediterranean, subcosmopolitan. Europe, Asia Minor, Near East (including Cyprus, Lebanon and Israel), Caucasus, Transcaucasia, northern Iran, North Africa; introduced in China, North and South America.
ISRAEL: Common everywhere north of Be`er Sheva (HH93); **Golan Hights**: Banyas, 500m, *ex larva* from *Salix* sp., 29.V.1995 (GS); **Upper Galilee**: Nahal Ziv'on, 1.VII.1995 (EY); Nahal Ammud, 25.IV.1974 (DF); **Lower Galilee**: Qiryat Tiv'on, 10-17.V.1994, *ex larva* from *Quercus* (EY); Qiryat Tiv'on, *ex larva* from *Quercus*, 10/17.V.94 (EY); **Carmel Ridge**: Nahal Oren, 16.IV.1996, 30.V.1996, 10.V.1999, 17.VI.1999 (PC); Daliyat el Karmil, *ex larva* from *Pistacia palaestina*, VI.1995; 22.VII.1995 (GS); Zikhron Ya`aqov, 14.VII.1969 (JH); Horeshat haArba'im [The Fourties], 08.VI.2007 (JB); **Yizre'`el Valley**: Bet Alfa, 15.IX.1995 (CH); **Central Coastal Plain**: Ilanot, 14.VIII.1968 (JH); Herzliyya, 29.VI.1996 (AF); Tel Aviv, 24.VI.1961 (BS); **Judean Hills**: Yerushalayim [Jerusalem], 15.IV.58, Linnavuori (CPS); Bet Shemesh, 12.IV.1993 (CH).
Host plants: *Celtis* spp., *Ceratonia siliqua, Ulmus*, *Quercus robur* (Halperin & Holzschuh, 1993); *Q. calliprinos* (Chikatunov et al., 1999); *Pistacia lentiscus, P. palaestina* (GS).

Stenhomalus (Obriopsis) bicolor (Kraatz, 1862)

Obrium bicolor Kraatz, 1862, Berl. entomol. Zeits., 6: 126. Type locality: "Griechenland" (Greece).
Stenhomalus bicolor: Halperin & Holzschuh, 1993: 26.
Distribution: South-eastern Mediterranean; from central and south-eastern Europe to Asia Minor and Near East, including Cyprus, Syria and Israel.
ISRAEL: **Mt. Hermon**: Nahal 'Ar'ar, 1 km NNE Biq'at Man, 1450m, 18/28.V.2001 (EY); **Upper Galilee**: Hula Valley, Lower Galilee, Jordan Valley, Yizre' `el Valley, Judean Hills (HH93).
Host plants: Development in dead twigs of deciduous trees: *Ficus carica*, *Euonymus europaeus* L. (Celastraceae), *Morus, Juglans, Cercis*; in Near East often on *Styrax officinalis* L. (Styracaceae). Life cycle of one year; adults, which overwinter in pupal cell, emerge next spring and can be found, from April to June, on flowers (*Crataegus*, *Cornus*, *Philadelphus, Styrax*).

Lygrus becvari Sama, 1999

Lygrus becvari Sama, 1999, Biocosme Mésogéen, 15 (2) (1998): 178. Type locality: Jordan: 50 km South of Maan.
Lygrus longicornis Pic, 1895: Halperin & Holzschuh, 1993: 26 (misidentification).
Lygrus becvari: Sama & Rapuzzi, 2006: 181.
Distribution: south-eastern Jordan, Egypt (Sinai) (Sama & Rapuzzi, 2006).
ISRAEL: **Southern Negev**: (HH93).
Host plants: *Ficus pseodosycomorus* Decne (Moraceae) (Halperin & Holzschuh 1993); *Acacia gerrardii* Benth. (Sama, 1999).

* *Turanoclytus raghidae* (Sama & Rapuzzi, 2000)

Xylotrechus raghidae Sama & Rapuzzi, 2000, Lambillionea, 100(1): 14. Type locality: Liban, Kesrouane: Aayoun es Simaane.
Distribution: Only known from Lebanon and the Mt. Hermon. A new record to Israel.
ISRAEL: **Mt. Hermon**: Har Hermon, 1600m, 7.VI.1993 (CH).
Host plants: Development in dead stems of *Astragalus* sp. (very likely *Astracantha gummifera* (Labill.) Podl.).

Xylotrechus stebbingi Gahan, 1906

Xylotrechus stebbingi Gahan, 1906, Fauna Brit. Ind., Col., 1: 244. Type locality: "North West Himalayas: Bashahr State; Tibet".
Xylotrechus stebbingi: Pavlicek et al., 1998: 73; Sama, 1999: 50; Chikatunov et al., 1999: 114; Buse et al.,

2008: 61.

Xylotrechus smei: Chikatunov et al., 2006: 317; Friedman et al., 2008: 242 (misidentification).

Distribution: Recently introduced from Asia (India, Tibet) in Europe and Middle East. It is recorded from southern France, Switzerland, northern and central Italy, Grece (including Crete), Israel, North Africa: Tunisia (Cocquempot, pers. comm.)

ISRAEL: **Lower Galilee**: Qiryat Tiv'on, 8.VIII.1997, 2.V.2000, 20.V.2000 (EY); **Carmel Ridge**: Haifa, Nahal Si'ah, 4.V.2000 (EY); 30.V.2000 (BO); Haifa, Nahal Ezov, 13.VII.2000 (BO); Horeshat haArba'im [The Fourties], 29.VI.2007 (JB) (Buse et al., 2008); Nahal Oren, 15.V.1997, 21.V.1998, 27.V.1999, 4.VI.1999 (PC) (Pavlicek et al. 1998); 5-31.VIII.1995, 11/16.VI.1996 (EY); **Samaria**: 'Ez Efrayim, 15.VIII.1998 (LF); **Northern Coastal Plain**: 4 km NE Atlit, Zomet Oren, *ex larva* from *Ficus carica*, 25.VIII.95 (EY) (Sama, 1999); Atlit, 25.VIII.1995, 6.VI.1996 (EY); **Central Coastal Plain**: Bet Herut, 2.V.1998, leg. O. Ovadia; Tel Aviv, 1.V.2001 (CH).

Host plants: Polyphagous on decidous trees; in India on *Quercus* spp., in Europe on *Populus* sp., *Morus alba*, *Alnus* sp., *Ficus carica*, *Koelreuteria paniculata* Laxm. (Sapindaceae), *Celtis australis L.* (Ulmaceae), *Ulmus* sp., *Ceratonia siliqua* and others. Larvae feed firstly under bark and then deep in the wood. Lyfe cycle of two years, adults on the host plants, nocturnal, frequently attracted to light, from May to November.

Clytus taurusiensis (Pic, 1903)

Chlorophorus taurusiensis Pic 1903, Echange, 19, n° 223: 139. Type locality: "M.Taurus" (Turkey).

= *Clytus bytinskii* Heyrovský, 1954, Ent. Arb. Mus. Frey, 5: 395. Type locality: Rehovot.

Clytus bytinskii: Bytinski-Salz, 1956: 216.

Clytus taurusiensis: Holzschuh, 1975: 103 (synonymy); Halperin & Holzschuh, 1993: 25.

Distribution: South-eastern Turkey, Israel.

ISRAEL: **Upper Galilee**: Nahal Ziv`on, 4.V.2000 (EY); **Southern Coastal Plain**: Shefela (HH93); Rehovot, 21.V.1948, (BS) (Heyrovský, 1954, type locality); **Judean Foothills**: Hulda, 10.IV.1947 (BS).

Host plants: "From dead apple branch", *Acacia saligna* (Labill.) H.L. Wendl. (Fabaceae) (Bytinski-Salz, 1956 as *A. cyanophylla*); *Celtis* spp., *Delonix regia* (Halperin & Holzschuh, 1993).

Clytus rhamni (Germar, 1817)

Clytus rhamni Germar, 1817, Reise Dalm.: 223, tav. 9, fig. 5. Type locality: "Bei Fiume" (Rijeka, Croatia).

Clytus rhamni: Sahlberg, 1913: 233; Bodenheimer, 1937: 145; Bytinski-Salz, 1956: 216; Halperin & Holzschuh, 1993: 26; Chikatunov et al., 1999: 108; Finkel et al., 2002: 215; Buse et al., 2008: 61; Chikatunov et al., 2006: 317.

Clytus rhamni ab. *temesiensis*: Heyrovský, 1948: 19.

Distribution: Central and Southern Europe, Caucasus, Transcaucasia, Asia Minor, Cyprus, Syria, Lebanon, Israel.

ISRAEL: **Golan Heights**: (HH93); Mezudat Nimrod, 14.VI.1978 (DF); Panyas, 4.VI.1993 (CH); 3.VI.1987 (EY); Odem, *ex larva* from *Quercus calliprinos*, 1/10.VI.96 (GS); **Upper Galilee**: (HH93); Ramot Naftali, 14.V.1998 (CH); Nahal Keziv, 21.V.1991, leg. M. Altaratz; Montfort Fortress, 27.V.2007 (JB); Elon, 25.V.1948 (BS); Har Meron, 15.VI.1971 (JK); 16.VI.1971, 13.VII.1971 (BS); 05.VI.2007 (JB); Har Kefir, 3.VI.1994 (EY); Har Kefir, Nahal HaAri, 26.V/2.VI.95 (EY, GS); **Lower Galilee**: (HH93); Qiryat Tiv'on, 19.V.1984 (EY); Allonim, 16.V.1948, 13.VI.1948 (BS); [Alonim (Carmel)], 17.V.1942 (H48); **Carmel Ridge**: Horeshat haArba'im [The Fourties], 08.VI.2007 (JB) (Buse et al., 2008); Bet Oren, 12.V.1991, leg. Y. Zvik; Nahal Oren, 9.V.1979 (DF); 15.IV.1996, 30.V.1996, 18.V.1998 (PC); Daliyat el Karmil, *ex larva* from *Quercus ithaburensis*, 28.V.95 (GS); **Northern Coastal Plain**: Binyamina, 13.V.1940 (BS).

Host plants: Polyphagous on deciduous trees; in Israel emerged from dead wood of *Quercus calliprinos* and *Q. ithaburensis* (GS).

Clytus madoni (Pic, 1890)

Clytus (Clytanthus) madoni Pic, 1890, Bull. Soc. entomol. France: 211. Type locality: "Palestina".

Clytus (Clytanthus) madoni: Sahlberg, 1913: 233.

Chlorophorus madoni: Bodenheimer, 1937: 145; Bytinski-Salz, 1956: 217; Finkel et al., 2002: 216.

Distribution: South-eastern Turkey, Lebanon, Israel.

ISRAEL: **Upper Galilee**: NW Galilee, 4km E Küste, Shelomi, 3.V.2000 (TO) (NMS); Montfort, IV.82, leg. M. Tedeschi (GS); Nahal Keziv, 1 km S. Goren, 21.IV.1988 (EY); Har

Meron: Sasa, 700m, V.1996 (GS); Har Meron, 3./4./10.V.2007 (JB); Kefar Meron [Kfir Meron], 700m, 10-17.V.1996 (GS); Har Kefir, Nahal HaAri, 27.VI.1997 (EY); **Lower Galilee**: Yodefat, 17.IV.1999 (EY); Kefar haHoresh [Kfar Hahoresh], 1.IV.1995 (GS); **Carmel Ridge**: Haifa, 22.IV.1973 (AF); Nahal Oren, 1.VI.1998 (AF); Daliyat el Karmil, *ex larva* from *Rhamnus palaestina*, 20.IV.1998 (GS); **Yizre'`el Valley**: Qishon River ["*in valle fluminis Kison*"], 31.III (S13), Nahalal, 17.IV.1941 (BS); Zomet ha'Amaqim (Jalame), 30.V.1993 (AF); **Samaria**: Rehan-Qazir [Shomeron, Rehan/Gazir (SW Megiddo)], 25.IV.87 (CPS); **Judean Foothills**: Newe Shalom, 26.IV.1997 (CH); **Judean Hills**: Zomet HaEla, 4.IV.1999 (CH); Bet Shemesh, 29.III-26.IV.77 (NMS); 5.IV.1996 (YD).

Host plants: Development in *Rhamnus palaestina* Boiss.; some adults emerged from living branches previously cut by larvae of *Purpuricenus interscapillatus* Plavilstshikov, 1937 and *Procallimus distinctipes* (leg. G. Sama); adults on flowers (chiefly Apiaceae) from the end of March to May.

Plagionotus bobelayei (Brullé, 1832)

Clytus bobelayei Brullé, 1832, Exp. Morée, Ins.: 253, Tav. 43, fig. 12, Type locality: Morée (South Greece).

= *Callidium speciosum* Adams, 1817, Mem. Soc. Imp. Nat. Moscou, 5: 309. Type locality: "in hortis circa Tiflin" (Caucasus) (nec Schneider, 1787, *Isotomus*).

Plagionotus bobelayi: Bodenheimer, 1937: 145 (lapsus).

Plagionotus speciosus: Heyrovský, 1954: 394; Bytinski-Salz, 1956: 216; Chikatunov et al., 1999: 113.

Distribution: East Mediterranean from Balkans to Armenia and Iran; Jordan, Syria, Lebanon, Israel.

ISRAEL: **Mt. Hermon**: Har Hermon, 1300m, 9.VI.1987 (JK); 1700m, 7.VII.1987 (AF); 26.V.1997 (LF); **Golan Heights**: Nahal Senir, 7.V.2007 (JB); Qazrin, 8.VI.1992, leg. E. Paz; 21.V.1993 (EY); 17 km E. Qiryat Shemona, Golan, 2 km SE Zomet, 16.V.96 (NMS);**Upper Galilee**: Dan, 11.V.1940 (BS); HaGosherim, 16.VI.1971 (JK); Ayyelet haShahar (B56); Manara, 2.VI.1946 (BS); Kabri, 31.VIII.1971 (DG); Kelil, 28.IV.1991 (EY); Hazor haGelilit, 16.V.1945 (BS); Hazor, 16.V.45 (H54); **Lower Galilee**: Qiryat Tiv`on, 3.IV.1973 (FN); 23.V.1998 (EY); Allonim, 26.IV.1945, 7.V.1948 (BS); Dabburiyya, 17.V.1969 (BS); **Carmel Ridge**: Haifa, 2.IV.1948 (BS); Haifa (B56); Nahal Oren, 16.IV.1996 (PC); Bat Shelomo, 13.V.1975 (JK); 19.V.1987 (EY); Zikhron Ya`aqov, 6.IV.1948 (BS); 3.IX.1955 (CL); 20.V.1973 (JK); **Jordan Valley**: Nahal Yarmouk, 20.V.1959 (LFH); **Samaria**: Nahal 'Iron [Ara], 2.V.1979 (DF); Shekhem [Nablus], 12.V.1972 (GT); **Northern Coastal Plain**: Ramat Yohanan (B56); **Central Coastal Plain**: Hadera (B56); Yarqon river (B56); **Judean Foothills**: Zor`a, 5.V.1961, leg. Kugler; **Judean Hills**: Biddu, 31.V.1974 (DF); Yerushalayim [Jerusalem], 30.IV.1942 (BS); 27.V.1950 (JW); 11.VI.1958 (PA); Yerushalayim [Jerusalem] (B56); Qiryat 'Anavim (B56).

Host plants: Ecologically associated with Malvaceae: *Alcea*, *Malva* (Danilevsky & Miroshnikov, 1985; Katbeh-Bader, 1996).

Plagionotus floralis (Pallas, 1773)

Cerambyx floralis Pallas, 1773, Reisen Russ., 2: Type locality: " Russia mer."

Plagionotus floralis: Bodenheimer, 1937: 145; Bytinski-Salz, 1956: 216.

Distribution: Europe, Asia Minor, Caucasus, Transcaucasia, northern Iran, Siberia, Near East; Syria, Jordan, Israel.

ISRAEL: **Golan Heights**: Qazrin, 21.V.1993 (EY); **Upper Galilee**: Tel Dan, 18.V.1948 (BS); Hula (B56); Elon, 18.V.1944 (BS); Har Meron, 27.V.1980 (JK); **Lower Galilee**: Allonim, 26.IV.1945 (BS); **Carmel Ridge**: Zikhron Ya'aqov, 20.V.1973 (BS); 20.V.1975 (MK); **Yizre`'el Valley**: Zomet ha'Amaqim [Jalami], 5.VI.1989 (EY); **Jordan Valley**: Migdal (B56); Teverya [Tiberias] (B56); Deganya (B56); **Northern Coastal Plain**: Ramat Yohanan, 11.IV.1944 (BS); Binyamina, 7.V.1945 (BS); **Central Coastal Plain**: Hadera, 16.V.1943 (BS); Na'an, 21.V.1945 (BS); **Judean Hills**: Bet Shemesh, 25.V.1977 (DS); Ma'ale haHamisha, 28.V.1947 (BS).

Host plants: Development on roots and stems of living herbaceous plants: *Medicago sativa* L. (Fabaceae), *Onobrychis*, *Amaranthus*, *Camelia*, *Melilotus* and others; *Euphorbia gerardiana* Jacq. (Euphorbiaceae) and *Achillea millefolium* L. (Asteraceae) are also reported. Biology in Cherepanov (1982, 1988).

Chlorophorus yachovi Sama, 1996

Chlorophorus yachovi Sama, 1996, Biocosme Mésogéen, 12 (4) (1995): 97. Type locality: Israel: Upper Galilee: Mt.Meron, Kfir Meron.

Chlorophorus nivipictus: Bytinski-Salz, 1956: 217; Bytinski-Salz & Sternlicht, 1967: 135; Halperin &

Holzschuh, 1993: 25.
Chlorophorus yachovi: Buse et al., 2008: 61.
Distribution: Israel, Lebanon.
ISRAEL: **Golan Heights**: Mas`ada, 20.VI.1972 (JH); Odem, 700m, *ex larva* (and *ex ovo*) from *Quercus calliprinos*, 1/18.VI.1997; 7.VII.1998; 2/15.VI.1999 (GS); **Upper Galilee**: Har Meron, Sasa, m.700, *ex larva* from *Quercus calliprinos*, 15.V/12.VI.1995 (GS); Sasa, 17.VI.1948 (BS); 16.III.1959 (JH); Nahal Ziv`on, 28.III.1995, 6.VI.1996, 10.V.2000, 17.VI.2000 (EY); Har Meron [M.Meron: Kfir Meron], m.1000, *ex larva* from *Quercus calliprinos*, 29.V.1995 (GS); Har Meron, 8.VI.1995 (GS), 18.VII.2007 (JB) (Buse et al., 2008).
Host plants: Larvae in dead branches of decidous trees: *Quercus ithaburensis* (Bytinski-Salz, 1956; Bytinski-Salz & Sternlicht, 1967); *Q. calliprinos, Q, boissieri* Reut. (Sama, 1996), *Crataegus monogyna* Jacq. (Rosaceae), *Pistacia* spp. (Halperin & Holzschuh, 1993). Adults (do not frequent flowers) on the host plants in June - July.

Chlorophorus gratiosus gratiosus (Marseul, 1868)

Clytus gratiosus Marseul, 1868, Abeille: 203. Type loc.: Beyrouth env. (Lebanon)
Chlorophorus gratiosus: Buse et al., 2008: 61.
Distribution: Lebanon, Israel, Turkey (here represented by *C. gratiosus* ssp. *sparsus* Reitter, 1886).
ISRAEL: **Carmel Ridge**: Horeshat haArba'im [The Fourties], window trap on *Quercus calliprinos*, 18.V-8.VI.2007 (JB) (Buse et al., 2008).
Host plants: *Quercus* sp. (Lebanon), *Paliurus* sp. (Turkey), both leg. G.Sama.

Chlorophorus sartor (Müller, 1766)

Leptura sartor Müller, 1766, Mél. Philos. Math. Soc. r. Turin, 3: 188. Type locality not stated, but Europe.
Clytus (Clytanthus) massiliensis: Sahlberg, 1913: 233.
Chlorophorus sartor: Bodenheimer, 1937: 145; Heyrovský, 1948: 19; Bytinski-Salz, 1956: 217; Bytinski-Salz & Sternlicht, 1967: 135; Halperin & Holzschuh, 1993: 25; Chikatunov et al., 1999: 107; Finkel et al., 2002: 213; Chikatunov et al., 2006: 317.
Distribution: Europe, Caucasus, Transcaucasia, Asia Minor, northern Iran, Middle East.
ISRAEL: **Mt. Hermon**: Har Hermon, 1600m, 25.VI.1997 (CH); **Golan Heights**: Mezudat Nimrod, 8.VI.1975 (JK); Panyas [Banyas], 3.VI.1987 (EY); Odem, 800m, *ex larva* from *Quercus calliprinos*, 1/10.VI.1996 (GS); 9.VI.1976 (DS); 27.V.1999 (LF); **Upper Galilee**: 15 km E. Qiryat Shemona, Hermon, Foothill, 16.V.1996 (NMS); Montfort, Nahal Keziv [NW Galilee, Wadi Keziv (Montfort)], 16.V.2000 (TO) (NMS); Har Meron, Sasa, *ex larva* from *Quercus calliprinos*, VI.1995 (GS); Har Kefir, Nahal HaAri, 26.V-2.VI.1995, Orbach (GS); Har Meron, Kfir Meron, 700m, 10/17.V.1996; also emerged *ex larva* in *Quercus calliprinos*, 24.V.1995, 4/8.VI.1996 and 23.VI.1998 (GS); Har Meron, 15.V.1971 (JK); 16.VI.1971 (BS); 10.V.2007 (JB); 11.VI.2007 (JB); Elkosh, 21.V.2007 (JB); Montfort Fortress, 27.V.2007 (JB); Mt. Adir, 5.VII.1980 (ESH); Elon, 25.V.1948, 21.V.1962 (BS); Har Kefir, 2.VI.1995 (EY); Kefar Weradim, VI.1993 (EY); Meghar [Mrar], 14.V.1974 (AF); **Lower Galilee**: Qiryat Tiv`on, 10.II.1955, leg. M. Sternlicht; 25.III.1955 (LFH); Allonim, 10.V.1948 (BS); Kfar haHoresh, 16.V.1996 (GS); **Carmel Ridge**: Carmel, 27.IV-27.VI (H48); Carmel (Haifa), Haifa, 13.V.1944 (BS); Yagur, 7.VI.1946 (BS); Yagur (Qishon river) (B56); Nahal Oren, 5.IV.1996, 10.VI.1996, 13.V.1997, 9.VI.1997, 18.V.1998 (PC); 30.V.1998 (AF); Oranim, 21.IV.1959 (JK); Bat Shelomo, 20.V.1975 (MK); Zikhron Ya'aqov, 6.V.1948 (BS); 10.V.1973 (JK); 20.V.1975 (MK); **Jordan Valley**: Sea of Galilee, 17.V.1996, Teverya, 10.V.1943 (BS); En Gev, 5-7.V.1996 (GS), 17.V.1996 (NMS); **Yizre'`el Valley**: Zomet ha'Amaqim (Jalame), 22.V.1993 (AF); **Northern Coastal Plain**: Nahariyya, 20.V.1962 (BS); 12 km NE.Haifa, Kefar Masaryk, 15.V.1996 (NMS); Ma'agan Mikha`el (10 km N. of Cesarea), 22.V.1998; Binyamina, 15.V.1940, 2.VI.1942 (BS); **Central Coastal Plain**: Herzliyya, 20.VI.1982 (JH); Tel Aviv, 7.VI.1967 (BS); Yarqon river (H63), (B56); **Southern Coastal Plain**: Miqwe Yisrael, 1931, leg. F. S. Bodenheimer; Beeri (B56); **Judean Foothills**: Nahshon, 9.V.1991, leg. Y. Zvik; Bar Giyyora, 31.V.1978(MP); Zomet HaEla, 4.IV.1999 (CH); **Judean Hills**: Park Canada [Kubebah b.Jerusalem], 13.6.58 (H63); Qiryat Ye'arim [Kiryat Ye'arin], 22.V.98, Bartolozzi e Sforzi (MSF); Ma'ale haHamisha, 28.V.1942 (BS); Qiryat 'Anavim, 5.VI.1931, leg. F. S. Bodenheimer; 18.VI.1942 (BS), [Kiriath Anavim] (H63); **Southern Coastal Plain**: Be`eri, 1.VI.1947 (BS); **Central Negev**: Sede Boqer, 12.VIII.1952 (JW).
Host plants: Polyphagous on decidous plants; in Israel it was reared from *Celtis australis, Cercis siliquastrum, Pistacia atlantica, Populus angulata* Aiton, *Ulmus minor* Miller*, Ziziphus*

spina-christi (Halperin & Holzschuh, 1993), *Quercus ithaburensis* (Bytinski-Salz & Sternlicht, 1967); *Quercus calliprinos* (GS), *Pistacia palaestina* (GS).

Chlorophorus trifasciatus (Fabricius, 1781)

Callidium trifasciatum Fabricius, 1781, Spec. Ins., 1: 244. Type locality: "Lusitania" (Portugal).
Chlorophorus trifasciatus: Heyrovský, 1948: 19; Bytinski-Salz, 1956: 216; Halperin & Holzschuh, 1993: 25; Finkel et al., 2002: 217.

Distribution: Europe, North Africa, Turkey, Syria, Israel.
ISRAEL: **Upper Galilee**: Sasa, 22.VI.1996 (BO); Har Meron, 26.VI.2007 (JB); Har Kefir, Nahal HaAri, 27.VI.1997, 28.V.1998 (EY); **Lower Galilee**: Allonim, 10.V.1948 (BS); **Carmel Ridge**: Nahal Oren, 24.V.1995 (AF); Ben Dor, 9.VI.1988 (EY); Zikhron Ya'aqov, 11.VI.1968 (JK); **Yizre`'el Valley**: Zomet ha'Amaqim [Jalami], 10.VI.1989 (EY); **Judean Hills**: Ma'ale haHamisha, 28.V.1947 (BS); Qiryat 'Anavim, 18.VI.1943 (H48); 21.VI.1946 (BS).
Host plants: Development in living roots of Fabaceae such as *Dorycnium hirsutum* (L.) Ser. and *Ononis natrix* L. (GS). Adults on flowers of the host plants, or on Apiaceae in May - August.

Chlorophorus varius damascenus (Chevrolat, 1854)

Clytus damascenus Chevrolat, 1854, Rev. Mag. Zool, 7.8: 20. Localité-type: "env. de Damas" (Syrie).
Chlorophorus varius + var. *damascenus*: Bodenheimer, 1937: 145.
Chlorophorus varius + var. *damascenus* + ab. *paulojunctus*: Heyrovský, 1948: 19.
Chlorophorus varius ssp. *damascenus*: Heyrovský, 1950: 14; Bytinski-Salz, 1956: 216; Heyrovský, 1963: 259.
Chlorophorus varius: Halperin & Holzschuh, 1993: 25 ; Buse et al., 2008: 61.
Chlorophorus varius damascenus: Chikatunov et al., 1999: 107.

Distribution: Europe, south-western Siberia (Urals), Asia Minor, Caucasus, Transcaucasia, northern Iran, Middle East (Iraq, Jordan, Lebanon, Israel), western part of North Africa (Egypt), Cyprus.
ISRAEL: **Golan Heights**: Panyas, 9.VI.1976 (DS); 11.VI.1993 (CH); Mas'ada, 20.VI.1993 (CH); **Upper Galilee**: Metulla (B56); 1 km SE Ma'yan Barukh, Nahal Senir, 14.VI.1997 (EY); Dafna, 16.VI.1971 (BS); Qiryat Shemona (B56); Amir, 10.VI.1953 (LFH); Hula, 23.VI.1952 (JW); 4.VII.1974 (MK); 15.VI.1978 (DF); 11.VI.1981 (IY); Lahavot haBashan, 7.VI.1958 (LFH); Gadot, 18.VI.1973 (DF); Elon, 7.IV.1947 (BS); Har Meron, 1./4./18.VII.2007 (JB); **Lower Galilee**: Almagor, 30.IV.1988 (EY); Sha'ar Ha'Amaqim, 13.VI.1986 (EY); **Carmel Ridge**: Haifa, 19.VIII.1957, leg. O. Yarkoni; Yagur, 7.VI.1946 (BS); Bet Oren, 18.VI.1981 (ESH); Nahal Oren, 22.V.1996, 10.VI.1996, 15.VI.1998 (PC); Zikhron Ya`aqov, 28.IV.1958 (YW); **Jordan Valley**: Biq'at Bet Zayda [Betecha], 19.VI.1971 (DG); Migdal (B56); Teverya [Tiberias] (B56); Deganya (B56); En Gev, 5/7.V.1996 (GS); **Northern Coastal Plain**: Rosh haNiqra, 9.VII.1948 (BS); Rosh haNiqra (B56); 'Akko [Acre] (B56); Ramat Yohanan (B56); Ma'agan Mikha`el, 3.VI.1990 (EY); Binyamina, 2.VI.1942, 29.V.1948 (BS); **Central Coastal Plain**: Hadera, 26.VI.58, leg. Linnavuori (Mus. Helsinki), 17.VI.1973, det. D. Furth; Ma'barot, 1.VII.1948 (BS); Netanya, 2.VIII.1953 (LFH); Tel Aviv, Ramat Gan, 12.VI.1942 (BS); **Judean Foothills**: Hulda, 14.VI.1975 (DS); **Judean Hills**: Ma'ale haHamisha, 2.VII.1946 (BS); Qiryat 'Anavim, 18.II.1943 (BS); Yerushalayim [Jerusalem] (H48, B56); **Judean Desert**: Nahal Perat [Vadi el Kelt] (H48, B56); **Southern Coastal Plain**: Miqwe Israel, Rehovot, 1.VI.1946 (BS); Ramla, 2.VI.1947 (BS), [Ramle] (B56); Nizzanim, 8.VI.1998 (CH), 7.VI.2007 (JB); **Dead Sea Area**: Yeriho, 26.IV.1942 (BS); [Jericho], 11.5.1959, 4.7.1958 (H63); 'En Gedi, 2.V.1943 (BS); **Northern Negev**: Ruhama (B56).
Host plants: Polyphagous on deciduous trees: In Israel reared from *Cercis siliquastrum, Pistacia atlantica, Populus angulata, Quercus boisseri, Robinia pseudacacia, Ziziphus spina-christi, Ulmus*, *Prunus* (Halperin & Holzschuh, 1993), grape orchards (Avidov and Harpaz, 1969; El Minshawy, 1976).

Purpuricenus dalmatinus Sturm, 1843

Purpuricenus dalmatinus Sturm, 1843, Catalog Kaefer-Sammlung: 353. Type locality: "Dalmatien".
Purpuricenus dalmatinus: Bodenheimer, 1937: 145.
Purpuricenus dalmatinus ssp. *hirsutus*: Bytinski-Salz, 1956: 217; Bytinski-Salz & Sternlicht, 1967: 135.
Purpuricenus dalmatinus m. hirsutus: Heyrovský, 1963: 259.

Distribution: Eastern Mediterranean from Balkans to the Near East, Syria, Jordan, Lebanon, Israel.
ISRAEL: **Upper Galilee**: Elon, 15.IV.1948 (BS); Elon (on flowering *Quercus infectoria*) (B56); Har Kefir, 850m, 26.V.1995 (EY); **Carmel Ridge**: Carmel (Haifa), Haifa, 2.IV.1939 (BS);

Jordan Valley: Nahal Yarmouk, 13.V.1953 (LFH); 9.V.1954 (MC); **Yizre'`el Valley**: Nahalal (B56); **Samaria**: Sanniriya, 4.IV.1981 (DF); Upper Nahal Tirza [Upper part of Wadi Fari`a], 11.III.1973 (DF); **Judean Hills**: Sho'eva, 18.IV.1992, leg. A. Bear.
Host plants: "Bred from *Quercus calliprinos*" (Bytinski-Salz, 1956); ecologically associated with *Quercus*; larvae develop in living stems and branches; Bytinski-Salz & Sternlicht (1967) record *Q. calliprinos* and *Q. ithaburensis*. Adults from April to June sitting on leaves and branches of host plants or flying around them.

Purpuricenus budensis (Götz, 1783)

Cerambyx budensis Götz, 1783, Naturf., 19: 70. Localité-type: Hungaria, Osen (?) env.
Purpuricenus budensis: Bodenheimer, 1937: 146; Bytinski-Salz, 1956: 217; Bytinski-Salz & Sternlicht, 1967: 135; Finkel et al., 2002: 217.
Distribution: Europe, Turkey, Caucasus, Transcaucasia, Middle East, Cyprus, Syria, Lebanon, Israel.
ISRAEL: **Mt. Hermon**: Har Hermon, 2000m, 2.VII.1987 (AF); **Upper Galilee**: Senir River [Banyas river above Dan] (B56); Manara (B56); Lower Nahal Keziv (Finkel et al., 2002); Elon, 15.V.1948, (BS); 'En Zetim, 21.V.1997, leg. L. Turner; Har Meron, 16.VI.1971 (BS); 11.VI.1974 (JK); 1.VII.2007 (JB); Har Kefir, 3.VI.1994, 26.V.1996, 27.VI.1997 (EY); Har Kefir, Nahal haAri, 26.V/2.VI.1995, (EY, GS); 2 km N Ga'ton, 9.VI.1990 (EY); **Lower Galilee**: Bet haQeshet [Beit Haqeshet (Tabor)], **Jordan Valley**: Nahal Yarmouk, 20.V.1959 (JK); 27.V.1962 (BS); **Northern Coastal Plain**: Binyamina, 14.V.1940, 25.VI.1942 (BS); **Central Coastal Plain**: Pardes Hanna, 2.IV.1946 (BS).
Host plants: Polyphagous on deciduous trees; development in dead dry twigs and branches of *Quercus*, *Prunus*, *Salix*, *Pistacia*, *Ulmus*, *Paliurus spina-christi* Mill. (Rhamnaceae), *Cercis siliquastrum* and maybe others. Adults on flowers, often on *Paliurus*, *Spartium*, Asteraceae and Apiaceae, in May-July.

Purpuricenus interscapillatus interscapillatus Plavilstshikov, 1937 (Fig. 5)

Purpuricenus budensis var. *interscapillatus* Plavilstshikov 1937, Folia Zool. Hydrob., 3: 247 [replacement name for *Purpuricenus budensis* var. *humeralis* Pic, 1891, nec *P. humeralis* (Fabricius, 1798)].
Purpuricenus budensis v. *humeralis* Pic, 1891, Mat. Long., 1: 23. Type locality: Asie Mineure.
Purpuricenus humeralis: Heyrovský, 1937 : 7.
Purpuricenus budensis subsp. *longevittatus* Pic, 1941, Op. Mart., 2: 2. Type locality: Liban.
Purpuricenus budensis m. *interscapillatus*: Heyrovský, 1948: 19; Bytinski-Salz, 1956: 217.
Distribution: Southern Turkey, Cyprus, Syria, Lebanon, Israel: replaced in SW Turkey by *P. i. nudicollis* Demelt, 1965 and in Iran by *P. i. sasanus* Kadlec, 2006.
ISRAEL: **Golan Heights**: Panyas, 3.VI.1946 (BS); Odem, *ex larva* from from *Quercus calliprinos*, 11.VI.1997; 9,13.VI.1998, idem, *ex larva* from *Prunus* sp., 7/19.VI.1998 (GS); **Lower Galilee**: Bet Qeshet, 28.VI.1948 (BS); **Carmel Ridge**: Carmel, 27.IV.1936 (H48); Daliyat el Karmil, 600m, *ex larva* from *Rhamnus palaestina* and *Prunus* sp., 11/23.VI.1998, 3/15.VI.1999 (GS); Elyaqim, 5.V.1998, 15.VI.2000 (EY).
Host plants: Development in living branches of *Quercus calliprinos*, *Rhamnus palaestina*, *Prunus* and maybe others deciduous trees.

Purpuricenus desfontainii inhumeralis Pic, 1891

Purpuricenus desfontainesi v. inhumeralis Pic, 1891, Mat. Long., 1: 24. Type locality: "Asie Mineure".
Purpuricenus desfontainei: Bodenheimer, 1937: 146.
Purpuricenus desfontainei ab. inhumeralis: Heyrovský, 1950: 14.
Purpuricenus desfontainesi ssp. *inhumeralis*: Bytinski-Salz, 1956: 217; Bytinski-Salz & Sternlicht, 1967: 135.
Distribution: The nominative subspecies occurs in North Africa (from Libya to Morocco) and Crete; the ssp. *inhumeralis* in the eastern Mediterranean from continental Greece to Syria and Israel.
ISRAEL: **Upper Galilee**: Shamir, 17.V.1960 (LFH); Har Kefir, 850m, 26.V.1993, 26.V.1995, 7.V.1998 (EY); Har Kefir, Nahal HaAri, 26.V/2.VI.92 (EY, GS); Elon, 8.V.1948, 13.V.1952 (BS); 12.V.1953 (LFH); **Jordan Valley**: Nahal Yarmouk, 13.V.1953 (LFH); 22.V.1962 (BS); Ma`oz Hayyim, 1.IX.1958 (BS); **Carmel Ridge**: 10 km S Haifa, Har Karmel, Bet Oren, 14.V.1996 (NMS); Zikhron Ya'aqov, 10.V.1952 (LFH); Daliyya [Dalia] (B56), 11.V.1980 (MR); **Northern Coastal Plain**: Rosh haNiqra, 1V.1964 (JM); Binyamina, 30.V.1940 (BS); **Judean Hills**: Yerushalayim [Jerusalem], 4.VII.1976 (BS).

Host plants: Development in decidous plants such as *Quercus calliprinos* (Bytinski-Salz & Sternlicht 1967), *Quercus ilex*, *Pistacia*, *Ziziphus*. Adults on flowers from April to - July.

Phoracantha semipunctata (Fabricius, 1775)

Phoracantha semipunctata Fabricius, 1775, Syst. Entomol.: 180. Type locality: "Nova Hollandia" (Australia).
Phoracantha semipunctata: Heyrovský, 1948: 394; 1954; Bytinski-Salz, 1956: 213; Chikatunov et al., 2006: 317.
Phorocantha semipunctata: Chikatunov et al., 1999: 112 (lapsus).

Distribution: Originally from Australia, imported everywhere the host plants grows; known throughout the Mediterranean area from Portugal and France to Turkey, Jordan and Israel.
ISRAEL: Extremely common from Dan to Beersheba and also at Ein Hatseva (B56); **Upper Galilee**: Kefar Gil'adi, 10.XI.1948 (BS); Julis, 10.VII.1983 (ESH); **Lower Galilee**: Qiryat Tiv'on, 9.X.1987, 5.VI.1998 (EY); Nahal Tavor, 25.III.2001 (CH); **Carmel Ridge**: Haifa, 3.XII.1961 (JW); Nahal Oren, 17.XI.1997, 25.VI.1999 (PC); **Northern Coastal Plain**: Dor, 26.VI.1961, leg. A. Akstein; **Yizre'`el Valley**: Bet haShitta, 24.V.1949 (BS), [Beth ha Schitta] (H54); **Jordan Valley**: Teverya, 25.VI.1960 (JH); Ginnosar, 6.III.1965 (BS); Kefar Ruppin, 10.III.1954 (JW); **Central Coastal Plain**: Hadera, 14.VII.1957 (JW); Ilanot, 10.VI.1959 (JH); Herzliyya, 25.VI.1983 (AF); Tel Aviv, 18.I.1948 (BS); 20.IV.1976 (DS); 15.VIII.1972 (DF); 27.XI.1988, leg. T. Feler; 10.VI.1994 (CH); **Southern Coastal Plain**: Giv`at Brenner, 25.VII.1970 (DG); Rehovot, 1.XII.1947, 17.IV.1948, 24.XII.1948 (BS); Nir Eliyyahu, 21.V.1969 (KY); **Judean Hills**: Yerushalayim [Jerusalem], 24.VI.1957 (YW); 21.VI.1968 (GT); **Northern Negev**: Ze`elim, 22.III.1977 (AF); Gevulot, 14.VI.1986 (ESH); Hazerim, 19.V.1987, 12.V.1990, 16 IX.1990 (EY).
Host plants: *Eucalyptus* spp. A pest for plantations of *Eucalyptus*; larvae feed under bark of dying or suffering trees. Adults crepuscular and nocturnal, flying or running on the host plant from March to December (in southern Europe mostly in June).

Phoracantha recurva Newman, 1842

Phoracantha recurva Newman, 1840, The Entomologist, 1: 4. Type locality: Australie.
Phoracantha recurva: Friedman et al., 2008: 243.

Distribution: Native to Australia. Its distribution expanded greatly in the last 20 years to Southern Africa (Malawi, South Africa, Zambia), South America (Argentina, Brazil, Chile, Uruguay), North America (California, USA) and most Mediterranean countries.
Lower Galilee: Nahal Tavor, 25.III.2001 (CH); **Samaria**: Qedumim, 13.IX.2007 (LF); Hod haSharon, 21.V.2008 (OR); **Central Coastal Plain**: Hadera, 20.VI.2006 (OR).
Host plants: *Eucalyptus* spp.

Subfamily LAMIINAE

Pedestredorcadion drusum (Chevrolat, 1870)

Dorcadion drusum Chevrolat, 1870, Ann. Soc. entomol. France, (4), 10 (Bull): LXXXIV. Type locality: "Syrie, dans les montaignes habitées par les Druses".
= *Dorcadion libanoticum* Kraatz, 1873, *in* Küster, Käf. Eur., 29: 100. Localité type: "Libanon" (synonymy in Sama & Rapuzzi, in print).
? *Dorcadion forcipiferum*: Bodenheimer, 1937: 146; Bytinski-Salz, 1956: 218.

Distribution: Lebanon, Israel.
ISRAEL: **Mt. Hermon**: Har Hermon, 1800m, 18.VII.1995 (CH); 1450m, 10.IV.85 (HH93); 1400m, 18.V.1981 (DF); 1200m, 12.IV.1978 (DF); Biq'at Man, 1430m, 4.V.1991, 23.V.1992, 12.V.1995, 1.V.1996, 1.V.1998 (EY); 10-15.V.1996 (GS); **Golan Heights**: Har Shipon, 18.VI.1993 (CH); Odem Forest V.2007 (LR).
Host plants: Not recorded. As usually in *Dorcadion*, larvae develop underground feeding externally and internally on culm of herbaceous plants (chiefly Poaceae).

Batocera rufomaculata (DeGeer, 1775)

Lamia rufomaculata De Geer, 1775, Mem. Ins., 5: 107. Type locality: " India".
Batocera rufomaculata: Heyrovský, 1954: 394; Chikatunov et al., 1999: 118; Chikatunov et al., 2006: 318.

Distribution: Tropical Africa and India, West Indies, Madagascar, Mauritius, Réunion, Antilles; introduced and established in Near East, chiefly along the coastal plains, from south - eastern Turkey to Israel and Egypt (Sinai).

ISRAEL: Coastal plain from Tel Aviv to Rosh Haniqra, Carmel Range east to Megiddo, 'Lower Galilee north of Nazareth (B56); **Mt. Hermon**: Har Hermon, 1600m, 20.VI.1993 (CH); 1400m, 21.VI.1993 (CH); **Golan Heights**: Mas`ada, 20.VI.1993 (CH); **Lower Galilee**: Qiryat Tiv'on, 19.VIII.1993, VI.1997, 15.X.1999 (EY); **Carmel Ridge**: Haifa, 9.VII.1958, leg. A. Yarkoni; Bet Oren, 24.V.1995 (CH); Nahal Oren, 10.VI.1996 (PC); 30.VIII.1995, 16.VI.1996 (EY); **Yizre'`el Valley**: Mishmar ha'Emeq, 30.VIII.1952 (MC); **Jordan Valley**: Teverya, 2.VII.1959 (JH); **Northern Coastal Plain**: Rosh haNiqra (B56); Benjamina, VI.1953 (H54); Qesarya, 10.IX.1952 (JW); **Samaria**: Zur Natan, 10.IX.1971, leg. A. Shoob; **Central Coastal Plain**: Herzliyya, 3.X.1982 (DS); Tel Aviv, 21.IX.1958 (JK); 30.VI.1960 (BS); Ramat Gan, 20.IX.1952 (LFH); **Southern Coastal Plain**: Bat Yam, 31.VII.1957 (JK); Ramla, 27.XII.1958 (YW); Palmahim, 20.VIII.1959 (CL); **Judean Hills**: Zur Hadassa, 10.VII.1948 (BS).
Host plants: *Ficus rubiginosa* Desf. (Moraceae), *Morus alba* (Bytinski-Salz, 1956), *Avocado* (Avidov and Harpaz, 1969); Chikatunov et al. (1999) also give *Ceratonia siliqua*. Chiefly common and noxious to fig trees.

Crossotus katbeh Sama, 2000 (Fig. 6)

Crossotus katbeh Sama, 2000, Quad. Studi Nat. Romagna, 13, suppl.: 107. Type locality: Israel, Arava Valley.: 'En Tamar.
Crossotus arabicus: Bytinski-Salz, 1956: 218 (misidentification).
Crossotus subocellatus: Halperin & Holzschuh, 1993: 27; Sama, 2000b: 109.
Crossotus katbeh: Chikatunov et al., 2006: 318.
Distribution: Jordan, Israel, Saudi Arabia. Not in Sinai where it is replaced by *C. subocellatus* (Fairmaire, 1886).
ISRAEL: **Dead Sea Area**: 'En Tamar, *ex larva* from *Acacia tortilis* (Forssk.) Hayne, 5/16.V.1996, 10/14.VI.96, VII.96, 31.VII.1998; 9.IX.1998; 25.IX.1998; 10/14.IX.1999 (GS); 'En Tamar, VII.1998; 15.VIII.1998 (EY, BO); **Central Negev**: 4 km N. fork to Dimona, *ex larva* from *Acacia tortilis*, I.1998 (GS); Mizpe Ramon, *ex larva* from *Acacia tortilis*, 13.X.95 (GS); **Southern Negev**: Elat, 24.VII.1970 (BS); Elat, Municipal garden, *A. cyanophylla*, 24.VII (B56); **'Arava Valley**: Zomet ha'Arava, 31.V.1994, 25.VII.1995, 29.IX.1995, VIII.1997; 1.VII.1999 (EY); Hazeva [Hazewa], *ex larva* from *Acacia* sp., 6.II.1998, leg. O. Niehuis (coll. Adlbauer, Graz); Nahal HaShitta, 16.V.1999 (IY, VK).
Host plants: Development on twigs and small branches of *Acacia* spp.

Crossotus strigifrons (Fairmaire, 1886)

Dichostathes strigifrons Fairmaire, 1886, Ann. Soc. ent. France (6), 5: 457 (foot note). Type locality: Sudan.
Crossotus arabicus: Heyrovský, 1954: 394; Bytinski-Salz, 1954: 289; Bytinski-Salz, 1956: 218 (misidentification).
Crossotus strigifrons: Halperin & Holzschuh, 1993: 27; Sama, 2000b : 109, Chikatunov et al., 2006: 318.
Distribution: Ethiopia, Somalia, Sudan (Holzschuh & Teocchi, 1991), Saudi Arabia, Egypt (Sinai), Israel, Jordan.
ISRAEL: **Dead Sea Area**: 'Enot Qane ['En Turaba], 26.VI.1959 (JK); 'En Gedi, 2.II.1948 (BS); 24.VI.1957, leg. I. Guterman; 'En Tamar, 5-7.V.1996 (GS); 5.VII.1998 (BO), 5-20.V.1996 (GS); idem *ex larva* from *A. tortilis*, V.96; 14/30.VI.96; 1/10.VII.96, 12.VIII.98; VIII.99 (GS), **Arava Valley**: Arava Valley, *A. tortilis*, VII-VIII, (HH93); 'En Hazeva [Ein 'Hatseva], VI-VII, from dead wood of *Acacia*; Hazeva, 15.IX.1976, leg. Ester, [Hazewa], *ex larva* from *Acacia* sp., 25.V.98, leg. O. Niehuis (Coll. K. Adlbauer, Graz); Nahal HaShitta, 12.VI.1999 (IY, VK); Nahal Shezaf, 20.V.1998 (IY) 22.VI.1999 (IY, VK); Nahal Zin [Wadi Fukra], 1.VIII.1950 (BS), [Wadi Fukra], VIII, *A. raddiana* (B56); Nahal 'Omer, *ex larva* from *A. raddiana*, one dead adult in pupal cell, VI.97 (GS); **Southern Negev**: Elat, 18.X.1963, leg. ?; Elat, 20.XI.1978, D. Shalmon (type series of *Crossotus palaestinensis* Breuning, in litt.). [?]Weget eja Divest, 22.VI.1940 (H54).
Host plants: Development on *Acacia* spp., together with the preceding species.

Crossotus xanthoneurus Sama, 2000 (Fig. 7)

Crossotus xanthoneurus Sama, 2000, Quad. St. nat. Romagna, 13, suppl.: 92. Type locality: Jordan: Aqaba: Wadi Rum; Petra.
= *Crossotus palaestinensis* Breuning, in litteris: Sama & Orbach, 2003: 67.
Distribution. Southern Jordan, southern Israel. The type series of *C. palaestinensis*, includes a single female labelled "Sinai: Nugra, 2.V.1979" (coll. Bytinski-Salz, TAU). Occurrence of this species in the fauna of Sinai needs confirmation.

ISRAEL: **Central Negev**: Mamshit [Kurnub], 14.VI. leg. Bytinski-Salz (TAU, type series of *C. palaestinensis* Breuning, in litt.).
Host plants: Development in living twigs and branches of *Retama raetam* (Forssk.) Webb & Berthel.(Fabaceae).

Niphona picticornis Mulsant, 1839

Niphona picticornis Mulsant, 1839, Long. Fr., 1: 169. Tav. 3, Fig. 6. Type locality: "Draguignan" (France).
Niphona picticornis: Bodenheimer, 1937: 146; Bytinski-Salz, 1956: 219; Heyrovský, 1963: 259; Bytinski-Salz & Sternlicht, 1967: 135; Halperin & Holzschuh, 1993: 27; Chikatunov et al., 1999: 119; Chikatunov et al., 2006: 318; Buse et al., 2008: 61.
Distribution: Circum-Mediterranean; known from North Africa and Iberian Peninsula to the Middle East.
ISRAEL: **Mt. Hermon**: Har Hermon, 22.III.1996, *Salix* sp. (GS); 1600m, 13.VI.1996 (AF); **Golan Heights**: Odem; 19.X.1995, *Salix* sp. (GS); 06.IV.2000, *Quercus calliprinos* (GS); **Upper Galilee**: Hula, 10.V.1946 (BS); Zefat, 02.V.1997, *Cedrus* sp. (GS); Shelomi, 7.III.1969 (DG); Lower Nahal Keziv, 3.IV.2000 (EY); Elqosh, 19.V.2007 (JB); 21.VI.2007 (JB); Har Meron, 17.VI.2007 (JB); Har Kefir, 850m, 3.II.1998 (EY); **Lower Galilee**: Qiryat Tiv'on, 13.VI.1987, 8.V.1991, 1.VI.1993, 15.VII.2000 (EY); Har Tavor, 11.VI.1948 (BS); 12.V.1951 (PA); 9.V.1978 (DF); Yavne`el, 31.III.1973 (DF); **Carmel Ridge**: Carmel (B56); Mt. Carmel, 15.III.1999, *Pistacia terebinthus* (GS); Haifa, 30.III.1969 (JH); Horeshat haArba'im [The Fourties], 20.VII.2007 (JB) (Buse et al., 2008); Yagur, 24.III.1942 (BS); Nahal Oren, 4.VI.1997 (PC); 3 km NW Zomet Elyaqim, 31.III.1995 (EY); **Yizre'`el Valley**: Gevat (B56); **Northern Coastal Plain**: Rosh haNiqra, 2.II.1960; Nahariyya, 4.VII.1947 (BS); Nahariya (B56); Kefar Masaryk (B56); Qiryat Ata, 7.VI.1946 (BS); East to Qiryat Ata [Kfar Ata] (B56); Ma'agan Mikha`el, 1.II.1960, leg. I. Sela; Binyamina, 5.VII.1926 (OT); **Central Coastal Plain**: Hadera (B56); Hadera, 16.IV.1978 (DS); Pardes Hanna, 10.VI.1938 (BS); Pardes Hanna (B56); Tel Aviv, 15.V.1947 (BS); 13.XI.1962 (JK); 15.VII.1982, leg. Z. Sever; 25.IV.1999 (AF); 4.IX.1988, leg. G. Tchetchik; Petah-Tiqwa, 10.V.1991, leg. D. Rauscher; **Southern Coastal Plain**: Rehovot (B56); **Foothills of Judea**: Park Canada [Qubeibe (near Rehovot)] (B56); **Central Negev**: Dimona, 04.IV.1996 (GS); Mamshit [Kurnub], 14.VI (BS); Bor Mashash, 4.IV.2007, leg. A. Laforgue (GS).
Host plants: Polyphagous, ecologically associated with deciduous trees and shrubs of the Mediterranean maquis; development on *Ficus*, *Pistacia*, *Ceratonia*, *Cercis*, *Robinia*, *Spartium junceum* L. (Fabaceae) *Calicotome spinosa* (L.) Link. (Fabaceae), *Ulmus*, *Quercus*, *Euphorbia dendroides* L. (Euphorbiaceae), *Cotoneaster*, *Elaeagnus*, *Malus sylvestris* Mill. (Rosaceae), *Morus alba* and many others. In Israel previously recorded in *Q. ithaburensis* and *Q. calliprinos* (Bytinski-Salz & Sternlicht, 1967); occasionally on conifers: *Pinus*, *Cedrus*.

Deroplia genei (Aragona, 1830)

Saperda genei Aragona, 1830, De quibusdam Col.: 25. Type locality: "Turbigo" (northern Italy).
Stenidea genei: Halperin & Holzschuh, 1993: 28; Chikatunov et al., 2006: 318.
Distribution: Europe, Asia Minor, Cyprus, northern Iran (ssp. *naviauxi* Villiers, 1970), Middle East: Israel, Jordan.
ISRAEL: **Carmel Ridge**: Nahal Oren, 15.V.1997, 28.X.1998 (PC); **Jordan Valley**: Biq'at Bet Zajda (HH93).
Host plants: *D. genei* usually develops in twigs and branches of many species of *Quercus* previously killed by *Coraebus florentinus* (Herbst, 1801) (Coleoptera, Buprestidae). In Israel it was found on *Quercus calliprinos* (Halperin & Holzschuh, 1993); in Jordan some adults emerged from *Pyrus* (GS). Adults can be found by beating from dead branches of the host trees in springtime and in autumn.

Apomecyna lameerei (Pic, 1895)

Pseudalbana lameerei Pic 1895, Echange, 11, n° 127: 77, Type locality: "Arabie".
= *Apomecyna arabica* Breuning, 1938, Novit. Entomol., 8: 50. Type locality: "Arabie: La Mecque".
Apomecyna arabica: Bytinski-Salz, 1956: 219.
Apomecyna lameerei: Chikatunov et al., 2006: 318.
Distribution: Desert regions from Pakistan westward to Mauritania and Western Sahara. Egypt (Sinai), Israel.

ISRAEL: **Northern Negev**: Urim, Revivim, 12.VI (at light) (B56); **'Arava Valley**: Gerofit, 12.VI.2002, 5.VIII.2002, 5.X.2002, 15.XI.2002, light trap (PC); **Southern Negev**: Ne`ot Semadar [Shizzafon], 5.VIII.2002, light trap (PC).
Host plants: Development in living stems of *Citrullus colocinthis* (L.) Schrad.; adults are often attracted to light traps.

Anaesthetis anatolica Holzschuh, 1969

Anaesthetis anatolica Holzschuh, 1969, Zeits. Arb. Österr. Ent., 21: 77. Type locality: Alanya (southern Turkey).
Anaesthetis testacea: Bodenheimer, 1937: 146; Bytinski-Salz, 1956: 219.
Anaesthetis anatolica: Halperin & Holzschuh, 1993: 27; Chikatunov et al., 2006: 317.
Distribution: Only known from southern Turkey, Syria and Israel where it replaces the european species *A. testacea* (Fabricius, 1781).
ISRAEL: **Golan Heights**: Panyas (HH93); **Carmel Ridge**: Haifa, Nahal Ezov, 13.VII.2000 (BO); **Southern Coastal Plain**: Holot Nizzanim, nat. res., 4.VI.2009, light trap (EY).
Host plants: In Turkey it was found *ex larvae* feeding in *Rosa* sp. and by beating from *Ceratonia siliqua* and *Quercus* sp; in Israel "on *Salix alba*" (Halperin & Holzschuh, 1993).

Pogonocherus perroudi (Mulsant, 1839)

Pogonocherus perroudi Mulsant, 1839, Hist. nat. Coléopt. France, Longic.: 158. Type locality: "Bordeaux; Draguignan" (France).
Pogonochaerus perroudi: Halperin & Holzschuh, 1993: 28.
Distribution: Europe, Circum-Mediterranean: North Africa, Asia Minor, Near East including Cyprus; unknown in Syria, uncommon in Lebanon and Israel.
ISRAEL: **Golan Heights**: Qazrin, 14.V.1996 (CH); Panyas, 23.V.1979 (DF); **Upper Galilee**: 'En Zetim, *ex larva* from *Pinus brutia*, emergence 14.VIII-6.IX.1977, leg. Halperin (BMNH); Kfir Meron, 18.V.1996 (GS); Meron, 15.V.1996, both from *P. brutia* (GS); Biriyya, 21,VII.1978 (JH), 5.II.79 *ex larva* from *P. brutia* (JH), 23.VIII.1982, leg. Z. Mendel; **Carmel Ridge**: Haifa, Carmeliyya, 31.X.1999 (BO).
Host plants: Ecologically strictly associated with pine trees; in Israel it develops in *Pinus brutia*.

Leiopus syriacus (Ganglbauer, 1884)

Liopus syriacus Ganglbauer, 1884, Verh. zool.-bot. Ges. Wien, 33 (1883): 532. Type locality: "Bei Beirut in Syrien" (Lebanon).
Leiopus syriacus: Chikatunov et al., 2006: 318.
Distribution – Southeastern Turkey, Syria, Lebanon, Israel.
ISRAEL: **Golan Heights**: Panyas, 20.IV.2002, light trap (VK); **Upper Galilee**: Tel Dan, 23.VIII.2002, light trap (PC).
Host plants: Development in dead branches and trunks of deciduous plants such as *Prunus ursina, Juglans regia, Acer syriacum* Boiss. and Gaill. (Aceraceae)*, Ficus carica*, *Cotoneaster*, *Quercus*.

Calamobius filum (Rossi, 1790)

Saperda filum Rossi, 1790, Fauna Etrusca, 1: 152, Tav. 5, Fig. 10. Loc.: "Etruria" (Italy, Tuscany).
Calamobius filum: Bodenheimer, 1937: 146; Heyrovský, 1948: 19; Bytinski-Salz, 1956: 219; Heyrovský, 1963: 259; Chikatunov et al., 1999: 118; Finkel et al., 2002: 218.
Distribution: Europe, North Africa, Asia Minor, Caucasus, Transcaucasia, northern Iran; common and widespread everywhere throughout the Mediterranean area.
ISRAEL: **Mt. Hermon**: Har Hermon, 1900m, 22.V.1973 (DF); 1500m, 15.V.1980 (MR); 16.VI.1993 (CH); Biq'at Man, 1450m, 1.V.1998 (EY); Newe Ativ, 26.IV.1978, 3.V.1979 (DF); **Golan Heights**: Majdal Shams, 13.V.1998 (CH); Mezudat Nimrod, 23.IV.1998 (CH); Qusbiya, 17.IV.1973 (DF); Nahal Mezar, 2.V.1997 (EY; **Upper Galilee**: HaTanur, 26.IV.1974 (DF); Hula, 1.VII.1993 (CH); Shelomi, 19.IV.1997 (CH); Elon, 8.V.1948 (BS); Hurfeish, 8.V.1973 (DF); NW Galilee, Hurfeish, Mt. Adir, 02.V.2000 (TO) (NMS); Yehi'am, 30.IV.1974 (DF); Har Meron, 18.IV.1973, 8.V.1973 (DF); 19.V.1998 (LF); Har Kefir, 850m, 24.IV.1998 (EY); **Lower Galilee**: Nahal Tavor, 25.III.2001 (CH); Kokhav haYarden, 26.III.2001 (CH); Mt. Yavne`el, 14.IV.2000 (EY); **Carmel Ridge**: Haifa, 8.IV. (BS); Khreibe Oaks (Carmel) (B56); Nahal Oren, 16.VI.1995, 16.IV.1996, 1.IV.1997, 27.III.2000 (PC); Nahal HaZore'a, 22.IV.1997 (EY); Zikhron Ya`aqov, 1.IV.1998 (AF); **Samaria**: Ma`ale Gilboa, 10.III.1997 (LF); Sabastiya, 24.III.1973 (DF);

Yizre'`el Valley: Sha'ar ha'Amaqim (B56); **Jordan Valley**: Capernaum (CRP); Teverya, 6.IV. (BS); 14.V.1980 (MR); 'En Gev, 2.IV.1998 (LF); Park haYarden, 8.V.1997 (LF); Gesher, 10.II.1996 (EY); **Central Coastal Plain**: Kefar Vitkin, 29.IV.1997 (CH); Nahal Poleg, 2.V.1980 (MR); 13.IV.1997 (RH); Netanya, 24.IV.1974 (DF); Tel Aviv, 15.III.1995 (CH); Rosh ha'Ayin, 16.IV.1993 (AF); **Judean Foothills**: Nahshon, 29.III.1973 (DF); Zomet HaEla, 4.IV.1999 (CH); Bet Guvrin, 31.III.1981 (AF); **Judean Hills**: Qiryat Ye'arim [Kiryat Ye'arin], 22.V.98, Bartolozzi e Sforzi (MSF); Yerushalayim [Jerusalem], 2.V.1940 (JW); 1.V.1941, 16.IV.1943, 15.V.1947 (BS); Qiryat Anavim, 17.IV.1974 (DF); **Southern Coastal Plain**: Be`eri, 23.IV.1981 (BS); Qiryat Gat, 22.IV.1962, leg. A. Katznelson; **Northern Negev**: Nahal Besor, 31.III.1975 (AF); Gevulot, 4.IV.1981 (ESH); Lehavim, 7.IV.1998 (LF); Bor Mashash, 25.III.1987 (FK); Hazerim, IV.1995 (EY); **Central Negev**: 'Arad, 16.IV.1997 (AF); Dimona, 29.IV.1997 (CH); Yeroham, 7.IV.1998 (AF); Har Horesha, 18.IV.1998 (AF); Sede Boqer, 16.IV.1997 (AM); 7.IV.1998, leg. N. Meltzer; 14.IV.1998, leg. T. Pavlicek.

Host plants: Development in living stems of Poaceae: *Arrhenaterum*, *Calamogrostis*, *Dactylis*, and others; adults on the host plants in springtime. Records regarding *Ceratonia siliqua* and *Pistacia* spp. (Chikatunov et al., 1999) are obviously wrong.

Agapanthia (Agapanthia) suturalis (Fabricius, 1787)

Saperda suturalis Fabricius, 1787, Mant. Ins., 1 : 149. Type locality: "Habitat in Africae plantis" (North Africa).

Agapanthia cardui: Baudi, 1894: 11; Sahlberg, 1913: 234; Bodenheimer, 1937: 146; Chikatunov et al., 1999: 116; Finkel et al., 2002: 218.

Agapanthia cardui + ab. *consobrina*: Heyrovský, 1948: 20; Heyrovský, 1950: 14.

Remark. *A. suturalis*, previously regarded as a form of *A. cardui* (Linnaeus, 1767) has recently been recognized as a distinct species (Sama, 2002). A new record to Israel.

Distribution: Southern Europe, Canary Islands, Mediterranean area from North Africa to Cyprus and the Middle East.

ISRAEL: **Mt. Hermon**: Har Hermon, 2200m, 2.VI.1993 (CH); 1400m, 11.VI.1976 (DS); Newe Ativ, 3.VI.1973, 26.IV.1974 (DF); **Golan Heights**: Mas'ada, 28.III.1974, leg D. Furth; Nahal Zavitam, 7.V.1987 (ASH); Qazrin, 20.V.1997, leg. Y. Nadler; Qusbiya, 3.V.1980 (MR); Nahal Mezar, 2.V.1997 (EY); **Upper Galilee**: NW Galilee, 4 km E Küste, Shelomi, 3.V.2000 (TO) (NMS); Monfort (GS); Nahal Keziv, 20.V.1999 (CH); Dishon, 18.IV.1973 (DF); NW Galilee, Hurfeish, Mt. Adir, 02.V.2000 (TO) (NMS); Har Meron, 8.V.1973 (DF); 20.V.1999 (LF); Har Kefir, 800m, 7.V.1998 (EY); Nahal Ammud, 8.V.1973 (DF); Rosh Pina, 9.V.1940 (BS); Almagor, 30.IV.1988 (EY); Meghar [Mrar] (B56); **Lower Galilee**: Qiryat Tiv`on, 25.III.1955 (LFH); Allonei Aba, 4.IV.1983 (EY); Kefar haHoresh, 1.IV.1995 (GS); Nahal Tavor, 26.III.2001 (CH); **Carmel Ridge**: Carmel (H48; B56); Haifa, 16.IV.1927 (OT); Khreibe (B56); 10 km S Haifa, Har Karmel, Bet Oren, 14.V.96 (NMS); Nahal Oren, 1.II.1996, 18.III.1996; 16.IV.1996, 1.IV.1997, 6.IV.1998, 27.III.2000 (PC); Daliyat el Karmil (GS); Oranim, 20.IV.1959 (JK); Zikhron Ya'aqov, 6.IV. (BS); 5.IV.1955 (LFH); Dalya, Gal'ed, 19-30.III (GS); **Samaria**: Nahal 'Iron [Wadi Ara], 23.III.1973 (DF); Ma'ale Gilboa', 17.III.1978 (DS); Upper Nahal Tirza [Upper part of Wadi Fari`a], 17.II.1973 (DF); Oranit, 23.IV.1984 (ESH); **Yizre'`el Valley**: Nahalal (B56); **Northern Coastal Plain**: Binyamina, 13.IV.1941, 25.III.1942, 12.IV.1947 (BS); Binyamina (B56); **Jordan Valley**: Kefar Nahum [Capernaum] (CRP); Teverya, 3.V.1980 (MR); Teverya [Tiberias] (B56); Teverya [Tiberias] (CRP); Deganya, 10.III.1941 (BS); Deganya (B56); 'En Gev (B56); 'En Gev (GS); Hammat Gader [El Hamma], 20.IV.1941 (BS); Gesher, 16.III.1973 (DF); 25.III (GS); Bet She`an; 20.II.1974 (DF); Massu`a (CRP); Yarden River [Jordan] (H48); **Central Coastal Plain**: Hadera (B56); Pardes Hanna, 8.IV.1946 (JW); Elyashiv, 23.III.1973 (DF); Nahal Poleg, 2.V.1980 (MR); 13.IV.1997 (RH); Ra'anana, 25.III.1948 (BS); Ra'anana (B56); Herzliyya, 22.III.1942 (BS); Herzliyya (B56); Tel Aviv, 9.III.2001 (CH); Yarqon River (B56); Ramat Gan, 20.III.1942 (BS); Ramat Gan (H48); Migdal Afeq [Migdal Zedek], 13.V.1999 (LF); **Judean Foothills**: Newe Shalom, 26.IV.1997 (CH); Modi'in, 14.IV.1991, leg. M. Shemesh; Bet Guvrin, 31.III.1975 (AF); **Judean Hills**: Shoresh, 20.V.1973 (DF); 'En Hemed [Aqua Bella], 14.V.1951 (JW); Qiryat Ye'arim [Kiryat Ye'arin], 22.V.98, Bartolozzi e Sforzi (MSF); Yerushalayim [Jerusalem] (H48); Yerushalayim [Jerusalem], 5.IV.1941, 16.IV.1943, 14.IV.1947 (BS); 15.V.1959, leg. O. Freund; **Southern Coastal Plain**: Palmahim, 8.III.1975 (MK); Ramla, 18.IV.1955 (JW); Nir'am, 21.III.1946 (BS); Be`eri, 22.IV.1981 (JK); Kerem Shalom, 5.IV.1965 (JK); **Judean Desert**: Mar Saba (Baudi, 1894); 'En Perat [Wadi Qelt] (H48); **Dead Sea Area**: Yitav [Auja], 20.II.1972 (MK); Yeriho [Jericho] (CRP); Yeriho,

28.II.1941 (BS); 11.III.1973, 14.II.1974 (DF); **Northern Negev**: Nir'am (B56); Urim (B56); Zomet Lehavim, 4.IV.1998, 29.IV.2000 (CH); Nahal Besor, 31.III.1975 (AF); 7.IV.1985 (JK); Be`er Sheva, 1.IV.1948 (BS); Be`er Sheva' (B56); Hazerim, 31.III.1989, 10.IV.1994, 23.IV.1997 (EY); Gevulot, 19.IV.1981, 14.III.1987 (ESH); Ze`elim, 18.IV.1967 (JK); 11.III.1974 (DF); Bor Mashash, 17.IV.1972 (FN); Haluza, 30.III.1965 (BS); **Central Negev**: Har Horesha, 17.IV.1998 (AF); Upper Nahal Zin [Wadi Nafha], 10.IV.1961 (BS).

Host plants: Polyphagous on herbaceous plants: *Valeriana officinalis* L. (Valerianaceae), *Salvia pratensis* L. (Lamiaceae), *Knautia arvensis* (L.) Coult. (Dipsacaceae), *Jasione montana* L. (Campanulaceae), *Cirsium*, *Carduus*, *Melilotus* and many others; adults on the host plants mostly in springtime.

Agapanthia* (*Agapanthia*) *frivaldszkyi Ganglbauer, 1884

Agapanthia frivaldszkyi Ganglbauer, 1884, Verh. zool.-bot. Ges. Wien, 31 (1883): 112. Type locality: “Kleinasien“ (Turkey).
Agapanthia frivaldszkyi: Halperin & Holzschuh, 1993: 27.
Phytoecia cylindrica: Finkel et al., 2002: 219 (misidentification).

Distribution: East Mediterranean: Bulgaria, Turkey, North Iran, Syria, Israel. In Israel apparently an uncommon species.

ISRAEL: **Golan Heights**: Banyas, 24.IV.1968 (KY); **Upper Galilee**: **Lower** Nahal Keziv, 6.IV.2001, leg. M. Finkel (Finkel et al., 2002, as *Phytoecia cylindrica*); **Lower Galilee**: Har Yavne`el, W. Mizpe Elot, 100-350m, 19.III.1999, leg. E. Orbach (GS); **Judean Foothills**: Newe Shalom, 19.IV.1997 (RH); **Carmel Ridge**: Mt. Carmel, 5.IV.1954 (HH93); M.Carmel, Dalya, Gal'ed, 19/30.3.1995; 19.II.1998, *ex larva* and e*x pupa* from *Cephalaria* sp., adults emerged III.1998, 9.IV.1998 (GS); **Jordan Valley**: Teverya [Tiberias], leg. Rydh (CRP).

Host plants: This species es very likely oligophagous on Dipsacaceae; in Turkey it was collected on *Cephalaria speciosa* Boiss. et Kotschy in Boiss. and *Cephalaria microcephala* Boiss. (Reyzek et al., 2003); in Israel some specimens emerged from *Cephalaria* sp. (GS).

Agapanthia* (*Agapanthia*) *lais Reiche & Saulcy, 1858 (Fig. 8)

Agapanthia lais Reiche & Saulcy, 1858, Ann. Soc. Ent. France, 6: 21. Type locality: “Peloponnèse” (southern Greece) (a wrong locality).
Agapanthia Lois: Sahlberg, 1913: 234 (lapsus).
Agapanthia violacea +A. lais: Bodenheimer, 1937: 146; Heyrovský, 1948: 20; Bytinski-Salz, 1956: 220.
Agapanthia osmanlis: Bytinski-Salz, 1956: 221; Chikatunov et al., 1999: 117 (misidentification).
Agapanthia lais: Finkel et al., 2002: 219.

Distribution: East Mediterranean: Syria, Jordan, Israel.

Remarks – *Agapanthia* (s.str.) *osmanlis* Reiche & Saulcy, 1858 does not occur in Israel as well as *A. violacea* (Fabricius, 1775); all specimens recorded under these names must be referred to *A.* (s.str.) *lais* or to *A.* (s.str.) *frivaldszkyi.*

ISRAEL: **Mt. Hermon**: Har Dov, 17.VII.1995 (CH); **Golan Heights**: Nahal Nimrod, 950m, 7.V.1993 (EY); 17 km E. Qiryat Shemona, Golan, 2 km SE Zomet, 16.V.1996 (NMS); Mas'ada, 4.V.1972 (MP), 28.IV.1974 (DF); Merom Golan, 7.V.1973 (DF); Qazrin, 9.V.1983 (ESH); 12.V.1998 (CH); Qusbiya, 6.V.1973 (DF), 3.V.1980 (MR); Nahal Zawitan, 'En Gev, 16.III.1973 (DF); 'El Al, 17.V.1969 (BS); Ramat Magshimim, 6.IV.1981 (IY); **Upper Galilee**: Metulla, 29.III.1942 (BS); Dan (B56); NW Galilee, 4 km E Küste, Shelomi, 3.V.2000 (TO) (NMS); Elon, 5.IV (BS); Sasa, 15.V.1973 (DF); Mishmar haYarden (B56); Har Meron, 13.V.1998, 10.X.1998 (CH); Almagor, 30.IV.1989 (EY); **Lower Galilee**: Qiryat Tiv'on, 23.III.1985 (EY); Allonim, 24.III.1942 (BS); 30.III.1991 (EY); Kefar haHoresh [Kfar Hakoresh], 15.IV.95 (GS); Nazerat (B56); Dabburiyya, 17.V.1969 (BS); **Carmel Ridge**: 10 km S Haifa, Har Karmel, Bet Oren, 14.V.1996 (NMS); Nahal Oren, 18.III.1996, 16.IV.1996, 1.IV.1997, 6.IV.1998, 27.III.2000 (PC); Zikhron Ya'aqov, 3.V.1954 (CL); 1.5 km NW Gal'ed, 3.IV.1993 (EY), 19.III.1995 (EY), 31.III.2001 (EY); Bat Shelomo, 17.IV.1987 (EY); **Yizre'`el Valley**: "*inter flumen Kison et oppidum Nazareth*" (S13); Qishon valley (B56); Nahalal (B56); Sarid (B56); Sarid, 15.IV.1985 (EY); 'Afula (B56); **Samaria**: Nahal 'Iron [Wadi Ara], 23.III.1973 (DF); Bet Lid (B56); Qedumim, 2.IV.1999, leg. L. Friedman; **Jordan Valley**: Biq'at Bet Zayda [Betecha], 16.III.1973 (DF); Teverya, 20.IV.1941 (BS); **Northern Coastal Plain**: Haifa Bay, 'Ir Ganim, 13.IV.1997 (EY); Nahsholim, 20.III.1984 (FK); Binyamina, 25.III.1942, 16.IV.1946 (BS); 26.IV.1954 (LFH); **Central Coastal Plain**: Kefar Vitkin, 29.IV.1997 (CH); Bet Herut, 16.V.1981, leg E. Shnei-Dor; Elyashiv, 23.III.1973 (DF); Netanya, 31.III.1959 (JK); 3.IV.1978 (DF); Ra'anana (B56); Tel Aviv, 19.III.1997 (LF); Bene 'Atarot [Wilhelma] (B56); **Southern Coastal Plain**: Miqwe Yisra'el, 20.III.1946 (BS); Holon (B56); Ashqelon, 15.V.1996 (CH); Gat (B56); Nir'am (B56); **Judean Foothills**: Nahshon, 29.III.1973, 29.II.1973 (DF); Latrun, 29.III.1973 (DF); 12.IV.1981 (ESH); Bet Shemesh, 8.IV.1979 (MK); 'Emeq HaEla, 4.IV.1999, leg. D. Givoni; Bet Guvrin, 31.III.1984 (ESH); **Judean Hills**: 'En Hemed [Aqua Bella], 10.V.1950 (JW), 3.V.1953 (JW); Yerushalayim [Jerusalem], 18.III.1969 (BS); Yerushalayim [Jerusalem], 16.IV.1943, 4.IV.1947 (BS), 29.IV.1954 (Asw); **Northern Negev**: Simcha station near Qibbutz Dorot, 29.III.1999, leg. Dorchin (NHML); Netivot, 31.III.1989 (EY); Zomet Lehavim, 7.IV.1998 (LF); Lahav, 19.III.1975 (AF).

Host plants: In Israel it is a rather common and widespread species; adults are frequently observed during spring, together with *A. pustulifera* Pic, sitting on stems and leaves of several Asteraceae, which also serve as host for larvae. In Syria adults were collected on *Onopordon macrocephalum* Eig. (Rejzek et al., 2001).

Agapanthia* (*Agapanthia*) *orbachi Sama, 1993 (Fig. 9)

Agapanthia orbachi Sama. 1993b, Lambillionea, 93(4): 471. Type locality: Dalya/Galed (Israel).
Agapanthia orbachi: Chikatunov et al., 1999: 117.

Distribution: Apparently an endemic species from Israel.

ISRAEL: **Upper Galilee**: Har Meron, W. Zefat (Sama. 1993b); **Carmel Ridge**: Daliyya, 6.IV.1993 (EY), [Mt. Carmel, Dalia res.] (Sama. 1993b); Mt. Carmel: 1,5 km NW Galed, 3-16.IV (GS), 19-30.V (GS); 120m, Gal'ed, 15.IV.1989, 9.IV.1994, 8.IV.2001 (EY).

Remark: The collecting locality "Lower Nahal Oren, leg. Y. Dorchin, 6.IV.1993" reported by Chikatunov et al. (1999) is a mistake and refers, in reality, to the type series collected in Daliyya.

Host plants: Monophagous on *Tragopogon coelesyriacus* Boiss.

Agapanthia* (*Epoptes*) *kirbyi (Gyllenhal, 1817)

Saperda kirbyi Gyllenhal 1817 in: Schönherr, Syn. Ins., 1 (3), App: 186. Type locality: "Lusitania" (probably a wrong locality).
Agapanthia kirbyi: ?Sahlberg, 1913: 234; Bodenheimer, 1937: 146; Bytinski-Salz, 1956: 219.

Distribution: Europe, Turkey, Caucasus, Transcaucasia, Iran, Middle East. In Israel an apparently uncommon species.

ISRAEL: **Upper Galilee**: Dafna [Dafne] (B56); **Jordan Valley**: Teverya, 25.IV.1943, 17.III.1946 (BS); **Northern Coastal Plain**: Binyamina, 12.IV.1947 (BS); **Central Coastal Plain**: Mikhmoret, 17.IV.1965 (JW); Tel Aviv, 17.IV.1976 (DS); 14.VI.1995 (CH); **Southern Coastal Plain**: Rehovot, 5.III.1955, leg. J. Halperin.

Host plants: Monophagous on *Verbascum*. Adults from March to June on the host plants.

Agapanthia* (*Epoptes*) *pustulifera Pic, 1905 (Fig. 10)

Agapanthia pustulifera Pic, 1905, Mat. Long., 5(2): 12. Type locality: "Jerusalem".
Agapanthia lateralis + A.dahli + ? A. kirbyi (partim ?): Sahlberg, 1913: 234 (misidentification).
?Agapanthia asphodeli + A. lateralis + A. pustulifera + A. dahli + A. mullneri + A. boeberi: Bodenheimer, 1937: 146 (misidentification).
Agapanthia dahli: Heyrovský, 1948: 20 (misidentification).
Agapanthia asphodeli + (?) *A. lateralis* var. *pustulifera + A. dahli + A. mullneri + A. cynarae*: Bytinski-Salz, 1956: 219-220 (misidentification).
Agapanthia dahli: Heyrovský, 1948: 19.
Agapanthia pustulifera: Halperin & Holzschuh, 1993: 29, 31; Finkel et al., 2002: 219.
?Agapanthia dahli + A. lateralis: Chikatunov et al., 1999: 115-116 (misidentification).

Distribution: Near East: Syria, Jordan, Israel.

Remarks: *Agapanthia* (*Epoptes*) *lateralis* Ganglbauer, 1884, *A.* (*E.*) *asphodeli* (Latreille, 1804), *A.* (*E.*) *dahli* (Richter, 1820) and *A.* (*E.*) *muellneri* (Reitter, 1898), do not occur in Israel; all records regarding these taxa are probably to be referred to *A. (Epoptes*) *pustulifera*, very common and widespread in Israel. *A* .(*Epoptes*) *nicosiensis* Pic, 1927 is a distinct species, endemic from Cyprus, not a synonym of *A. dahli* as stated by Chikatunov et al. (1999); *A. (Epoptes*) *muellneri* Reitter, 1899 is a distinct species from Central Asia (described from Uzbekistan), not a synonym of *A. lateralis* Ganglbauer, 1884 (from Turkey) as stated by Chikatunov et al. (1999).

ISRAEL: **Mt. Hermon**: Har Hermon, 1650m, 8.V.1979 (DF); 1400m, 3.V.1994, leg. I. Herold; Biq'at Man, 1400m, 17.IV.1991 (EY); **Golan Heights**: Panyas, 8.IV.1968, leg. P. Creisller; Har Avital [Abu Nida], 28.V.1969, leg. D. Gerling; Qazrin, 12.V.1998 (CH); 7.V.2007 (JB); Susita, 19.IV.1976 (MK); **Upper Galilee**: Tel Hay, Qiryat Shemona, 15.IV (CPS); Dafna [Daphne Oaks] (B56); Hanita, 17.IV.1946 (BS); 27.III.1976 (DG); NW Galilee, 4 km E Küste, Shelomi, 3.V.2000

(TO) (NMS); Ramot Naftali, 18.V.1981 (JK); 8.V.2007 (JB); Geranot haGalil, 4.IV.1998 (EY); 19.III.1986 (ESH); Sasa (B56); Sasa, 15.V.1973 (DF); 'En Zetim, 8.V.2007 (JB); Zefat [Safed], 6.V.2007 (JB); Mishmar haYarden (Bytinski-Salz (B56); Rosh Pina, 15.IV.1941 (BS); Huqoq, 17.III.1981 (MK); **Lower Galilee**: "*Juxta oppidum Canam*", 29.III; "*valle flumen Kison*", 31.III; "*locis diversis in Galilea*", 28/29.III (S13); Qiryat Tiv`on, 2.IV.1975 (MK); Kefar haHoresh [Khar Hahoresh], 12.IV (CPS); idem, 12.III (GS); Kfar Hanna (Canae) (B56); Zippori, 11.IV.1988 (EY); Har Yavne`el, 14.IV.2000 (EY); Har Yavne`el, W Mizpe Elot, 100-350m, 19.III.99 (EY); Nahal Tavor, 25.III.2001 (CH); Kokhav haYarden, 27.III.2001 (CH); **Carmel Ridge**: Carmel (B56); Haifa, 15.IV.1927 (OT); Khreibe Oaks (Carmel) (B56); Oranim, 21.IV.1959 (JK); Nahal Oren, 27.III.2000 (PC), Dalya/Galed, 19-30.III (GS); Gal'ed, 19.III.1995 (EY); **Yizre'`el Valley**: Qishon valley (B56); Mishmar haEmeq, 3.IV.1946 (MC); Bet Alfa, 15.IV.1995 (CH); Gilboa', 23.IV.1981 (IY); **Samaria**: Nahal 'Iron [Wadi Ara], 23.III.1973, leg. D. Furth; **Northern Coastal Plain**: Nahariyya, 2.IV.1944 (BS); Akko, 7.IV.1995 (CH); Binyamina, 13.IV.1941, 12.IV.1947 (BS); **Jordan Valley**: Kefar Nahum [Kapernaum] (CRP); Kefar Nahum, 17.III.1981 (MK); Teverya, 14.IV.1942, 28.III.1946 (BS); 'En Gev, 25.III (GS); Gesher, 16.III.1973 (DF); Gesher, 25.III (GS); Deganya, 18.III.1941 (BS); Bet She'an, 12.III.2008 (JB); Nahal Tirza Spill, Jiftlik [Vadi Fara-Ciflik], 8.III-19.V (H48); **Central Coastal Plain**: Netanya (CRP); Giv'at Shemu`el, 16.III.1973 (DF); **Judean Foothills**: Nahshon, 29.III.1973 (DF); Latrun, 17.IV.1981 (ESH); 27.III,1999, T. Pavlicek; Zor'a, 11.III.1975 (GT); Hulda, 3.V.1946 (BS); Avi'ezer, Bet Shemeh, 4.IV (CPS); **Judean Hills**: Shilo (B56); Bet Lehem [Betlhéem] (MNHNP, ex. coll. Sedillot); 'En Hemed [Aqua Bella], 10.V.1950 (JW); Qiryat Anavim, 12.IV.1957 (JW); Yerushalayim [Jerusalem] (type locality); Yerushalayim [Jerusalem], 28.II.1940, 5.IV.1941, 25.III.1961 (BS); 21.II.1955, leg. A. Bresler; Yerushalayim, Newe Ya'aqov [Kefar 'Ivri] (B56); **Judean Desert**: Nahal Perat [Wadi Fara], 19.IV.42, leg. Houska (NMP, coll. Heyrovský, as *A. kindermanni*); **Southern Coastal Plain**: Miqwe Yisra`el, 20.II.1946 (BS); Holon, 27.II.1956 (CL); Rishon leZiyyon (B56); Lakhish, 13.IV.1946 (BS); Ashqelon, 5.IV.1991, leg. I. Herold; Negba, 29.III.1977 (DS); Nir'am, 14.III. (BS); Be`eri, 23.IV.1981 (BS); Urim, 18.IV.1968 (DG); **Northern Negev**: Lahav, 7.IV.1998 (CH); Be`er Sheva, 14.III.1946 (BS); Hazerim, 20.III.1991 (EY); Gevulot, 7.III.1981, 7.III.1981 (ESH); Bor Mashash, 25.III.1987 (ASH); **Central Negev**: Dimona, 11.IV.1986 (ESH); Mash`abbe Sade, 14.V.1979 (JK); Yeroham [Bir Rekhme], 6.IV.1954 (LFH), 9.IV.1957 (LEW); Sede Boqer, 19.IV.1980 (JK); 14.II.1987, 13.IV.1987 (ESH); 'En Avedat, 16.IV.1997 (AM); 16.IV.1997 (LF); Nahal Zin [Wadi Fukra] (B56).
Host plants: Development in stems and stalks of herbaceous plants; recorded on *Asphodelus* sp., *Carduus*, *Carthamus*, *Eremostachys laciniata* (L.) Bunge (Bytinski-Salz, 1956; Halperin & Holzschuh, 1993), *Centaurea (Calcitrapa) iberica* Trev. ex Sprengl (Rejzek et al., 2003.

Agapanthia (*Epoptes*) sp.

Agapanthia villosoviridescens group: Halperin & Holzschuh, 1993: 27.
Israel - Carmel 3.VI.61 (HH93).
Host plants: Not recorded.
Remarks - Specimen not at our disposal; determination to check. *A. (Epoptes) villosoviridescens* (De Geer, 1775) is an hygrophile, chiefly montane species, common in Europe, western Caucasus, Siberia eastward to Ussuri, unknown in Asia Minor and in other countries of Near East. Its occurrence in Israel appears unlikely. This record probably refers to *A.(Epoptes) subsimplicicornis* Sama, Rapuzzi & Kairouz, in description, from Lebanon.

Saperda quercus ocellata Abeille de Perrin, 1895

Saperda (Compsidia) ocellata Abeille, 1895, Bull. Soc. entomol. France: 229. Type locality: "Akbes" (southern Turkey).
Saperda quercus ocellata: Sama & Orbach, 2003: 68.
Distribution: East Mediterranean; nominotypical subspecies from Balkans ("Dalmatia", type locality), southward to Greece, eastward to Bulgaria and European Turkey; the ssp. *ocellata* from southern Turkey to Syria, Jordan, Israel.
ISRAEL: **Golan Heights**: Nimrod, 11.V.1996, one larva in *Quercus* sp., adult not emerged (GS); **Upper Galilee**: Elqosh, 21.V.2007 (JB); Har Meron, 19.V.1973 (MK); 4.V.1998 (CH); 26.V.1999 (AF); 11./19.V.2007 (JB); Har Meron [Miron], 11.V.1996 (GS); Har Kefir, 800m, 11/14.V.1996, by beating from *Quercus* sp. (GS, EY) (Sama & Orbach, 2003), 16.V.1998, 22.V.1999, 27.IV.2001 (EY).

Host plants: Ecologically associated with *Quercus* spp. (decidous); larvae feed in living branches.

Oxylia argentata languida (Ménétriés, 1838)

Phytoecia longuida (sic !) Ménétriés, 1838, Mém. Acad. St. Petersb., (6), 5 : 42. Type loc.: "entre Costantinople et le Balkan; Syrie" (Turkey) (lapsus).
Oxylia duponcheli: Sahlberg, 1913: 234; Bodenheimer, 1937: 146.
Oxylia duponcheli var. *languida*: Bytinski-Salz, 1956: 221.

Distribution: Turkey, Syria, Lebanon, Israel.

ISRAEL: **Golan Heights**: Qusbiya, 17.IV.1972 (DF); southern part of GH, 16.V.2007 (JB); **Lower Galilee**: "*in Galilea inter oppida Canam et Nazareth*, 29.III" (S13); HaSolelim, 27.3.1985, Orbach (GS); Qiryat Tiv'on, 19.III.1990 (EY); Mt. Yavne`el, Mizpe Elot, 19.III.2000, 7.IV.2000, 16.III.2001 (EY); **Yizre'`el Valley**: Sede Ya'aqov, 3.III.1979 (DF); Nahalal, 17.IV.1941 (BS); Jalami, 28.III.1998, 5.IV.1993 (EY); **Carmel Ridge**: Nahal Tut, 2.III.1974 (DF); **Samaria**: Shekhem [Nablus], 18.IV.1974 (DF); **Jordan Valley**: 5 km W Hammat Gader, 19.III.1995 (EY); **Central Coastal Plain**: Rishon leZiyyon, 22.III.1948 (BS), **Southern Coastal Plain**: Beror Hayil, 14.IV.1947 (BS); **Judean Hills**: Yerushalayim [Jerusalem], 1.V.1941 (BS).

Host plants: Larvae in roots and stalks of Boraginaceae such as *Anchusa italica* Retz. and *Echium* spp.

Coptosia ganglbaueri Pic, 1891

Coptosia ganglbaueri Pic, 1936, L'Echange, 51, n° 463: 3 (hors texte). Type locality: "Jerusalem".
Coptosia Ganglbaueri: Heyrovský, 1950: 14.

Distribution: East Mediterranean: eastern Turkey, Syria, Lebanon, Israel, Cyprus.

ISRAEL: **Golan Heights**: 17 km E Qiryat Shemona, Golan, 2 km SE Zomet, 16.V.1996 (NMS); **Lower Galilee**: Kefar haHoresh [Kfar Hahoresch], 28.III.1981;5.III.1982, leg. Y. Dorchin (CPS); **Carmel Ridge**: 2 km N. Zomet Elyaqim, 9.IV.1999 (EY); **North Coastal Plain**: Haifa Bay, 'Ir Ganim, 12.IV.1994, 1/13.IV.1997, 9.IV.1998 (EY); **Central Coastal Plain**: Ra'ananna, 25.III.1948 (BS); **Southern Coastal Plain**: Giv'at Brenner (B56); **Judean Hills**: Yerushalayim [Jerusalem], 10.III.1942, 4.IV.1947 (BS).

Host plants: Development in roots and stalks of Boraginaceae such as *Echium glomeratum* Poiret, *Anchusa strigosa* Labill., *Anchusa* cfr. *barellieri* (All.) Vitman.

Coptosia compacta sancta (Reiche, 1877)

Phytoecia sancta Reiche, 1877, Ann. Soc. Entomol. France, (5), 7 (Bull.): CXXXVI. Type locality: "Nazareth in Palaestina".
Coptosia sancta: Bodenheimer, 1937: 146; Heyrovský, 1948: 20.
Coptosia ganglbaueri ab. *nigrosuturata* Heyrovský, 1950, *Cas. čs. Spol. Ent.*, 47(1-2): 14. Type locality: Israel: Dahlia (leg. coll. Bytinski-Salz) (Holotypus examined).
Coptosia compacta + nigrosuturata: Bytinski-Salz, 1956: 221.

Distribution: Near East from southern Syria to Jordan and Israel.

ISRAEL: **Golan Heights**: Mas'ada, 28.IV.1974 (DF); **Upper Galilee**: Dalton, 25.IV.1974 (DF); Nahal 'Ammud, 13.III.1979 (MK); **Lower Galilee**: HaSolelim, 9.IV.1997 (EY); Alonim, 15.V.92 (EY); Allonei Aba, 20.IV.1987 (EY); Nazerat, 2.III.1979 (DF); Mt. Yavne`el, Mizpe Elot, 100-350m, 19.III.99, Orbach (GS); 7.IV.2000, 16.III.2001 (EY); **Carmel Ridge**: Haifa, 9.IV.1998 (EY); Daliyya, 1946 (BS); Nahal Tut, 2.III.1979 (DF); **Judean Hills**: Yerushalayim [Jerusalem], 1.V.1941 (BS); 1946 (Heyrovský, 1950).

Host plants: Larvae on Boraginaceae such as *Anchusa italica* Retz.

Pilemia hirsutula (Frölich, 1893)

Saperda hirsutula Frölich, 1793, Nat. F., 27: 141. Type locality: Austria.
Pilemia hirsutula: Heyrovský, 1950: 14.

Distribution: Europe, Turkey, Caucasus, Transcaucasia, northern Iran, Syria, Lebanon, Israel.

ISRAEL: **Mt. Hermon**: Har Hermon, 2000m, 12.VI.1996 (AF); 1800m, 9.VI.1976 (AF); 1600m, 13.VI.1998 (AF); 1400m, 10.VI.1993 (CH); **Golan Heights**: Majdal Shams, 3.VIII.1995 (CH); **Upper Galilee**: Mahanayim, 5.IV.1978 (DF); Nahal 'Ammud, 7.IV.1978 (DF); Rosh Pinna, 7.III.1995 (EY); **Lower Galilee**: Yavne`el, 7.IV.2000 (EY); **Yizre'`el Valley**: Jalami, 30.III (EY); **Samaria**: Upper Nahal Tirza [Upper part of Wadi Fari`a], 15.II.1979 (DF); **Jordan Valley**: Deganya, 18.III.1941, 3.IV.1942 (BS); Nahal Yarmoukh, 15.IV.1961 (BS); **Judean Hills**: Yerushalayim [Jerusalem], 1.V (BS); **Southern Coastal Plain**: Shefela (HH93); **North**

Negev: Hazerim, 9.IV.1989 (EY); **Central Negev**: Yeroham, 28.III.1957 (JK); 'En Avedat, 29-30.III (D. Baiocchi leg.); 16.IV.1997 (AF).
Host plants: Development in stalks and roots of Lamiaceae such as *Eremostachys laciniata* (L.) Bunge; *Salvia dominica* L., *Phlomis* sp.; adults on the host plants chiefly in March-May.

Pilemia halperini (Holzschuh, 1999) (Fig. 11)

Phytoecia (Pilemia) halperini Holzschuh, 1999, Forst. Bund., 110: 51. Type locality: Israel, Qusbiye.
Distribution: Endemic species from Israel.
Israel: **Golan Heights**: Qusbiya, 23.IV.1979, leg. Halperin (Holschuh, 1999, type locality); **Lower Galilee**: Har Yavne`el, Mizpe Elot, 19.III.1999 (EY, BO); 3.III.2001 (BO).
Host plants: Found on *Anchusa strigosa* Labill. (Boraginaceae) (EY).

*****Helladia armeniaca armeniaca*** (Frivaldszky, 1878)

Phytoecia armeniaca Frivaldszky, 1878, Term. Füzet, 2: 10. Type locality: Diarbekir (Turkey).
Distribution: Eastern Turkey, Transcaucasia, Syria, Iran. A new record to Israel.
Israel: **Mt. Hermon**: Biq'at Man, 1450m, 4.V.1991, 23.V.1992, 21.IV.1995, 1.V.1998, 20.IV.2001 (EY); 11/18.V.1996 (GS)
Host plants: All specimens from Mt. Hermon were collected on or near *Scorzonera subintegra* (Boiss.) (Asteraceae), which is the host plant of this rare species in Israel (GS).

Helladia ferrugata (Ganglbauer, 1884)

Phytoecia ferrugata Ganglbauer, 1884, Best.Tab., 8: 574. Type locality "Syrien (Chaifa)".
Phytoecia ferrugata: Bodenheimer, 1937: 146; Bytinski-Salz, 1956: 222.
Phytoecia ferrugata + ab. *houskai* Heyrovský, 1948, Cas. čs. Spol. Ent., 45: 20.
Helladia ferrugata + *dilaticollis*: Pic, 1952, Entom. Arb. Mus. Frey, 3: 691-692.
Helladia ferrugata: Finkel et al., 2002: 220.
Distribution: East Mediterranean: Syria, Lebanon, Israel, Jordan.
ISRAEL: **Mt. Hermon**: Har Hermon, 23.V.1998, Bartolozzi e Sforzi (MSF); Biq'at Man, 1430m, 4.V.1990 (EY); 10/17.V.1996 (GS); 1600m, 26.V.2007 (JB); Nahal Guvta, 1250m, 28.IV.1995 (EY); **Golan Heights**: Nahal Nimrod, 950m, 7.V.1993 (EY); Merom Golan, 7.V.2007 (JB); **Upper Galilee**: Dan, 6.VII. (BS); Mezad Abbirim, 7.IV.1988 (EY); 'En Zetim, 8.V.2007 (JB); Har Meron [Jebel Jermak] m.900 (B56); Har Meron, 28.III.1995 (GS); 4.V.2007 (JB); Har Kefir, 850m, 29.IV.1998 (EY); **Lower Galilee**: Qiryat Tiv'on, 23.III.1993 (EY); Allonei Aba, 4.IV.1994 (EY); Kefar haHoresh [Kfar Hakoresh], 1.IV.1995 (GS);**Carmel Ridge**: Carmel (B56); Har Sumaq, 25.III.1989 (JK); Daliyat el Karmil, 19/30.3.1995 (GS); **Northern Coastal Plain**: Haifa Bay, 'Ir Ganim, Ir-Ganim, 20.III (EY), 13.IV.1993 (EY); Binyamina, 25.III.1942 (BS); **Yizre'`el Valley**: Mishmar haEmeq, 12.IV.1946 (MC); **Jordan Valley**: Deganya (B56); Nahal Yarmoukh, 12.V.1947 (BS); **Central coastal Plain**: Netanya (B56); **Southern Coastal Plain**: Holon (B56); Palmahim (Tel Aviv), IV, leg. D. Baiocchi (GS); **Judean Foothills**: Bet Guvrin, 31.III.1984 (ESH); **Judean Hills**: Bet Lehem [Bethlem], IV (Pic, 1952); Yerushalayim [Jerusalem], Houska (CPS), [Gerusalemme], 10.III.33, leg. A. Schatzmayr (GS), 16.IV.1940, 4.IV.1941, 12.III.1943, 4.IV.1947 (BS), 30.III-3.V (H48); **Judean Desert**: Marsaba, IV (Pic, 1952); **Dead Sea Area**: Ne`ot haKikkar, 1965 (KY).
Host plants: Adults are usually collected on *Centaurea* (Asteraceae) (GS).

Helladia insignata (Chevrolat, 1854)

Phytoecia insignata Chevrolat, 1854, Rev. Zool., 2: 485. Type locality: "Saida" (Lebanon).
? *Phytoecia humeralis scapulata*: Baudi, 1894: 11; Bodenheimer, 1937: 146.
= *Phytoecia (Helladia) humeralis v. bethaniensis* T. Pic, 1900, Ent. Nachr., 26: 67. Type locality: "Palaestina: Bethania".
Phytoecia (Helladia) insignata: Pic, 1903, Mat. Long., 4(2): 14.
Phytoecia humeralis + *bethaniensis*: Sahlberg, 1913: 235.
Phytoecia humeralis ab. *bethaniensis* + ab. *insignita* + ab. *bytinskii*: Heyrovský, 1948: 20.
Phytoecia humeralis ab. *bethaniensis*: Heyrovský, 1950: 14.
Phytoecia humeralis m. insignita: Breuning, 1951, Ent. Arb. Mus. Frey, 2: 57 (lapsus).
Helladia humeralis m. insignita + *bethaniensis*: Pic, 1952, Ent. Arb. Mus. Frey, 3: 692.
Phytoecia humeralis ssp. *frontalis* + *humeralis* ab. *insignata* + ab. *bytinskii*: Bytinski-Salz, 1956: 222.
Helladia insignata: Sama, 1999: 293; Finkel et al., 2002: 220.
Distribution: Southern Syria, Lebanon, Jordan, Israel.
ISRAEL: **Mt. Hermon**: Har Hermon, 1800m, 25.V.1999 (LF); **Golan Heights**: Mas'ada, 19.V.1972 (MP); **Upper Galilee**: 'Evron, 2.III.1946 (BS); 'En Zetim, 5.V.1999 (LF); 6.V.1999

(AF); **Lower Galilee**: Qiryat Tiv`on, 25.III.1955, leg. L. Fishelson; Allonim, 27.III. (BS); Kefar haHoresh [Kfar Hachoresh], 16.III.1991 (EY); 1.IV.1995 (GS); Zippori, 16.IV.1986 (EY); Nahal Tavor, 25.III.2001 (CH); **Carmel Ridge**: "*in convalli promontorii Carmelis*, 26.III" (S13); Haifa, 20.III. (BS); Gal'ed, 16.IV.1993 (EY); Zikhron Ya`aqov, 1.IV.1997 (RH); **Samaria**: Upper part of Wadi Fari`a, 11.III.1973 (DF); **Northern Coastal Plain**: Binyamina, 25.III.1942 (BS); **Yizre'`el Valley**: Ramat Yishay, 26.III.1988 (EY); HaZorea, 2.III.1979 (DF); Zomet ha'Amaqim, 31.III.1991 (EY); Jalami, 9-16.III.1990 (EY); 'En Harod, 5.III.1948 (BS); **Jordan Valley**: Kare Deshe, 22.III.1973 (DF); Deganya (B56), Hammat Gader [El Hamme] (B56); Bet She`an [Beisan] (B56), 24 km S Mehola, 24.II.1998 (GS); Adam Bridge [Damiya], 26.II.1967 (DG); Al Maghtas, 24.II.1942 (BS); **Central Coastal Plain**: Bene 'Atarot [Wilhelma] (B56), **Southern Coastal Plain**: Miqwe Yisra`el, 20.III.1945 (BS); 'Eqron (B56); **Judean Foothills**: Latrun, 29.III.1973 (DF); **Judean Hills**: Yerushalayim [Jerusalem] (Pic, 1952); Yerushalayim [Jerusalem], 5.IV.1943 (BS); 23.V.1965 (JW); **Judean Desert**: Nahal Perat [Wadi el Kelt Police Station] (B56); [Wadi el Kelt] (B56), Ma'ale Adumim, 26.III.1970 (BS); 24.II.1981 (DF); Khan Khatrura (The Good Samaritan) (B56), Hevron Desert, 26.III.1974 (DF); **Northern Negev**: Hazerim, 17.II.1987, 28.III.1991 (EY); **Dead Sea Area**: Yeriho, 10.III.1931, leg. F. S. Bodenheimer, 26.II.1941 (BS), 17.II.1945 (JW); 'Enot Zuqim, 27.II.1968 (JK).

Host plants: Reared from *Silybum marianum* (L.) Gaertn (Asteraceae) and *Centaurea hyalolepis* Boiss. (Asteraceae) (leg. G. Sama); adults on the host plants very early in springtime (February - April).

Helladia alziari Sama, 1992

Helladia millefolii ssp. alziari Sama, 1992, Lambillionea, 92: 306. Type locality: Cyprus.
Phytoecia millefolii: Bodenheimer, 1937: 146; Heyrovský, 1954: 395; Bytinski-Salz, 1956: 223.
Helladia alziari: Sama, 2003: 73.

Distribution: East Mediterranean, from south-eastern Turkey and Cyprus to Syria, Lebanon, Jordan, Israel.

ISRAEL: **Golan Heights**: Majdal Shams, 3.VIII.1995 (CH); Ramat Magshimim, 6.IV.1981 (IY); **Upper Galilee**: Amir, 5.IV.1978 (DF); Ramot Naftali, 13.V.1998, leg. H. Ackerman; **Lower Galilee**: Kefar HaHoresh, 30.III.1990 (EY),12.III.1995 (YD); Nazerat, 2.III (YD); Yavne`el, 21.III.1973 (DF); Kokhav haYarden, 26.III.2001 (CH); **Carmel Ridge**: Ben Dor, 20.IV.1990 (EY); Nahal Tut, 9.V.1979 (DF); Dalya/Galed, 19/30.III.1995 (GS); Gal'ed, 15.III.1989, 19.III.1995 (EY); **Samaria**: Qedumim, 2.IV.1999 (LF); **Northern Coastal Plain**: Haifa Bay, 5.IV (EY); **Yizre'`el Valley**: Zomet Ha'Amaqim, 25.III.1989 (EY); **Central Coastal Plain**: Kefar Vitkin, 5.III.1940 (BS); Bet haLewi, 27.III.1947 (BS); Tel Aviv, 8.V.1948 (H54), 11.IV.1961 (BS); **Southern Coastal Plain**: Miqwe Yisra`el (B56); **Judean Foothills**: Nahshon, 21.III.1998 (CH); **Judean Desert**: 'En Perat ["*in vicinate fontium Ain Fara in Judea*"], 18.III (S13), [Ein Fara (near Jerusalem)] (B56); **Dead Sea Area**: 'Enot Zuqim, 1.II.1994 (CH).

Host plants: Development in stalks and root complex of *Dittrichia viscosa* (L.) Aiton (Asteraceae).

Helladia pontica (Ganglbauer, 1884)

Phytoecia pontica Ganglbauer, 1884, Best. Tab., 8: 574. Type locality: "Pontus, Caucasus".
Phytoecia humeralis var. *pontica*: Heyrovský, 1948: 20.
Phytoecia pontica: Heyrovský, 1954: 395; Bytinski-Salz, 1956: 223.

Distribution: Turkey, Syria, Jordan, Israel.

ISRAEL: **Golan Heights**: Majdal Shams, 3.VIII.1995 (CH); **Upper Galilee**: Dishon, 2.IV.1984 (ESH); 'En Zetim, 6.V.1999 (AF); 8.V.2007 (JB); Har Meron, Sasa, 28.III.1995 (GS); Rosh Pina, 29.III.1952, leg. J. Verechsohn; Meghar [Mrar], 4.IV.1953 (BS); **Lower Galilee**: Zippori, 12.IV.1997 (EY), Kefar HaHoresh, 12.III.1995 (YD), 29.III.1997 (EY); Nazerat, 24.III (YD); 'En Dor, 14.III.1981 (ESH); **Carmel Ridge**: Haifa (B56); **Yizre'`el Valley**: Megiddo, 27.II.1988 (EY); Moledet, 4.IV (EY); **Jordan Valley**: Teverya, 20.IV. (BS); Kinneret (B56); 20-40 km N Jericho, 21.III.1995 (GS); **Judean Foothills**: Latrun, 22.III.1998 (CH); Bet Guvrin, 31.III.1984 (ESH); **Judean Desert**: Nahal Perat [Vadi el Kelt] (H48); Hevron Desert, 26.III.1974 (DF).

Host plants: In Jordan reared from *Onopordum macrocephalum* Eig (Asteraceae) (leg. G.Sama)

[***Helladia orbicollis orbicollis*** (Reiche & Saulcy, 1857)]

Phytoecia orbicollis Reiche & Saulcy, Ann. Soc. Ent. France (3), 6: 15. Type locality: "Naplouse" (Nablus, Palestina) (very likely a wrong locality).

Phytoecia flavescens: Bodenheimer, 1937: 146.

Distribution: Although described from Nablus (= Shekhem), this species, currently only known from northern and central Lebanon, southern Syria and Jordan, has never been recorded again from Israel or Palestine. We therefore think it does not live in Israel. Specimens stored under this name by the Tel Aviv University Collections [Mt. Hermon: Newe Ativ, 7.VI.1993 (CH) and Upper Galilee: 'En Zetim, 21.V.1997 (AM)] belongs to *Helladia insignata*; one specimen from Golan: Majdel Shams, 3.VIII.1895 (VC) belongs to *Phytoecia virgula* Charpentier, 1825).

Host plants: Development in stalks and root complex of *Centaurea* sp. (probably C. *calcitrapa* L.) (GS).

***Musaria wachanrui* (**Mulsant, 1851**)** (Fig. 13)

Phytoecia wachanrui Mulsant, 1851, Mem. Acad. Sci. Lyon, 1: 127. Type locality: "Turquie".

Phytoecia jezabel Reiche & Saulcy, 1858, Ann. Soc. entomol. France (3), 6: 13 Pl. 1, fig. 5. Type locality: "env. de Jerusalem".

Phytoecia Wachanruei: Sahlberg, 1913: 235 (lapsus).

Phytoecia rubropunctata: Bodenheimer, 1937: 146 (misidentification).

Phytoecia wachanrui: Bodenheimer, 1937: 146; Heyrovský, 1948: 20; Bytinski-Salz, 1956: 223.

Phytoecia wachanrui + ab. *jezabel*: Bytinski-Salz, 1956: 223.

Musaria astarte perrini: Finkel et al., 2002: 221 (misidentification).

Distribution: South-eastern Turkey, Syria, Jordan, Lebanon, Israel.

ISRAEL: **Mt. Hermon**: Har Hermon, 1800m, 6.V.1975 (JK); 3.VIII.1995 (CH); 1600m, 26.V.2007 (JB); Biq'at Man, 1450m, 4.V.1991, 11.V.1996, 1.V.1998 (EY); **Lower Galilee**: Allonim, 24.III.1989 (EY); Mt. Yavne`el, Mizpe Elot, 18.III.1999, 14.IV.2000 (EY); **Carmel Ridge**: Nahal Oren, 27.III.2000 (CH); **Samaria**: Bet Lid, 1.IV. (BS); **Jordan Valley**: Nahal Yarmouk, 20.V.1959 (JK); **Northern Coastal Plain**: Binyamina, 11.II.1946 (BS); **Yizre'`el Valley**: Jalami, 9.III.1990 (EY); **Central Coastal Plain**: Tel Aviv, 13.IV.1961 (BS); **Judean Hills**: Yerushalayim [Jerusalem], 21.II.1940, 11.III.1943, 4.IV.1947 (BS); **Judean Desert**: Ma'ale Adummim, 1.IV.1975 (BS); **Northern Negev**: Be`er Sheva', 1950 (JW); Hazerim, 13.IV.1992 (EY).

Host plants: adults are usually found on *Eryngium* sp. (Apiaceae), likely the host plant of larvae.

[***Musaria astarte perrini*** (Pic, 1891)]

Distribution: This species is usually divided into three populations: *M. astarte astarte* Ganglbauer, 1884 occurring in southern Turkey and north-eastern Syria; *M. a. lederi* Pic, 1889 in north-eastern Turkey, Caucasus, Armenia and northern Iran; *M. a. perrini* from Lebanon and southern Syria. The latter was recorded from Yerushalayim [Jerusalem] (Heyrovský (1948) and Lower Nahal Keziv (Finkel & al., 2002). All specimens stored under this name by TAU collections [Samaria: Har 'Eval, 4.IV.1999 (LF) and Upper Galilee: Lower Nahal Keziv, 13.IV.2000, leg. Finkel], belong to *M. wachanrui*. We regard these records due to misidentification and occurrence in Israel of this species not proved.

Neomusaria waltli Sama, 1991

Neomusaria waltli Sama, 1991, Boll. Soc. ent. Ital., 123(2): 127 (new name for *Saperda modesta* Waltl).

Saperda modesta Waltl, 1838, Isis, 6: 471 (nec Fabricius, 1781). Type locality: Liban, Beirouth.

Phytoecia modesta: Sahlberg, 1913: 236.

? Phytoecia merkli: Heyrovský, 1948: 20; Bytinski-Salz, 1956: 223.

Neomusaria waltli Sama, 1993a: 293.

Distribution: South-eastern Turkey, Syria, Lebanon, Jordan, Israel.

Israel: **Golan Heights**: Panyas, 26.IV.1974 (DF); **Upper Galilee**: Hula, 20.III.1946 (BS); Huliot (B56); Nahal Bezet, 27.IV.1992, leg. Y. Zvik; 1 km N Jish, 6.IV.2001 (EY); **Lower Galilee**: "*prope flumen Kison in Galilea*" (S13); Kefar haHoresh, 10.III.86, Dorchin (CPS), 31.III.1990 (EY), 1.IV.1995 (GS); Allonim, 2.IV.1994 (EY), 30.III (EY); Nazareth, 12.IV.88, on *Salvia* (YD); **Carmel Ridge**: Bet Oren, 9.IV.1993, 17.IV.1996 (BO); Nahal Oren, 18.III.1973, 3.IV.1978 (DF); Daliyat el Karmil, 19-30.III.1995 (GS); Dalya/Galed, 19/30.III.1995 (GS); Dalya (leg. O. Mehl); **Samaria**: Nahal 'Iron [Wadi Ara], 19.III.1974 (DF); **Jordan Valley**: 'En Gev, 5.IV.1942 (BS); **Northern Coastal Plain**: Binyamina, 13.IV.1941 (BS); **North Negev**: Hazerim, 21.III.1983 (EY).

Host plants: Adults are usually found on *Salvia* sp., very likely the host plant of larvae.

[***Neomusaria merkli*** (Ganglbauer, 1884)]

Distribution: Turkey, Syria.
Remark: Recorded by Heyrovský (1948) and by Bytinski-Salz (1956) from Jerusalem. We think that this species does not occur in Israel where it is replaced by *N. waltli* Sama, 1991.

Opsilia coerulescens (Scopoli, 1763)

Leptura coerulescens Scopoli, 1763, Ent. Carn.: 49. 160. Type locality: Carniola" (Slovenia).
Phytoecia virescens: Sahlberg, 1913: 236.
Phytoecia coerulescens: Bodenheimer, 1937: 146; Heyrovský, 1948: 20; Bytinski-Salz, 1956: 223; Chikatunov et al., 1999: 120.

Distribution: Europe, North Africa, Asia Minor, Caucasus, Transcaucasia, northern Iran, Turkestan, Kazakhstan, western Siberia, northern Mongolia, Northern China; common everywhere in the Near East.
ISRAEL: **Mt. Hermon**: Har Hermon [M.Hermon], 2300m, IV.82, leg. M. Tedeschi (GS); **Golan Heights**: Nahal Nimrod, Mt. Katah, 1100m, 18.V.1991 (EY); **Upper Galilee**: HaTanur, 6.V.1987 (ASH); Monfort, 18.III.1973 (DF); Ramot Naftali, 16.V.1968 (DG); Amir, 31.III.1945, leg. E. Rivnay; **Lower Galilee**: Allonim, 27.III.1942 (BS); Mt. Yavne`el, Mizpe Elot, 19.III.1999, 9.IV.1999 (EY); Lower Galilee: Kfar Hakoresh, 12.III.1995 (GS); **Jordan Valley**: Nahal Yarmouk, 13.V.1953 (LFH); **Carmel Ridge**: Nahal Oren, 3.IV.1978 (DF); Daliyat el Karmil, 20-28.III.1998 (GS); **Samaria**: Upper Nahal Tirza [Upper part of Wadi Fari`a], 1.III.1973 (DF; **Northern Coastal Plain**: Qiryat Atta, 18.III.1973 (DF); Ma'agan Mikha`el, 23.III.1975, leg. Z. Berkowitz; Binyamina, 25.III.1942 (BS); **Yizre'`el Valley**: Jalami, 13.IV.1994 (EY); **Central Coastal Plain**: Hadera, 5.IV.1944 BS); **Judean Foothills**: Rogelit, 18.III.1948 (DF); Newe Shalom, 26.IV.1997 (CH); **Judean Hills**: Yerushalayim [Jerusalem], 23.III.1941, 1.V.1941, 16.IV.1943 (BS); **Judean Desert**: Nahal Perat [Wadi Qelt], 21.II.1941, 25.III.1941 (BS); **Dead Sea Area**: Yeriho ["*Hierichuntem*"] (S13); Qalya, 8.III.1976 (MK); **Northern Negev**: Be`er Sheva', 15.III.1956 (JW); Ze`elim, 11.III.1969 (GT); Hazerim, 9.III.1987, 9.IV.1989, 10. IV.1994 (EY).
Host plants: Development mostly on Boraginaceae: *Anchusa*, *Echium*, *Cerinthe*, *Cynoglossum*, *Lycopsis*, *Lithospermum*, *Symphytum*.

Phytoecia caerulea bethseba Reiche & Saulcy, 1858

Phytoecia bethseba Reiche & Saulcy, 1858, Ann. Soc. ent. Fr., (3), 6: 17, Tab. 1, Fig. 6. Type locality: Palestine.
Phytoecia rufimana + ssp. *Bethseba*: Sahlberg, 1913: 236.
Phytoecia bethseba: Bodenheimer, 1937: 146; Heyrovský, 1948: 20.
Phytoecia coerulea var. *bethseba*: Pic, 1952: 700.
Phytoecia coerulea ssp. *bethseba*: Bytinski-Salz, 1956: 223.
Phytoecia coerulea: Chikatunov et al., 1999: 119; Finkel et al. 2002: 221.
Phytoecia caerulea: Finkel et al. 2002: 221.

Distribution: The nominotypical subspecies, known from Europe, Asia Minor, Caucasus and Transcaucasia, is totally replaced by *P. c. bethseba* in the Near East from Syria to Lebanon, Jordan and Israel.
ISRAEL: **Golan Heights**: Mas'ada, 17.IV.1973 (DF); Merom Golan, 6.V.1973 (DF); Qazrin, 4.V.1998 (LF); Qusbiya, 18.III.1973 (MK); **Upper Galilee**: HaTanur; 26.IV.1974 (DF); Dafna, 4.III.1942 (BS); Shelomi, 19.IV.1997 (CH); Monfort, 18.IV.1973 (DF); Dalton, 25.IV.1974 (DF); 'En Zetim, 21.V.1997 (AM); **Lower Galilee**: Qiryat Tiv'on, 2.IV.1975 (MK); 23.III.1985 (EY); Basmat Tab'un, 14.IV.1999 (LF); Allonim, 30.III.1991 (EY); Kefar haHoresh [Kfar Hachoresh], 12.III.1995, Dorchin (GS); Yavne`el, 31.III.1973 (DF); Nahal Tavor, 26.III.2001 (CH); **Carmel Ridge**: Haifa, 20.III.1942 (BS); Nahal Oren, 18.III.1996, 27.III.2000 (PC); Dalyat el Karmil, 19/30.III.1995 (GS); Gal'ed, 10.IV.1993 (EY); **Samaria**: Shekhem, 1.III.1973 (MK); Upper Nahal Tirza [Upper part of Wadi Fari`a], 1.III.1973 (MK); Qedumim, 2.IV.1999 (LF); **Jordan Valley**: Park haYarden, 2.IV.1998 (AF); Biq'at Bet Zayda [Betecha], 16.III.1973 (DF); Kinneret ["*lacum Genezareth*"] (S13); Teverya, 4.III.1968 (BS); Teverya [Tiberias] (CRP); Ginnosar, 6.III.1965 (BS); Reshafim, 17.II.1973 (DF); 24/15 km sud Mehola, 24.II.1998 (GS); Lower Nahal Tirza [Lower part of Wadi Fari`a], 19.II.1974 (DF); Al Maghtas, 24.II.1942 (BS); **Central Coastal Plain**: Netanya, 13.III.1944 (BS); Netanya (CRP); Herzliyya, 17.III.1942 (BS); Tel Aviv, 6.III.1955 (LFH); 2.IV.1973 (BS); Ramat Gan (H48); Migdal Afeq [Migdal Zedek], 13.IV.1999 (AF); **Judean Foothills**: Newe Shalom, 26.IV.1997 (CH); Latrun, 29.III.1973, 18.III.1978 (DF);

Bet Guvrin, 31.III.1975 (AF); **Judean Hills**: Bet Shemesh, 17.IV.1974 (DF); Ramallah, 28.IV.1969 (BS); Yerushalayim [Hierosolyma] (S13), [Jerusalem], V (Pic, 1952); 3.IV.1941, 1.V.1941, 1.IV.1943, 20.III.1968 (BS); Qiryat ' Anavim (B56); **Southern Coastal Plain**: Holon, 28.III. (BS); Miqwe Yisra`el (B56); Sederot, 27.II.1974 (DF); Be`eri, 2.III.1973 (DF); **Judean Desert**: Nahal Perat [Wadi el Kelt] (B56); 'En Perat [Ain Fara] (S13), ['Ein Fara] (B56); Ma`ale Adummim, 26.III.1970 (BS); Mar Saba Convent (B56); **Dead Sea Area**: Yeriho ["*Hierichuntem*"] (S13; [Jericho], 3.IV.1943 (BS); 8.III.1976 (MK); Mezoqe Deragot [Um Daraj], 16.III.1979 (DF); **Northern Negev**: Sharsheret, 1.IV.1982 (DF); Lahav, 7.IV.1996 (YD); Gevulot, 12.III.1974 (DF); 7.III.1981 (ESH); Nahal haBesor, Park Eshkol, 25.III.1991 (EY); Be`er Sheva', 15.IV.1970 (BS); Hazerim, 17.II.1987 (EY); Bor Mashash, 29.III.1970 (MP); 25.IV.1997 (CH).
Host plants: Development in living stems of Brassicaceae such as *Sinapis*, *Sisymbrium*, *Rapistrum*; adults can be found on the host plants very early in spring, from February to May.

Phytoecia croceipes Reiche & Saulcy, 1858

Phytoecia croceipes Reiche & Saulcy, 1858, Ann. Soc. ent. France (3) 6: 17. Type locality: "Palestine".
Phytoecia longicollis A. Costa, 1878, Atti Acad. Sc. fis. nat. 7: 27, foot note. Type locality: "Palestina: dint. Gerusalemme".
Phytoecia croceipes v. *annulifer* Th. Pic, 1900, Ent. Nachr., 26: 67. Type locality: "Palaestina: Jericho".
Phytoecia croceipes: Bodenheimer, 1937: 146; Heyrovský, 1954: 395; Finkel et al. 2002: 222.
Phytoecia croceipes var. *annulipes*: Sahlberg, 1913: 235 (lapsus).
Distribution: East Mediterranean from Turkey to Syria, Iraq, Israel, Jordan, Cyprus.
ISRAEL: **Golan Heights**: Qazrin, 4.V.1999 (LF); 2.IV.1988 (EY); **Lower Galilee**: "*in valle fluminis Kison*" (S13); Qishon River [Qison valley] (B56); Allonim, 23.III. (BS); "*prope oppidum Nazareth*" (S13); Nazerat [Nazareth] (B56); **Northern Coastal Plain**: Binyamina, 25.III.1942 (BS); **Judean Foothills**: Nahshon, 19.IV.1997 (RH); Newe Shalom, 14.IV.1997 (RH).
Host plants: host plants and larval biology poorly known; adults can be found sitting on stems of herbaceous plants, mostly Apiaceae.

[***Phytoecia cylindrica*** (Linnaeus, 1758)]

Species known from Europe, Asia Minor, Caucasus, Transcaucasia, Iran, Middle Asia, Siberia, northern China; records from Israel: Jericho (Bytinski-Salz, 1956) and Lower Nahal Keziv (Finkel et al., 2002) are due to misidentification. All specimens stored under this name in TAU collection belong to *Agapanthia frivaldszkyi.*

Phytoecia geniculata Mulsant, 1862

Phytoecia geniculata Mulsant, 1862, Long. France, 2: 420. Type locality: "Grèce, Costantinople".
Phytoecia nazarena Reiche, 1877, Ann. Soc. entomol. France, (5) 7, Bull.: CXXXVI. Type locality: "Nazareth in Palaestina".
Phytoecia geniculata + v. *nazarena*: Pic, 1895, Echange, 11, n° 126: 66; Pic, 1952, Entom. Arb. Mus. Frey, 3: 699.
Phytoecia geniculata var. *nazarena*: Sahlberg, 1913: 235.
Phytoecia geniculata: Bodenheimer, 1937: 146.
Phytoecia geniculata v. *palaestina* Pic, 1930, Echange, 46, n° 439: 3. Type locality: "Jerusalem".
Phytoecia geniculata ab. *nazarena*: Heyrovský, 1948: 20; 1950: 14.
Distribution: Greece, Turkey, Syria, Jordan, Iraq, Israel, Cyprus; also recorded from Bulgaria and Romania (Althoff & Danilevsky, 1997).
ISRAEL: **Mt. Hermon**: Har Hermon, 29.III.1995 (GS); **Upper Galilee**: Qiryat Shemona, 20.II.1962 (BS); Elon, 5.IV. (BS); **Lower Galilee**: Qiryat Tiv`on, 26.III. (BS); Allonim, 29.III.1942 (BS); 16.III.1990 (EY); Kefar HaHoresh, 2.II.87 (YD); 16.III.1991 (EY); Zippori, 23.III.1985; 12.IV.1997 (EY); 'Afula, 28.III.1942 (BS); **Carmel Ridge**: Har Carmel ["*M. Carmelis*"], 11-26.III (S13); Haifa, 2.III.1942, 11.III.1944 (BS); Kibbutz Dalya, 14.III.75, leg. O. Mehl (GS); **Samaria**: Shekhem, 1.III.1973 (MK); Upper Nahal Tirza [Upper part of Wadi Fari`a], 11.III.1973 (DF); **Yizre'`el Valley**: Ramat Yishai, 26.III.1988 (EY); Mishmar ha'Emeq, 14.IV.1946 (MC); Merhavya [Merhavia], (B56); 'En Harod [Ejn Charod], 5.III.1948 (BS); Nurit, 20.II.1974 (DF); **Northern Coastal Plain**: Haifa Bay, 'Ir Ganim, 2.III.2001 (EY); Binyamina, 12.IV.1947 (BS); **Jordan Valley**: Teverya, 2.IV.1942 (BS); Teverya [Tiberias] (CRP); Deganya, 4.II.1944 (BS); Reshafim, 17.II.1973 (DF); 24 km S Mehola, 24.II.1998 (GS); Massua (CRP); **Central Coastal Plain**: Tel Aviv, 2.III.1954 (LFH); **Southern Coastal Plain**: Miqwe Yisra`el, 20.III.1946 (BS); Holon, 15.II.1946 (BS); **Judean Hills**: Yerushalayim [Jerusalem]; 6.IV.1941, 11.III.1943, (BS); Yerushalayim [Jerusalem], IV (Pic, 1952); Yerushalayim

[Jerusalem], 5.IV.1941 (H50); Yerushalayim [Jerusalem] (B56); Zur Hadassa, 8.IV.1953 (LFH); **Judean Desert**: Nahal Perat [Wadi Qelt] (H48), [Wadi el Kelt] (B56); Good Samaritan [Chan Hatrura] (B56); **Dead Sea Area**: Yeriho ["*Hierichuntem*"] (S13), [Jericho] (CRP); 'Enot Zuqim, 27.XII.1992 (CH); **Northern Negev**: Zomet Lehavim, 4.IV.1999 (CH).
Host plants: Adults were found in pupal cells in roots of Asteraceae: *Cirsium* sp., in southern Turkey, *Notobasis syriaca* (L.) Cass. and *Silybum marianum* (L.) Gaertn in northern Jordan (all leg. G. Sama).

Phytoecia manicata Reiche & Saulcy, 1858

Phytoecia manicata Reiche & Saulcy, 1858, Ann. Soc. ent. France (3) 6: 17. Type locality: "Syria".
Phytoecia manicata: Bodenheimer, 1937: 146; Heyrovský, 1950: 14; Chikatunov et al., 1999: 120.
Distribution: Bulgaria, south-eastern Turkey, Syria, Lebanon, Jordan, Israel.
ISRAEL: **Upper Galilee**: Metulla, 13.V.1973 (DF); Amir, 31.III.1945 (BS); Shelomi, 19.IV.1997 (CH); Almagor, 10.V.1988 (EY); Huqoq, 3.III.1984 (ESH); **Lower Galilee**: Ramat Yishai, 26.III.1988 (EY); Allonim, 3.III.1942 (BS); Kefar haHoresh [Kfar Hakoresh], 30.III.1990 (EY); 1.IV.1995 (GS); Yavne`el, 21.II.1973 (DF); Nahalal, 17.IV.1941 (BS); Nahal Tavor, 26.III.2001 (CH); Kokhav haYarden, 26.III.2001 (CH); **Carmel Ridge**: Bet Oren, 23.III.1973 (AF); Nahal Oren, 18.III.1996 (PC); Nahal Tut, 2.III.1979 (DF); Gal'ed, 3.IV.1993 (EY); **Yizre'`el Valley**: Sha'ar ha'Amaqim, 7.III.1948 (BS); 5.IV.1993 (EY); **Samaria**: Upper Nahal Tirza [Upper part of Wadi Fari`a], 3.III.1973 (DF); **Jordan Valley**: Kefar Nahum, 17.III.1981 (MK), [Capernaum] (CRP); Teverya, 4.III.1968 (BS), [Tiberias] (CRP); Ginnosar, 6.III.1965 (BS); Gesher, 16.III.1973 (DF); **Central Coastal Plain**: Nahal Poleg, 10.V.1997 (CH); **Southern Coastal Plain**: Miqwe Yisra`el, 20.III.1945 (Heyrovský, 1950); **Judean Foothills**: Ben Shemen, 22.III.1942 (BS); **Judean Hills**: Yerushalayim [Jerusalem], 10.IV.1942 (BS) **Judean Desert**: 'En Perat [Wadi Qelt], 28.II.1942 (BS).
Host plants: Host plants and larval biology poorly known; Danilevsly & Miroshnikov (1985) list *Prangos*. Adults are usually observed on Apiaceae.

Phytoecia pubescens Pic, 1895

Phytoecia manicata v. *pubescens* Pic, 1895, L'Echange, 11, n. 126: 64. Type locality: "Syrie".
Phytoecia glaphyra Daniel, 1906, Münchn. Kol. Zeit., 3: 177. Type locality: "Dalmatia, Graecia, Asia Minor, Syria".?
Phytoecia glaphyrus: Sahlberg, 1913: 234 (lapsus).
? Phytoecia cylindrica: Bodenheimer, 1937: 146.
Phytoecia manicata v. *pubescens*: Bytinski-Salz, 1956: 223.
Distribution: East Mediterranean from Balkans to Caucasus, Transcaucasia, Syria, Lebanon, Israel.
ISRAEL: **Upper Galilee**: Amir, 31.III.1945, (BS); **Lower Galilee**: Allonim, 27.III.1942, (BS); Kefar haHoresh [Kfar hakoresh], 12.III.1995; 1.IV.1995 (GS); 'Afula [Afuleh], 28.III.1942 (BS); **Carmel Ridge**: Dalya/Galed, 19.III.1995 (GS); **Jordan Valley**: Kefar Nahum [Capernaum] (CRP); Teverya [Tiberias] (CRP); **Northern Coastal Plain**: Benjamina, 25.III.1942 (BS).
Host plants: not recorded.

Phytoecia virgula (Charpentier, 1825)

Saperda virgula Charpentier, 1825, Hor. Soc. entomol. Ross.: 225. Type locality: "Dalmatia".
Phytoecia virgula: Bodenheimer, 1937: 146; Chikatunov, 1999: 121; Finkel et al., 2002: 223.
Phytoecia virgula ab. *major*: Heyrovský, 1948: 20; 1950: 14.
Distribution: Europe, Asia Minor, Caucasus, Transcaucasia, northern Iran, Middle East to Israel, Kazakhstan, southern Urals.
Israel: **Mt. Hermon**: Har Hermon, 1800m, 3.VIII.1995 (CH); 1600m, 9.VI.1975 (MK); 13.VI.1996 (AF); 20.V.1997 (CH); 26.V.2007 (JB); 1500m, 23.V.1978 (AF); 1400m, 20.V.1997 (LF); 1300m, 29.III.1995 (GS); Biq'at Man, 1430m, 10.V.1996 (EY); **Golan Heights**: Panyas [Banyas], 7.V.1993 (EY); Mt. Katah, 1100m, 25.V.1990 (EY); Mas`ada, 20.VI.1993 (CH); Qusbiya, 6.V.1973 (DF); 3.V.1980 (MR); Mevo Hamma, 10.III.1946 (BS); Majdel Shams, 3.VIII.1895 (VC); **Upper Galilee**: Ramot Naftali, 2.V.1994, leg. M. Levin; Jish, 6.IV.2001 (EY); Har Meron, 25.V.2007 (JB); 20 km NE Qiryat Shemona, Cableway, 16.V.1996 (NMS); **Lower Galilee**: Qiryat Tiv`on, 25.III.1955 (LFH); Kefar HaHoresh, 31.III.1990 (EY); 12.III.1995, Dorchin (GS); Mt. Yavne`el, Mizpe Elot, 3.IV.1999 (EY); Nahal Tavor, 25.III.2001 (CH); **Carmel Ridge**: Haifa, 28.III.1942 (BS); Nahal Oren, 16.III.1996, 6.IV.1998 (PC); Elyaqim,

15.IV.2000 (EY); Dalya/Galed, 19.III.1995 (GS); Gal'ed, 31.III.2001 (EY); **Samaria**: Nahal 'Iron [Wadi Ara], 19.III.1974 (DF); 'Ez Efrayim, 23.III.1998 (LF);
Central Coastal Plain: Netanya, 13.III.1944 (BS); Ra'ananna, 25.III.1948 (BS); **Judean Hills**: Bethléem (Pic, 1952); Bet Shemesh, 12.IV.1993 (CH); Yerushalayim [Jerusalem] (Pic, 1952), Yerushalayim [Jerusalem], 3.XI.1929, leg. F. S. Bodenheimer; 4.IV.1947 (BS); **Northern Negev**: Ze`elim, 12.III.1974 (DF).
Host plants: Polyphagous on several herbaceous plants: *Chrysanthemum*, *Artemisia*, *Daucus*, *Hieracium*, *Tanacetum*, *Inula*, *Anthemis, Onopordon*, *Echinops*.

Blepisanis vittipennis (Reiche, 1877)

Phytoecia vittipennis Reiche, 1877, Ann. Soc. entomol. France (5) 7, Bull.: 146. Type locality: "Bulgaria in montibus Balkan dictis".
Phytoecia vittipennis: Bodenheimer, 1937: 146
Distribution: Balkans, Turkey, Armenia, Syria, Lebanon, Israel.
Israel: **Mt. Hermon**: Har Hermon, m.1700, 3.VI (YD); **Upper Galilee**: Upper Galilee, 9.V.26, leg. Hucklesby (BMNH).
Host plants: In Lebanon and in Syria several adults were found on *Achillea* sp. (Asteraceae) (GS); Rejzek et al. (2003) record *Achillea biebersteinii* Afan. (Asteraceae) as the possible host.

SPECIES TO BE DELETED FROM THE ISRAELI CERAMBYCID FAUNA

Species listed by Bodenheimer (1937)

Prionus asiaticus (Faldermann, 1837) - misidentification [= *M. besikanus* (Fairmaire, 1855)]
Prionus angustatus (Jakovlev, 1887) - misidentification [= *M. besikanus* (Fairmaire, 1855)]
Rhaesus caesariensis (Pic, 1918) – misidentification [*Eurynassa australis* (Boisduval, 1835)]
Rhamnusium graecum Schaufuss, 1862
Cortodera discolor Fairmaire, 1866
Stenopterus ater (Linnaeus, 1758)
Ropalopus lederi Ganglbauer, 1882
Dorcadion forcipiferum Kraatz, 1873 [= *P. drusum* Chevrolat, 1870)]
Dorcadion caucasicum Küster, 1847
Anaesthetis testacea (Fabricius, 1781) (= *Anaesthetis anatolica* Holzschuh, 1979)
Agapanthia asphodeli (Latreille, 1804) (= *Agapanthia (Epoptes) pustulifera* Pic, 1905)
Agapanthia irrorata (Fabricius, 1787)
Agapanthia lateralis Ganglbauer, 1884 (= *Agapanthia (Epoptes) pustulifera* Pic, 1905)
Agapanthia dahli (Richter, 1820) (= *Agapanthia (Epoptes) pustulifera* Pic, 1905)
Agapanthia muellneri Reitter, 1898
Agapanthia boeberi (Fischer, 1806)
Agapanthia cardui (Linnaeus, 1767 [= *Agapanthia* (s. str.) *suturalis* (Fabricius, 1787)
Agapanthia violacea (Fabricius, 1775) (= *Agapanthia* (s. str.) *lais* Reiche & Saulcy, 1858)
Oxylia duponcheli (Brullé, 1832) [= *Oxylia argentata languida* (Ménétriés, 1839)]
Phytoecia rubropunctata (Goeze, 1777) [? = *Musaria wachanrui* (Mulsant, 1851)]
Phytoecia nigripes Voet, 1778 (not available), currently *Musaria affinis* (Harrer, 1784)
Phytoecia flavescens Brullé, 1832 [= *Helladia orbicollis* (Reiche & Saulcy, 1858)]
Helladia orbicollis (Reiche & Saulcy, 1857) [= *Helladia insignata* (Chevrolat, 1854)]
Musaria astarte (Ganglbauer, 1886) [= *Musaria wachanrui* (Mulsant, 1851)
Phytoecia cylindrica (Linnaeus, 1758)
Phytoecia longicollis A. Costa, 1878 = *P. croceipes* Reiche & Saulcy, 1858

Species mentioned by different authors

Vadonia unipunctata (Fabricius, 1789) - "Palestine" (Plavilstshikov, 1936, as *Leptura unipunctata*
Stenurella septempunctata (Fabricius, 1792) - "Palestine" (Plavilstshikov, 1936, as *Strangalia septempunctata*
Arhopalus rusticus (Linnaeus, 1758) - Lower Nahal Oren (Chikatunov et al., 1999), misidentification [= *Arhopalus ferus* (Mulsant, 1839)]
Rosalia alpina syriaca Pic, 1894 – "Palästina " (Plavilsthikov, 1940)

Agapanthia cardui (Linnaeus, 1767) – Haifa (Sahlberg, 1913); Lower Nahal Keziv; Lower Nahal Oren (Finkel et al., 2002), misidentification [= *Agapanthia* (s. str.) *suturalis* (Fabricius, 1787)
Agapanthia osmanlis Reiche & Saulcy, 1858 – Several localities (Chikatunov et al., 1999), misidentification [= *Agapanthia* (s. str.) *lais* (Reiche & Saulcy, 1858)
Agapanthia lateralis Ganglbauer, 1884 - Lower Nahal Oren (Chikatunov et al., 1999), misidentification [= *Agapanthia (Epoptes) pustulifera* Pic, 1905)
Agapanthia dahli (Richter, 1820) - Several localities (Chikatunov et al., 1999), misidentification (= *Agapanthia (Epoptes) pustulifera* Pic, 1905 ?)
Oxylia duponcheli (Brullé, 1832) – Galilea (Sahlberg, 1913) [= *Oxylia argentata languida* (Ménétriés, 1839)]
Phytoecia cylindrica (Linnaeus, 1758) - Lower Nahal Keziv (Finkel et al., 2002), misidentification (= *Agapanthia frivaldszkyi* Ganglbauer, 1884)
Musaria astarte perrini (Pic, 1891) - Lower Nahal Keziv (Finkel et al., 2002), misidentification [= *Musaria wachanrui* (Mulsant, 1851)]
Neomusaria merkli (Ganglbauer, 1884) – Jerusalem (Heyrovský, 1948; Bytinski-Salz, 1956), misidentification [=*Neomusaria waltli* Sama, 1991

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Fig. 2-3. *Cortodera kochi* Pic, 1935 ♂♂

Fig. 4. *Ropalopus ledereri ledereri* (Fairmaire, 1866)

Fig. 5. *Purpuricenus interscapillatus interscapillatus* Plavilstshikov, 1937

Fig. 6. *Crossotus katbeh* Sama, 2000

Fig. 7. *Crossotus xanthoneurus* Sama, 2000

Fig. 8. *Agapanthia* (*Agapanthia*) *lais* Reiche & Saulcy, 1858

Fig. 9. *Agapanthia* (*Agapanthia*) *orbachi* Sama, 1993

Fig. 10. *Agapanthia* (*Epoptes*) *pustulifera* Pic, 1905

Fig. 11. *Pilemia halperini* (Holzschuh, 1999)

Fig. 12. *Helladia insignata* (Chevrolat, 1854) from Qartaba (Syria)

Fig. 13. *Musaria wachanrui* (Mulsant, 1851)

TURKISH OXYMIRINI DANILEVSKY IN ALTHOFF & DANILEVSKY, 1997 WITH ZOOGEOGRAPHICAL REMARKS (COLEOPTERA: CERAMBYCIDAE: LEPTURINAE)

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[**Özdikmen, H.** 2010. Turkish Oxymirini Danilevsky in Althoff & Danilevsky, 1997 with zoogeographical remarks (Coleoptera: Cerambycidae: Lepturinae). Munis Entomology & Zoology 5 (1): 52-59]

ABSTRACT: All taxa of the tribe Oxymirini Danilevsky in Althoff & Danilevsky, 1997 in Turkey and the world fauna are evaluated. A new faunistical data for Turkey is given in the text.

KEY WORDS: *Oxymirus,* Oxymirini, Lepturinae, Cerambycidae.

Subfamily LEPTURINAE Latreille, 1802

Tribe OXYMIRINI Danilevsky in Althoff & Danilevsky, 1997

Type genus: *Oxymirus* Mulsant, 1863

Tribe Oxymirini was erected by Danilevsky (in Altthof & Danilevsky, 1997) on the base of larval characters in Švácha & Danilevsky (1989).

Danilevsky (2009a,b) stated that "*The tribe system of Lepturinae (with Rhamnusiini, Oxymirini, Enoploderini and so on) is more or less agree with P. Švácha (1989 in Švácha & Danilevsky, 1989) divisions, though P. Švácha joined Rhamnusium and Enoploderes in one tribe. Rhamnusiini, Oxymirini and Enoploderini were named by Danilevsky in "A Check-list …" (Althoff & Danilevsky, 1977)*".

It seems that Oxymirini Danilevsky, 1997 is available, but Enoploderini and Rhamnusiiini are not available according to the ICZN Art. 13.1 now. Recently Sama in Sama & Sudre (2009) described tribe Rhamnusiini with the type genus *Rhamnusium* Latreille, 1829.

Also, Vives (2000) separated the genera *Rhagium* and *Rhamnusium* in the tribe Rhagiini and he grouped other Rhagiini (including *Oxymirus*) in the tribe Toxotini.

According to Vitali (2009), the larval differences claimed by Danilevsky (1997) are not sufficient to define the tribe of Oxymirini since they are not supported by adult characters. So Vitali (2009) placed these tribal names (Rhamnusiini, Oxymirini and Enoploderini) of Danilevsky (1997), Toxotini Mulsant, 1839 and Stenocorini Thomson, 1860 as synonyms of the tribe Rhagiini Kirby, 1837.

Recently, Sýkorová (2008) actualized a study on DNA of some Cerambycidae and she obtained some important results on tribal classification of Lepturinae.

According to Sýkorová (2008), however, Oxymirini are reasonably supported. Rhagiini is not retrieved as monophyletic.

On tribal classification of Lepturinae, Sýkorová (2008) mentioned that "*distribution of genera in the tribe in the subfamily Lepturinae is very unsteady, but the only work that Švácha & Danilevsky (1989) is attempted to define the tribe to at least larval apomorphies. Fig. 1 shows the relationship proposed by each tribe (one of the newly created tribe were named, tribus containing genera Oxymirus and Anthophylax was later named Oxymirini Althoff & Danilevsky, 1997)*".

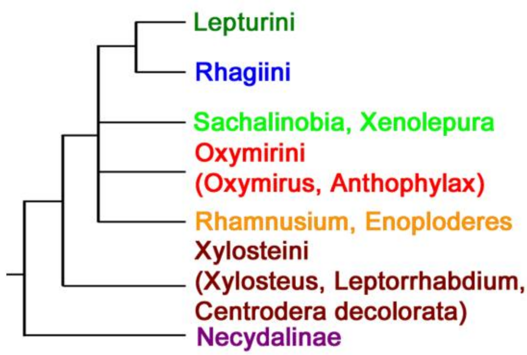

Figure 1. The relationship proposed by each tribe. Colors were used according to the preliminary draft tribal classification of Švácha & Danilevsky, 1989 (from Sýkorová, 2008).

Sýkorová (2008) also stated that these groups are present in virtually all analysis with few exceptions (e. g. *Oxymirus*). Linking Old World *Oxymirus* and New World *Anthophylax* within one tribe Oxymirini is supported in several kladogram. Furthermore, Sýkorová (2008) pointed out that *Oxymirus mirabilis* regraded in the genus *Anthophylax* according to reliability of kladogram and appropriateness of the sequence of 16S rDNA which agree with the larval morphology in Švácha & Danilevsky (1989).

According to her, within the subfamily Lepturinae s. str., tribe Lepturini in the modified scale (including the genera *Desmocerus, Grammoptera* and *Strophiona*) and Oxymirini were mostly monophyletic. Monophylety of tribe Rhagiini is not supported. The short sequence is not sufficient to assess the position of some isolated, probably basal genera (e. g. *Rhamnusium, Sachalinobia, Caraphia, Centrodera, Teledapus, Enoploderes*) and to determine the mutual relationship of higher taxa within the subfamily Lepturinae.

So, I now accept Oxymirini Danilevsky, 1997 as a separate tribe from Rhagiini and Lepturini and others on the base of larval morphologies (Švácha & Danilevsky, 1989) and the study of DNA (Sýkorová, 2008).

Danilevsky (2009b) stated that "*according to the DNA Cerambycidae study of M. Sýkorová (2008) with English comments by P. Švácha (personal message, 2008): The three lepturine genera [Enoploderes, Rhamnusium and Sachalinobia] probably should not be included in any of the existing tribes (Xylosteini, Oxymirini, Rhagiini s.l., Lepturini)*".

New World genus *Anthophylax* LeConte, 1850, of which the type species is *A. viridis* LeConte, 1850, has four species as *Anthophylax attenuatus* (Haldeman, 1847) [SE Canada, NE USA]; *A. cyaneus* (Haldeman, 1847) [E North America]; *A. hoffmani* Beutenmüller, 1903 [SE USA] and *A. viridis* LeConte, 1850 [E North America]. Sýkorová (2008) studied on the species, *Anthophylax attenuatus* (Haldeman, 1847) and *A. cyaneus* (Haldeman, 1847). Monné & Bezark (2009) placed the genus *Anthophylax* LeConte, 1850 in the tribe Lepturini Latreille, 1802. *A. cyaneus* (Haldeman, 1847), *A. hoffmani* Beutenmüller, 1903 and *A. viridis* LeConte, 1850 are metallic. Only the species *A. attenuatus* (Haldeman, 1847) has dense tufts of white hairs on the reddish-brown elytra.

So I think now the status of *Anthophylax* LeConte, 1850 and even probably *Neanthophylax* Linsley & Chemsak, 1972 according to Švácha & Danilevsky (1989) need to be clarified with future investigations on immature stages and adult characters in comparison of that of the genus *Oxymirus*. And then we can decide on the real status of *Oxymirus mirabilis*. Anyway, this species was originally described as *Anthophylax mirabilis* Motschulsky, 1838. Švácha & Danilevsky (1989) gave it as *Anthophylax mirabilis* Motschulsky, 1838. Since they stated that "*the larvae of O. mirabilis differ significantly from those of the type species, O. cursor. Having examining larvae of some North American species of the genus Anthophylax, it has become clear that they are congeneric with O. mirabilis, which has been therefore transferred to that genus*".

Genus *OXYMIRUS* Mulsant, 1863

Type species: *Cerambyx cursor* Linnaeus, 1758

Body is small or moderate size generally. It is approximately between 14-32 mm.

Head robust and small, gradually narrowed posteriorly, somewhat elongated and slightly narrowed in front of the eyes; without distinct temples, simply narrowed behind eyes; impressed with a distinct median line that runs from the clypeus to the occiput; clypeus large, limited above by a faint semicircular line, extending in front considerably beyond the base of the mandibles; labrum large; maxillary palpi longer than the labial, last joint of both strongly triangular; eyes of moderate size, finely facetted, emarginate, rather deeply incurved; antennae inserted in small but rather prominent tubercles placed between the lower lobes of the eyes and at a very short distance from them; Antennae, with 11 articles in both sexes, reaching almost the elytral apex in the male and the level of the apical third in the female, rather slender: first segment barely reaching past the eye, third longer than the fourth, but distinctly shorter than the fifth; fifth to seventh or eighth subequal, ninth and tenth shorter, 4th segment shorter than 3rd and 5th segments. Pronotum longer than broad, constricted near apex and base with anterior and posterior transverse depressions, with a strong tubercle at the middle of each side and two elongate elevations on the disc with medial groove, pronotum slightly bell-shaped and lateral pronotal spines large and obtuse.

Prosternum with a narrow triangular projection. Scutellum triangular. Elytra much broader at base than base of pronotum, a little prominent at the shoulders, gradually narrowed posteriorly, rounded at the apex, each elytron with or without small sutural spine. Legs rather long and slender, femora gradually and not strongly thickened, the hind pair do not reach to the apex of the elytra in the male; tibial spurs rather long; first segment of tarsi long, that of the hind tarsi longer than the second and third united, third segment deeply bilobed (Gahan, 1906; Villiers, 1978; Bily & Mehl, 1989).

The genus characterized by antennae attached between eyes; pronotum laterally with markedly produced spinescent tubercles and 1st segment of hind tarsi notably longer than next two segments together (Cherepanov, 1990).

Larvae are polyphagous in deciduous trees and conifers (e.g. *Fagus, Larix, Abies, Picea, Pinus, Betula, Alnus, Corylus, Quercus, Carpinus, Populus, Salix, Ulmus, Sorbus*). Larvae feed in decaying or rotten wood. Pupation is in soil in a cocoon. Occasionally pupation takes place in wood. Adults are in May-July in general or late April to August. Life cycle is several years (3 years). They are nocturnal, rarely on flowers in the daytime (Plavilstshikov, 1936; Bily & Mehl, 1989; Švácha & Danilevsky, 1989; Cherepanov, 1990; Bense, 1995; Vives, 2000; Sama, 2002; Hoskovec & Rejzek, 2009).

The small genus *Oxymirus* Mulsant, 1863 has only 2 species in the world fauna, of which one is known to occur in Turkey. The genus has W-Palaearctic (European + SW-Asiatic) chorotype.

A key for species

1 (2) Elytral apex with a tooth in the suture; elytra without transversal stripes or bands...***O. cursor* (Linnaaeus, 1758)**

2 (1) Elytral apex rounded and without tooth in the suture; elytra with transversal spots or bands..***O. mirabilis* (Motschulsky, 1838)**

Oxymirus cursor (Linnaeus, 1758)

Original combination. *Cerambyx cursor* Linnaeus, 1758.

Other names. *noctis* Linnaeus; *vittatus* Gmelin; *niger* Olivier; *striatus* Voet; *verneuili* Mulsant; *testaceus* Gredl.; *lacordairei* Pascoe; *genuinus* Letzner; *fenestratus* Letzner; *niger* Letzner; *lineatus* Letzner; *nigricollis* Letzner; *genuinus* Letzner; *tournieri* Pic; *luctuosus* Latreille; *letzneri* Csiki; *subvittatus* Reitter; *nigrinus* Reitter; *subvittatus* Reitter; *semiobscurus* Pic; *bicoloricollis* Pic; *spaceki* Roubal; *liberecensis* Podany; *demetli* Heyrovsky; *leseigneuri* Villiers.

Length moderate size. It is approximately between 25-32 mm. In the male, most often nearly black, faintly covered above, more densely beneath, with grey pubescence. Head and prothorax finely and very densely punctate; furnished sparsely with some longish hairs, especially on the sides. Antennae do not reach the elytral apex. Scutellum rather densely pubescent. Elytra rugose, each with an obtuse costa that extends along almost its whole length from the shoulder and two feebler and shorter costae along the disc, the intervals between the costae depressed, forming shallow channels. Last ventral segment elongate, narrowed posteriorly, subsinuately truncate at the apex, strongly carinate along the middle. In the female, exceptionally coloured like the male, but usually differs as follows: Upper side with yellow hairs, a rather broad chestnut-red band along the middle of each elytron and another along the side margin, the two bands uniting at the apex; the legs to a great extent and the antennae reddish brown; last ventral segment scarcely longer than the penultimate, not carinate along the middle; antennae shorter than in the male, extend hardly beyond the middle of elytra (on the base of Gahan, 1906, Plavilstshikov, 1936).

Records in Turkey. Absent.

Range. Europe (Spain, France, Italy, Slovenia, Croatia, Bosnia-Herzegovina, Serbia, Macedonia, Bulgaria, Romania, Hungary, Austria, Switzerland, Czechia, Slovakia, Germany, Luxembourg, Belgium, Netherlands, Denmark, Poland, Sweden, Norway, Finland, Estonia, Latvia, Lithuania, Belorussia, Ukraine, Moldova, European Russia), W Siberia.

Chorotype. European.

Remarks. It has been recorded by Acatay (1948, 1961 and 1968) and Lodos (1998) in his unrealistic list from Turkey without any exact locality. So it is not confirmed for Turkey now.

This species is rather variable. According to Plavilstshikov (1936) and Villiers (1978), some variations present as follows:

Forma typica: In male, antennae do not reach or extend barely beyond the elytral apex. In female, extend hardly beyond the middle of elytra. Elytra, pronotum and legs black (male); Elytra with 2 more or less clear costae, elytral apex in the suture with a small tooth; Upper side with faintly grey (male) or yellow (female) hairs, underside denser hairy. Black, base of antennae and mouth red (male); or black, mouth, the biggest part of the antennae, tibiae and tarsi rust-color completely, elytra reddish yellowish-brown with a wide stripe in the suture and a wide longitudinal band from the shoulder up to apex black (female).

ab. *fenestratus* Letzner: Pronotum black completely; elytra black, only before the apex with a brighter longitudinal spot (male and female).

ab. *leseigneuri* Villiers: Pronotum black completely, elytra as precedent but lateral edge ruddy (male and female).

ab. *bicoloricollis* Pic: Head black, pronotum black, red lined, elytra yellowish along the suture blackish and along the side edges (lateral carinae) brownish or blackish (male and female).

ab. *verneuli* Mulsant: Pronotum, elytra, body, legs and antennae reddish-yellow (male and female). Sometimes uniformly brownish-yellow (female).

ab. *subvittatus* Reitter: Sometimes elytra brighter colored (male). Pronotum black completely, elytra black with two brown bands (female).

ab. *tournieri* Pic: Longitudinal band strongly diminished and only in the shoulders intimated. Pronotum black completely, elytra brown with only the suture and the calus humeral callus black (female).

ab. *semiobscurus* Pic: Only the head and the pronotum black, elytra yellowish with only the suture very closely black (female).

ab. *lineatus* Letzner: Elytra black or for a great part black, the discal band very shrunk and short in the anterior part brightly (female).

ab. *letzneri* Csiki: Pronotum black completely, elytra black with only lateral edge ruddy (female).
ab. *niger* Letzner: Elytra black, narrowly reddish lined (female).
ab. *nigrinus* Reitter: Pronotum and elytra uniformly black (female).
ab. *liberecensis* Podany: Pronotum black completely, elytra like forma typica, but discal band reaching to the suture (female).
ab. *demelti* Heyrovsky: Pronotum black completely, elytra dark brown with black basal part, legs brown-black (male).
ab. *nigricollis* Letzner: Elytra black, discal and lateral stripes brown, or elytra brown, sutural stripe and border line black (male).
ab. *spaceki* Roubal: The body honey-yellow, base of femora, antennae from the 3-rd segment, metasternum, shortened discal band and subhumeral stripe on elytra black (male).

***Oxymirus mirabilis* (Motschulsky, 1838)**

Original combination. *Anthophylax mirabilis* Motschulsky, 1838.

Other names. *atripes* Pic; *multinotatus* Pic.

Length moderate size. It is approximately between 14-20 mm. In male, antennae reaching the elytral apex. In the female, extend hardly beyond the middle of elytra. Elytra without costae, elytral apex in the suture without tooth; Upper side with felt-like, silky brilliant pubescence. Male gray-black, elytra to the apex yellowish-brown, in the middle with two brownish-yellow or pale-yellow, outwardly black enclosed zigzag transversal bands often flowing into each other in the suture; Female brown-black, antennae and legs rust-red, elytra red-brown with two zigzag-shaped bands of hairs, a bald longitudinal spot in the shoulder and a big hairless area between the transversal bands black.

Material examined: Giresun prov.: Eğribel pass-Kümbet plateau, 1-15.06.2009, leg. A. Y. Okutaner, 2 specimens. The specimens were collected from a pheromone trap.

Records in Turkey. Ordu prov.: Mesudiye as *Toxotus mirabilis* (Sama, 1982) (Map. 1).

Range: Caucasus (Armenia, Azerbaijan, Georgia), Transcaucasus, N Iran, Turkey.
Chorotype: SW-Asiatic (Irano-Caucasian + Irano-Anatolian + Anatolo-Caucasian).

Remarks: It has been recorded only by Sama (1982) from Turkey until now. The present materials are the first record for Giresun province and the second record for Turkey. So it confirmed for Turkey. This species is distributed only in NE Turkey.

According to Plavilstshikov (1936), the variations present as follows:
Forma typica: as mentioned above.
ab. *atripes* Pic: Sometimes black, elytra in the middle yellow drawn (male) or elytra brownish-red with black hind band and black in front third, antennae black, slightly red (female).

ab. *multinotatus* Pic: Upper side brown-red, head and pronotum partly black or dark, elytra with black shoulder line and with three indistinct black spots in front half and discontinuous black hind band (male and female).

Note: The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999). Distribution and other names are based on Gahan (1906), Aurivillius (1912), Winkler (1924-1932), Plavilstshikov (1936), Villiers (1978), Danilevsky & Miroshnikov (1985), Bense (1995), Althoff & Danilevsky (1997), Sama (2002), Danilevsky (2009a,b).

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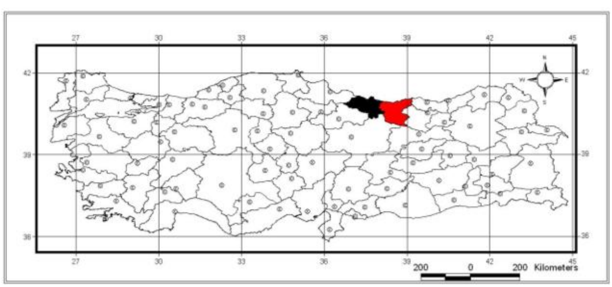

Map. 1. The distributional records of *Oxymirus mirabilis* (Motschulsky, 1838) in Turkey.

THREE NEW TAXA OF THE GENUS *CARABUS* (COLEOPTERA, CARABIDAE) FROM SIBERIA

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[Obydov, D. 2010. Three new taxa of the genus *Carabus* (Coleoptera: Carabidae) from Siberia. Munis Entomology & Zoology, 5 (1): 60-64**]**

ABSTRACT: Three new taxa of the genus *Carabus*: *Carabus (Carabulus) leachi semiensis* ssp. n.; *Carabus (Diocarabus) slovtzovi sainakensis* ssp. n. and *Carabus (Aulonocarabus) truncaticollis tungusensis* ssp. n. are described from Siberia. Diagnostic data are given.

KEY WORDS: Coleoptera, Carabidae, *Carabus,* new subspecies, Siberia.

DESCRIPTION

Carabus (Carabulus) leachi semiensis ssp. n. (Fig.1).

Holotype: male with label: "E. Kazakhstan, Semei (Semipalatinsk) env., 12-26.VII.1992, V. Sinyaev leg."

Papatypes: 3 males, 2 females, same data and same locality.

The holotype and paratypes are preserved in the collection of the State Museum of Biology (Moscow, Russia).

Description. Body length in males is 19.5-20.0 mm (including mandibles), width 7.5-7.6 mm; body length in females is 20.0-20.6 mm, width 7.7-7.9 mm.

Head slightly thickened, ratio width of pronotum/width of head 1.80; eyes slightly convex; mandibles relatively long, narrow, slightly curved; terebral tooth of the right mandible one-dentate strongly prominent; terebral tooth of left mandible small, slightly prominent; retinaculum of the left mandible indistinct, retinaculum of the right mandible triangular strongly prominent; surface of mandibles smooth. Frontal furrows very shallow, inside smooth. Frons smooth; vertex and neck with sparse coarse punctures. Labrum wider than clypeus, strongly notched, with 2 lateral setae. Antenna protruding beyond the base of pronotum by 4 apical segments; palpi moderately dilated; penultimate segment of the maxillary palpi equal to the last segment; penultimate segment of the labial palpi with 7 setae. Mentum tooth broad triangular, much longer than lateral lobes; submentum without setiferous pores.

Prothorax transverse, slightly convex, broadest at about middle; ratio width/length 1.87. Pronotum with sparse coarse punctures, posteriorly with few coarse wrinkles; pronotal sculpture less rough laterally, pronotum nearly smooth on disk. Median longitudinal line distinct; basal foveae deep, inside coarsely-wrinkled. Sides of pronotum narrowly margined, its margin slightly broader posteriorly; lobes of hind angles long, triangular, strongly bent downwards. Lateral margin with 2 setiferous pores: one pore at about middle and one pore near hind angle.

Elytrae oval, slightly convex, widest at about middle; shoulders prominent; sides of elytrae narrowly margined. Ratio length/width 1.50; ratio width of elytrae/width of pronotum 1.36. Elytral sculpture triploid; all elytral interspaces slightly convex, interrupted into short and long links, sometimes secondary and tertiary elytral interspaces partially integral. Primary foveoles distinct; striae coarsely punctured.

Metepisternum smooth, slightly longer than its width. Abdominal sternites smooth; sternal sulci absent.

Legs of normal length; fore male tarsi with four dilated segments bearing hairy pads.

Shape of aedeagus and endophallic structure in general is characteristic for the species.

Coloration dark bronze, sometimes nearly black; margin of pronotum red, margin of elytra red, reddish-bronze, green or black; sometimes elytra with green lustre; primary elytral foveoles sometimes green. Mandibles, palpi, antenna, legs and ventral body surface black.

Differential diagnosis. The new subspecies differs from *Carabus (Carabulus) leachi leachi* Fischer von Waldheim, 1824 by the following features: palpi less dilated; sculpture of head less rough (frons smooth, vertex and neck with sparse coarse punctures; in *Carabus leachi leachi* frons, vertex and neck completely coarsely-punctured with coarse wrinkles); pronotum less convex with less rough sculpture, lobes of hind angles more bent downwards; elytrae less convex, elytral sculpture absolutely different (all elytral interspaces slightly convex, interrupted into short and long links, sometimes secondary and tertiary elytral interspaces partially integral, primary foveoles distinct; in *Carabus leachi leachi* elytrae more convex, all elytral interspaces about equally developed, interrupted into short links, primary foveoles indistinct); sternal sulci absent (in *Carabus leachi leachi* sternal sulci very shallow and short but well marked); coloration darker.

Distribution. Eastern Kazakhstan, Semei City environs (old name is Semipalatinsk). Up to now only one population is known.
Habitat. The beetles were collected in the pine forest.

***Carabus (Diocarabus) slovtzovi sainakensis* ssp. n.** (Fig.2).

Holotype: male with label: "Tuva, Akademika Obrucheva Mt Ridge, 2100 m, N52°00' E95°34', Sainak Pass, 2.VII.1998, D. Obydov leg."

Papatypes: 2 males, female, same data and same locality.

The holotype and paratypes are preserved in the collection of the State Museum of Biology (Moscow, Russia).

Description. Body length in males is 12.5-14.0 mm (including mandibles), width 5.3-5.9 mm; body length in female is 13.6 mm, width 5.6 mm.

Head not thickened, ratio width of pronotum/width of head 1.43; eyes strongly convex; mandibles short, slightly curved; terebral tooth of the right and left mandibles bi-dentate strongly prominent; retinaculum of the left mandible small, retinaculum of the right mandible triangular strongly prominent; surface of mandibles smooth. Frontal furrows shallow, inside with few coarse wrinkles. Frons, vertex and neck with coarse punctures, laterally head with coarse wrinkles.

Labrum wider than clypeus, slightly notched, without lateral setae. Antenna long, protruding beyond the base of pronotum by 5 apical segments; palpi moderately dilated; penultimate segment of the maxillary palpi shorter than the last segment; penultimate segment of the labial palpi with 2 setae. Mentum tooth narrow triangular, equal to lateral lobes; submentum with 2 setae.

Prothorax transverse, convex, broadest at about middle; ratio width/length 1.46. Pronotum with dense coarse punctures. Median longitudinal line indistinct; basal foveae shallow, inside coarsely-punctured. Sides of pronotum narrowly margined; lobes of hind angles evenly rounded, slightly bent downwards. Lateral margin with 2-3 setae: one or two setae at about middle and one setae near hind angle.

Elytrae oblong-oval, convex, widest at about middle; shoulders prominent; sides of elytrae narrowly margined. Ratio length/width 1.65; ratio width of elytrae/width of pronotum 1.43. Elytral sculpture triploid, rough; all elytral interspaces about equally developed, interrupted into short links, sometimes conjugated transversely. Primary foveoles deep, distinct, sometimes partially indistinct; do not form accurate lines, as at other subspecies of *Carabus slovtzovi*. Striae coarsely punctured.

Metepisternum with few punctures, not longer than its width. Abdominal sternites smooth; sternal sulci absent.

Legs of normal length; fore male tarsi with four dilated segments bearing hairy pads.

Shape of aedeagus and endophallic structure in general is characteristic for the species.

Coloration black; mandibles, four basal antenna segments (apically), femurs, tibiae and claws reddish-brown; ventral body surface black.

Differential diagnosis. The new subspecies differs from *Carabus (Diocarabus) slovtzovi slovtzovi* Mannerheim, 1849 by the following features: pronotum narrower, with shorter hind angles; antenna longer, protruding beyond the base of pronotum by 5 apical segments (in *Carabus slovtzovi slovtzovi* – by 3-4 apical segments); elytra narrower, elytral sculpture more rough, primary foveoles sometimes partially indistinct; do not form accurate lines, as in *Carabus slovtzovi slovtzovi*; coloration usually black. The new subspecies differs from *Carabus (Diocarabus) slovtzovi rasae* Obydov, 2000 (taxon has been described from south-eastern Tuva, Sangilen Mt Ridge, 2300-2600 m) by smaller body size (in *Carabus slovtzovi rasae* body size is 15-17 mm); narrower pronotum and elytra; more rough elytral sculpture with primary foveoles do not form accurate lines and black coloration.

Distribution. Up to now only one population from Tuva (central part of Akademika Obrucheva Mt Ridge, Sainak Pass, 2100 m) is known.
Habitat. The beetles were collected in the mountain tundra.

Carabus (Aulonocarabus) truncaticollis tungusensis ssp. n. (Fig.3).

Holotype: female with label: “Evenk Autonomous Region, N. Tunguska Riv., Tura Vil. env., 12.VII.1979”

Papatypes: female, same data and same locality.

The holotype and paratype are preserved in the collection of the State Museum of Biology (Moscow, Russia).

Description. Body length is 16.5-16.7 mm (including mandibles), width 7.2-7.5 mm.

Head not thickened, ratio width of pronotum/width of head 1.66; eyes strongly convex; mandibles short, slightly curved. Frontal furrows relatively deep and long, inside nearly smooth. Frons smooth, vertex and neck with sparse coarse punctures. Labrum slightly wider than clypeus, slightly notched, without lateral setae. Antenna protruding beyond the base of pronotum by 4 apical segments; palpi slightly dilated; penultimate segment of the maxillary palpi longer than the last segment; penultimate segment of the labial palpi with 2 setae. Mentum tooth narrow triangular, shorter than lateral lobes; submentum with 2 setae.

Prothorax transverse, convex, broadest at about middle; ratio width/length 1.35. Pronotum with dense coarse punctures. Median longitudinal line distinct; basal foveae big triangular, inside coarsely-punctured. Sides of pronotum narrowly margined; lobes of hind angles evenly rounded. Lateral margin with 2 setae: one setae at about middle and one setae near hind angle.

Elytrae oval, convex, widest at about middle; shoulders prominent; sides of elytrae narrowly margined. Ratio length/width 1.62; ratio width of elytrae/width of pronotum 1.53. Elytral sculpture pentaploid, strongly similar elytral sculpture of nominotypical subspecies.

Metepisternum smooth, longer than its width. Abdominal sternites smooth; sternal sulci absent.

Legs of normal length.

Coloration bronze or dark bronze; mandibles, palpi, antenna, tibiae and ventral body surface black; femurs and claws brown.

Differential diagnosis. The new subspecies differs from all other subspecies of *Carabus (Aulonocarabus) truncaticollis* Eschscholtz, 1833, described from northern Siberia by one-color bronze pronotum and elytra and elytral sculpture, which a strongly similar elytral sculpture of nominotypical subspecies. Nominotypical subspecies is distributed in Alaska and Islands of Bering Sea.

Distribution. Northern Krasnoyarsk Region. Evenk Autonomous Region, North Tunguska River Valley.
Habitat. The beetles were collected in the tundra area.

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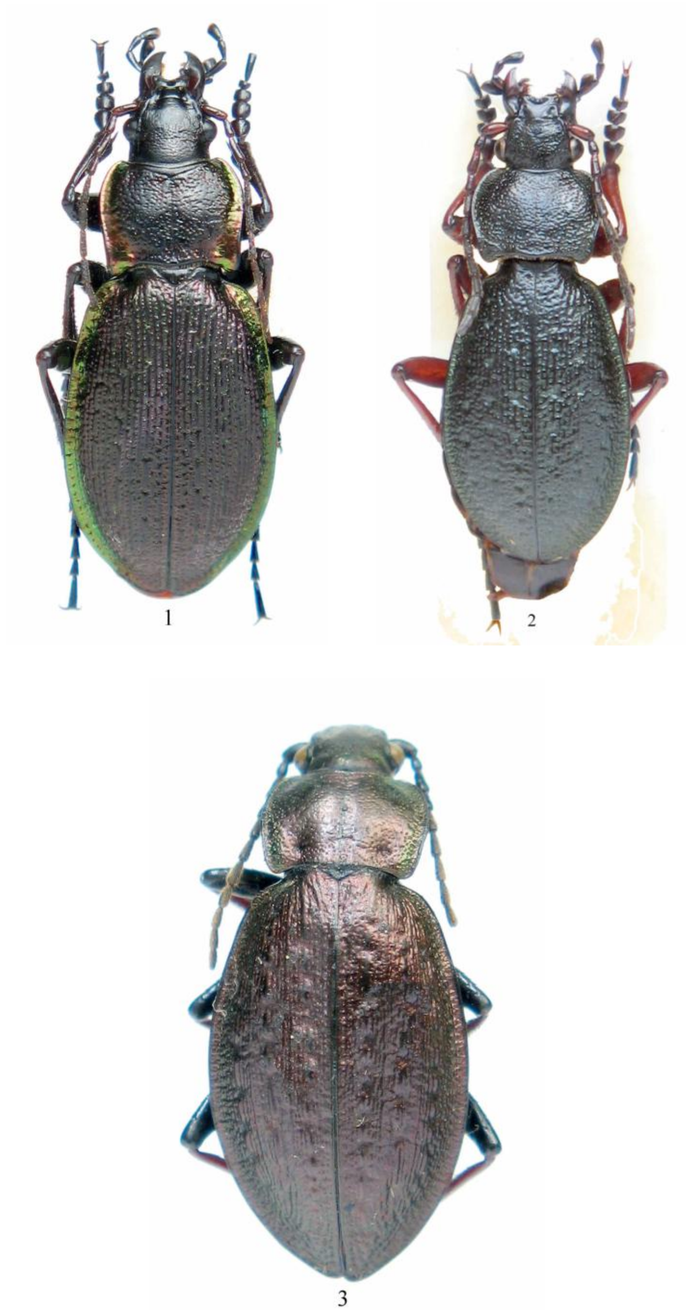

Figures 1. *Carabus* (*Carabulus*) *leachi semiensis* ssp. n. (Holotype). 2. *Carabus* (*Diocarabus*) *slovtzovi sainakensis* ssp. n. (Holotype). 3. *Carabus* (*Aulonocarabus*) *truncaticollis tungusensis* ssp. n. (Holotype).

LACEWINGS (INSECTA: NEUROPTERA) OF IRANIAN RICE FIELDS AND SURROUNDING GRASSLANDS

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[Ghahari, H., Satar, A., Anderle, F., Tabari, M., Havaskary, M. & Ostovan, H. 2010. Lacewing (Insecta: Neuroptera) of Iranian rice fields and surrounding grasslands. Munis Entomology & Zoology 5 (1): 65-72**]**

ABSTRACT: Lacewings (Neuroptera) are efficient predators of pests in different agroecosystems. In this paper, totally 23 species of 14 genera including, *Anisochrysa*, *Chrysopa*, *Chrysoperla*, *Cunctochrysa*, *Dichochrysa*, *Mallada*, *Suarius* of family Chrysopidae, *Coniopteryx*, *Hemisemidalis* of family Coniopterigidae, *Hemerobius*, *Sympherobius*, *Wesmaelius* of family Hemerobiidae and *Myrmeleon*, *Palpares* of family Myrmeleontidae were collected from Iranian rice fields and surrounding grasslands.

KEY WORDS: Neuroptera, Rice field, Iran

Lacewings (Neuroptera) belong to one of the most important groups of insects because of their significant roles in integrated pest management as predators of aphids, mites and several other agricultural pests, and also as the valuable indicators for assessing ecological statement of an habitat (Stelzl & Devetak, 1999; Canbulat, 2007). The Neuroptera include the lacewings, mantidflies, antlions, and their relatives. The order contains some 5,500 species in 21 families. Traditionally, the group was once known as Planipennia, with the Neuroptera at that time also including alderflies, fishflies, dobsonflies and snakeflies, but these are now generally considered to be separate orders (the Megaloptera and Raphidioptera). Within the endopterygotes, the closest living relatives of the neuropteridan clade are the beetles (Aspöck et al. 2001).

Neuropterans first appeared during the Permian Period, and continued to diversify through the Mesozoic Era. During this time several unusually large forms evolved, especially in the extinct family Kalligrammatidae, often referred to as "the butterflies of the Jurassic" due to their large, patterned wings (Martynova, 1952; Ponomarenko and Shcherbakov, 2004; Engel, 2005).

Larvae are mostly terrestrial except for Sisyridae. Their mandibles are long, sicklelike. The larvae of most families are predators and suck the body fluid of their preys. Many chrysopids eat aphids and other pest insects, and have been used for biological control (either from commercial distributors but also abundant and widespread in nature). Some species (especially *Chrysoperla carnea*) are reared and sold commercially as biocontrol agents. Larvae of some Ithonidae are root feeders, and larvae of Sisyridae are aquatic, and feed on freshwater sponges. A few mantispids are parasites of spider egg sacs (New, 1996).

The Neuropteran fauna of Iran has been studied rather well and the total identified species of Iranian Neuroptera is 168. The most important researches on Iranian Neuroptera which were recently conducted are those by Mirmoayedi (1998, 2002), Yassayie and Mirmoayedi (1998) and Mirmoayedi et al. (1999).

Rice fields, together with their contiguous aquatic habitats and dry lands comprise a rich mosaic of rapidly changing ecotones, harboring a rich biological diversity, maintained by rapid colonization as well as by rapid reproduction and growth of organisms (Fernando, 1995, 1996). The variety of organisms inhabiting rice field ecosystems includes a rich composition of fauna and flora. These organisms colonize rice fields by resting stages in soil, by air and via irrigation water (Fernando, 1993). The fauna are dominated by micro, meso and macro invertebrates (especially arthropods) inhabiting the vegetation, water and soil sub-habitats of the rice fields, while vertebrates are also associated with rice fields. The aquatic phase of rice fields generally harbors a varied group of aquatic animals. Those that inhabit the vegetation are mainly the arthropod insects and spiders (Bambaradeniya et al. 1998). In relation to the rice crop, the fauna and flora in rice fields include pests, their natural enemies (predators and parasitoids) and neutral forms.

Previous studies on the biodiversity of rice fields deal mainly with agronomic aspects, where the rice pests, their natural enemies and weeds have been surveyed extensively. Comprehensive studies on the ecology and biodiversity of rice fields are scanty. Among the earliest published records on the subject, Weerakoon (1957) has given a brief popular account on the ecology of rice field animals in Sri Lanka. A preliminary study on fauna and flora of a rice field in Sri Lanka by Bambaradeniya et al. (1998) has documented 77 species of invertebrates, 45 species of vertebrates and 34 species of plants. Roger and Kurihara (1989) have dealt with the aquatic ecology of rice fields in detail. Bambaradeniya (2000) has carried out the most recent comprehensive survey on the ecology and biodiversity in an irrigated rice field ecosystem. This survey documented 494 species of invertebrates belonging to 10 phyla, 103 species of vertebrates, 89 species of macrophytes, 39 genera of microphytes and 3 species of macrofungi from an irrigated rice field ecosystem in Sri Lanka. The majority of the invertebrates were arthropods (82%, 405 species), dominated by insects (78%, 317 species). The high number of animal and plant species documented in the above survey indicates that the irrigated rice field is an agroecosystem with a high diversity. The above study not only documented the overall biodiversity associated with this unique man-made temporary aquatic ecosystem, but elucidated the spatial and temporal variation of biodiversity, in relation to various governing factors affecting this ecosystem. For instance, using terrestrial arthropods as a surrogate group, the survey clearly documented the spatial variation of rice field biodiversity in two rice fields in the same locality and irrigated by the same reservoir, but differing in agronomic practices. Furthermore, it also highlighted how an increase in the structural complexity of the habitat contributed to a temporal gradient in biodiversity through the progression of each rice cultivation cycle, while significant seasonal variations were less likely to occur in a particular rice field that follows generally similar agronomic practices during each cycle.

According to Dale (1994) who has given a comprehensive account of the biology and ecology of insect pests of rice, over 800 species of insects damage rice plants in several ways, although the majority of them cause minor damage. The number of insect species that cause economic damage to rice varies from 20

(Pathak and Khan, 1994) to 30 (Riessig et al. 1986). Bambaradeniya (2000) recorded 130 species of phytophagous insects in Sri Lankan rice fields, of which the majority (76 species) consisted of visitors or other insects associated with weeds. In addition to causing direct damage to rice plants, many rice insect pests also act as vectors of viral diseases of rice, such as the Tungro virus (Dale, 1994). The insect pests of rice are either monophagous feeding only on the rice plant, or polyphagous, where they move in and out of adjacent vegetation including largely rice field weeds. Loevinsohn (1994) has discussed various forces that determine the presence and abundance of insect pests in rice agro-ecosystems, including their adaptations to the rice environment, the influence of the cropping system and the dynamics of the pest populations in relation to the cultural environment.

MATERIALS AND METHODS

Among the several Iranian provinces which included paddy fields, five provinces including, Chaharmahal & Bakhtiari, East Azarbayjan, Golestan, Guilan, Isfahan and Mazandaran were surveyed. Materials were captured by sweeping net of 50 cm in diameter and the light traps (200 watts tungsten) from the rice fields and surrounding grasslands. In addition to the collected specimen by the Iranian authors, several other collected specimens by many researchers and amateur students have also been included in this study. Additionally, the preserved specimens in Ghaemshahr and Amol Islamic Azad Universities were checked too. The collected specimens were preserved in 75% ethanol and sent to the specialists of Natural History Museum Vienna for identification to species level. The information concerning the species' name, describer, locality and the date of collection were collected and the number of species (in brackets) was also given.

RESULTS

In a total of 23 species of 14 genera and 4 families (Chrysopidae, Coniopterigidae, Hemerobiidae, Myrmeleontidae) were collected from different Iranian rice fields and surrounding grasslands. The list of species is given below.

I. Family Chrysopidae Schneider, 1851

The Chrysopidae is one of the largest and economically most important families of the Neuroptera. The family includes over 1200 currently recognized species and subspecies that are divided between 86 genera and subgenera. The larvae of all species and adults of a few genera are predaceous and most feed on aphids, coccids and other soft-bodied insects they encounter on foliage. For this reason, some species have been reared and successfully used for the biological control of agricultural pests (Brooks & Barnard, 1990).

The family Chrysopidae included several predators which have efficient role in biological control programs. While depending on species and environmental conditions, some green lacewings will eat only about 150 prey items in their entire life, in other cases 100 aphids will be eaten in a single week. Thus, in several countries, millions of such voracious Chrysopidae are reared for sale as biological control agents of insect and mite pests in agriculture and gardens. They are distributed as eggs, since as noted above they are highly aggressive and cannibalistic in confined quarters; the eggs hatch in the field. Their performance is variable; thus, there is a lot of interest in further research to improve the use of green lacewings as biological pest control.

In a total of 16 Chrysopidae species were collected from Iranian rice fields and around grasslands. The fauna of Chrysopidae of Iran was studied better than the other families of Neuroptera. Holzel (1966, 1967, 1981) studied the fauna of Iranian Chrysopidae very well and totally 33 species are listed in the check-list Modarres Awal (1997). After many other researches by Mirmoayedi (1998, 2002) and other authors in recent years, the total number of Iranian Chrysopidae is 45 species.

***Anisochrysa* Nakahara, 1955**

***Anisochrysa flavifrons* Brauer, 1850**

Material: Golestan province: Kordkoy (1 specimen), June 2005.

***Chrysopa* Leach, 1815**

***Chrysopa caviceps* McLachlan, 1898**

Material: Guilan province: Rasht (1 specimen), July 2005.

***Chrysopa dubitans* McLachlan, 1887**

Material: Isfahan province: Lenjan (1 specimen), August 2000. East Azarbayjan province, Arasbaran (2 specimens), July 2003.

***Chrysopa perla* Linnaeus, 1758**

Material: Chaharmahal & Bakhtiari province: Sahrekord (1 specimen), August 2003.

***Chrysopa viridana* Schneider, 1845**

Material: Guilan province: Rasht, Fooman (3 specimens), July 2005.

***Chrysoperla* Steinmann, 1964**

***Chrysoperla carnea* (Stephens, 1836)**

Material: Isfahan province: Lenjan, Isfahan, Najaf-Abad (7 specimens), August 2000. Guilan province: Rasht, Fooman, Lahijan (4 specimens), July 2002. Chaharmahal & Bakhtiari provinc: Shahrekord (4 specimens), August 2004. East Azarbayjan province, Arasbaran (6 specimens), July 2004. Mazandaran province: Amol, Babol, Ghaemshahr, Sari, Behshar, Savadkooh (14 specimens), September 2005. Golestan province: Gorgan, and Kordkoy (8 specimens), June 2006.

Comment: *C. carnea* is a dominant species of Neuroptera in Iranian rice fields (Ghahari et al. 2008), and in the present research was collected all over of Iranian rice fields and surrounding grasslands. The egg and pupal parasitoids, *Telenomus acrobates* Giard 1895 (Hymenoptera: Scelionidae) (Chaharmahal & Bakhtiari provinc: Shahrekord) and *Dichrogaster modesta* (Gravenhorst, 1829) (Hymenoptera: Ichneumonidae) (Guilan province: Lahijan), respectively, were reared from *C. carnea*. Also, three asilid flies including, *Acnephalum futile* Wulp, 1899, *Cerdistus debilis* Becker, 1923 and *Trichomachimus curtusus* Lehr, 1989 (Diptera: Asilidae) were observed as the predators of *C. carnea* in Lahijan (Guilan province), Arasbaran (East Azarbayjan province) and Najaf-Abad (Isfahan province), respectively.

***Chrysoperla iranica* Holzel, 1967**

Material: Isfahan province: Lenjan (3 specimens), August 2000. Guilan province: Fooman (2 specimens), July 2005.

Comment: *Erax nubeculus* (Loew, 1848) (Diptera: Asilidae) was observed as the predator of *C. iranica* in Lenjan (Isfahan province).

***Chrysoperla mutata* (McLachlan, 1898)**

Material: Guilan province: Rasht (1 specimen), July 2005. Mazandaran province: Amol (1 specimen), September 2005.

***Chrysoperla rotundata* (Navás, 1929)**

Material: Guilan province: Rasht (1 specimen), July 2005.

***Chrysotropia* Navás, 1911**

***Chrysotropia ciliata* (Wesmael, 1841)**

Material: Chaharmahal & Bakhtiari province: Shahrekord (1 specimen), August 2004.

***Cunctochrysa* Hölzel, 1970**

***Cunctochrysa albolineata* (Killington, 1935)**
Material: Mazandaran province: Amol (1 specimen), September 2005. Guilan province: Rasht (2 specimens), July 2005.

***Dichochrysa* Yang, 1991**

***Dichochrysa prasina* (Burmeister, 1839)**
Material: Guilan province: Rasht (1 specimen), July 2005.
***Dichochrysa zelleri* (Schneider, 1851)**
Material: Mazandaran province: Amol, Babol (2 specimens), September 2005.

***Mallada* Navás, 1925**

***Mallada derbendicus* (Hölzel, 1967)**
Material: Golestan province: Kordkoy (1 specimen), July 2005.

***Suarius* Navás, 1914**

***Suarius mongolicus* (Tjeder, 1936)**
Material: Mazandaran province: Freydonkenar (2 specimens), September 2005.
***Suarius nanus* (McLachlan 1893)**
Material: Mazandaran province: Amol (1 specimen), September 2005.

II. Family Coniopterigidae Burmeister, 1839

The Coniopterygidae of Iran was studied by Aspock & Aspock (1965), Raush & Aspock (1978), Meinandr (1998), Mirmoayedi (1998, 2002), and the total number of species reported from Iran is 25 species. In this research two species of this family were collected from Iranian rice fields as below.

***Coniopteryx* Curtis, 1834**

***Coniopteryx* (*Holoconiopteryx*) *drammonti* Rousset, 1964**
Material: Chaharmahal & Bakhtiari province: Shahrekord (1 specimen), August 2003.

***Hemisemidalis* Meinander, 1972**

***Hemisemidalis pallida* (Withycombe, 1924)**
Material: Chaharmahal & Bakhtiari province: Shahrekord (2 specimens), August 2003. Golestan province: Gorgan (1 specimen), June 2004.
Comment: *Lasiopogon tarsalis* Loew, 1847 (Diptera: Asilidae) was observed as the predator of *H. pallida* in Shahrekord (Chaharmahal & Bakhtiari province).

III. Family Hemerobiidae Latreille, 1802

***Hemerobius* Linnaeus, 1758**

***Hemerobius humulinus* Linnaeus, 1758**
Material: East Azarbayjan province, Arasbaran (1 specimen), July 2005. Mazandaran province: Amol (1 specimen), September 2005.

***Sympherobius* Banks, 1904**

***Sympherobius pygmaeus* (Rambur, 1842)**
Material: Isfahan province: Isfahan (2 specimens), August 2000. Guilan province: Rasht (3 specimens), July 2005.
Comment: The asilid fly, *Theurgus kerzneri* Lehr, 1974 (Diptera: Asilidae) was observed as the predator of *S. pygmaeus* in Isfahan (Isfahan province).

***Wesmaelius* Krüger, 1922**

***Wesmaelius navasi* (Andreu, 1911)**
Material: Mazandaran province: Ghaemshahr, Savadkooh (2 specimens), June 2003.

IV. Family Myrmeleontidae Latreille, 1802

The Myrmeleontidae fauna of Iran was studied by Holzel (1968, 1972), Mirmoayedi et al. (1999) with 80 species, and recently Mirmoayedi (2002) with 9 species. In this research, two species were collected from Iranian rice fields.

Myrmeleon Linnaeus 1767

Myrmeleon hyalinus Olivier 1811

Material: Isfahan province: Isfahan (1 specimen), August 2000. Chaharmahal & Bakhtiari province: Shahrekord (2 specimens), September 2004. East Azarbayjan province, Arasbaran (1 specimen), July 2005.

Palpares Rambur, 19842

Palpares solidus Gerstaecker, 1894

Material: Isfahan province: Lenjan (1 specimen), August 2000.

DISCUSSION

The arthropod natural enemies of rice pest insects include a wide range of predators and parasitoids that are important biological control agents. Predators include a variety of spiders, and insects such as different coleopteran families, aquatic and terrestrial predatory bugs, lacewings, dragonflies, etc (Ghahari et al., 2008). They have stated that long histories of rice cultivation in many parts of the world have allowed stable relationships to evolve between rice insect pests and their natural enemies. In most instances, the species richness and abundance of predator populations may be greater than those of the pest populations, when little or no insecticides are used (Way and Heong, 1994). A pioneering study by Settle et al. (1996) conducted in Java demonstrated the existence of high levels of natural biological control in tropical irrigated rice systems. Bambaradeniya (2000) observed that more than 50% of the terrestrial arthropod species in Sri Lankan rice fields consisted of predators, with spiders being the dominant predatory group. Although fauna of Iranian Neuroptera was studied rather well (Modarres Awal, 1997; Mirmoayedi, 1998, 2002; Yassayie & Mirmoayedi, 1998; Mirmoayedi et al., 1999) same as Turkish fauna (Canbulat, 2007), neighboring of Iran, but Iran is a large country with various geographical climates and therefore more diverse species of this taxon are expected for Iran.

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A SYNOPSIS ON TURKISH *CLYTRA* LAICHARTING, 1781 (COLEOPTERA: CHRYSOMELIDAE)

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ABSTRACT: The Turkish *Clytra* species are presented and evaluated with zoogeographical remarks. Many new faunistic data are given in the present text. The female of *Clytra aliena* Weise, 1897 is described for the first time.

KEY WORDS: *Clytra,* Clytrinae, Chrysomelidae, Coleoptera, Turkey

The subfamily Clytrinae contains 1500 species of 62 genera belonging to six tribes in the world, it consists of 38 genera in one tribe (Clytini) in the Palearctic region (Seeno & Wilcox, 1982).

The known works on Turkish Clytrinae begun in second half of 1800s. Among the main works;

Firstly, some new species were described by Heyden (1886), Weise (1897, 1900) and Reineck (1908). Then, Nizamlıoğlu (1957, 1961) gave some information on hosts, damages and descriptions of *Labidostomis propinqua*, *Clytra novempunctata*, *Smaragdina unipunctata* and *Smaragdina limbata*. Later, important contributions to Turkish Clytrinae fauna were made by Medvedev (1970, 1975), Tomov & Gruev (1975), Gruev & Tomov (1979). Consequently, the information of Turkish Clytrinae have been improved by Kasap (1980, 1982, 1987a,b) on Clytrinae species in Central Anatolian Region of Turkey mostly, Aydın & Kısmalı (1990) on Clytrinae species in Aegean Region of Turkey, Aslan & Özbek (1998) on Clytrinae species in Erzurum, Erzincan and Artvin provinces in NE Turkey, Gök (2003) on Clytrinae species in Isparta provinces (Dedegöl Mts.) in Western Mediterranean Region of Turkey and Maican (2007) on some Clytrinae species in Denizli, İzmir, Çanakkale and Edirne provinces in W and NW Turkey until now.

According to Kasap (1987a, b) and Warchalowski (2003), Clytrinae is represented in seven genera in Turkey as *Labidostomis, Tituboea, Lachnaia, Clytra, Smaragdina, Cheilotoma, Coptocephala*.

CLYTRA Laicharting, 1781

= *Clythra* Fabricius, 1798
= *Hirtoclytra* Medvedev, 1961

Type sp.: *Chrysomela quadripunctata* Linnaeus, 1758

The genus can be easily distinguished from related genera by following diagnostic characters:

Posterior angles of pronotum not elevated, situated in the plane of humeral part of elytra. Anterior coxa separated by a projection of prosternum. Legs robust, fore legs in male as long or only insignificantly longer than in female. Background coloration of elytra yellow or yellowish-red. Elytra always with black humeral spot, in some species other parts of elytra with or without black spots. Length of body above 6-7 mm.

The genus has three subgenera as the nominotypical subgenus *Clytra* Laicharting, 1781; *Clytraria* Semenov, 1903 and *Ovoclytra* Medvedev, 1961. All subgenera are represented in Turkey.

According to Lopatin (1984), genus consists of about 50 species distributed in the Old World. In the Palaearctic Region 16 species are known. According to Warchalowski (2003), genus is represented by seven species in Europe as *Clytra (Clytra) espanoli* Daccordi & Petitpierre, 1977; *Clytra* (*Clytra*) *laeviuscula* Ratzeburg, 1837; *Clytra (Clytra) quadripunctata* (Linnaeus, 1758); *Clytra (Clytraria) atraphaxidis* (Pallas, 1773); *Clytra (Clytraria) novempunctata* Olivier, 1808; *Clytra (Clytraria) valeriana* Ménétries, 1832 and *Clytra (Ovoclytra) binominata* Monrós, 1953. However, he mentioned the species *Clytra* (*Clytra*) *appendicina* Lacordaire, 1848 as an aberration of *C. quadripunctata*.

Kasap (1980) stated eleven species for Turkey in his catalogue. He also gave the species *Clytra appendicina* Lacordaire, 1848 as a subspecies of *C. quadripunctata*. He did not mention *Clytra ovata* (Lacordaire, 1848) for Turkey. So Turkish *Clytra* species are as given follows.

The present materials were collected by various collectors (mostly by present authors) from various parts of Turkey between 1940 and 2009. These materials were preserved in Gazi University (Ankara) and Nazife Tuatay Plant Protection Museum (Ankara).

***CLYTRA* Laicharting, 1781**
Subgen. *CLYTRA* Laicharting, 1781

***Clytra aliena* Weise, 1897**

Material examined: Kastamonu: Küre, 1040 m, 18.06.2003, 1 female; Ankara: Beypazarı, Beypazarı-Kıbrıscık road 5th km, 823 m, N 42 56 E 31 62, 14.06.2009, 2 males.

This species is endemic to Turkey. It is distributed only in CN Turkey. The present material is the first record for Kastamonu province. Weise (1897) described this species from Ankara on the base of one male specimen (holotype). Later Kasap (1987b) recorded one male specimen from Sivas province. He redescribed it with figures of aedeagus. So the female has not been known until now. The female is described for the first time with the present work.

Description of female: Like the male. In both sexes, each elytron has only a humeral black spot. Length of body is shorter than the male (males: 9.0-9.1 mm, female: 8.3 mm). Spermatheca is as figure 1.

Records in Turkey: Ankara as the type locality (Weise, 1897; Clavareau, 1913; Winkler 1924-1932; Medvedev, 1961); Sivas: Yıldızeli-Tokat road (Kasap, 1987b).
Range: Turkey: Ankara (Weise, 1897; Clavareau, 1913; Winkler 1924-1932; Medvedev, 1961; Kasap, 1987b); Turkey (Warchalowski, 2003; Borowiec, 2009).
Chorotype: Anatolian.
Occurrence: Very rare.

Clytra appendicina Lacordaire, 1848

Material examined: Ankara: Çubuk II Dam, 2 specimens; Ankara: Kızılcahamam, Yukarı Çanlı, 1400 m, 14.06.1997, 1 specimen; Ankara: Beypazarı, Kıbrıscık-Beypazarı road, Ahlattık pass, 1102 m, N 42 24 E 31 59, 09.07.2009, 1 specimen.

This species was regarded by some authors as a subspecies or aberration of *C. quadripunctata*. Since Medvedev (1961) placed it as a subspecies of *C. quadripunctata* due to similarity of aedeagal forms. It probably is distributed in N Turkey. The present material is the first record for Kızılcahamam, Çubuk and Beypazarı (Ankara).

Records in Turkey: Turkey (Lefevre, 1872); Ankara: Karagöl (Tomov & Gruev, 1975); Ankara: Karagöl, Atatürk Orman Çiftliği, Lalahan, Ayaş, Beynam (Kasap, 1987b).
Range: S and southern parts of C Europe (Winkler, 1924-1932); Central Asia (Lopatin, 1984); S and southern parts of C Europe, Anatolia, Central Asia (Borowiec, 2009).
Chorotype: Centralasiatic-European.
Occurrence: Not common.

***Clytra laeviuscula* (Ratzeburg, 1837)**
= *quadripunctata* Laicharting, 1781 (nec Linnaeus, 1758)
= *fasciata* Ratzeburg, 1837 (nec Fabricius, 1801)
= ab. *connexa* Fricken, 1888
= ab. *antistita* Weise, 1889
= ab. *biinterrupta* Reitter, 1912

Material examined: Çankırı: Ilgaz, 20.07.1984, leg. Y. Özdemir, 3 specimens; Ankara: Kızılcahamam, Işık Mt., 24.06.1993, 1 specimen, 01.07.1994, 1 specimen, 02.07, 1994, 10 specimens; Ankara: Kızılcahamam, Yukarı Çanlı, 1300 m, 19.08.1997, 2 specimens; Ankara: Kızılcahamam, Bel peak, 1550 m, 21.08.1997, 6 specimens; Ankara: 2000, 3 specimens; Sakarya: Adapazarı, Poyrazlar village, 12.07.1993, leg. A. Kalkandelen, 1 specimen; Isparta: Eğirdir, 29.06.1995, Wild herb, leg. Y. Özdemir, 2 specimens; Ankara: Haymana, 18.06.1999, on *Triticum,* leg. M. Özdemir, 1 specimen; Karabük: Bartın–Safranbolu road, Soğuksu place, 21.07.2003, 1 specimen, Safranbolu, Gürleyik, 21.07.2003, 1 specimen, Safranbolu, Bulak village, 22.07.2003, 1 specimen.

This species is distributed rather widely in Turkey. The present materials are the first record for Çankırı, Karabük and Sakarya provinces.

Records in Turkey: Denizli: Sarayköy (Sahlberg, 1913); Ankara: Hasanoğlan, Kayseri: Erciyes Mt. (Tomov & Gruev, 1975); Afyon, Kayseri: Bünyan, Konya: Kızılören (Kasap, 1987b); İzmir: Bornova (Aydın & Kısmalı, 1990); Erzincan: Yollarüstü, Erzurum: Aşkale, Oltu, Tortum, Uzundere (Aslan & Özbek, 1998); Isparta: Aksu (Gök, 2003).
Range: Europe, Siberia, Japan (Clavareau, 1913, Winkler, 1924-1932; Medvedev, 1961); European part of Russia, Crimea, Northern Caucasus, Transcaucasia, Southwestern Siberia, Altai, Northern and Eastern Kazakhstan, Eastern Kirgizia, Northern Tadzhikistan, Central and Southern Europe, Asia Minor, Northwestern China, Eastern Afghanistan (Lopatin, 1984); Distributed from France and

England to Altai Range, reported also, perhaps erroneously, from Morocco (Warchalowski, 2003); W Palaearctic Region from France to Altai Mts (Borowiec, 2009).
Chorotype: Sibero-European or Palaearctic.
Occurrence: Not common.

Clytra quadripunctata (Linnaeus, 1758)
= *quadrisignata* Märkel, 1842
= ab. *dissimilis* Weise, 1889
= ab. *puberula* Weise, 1898

This species probably is distributed only in N Turkey. It has been recorded only by Tomov & Gruev, 1975 from Turkey (Erzurum prov.).

Records in Turkey: Erzurum: İspir, İkizdere (Tomov & Gruev, 1975); Erzurum: Olur, Uzundere (Aslan & Özbek, 1998);
Range: Europe, Siberia (Winkler, 1924-1932; Medvedev, 1961); Russia, Central Asia, Europe, Asia Minor, N Iran, Mongolia, NE Afghanistan (Lopatin, 1984); W Palaearctic, from N Spain and Ireland to Mongolia (Warchalowski, 2003; Borowiec, 2009).
Chorotype: Sibero-European.
Occurrence: Not common.

Subgen. *CLYTRARIA* Semenov, 1903
= *Clytrella* Medvedev, 1961

***Clytra atraphaxidis* (Pallas, 1773)**
= ssp. *atraphaxidis* Pallas, 1773 (*Chrysomela*)
= ssp. *maculifrons* Zoubokoff, 1833
= ab. *punctata* Weise, 1890
= ab. *ashabadensis* Branczik, 1890
= ab. *conjuncta* Heyden, 1891
= ab. *delagrangei* Pic, 1896
= ab. *nigromaculata* Pic, 1897
= ab. *deficiens* Weise, 1900
= ab. *croceicollis* Weise, 1900
= ab. *marginicollis* Weise, 1900
= ab. *lacordairei* Weise, 1900
= ab. *angulata* Weise, 1900
= ab. *vulgaris* Weise, 1900
= ab. *flexuosa* Weise, 1900
= ab. *defecta* Jacobson, 1901
= ab. *sierrana* Daniel, 1903
= ab. *quinquemaculata* Pic, 1920

Clytra atraphaxidis atraphaxidis (Pallas, 1773)

Material examined: Denizli: 15.06.1964, leg. N. Canbulat, 2 specimens; Ankara: Kızılcahamam, Keçikaya hill, 1630 m, 24.06.1987, 1 specimen; Ankara: Kızılcahamam, Soğuksu National Park, 1300 m, 08.08.1990, 1 specimen; Nevşehir: Avanos, 1050 m, 23.07.1992, 2 specimens; Niğde: Fertek, 08.06.1997, 1 specimen; Eskişehir: Central, Çavlum village, 23.06.1997, on *Malus,* leg. Y. Özdemir, 1 specimen; Niğde: Bor, Bor-Ankara road, 1100 m, 13.07.1997, 3 specimens; Ankara: Ayaş, Başbereket, 13.07.1997, 1 specimen; Niğde: Bor, Bor-Altunhisar road, Pınarbaşı, 1100 m, 17.07.1997, 1 specimen; Niğde: Bor, Balcı village, 17.07.1997, 1 specimen; Ankara: 2000, 2 specimens; Niğde: exit of Ulukışla, 1350 m, 29.05.2001, 4 specimens; İçel: Mut- Silifke road, 100 m, 01.06.2001, 1 specimen; Niğde: exit of Ulukışla-Pozantı, 1290 m, 24.06.2001, 1 specimen; İçel: Mersin-Gözne road, return of Çukurkeklik, 275 m, 25.06.2001, 2 specimens; İçel: Silifke-Mut road, 30 m, 26.06.2001, 1 specimen; İçel: Silifke-Mut road 50th km, 145 m, 26.06.2001, 2 specimens; İçel: Mut-Karaman road, return of Değirmenbaşı, 1370 m, 26.06.2001, 1 specimen; Kastamonu: exit of Tosya, Zincirli Kuyu village, 650 m, 16.06.2003, 1 specimen; Ankara: Kıbrıscık-Beypazarı road, Ahlattık pass, 1102 m, N 42 24 E 31 59, 09.07.2009, 1 specimen.

This species is represented by the nominotypical subspecies in Turkey. It is distributed rather widely in Turkey. The present materials are the first record for İçel, Kastamonu, Nevşehir and Niğde provinces.

Records in Turkey: Konya: Akşehir (Bodemeyer, 1900; Ganglbauer, 1905); Anatolia (Sahlberg, 1913); Hatay: Akbez as ab. *delagrangei* Pic, 1896 (Winkler, 1924-1932); Denizli, İzmir: Bergama (Tuatay et al., 1972); Tokat: Turhal, Eskişehir, İzmir: Cumaovası, Bornova (Gül-Zümreoğlu, 1972); Ankara: Ayaş, Dikmen, Edirne: Keşan (Tomov & Gruev, 1975); Ankara: Beytepe, Ayaş, İzmir: Tire (Kasap, 1987b); Aydın: Central, Söke, İzmir: Central, Bornova, Foça, Karaburun-Mordoğan, Kemalpaşa, Ödemiş-Bozdağ, Seferihisar, Manisa (Aydın & Kısmalı, 1990); Artvin: Ardanuç, Ferhatlı, Erzincan, Erzurum: Dutçu, Pasinler (Aslan & Özbek, 1998); Isparta: Aksu (Gök, 2003).
Range: S Europe, Hungary, Siberia, Turkey, Syria (Clavareau, 1913; Medvedev, 1961); Europe, Asia Minor, European Russia, Iran (Winkler, 1924-1932); S European part of Russia, Crimea, Caucasus, N and E Kazakhstan, Central Asia, S Europe, Asia Minor, NW Asia, W Iran (ssp. *atraphaxidis* s. str.) and C and N Kazakhstan, Central Asia, N Iran (ssp. *maculifrons* Zoubokoff, 1833) (Lopatin, 1984); From Spain, Corsica, Sicily, S Italy and Greece to Central Asia, Mongolia and Korea (Warchalowski, 2003); S Europe, Asia Minor, C Asia, Mongolia, Korea (Borowiec, 2009).
Chorotype: Sibero-European.
Occurrence: Not common.

Clytra novempunctata Olivier, 1808

= *globulosa* Lefevre, 1872
= *elata* Weise, 1881
= *persica* Pic, 1920
= ab. *aleppensis* Redtenbacher, 1843
= ab. *signicollis* Weise, 1900
= ab. *juncta* Pic, 1920

Material examined: Ankara: 3 specimens; İzmir: 25.05.1961, leg. O. Değirmenci, 4 specimens; Ankara: Bağlum, 07.06.1961, leg. N. Tuatay, 1 specimen; Kızılcahamam, 31.05.1962, leg. Y. Sürmeli, 6 specimens; 12.06.1964, leg. Y. Sürmeli, 3 specimens; Çubuk, Karagöl, 09.06.1966, leg. Y. Sürmeli, 1 specimen; Mogan Lake, 27.06.1980, 1 specimen; Beypazarı, İnönü plateau, 21.06.1994, leg. Y. Özdemir, 1 specimen; Konya: 08.06.1962, leg. N. Karabıyık, 1 specimen; Yozgat: 27.06.1962, leg. Y. Sürmeli, 3 specimens; Tokat: Zile, 19.06.1964, leg. A. Demirtola, 1 specimen; Gaziantep: 30.04.1966, leg. A. Demirtola, 3 specimens; Mardin: 09.05.1966, leg. A. Demirtola, 1 specimen; Siirt: 20.05.1966, leg. Y. Sürmeli, 1 specimen; Elazığ: 14.05.1968, leg. Y. Sürmeli, 1 specimen, Central, 07.06.1972, leg. Y. Dörtbudak, 5 specimens; Tunceli: Pertek, 07.06.1972, leg. Y. Dörtbudak, 1 specimen; Hatay: Dörtyol, 05.06.1975, leg. S. Kornoşor, 1 specimen; Burdur: Ağlasun, 26.06.1995, on *Medicago,* leg. Y. Özdemir, 1 specimen; Isparta: Eğirdir, Semirkent, 29.06.1995, leg. Y. Özdemir, 1 specimen; Niğde: Yenihisar, 05.06.1996, leg. A. Kalkandelen, 1 specimen; Karaman: 17.05.2001, on *Juglans,* leg. M. Özdemir, 1 specimen; Bolu: between Gerede–Kızılcahamam, 1405 m, 17.05.2003, 1 specimen; Sinop: Sinop-Zonguldak road, 43 km to Ayancık, 25 m, 17.06.2003, 1 specimen; Bartın: Ulus, kalecik village, 21.07.2003, 1 specimen; Ankara: Kıbrıscık-Beypazarı road, Ahlattık pass, 1102 m, N 42 24 E 31 59, 09.07.2009, 3 specimens; Ankara: Beypazarı İnözü Valley, 725 m, N 40 11 E 31 54, 26.05.2009,1 specimen, 13.06.2009, 1 specimen; Ankara: Beypazarı, entry of Sabagöz Valley, 710 m, N 40 14 E 31 54, 12.05.2008, 2 specimens, 17.06.2009, 1 specimen; Ankara: Beypazarı, Kıbrıscık road, İnözü 1 bridge env., 1050 m, N 40 16 E 31 54, 17.06.2009, 1 specimen; Ankara: Beypazarı-Kıbrıscık road 5th km, 823 m, N 42 56 E 31 62, 14. 06. 2009, 1 specimen. **As *Clytra novempunctata* ab. *aleppensis*:** Bolu: Bolu-Gerede road, Susuz Kınık village, 720 m, 17.05.2003, 1 specimen; Gerede–Karabük road, Dikmen and Sungur villages, 1450 m, 14.06.2003, 1 specimen; Karabük: Hanköy, Aşağıbağ district, 575 m, 16.05.2003, 1 specimen; Osmaniye: Bahçe, 551 m, N 37 11 E 36 33, 18.05.2006, 2 specimens, Akyar village, 151 m, N 37 02 E 36 11, 17.05.2006, 1 specimen, Yarpuz road, Orman store env., 273 m, N 37 05 E 36 19, 18.05.2006, 1 specimen, Boğaz Plateau, 713 m, N 37 04 E 36 22, 18.05.2006, 1 specimen, Haraz Plateau, 713 m, N 37 04 E 36 21, 18.05.2006, 1 specimen, Zorkun, Çiftmazı Kent forest, N 37 01 E 36 17, 786 m, 02.06.2007, 4 specimens, Bahçe, Kabacalı village, N 37 11 E 36 36, 722 m, 02.06.2007, 3 specimens, Düziçi, Yarbaş, N 37 11 E 36 25, 376 m, 02.06.2007, 2 specimens, Düziçi, Gökçay, N 37 20 E 36 27, 600 m, 1 specimen; Hatay: Dörtyol-Erzin, Kuzuculu, 188 m, N 36 54 E 36 11, 17.08.2006, 1 specimen, Yukarı Ekinci village, 178 m, N 36 15 E 36 07, 27.06.2006, 1 specimen; Gaziantep: Kuşcubeli pass, 1134 m, N 37 06 E 36 36, 19.05.2006, 1 specimen, Nurdağı, N 37 10 E 36 42, 814 m, 17.05.2007, 7 specimens; **As *Clytra novempunctata* ab. *juncta*:** Bolu: Entry of Gerede highway, 1400 m, 14.06.2003, 1 specimen; Karabük: exit of Safranbolu, Kastamonu road, 520 m, 15.06.2003, 1 specimen; Kastamonu: Pınarbaşı, Uzunçam village, 655 m, 18.06.2003, 1 specimen; Osmaniye: Küllü village, 1707 m, N 36 57 E 36 24, 25.06.2006, 1 specimen, Küllü-Islahiye road, Hınzırlı Plateau, 1620 m, N 36 57 E 36 25, 25.06.2006, 1 specimen; **As *Clytra novempunctata* ab. *signicollis*:** Osmaniye: Bahçe, Horu stream env., N 37 10 E 36 27, 562 m, 17.05.2007, 1 specimen.

This species is distributed widely in Turkey. The present materials are the first record for Bartın, Bolu, Burdur, Elazığ, Gaziantep, Hatay, Karaman, Karabük, Kastamonu, Mardin, Osmaniye, Siirt, Sinop and Tunceli provinces.

Records in Turkey: Konya: Ereğli (Bodemeyer, 1900); Kayseri (Ganglbauer, 1905); Tokat: Turhal, İzmir: Bornova, Manisa: Beydere (Gül-Zümreoğlu, 1972); Amasya, Ankara: Karagöl, Giresun: Balaban Mts., İçel: Gözne, Niğde: Çiftehan (Tomov & Gruev, 1975); Ankara: Dodurga, Bağlum, Temelli, Bayındır, Lalahan, Ayaş, Bala-Beynam, Kalecik, Kızılcahamam, Çubuk-Karagöl, Çorum: Sungurlu, Koparan pass, Kayseri: Bünyan, Yılanlı Mt., Konya: Central, Kızılören, Çumra, Seydişehir, Hadım-Taşkent, Niğde: Bor, Sivas: Yıldızeli, Yozgat: Central (Kasap, 1987); Aydın: Çine-Madran, Karacasu, Kuşadası, Sultanhisar, Denizli: Central, Acıpayam, İzmir: Central, Bayındır, Bornova, Çeşme, Foça, Kemalpaşa, Ödemiş, Manisa: Central-Sultanyayla, Demirci, Muğla: Central, Bodrum, Fethiye,

Köyceğiz, Milas, Yatağan, Uşak: Central, Banaz (Aydın & Kısmalı, 1990); Artvin: Borçka, Erzurum: Şenkaya, Abdurrahman Gazi, Uzundere (Aslan & Özbek, 1998); Isparta: Aksu, Yenişarbademli-Yakaköy arası (Gök, 2003).
Range: North Africa, Europe, Asia Minor, Syria, Iran (Clavareau, 1913); Europe, Mediterranean (Winkler, 1924-1932); Transcaucasia, Dagestan, Turkmenia: Ashkhabad, Greece, Yugoslavia, Asia Minor, Northwest Asia, Iraq, Northwestern Iran, Northeastern Africa (Lopatin, 1984); Distributed in SE Europe (E Balkan, Romania, S Ukraine, S Russia), Caucasian countries, Asia Minor and Central Asia. Known also from Sicily (Warchalowski, 2003); Romania, Balkans, S Ukraine, S Russia, Caucasus, Asia Minor, C Asia. Recorded also from Sicily (Borowiec, 2009).
Chorotype: Centralasiatic-Mediterranean or W-Palaearctic.
Occurrence: Not common.

Clytra valeriana (Menetries, 1832)

= ssp. *valeriana* Menetries, 1832
= ssp. *tetrastigma* Schmidt, 1841
= ssp. *taurica* Medvedev, 1961
= ssp. *iranica* Medvedev, 1961
= ssp. *opacipennis* Lopatin, 1962
= *valerianae* Lacordaire, 1848
= ab. *tetrastigma* Schmidt, 1841
= ab. *dissimilithorax* Desbrocher, 1870
= ab. *drurei* Pic, 1920
= ab. *subjuncta* Pic, 1920

Clytra valeriana valeriana (Menetries, 1832)

Material examined: İzmir: Selçuk, 15.06.1964, leg. O. Özar, 1 specimen; Ankara: Kızılcahamam, 03.08.1983, leg. S. Bilgetekin, 1 specimen; Yozgat: Kazankaya, 28.07. 1987, leg. Y. Özdemir, 1 specimen; Sorgun, 27.09.1994, *Triticum*, leg. P. Erdoğan, 1 specimen; Niğde: 13.06.1990, leg. A. Kalkandelen, 1 specimen; Ankara: Kızılcahamam, Işık Mt., 01.07.1994, 1 specimen; Eskişehir: Seyitgazi, 25.06. 1997, leg. Y. Özdemir, 1 specimen; Niğde: Niğde-Bor road, 17.06.1996, 2 specimens, Çamardı, 29.06.1996, 1 pecimen; Aksaray: Belisırma, 1280 m, 03.06.1997, 4 specimens; Niğde: Bor, Üstünkaya, 07.06.1997, 1 specimen; Ankara: Şereflikoçhisar-Evren road, İbrahimbeyli, 1200 m, 21.06.1997, 1 specimen; Niğde: 12 km to Ulukışla, 1280 m, 23.06.1997, 2 specimens, E of Melendiz Mt., between Değirmenli-Ovacık, 1500 m, 24.06.1997, 5 specimens, Çamardı, Bademdere-Elmalı, 1750 m, 24.06.1997, 2 specimens, entry of Kayseri-Niğde, 1420 m, 24.06.1997, 1 specimen, Çamardı, Bulduruş pass, 1720 m, 24.06.1997, 2 specimens; Nevşehir: Tilköy, 1270 m, 25.06.1997, 3 specimens; Kayseri: Yeşilhisar, Güzelöz, 1320 m, 25.06.1997, 1 specimen; Niğde: between Araplı-Höyük, 1360 m, 26.06.1997, 10 specimens, return of Niğde-Nevşehir road, 1380 m, 26.06.1997, 1 specimen, Çiftlik road, Melendiz, Güllü Mt., 1580 m, 27.06.1997, 15 specimens; Aksaray: Güzelyurt, 1700 m, 27.06.1997, 2 specimens; Ankara: Kızılcahamam, Güvem, 1080 m, 01.07.1997, 1 specimen; Niğde: Gebere Dam, 02.07.1997, 2 specimens; Ankara: Kızılcahamam, Yenimahalle, 30.06.1993, 1 specimen, 05.07.1997, 3 specimens, Kızılcahamam, Yukarı Çanlı, 1300 m, 11.07.1997, 1 specimen; Ankara: Beypazarı, İnözü Valley, 725 m, N 40 11 E 31 54, 26.05.2009, 1 specimen; Ankara: 1 specimen; Turkey: without exact locality, 1 specimen.

This species is represented by the nominotypical subspecies in Turkey. It is distributed rather widely in Turkey. The present materials are the first record for Aksaray, Eskişehir, Niğde and Yozgat provinces.

Records in Turkey: Konya: Akşehir (Bodemeyer, 1900); İzmir: Selçuk (Tuatay et al., 1972); Ankara: Kavaklıdere, Sivas: Şerefiye (Tomov & Gruev, 1975); Ankara: Beytepe, Bağlum, Temelli, Lalahan, Beynam, Kızılcahamam, Nevşehir: Gülşehir, Kayseri: Bünyan, Sivas: Central, Konya: Central, Akşehir (Kasap, 1987); Aydın: Karacasu, İzmir: Central-Gümüldür, Bornova, Kemalpaşa, Seferihisar, Manisa: Salihli, Uşak: Banaz (Aydın & Kısmalı, 1990); Erzincan, Erzurum: Palandöken, Pasinler, Söğütlü, Şenkaya, Tortum, Pehlivanlı, Dutçu (Aslan & Özbek, 1998).
Range: S Russia, Iran, Turkey, Greece (Clavareau, 1913); S European Russia, E Mediterranean (Winkler, 1924-1932); S Ukraine, Rostov Region, Stavropol Region, Caucasus, Transcaucasia, possibly also NW Kazakhstan, Balkan Peninsula (Lopatin, 1984); Distributed in Greece, Serbia, Bulgaria, Caucasian countries, Middle East and Central Asia. Known also from Sicily. Ssp. *tetrastigma* from Greece and Bulgaria, ssp. *taurica* from Crimea, ssp. *iranica* from Central Asia, ssp. *opacipennis* from Caucasus (Warchalowski, 2003); Balkans, Asia Minor, Caucasus, Crimea, C Asia. Recorded also from Sicily (Borowiec, 2009).
Chorotype: Centralasiatic-Mediterranean.
Occurrence: Not common.

Subgen. *OVOCLYTRA* Medvedev, 1961

***Clytra binominata* Monrós, 1953**
= *laticollis* Weise, 1889 (nec Olivier, 1808)

This species probably is distributed only in W and S Turkey. Firstly, it was recorded by Aydın & Kısmalı (1990) for Turkey. However, Kasap (1980) stated one specimen from Denizli (Central), one specimen from Denizli (Tavas) in 1969, one specimen from Adana and one specimen from İzmir in Zoologische Staatssamlung, München (MZS) in his unpublished work as *Clytra laticollis*.

Records in Turkey: Adana: Çah Mt., İçel: Alata, Erdemli (Tomov & Gruev, 1975); İzmir: Central, Bornova, Kemalpaşa, Manisa: Kula as *Clytra laticollis* (Aydın & Kısmalı, 1990); Isparta (Şen, 2007).
Range: Rhodos (Clavareau, 1913); Greece, Rhodos, S Anatolia (Warchalowski, 2003; Borowiec, 2009).
Chorotype: E-Mediterranean.
Occurrence: Not common.

***Clytra bodemeyeri* Weise, 1900**
= ssp. *bodemeyeri* Weise, 1900
= ssp. *arabica* Medvedev, 1961

***Clytra bodemeyeri bodemeyeri* Weise, 1900**

Material examined: Ankara: Hacıkadın, 21.06.1940, 1 specimen; Kırşehir: Özbağ, 27.05.1992, leg. Y. Özdemir, 1 specimen; Niğde: 5 km to Ulukışla, 1400 m, 23.06.1997, 4 specimens; Osmaniye: Akyar village, 151 m, N 37 02 E 36 11, 17.05.2006, 2 specimens, entry of Yarpuz, 930 m, N 37 03 E 36 25, 18.05.2006, 2 specimens, Kaypak-Yarpuz road, N 37 04 E 36 26, 1194 m, 03.06.2007, 3 specimens, Bahçe, Kızlaç, N 37 10 E 36 37, 761 m, 19.05.2007, 1 specimen;

Gaziantep: Nurdağı, N 37 10 E 36 42, 814 m, 17.05.2007, 3 specimens, Nurdağı, Gökçedere village, N 37 09 E 36 43, 496 m, 17.05.2007, 2 specimens, Fevzipaşa, N 37 06 E 36 39, 1126 m, 18.05.2007, 1 specimen; Hatay: Erzin-Kaplıcalar place, 123 m, N 36 57 E 36 15, 17.05.2006, 4 specimens, Akbez, N 36 51 E 36 32, 527 m, 18.05.2007, 1 specimen; Ankara: Beypazarı-Kıbrıscık road 5th km, 823 m, N 42 56 E 31 62, 14. 06. 2009, 1 female.
This species probably is represented by nominotypical subspecies in Turkey. It was described by Weise (1900) from Konya province. So the western phenotype is the nominotypical subspecies. Eastern phenotype was described by Medvedev (1961) from Mesopotamia as the subspecies *Clytra bodemeyeri arabica*. This species is distributed rather widely in S Turkey. The present materials are the first record for Gaziantep and Osmaniye provinces.

Records in Turkey: İçel: Bolkar Mts., Maden-Burna, Konya: Halkapınar (Zanapa) (Bodemeyer, 1900); Hatay, İçel: Gözne, Niğde: Çiftehan (Tomov & Gruev, 1975); Ankara: Beytepe, Bağlum, Dodurga, Lalahan, Beynam, Kalecik-Akyurt, Konya: Central, Kızılören, Zanapa, Bereketli (Kasap, 1987b); Erzurum: Aşkale, Uzundere (Aslan & Özbek, 1998).
Range: Asia Minor, Cyprus (Clavareau, 1913); Asia Minor (Winkler, 1924-1932); Distributed in Asia Minor (ssp. *bodemeyeri* s. str.) and Mesopotamia (ssp. *arabica* Medvedev, 1961) (Warchalowski, 2003); Asia Minor, Iraq (Borowiec, 2009).
Chorotype: E-Mediterranean or SW-Asiatic.
Occurrence: Not common.

Clytra cingulata Weise, 1898

This interesting and rare species has been known only from the type locality (Kurdistan = Anatolia) for Turkey. Kasap (1980) stated one specimen from Kahramanmaraş (Taurus) in 1928 in Zoologische Staatssamlung, München (MZS) in his unpublished work.

Records in Turkey: Kurdistan (Anadolu) (Weise, 1898).
Range: Kurdistan (Anatolia) (Winkler, 1924-1932); Anatolia and Middle East (Warchalowski, 2003; Borowiec, 2009).
Chorotype: SW-Asiatic.
Occurrence: Very rare.

Clytra nigrocincta (Lacordaire, 1848)
= ab. *cypríca* Pic, 1918
= ab. *semireducta* Pic, 1918
= ab. *multipunctata* Pic, 1920
= ab. *subinterrupta* Pic, 1920
= ab. *bagdatensis* Pic, 1920

Kasap (1980) stated one specimen from İzmir in Zoologische Staatssamlung, München (MZS) in his unpublished work. It probably is distributed rather widely in Turkey. However, it has been reported only from İstanbul and İzmir provinces for Turkey

Records in Turkey: İstanbul (Lefevre, 1872).

Range: Asia Minor, Cyprus, Syria, Caucasus (Clavareau, 1913; Winkler, 1924-1932); E Turkey, Syria, Iraq, Transcaucasia, N Iran (Warchalowski, 2003; Borowiec, 2009).
Chorotype: SW-Asiatic.
Occurrence: Not common.

Clytra ovata (Lacordaire, 1848)

This species has not been recorded from any exact locality for Turkey. Also, Kasap (1980) did not mention this species for Turkey in his catalogue. However, Warchalowski (2003) and Borowiec (2009) stated it for S Turkey.

Records in Turkey: Absent.
Range: Cyprus, Near East, S Turkey (Warchalowski, 2003; Borowiec, 2009).
Chorotype: E-Mediterranean.
Occurrence: Not common.

Clytra rotundata Medvedev, 1961

It was described by Medvedev (1961) from Cyprus. Kasap (1980) stated two specimens that were collected by E. Şekeroğlu and Ç. Şengonca in 1978 from Adana (Balcalı) in his collection in his unpublished work. So it is distributed only in S Turkey and Cyprus.

Records in Turkey: Turkey (Medvedev, 1961).
Range: Cyprus, Turkey (Medvedev, 1961); Cyprus (Warchalowski, 2003; Borowiec, 2009).
Chorotype: E-Mediterranean.
Occurrence: Not common.

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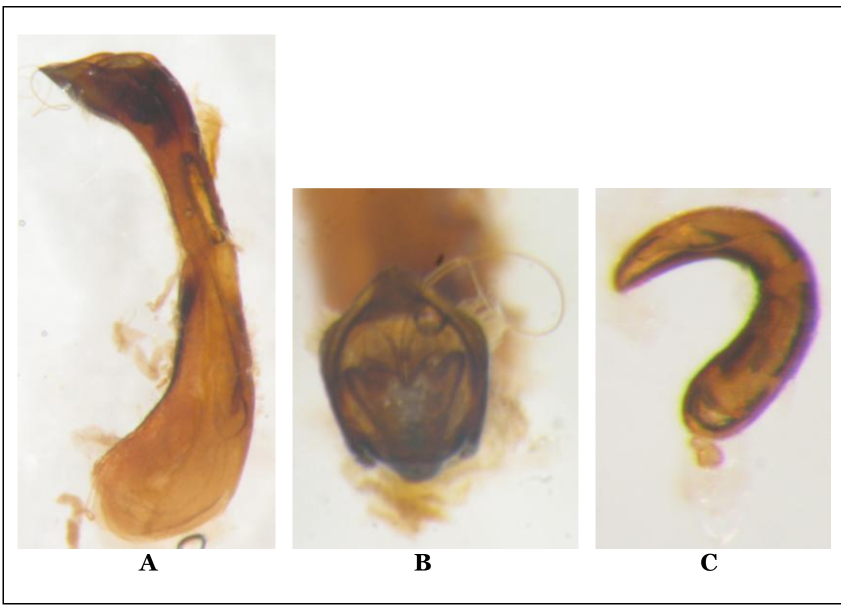

Figure 1. *Clytra aliena* Weise, 1897 A. Aedeagus in lateral view, B. Apex of aedeagus in dorsal view, C. Spermatheca in lateral view.

A CONTRIBUTION TO THE ICHNEUMON WASPS (HYMENOPTERA: ICHNEUMONIDAE) FROM THE FORESTS OF NORTHERN IRAN

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[Ghahari, H., Jussila, R., Kolarov, J. & Sedivy, J. 2010. A contribution to the ichneumon wasps (Hymenoptera: Ichneumonidae) from the forests of northern Iran. Munis Entomology & Zoology, 5 (1): 85-89**]**

ABSTRACT: Ichneumonid wasps (Hymenoptera: Ichneumonidae) from the forests of Northern Iran is preliminary studied in this paper. A total of eleven species from ten genera (including *Cylloceria*, *Ichneumon*, *Ischnus*, *Lissonata*, *Phaestacoenitus*, *Perithorus*, *Polysphincta*, *Protichneumon*, *Scambus*, *Temelucha*) and seven subfamilies (including Banchinae, Cremastinae, Cryptinae, Cyllocerinae, Ichneumoninae, Phrudinae and Pimplinae) were collected. All species are new records for Iranian fauna.

KEY WORDS: Ichneumonidae, Parasitoid, Fauna, New record, Forests, Iran

Ichneumonidae parasitize mainly larvae and pupae of holometabolous insects, excluding Megaloptera and Siphonaptera, whereas some species are almost completely restricted to the immature stages of Holometabola (a few groups use egg nests of Pseudoscorpionida and egg cocoons of Araneae or adult Araneae). Unlike microhymenoptera, ichneumonids rarely parasitize individual eggs, and a few are egg-larval parasitoids, laying an egg into the host egg but consuming the host in its larval stage (Heinrich, 1977; Gauld, 1988; Wahl & Sharkey, 1993). Symphyta parasitism is quite common in Ichneumonidae, having arisen on several separate occasions. Ectoparasitism is a primitive condition for the ichneumonids. External parasitoids generally parasitize hosts in concealed locations, such as stem tunnels, pupal cells, leaf rolls, or cocoons. Many species inject venom before the eggs are laid. The resulting paralysis may be temporary or permanent, or fatal. The egg is sometimes deposited next to the host, especially when the paralysis is permanent. If only temporary paralysis is induced, the egg is often deposited on the host but where the host cannot reach it (Townes, 1972; Wahl & Sharkey, 1993). Endoparasitism evolved independently on several occasions within the ichneumonids, the exact number of times within each family being unclear. Although certain advantages are gained by developing inside the host, the ichneumonid is subject to attack by the host's immune system. A variety of strategies are used to overcome this, including the injection of viruses at the time of the oviposition. These serve to control the immune reactions of the host (Gupta, 1991; Noort, 2004). Ichneumonids have been used successfully as biocontrol agents and given the largely undocumented fauna there is a huge potential for their utilization in managed biocontrol programs (Gupta, 1987). Comprehensive quantitative biodiversity surveys will enable the identification of hotspots of species richness and endemism; essential base line data that will enable informed future conservation management decisions.

Forests form an integral part of life on earth, providing a range of benefits at local, national and global levels, covering approximately 40% of the world's total land mass (FAO 1995). Forest ecosystems are distinct, coherent communities comprised of a variety of life forms and a physical environment with which they interact (Slocombe, 1993). Integral to this concept is that the system should have sufficient diversity and complexity and an inherent capacity to be self-sustaining in the absence of catastrophic disturbances. A sustainable ecosystem has the capacity across the landscape for renewal, for recovery from a wide range of disturbances, and for retention of its ecological resiliency, while meeting the current and future needs of people for desired levels of values, uses, products and services (Werner, 1996). In view of the ecological attributes of forest ecosystems, the choice and evaluation of biological control tactics may vary. The influence on the classical approach to biological control has been analyzed by Pschorn-Walcher (1977). The vast, diverse, relatively less disturbed, long-lived and highly stable in space and time ecosystem confers both advantages and disadvantages for biological control. Diversity confers an advantage for foreign exploration as a large complex of natural enemies is available from which to choose. However, this could also make it more difficult for colonization of new species of natural enemies. There would be expected to be a greater chance for the introduced natural enemies to be in competition with related native natural enemies since there is a high probability that relatives would be present in the rich forest fauna. The vastness and diversity create sampling and evaluation problems but less disturbance allow long term evaluations to be more exact (Dowden, 1962; Dahlsten et al., 1998).

Although the fauna of the Iranian Ichneumonidae was studied rather well (Kolarov & Ghahari, 2005, 2006, 2007, 2008) but the fauna of these powerful parasitoids was not perfectly studied in the forests of northern Iran so far. In this paper we present the result of a preliminary faunistic survey from Iranian northern forests.

MATERIAL AND METHOD

The materials were collected by light and malaise traps located in different forests of northern Iran (Mazandaran and Guilan provinces). Additionally, the preserved specimens in insect collection of Ghaemshahr and Amol Islamic Azad Universities were checked and the results are used in this paper. Classification, nomenclature and distributional data of Ichneumonidae suggested by Kasparyan (1981), Yu & Horstmann (1997) and Yu et al. (2005) have been followed.

RESULTS

Totally 11 Ichneumonidae species of 10 genera and 7 subfamilies were collected and identified from the forests of Northern Iran (Mazandaran and Guilan province). The list of species which all of them are newly recorded from Iran is given below.

Subfamily Banchinae

Genus *Lissonota* Gravenhorst, 1829

***Lissonata flavovariegata* (Lucas, 1849)**

Material: Mazandaran province: Savadkooh (1♂), October 2004.

Subfamily Cremastinae
Genus *Temelucha* Förster, 1869

***Temelucha observator* Aubert, 1966**
Material: Mazandaran province: Sari: Shahid Zare Park (2♂♂), July 2001.

Subfamily Cryptinae
Genus *Ischnus* Gravenhorst, 1829

***Ischnus agitator* (Olivier, 1792)**
Material: Mazandaran province: Ghaemshahr: Ahangarkola (1♀, 1♂), September 1999.

Subfamily Cyllocerinae
Genus *Cylloceria* Schiødte, 1868

***Cylloceria melancholica* (Gravenhorst, 1820)**
Material: Guilan province: Lahijan (2♂♂), July 2006.

Subfamily Ichneumoninae
Genus *Ichneumon* Linnaeus, 1758

***Ichneumon illuminatorius* Gravenhorst, 1829**
Material: Guilan province: Lahijan (1♀), July 2006.

Genus *Protichneumon* Thomson, 1893

***Protichneumon fusorius* Linnaeus, 1893**
Material: Mazandaran province: Savadkooh (1♀, 1♂), October 2004.

Subfamily Phuridinae
Genus *Phaestacoenitus* Smits van Burgst, 1913

***Phaestacoenitus caucasicus* Kasparyan, 1983**
Material: Mazandaran province: Amol (1♀), September 2003.

Subfamily Pimplinae
Genus *Perithorus* Holmgren, 1859

***Perithorus scurra* (Panzer, 1804)**
Material: Mazandaran province: Ramsar (2♀♀), October 2003.

Genus *Polysphincta* Gravenhorst, 1829

***Polysphincta tuberosa* Gravenhorst, 1829**
Material: Mazandaran province: Savadkooh (1♀), October 2004.

Genus *Scambus* Hartig, 1838

***Scambus foliae* (Cushman, 1938)**
Material: Mazandaran province: Behshahr: Abbas-Abad (2♀♀), July 2002.

***Scambus signatus* (Pfeffer, 1913)**
Material: Mazandaran province: Ghaemshahr: Ahangarkola (1♀), June 2002. Guilan province: Roodbar (2♀♀), September 2004.

DISCUSSION

Biological control of insect pests has much potential for successful implementation in forests. Despite the high probability for success, a lack of practical information has largely delayed the use of biological control in operational programs in forested ecosystems. There is little practical information available to help foresters integrate biocontrol with other management objectives. Furthermore, there is still a generally poor understanding among forest professionals of the realistic extent and effectiveness of using the biological control to manage forest pests (Franz, 1971; Berryman, 1982). Though the biological control is an important pest management strategy in forested ecosystems, continued research is needed to develop even better recommendations for specific pests (Turnock et al., 1976; Dahlsten & Mills, 1999).

Forested environments have several characteristics that make them excellent candidates for the use of biological control to accomplish pest management goals. Most forests tend to be diverse, stable systems. Diversity creates increased opportunities for biological control by providing an array of habitats for natural enemies. The relative stability of most forests provides natural enemies with the conditions necessary to maintain viable populations in an area. Rotation intervals in forests are long and growth rates are relatively slow. The value of individual forest trees is usually low compared with that of landscape or Christmas trees. Therefore, tactics used to manage forest pests need to be inexpensive. Biological control programs can be a relatively low-cost option for longterm pest management (Franz, 1970; Pschorn-Walcher, 1977). Tolerance for damage caused by foliage- or sap-feeding insects is generally higher in forest stands than in urban forests or plantations, where the aesthetic appearance of trees is a major concern. Relatively healthy trees are likely to tolerate and recover from moderate and occasionally high levels of leaf feeding. Biotic and abiotic forest disturbances, such as outbreaks of native insects are natural influences in forest ecosystems. Many forest insects play important roles in forest succession by selectively killing or retarding the growth of certain tree species while leaving others untouched (Castello et al., 1995). Some mortality of forest trees is acceptable and even appreciated for wildlife values and because mortality of weak or suppressed trees will benefit the long-term productivity of the forest. This outlook is compatible with biological control, where low or tolerable populations of pest insects can be expected to persist. Many forest insect outbreaks tend to be extensive, covering vast geographic areas. Areas affected by the outbreak may be remote and difficult to access. From a logistical, environmental and economic standpoint, only a small portion of most outbreaks could ever be treated using conventional insecticides. Many natural enemies, on the other hand, are capable of increasing their numbers in response to changes in pest density. This enables these natural enemies to eventually exert their influence on pest populations over large areas. Emphasizing biological control in forest pest management is appropriate because it can be ecologically compatible with other management objectives, is generally unobtrusive and is often a relatively inexpensive option for long-term pest control (Dowden, 1962; Dreistadt et al., 1990).

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AN OVERVIEW ON THE PALAEARCTIC SUBGENUS *PHYTOECIA* (*PILEMIA*) FAIRMAIRE, 1864 WITH A NEW SPECIES *PHYTOECIA* (*PILEMIA*) *SAMII* SP. N. FROM TURKEY (COLEOPTERA: CERAMBYCIDAE: LAMIINAE)

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[**Özdikmen, H. & Turgut, S.** 2010. An overview on the Palaearctic subgenus *Phytoecia* (*Pilemia*) Fairmaire, 1864 with a new species *Phytoecia* (*Pilemia*) *samii* sp. n. from Turkey (Coleoptera: Cerambycidae: Lamiinae). Munis Entomology & Zoology, 5 (1): 90-108**]**

ABSTRACT: All taxa of the subgenus *Pilemia* Fairmaire, 1864 in Turkey and the world fauna are evaluated and summarized. A new species *Phytoecia* (*Pilemia*) *samii* n. sp. is described from Turkey. Some new faunistical data are also given for Turkey in the text. Short descriptions and a short identification key are also given for Turkish species in the text.

KEY WORDS: *Pilemia, Phytoecia,* Saperdini, Lamiinae, Cerambycidae, Coleoptera.

The main aim of this work is to clarify current status of the subgenus *Phytoecia* (*Pilemia*) Fairmaire, 1864 in Turkey and world fauna.

Subfamily LAMIINAE Latreille, 1825

Tribe SAPERDINI Mulsant, 1839

= Phytoeciaires Mulsant, 1839
= Saperdina Thomson, 1859
= Saperditae Thomson, 1860
= Saperdites Fairmaire, 1864
= Phytoecites Fairmaire, 1864
= Obereini Thomson, 1864
= Obereitae Thomson, 1864
= Phytoeciini Pascoe, 1864
= Saperdides Lacordaire, 1872
= Glénéides Lacordaire, 1872
= Gleneini Lacordaire, 1872
= Obereini Sama, 2008

Type genus: *Saperda* Fabricius, 1775

Vitali (2009) stated that "Saperdini, Phytoecini, Obereini and Gleneini are characterised by mutual characters that do not allow considering them as separated tribes. Breuning's systematics, the only world-wide revision, is adopted here". We agree with Vitali's approach now. In fact that Ohbayashi & Niisato (2007) accepted Saperdini = Gleneini = Phytoeciini. We agree with these approaches and prefer now to return to Breuning's position.

Genus *PHYTOECIA* Dejean, 1835

= *Cardoria* Mulsant, 1863
= *Opsilia* Mulsant, 1863
= *Pilemia* Fairmaire, 1864
= *Helladia* Fairmaire, 1864
= *Musaria* Thomson, 1864
= *Blepisanis* Pascoe, 1866
= *Hoplotoma* Perez, 1874

= *Semiangusta* Pic, 1892
= *Pygoptosia* Reitter, 1895
= *Pseudomusaria* Pic, 1900
= *Fulgophytoecia* Pic, 1900
= *Neomusaria* Plavilstshikov, 1928
= *Cinctophytoecia* Breuning, 1947
= *Pseudoblepisanis* Breuning, 1950
= *Mimocoptosia* Breuning & Villiers, 1972

Type species: *Saperda cylindrica* Fabricius, 1775 = *Cerambyx cylindricus* Linnaeus, 1758

Now, we think that the presence of mixed characters in the whole genus does not allow us to consider the subgenera as valid genera as stated by some authors. Therefore, Breuning's (1951) systematics is adopted here chiefly.

In this case, the genus includes at least 15 subgenera as *Blepisanis* Pascoe, 1866; *Cardoria* Mulsant, 1863; *Cinctophytoecia* Breuning, 1947; *Fulgophytoecia* Pic, 1900; *Helladia* Fairmaire, 1864; *Mimocoptosia* Breuning & Villiers, 1972; *Musaria* Thomson, 1864; *Neomusaria* Plavilstshikov, 1928; *Opsilia* Mulsant, 1863; *Phytoecia* Dejean, 1835; *Pilemia* Fairmaire, 1864; *Pseudoblepisanis* Breuning, 1950; *Pseudomusaria* Pic, 1900; *Pygoptosia* Reitter, 1895 and *Semiangusta* Pic, 1892.

Subgenus *PILEMIA* Fairmaire, 1864

Type species: *Phytoecia tigrina* Mulsant, 1851

Reitter (1905) accepted it as a genus and stated 4 species for Palaearctic fauna as *Pilemia hirsutula* (Frölich, 1793) [for Mediterranean area, Hungary, S Russia, Caucasus, Turkestan]; *Pilemia tigrina* (Mulsant, 1851) [for S France, Hungary, Transylvania]; *Pilemia annulata* (Hampe, 1852) [for Iran] and *Pilemia wawerkana* Reitter, 1905 [for Akbez in S Turkey].

After the revision of Daniel (1906) who regarded *Pilemia* as a subgenus, Aurivillius (1921) and Winkler (1924-1932) who regarded *Pilemia* as a separate genus, gave 4 species for world fauna as *Pilemia annulata* (Hampe, 1852) [for Transcaucasia, Kudistan, S Turkey (Akbez)], *Pilemia griseomaculata* (Pic, 1891) [for S Turkey (Akbez)], *Pilemia hirsutula* (Frölich, 1793) [for S Germany, Austria, Hungary, Transylvania, Serbia, Greece, Turkey, S Russia, Caucasus, Transcaucasia and Transcaspia], *Pilemia tigrina* (Mulsant, 1851) [for S France, Hungary, Transylvania, Balkans, Turkey].

Breuning (1951 and 1966) regarded it as a subgenus and gave 5 species in the subgenus *Pilemia* for whole world fauna as *Phytoecia* (*Pilemia*) *tigrina* Mulsant, 1851 [for S Europe, Turkey], *Phytoecia* (*Pilemia*) *vagecarinata* Pic, 1952 [for Syria], *Phytoecia* (*Pilemia*) *griseomaculata* (Pic, 1891) [for Syria, S Turkey], *Phytoecia* (*Pilemia*) *annulata* Hampe, 1852 [for Iran, Turkey] and *Phytoecia* (*Pilemia*) *hirsutula* (Frölich, 1793) [for Turkmenia, Transcaspia, Iran].

Then, 3 new species for this subgenus were described by Holzschuh (1984) as *Phytoecia* (*Pilemia*) *inarmata* [from Greece], *Phytoecia* (*Pilemia*) *maculifera* [from S Turkey: Cilicien Taurus: İçel and Adana provinces] and *Phytoecia* (*Pilemia*) *serriventris* [from Bulgaria]. These species were separated by Holzschuh (1984) from *Phytoecia* (*Pilemia*) *tigrina* Mulsant, 1851 by using penis and secondary sex characters chiefly. He mentioned that *Phytoecia* (*Pilemia*) *tigrina* Mulsant, 1851 described from S France (Grasse) and known from Hungary, Yugoslavia, Romania, Bulgaria, Greece and Turkey. However, Villiers

(1974) leaded that information of the type locality based on a mistake. So Villiers (1978) and Brustel et al. (2003) did not mention the subgenus for France.

Danilevsky & Miroshnikov (1985) accepted it as a subgenus and gave 2 species in this subgenus for Caucasus as *Phytoecia* (*Pilemia*) *hirsutula* (Frölich, 1793) [for European Russia, Caucasus, Transcaucasia, Kopetdagh, E Europe, Near East, Turkey, N Iran] and *P.* (*Pilemia*) *annulata* Hampe, 1852 [for Caucasus, Near East, N Iran, Turkey]. Then, *P.* (*Pilemia*) *tigrina* Mulsant, 1851 was recorded by Miroshnikov (1990) as 3rd species for Caucasian fauna.

Bense (1995) regarded it as a subgenus and gave 4 species in this subgenus for Europe as *Phytoecia hirsutula* (Frölich, 1793) [for E Europe], *P. tigrina* Mulsant, 1851 [for E Europe], *P. serriventris* Holzschuh, 1984 [for Bulgaria] and *P. inarmata* Holzschuh, 1984 [for Greece].

Althoff & Danilevsky (1997) regarded it as a separate genus and also gave 4 species in this genus for Europe as *Pilemia hirsutula* (Frölich, 1793) [for Italy, Croatia, Bosnia & Herzegovina, Serbia, Macedonia, Albania, Greece, Bulgaria, Romania, Hungary, Slovakia, Ukraine, Crimea, European Russia and European Kazakhstan], *Pilemia tigrina* (Mulsant, 1851) [for ?France, Serbia, Bulgaria, Romania, Hungary, Ukraine], *Pilemia serriventris* (Holzschuh, 1984) [for Bulgaria] and *Pilemia inarmata* (Holzschuh, 1984) [for Greece].

Sama (2002) accepted it as a separate genus and mentioned 2 species in this genus for Europe as *Pilemia tigrina* (Mulsant, 1851) [for C Europe, Hungary, Turkey, Middle East] and *Pilemia hirsutula* (Frölich, 1793) [for C Europe, S Slovakia, Hungary, Turkey, Caucasus, Transcaucasus, N Iran].

Recently, 2 new species were described by Holzschuh (2003 and 2006). *Phytoecia* (*Pilemia*) *smatanai* was described by Holzschuh (2003) from Turkey and *Phytoecia* (*Pilemia*) *hladilorum* was described by Holzschuh (2006) from Greece.

So the number of known species of this subgenus in the world fauna rose to 11.

According to Danilevsky (2009a, b), *Pilemia* Fairmaire, 1864 is a subgenus of *Phytoecia* Mulsant, 1839. Danilevsky (2009a) gave 5 species in this subgenus for Europe as *Phytoecia* (*Pilemia*) *hirsutula* (Frölich, 1793) [for Italy, Croatia, Bosnia & Herzegovina, Serbia, Macedonia, Albania, Greece, Bulgaria, Romania, Hungary, Slovakia, Moldova, Ukraine, Crimea, European Russia and European Kazakhstan], *Phytoecia* (*Pilemia*) *tigrina* Mulsant, 1851 [for ?France, Serbia, Bulgaria, Romania, Hungary, Moldova, Ukraine], *Phytoecia* (*Pilemia*) *serriventris* Holzschuh, 1984 [for Bulgaria], *Phytoecia* (*Pilemia*) *inarmata* Holzschuh, 1984 [for Greece] and *Phytoecia* (*Pilemia*) *hladilorum* Holzschuh, 2006 [for Greece]. Also Danilevsky (2009b) gave 3 species in this subgenus for the territory of former USSR as *Phytoecia* (*Pilemia*) *hirsutula* (Frölich, 1793) [for European Russia, Crimea, Caucasus, C Asia, Kazakhstan, W Siberia, Europe, Near East (Turkey), Iran], *Phytoecia* (*Pilemia*) *annulata* Hampe, 1852 [for Caucasus, Near East (Turkey), Iran] and *Phytoecia* (*Pilemia*) *tigrina* Mulsant, 1851 [for European Russia, Caucasus, Europe, Near East (Turkey)].

The subgenus has 11 species in the world fauna (only in Palaearctic region). It is distributed from Europe to Central Asia (Italy to Kazakhstan, Iran and Turkmenia) [**Europe**: Italy, Croatia, Bosnia & Herzegovina, Serbia, Macedonia, Albania, Greece, Romania, Bulgaria, Hungary, Slovakia, Moldova, Ukraine, Crimea, European Russia, European Kazakhstan, **Caucasus**: Armenia, Daghestan, **Central Asia**: Turkmenia, **Other Countries:** Iran, Turkey, Syria, Israel]. So, the subgenus has Centralasiatic-Europeo-Mediterranean chorotype mainly.

In Europe, this subgenus includes 5 species as *Phytoecia* (*Pilemia*) *hirsutula* (Frölich, 1793); *P.* (*P.*) *tigrina* Mulsant, 1851; *P.* (*P.*) *angusterufonotata* (Pic, 1952) [= *P.* (*P.*) *inarmata* Holzschuh, 1984]; *P.* (*P.*) *serriventris* Holzschuh, 1984 and *P.* (*P.*) *hladilorum* Holzschuh, 2006.

The subgenus has been represented by 6 species in Turkey as *Phytoecia* (*Pilemia*) *hirsutula* (Frölich, 1793); *P.* (*P.*) *tigrina* Mulsant, 1851; *P.* (*P.*) *annulata* Hampe, 1852; *P.* (*P.*) *griseomaculata* (Pic, 1891); *P.* (*P.*) *maculifera* Holzschuh, 1984; *P.* (*P.*) *smatanai* Holzschuh, 2003.

Finally, with the present work, the number of known species of this subgenus in Turkish fauna rose to 7 and in the world fauna rose to 12 with new species *P.* (*P.*) *samii* **n. sp.**

The most wide spread species is *Phytoecia* (*Pilemia*) *hirsutula* (Frölich, 1793). *P.* (*P.*) *tigrina* Mulsant, 1851 and *P.* (*P.*) *annulata* Hampe, 1852 follow it. The remaining 8 species are endemic for 5 different countries [*P.* (*P.*) *serriventris* Holzschuh, 1984 to Bulgaria; *P.* (*P.*) *angusterufonotata* (Pic, 1952) [= *P.* (*P.*) *inarmata* Holzschuh, 1984] and *P.* (*P.*) *hladilorum* Holzschuh, 2006 to Greece; *P.* (*P.*) *griseomaculata* (Pic, 1891), *P.* (*P.*) *maculifera* Holzschuh, 1984 and *P.* (*P.*) *smatanai* Holzschuh, 2003 to Turkey; *P.* (*P.*) *vagecarinata* Pic, 1952 to Syria and *P.* (*P.*) *halperini* Holzschuh, 1999 to Israel].

***Phytoecia* (*Pilemia*) *angusterufonotata* (Pic, 1952) stat. rest. (Fig. 1)**

Orig. comb.: *Pilemia angusterufonotata* Pic, 1952
Type loc.: Greece: Morea.
Other names: *inarmata* Holzschuh, 1984 **syn. n.**

It is endemic to Greece. This species is in –*tigrina* species group. In 1984, Holzschuh described a new species *Phytoecia* (*Pilemia*) *inarmata* though separated from *P. tigrina* by using penis form and secondary sex characters (coloration of body, form of red spot on pronotum, elytral pubescence, form of 1st and 2nd sternites, form of upper margin of pygidium) from Greece (Pelopennese: S Tripolis and Morea: Kerpini) on the base of 3 males and 8 females specimens. Firstly, Danilevsky (2009a) mentioned it can be a synonym of *P. angusterufonotata* (Pic, 1952). So, as a result of our work, *P.* (*P.*) *inarmata* Holzschuh, 1984 is a synonym of *P.* (*P.*) *angusterufonotata* (Pic, 1952).

Distribution: Greece.
Chorotype: Greek.

***Phytoecia* (*Pilemia*) *annulata* Hampe, 1852**

Orig. comb.: *Phytoecia annulata* Hampe, 1852
Type loc.: Iran.
Other names: *angorensis* Pic, 1952 (Fig. 2).
ssp.: *Phytoecia annulata annulata* Hampe, 1852; *Phytoecia annulata wawerkana* (Reitter, 1905)

Pilemia wawerkana was described by Reitter (1905) from Akbez (S Turkey: Hatay prov., not Syria). He separated this species from *P. annulata* (Hampe, 1852). Then following authors (e.g. Aurivillius, 1921; Winkler, 1924-1932; Breuning, 1966) regarded it as a variety or morpha of *P. annulata* (Hampe, 1852).

It was given by Rejzek & Hoskovec (1999) as a subspecies of *Phytoecia annulata* Hampe, 1852. So this species has 2 subspecies as *P. annulata annulata* Hampe, 1852 that occurs in Iran, Caucasus and NE Turkey and *P. annulata wawerkana* (Reitter, 1905) which occurs in S and SE Turkey. Breuning (1966) mentioned *P. annulata* v. *angorensis* Pic, 1952 that was described from Turkey (Ankara province) is a morpha of *P. annulata wawerkana* (Reitter, 1905). This species is reported for the first time for Osmaniye province with the present materials.

Short description: Body is small size, approximately between 8-13 mm. General body color black with white and rusty-spotted gray pelage. Antennae curled. Pronotum with a wide, median cross longitudinal light hair band that has yellowish hairs in posterior half and rusty colored hairs in anterior half in both sexes. Elytral apex rounded in both sexes. Pygidium tapering to the top, in the middle of apex with a small wide insertion.
Material examined: Osmaniye prov.: Bahçe, Kızlaç village, Aslanlı Beli, N 37 10 E 36 38, 768 m, 21.04.2007, 3 specimens [as *P.* (*Pilemia*) *annulata wawerkana* (Reitter, 1905)].
Records in Turkey: S Turkey: Hatay prov.: Akbez (not Syria) as the type locality of *Pilemia wawerkana* (Reitter, 1905); Kurdistan, S Turkey (not Syria) (Winkler, 1924-1932); Turkey (Danilevsky & Miroshnikov, 1985; Lodos, 1998); Adıyaman prov.: Nemrut Mt. as *P. annulata* ssp. *wawerkana* (Rejzek & Hoskovec, 1999); Kars prov.: Sarıkamış, Sivas prov.: Kurbağalıbeli pass (Rejzek et al., 2001).
Distribution: Caucasus, Turkey, Iran.
Chorotype: SW-Asiatic (Irano-Caucasian + Anatolo-Caucasian + Irano-Anatolian).

Phytoecia (*Pilemia*) *griseomaculata* (Pic, 1891)

Orig. comb.: *Pilemia tigrina* var. *griseomaculata* Pic, 1891 (Fig. 3)
Type loc.: Turkey (not Syria).
Other names: *laterufonotata* Pic, 1952 (Fig. 4).

Reitter (1905) gave it as a synonym of *P. tigrina* in accordance with the description of Pic (1891). He stated that "when variety described, but the differences permitted no sharp one separation. These are identical taxa with less clearly curled antennae. Other given more or less distinct differences also came of the typical form. Then, the following authors regarded it as a separate species. It was recorded by Rejzek et al. (2001) from Syria (Bludan). Breuning (1966) mentioned v. *laterufonotata* Pic, 1952 that was described from Turkey (Hatay prov.: Akbez, not Syria) is a morpha of *P.* (*Pilemia*) *griseomaculata* (Pic, 1952).

Short description: Body is small size, approximately between 8-12 mm. General body color black with white-spotted pelage. Upper side griseous. Antennae curled. Pronotum with a narrow, median cross longitudinal light hair band and with a transverse red spot in anterior half in female and with a median, more or less circular red spot in male. Elytral apex obtuse in both sexes. Pygidium a little tapering to the top, upper margin obtuse in the male and in the middle of apex with a distinct wide insertion in the female.
Records in Turkey: S Turkey: Hatay prov.: Akbez (not Syria) as the type locality of *Pilemia tigrina* var. *griseomaculata* (Pic, 1891); Erzurum prov. And near (Özbek, 1978); Turkey (Lodos, 1998).

Distribution: Turkey, Syria.
Chorotype: SW-Asiatic (Syro-Anatolian).

Phytoecia (*Pilemia*) *halperini* Holzschuh, 1999

Orig. comb.: *Phytoecia* (*Pilemia*) *halperini* Holzschuh, 1999
Type loc.: Israel.

This species is endemic to Israel. It was described by Holzschuh (1999) though separated from *P. griseomaculata* from Israel (Qusbiye) on the base of 1 female specimen.

Distribution: Israel.
Chorotype: Israelian.

Phytoecia (*Pilemia*) *hladilorum* Holzschuh, 2006

Orig. comb.: *Phytoecia hladilorum* Holzschuh, 2006
Type loc.: Greece.

Phytoecia hladilorum Holzschuh, 2006 is described from Greece (Pelopones, Taygetos Mt.) on the base of 1 male and 1 female. He did not mention subgenus, but he compared the species with *P.* (*Pilemia*) *hirsutula hirsutula* and *P.* (*Pilemia*) *hirsutula homoiesthes*. So it is in the subgenus *Pilemia*. It is endemic to Greece.

Distribution: Greece.
Chorotype: Greek.

Phytoecia (*Pilemia*) *hirsutula* (Frölich, 1793)

Orig. comb.: *Saperda hirsutula* Frölich, 1793
Type loc.: Austria (to be regarded as "Austro-Hungarian Empire", likely in Hungary).
Other names: *atomaria* Towsend, 1797; *holosericea* Faldermann, 1837; *holosericea* Ganglbauer, 1884; *obsoleta* Ganglbauer (in Mars, 1888); *moreana* Breuning, 1943; *ciliciae* Breuning, 1951; *tournieri* Pic, 1952 (Fig. 5); *holtzi* Pic, 1952 (Fig. 6); *androsensis* Breuning, 1963.
ssp.: *Phytoecia hirsutula hirsutula* (Frölich, 1793); *Phytoecia hirsutula homoiesthes* Ganglbauer, 1888.

As commonly accepted that this species which is the most wide spread species among the species in the subgenus *Pilemia,* has 2 subspecies as *P. hirsutula hirsutula* (Frölich, 1793) and the eastern subspecies *P. hirsutula homoiesthes* Ganglbauer, 1888 which occurs only in Iran and C Asia (Turkmenia). So it is represented by the nominotypical subspecies in Turkey and distributes rather widely. On the other hand, *Pilemia obsoleta* Ganglbauer, 1888 was regarded as a form of this species, but Vitali (2009) regarded as a subspecies. According to Sudre (2000), *Oxylia androsensis* Breuning, 1963; *Phytoecia* (*Blepisanis*) *ciliciae* Breuning, 1951 and *Phytoecia* (*Rubrophytoecia*) *moreana* Breuning, 1943 are synonyms of *Phytoecia* (*Pilemia*) *hirsutula* (Frölich, 1793). This species is reported for the first time for Osmaniye province with the present materials.

Short description: Body is small size, approximately between 5-14 mm. General body color black with dense yellow-spotted pelage. Antennae not curled. Pronotum with 3 cross longitudinal light hair band (1 median and 2 lateral) in both sexes. Elytral apex obtuse in both sexes. Pygidium distinctly tapering to the top.
Material examined:Osmaniye prov.: Boğaz plateau, N 37 04 E 36 22, 713 m, 18.05.2006, 1 specimen; Zorkun road, Çiftmazı, N 37 01 E 36 17, 223 m, 20.05.2006, 1 specimen; **Antalya prov.:** Alanya, Keşbelen plateau, N 36 37 E 32 22, 1750 m, 14.06.2007, 1 speimen; Akseki, Mahmutlu village env., N 36 55 E 31 47, 1054 m, 19.05.2008, 15 specimens; Akseki, between Çukurköy-Mahmutlu, N 36 54 E 31 48, 830 m, 19.05.2008, 2 specimens; İbradı-Akseki road, N 37 05 E 31 36, 984 m, 20.05.2008, 1 specimen; **Konya prov.:** Between Gencek-Derebucak, N 37 25 E 31 29, 1212 m, 20.05.2008, 1 specimen.
Records in Turkey: Konya prov.: Meram (Bodemeyer, 1900); Bilecik prov. (Bodemeyer, 1906); Turkey (Winkler, 1924-1932; Lodos, 1998; Sama & Rapuzzi, 2000; Sama, 2002); İzmir prov.: Bergama (Demelt & Alkan, 1962); İzmir prov.: Pergamon, İçel prov.: Namrun (Demelt, 1963); Erzurum prov. (Breuning & Villiers, 1967); Erzurum prov. and near (Özbek, 1978); Antalya prov. – Demelt, 1961 (Ex. Öymen, 1987); İçel prov.: Erdemli (Adlbauer, 1988); Adıyaman prov.: Nemrut Mt. (Rejzek & Hoskovec, 1999); Hakkari prov. (Rejzek et al., 2001); Bayburt prov.: Maden, Erzurum prov.: Akdağ / Çat / Ilıca (Atlıkonak) / İspir (Madenköprübaşı) / Oltu / Pasinler (Çalıyazı) / Şenkaya (Hoşköy) / Turnalı / Tortum (Söğütlü), Kars prov.: Sarıkamış (Karakurt, Şeytangeçmez) (Tozlu et al., 2003); Isparta prov.: Yalvaç (Özdikmen & Hasbenli, 2004); Afyon prov.: Erkmen valley (Özdikmen, 2007).
Distribution: Europe (Italy, Croatia, Bosnia-Herzegovina, Serbia, Macedonia, Albania, Greece, Bulgaria, Romania, Hungary, Slovakia, Moldova, Ukraine, Crimea, European Russia, European Kazakhstan), W Siberia, Turkmenia, Caucasus, Transcaucasia, Turkey, Iran, Syria, Israel.
Chorotype: Turano-Mediterranean (Turano-E-Mediterranean).

Phytoecia (*Pilemia*) *maculifera* Holzschuh, 1984

Orig. comb.: *Phytoecia* (*Pilemia*) *maculifera* Holzschuh, 1984
Type loc.: Turkey.

This species is in –*tigrina* species group. It was described by Holzschuh (1984) though separated from *P. tigrina* by using penis form and secondary sex characters (coloration of antennae and legs, form of eyes, form of red spot on pronotum, coloration and pubescence of elytra, form of 1st and 2nd sternites, form of upper margin of pygidium) from Turkey (İçel: Namrun and Adana: Tekir and Nurdağı pass) on the base of 5 males and 6 females specimens. It is endemic to Turkey.

Short description: Body is small size, approximately between 6-13 mm. General body color black with rather dense yellowish-white-spotted pelage. The elytra barely brillant. Antennae curled. Pronotum with a narrow, median cross longitudinal light hair band and with a red spot in anterior half in both sexes. Sometimes pronotum without red spot. Elytral apex obtuse in male. Pygidium tapering to the top, in the middle of apex with a distinct wide insertion in male.
Material examined:Osmaniye prov.: Bahçe, Kızlaç village, Aslanlı Beli, N 37 10 E 36 38, 768 m, 21.04.2007, 2 specimens.

Records in Turkey: İçel prov.: Namrun and Adana prov.: Tekir and Nurdağı pass as the type loc. (Holzschuh, 1984); Osmaniye prov.: Nurdağı pass (Adlbauer, 1988); İçel prov.: Arslanköy (Rejzek et al., 2001).
Distribution: Turkey.
Chorotype: Anatolian.

***Phytoecia* (*Pilemia*) *samii* sp. n.** (Fig. 7)

Description: Body length: 9.00 mm., Length of pronotum: 1.38 mm., Width of pronotum: 2.00 mm., Length of elytra: 6.75 mm., Width of elytra: 2.75 mm.

General coloration of the body black, with a small reddish spot before the middle of pronotal disc (Fig. 7, 8A).

Except the whitish-grey hairs, on the elytra irregularly blotchy-distributed hairs are present such as *P. smatanai* and *P. serriventris*. The frons, the sides of pronotum with erect hairs and the sides of elytra semi-recumbent hairs.

Head with similarly large eyes like with *P. smatanai* and *P. maculifera*. Pronotum on the sides like *P. maculifera*, more bulbous than *P. smatanai*. Elytra like *P. smatanai* and *P. maculifera,* relatively short and hardly brilliant, however, punctations like *P. smatanai*, less close than *P. maculifera*. Elytral apex oblique truncate (pointed at outer angle) in male like *P. serriventris*.

Penis at the apex not long, tapering to the top, almost triangular (Fig. 9B).

Underside with tooth-like process in the middle on posterior margin of 1-3rd sternites. The process on 1st sternite is large, the process on 2nd and 3rd sternites are in decreasing size. 3rd is as a granule (Fig. 10A). This character is similar to *P. serriventris*.

The pygidium is formed similarly to that of *P. maculifera* and *P. serriventris* (Fig. 11A).

Discussion: This species is in –*tigrina* species group undoubtedly. This new species is close to *P. smatanai*, *P. maculifera* and *P. serriventris*. It can easily distinguish from them by using the main diagnostic characters in the following short key.

1 Upper side with sienna-colored hairs…………….***serriventris* Holzschuh, 1984**
1" Upper side without sienna-colored hairs……………………………………………………**2**

2 Underside without tooth-like process or tubercle on the sternites in male…………
……………………………………………………………………………***smatanai* Holzschuh, 2003**
2" Underside with tooth-like process or tubercle on the sternites in male………….**3**

3 Elytral apex obtuse in male…………………………….***maculifera* Holzschuh, 1984**
3" Elytral apex oblique truncate (pointed at outer angle) in male…….***samii* sp. n.**

Materials: Holotype ô: Turkey: Konya province: Derebucak, N 37 22 E 31 29, 1217 m, 20.05.2008. Paratypes: 1 ô from the same locality of holotype and 1 ô from

Konya prov.: İbradı-Derebucak road, 12 km to Derebucak, N 37 28 E 31 37, 1388 m, 12.06.2007.

Some measurements of the body for paratypes: Body length: 9.38 mm., Length of pronotum: 1.57-1.63 mm., Width of pronotum: 2.20 mm., Length of elytra: 6.88-7.20 mm., Width of elytra: 2.82 mm.

Etymology: The species name "*samii*" is dedicated to Sami Turgut (Turkey) who is the father of second author.

Phytoecia (*Pilemia*) *serriventris* Holzschuh, 1984

Orig. comb.: *Phytoecia* (*Pilemia*) *serriventris* Holzschuh, 1984
Type loc.: Bulgaria.

This species is in –*tigrina* species group. It was described by Holzschuh (1984) though separated from *P. tigrina* by using penis form and secondary sex characters (coloration of antennae, coloration and pubescence of head, pronotum and elytra, form of 1-4th sternites, form of upper margin of pygidium) from Bulgaria (Harmanlı) on the base of 7 males and 7 females specimens. It is endemic to Bulgaria.

Distribution: Bulgaria.
Chorotype: Bulgarian.

Phytoecia (*Pilemia*) *smatanai* Holzschuh, 2003

Orig. comb.: *Phytoecia* (*Pilemia*) *smatanai* Holzschuh, 2003
Type loc.: Turkey.

This species is endemic to Turkey. It is in –*tigrina* species group. It was described by Holzschuh (1984) though separated from *P. maculifera* and *P. serriventris* by using penis form and secondary sex characters from Turkey (Konya: Seydişehir) on the base of 1 male specimen.

According to original description of Holzschuh (2003), it is 8 mm. Coloration black, with a small reddish spot before the middle of pronotal disc. Except the whitish-grey hairs, on the elytra irregularly blotchy -distributed hairs are present such as *P. serriventris*. The frons, the sides of pronotum with erect hairs and the sides of elytra semi-recumbent hairs and the suture with sienna-coloured longitidunal band. Dorsal band exists indistincly. At an angle of elytra have very short, erect hairs, more distictive than comparative species. Head with similarly large eyes like with *P. maculifera*. Pronotum on the sides less bulbous and more rounded than *P. maculifera*. Elytra like *P. maculifera,* relatively short and hardly brilliant, however, punctations less close. Underside without tooth-like process or tubercle on the sternites. Pygidium at the apex almost obtuse. Penis like *P. maculifera*, but a little longer and before the apex recognizably curved.

Records in Turkey: Konya prov.: Seydişehir as the type loc. (Holzschuh, 2003).
Distribution: Turkey.
Chorotype: Anatolian.

***Phytoecia* (*Pilemia*) *tigrina* Mulsant, 1851**

Orig. comb.: *Phytoecia tigrina* Mulsant, 1851
Type loc.: S France ("Grasse, Var" – obviously incorrect locality).
Other names: *anchusae* Fuss, 1852; *breverufonotata* Pic, 1952 (Fig 12).

Villiers (1974) leaded that information of the type locality based on a mistake. So Villiers (1978) did not mention Pilemia tigrina (Mulsant, 1851) for France. However, this species was described from France according to cryptic captures from Grasse (Alps Maritime) and Esterel (Var). Bense (1995) excludes the likelihood of its presence in France. Sama (2002) stated that the type locality "Grasse and Var" in S France are obviously an incorrect locality. Brustel et al. (2003) did not also mention it for France for the same reason.

Short description: Body is small size, approximately between 10-13 mm. General body color black with white-spotted gray pelage. Antennae curled. Pronotum with a narrow, median cross longitudinal light hair band and with a transverse red spot in anterior half in female. Elytral apex obtuse in male, rounded in female. Pygidium tapering to the top, in the middle of apex with a narrow distinct insertion.
Records in Turkey: Malatya prov. (Heyden, 1888); Bilecik prov. (Bodemeyer, 1906); Asia Minor and European Turkey as *P. tigrina anchusae* Fuss, 1852 (Winkler, 1924-1932); İzmir prov.: Bergama (Demelt & Alkan, 1962; Demelt, 1963); Manisa prov.: Keçiliköy (Gül-Zümreoğlu, 1975); Turkey (Lodos, 1998; Sama, 2002); Isparta prov.: Yalvaç (Sultan Mts.) (Özdikmen & Hasbenli, 2004).
Distribution: Europe (?France, Serbia, Bulgaria, Romania, Hungary, Moldova, Ukraine), Caucasus (Armenia), Turkey.
Chorotype: Turano-European (Turano-Sarmato-Pannonian).

***Phytoecia* (*Pilemia*) *vagecarinata* (Pic, 1952)**

Orig. comb.: *Pilemia vagecarinata* Pic, 1952
Type loc.: Syria.

This species was described by Pic (1952) from ?Syria. Rahmé et al. (2005) collected the rare species from Kasab (NW Syria). Kasab a Syrian border town located in Latakia Governorate (Muhafazat al Ladhiqiyah) NW of the country. It is 65 km from Latakia, 3 km from the Turkish border, and 17 km from the Mediterranean Sea. So this species is very likely present in Turkey (at least in Hatay province). Type could not be found by Tavakilian in MNHN.

Short description: Body is small size. General body color black with uniformly dense and regular yellowish hairs. Antennae not curled. Pronotum with 3 longitudinal light hair band (1 median and 2 lateral) in both sexes. Lateral bands not reach anterior margin. Elytral apex rounded in male, almost obtuse in female. Pygidium tapering to the top.
Distribution: Syria,?Turkey.
Chorotype: Syrian or SW-Asiatic (Syro-Anatolian).

A short identification key for Turkish *Phytoecia* (*Pilemia*) species

1 Antennae not curled..**2**
1" Antennae curled..**3**

2 General body color black with dense yellow-spotted pelage. Pronotum with 3 cross longitudinal light hair band (1 median and 2 lateral) in both sexes. Elytral apex obtuse in both sexes...***hirsutula* (Frölich, 1793)**
2" General body color black with uniformly dense and regular yellowish or yellowish-white hairs. Pronotum with 3 longitudinal light hair band (1 median and 2 lateral) in both sexes. Lateral bands not reach anterior margin of pronotum. Elytral apex rounded in male, almost obtuse in female...
....***vagecarinata* (Pic, 1952)**

3 Pronotum without a reddish spot and with a median wide, cross longitudinal light hair band; the upper side of the body with partly rusty colored (with sienna colored pubescence)...***annulata* Hampe, 1852**
3" Pronotum with a reddish spot and with a median narrow, longitudinal light hair band; the upper side of the body without rusty coloration..............................**4**

4 Upper side griseous...***griseomaculata* (Pic, 1891)**
4" Upper side not griseous, without metallic shine but sometimes barely brilliant.
....**5**

5 Pronotum with a small, circular median reddish spot in anterior half; the 1st and 2nd sternite in male with or without tooth-like process or tubercle in the middle before the posterior margin...**6**
5" Pronotum with a larger reddish spot in anterior half; the 1st and 2nd sternite in male with tooth-like process or tubercle in the middle before the posterior margin...**7**

6 The 1st and 2nd sternite in male without tooth-like process in the middle before the posterior margin; elytral apex obtuse in male..***smatanai* Holzschuh, 2003**
6" The 1st and 2nd sternite in male with tooth-like process in the middle before the posterior margin; elytral apex oblique truncate in male...................***samii* sp. n.**

7 Pygidium strongly narrowed, the upper side at the apex arched, in female the upper edge of the apex of pygidium not roof-shaped; Pronotum in female with more or less wide red transverse band before the middle of disc; at least antennal segment 3 and (or) legs a little bit reddish mostly, nevertheless, in bigger expansion reddish colored; the 1st and 2nd sternite in male with distinct small tubercle (or hump) in the middle before the posterior margin; Elytra without clear metallic shine and without significantly erect hairs.........***tigrina* (Frölich, 1793)**
7" Pygidium a little narrowed, upper side at the apex flattened, in female the upper edge of the apex of pygidium roof-shaped above the lower edge; Pronotum in both sexes with plump red spot before the middle; antennae and legs completely black, 1st sternite in male with a tooth-like process in the middle before the posterior margin;, the process on the 2nd sternite weakly such as a granule; Elytra uniformly white-gray mottled, barely brilliant, without metallic shine...***maculifera* Holzschuh, 1984**

* The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Taglianti et al. (1999). As far as possible as one chorotype description can be determined for each taxon in the text. This work supported by the projects of TÜBİTAK (project number TBAG-105T329) and GAZİ UNIVERSITY (project number BAP-06/32).

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Figure 1. *P. angusterufonotata* Pic, 1952.

Figure 2. *P. angorensis* Pic, 1952.

Figure 3. *P. griseomaculata* Pic, 1891.

Figure 4. *P. laterufonotata* Pic, 1952.

Figure 5. *P. tournieri* Pic, 1952.

Figure 6. *P. holtzi* Pic, 1952.

Figure 7. *P. samii* sp. n. (Holotype)

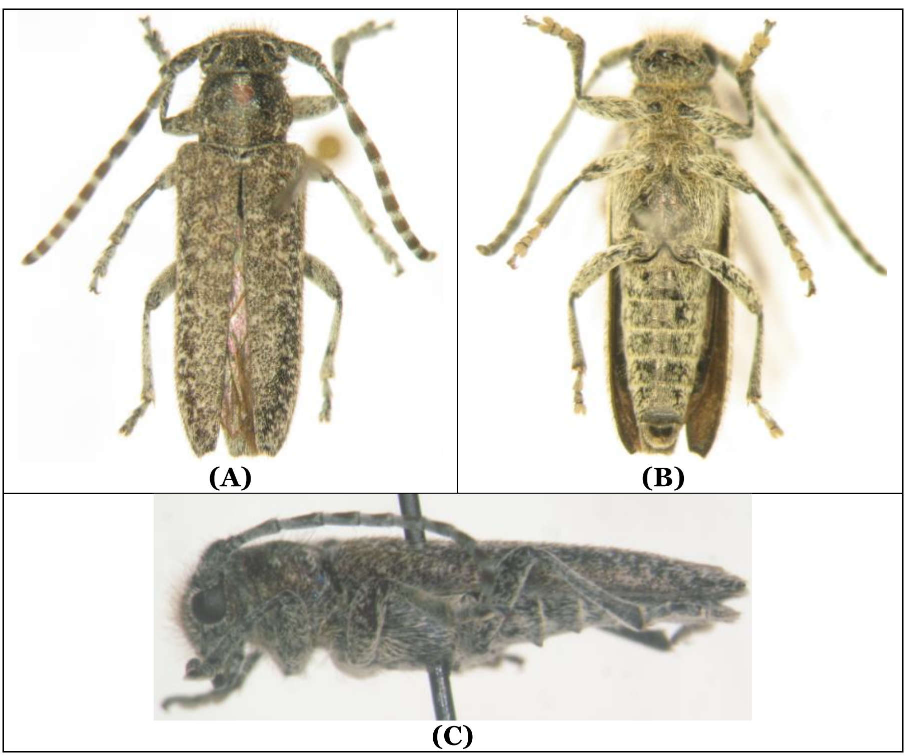

Figure 8. *P.* (*Pilemia*) *samii* sp. n. (Paratype) (A) Dorsal view (B) Ventral view (C) Lateral view.

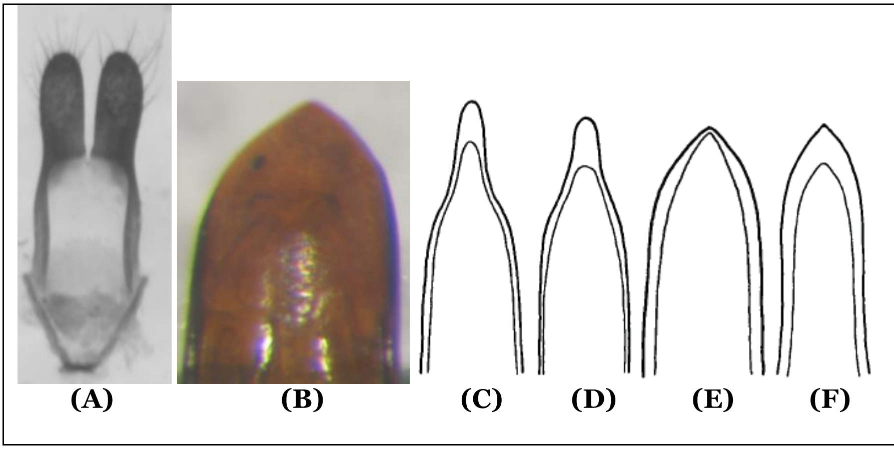

Figure 9. (A) Paramers of *P. samii* sp. n. (Holotype); Apex of penis (B) *P. samii* sp. n. (Paratype) (C) *P. tigrina* Mulsant, 1851 (D) *P. inarmata* Holzschuh, 1984 (E) *P. serriventris* Holzschuh, 1984 (F) *P. maculifera* Holzschuh, 1984 [C, D, E, F from Holzschuh (1984)].

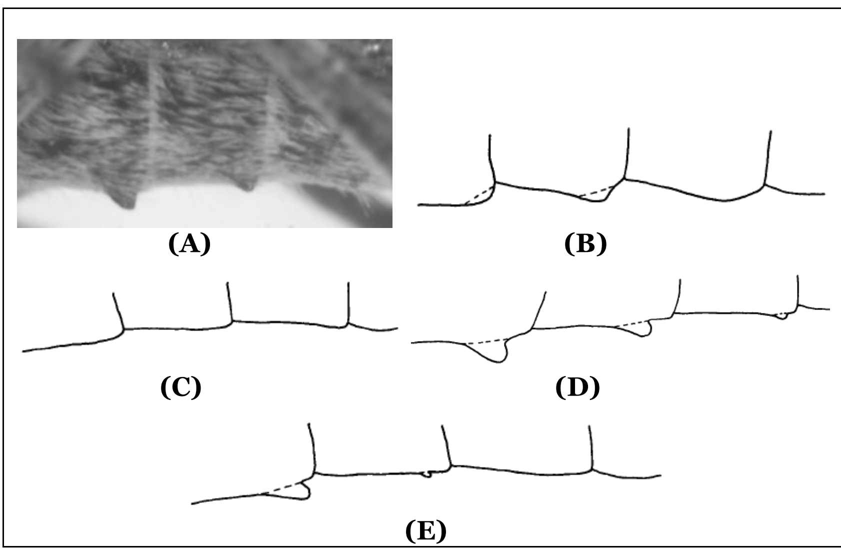

Figure 10. 1-3rd sternites (lateral view) (A) *P. samii* sp. n. (Paratype) (B) *P. tigrina* Mulsant, 1851 (C) *P. inarmata* Holzschuh, 1984 and *P. smatanai* Holzschuh, 2003 (D) *P. serriventris* Holzschuh, 1984 (E) *P. maculifera* Holzschuh, 1984 [B C, D, E from Holzschuh (1984)].

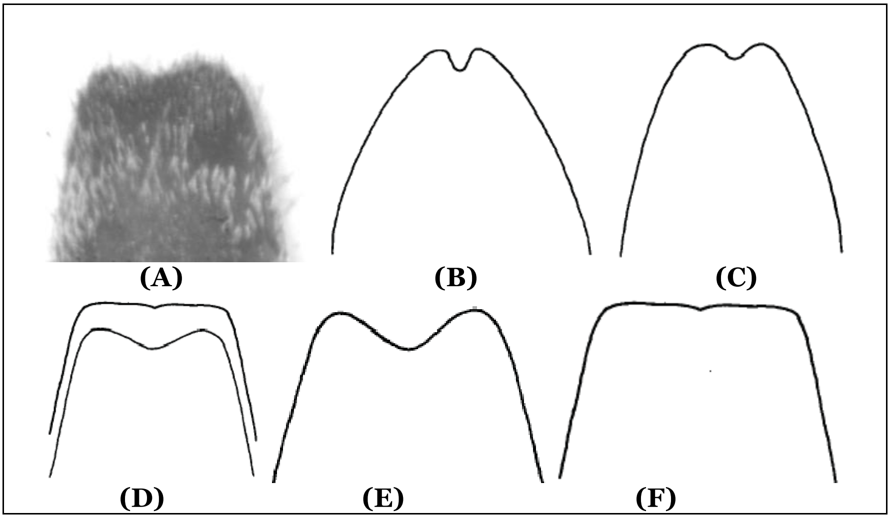

Figure 11. Pygidium (dorsal view) (A) *P. samii* sp. n. (Paratype) (B) *P. tigrina* Mulsant, 1851 (C) *P. inarmata* Holzschuh, 1984 (D) *P. serriventris* Holzschuh, 1984 (E) *P. maculifera* Holzschuh, 1984 (F) *P. smatanai* Holzschuh, 2003 [B C, D, E from Holzschuh (1984)].

Figure 12. *P. breverufonotata* Pic, 1952.

EFFICIENCY OF DIFFERENT LIGHT SOURCES IN LIGHT TRAPS IN MONITORING INSECT DIVERSITY

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[**Ramamurthy, V. V., Akhtar, M. S., Patankar, N. V., Menon, P., Kumar, R., Singh, S. K., Ayri, S., Parveen, S. & Mittal, V.** 2010. Efficiency of different light sources in light traps in monitoring insect diversity. Munis Entomology & Zoology 5 (1): 109-114]

ABSTRACT: Field observations were undertaken at weekly interval (standard week), during 2007-08 at the Indian Agricultural Research Institute, New Delhi for studying the effect of three light sources in light traps (*viz.,* mercury, black and ultra violet) on insect catch and their relationship with weather parameters. Results when analysed revealed that coleopterans dominate the catches, followed by hemipterans, hymenopterans and lepidopterans. The mercury light was more efficient for Lepidoptera, Hemiptera, Hymenoptera, Odonata, and Diptera and while black light was more efficient for Coleoptera, Orthoptera, Isoptera, and Dictyoptera. Similar attractiveness to the mercury and black light sources were found for coleopterans. Coleopterans were equally attracted to mercury and black light sources. Average temperature showed significant relationship with coleopterans, lepidopterans and hemipterans when all insect traps were considered together.

KEY WORDS: Mercury light trap, black light trap, ultra violet light trap, insects, population, climatic factors

Collections of a light trap provide significant clue to the diversity of insects active at night, their respective affinity to different wavelengths of light and to understand and predict how populations function (Southwood and Henderson, 2000). Such information, if properly documented, could be put to multi-dimensional use by field- researchers, such as, selection of light-traps for attracting specific order of insects. Inspite of the market being flooded with different models of light traps with lightsources varying in their intensity and wavelengths, no scientific data on the trap collection, diversity, number and its efficacy is available for ready use. Such a data could shed light on the insects attracted to specific range of light. In this regard, a comparative analysis of different light trap collections becomes mandatory in order to study the efficacy of different wavelengths of light in attracting insects of specific orders viz., Coleoptera (Sushil et al., 2004), Hemiptera (Rai and Khan, 2002; Manimaran and Manickavasagam, 2000), Lepidoptera (Rose et al., 2004), Hymenoptera and Diptera (Nair et al., 2004). Further corelating this data with weather parameters could help to predict the period of maximum insect diversity and activity. In order to make such information available, a complete segregation of the individual trap collection over a period of time on the basis of order and total catch, and simultaneously corelating it with the prevalent weather conditions becomes necessary. Hence, a comparative analysis of the light-trap collections using three different light sources and different agroecosystems were carried out correlating with weather conditions. The results of the preliminary observations obtained over two years are presented herein.

MATERIAL AND METHODS

The present investigations were carried out from 1st to 52nd standard week of 2007 and 2008 in the experimental fields of Indian Agricultural Research Institute (IARI) (28°4′N, 77°09′E and 228.16m above mean sea level), New Delhi. Three different light sources, mercury with lumens 2700, black or ultra violet-A 400–315 nm and ultra violet-C 280–100 nm (Fig. 5) designed on the bioquip model light trap with certain modifications incorporated towards essential requirements for field use were evaluated. This trap had four constituent parts, a. collecting chamber b. funnel shaped lid c. light source and d. lid from the top to protect from unexpected night showers. The light traps were installed in four different places viz., Site I (mix vegetation of vegetables and cereals), Site II (field of different vegetables), Site III (field of cereals for seed production) and Site IV (normal cereals) at weekly intervals for 7 to 8 h. Benzene was used as killing agent and the insects were segregated orderwise for recording the observations. The weather data were obtained from IARI observatory (28°4′N, 77°09′E) and correlation coefficients worked out using SPSS-Version 10.

RESULTS AND DISCUSSION

Variation in different experimental sites:

The insects were found round the year, but it showed its dominancy from 10th to 45th standard week and reached its peak on 27th and 30th standard week in 2007 and 2008 respectively (Fig. 1). The relative catch of insects in Site I, Site II, Site III and Site IV was 25%, 26%, 13% and 36% respectively (Fig. 2). In Site III, the total average catch was low due to the variation in the use of insecticides. The relative total catch (Fig. 3) of insects for UV, Mercury and Black light traps recorded at Site I was 14%, 56% and 30% respectively; at Site II 14%, 39% and 47% respectively; at Site III 09%, 51% and 40% respectively and at Site IV 08%, 42%5 and 50% respectively.

Variation due to different light sources:

Amongst the three light traps, Mercury light trap showed the maximum ability followed by Black light trap and UV light trap (Table 1); The details of insects of various orders in UV, Mercury and Black light traps varied from 0.00 to 66.71; 0.01 to 53.15 and 0.00 to 70.89 percent respectively (Table 1). The total catch of UV, Mercury and Black light traps were varied from 27.89 to 37.17 percent in Coleoptera; from 29.47 to 37.79 percent in Hemiptera; from 19.57 to 56.97 percent in Hymenoptera and from 18.44 to 59.43 percent in Lepidoptera (Fig. 4). The observations are in agreement with those of Upadhyay et al., (2000) and Nair et al., (2004).

Relationship with weather factors:

On comparing the weather parameters it was evident that; average temperature (9.3 to 36.7 °C) showned most significant relationship with total insects catch (r=0.36) followed by rainfall (O to 28.71 mm) (r=0.24). Lepidoptera (r=0.21), Coleoptera (r=0.41), Hemiptera (r=0.20) and Coleoptera (r=0.27), Dictyoptera (r=0.22), Odonata (r=0.20) showed positive significant correlation with average temperature and rainfall respectively. Other insect orders did not show any significant relationship with weather parameters (Table 2).

Hence, the knowledge of insect catch in light trap can be used for developing measures to safeguard the health of agricultural environments. Insect population analysis is required for interpreting and forecasting the response of different orders to weather patterns. The data analysis shall allow field workers to pin down and isolate crop pests there by providing scope for ETL of crop pests for implementation of appropriate management practices.

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Table 1. Relative catch (percentage) of different insects order in light traps.

Orders / Light Sources	LEP	ORT	HEM	HYM	DIP	COL	DIC	ODO	DER	ISO	NEU	Total
UV	2.82	0.83	20.00	3.00	4.42	66.71	0.07	0.01	2.02	0.11	0.00	10.09
MER	9.09	0.35	23.10	8.74	4.32	53.15	0.07	0.32	0.83	0.02	0.01	48.13
BLA	3.39	0.46	18.01	3.60	2.19	70.89	0.32	0.13	0.87	0.14	0.00	41.78

LEP = Lepidoptera; ORT= Orthoptera; HEM= Hemiptera; HYM= Hymenoptera; DIP= Diptera; COL=Coleoptera; DIC= Dictyoptera; ODO= Odonata; DER= Dermaptera; ISO= Isoptera; NEU= Neuroptera; UV= Ultra Violet light; MER= Mercury light; BLA= Black Light

Table 2. Correlation between weather parameters and insects caught in light traps #

Orders / Climatic factors	LEP	ORT	HEM	HYM	DIP	COL	DIC	ODO	DER	ISO	NEU	Total
Av T	0.21*	0.16	0.20*	0.16	0.16	0.41**	0.09	0.08	0.13	0.19	0.15	0.36**
Av RH	0.02	0.12	-0.08	0.14	-0.13	0.03	0.13	0.12	0.06	0.12	-0.05	0.03
SSH	0.02	-0.01	0.04	-0.11	0.13	-0.05	-0.17	-0.16	0.01	0.00	-0.03	-0.04
RF	0.12	0.07	0.09	0.18	-0.02	0.27**	0.22*	0.20*	0.07	-0.02	-0.05	0.24*

Av T= Average temperature; SSH= Sun Shine Hours; Av RH= Average % Relative Humidity; RF= Rainfall; LEP = Lepidoptera; ORT= Orthoptera; HEM= Hemiptera; HYM= Hymenoptera; DIP= Diptera; COL=Coleoptera; DIC= Dictyoptera; ODO= Odonata; DER= Dermaptera; ISO= Isoptera; NEU= Neuroptera *= Correlation is significant at the 0.01 level (2-tailed).; **= Correlation is significant at the 0.05 level (2-tailed); # all light sources combined

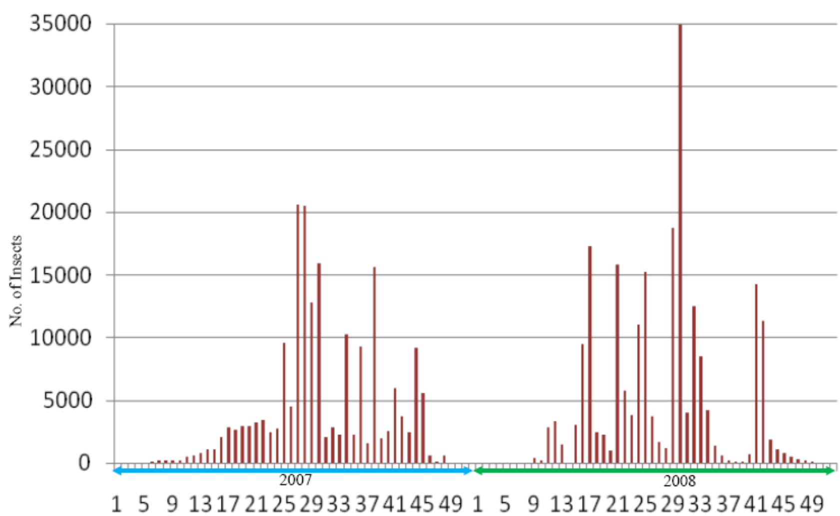

Fig. 1. Population fluctuation of insects, 2007 and 2008

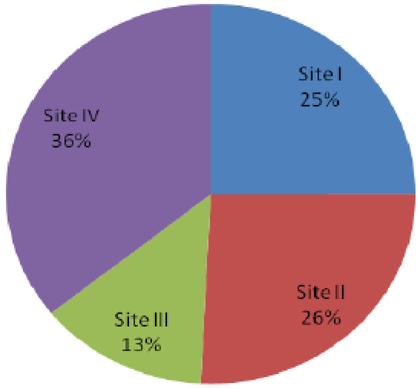

Fig. 2. Relative catch of insects at different localities: Site I (mix vegetation of vegetables and cereals), Site II (field of different vegetables), Site III (field for cereals for seed production) and Site IV (normal cereals).

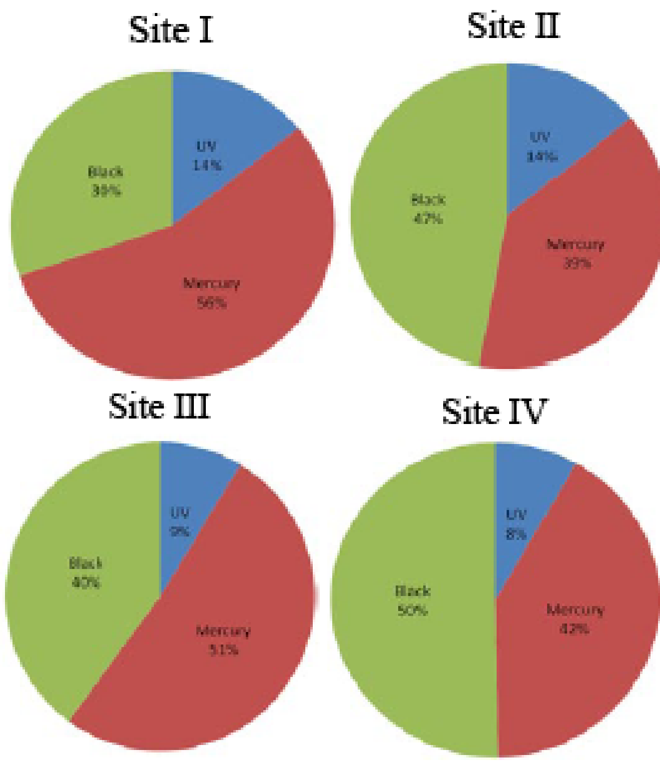

Fig. 3. Relative catch of insects using UV, Mercury and Black light trap in different localities. Site I (mix vegetation of vegetables and cereals), Site II (field of different vegetables), Site III (field for cereals for seed production) and Site IV (normal cereals)

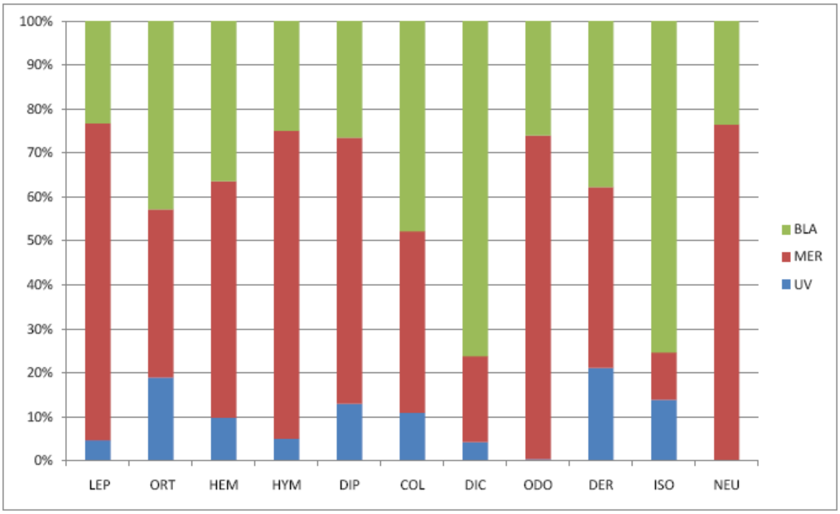

Fig. 4. Efficiency of different light sources (viz., UV = Ultra Violate, MER= Mercury and BLA= Black) on different insect orders (LEP = Lepidoptera; ORT= Orthoptera; HEM= Hemiptera; HYM= Hymenoptera; DIP= Diptera; COL=Coleoptera; DIC= Dictyoptera; ODO= Odonata; DER= Dermaptera; ISO= Isoptera; NEU= Neuroptera)

Fig. 5. Disassembled and assembled light traps; UV (i), Mercury (ii) and Black (iii); Collecting chamber (a), Lid from the top (b), Light source (c), Funnel shaped lid (d)

A NEW FAMILY AND TWO GENERA NAMES FOR TURBELLARIA (PLATYHELMINTHES)

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[Özdikmen, H. 2010. A new family and two genera names for Turbellaria (Platyhelminthes). Munis Entomology & Zoology, 5 (1): 115-117**]**

ABSTRACT: Two junior homonyms were detected amongst the turbellarian genus group names and the following replacement names are proposed: *Novomitchellia* nom. nov. for *Mitchellia* Kawakatsu & Chapman, 1983 and *Faubelus* nom. nov. for *Notocirrus* Faubel, 1983. Accordingly, new combinations are herein proposed for the species currently included in these genera: *Novomitchellia sarawakana* (Kawakatsu & Chapman, 1983) comb. nov. and *Faubelus neupommerensis* (Faubel, 1983) comb. nov.. In addition, I propose the replacement name Faubelidae as a new name for the family name Notocirridae.

KEY WORDS: nomenclatural change, homonymy, replacement name, Turbellaria, Platyhelminthes.

Family FAUBELIDAE nom. nov.
Genus *FAUBELUS* nom. nov.

Remarks: The genus group name *Notocirrus* was proposed for marine polychaete worms by Schmarda (1861) with the type species *Notocirrus chilensis* Schmarda, 1861 from Pacific Ocean, Chile by subsequent designation by Ehlers, 1868. For the present, the genus *Notocirrus* Schmarda, 1861 has 10 species as *Notocirrus arcachonis* Quatrefages, 1843; *N. attenuatus* (Treadwell, 1906); *N. biaciculus* Gallardo, 1968; *N. californiensis* Hartman, 1944; *N. chilensis* Schmarda, 1861; *N. compositus* Szankiawski & Gazdzicki, 1978; *N. lorum* Ehlers, 1897; *N. scoticus* McIntosh, 1869; *N. spinifera* (Moore, 1906) and *N. virginis* (Kinberg, 1865).

On the other side, the monotypic polyclad genus *Notocirrus* was described by Faubel (1983) with the type species *Notocirrus neupommerensis* Faubel, 1983 by original designation. The name is currently used as a valid generic name in Polycladida as the type genus of the family Notocirridae Faubel, 1983. The family includes eight genera as *Amyris* Marcus & Marcus, 1968; *Chiliplana* Faubel, 1983; *Copidoplana* Bock, 1913; *Diplandros* Hyman, 1953; *Notocirrus* Faubel, 1983; *Notoplehnia* Faubel, 1983; *Triadomma* Marcus, 1947 and *Tripyloplana* Faubel, 1983.

However, the name *Notocirrus* Faubel, 1983 is invalid under the rule of homonymy, being a junior homonym of *Notocirrus* Schmarda, 1861. Under the International Code of Zoological Nomenclature (ICZN 1999) it must be rejected and replaced. In accordance with article 60 of the International Code of Zoological Nomenclature, fourth edition (1999), I propose to substitute the junior homonym *Notocirrus* Faubel, 1983 for the nomen novum *Faubelus*.

As a result of this, *Notocirrus* Faubel, 1983 is replaced with *Faubelus* new name. The following new combination is established: *Faubelus neupommerensis* (Faubel, 1983) comb. nov..

In addition to this, I herein propose the replacement name Faubelidae new name for the family name Notocirridae because its type genus *Notocirrus* Faubel, 1983 is invalid and the type genus of a family group name must be valid.

SYSTEMATICS

Order Polycladida
Suborder Acotylea
Superfamily Leptoplanoidea
Family **Faubelidae** new name
pro Notocirridae Faubel, 1983
Type genus.— *Faubelus* new name.
Remarks.—The name *Notocirrus* has been used in Polycladida as a stem for a family-group name, and should be automatically replaced with the new name.

Genus ***Faubelus*** new name
pro *Notocirrus* Faubel, 1983: 89, junior homonym of *Notocirrus* Schmarda, 1861.
Type species.— *Notocirrus neupommerensis* Faubel, 1983 by original designation.
Etymology.— from A. Faubel who current author name of the preexisting genus *Notocirrus*.

The following new combination is proposed and the species is removed from *Notocirrus*:

Faubelus neupommerensis (Faubel, 1983) **new combination**
Syn.: *Notocirrus neupommerensis* Faubel, 1983

Family DIMARCUSIDAE
Genus *NOVOMITCHELLIA* nom. nov.

Mitchellia Kawakatsu & Chapman, 1983. Journal speleol. Soc. Japan 8: 22. (Platyhelminthes: Turbellaria: Archoophora: Tricladida: Cavernicola: Dimarcusidae). Preoccupied by *Mitchellia* Koninck, 1877. Mém. Soc. Sci. Liége, (2) 6, Rech. Foss. Paléoz., 128. (Mollusca: Gastropoda: Prosobranchia: Archaeogastropoda: Scoliostomatidae: Mitchellinae).

Remarks: Koninck (1877) described the fossil gastropod genus *Mitchellia* with the type species *Mitchellia striatula* Koninck, 1877 from the Yass District, New South Wales, Australia. Fryda et al. (2002) described a new family (Scoliostomatidae) and its two new subfamilies (Scoliostomatinae and Mitchellinae). The genus *Mitchellia* Koninck, 1877 is the type genus of the subfamily Mitchellinae.

Then, the monotypic triclad genus *Mitchellia* was proposed by Kawakatsu & Chapman (1983) with the type species *Mitchellia sarawakana* Kawakatsu & Chapman, 1983 by original designation and by monotypy from Water Polo Cave, Sarawak, East Malaysia.

Thus, the genus group name *Mitchellia* Kawakatsu & Chapman, 1983 is a junior homonym of the genus *Mitchellia* Koninck, 1877. So I propose a new replacement name *Novomitchellia* **nom. nov.** for *Mitchellia* Kawakatsu & Chapman, 1983. The name is from the Latin prefix “novo” (meaning “new” in English).

Summary of nomenclatural changes:

Novomitchellia **nom. nov.**
pro *Mitchellia* Kawakatsu & Chapman, 1983 (non Koninck, 1877)

Novomitchellia sarawakana (Kawakatsu & Chapman, 1983) **comb. nov.**
from *Mitchellia sarawakana* Kawakatsu & Chapman, 1983

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FUMIGANT TOXICITY OF ESSENTIAL OILS OF *LAVANDULA OFFICINALIS*, *ARTEMISIA DRACUNCULUS* AND *HERACLEUM PERSICUM* ON THE ADULTS OF *CALLOSOBRUCHUS MACULATUS* (COLEOPTERA: BRUCHIDAE)

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ABSTRACT: *Callosobruchus maculatus* F. is a major insect pest of stored-grain legumes in many countries. In the present study, fumigant toxicity of essential oils from *Lavandula officinalis* L., *Artemisia dracunculus* L. and *Heracleum persicum* Desf. was assessed on the adults of *Callosobruchus maculates*. The results indicated that the mortality of adults increased with increased concentration and exposure time. LC_{50} values for oils from *Lavandula officinalis*, *Artemisia dracunculus* and *Heracleum persicum* were 41.52, 210.61 and 337.58 μlL^{-1}, respectively. Toxicity of *Lavandula officinalis* oil was more than other two plants (LC_{50} = 41.52 μlL^{-1}), but the essential oils from all three plants were effective against this pest. Therefore, these essential oils were suggested to be used for *Callosobruchus maculates* control in stores.

KEY WORDS: *Callosobruchus maculatus*, essential oils, fumigant toxicity, *Lavandula officinalis, Artemisia dracunculus, Heracleum persicum*

Chemical fumigants are commonly used to control stored product pests throughout the world, but these products adversely affect the environment and are hazardous to human health (Lee et al., 2004; Tapondjou et al., 2002). Therefore, considerable amount of investigations have been carried out in the last three decades to find alternative control methods of store product pests (Morimoto et al., 2002; Park et al., 2002; Koul et al., 2003). The *Callosobruchus maculatus* F. causes considerable damage to the legumes, especially to *Vigna ungiculata* (L.) in storages and it damages distinctively with feeding by larvae inside the seeds (Hu et al., 2008). Many researches are conducted for managing this pest by various essential oils. Kestenholz et al. (2007) reported that *Cassia sophera* L. extract is effective in reducing *C. maculatus* infestation. Ketoh et al. (2006) indicated that essential oils of *Cymbopogon schoenanthus* and piperitone had toxic effects on adults of *C. maculatus*.

In this study, the fumigant toxicity of *Lavandula officinalis* L., *Artemisia dracunculus* L. and *Heracleum persicum* Desf. oils were assayed on the adults of *Callosobruchus maculatus*.

MATERIALS AND METHODS

This research was conducted in the laboratory of the Department of Entomology at University of Mohaghegh-Ardabili, Iran, in 2008. One hundred pairs of two day old adults of *C. maculatus* were transfered on 150 g seeds of *Vigna ungiculata* (L.) in a plastic jar of 2000 ml volume. Experiments were carried out in an incubator that was set at 28 ± 1 C, 60 ± 5% RH, in total darkness. Flowers of *Lavandula officinalis* L. were collected from Ferdowsi University of Mashhad, Iran and the leaves of *Artemisia dracunculus* L. and the fruits of *Heracleum persicum* Desf. were obtained from a drugstore in Mashhad, Iran. The plant materials were dried under suitable ventilation and shade conditions and were hydrodistilled with a Clevenger set to extract their essential oils. Concentrations of 24, 30, 36, 42, 51 and 61 µlL-1 of *Lavandula officinalis* L., and 91, 139, 206, 303 and 454 µlL-1 of *Artemisia dracunculus* L. and 152, 212, 333, 515 and 758 µlL-1 of *Heracleum persicum* Desf. were infused on the filter paper pieces of 2 cm in diameter. They were transferred to the caps of glass vials of 33 ml volume. Five pairs of two day old adults were transferred to each glass vial. In control containers no essential oil was used. The experiment was replicated eight times. Mortality was recorded after 3, 6, 9, 12 and 24 h exposure time. The relationship between data was examined by analysis of variance (ANOVA) and correlation analysis. The data were transformed into arcsin$\sqrt{x}$ before statistical analysis as necessary. The means were separated by using the Tukey test, $\alpha = 0.01$. In order to determine LC$_{50}$ values, mortality were recorded after 24 h. Data was analyzed using Probit analysis of SPSS 11.5.

RESULTS

The results illustrated that LC$_{50}$ value for *A. dracunculus* oil (210.61 µlL^{-1}) was about 8 times higher than for *L. officinalis* oil (41.52 µlL^{-1}). *L. officinalis* oil was the most toxic one. *H. persicum* oil had the highest LC$_{50}$ value (337.58 µlL^{-1}) and had less toxic effect on the pest (Table 1). It was found that mortality depended on concentration and exposure time in addition to essential oil type (Table 2). There was no mortality in concentrations 24 µlL^{-1} of *L. officinalis* oil and 91 µlL^{-1} of *A. dracunculus* at 3, 6 and 9 h exposure time. Also no mortality was observed at the concentrations of 30, 36 and 42 µlL^{-1}of *L. officinalis* oil, 139, 206 and 303 µlL^{-1} of *A. dracunculus* oil and 152, 212 µlL^{-1} of *H. persicum* oil at 3 and 6 h exposure time. The highest mortality at 3 h exposure time was 6.25% at the concentration of 758 µlL^{-1} of *H. persicum*. The mortality rate increased in all essential oils by increased concentrations at 12 and 24 h exposure time. Regression analysis of data indicated significant correlation between percentage mortality and period of exposure in all treatments ($P<0.05$). The highest coefficient of determination (96%) was attributed to *L. officinalis* oil (Table 3).

DISCUSSION

Among the three essential oils that were assayed in this research, *L. officinalis* oil was more toxic and *H. persicum* oil was less toxic than the others. Papachristos & Stamopoulos, 2001 indicated that essential oils from various plant species had very different toxicities on *Acanthoscelides obtectus* (Say). According to Park et al. (2002) some constituents of many plants such as linalool, terpineol, carvacrol and myrcene have insecticidal effects on some stored products pests.

The results showed that insect mortality varied with the essential oils type, concentration and the exposure time. The mortality of adult *C. maculatus* has increased with increasing of concentrations of *Ocimum basilicum, O. gratissimum*, *A. scoparia* and *A. sieberi* oils (Keita et al., 2001; Sanon et al., 2002. Negahban et al., 2006). The slope value of probit mortality regression of *L.*

officinalis oil was higher than the other two oils which indicated that there was a large increase in the mortality of insects with relatively small increase in the concentration of the toxicant. Similar results were reported by Tiwari and Singh, 2004. According to LC_{50} values, *L. officinalis* oil was the most toxic (LC_{50} =41.52 μlL^{-1}) and *H. persicum* oil was the least toxic (LC_{50} = 337.58 μlL^{-1}) in our studies. Keita et al. (2001) has reported that fumigant LC_{50} value of *Ocimum basilicum* on *C. maculatus* was 440 μlL^{-1}. It was higher than LC_{50} values of essential oils tested in our study means *Ocimum basilicum* was less toxic to *C. maculatus*.

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Table 1. Fumigant toxicity of essential oils of *Lavandula officinalis* L., *Artemisia dracunculus* L. and *Heracleum persicum* Desf. on *Callosobruchus maculatus* F. after 24 h exposure time§

Source of essential oil	LC50 values (μlL^{-1})	LC90 values (μlL^{-1})	Slop ± SE	$Chi\text{-}square_{(df)}$	P-value
L.officinalis	41.52 (39.70 - 43.03)	61.52 (57.27 - 67.27)	7.50 ± 0.60	$5.8_{(4)}$	0.29
A.dracunculus	210.61 (190.91 - 232.72)	520.30 (438.18 - 661.21)	3.26 ± 0.31	$2.9_{(3)}$	0.51
H.persicum	337.58 (305.45 - 373.64)	848.97 (713.93 - 1073.03)	3.21 ± 0.30	$7.9_{(3)}$	0.69

§ Oil applied to 2 cm filter papers held in 33 mL vials.

Table 2. Mortality percent (±SE) in the adults *Callosobruchus maculatus* exposed for various periods to *Lavandula officinalis* and *Artemisia dracunculus* essential oils at different concentrations (replicates =8)§

Source of essential oil	Concentration (μlL^{-1})	Exposure period (h)					Effects of exposure period	
		3	6	9	12	24	F(4,35)	p
L.officinalis	24	0.00	0.00	0.00	1.25±1.25^{A}	3.75±2.63^{A}	1.57	0.20
	30	0.00	0.00	7.50±2.50^{ABab}	7.50±2.50^{Aab}	16.25±4.60^{ABb}	6.72	0.001
	36	0.00	0.00	12.50±3.70^{ABa}	15.00±5.34^{Aa}	36.25±4.98^{BCb}	16.53	0.001
	42	0.00	0.00	23.75±4.20^{BCb}	38.75±5.15^{Bbc}	46.25±4.98^{Cc}	33.34	0.001
	51	1.25±1.25^{a}	3.75±2.63^{a}	37.50±4.53^{CDb}	56.25±5.96^{Bbc}	71.25±5.15^{Dc}	53.29	0.001
	61	0.00	5.00±2.67^{a}	50.00±4.22^{Db}	81.25±3.98^{Cc}	95.00±1.89^{Ec}	209.82	0.001
Results of concentration effect	F(5,42)	1	2.24	28.73	51.28	64.75		
	P	0.43	0.07	0.001	0.001	0.001		
A.dracunculus	91	0.00	0.00	0.00	3.75±1.83^{Aab}	11.25±2.95^{Ab}	9.92	0.001
	139	0.00	0.00	1.25±1.25^{Aab}	15.00±4.22^{ABb}	36.25±5.96^{Bc}	23.19	0.001
	206	0.00	0.00	5.00±2.67^{Aa}	32.50±6.20^{BCb}	43.75±5.32^{Bb}	30.40	0.001
	303	0.00	0.00	12.5±3.66^{ABa}	46.25±4.98^{CDb}	67.50±4.53^{Cc}	92.82	0.001
	454	0.00	2.50±1.64^{a}	18.75±3.98^{Bb}	58.75±5.15^{Dc}	88.75±2.26^{Dd}	152.95	0.001
Results of concentration effect	F(4,35)	-	2.33	11.15	24.11	52.50		
	P		0.08	0.001	0.001	0.001		
H.persicum	152	0.00	0.00	1.25±1.25^{Aa}	5.00±2.67^{Aab}	12.5±3.66^{Ab}	6.36	0.001
	212	0.00	0.00	6.25±2.63^{Aa}	13.75±3.75^{ABab}	26.25±5.96^{Ab}	10.83	0.001
	333	0.00	1.25±1.25^{a}	23.75±4.60^{ABb}	36.25±7.06^{BCb}	52.50±4.53^{Bc}	36.89	0.001
	515	2.50±1.64^{a}	5.00±2.67^{a}	35.00±6.27^{BCb}	41.25±4.41^{Cb}	67.50±5.90^{BCc}	35.51	0.001
	758	6.25±2.63^{a}	8.75±3.98^{a}	52.50±5.90^{Cb}	63.75±4.60^{Db}	88.75±3.98^{Cc}	67.79	0.001
Results of concentration effect	F(4,35)	3.91	2.96	21.26	32.29	39.38		
	P	0.01	0.03	0.001	0.001	0.001		

§ Mortality data at each exposure period was a mean of eight replicates, concentrations applied to 2 cm filter papers held in 33 mL vials. Exposure periods were 3, 6, 9, 12 and 24 h. The means with similar words have no significant difference in each row (small words) and columns (large words). (Tukey test, α = 0.01).

Table 3. Linear regression analysis of *Callosobruchus macuclatus* mortality data on exposure periods in various concentrations of the three essential oils§

Source of essential oil	Concentration (μlL^{-1})	Total number of insects	$F_{(1,3)}$	P-value	R^2	Slop ± SE
L.officinalis	24	560	36.82	0.009	90	0.26 ± 0.04
	30		37.45	0.009	90.1	0.79 ± 0.13
	36		93.03	0.002	95.8	1.80 ± 0.19
	42		10.67	0.047	70.7	2.34 ± 0.72
	51		12.86	0.037	74.8	3.49 ± 0.97
	61		10.44	0.048	70.2	4.74 ± 1.47
A.dracunculus	91	480	40.80	0.008	90.9	0.58 ± 0.09
	139		41.18	0.008	90.9	1.69 ± 0.26
	206		14.65	0.031	77.3	2.32 ± 0.60
	303		28.81	0.013	87.4	3.50 ± 0.65
	454		30.73	0.012	88.1	4.54 ± 0.82
H.persicum	152	480	78.49	0.003	95.1	0.64 ± 0.07
	212		76.07	0.003	94.9	1.34 ± 0.15
	333		35.26	0.010	89.5	2.59 ± 0.44
	515		25.60	0.015	86	3.18 ± 0.63
	758		15.44	0.029	78.3	4.40 ± 1.03

§ Concentrations applied to 2 cm filter papers held in 33 mL vials.

MITES (ACARI: PROSTIGMATA & MESOSTIGMATA) INHABITING GREEN PLANTINGS IN URBAN ENVIRONMENT OF NORTH-EASTERN IRAN, INCLUDING SIX NEW RECORDS

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[**Namaghi, H. S.** 2010. Mites (Acari: Prostigmata & Mesostigmata) inhabiting green plantings in urban environment of north-eastern Iran, including six new records. Munis Entomology & Zoology 5 (1): 123-130]

ABSTRACT: In 2007 & 2008, a study of injurious and beneficial mites inhabiting green plantings was carried out in the urban environment of the north-eastern region of Iran, recording 24 species at different localities. Six species, *Eotetranychus willametti*, *Oligonychus ilicis*, *Tetranychus truncatus, T. tumidellus, Aceria fraxiniflora, and Aculus dimidiatus* are recorded from Iran for the first time. Also, 18 species are new for the fauna of north-eastern provinces of Iran. Most of the collected mites are phytophagous (19 species), dominated by Tetranychidae, with the presence of Tenuipalpidae and Eriophyidae of secondary importance. It was found that *Oligonychus ununguis* and *Tetranychus turkestani* are the most common and important pest species of conifers and broad leaf plants respectively. Species of 4 families belonging to 2 orders were found as predators. Among them, *Phytoseius corniger* and *Amblyseius bagdasarjani* were the most common predatory mite species in green plantings of the study areas. Plant association and provincial records of identified species are given.

KEY WORDS: Acarofauna, Iran, New records, Ornamental plants, Khorasan province

Green plantings in big cities, especially trees contribute to many quality of life factors. Some of the benefits that urban trees provide can be mentioned as follow: providing shade that lowers temperature; reducing air pollution of cities by removing pollutants from the air; trees also sequester and reduce carbon dioxide while releasing oxygen as they photosynthesize; reducing noise pollution; protecting our eyes and skin from harmful sun damage and they contribute to beautifying the urban landscape that we live and work in. There is no doubt that performance of such functions would be impossible if trees are not healthy.

There are a number of environmental stressors that urban trees have to combat as compared with those growing in a forested environment: 1) poor urban soils that are compacted, lack adequate organic matter, and have poor drainage; 2) the presence of detrimental contaminants such as salt and oils; heat island effect phenomenon that traps heat in cities and result in temperatures that can be as much as 10 degrees higher than the surrounding suburbs; 4) construction and mechanical damage to root, trunk and branches and 5) tree disease and pests. The cumulative effect of these factors results in decreasing the vital activity of green plants. On the other hand, urban conditions can also stimulate the reproduction of some important phytophages. In this respect, Tetranychoid mites are one of the most dangerous groups, especially in large cities (Zhovnerchuk, 2006).

Reviewing literature revealed that in Iran up to now, only a few faunistic studies mainly around the capital and northern regions of Iran have been carried out on mites associated with forest trees and bushes. On the other hand, of more than 1040 species of mites reported from Iran (Kamali *et al.* 2001; Khanjani & Haddad Iraninejad, 2005) about 90 species have been found on shade trees and ornamental plants. Except the only report of the occurrence of the Eriophyid, *Trisetacus* sp. on *Pinus* sp. in Mashhad (Kamali, 2007) , to our best knowledge, there has been no previous study on mites associated with green plantings in urban environments in Northern, Southern & Razavi Khorasan provinces of Iran and no information in this regard is available in the literature. This study aimed to investigate the occurrence and species diversity of herbivorous and predatory mites of arboreal plant parts of urban and suburb parks in north-eastern Iran, for further ecological work needed for the urban green plantings integrated pest management program.

MATERIALS AND METHODS

Mites associated with urban trees and plants were surveyed in the main cities of the north-eastern region of Iran in 2007 and 2008. Green plantings in various city and suburb parks as well as botanical gardens were investigated. The mites were collected together with leaves taken from different parts of plants or by shaking them off branches onto a white tray every 2-3 weeks throughout the growing season. The materials were placed in plastic bags or in plastic tubes with 70% ethanol, and after that transported to the laboratory where plant materials were examined under a binocular microscope. Collected mites were slide mounted in Hoyer's medium. Generic and specific identifications were made by the author at 40-100x with a phase contrast microscope, using as reference Bolland *et al* (1998); Jeppson *et al.* (1975); Khanjani & Haddad Iraninejad (2005); Khosrowshahi & Arababi(1997). A representative number of slides were verified or in some cases identified by Dr Hong (China), Dr Ueckermann (South Africa) and Dr Gotoh (Japan).

The sampled plant families were: Salicaceae, Moraceae, Simaroubaceae, Rosaceae, Platanaceae, Pinaceae, Cupressaceae, Fabaceae, Malvaceae, Aceraceae, Ulmaceae, Oleaceae, Meliaceae, Asteraceae, Bignoniaceae, Lamiaceae, Convolvulaceae. Plant names follow Mozaffarian (2003).

The type specimens are held in the mite reference collection of Plant Protection Department, Agricultural College of Ferdowsi University of Mashhad, Iran. Also, some specimens are hold by Dr. Ueckermann (South Africa), Dr. Hong (China) and Dr Gotoh (Japan).

RESULTS

A total of 24 species of 8 families were identified in this study, as indicated subsequently. Six species, *Eotetranychus willametti*, *Oligonychus ilicis*, *Tetranychus truncatus, T. tumidellus, Eriophyes fraxiniflora, and Aculus dimidiatus* were new to the fauna of Iran. Also, 18 species were new records for the region. The following list includes records made by author with comments on the plant association from which our collected materials was taken.

I- Order Mesostigmata
Family Phytoseiidae
Phytoseius corniger Wainstein

Materials examined and associations: 11 specimens (9 ♀♀, 2 ♂♂), Neyshabor (Baghrod), (*Alianthus altissima*), 12 August 2007; Torogh forest park, (*Fraxinus excelsior*), 21 June 2007; Ferdowsi University campus, (*Fraxinus excelsior*), (*Acer* sp.), (*Ulmus* sp.), 14 September 2007; Torbat heidarieh, (*Platanus orientalis*), 11 October 2008.
Previous provincial records for Iran: it is found all over Iran (Kamali et al., 2001).
Comments: This phytoseiid was the most frequently found predator on a variety of plants. It was interesting to observe this predator on plants there were no phytophagous mites.

***Typhlodromus bagdasarjani* Wainstein & Arutunjan, 1967**

Materials examined and associations: 3 specimens (3 ♀♀), Mashhad Airport surrounding, (*Acer* sp.), 29 August 2008; Mashhad (Mellat park), (*Fraxinus excelsior*), Kashmar, 8 October 2008.

Previous provincial records for Iran: East Azerbaijan (Daneshvar, 1978; Modarres Awal, 1997).

Comments: This predatory mite was found on some sampled plants, but it was far less abundant and not as widely distributed as *Phytoseius corniger* species. It is the second record of this mite species in Iran and is new for the province fauna.

II- Order Prostigmata

Family Anystidae

***Anystis baccarum* L.**

Materials examined and associations: 2 ♀♀, Chenara, (*Thuja orientalis*) 28 July 2007; 1 ♀, Mashhad(Vakil abad forest park), (*Platanus orientalis*), 3 August 2008.

Previous provincial records for Iran: Western Azerbaijan, Mazandaran, Khuzestan, East Azerbaijan, Hamadan, Charmahal & Bakhtiari, Tehran (Kamali et al., 2001).

Comments: *Anystis baccarum* L. is a general predator living in diverse habitats, is known to feed on various arthropods including tetranychids, and has been found in association with several perennial crops (Sorenson et al., 1976).

Family Cheyletidae

***Cheyletogenus ornatus* (Canestrini & Fanzago, 1876)**

Materials examined and associations: 5 ♀♀, Ferdowsi University Campus (*Pinus* sp.), October 2008.

Previous provincial records for Iran: Kerman (Merhnejad & Ueckermann, 2001; Yazdani & Ebrahimi 1993); Tehran (Sorush & Kamali, 2002); Mazandaran (Barimani & Kamali, 1999; Faraji & Kamali, 1993; Taghavi et al., 1998).

Comments: Mehrnejad and Ueckermann (2001) found this mite species in the colonies of armored scale insects (*Pistaciaspis pistaciae* and *Salisicola davatchi* B. & K., Diaspididae) on pistachio trees. According to the latter, this mite is a useful predator, but is not deemed an especially promising biocontrol agent.

Family Diptilomiopidae

***Diptacus gigantorhynchus* (Nalepa, 1892)**

Materials examined and associations: 3 specimens, Botanical garden of Ferdowsi University of Mashhad, (*Prunus* sp.), 21 July 2007.

Previously recorded from Guilan on *Mespilus germanica* L. (Hajizadeh, 2004).

Family Eriophyidae

***Aceria fraxiniflora* Felt.,1906**

Materials examined and associations: 51 specimens, Ferdowsi University Campus (*Fraxinus excelsior*), May-October 2007; Torogh forest park, 19 June & 18 August 2008.

Previous records for Iran: Before this study, there was no record of this Eriophyoid species occurring in Iran.

Comments: Numerous specimens of this mite were found on deformed flowers on ash trees (*Fraxinus excelsior*) in May 2007 in Mashhad (Ferdowsi University Campus). Subsequent sampling showed that this species is active throughout the summer and has the potential to produce several generations per year. Frequency of observed deformed male flowers of ash trees in response to this mite feeding which remain on trees as green masses until end of summer suggested that this species could be an important pest of ash in all growing areas.

***Aculus dimidiatus* (Hall, 1967)**

Materials examined and associations: 30 specimens, Mashhad (Mellat park), 5 September 2007, (*Populus* sp.).

Previous records for Iran: This is the first report of the occurrence of this mite species in Iran.

Comments: This vagrant eriophyid was found on both upper and lower leaf surfaces of poplar tree without any specific symptom of feeding injury.

***Rhinophytoptus dudichi* Farkas, 1963**

Materials examined and associations: 3 specimens, botanical garden of Ferdowsi University of Mashhad, (*Prunus* sp.), 21 July 2007.

Previous records for Iran: There is no provincial record of this mite species in Iranian literature, but according to the data base, www.faunaeur.org, Iran is included in the distribution map of this species.

Comments: No damage to the host was observed.

Family Eupalopsellidae

***Eupalopsellus olandicus* Sellnick**

Materials examined and associations: 3 specimens, Ferdowsi University Campus (*Chrysanthemum* sp.), 28 September 2007; Mashhad (Mellat park), (*Chrysanthemum* sp.), 16 October 2007.

Previous provincial records for Iran: Eastern Azerbaijan (Bagheri et al., 2007).

Comments: Eupalopsellid mites play a role in the biological control of spider mites (Tetranychidae) and some insects such as Coccoidea and Diaspididae (Fan, 2004). It is the second record of this mite species in Iran and is new for the province fauna**.**

Family Tenuipalpidae

***Aegyptobia meyerae* Khosrowshahi & Arbabi, 1997**

Materials examined and associations: 5 specimens, Fariman, (*Thuja orientalis*), 18 September 2008, Mashhad (Mellat park), (*Thuja orientalis*), 18 November 2008.

Previous provincial records for Iran: Tehran (Khosrowshahi & Arbabi, 1997).

Comments: This is the second record of *A. meyerae* in Iran and new for the province.

***Agyptobia ueckermanni* Khosrowshahi & Arbabi, 1997**

Materials examined and associations: 3 specimens (♀♀), Mashhad Airport suroundings, (*Thuja orientalis*), 19 October 2008; Mashhad (Mellat park), (*Thuja orientalis*), 2 November 2008.

Previous provincial records for Iran: Tehran (Khosrowshahi & Arbabi, 1997).

Comments: This is the first report of the occurrence of *A. ueckermanni* in Razavi Khorasan province.

***Brevipalpus lewisi*, McGregor, 1949**

Materials examined and associations: 4 specimens (4 ♀♀), Ferdowsi University campus, (*Syringa vulgaris*), 15 October 2007.

Previous provincial records for Iran: Tehran, Lorestan (Khosrowshahi & Arbabi, 1997; Kamali et al., 2001).

Comments: This is the first report of the occurrence of this mite species in Razavi Khorasan province.

***Cenopalpus meyerae* Khosrowshahi, 1991**

Materials examined and associations: 17 specimens, Vakil abad, (*Platanus orientalis*), 2 July 2007, Torogh forest park, (*Platanus orientalis*), 4 August 2007, Mashhad Air port, 23 September 2008, Neyshabor(Baghrod), (*Platanus orientalis*), 13 October 2008.

Previous provincial records for Iran: it is said that this species is widely distributed throughout Iran, but localities are not specified (Khosrowshahi, 1991; Khosrowshahi & Arbabi, 1997).

Comments: This is the second report of the occurrence of this species in Iran and it is new for the Razavi Khorasan fauna.

***Cenopalpus saryabiensis* Akbar & Chuadhri,1985**

Materials examined and associations: 6 specimens (♀♀), Mashhad (Mellat park), (*Pinus eldarica*), 4 August 2007; Torogh , (*Pinus* sp.), 20 September 2007.

Previous provincial records for Iran: Tehran (Khosrowshahi & Arbabi, 1997).

Comments: This is the second record of this mite species in Iran.

Family Tetranychidae

Eotetranychus willametti (McGregor, 1917)

Materials examined and associations: 19 specimens (7 ♂♂, 12 ♀♀), Ferdowsi University campus (*Ulmus campestris*), 19 October & 3 November 2008.
Previous provincial records for Iran: This is the first record of this mite species in Iran.
Comments: This mite is a serious pest of grape in California. Also, it has been reported from elm, white oak, apple pear and other plants (Jeppson et al., 1975).

Oligonychus coffeae McGregor, 1952

Materials examined and associations: 4 specimens (3♀♀, 1♂), Ferdowsi University Campus (*Querqus* sp.), 12 June 2007.
Previous provincial records for Iran: Razavi Khorasan (Sadeghi, 1995); Mazandaran (Barimani et al., 2004).
Comments: Quercus is a new host for *Oligonychus coffeae* in Iran. This mite has already been reported from apple and quince trees in the region.

Oligonychus ilicis McGregor, 1917

Materials examined and associations: 7 specimens (3♂♂, 4♀♀), Mashhad (Bahrabad park), (*Thuja orientalis*), 18 November 2008.
Previous provincial records for Iran: this is the first record of this species from Iran.
Comments: this species has been found on holly, conifers, azalea, camellia, Cranberries, walnut and sycamore in USA, coffee in Brazil, and on tea, rice, laurel holly & boxwood in Japan. It also attacks camphore, eucalyptus, oak, spruce, pear and quince (Jeppson et al., 1975).

Oligonychus judithae Meyer, 1974

Materials examined and associations: 11 specimens (7♀♀, 4♂♂), Mellat park, (*Thuja orientalis*), 27 May 2007, Torogh forest park (*Thuja orientalis*), 6 September 2007, Ferdowsi University Campus (*Thuja orientalis*) October 2008.
Previous provincial records for Iran: Isfahan (Behdad, 1998; Kamali et al., 2001; Khanjani & Haddad Irani Nejad, 2005).
Comments: This is the first record of this species in Razavi Khorasan province.

Oligonychus ununguis (Jacobi, 1905)

Materials examined and associations: 21 specimens (12 ♀♀, 9 ♂♂), Torogh forest Park (*Thuja orientalis*), 23 September 2007; FUC (*Pinus* sp., *Thuja orientalis*, *Juniperus* sp.), May-December 2008; Mashhad (Vakil abad), *Pinus* sp., 4 October 2008.
Previous provincial records for Iran: Mazandaran (Barimani Varandi & Kamali, 1999); Guilan(Kamali et al., 2001, Khanjani & Haddad Irani Nejad, 2005).
Comments: Spruce spider mite is regarded as one of the most serious mites attacking conifers throughout the world. A number of conifers are host to the spruce spider mite including: arborvitae, cypress, fir, false cypress, hemlock, incense cedar, larch, juniper, redwood, pine, yew, Douglas-fir and spruce (Jeppson et al., 1975).

Panonychus ulmi (Koch, 1836)

Materials examined and associations: 5 specimens (3♀♀, 2♂♂), Mashhad (Mellat park), (*Morus alba*), 7 September 2007.
Previous provincial records for Iran: It is widely distributed in major growing areas of Iran: Golestan, West Azerbaijan, East Azerbaijan, Tehran, Razavi Khorasan, (Khanjani & Haddad Irani Nejad, 2005).
Comments: European red mite, *P. ulmi* is a major pest of most deciduous fruit orchards such as apple, pear, plum, peach, cherry, walnut, almond, and several other trees (Jeppson et al., 1975).

Tetranychus truncatus Ehara, 1956

Materials examined and associations: 8 specimens (5♀♀, 3♂♂), Mashhad (Vakil abad), (*Mentha* sp., Lamiaceae), 20 October 2008.

Previous provincial records for Iran: this is the first record of this mite species from Iran.
Comments: This mite has been reported as a pest of mulberry and other plants in Japan and the Philipines (Ehara, 1956).

***Tetranychus tumidellus*, Pritchard & Baker, 1955**
Materials examined and associations: 5 specimens(2 ♀♀, 3 ♂♂), Ferdowsi University Campus, (*Aster* sp.), 14 October 2008.
Previous provincial records for Iran: this is the first record of this mite species from Iran.
Comments: This mite has been reported as pest of wild and cultivated peanut in Brazil, South Turkey, Georgia and Alabama in USA (Jeppson et al., 1975).

***Tetranychus turkestani* (U. & N., 1937)**
Materials examined and associations: 37 specimens (24 ♀♀, 13 ♂♂), Fariman, (*Ailanthus altissima*), 2 June 2007, Ferdowsi University campus, (*Rosa* spp., *Melia azaderach*, *Fraxinus excelsior* , *Ulmus* sp., *Catalpa speciosa*), 27 July 2007; (*Syringa vulgaris* , *Robinia pseudoacacia* L), 7August 2007; Khaf (Torbat Heidarieh), (*Morus alba*), 9 September 2007; Neyshabor (Baghrod), (*Morus nigra*), 29 July 2008.
Previous provincial records for Iran: Ardabil, Isfahan, Southwestern Iran, Tehran Hamadan, Kerman, Charmahal & Bakhtiari, Khuzestan, West Azerbaijan (Kamali et al., 2001; Khanjani & Haddad Irani Nejad, 2005).

***Tetranychus urticae* Koch, 1836**
Materials examined and associations: 25 specimens (16 ♀♀, 9 ♂♂), Shirvan, (*Fraxinus excelsior*), 25 June 2007, Chenaran, (*Robina pseudoacasia*), 1 August 2007, Ferdowsi Univ. campus, (*Rosa* spp., *Acer* sp., *Morus* spp. Ulmus sp.), 1 September 2007.
Previous provincial records for Iran: This species is widely distributed in all growing areas of Iran (Kamali et al., 2001; Rafiei et al., 2004; Khanjani & Haddad Irani Nejad, 2005).
Comments: It is known that this species has more than 150 host plants, including most deciduous fruit trees, vegetables and ornamental plants (Jepson et al., 1975). Two spotted spider mite is predominantly found on mature leaves and is encountered much less frequently on the young expanding leaves.

DISCUSSION

Of 30 mite species collected in this survey, one species each from genera *Tetranychus* (on Wisteria), *Schizotetranychus* (on willow), *Meyernychus* (on Mulberry), *Bryobia* (on Cypress), *Aceria* (on C*onvolvulus* sp.) and *Agistemus* (on *Chrysantemum*) remained undetermined, which are either new species or species of which the identity is still unconfirmed. Of collected species, 19 species were phytophagous. Except in cases of *Tetranychus* spp., *Oligonychus ununguis*, and *A. fraxiniflora*, the majority were relatively not numerous and far from reaching economic injury level.

In this study, *T. turkestani, T. urticae* and *O. ununguis* were the predominant species in the complex of Tetranychoid mites on landscape plants and collected from different locations and plants.

Among the predatory mites, *Phytoseius corniger* and *Typhlodromus bagdasarjani* were present on a variety of plants, even where no phytophagous mites were found. This may allow them to prevent the outbreaks of harmful mites also in the urban environment. Although mite predators of families Stigmaeidae, Anystidae and Cheyletidae are relatively important controlling agents of phytophagous mites (Gerson, *et al.* 2003). Generally the species richness and abundance of these natural enemies on sampled plants was relatively low in the studied areas.

Phytophagous mites diversity is related to the number of predators in the system and their efficiency in preventing single species from monopolizing food resources. Therefore, predators play an important role in diverse and stable conditions and stabilizing factors involved in predator-prey population dynamics (Price, 1997).

High population of certain phytophagous mites may be explained by the lack of predatory mites, which could effectively control various plant pests but are rare in urban environments, possibly because of their sensitivity to air pollution. Several factors have been mentioned to markedly affect the pests of green plantings in urban areas: microclimatic conditions, feed quality, and activities of predatory species as well. All these seem so interconnected that further investigation of this problem requires a more complex approach, taking into account the accumulating anthropogenic stress.

CONCLUSION

The majority of species collected in this study were found in low abundance, with the exception of *Tetranychus turkestani*, *Oligonychus ununguis*, *Aceria fraxiniflora*, *Aculus dimidiatus*. Species diversity of predatory mites was low. This survey was conducted over 2 years. We therefore consider that this study represents preliminary results, and that further faunistic studies are required. Clearly, more species are to be expected after more intensive collecting. Investigations on the effectiveness of the predatory phytoseiid species for the control of the pest species should be a further step.

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A SYNOPSIS ON THE GENUS *RHAMNUSIUM* LATREILLE, 1829 WITH A NEW RECORD (COLEOPTERA: CERAMBYCIDAE) FOR ANATOLIAN FAUNA FROM A NEW HOST PLANT, *LIQUIDAMBAR ORIENTALIS* MILLER (HAMAMELIDACEAE)

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ABSTRACT: All taxa of the genus *Rhamnusium* Latreille, 1829 in the world and Turkey are evaluated. These taxa are also discussed in detail here with some taxonomical, faunistical, zoogeogrephical and biological remarks. A longicorn beetle, *Rhamnusium bicolor* (Schrank, 1781), presented for the first time for Anatolian fauna from a new host plant, *Liquidambar orientalis* Miller (Hamamelidaceae). A short identification key of *Rhamnusium* species is also given in the text.

KEY WORDS: Coleoptera, Cerambycidae, *Rhamnusium*, Turkey, *Liquidambar orientalis*.

First of all, the genus *Rhamnusium* Latreille, 1829 has a classification problem on tribal rank. Traditionally, it was placed by authors in the tribe Rhagiini Kirby, 1837. Vives (2000) separated the genera *Rhamnusium* Latreille, 1829 and *Rhagium* Fabricius, 1775 from other Rhagiini and he grouped the others in the tribe Toxotini Mulsant, 1839. However, the genus *Rhamnusium* was given by Althoff and Danilevsky (1997) under the tribal name Rhamnusiini Danilevsky, 1997 firstly. Several tribes (Rhamnusiini, Oxymirini, Enoploderini) were named in Althoff and Danilevsky (1997). The tribal names Rhamnusiini Danilevsky, 1997 and Enoploderini Danilevsky, 1997 are not available according to the ICZN (1999) Art. 13.1. So now, we do not use the tribe name Rhamnusiini Danilevsky, 1997 as valid. The same opinion is shared by Vitali (2009). He mentioned that Enoploderini and Rhamnusiiini compared only in electronic papers.

In addition to this, the separation as Rhamnusiini Danilevsky, 1997 seems to be require. Danilevsky (2009a) stated that "*according to the DNA Cerambycidae study of M. Sýkorová (2008) with English comments by P.Svacha (personal message, 2008): The three lepturine genera [Enoploderes, Rhamnusium and Sachalinobia] probably should not be included in any of the existing tribes (Xylosteini, Oxymirini, Rhagiini s.l., Lepturini)*". So, Rhamnusiini Danilevsky, 1997 must be establish validly.

Finally, Sama in Sama & Sudre (2009) described tribe Rhamnusiini with the type genus *Rhamnusium* Latreille, 1829.

The main aim of this work is to clarify current status of the genus in the world and Turkey. The genus *Rhamnusium* Latreille, 1829 has Palaearctic chorotype. It is distributed in European and Mediterranean area especially.

MATERIALS AND METHODS

This study was conducted in Turkey. A visual examination was carried out of damages caused to trunks of sweet gum trees in the areas. Some of trunks including larvae in each area were cut and put into rearing boxes (Figure 1). Pupation occurred inside trunks. As soon as possible the adults emerged, the species were determined and taken photos.

According to Alan and Kaya (2003), The natural range of oriental sweet gum is a limited area in southwest Turkey and Rhodos Island in Greece between 36°-38° N, and it is found at altitudes of 0-1000 m.

The natural range of this plant in Turkey is Antalya prov. (Alanya, Kas, Serik), Aydin prov. (Central), Burdur prov. (Bucak), Denizli prov. (Acipayam, Beyagac, Tavas), Isparta prov. (Sutculer) and Mugla prov. (Central, Dalaman, Datca, Fethiye, Koycegiz, Marmaris, Milas, Ortaca, Yatagan) (Figure 2).

RESULTS AND DISCUSSION

Tribe RHAMNUSIINI Sama, 2009
Type genus: *Rhamnusium* Latreille, 1829

Genus *RHAMNUSIUM* Latreille, 1829
Type species: *Rhagium salicis* Fabricius, 1787. = *Cerambyx bicolor* Schrank, 1781 nec Voet, 1778.

Body length is medium size generally. It is approximately between 12 and 24 mm.

Diagnostic characters of this genus are:

The genus differs from the nearest taxa by very strongly developed temples which are far convex in sides; the eyes protruding in sides are not less strongly developed also is not more slight, and is not stronger than temples; head behind the temples suddenly narrowed like a neck. 3rd and 4th antennal segments short and almost same-long, 3rd segment much shorter than 5th.

Head broad and robust, depressed transversally behind the antennal tubercules, with a very short neck. Eyes transverse, cut away forward. Antennae short, thick and sometimes hard toothed in the males, first segment longer than third which is equal with fourth and much shorter than fifth segment. Moreover, pronotum with well developed lateral humps normally; these are big, conical or sharpened but not dental-shaped; the lateral humps always clear. Prosternal process narrow, the front coxae clearly overriding. Mesosternal process between the middle coxae is bit by bit forwards sloping or weakly taken on back, not vertically sloping. Elytra almost parallel in the females, lightly shrunk in apical region in the males, rounded in the apex; elytra have not clear costae, at most only with two or three fine longitudinal lines (Plavilstshikov 1936, Villiers 1978).

The genus *Rhamnusium* Latreille, 1829 is close to the genus *Rhagium* Fabricius, 1775. Both genera can be separated shortly as follows:

- Temples very convex. 3rd and 4th antennal segments short and almost same-long, 3rd segment much shorter than 5th. Lateral humps or tubercules of pronotum not like a spine. Elytra without clear keels.....................***Rhamnusium*** Latreille, 1829

- Temples not very convex. 3rd segment rather long, 4th segment short and 3rd segment not much shorter than 5th. Lateral humps or tubercules of pronotum like a spine. Elytra with clear keels..***Rhagium*** Fabricius, 1775

Larval development is in deciduous trees (*Populus, Aesculus, Ulmus, Fagus, Salix, Quercus, Acer, Castanea, Carpinus, Tilia, Juglans, Prunus, Platanus, Robinia*). Larvae are always in dead parts of living trees, in dead wood in contact with living tissue. Larvae make galleries in the wood. Pupation in pupal cells is spring/summer in the wood generally. Life cycle is about 2-3 years. Adults can be found on the host plants generally (Svacha and Danilevsky 1988, Cherepanov 1990, Bense 1995, Vives 2000, Sama 2002, Hoskovec and Rejzek 2009).

As commonly accepted that the genus has 5 species in the world fauna as *Rhamnusium algericum* Pic, 1896; *R. bicolor* (Schrank, 1781); *R. graecum* Schaufuss, 1862; *R. rugosipenne* Pic, 1939 and *R. testaceipenne* Pic, 1897. *R. algericum* Pic, 1896 is endemic to Algeria and *R. rugosipenne* Pic, 1939 is endemic to China. The remaining species have more or less distribution areas.

In Europe and Turkey, this genus includes 3 species as *R. bicolor* (Schrank, 1781); *R. graecum* Schaufuss, 1862 and *R. testaceipenne* Pic, 1897. According to Bense (1995) it is represented by one species, *R. bicolor* (Schrank, 1781), in Europe due to *Rhamnusium gracilicorne* (Théry, 1894) and *R. graecum* Schaufuss, 1862 are chromatic variations of its. Althoff and Danilevsky (1997) gave three species as mentioned above from Europe. Sama (2002) also accepted one species, *R. bicolor* (Schrank, 1781), for Europe. According to him, all taxa [*R. bicolor* (Schrank, 1781); *R. ruficollis* (Herbst, 1784); *R. graecum* Schaufuss, 1862 and *R. juglandis* Fairmaire, 1866 (=*R. testaceipenne* Pic, 1897)] could be only geographic variations of one species. However, three species were presented by Sama for Europe in Fauna Europeae (2007). The old records from Turkey of *R. graecum* and *R. testaceipenne* summarized in Ozdikmen (2007 and 2008). *R. bicolor* (Schrank, 1781) has not been recorded from Anatolia until now.

The species of the genus *Rhamnusium* Latreille, 1829 are presented as follows:

algericum Pic, 1896
Original combination: *Rhamnusium algericum* Pic, 1896.
Other names: *R. algericum* var. *testaceum* Pic, 1896; *R. algericum* var. *nigrum* Pic, 1906.

Range: N Africa (Algeria).
Chorotype: N African.
Host plants: *Quercus, Acer, Populus* (Svacha and Danilevsky 1988).
Remarks: It is endemic to Algeria.

bicolor Schrank, 1781 (New record for Anatolian fauna).
ssp. ***bicolor*** Schrank, 1781
ssp. ***demaggii*** Tippmann, 1956
Original combination: *Cerambyx bicolor* Schrank, 1781
Other names: *Cerambyx virgo* Voet, 1778 (invalid name); *Cerambyx glaucopterus* Schaller, 1783; *Rhagium schranki* Laicharting, 1784; *Stenocorus ruficollis* Herbst, 1784; *Rhagium salicis* Fabricius, 1787; *Cerambyx rubroviolaceus* Villers, 1789; *Rhagium etruscum* Rossi, 1790; *Stenocorus salicis* (Fabricius) Olivier, 1795; *Rhamnusium bicolor* var. *ambustum* Heyden, 1876; *Rhamnusium bicolor* var. *atripenne* Bedel, 1892; *Rhamnusium bicolor* var. *humerale* Bedel, 1892; *Rhagium gracilicorne* Théry, 1894; *Rhamnusium bicolor* var. *limbatum* Pic, 1897; *Rhamnusium bicolor* var. *capitale* Pic, 1898; *Rhamnusium bicolor* var.

aubei Pic, 1898; *Rhamnusium bicolor* var. *rufotestaceum* Pic, 1898; *Rhamnusium bicolor* var. *inapicale* Pic, 1901; *Rhamnusium bicolor* var. *diversitarse* Dayrem, 1916; *Rhamnusium bicolor* var. *lutetianum* Dayrem, 1916; *Rhamnusium bicolor* var. *pici* Kanabé, 1932; *Rhamnusium bicolor* var. *symmetricum* Kanabé, 1932; *Rhamnusium bicolor* var. *occipitale* Plavilistshikov, 1936; *Rhamnusium bicolor* var. *bischoffi* Pic, 1947; *Rhamnusium bicolor* var. *nigripenns* Podaný, 1950; *Rhamnusium gracilicorne* var. *subhumerale* Heyrovsky, 1955; *Rhamnusium gracilicorne* var. *micani* Heyrovsky, 1955; *Rhamnusium gracilicorne* var. *apicepraeustum* Heyrovsky, 1955; *Rhamnusium bicolor* var. *aeneomicans* Tippmann, 1956; *Rhamnusium bicolor* var. *bergeri* Villiers, 1978 (invalid name); *Rhamnusium bicolor* var. *bedeli* Villiers,1978 (invalid name).

Material examined: Muğla prov.: Fethiye, Yanıklar, 40-60 m, cutting date of trees 08.04.2009; adults emerged in 24.04.2009, in Oriental sweet gum (*Liquidambar orientalis* Miller), leg. H. Cebeci (Figure 3).
Records in Turkey: İstanbul prov.: Büyükada from *Aesculus hippocastanum* (Demelt 1963).
Range: Europe (Spain, France, Italy, Sicily, Slovenia, Croatia, Bosnia-Herzegovina, Serbia, Albania, Macedonia, Greece, Bulgaria, Romania, Hungary, Austria, Switzerland, Czech Republic, Sweden, Germany, Belgium, Netherlands, Luxembourg, Poland, Finland, Estonia, Latvia, Lithuania, Belorussia, Ukraine, ?Crimea, Moldavia, European Russia, European Kazakhstan).
Chorotype: European.
Host plants: *Populus*, *Aesculus*, *Ulmus, Salix, Quercus, Castanea, Tilia, Acer, Juglans*, *Fagus* (Svacha and Danilevsky 1988, Vives 2000, Hoskovec and Rejzek 2009).
Remarks: It is the widest spread species of *Rhamnusium* Latreille, 1829. As understanding from other names, this species is very variable and it has many variations. Diagnostic characters of many variations can obtain from Plavilstshikov (1936) and Villiers (1978). It is represented by the nominotypical subspecies in Turkey. The other subspecies, *Rhamnusium bicolor demaggii* Tippmann, 1956 occurs only in Italy. It is regarded by some authors (e.g. Vitali 2009) as a synonym of the nominotypical subspecies. However, it is still regarded as a subspecies by some authors (e.g. Danilevsky 2009b).

In addition to this, the name of this species is under discussion. The name, *Cerambyx bicolor* Schrank, 1781, is a primary junior homonym of *Cerambyx bicolor* Voet, 1778. The later is in the genus *Chydarteres* Hüdepohl, 1985 in the tribe Trachyderini Dupont, 1836 as a valid name now. Therefore, Silfverbeg (1977) replaced it with the senior synonym name *Cerambyx virgo* Voet, 1778. The last name was also cited by Aurivillius (1912) with a question mark under *R. bicolor* (Schrank, 1781) in spite of being senior name. The replacing of Silfverberg, however, has not been accepted by many authors (Lobanov et al. 1981, Svacha and Danilevsky 1988, Bily and Mehl 1989, Burakowski et al. 1990, Sama 2002) until now. Since, according to the authors, Voet (1778) did not use binominal nomenclature in his publication. Moreover, Sama (2002) stated that the identity of *C. virgo* appears extremely doubtful.

Consequently, this problem has still been unsolved. In real, under these circumstances, *Cerambyx bicolor* Schrank, 1781 is still a primary homonym. And it must be replace with an available name according to ICZN (1999). It seems that a senior synonym name for it is *Cerambyx glaucopterus* Schaller, 1783, but we propose to preserve the name *R. bicolor* (Schrank, 1781) due to prevailing usage according to ICZN (1999) Art. 23.9.

This species has been recorded only by Demelt (1963) from horse chestnut tree (*Aesculus hippocastanum*) for NW Turkey (Istanbul province) until now.

This old record was so doubtful. Since *R. graecum* was also recorded by Demelt (1963) in the same reference from same locality, date and host plant. So, Demelt's record from Istanbul was disregarded by Ozdikmen (2008) for Marmara region of Turkey due to the doubtful status of *R. bicolor* for Turkey. The presence of *R. bicolor* in Turkey is also confirmed by the authors with this work.

These present materials obtained from host plant of larvae. Host plant is Oriental sweet gum (Hamamelidaceae: *Liquidambar orientalis* Miller). It is a new host plant of *Rhamnusium bicolor* (Schrank, 1781). The present materials are the second record for Turkey and it is the first record for Anatolian fauna (SW Turkey) interestingly.

The larvae of *Rhamnusium bicolor* feed in the wood. The specimens were collected in a hollow trunk of Oriental sweet gum (Figure 4).

Among the longhorned beetles species, only *Rhaesus serricollis* (Motschulsky, 1838) has been recorded by Acatay (1971), Erdem and Canakcioglu (1977), Canakcioglu (1983), Oymen (1987) from Oriental sweet gum in Turkey until now. So, Oriental sweet gum is served as a host plant for two longhorned beetles species with the present record.

graecum Schaufuss, 1862
ssp. ***graecum*** Schaufuss, 1862
ssp. ***italicum*** Müller, 1966

Original combination: *Rhamnusium graecum* Schaufuss, 1862.
Other names: *Rhamnusium juglandis* Fairmaire, 1866; *Rhamnusium graecum* var. *praeustum* Reitter, 1895; *Rhamnusium graecum* var. *geniculatum* Pic,1898; *Rhamnusium delagrangei* Pic, 1901.

Records in Turkey: Anatolia as *R. graecum* var. *juglandis* Fairmaire, 1866 (Aurivillius 1912, Winkler 1924-1932); Anatolia (Plavilstshikov 1936); Istanbul prov.: Princes Islands from *Aesculus hippocastanum* (Demelt 1963); Turkey (Lobanov et al. 1981, Danilevsky and Miroshnikov 1985, Lodos 1998); Ankara prov.: Kizilcahamam, Istanbul prov.: Princes Islands from *Populus* (Svacha and Danilevsky 1988); European Turkey (Althoff and Danilevsky 1997).
Range: Europe (Italy, Greece, European Turkey), Transcaucasia, Azerbaijan, Armenia, Syria, Turkey, Persia.
Chorotype: Turano-Mediterranean (Turano-Apenninian).
Host plants: *Populus* (Svacha and Danilevsky 1988).
Remarks: It is more or less widespread species of *Rhamnusium* Latreille, 1829. This species has two subspecies. It is represented by the nominotypical subspecies in Turkey. Known other subspecies, *R. graecum italicum* Müller, 1966 occurs only in Italy. *R. juglandis* that has reddish-yellow elytra described from Turkey (İzmir prov.: Bozdağ), *R. graecum* var. *praeustum* described from Syria and *R. graecum* var. *geniculatum* that has reddish-yellow coloration in the apex of abdomen and femora and in the base of tibiae and antennae described from Greece. It was also recorded from Anatolia by Pic (1901).

We have another problem. *Rhamnusium delagrangei* was described from Smyrna (=Izmir province in SW Anatolia) by Pic (1901). Aurivillius (1912) and Winkler (1924-1932) gave the species in *Rhamnusium* for Smyrna (SW Anatolia). According to Pic (1901), this species has almost entirely black femora and relatively robust body. In the other side, a species, *R. juglandis* with reddish-yellow elytra described from Izmir province (Bozdag). It is regarded as a color variation of *R. graecum* (e.g. Plavilstshikov, 1936). Also Plavilstshikov (1936) do not mention *delagrangei* Pic, 1901. However, it is very probably that it also should be a synonym of *R. graecum* like *R. juglandis*.

rugosipenne Pic, 1939.
Original combination: *Rhamnusium rugosipenne* Pic, 1939.

Range: China.
Chorotype: Chineese.
Remarks: It is endemic to China.

testaceipenne Pic, 1897.
Original combination: *Rhamnusium testaceipenne* Pic, 1897.
Other names: *Rhamnusium testaceipenne* var. *anatolicum* Pic, 1901; *Rhamnusium testaceipenne* var. *obscuripes* Pic, 1903; *Rhamnusium testaceipenne* var. *rufotibialis* Pic, 1908; *Rhamnusium testaceipenne* var. *mesmini* Pic, 1908.

Records in Turkey: Amasya prov. as *R. testaceipenne* var. *anatolicum* Pic, 1901 (Aurivillius 1912); Asia Minor as *R. testaceipenne* var. *anatolicum* Pic, 1901 (Winkler 1924-1932); European Turkey as *R. testaceipenne* var. *obscuripes* Pic, 1903 (Winkler 1924-1932); Turkey (Aurivillius 1912 as *R. testaceipenne* var. *obscuripes* Pic, 1903; Lobanov et al. 1981, Danilevsky and Miroshnikov 1985, Lodos 1998, Svacha and Danilevsky 1988 from *Carpinus*; Sama 2002); Anatolia (Plavilstshikov 1936); Ankara prov.: Cubuk (Demelt 1963); Konya prov. (Danilevsky 2009b).
Range: Europe (Crimea), Caucasia, Transcaucasia, Near East, Turkey, Syria, Persia.
Chorotype: Turanian (Ponto-Caspian).
Host plants: *Quercus, Carpinus* (Svacha and Danilevsky 1988, Hoskovec and Rejzek 2009).
Remarks: It is more or less widespread species of *Rhamnusium* Latreille, 1829. *R. testaceipenne* var. *anatolicum* and *R. testaceipenne* var. *obscuripes* described from Turkey. Accordnig to Plavilstshikov (1936), it is very possible that *R. testaceipenne* var. *obscuripes* belongs to *R. graecum* Schaufuss, 1862. Elytra is blue and legs and abdomen are partly black in *R. testaceipenne* var. *obscuripes*. Also *R. testaceipenne* var. *rufotibialis* described from Taurus. Sama (2002) supposed *R. testaceipenne* Pic, 1897 is a synonym of *R. juglandis* Fairmaire, 1866. However, according to Plavilstshikov (1936) *R. juglandis* Fairmaire, 1866 (as var. *juglandis* Fairm.) is a red form of *R. graecum* Schaufuss, 1862.

A short identification key of Turkish *Rhamnusium* species

1 Antennae at least partly black..**2**
- In general, antennae light, redish-yellow or yellow, in apical half dull. Rarely antennae partly black...**3**
2 Antennae black, at most in the base lightly. All femora completely or partly black...***graecum*** Schaufuss, 1862
- Antennae up to middle of the 5th segment lightly, at most in the base darkened. Only hind femora black in the base.........................***bicolor*** Schrank, 1781 (partly)
3 First antennal segment strongly thickened, less two times longer than apical width. 5th segment more than twice longer than at the apical width.........................
....***bicolor*** Schrank, 1781 (partly)
- First antennal segment less tickened, at least two times longer than apical width. 5th segment no more than twice longer than at the apical width...............................
....***testaceipenne*** Pic, 1897

Note: The present zoogeographical characterisation is based on the chorotype classification of Anatolian fauna, recently proposed by Taglianti et al. (1999).

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Figure 1. Tree pieces into rearing boxes.

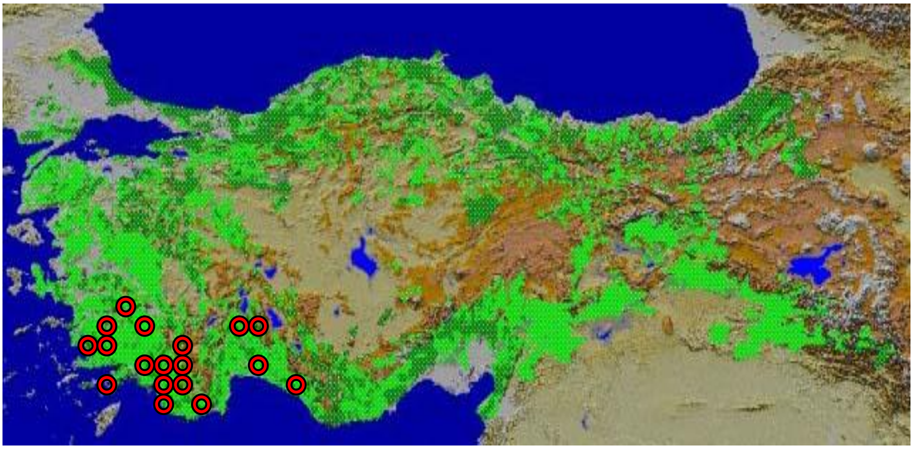

Figure 2. The natural ranges of Oriental sweet gum.

a **b**

Figure 3. *Rhamnusium bicolor* (Schrank, 1781) a) Female b) Male

Figure 4. The damage of larvae in the wood.

A GEOMETRIC MORPHOMETRIC STUDY ON THE HOST POPULATIONS OF THE POD BORER ,*HELICOVERPA ARMIGERA* (HÜBNER) (LEPIDOPTERA: NOCTUIDAE) IN SOME PARTS OF IRAN

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[Khiaban, N. G. M. Z., Haddad Irani Nejad, K., Hejazi, M. S., Mohammadi, S. A. & Sokhandan, N. 2010. A geometric morphometric study on the host populations of the Pod Borer, *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) in some parts of Iran. Munis Entomology & Zoology 5 (1): 140-147**]**

ABSTRACT: The pod borer, *Helicoverpa armigera* (Hübner) is one of the key pests causing severe yield losses in several crops such as cereals, pulses, cotton, vegetables and fruit crops as well as wild hosts in Iran. In this study, shapes and sizes of wings were compared in populations on 4 host plants (cotton, tomato, corn and chickpea) using a land mark – based geometric morphometric method, analysis of partial warp scores and centroid sizes. The results showed significantly smaller wing size in populations on cotton and a significant host plant–associated shape difference among populations. Multivariate analysis of variance (MANOVA) of shape variables in forewings indicated significant differences among populations. Simple analysis of variance (ANOVA) indicated that the centroid size of cotton populations was significantly smaller than others. The analysis also showed a significant difference between the populations.

KEY WORDS: Geometric morphometric, Sexual dimorphism, Thin plate- spline, Pod borer, *Helicoverpa armigera,* Host populations

When an insect population has two or more host species, the possibility arises that gene flow is restricted between groups on different hosts that are subjected to divergent natural selection for host adaptations (Berlocher & Feder, 2002).

The ability of many of insect species to existence on diverse host plants is an useful strategy and adaptive advantage for their better survival in the ecosystem. In nature, polyphagous pests tend to be mono or oligophagic at the micro ecological level and their populations could be made up of individuals that are predominantly monophagous (Karowe, 1989). If host plant species produce different selective regimes to herbivorous insects, genetic variations and host plant–associated local adaptation may occur (Ruiz-Montoya et al., 2003).

The existence of host-associated populations has been demonstrated in several insect pests (Downie et al., 2001; Abdullahi et al., 2003; Sarafrazi et al., 2004; Mozaffarian et al., 2007). Polyphagous insects have many advantages and feed on different hosts providing different nutritional resources. The selective use among diverse resources may lead to the evolution of ecological specialization and adaptation (Berenbaum, 1996; Kawecki, 1997). The pod borer is migratory and is also a key pest on all continents (Feng et al., 2005). Hence polyphagy at the species level, as has been demonstrated in *H. armigera*, does not necessarily imply polyphagy at the individual level (Cunningham et al., 1999).

Host plants used by *H.armigera* have been recorded for India (60 cultivated and 67 wild plants) (Karim, 2000), Africa (Pearson, 1958), Australia (Zalucki et al., 1994), and New Zealand (Thanee, 1987).

H. armigera has high mobility and fecundity and has also shown great capacity to develop resistance to used different synthetic insecticides in its management (Armes et al., 1996; Kranthi, 1997). The versatility and adaptively of this species may be due to the presence of a strong genetic variability governing the behavior of *H. armigera* (Zhou et al., 2000; Scott et al., 2003) making it a serious pest on several crops.

A better understanding of the host populations differences of polyphagous pest like *H. armigera* can be very useful to understand the structure , population dynamics, their behavior and response to various selection pressures.

In our observation the relative abundance of *H. armigera* in chickpea and corn was much higher than in cotton and other host crops in North- west Iranian cotton ecosystems. To gain information on intraspecific variation in the pod borer, this study searched for significant differences among host populations of the pest using geometric morphometric techniques.

MATERIAL AND METHODS

During summer 2005-2006 Larve of *H.armigera* were collected from several provinces in Iran from North and North west of Iran on different crops such as Tomato, chickpea, Cotton, Corn and reared in laboratory (Table 1). Forewings were measured. 15 landmarks on the forewing were chosen (Figure 1), and their Cartesian coordinates were digitized by tpsDig (Rohlf, 2003a). A total of 134 forewing images were analyzed. The raw coordinate data were aligned prior to analysis using the software package tpsRelw (version 3.2) to remove size and arbitrary positioning effects of the specimens relative to the reference axis (Rolf & Marcus, 1993). The average shape or tangent configuration was computed as the average configuration of all specimens. Rotation, translation and scaling parameters were calculated in order to make the coordinate data interpretable and to bring all the images into a common coordinate system (Rohlf & Marcus, 1993). These parameters were then used to superimpose the configurations. The rotational fitting options used were generalised least-squares (GLS) (Pavlinov 2001).

Centroid sizes as a size measure of any specimen (Slice et al., 1996) were calculated and used as variables in univariate statistical analysis for comparing the size of specimens (Adams & Funk, 1997). Variation between different populations was analysed using tpsRelw or NTSYS-pc, using partial warp scores for each specimen as variables in multivariate analyses of variance (MANOVA).
Morphologic distances among test populations were computed and the result and distance matrixes were also subjected to cluster analysis by the unweighted pair group method to show similarity among test populations. To find any isometry in size variation between populations, analyses of allometry among known groups were performed. Statistical analyses were performed using NTSYS-pc (Rohlf, 1998) and SPSS 14.

RESULTS

Altogether, 134 forewing images were analyzed. PCA of forewing data found three principal components (PCs) with eigenvalues greater than 1%. The first principal component, PC1, accounted for 46.399% of variability, and the 2 accounted for 85.14%. An ordination plot of PCA (Fig. 2) shows that the first principal component separated the cotton and tomato populations from the other populations. DFA found three discriminant functions that were statistically significant at the 95% confidence level. DFA of forewings differentiated geographic populations in 72.2% of cases, i.e., among the 134 forewings, 97 specimens were placed correctly in one of the four regions. The morphological distances among forewings was greatest between the tomato population of shahindej and the cotton populations of cotton and corn population of Khodaafarin. The two closest populations (23.546) were chickpea population of sardasht and corn population of khodaafarin (Table 2).

A DFA scatter plot of populations implies that the cotton population was very dissimilar from others (Fig. 3). The cotton population was clearly differentiated from the other populations. The cluster analysis gave the same general results as did the DFA. The closest populations (chickpea and corn), were placed closest together in all analyses.

CVA plots of CV1 against CV2 also showed significant differences between all populations (Fig,6).

Comparing centroid sizes of host plant associated populations showed significant differences between them and in all comparisons cotton associated populations had smaller wings than other host plant populations (Figure 4).

ANOVA test on centroid size found significantly different populations among the four populations in the study areas in general(Table 3).

Regression of shape on size in the above comparisons did not show significant allometric growth between host plant-associated populations (Table 4).

DISCUSSION

Cluster analyses of morphologic distances showed that wing shape within populations feeding on cotton is more dissimilar than those feeding on other host plants. And within populations feeding on corn and chickpea are more similar together. Comparing centroid sizes showed cotton associated populations had smaller wings than other host plant populations. A study of genetic variability of the bollworm, *Helicoverpa armigera,* occurring on different host plants showed that cotton stood out as unique in one cluster while the insects collected and reared on all other hosts grouped separately (Subramanian & Mohankumar, 2006). The bollworm, *H. armigera* inflicts severe damage on cotton worldwide. However, laboratory studies on the relative host preferences of *H. armigera* for cotton revealed that cotton was the host of lowest relative preference. However in areas of intense cotton cultivation a very high percentage of local pod borer populations may feed exclusively on cotton at certain times of the growing season (Gould 1998). our results showed the same results and may confirm association between molecular and geometric morphometric works particularly in the cotton population. Smallest size in cotton population confirm that cotton has lowest preference. The larger size of moths on hosts other than cotton showed that some host plants such as tomato, corn and chickpea can provide for increased stored nutritional reserves by larvae that may result in more successful over-wintering and higher fecundity in adults. The scatter plots of CVA in *H.armigera* confirmed that the greatest morphological distance was observed between the cotton and tomato population.

Multivariate analyses of partial-warp scores of the wing shapes of the pod borer *H.armigera* demonstrated significant differences among host populations. The existence of *H.armigera* in different phenotypes may therefore have allowed survival in a variety of geographic conditions. Because many different selective pressures can be hypothesized to explain host plant specialization, it is easy to predict that the evolutionary process will be strongly dependent upon geographic variation in insect-plant interactions (Ballabeni et al. 2003), but evidence of this is seldom documented. The observed variation in *H.armigera* is probably linked to geographic differences in habitats and different altitude and enviromental conditions, as has been observed in other species.

A geometric morphometic study on the host plant-associated population variation of carob moth, *Ectomyelois ceratoniae* (Zeller, 1839) (Lepidoptera: Pyralidae), showed significantly smaller wing size in populations on pomegranate and a significant host plant-associated shape difference among populations as a consequence of allometric growth (Mozaffarian, et al 2007). The phenotype of each individual could therefore be the result of an interaction between its genotype and its environment, related to different geographic, altitude and climatological conditions.

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Table 1. List and code of collecting sites and host plants, and the number of forewing female Pod borer.

Province	**Population**	**Host**	**code**	**Fore wing Female**
Golestan	Gorgan	cotton	GC	15
Ardabil	Khodafarin	corn	KF	30
West Azarbyjan	Sardasht	chickpea	SD	66
West Azarbyjan	Shahindej	tomato	SJ	20
	Total			134

Table 2. Square of morphological distances between four host populations of *Helicoverpa armigera*.

	Squared Euclidean Distance			
	1	2	3	4
1	.000	54.739	49.506	64.179
2	54.739	.000	23.546	62.770
3	49.506	23.546	.000	57.260
4	64.179	62.770	57.260	.000

This is a dissimilarity matrix

Table 3. One way ANOVA of Centroid Size in female fore wings.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	239380.7	3	79793.567	14.969	.000
Within Groups	692969.3	130	5330.533		
Total	932350.0	133			

Table 4. Regression of shape on size in host populations of *Helicoverpa armigera* in Iran.

Wing	**Sex**	**Wilks` λ**	**Fs**	**df1**	**df2**	**Probability**
Forewing	**Female**	**0.76775022**	**1.513**	**22**	**110**	**0.0842**

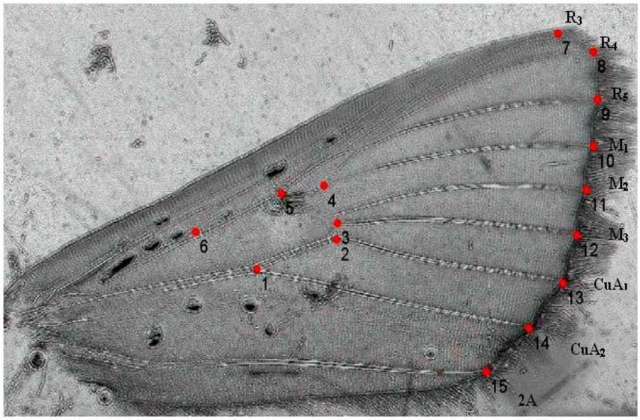

Figure 1. Distribution of landmarks on forewing of *Helicoverpa armigera*.

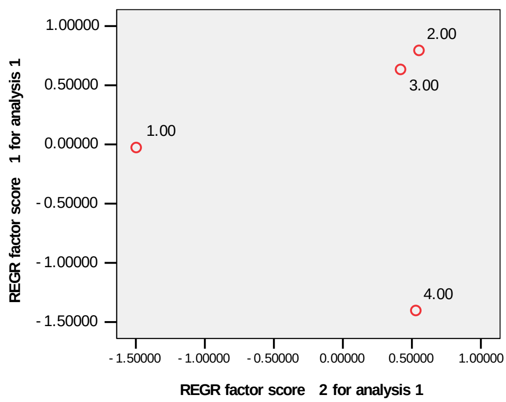

Fig. 2. Ordination plot for four populations in principal of component analysis (PCA) 1-GC, 2-KF, 3-SD, 4-SJ

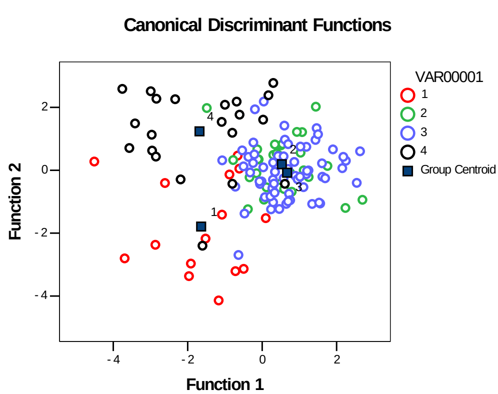

Fig. 3. Plot of discriminant function analysis (DFA) forewing shapes 1-GC, 2-KF, 3-SD, 4-SJ

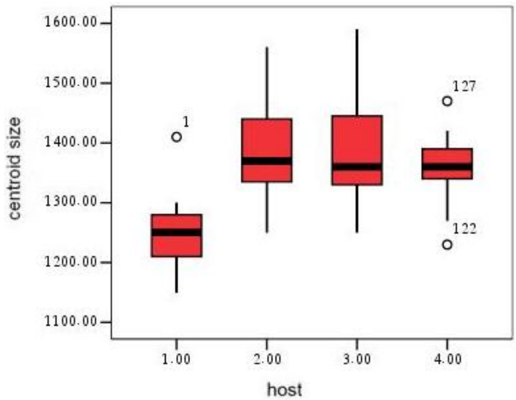

Figure 4. Comparing size of forewings between populations on different host plants. 1- cotton, 2- corn, 3- chickpea, 4- tomato

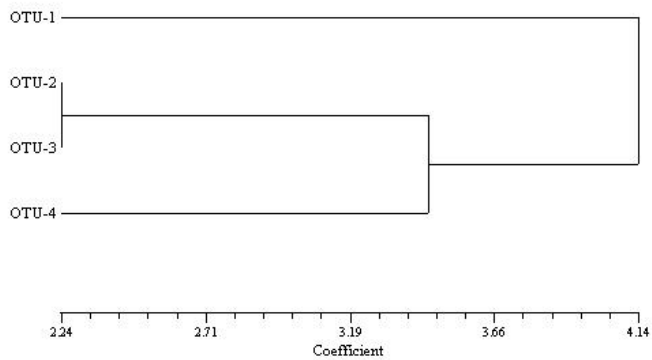

Figure 5. Cluster Analysis of Pod borer forewings 1-GC, 2-KF, 3-SD, 4-SJ

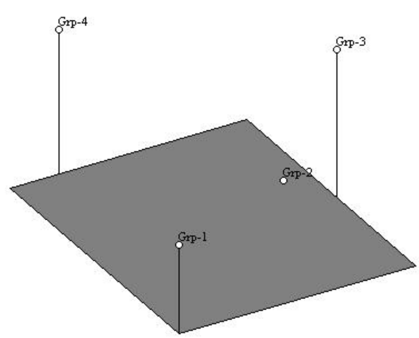

Figure 6. CVA of female forewings of pod borer 1-GC, 2-KF, 3-SD, 4-SJ

CONTRIBUTION TO THE STUDY OF EULOPHIDAE (HYMENOPTERA: CHALCIDOIDEA) OF FARS PROVINCE OF IRAN: I- SUBFAMILIES ENTEDONINAE AND TETRASTICHINAE

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ABSTRACT: A checklist of the species belonging to the eulophid subfamilies Entedoninae and Tetrasichinae collected in Fars province of Iran during 2004 to 2007 is presented. 4 species of Entedoninae and 11 species of Tetrasichinae are listed among them 3 species are recorded for the first time from Iran. Available biological data and geographical distribution of each species is mentioned briefly.

KEY WORDS: Eulophidae, Entedoninae, Tetrastichinae, Fars, Iran

Eulophidae (Hymenoptera: Chalcidoidea) is one of the largest families of parasitic wasps containing over 4472 species placed in 297 genera (Noyes, 2008). Most eulophids are generally parasitoids of holometabolous insects, but overall range of hosts and biology is remarkable diverse. Although the majority of species are parasitoids, the family also contains phytophagous and predator species. Parasitoids may be ectoparasitoids (Eulophinae and Euderinae) or endoparasitoids (Entedoninae and Tetrastichinae). Several species of Eulophidae are important in biocontrol programs throughout the world (Noyes 2008).

The eulophid wasps of Iran have received attention recently. The first reported Eulophidae from Iran was *Tetrastichus epilachnae* (Girard, 1896) (Kiryukhin, 1948; Herting, 1973). Then Davachi & Chodjai (1968) reported only 2 eulophid species. Different authors added some records on this family (e. g. Doganlar, 1992; Hesami et al., 2005; Hesami et al., 2006; Hesami et al., 2007, Mahani et al., 2003; Rezaei et al., 2003; Talebi et al., 2005; Yefremova et al., 2007; Zahiri et al. 2003). In this paper we report some species from subfamilies Entedoninae and Tetrastichinae from Fars province. Also we will provide species list of two other subfamilies (Euderinae and Eulophinae) in a separate paper.

MATERIALS AND METHODS

This paper is a result of twenty two collection trips of first author to the different localities of Fars province during the years 2004-2007. The eulophid wasps were reared from hosts or captured by sweep net or malaise trap. The specimens are deposited in the Zoological Institution of Russian Academy of Science, St. Petersburg (ZISP), and Department of Plant Protection, Islamic Azad University, Shiraz branch. The taxonomic arrangement of Boucek (1988) for subfamilies is followed in this paper. The morphological terminology follows Graham (1987, 1991) and Gibson (1997). Synonyms, combinations and misspelling are according to Noyes (2008).

The abbreviations used in the text are as follows: SMV= submarginal vein, MV= marginal vein, PMV= postmarginal vein, SV= stigmal vein. Sculpture terminology follows Eady (1968) and Harris (1979).

Species account

Subfamily Entedoninae
Genus *Chrysocharis* Foerster, 1856

Chrysocharis Forster, 1856: 152. Type species: *Chrysocharis femoralis* Forster, 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.) (Boucek & Askew, 1968; Hansson, 1985).

Distribution. Cosmopolitan.

Identification. Keys to the species of this genus was published by Trjapitzin (1978) and Hansson (1985).

Chrysocharis laomedon (Walker, 1839)

Synonyms. *Entedon laomedon* Walker 1839, *Entedon parsodes* Walker 1839, *Entedon sartamus* Walker 1839, *Epilampsis albiceps* Delucchi 1954, *Kratochviliana laomedon* Boucek 1961

Material examined: 2♀, Iran, Fars, Dashte Arjan (29°34’ N, 51°56’ E, 2100 m), sweeping in oak trees, 20 April 2007.

Biology. Parasitoid of Curculionidae, Agromyzidae, many leafmining Lepidoptera (Gracillariidae, Lyonetidae, Nepticulidae and Tischeriidae) (Hansson, 1985; Noyes, 2008).

Distribution. Nearctic and Palearctic regions. This species is widely distributed in Europe without any report from the Middle East.

This is a new record for the fauna of Iran.

Genus *Closterocerus* Westwood, 1833

Closterocerus Westwood, 1883. Type species *Closterocerus trifasciatus* Westwood, 1833, by monotypy.

Diagnosis. Mesopleuron with transepimeral sulcus weakly curved or straight, arching posteriad. Fore wing usually with a single line of setae extending apically from stigma, radial cell bare, postmarginal vein equal or shorter than stigmal vein. Antenna typically strongly flattened, funicle with capitate big sensillae rounded apically (mushroom shape) (sensilla visible only in slide); sensory pores of scape in a cluster near apex of scape in males.

Biology. Host range very broad, primary parasitoid of various mining Diptera (Agromyzidae), Lepidoptera (Gracillariidae, Coleophoridae), Coleoptera and Hymenoptera; also hyperparasitoid of some Hymenoptera such as Braconidae, Eulophidae and Encyrtidae (Boucek & Askew, 1968; Hansson, 1994).
Distribution. Cosmopolitan.
Identification. Species identification can be possible with Hansson (1990).

Closterocerus formosus Westwood, 1833

Main combinations and synonyms. *Achrysocharis formosa* (Westwood, 1833), *Chrysonotomyia formosa* (Westwood, 1833), *Derostenus* (*Closterocerus*) *formosus* (Westwood, 1833), *Derostenus fullowayi* Crawford, 1913, *Derostenus silvia* (Girault, 1917), *Derostenus variipes* Crawford, 1913, *Entedon formosus* (Westwood, 1833), *Entedon ovulorum* Ratzeburg, 1848, *Entedon phaenna* Walker, 1839, *Neochrysocharis formosa* (Westwood, 1833).
Material examined. 7♀& 6♂, Iran, Fars, Shiraz (29°45' N, 52°28' E, 1600-1700 m), 14 June 2006, ex *Liriomyza trifolii* Burgess (Diptera: Agromyzidae) on basil; 4♀ & 1♂, Iran, Fars, Shiraz, Eram Garden (29° 38' N, 52° 31' E, 1560 m), 28 June 2006, ex *Calycomyza humeralis* (Diptera; Agromyzidae) on aster, 6 ♀ & 2♂, Iran, Fars, Shiraz, Zafar abad (29°24' N, 52°35' E, 1400-1500 m), 6 July 2007, ex *L. trifolii* on cucumber.
Biology. Solitary larval endoparasitoid of lepidopterous and diptereous leaf-miners.
Distribution. Cosmopolitan.

Genus *Entedon* Dalman, 1820

Diagnosis. Propodeum without true lateral plicae, with single median carina (most species); pronotum narrow dorsally, its lateral margins with protruding lateral shoulders delimited by semicircular plica beneath; propodeal spiracle on elevated area bearing lateral subconical projection beneath; mandibles with 2 teeth in all known species; first gastral tergite with oval membranous areas adjacent to the petiolar emargination.
Biology. The species of *Entedon* are recorded as solitary (most species) or gregarious (*E. cioni* Thomson, *E. cionobius* Thomson, *E. zanara* Walker) larval (rarely egg-larval, e.g. *E. ergias*) endoparasitoids of various Coleoptera, mainly Curculionidae (including Scolytinae), but also Apionidae, Chrysomelidae (Bruchinae, in particular), Anobiidae, Mordellidae, Bostrichidae, Buprestidae, Cerambycidae, Nitidulidae, However, the biological data on many species remain unknown (Gumovsky & Boyadzhiev, 2003).
Distribution. Cosmopolitan.
Identification. Askew (1991) and Gumovsky (1997a, 1997b, 1998a, 1998b, 1999a, 1999b) provided useful keys to this genus.

Entedon sp.

Material examined. 7♀ & 2♂, Iran, Fars, Shiraz,Akbar abad ring way (29°40' N, 52°33' E, 1730 m), 17 April 2006, ex cocoons of *Apanteles glomeratus* (Hymenoptera: Braconidae) on *Aporia crataegi* (Lepidoptera: Pieridae) on the wild almond.
This is first report of this genus from Fars province of Iran.

Genus *Pediobius* Walker, 1846

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 Lepidoptera, Coleoptera, Diptera and Hymenoptera, some species attack spider eggs often as secondary parasitoid.
Distribution. Cosmopolitan.
Identification of species: Keys to species of *Pediobius* are published by Boucek (1965) and Trjapitzin (1978).

Pediobius pyrgo **(Walker, 1839)**

Synonyms. *Entedon pyrgo* Walker, 1839, *Derostenus nawai* Ashmead, 1904, *Elachestus complaniusculus* Ratzeburg, 1852, *Eulophus pyralidum* Audouin, 1842, *Pediobius nawai* (Ashmead, 1904), *Pleurotropis complaniuscula* (Ratzeburg, 1852), *Pleurotropis nawai* (Ashmead, 1904), *Pleurotropis* (*Rhopalotus*) *substrigosa* Thomson, 1878, *Rhopalotus chalcidiphagus* Szelényi, 1957, *Rhopalotus substrigosus* (Thomson, 1878)
Material examined: 1♀, Iran, Fars, Shiraz, Eram Garden (29° 38' N, 52° 31' E, 1560 m), 28 September 2006, ex *Phylloncnistis citrella* Stainton (Lepidoptera: Gracillariidae).
Biology. Parasitoid of larva and pupa of different orders of insects such as Coleoptera, Dermaptera, Diptera, Hymenoptera and Lepidoptera, Also hyperparasitoid of Hymenoptera such as Braconidae, Eulophidae, Ichneumonidae and Pteromalidae through their lepidopteran hosts.
Distribution. Nearctic, Palearctic and Oriental. It's second report from Iran and first report from Fars province of Iran.

Subfamily Tetrastichinae

Genus *Aprostocetus* Westwood, 1833

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; mesoscutum 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. Hosts are very variable, most of them associated with galling arthropods such as Cecidomyiidae, Cynipidae and Eriophyidae, Also on Chrysomelidae, Curculionidae (Coleoptera), Agromyzidae, Tephritidae (Diptera), Coccidae (Hemiptera), Gracillariidae, Lasiocampidae, Lymantriidae, Lyonetiidae, Pyralidae, Tischeriidae, Tortricidae, Yponomeutidae, Pieridae (Lepidoptera) and Anguinidae (Nematoda).
Distribution. Cosmopolitan.
Identification. A key for identification of European species of *Aprostocetus* was given by Graham (1987). Yefremova et al. (2007) provided a key to 9 species of Iran, but here we report a new species that is not in that key.

Aprostocetus artemisicola **Graham, 1987**

Material examined. 2♀ & 1♂, Iran, Fars, Dashte Arjan, Arjan-Parishan protected area (29°34' N, 51°56' E, 2100 m), 21 April 2007, sweeping in the oak forest.
Biology. Parasitoid of Cecidomyiidae (Diptera) on *Artemisia* spp.
Distribution. This species is distributed in Europe without any report from the Middle East. **This is a new record for the fauna of Iran.**

Aprostocetus forsteri Walker, 1847

Synonyms. *Eulophus forsteri* Walker, 1847, *Tetrastichus forsteri* (Walker, 1847).
Material examined. 1♀, Iran, Fars, Ghalat (29°48' N, 52°19' E, 2090 m), 11 July 2006, Malaise trap (ZISP).
Biology. Parasitoid of *Aylax jaceae* Schenek (Hymenoptera, Cynipidae) (Graham, 1978), *Aylax salviae* Giraud (Hymenoptera, Cynipidae) (Domenichini, 1966).
Distribution: Palearctic. This is a new record for the fauna of Fars province of Iran.

Aprostocetus lachares (Walker, 1839)

Synonyms. *Cirrospilus lachares* Walker, 1839, *Tetrastichus lachares* (Walker, 1839)
Material examined. 2♀ & 1♂, Iran, Fars, Shiraz (29°41' N, 52°28', 1650 m), 4 August 2006, Sweeping in weeds in a garden.
Biology. Unknown.
Distribution. Palearctic. This is a new record for the fauna of Fars province of Iran.

Aprostocetus zosimus (Walker, 1839)

Main combinations an synonyms. *Aprostocetus charoba* (Walker, 1840), *Cirrospilus zosimus* Walker, 1839, *Tetrastichus zosimus* (Walker, 1839).
Material examined. 1♀, Iran, Fars, Sepidan, Bereshneh (30°12' N, 52°02' E, 2080 m), 17 October 2006, ex galls of *Diplolepis rosae* (L.) (Hymenoptera: Cynipidae) on *Rosa canina* also with another parasitoids *Orthopelma mediator* (Thunberg) (Hymenoptera: Ichneumonidae) and *Eupelmus urozonus* Dalman (Hymenoptera: Eupelmidae) (ZISP).
Biology. Parasitoid of Cecidomyiidae (Diptera), Coleophoridae and Lyonetiidae (Lepidoptera). Also hyperparasitoid of Platygasteridae, Pteromalidae and Eupelmidae.
Distribution. Nearctic, Palearctic, New Zealand.

Genus *Baryscapus* Forster, 1856

Baryscapus Forster, 1856: 84. Type species: *Baryscapus centricolae* Ashmead, 1887 (subsequent monotypy).
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, Cynipoidae and Chalcidoidea (Graham, 1991)
Distribution. Cosmopolitan.
Identification. For a key to the Palearctic species see Graham (1991).

Baryscapus erynniae (Domenchini, 1966)

Synonym. *Tetrastichus erynniae* Domenichini, 1965
Material examined. 2♀, Iran, Fars, Shiraz (29°41' N, 52°28' E, 1600 m), 4 August 2005, ex pupa of elm leaf beetle (*Galerucella luteola*) parasitized by a Tachinidae fly (Diptera).
Biology. Hyperparasitoid of tachinid flies through Chrysomelidae hosts.

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

Baryscapus oophagus (Otten, 1942)

Synonyms. *Eutetrastichus oophagus* (Otten, 1942), *Tetrastichus oophagus* Otten, 1942
Material examined. 2♀, Iran, Fars, Ghalat (29°48' N, 52°19' E, 2090 m), 7 June 2006, Malaise Trap.
Biology: Endoparasitoid of *Diprion pini* L. and *Neodiprion sertifer* Geoffroy (Hymenoptera, Diprionidae) (Domenichini 1966; Graham, 1991).
Distribution: Palearctic. This is second report from Iran and a new record for the fauna of Fars province of Iran.

Genus *Leptocybe* Fisher & LaSalle, 2004

Leptocybe Fisher & LaSalle, 2004, (in Mendel et al. 2004: 53). Type species *Leptocybe invasa* Fisher & LaSalle, 2004, by original designation and monotypy
Diagnosis. Head weak, with distinct groove and weakened area around ocellar triangle. Propodeum with a raised lobe of the callus that partially overhangs the outer rim of the spiracle; spiracular depression open to anterior margin of propodeum. Two longest cercal setae subequal in length, and straight or only slightly curved. Postmarginal vein short, less than 0.25 length of stigmal vein. Mesoscutum without median line, and with 2–3 small adnotaular setae. Malar sulcus distinctly curved. Dorsellum long, medially as long as propodeum (Mendel et al. 2004).
Biology. forming typical bump-shaped galls on the leaf midribs, petioles and stems of several *Eucalyptus* species.
Distribution. Middle East, Mediterranean, Afrotropical, Oriental, South and South-East Asia.

Leptocybe invasa Fisher & LaSalle, 2004

Material examined. 24♀, Iran, Fars, Shiraz (29° 31' N, 52° 36' E, 1450 m), June-August 2005, ex galls on leaves and petioles on *Eucalyptus camaldulensis*.
Biology. Making galls on *Eucalyptus*.
Distribution. Middle East, Mediterranean, Afrotropical, Oriental, South and South-East Asia.

Genus *Neotrichoporoides* Girault, 1913

Neotrichoporoides Girault, 1913: 50. Type species *N. uniguttata* Girault, by original designation.
Diagnosis. Genal suture below eye with triangular or elongate depression along 0.2–0.7 of its length. Antenna of female with 4 discoid anelli; other segments usually strongly elongate. Pronotum conical; mesoscutum without longitudinal median groove. Length of scutellum no more than its width, subequal to length of mesoscutum. First pair of hairs of scutellum situated in its posterior half, less frequently in middle. Each side of propodeum with 3–7 hairs. MV 5.5–9.5 times as long as SV.
Biology. Many species of the genus are trophically associated with Diptera (Diopsidae, Anthomyiidae, Lonchaeidae and Muscidae) especially on stems of Poaceae.
Distribution. Palearctic , Afrotropical, and Neotropical Regions.
Identification. For a key to the Palearctic species see Graham (1991).

Neotrichoporoides szelenyii **(Erdos, 1951)**

Synonyms. *Aprostocetus szelenyii* (Erdos), *Geniocerus szelenyii* Erdos, *Tetrastichus szelenyi* (Erdos)
Material examined. 1♂, Iran, Fars, Ghalat (29°48' N, 52°19' E, 2090 m), 11 July 2006, Malaise Trap (ZISP).
Biology. Unknown.
Distribution. Palearctic.
This is a new record for the fauna of Iran.

Genus *Oomyzus* Rondani, 1870

Oomyzus Rondani, 1870: 141. Type species *Pteromalus gallerucae* Fonscolombe, by monotypy.
Diagnosis. Head rounded; thorax compact, convex. Propodeum with deep and wide emargination, medially not longer than metanotum.
Biology. Parasitoid of egg, larva and pupa of Coleoptera, Diptera, Lepidoptera and Neuroptera (Graham, 1991, LaSalle, 1994)
Distribution. Worldwide, except South America.
Identification. For a key to the Palearctic species see Graham (1991).

Oomyzus brevistigma **(Gahan, 1936)**

Synonym. *Tetrastichus brevistigma* Gahan, 1936
Material examined. 1♀, Iran, Fars, Shiraz (29°41' N, 52°28' E, 1600 m), 27 July 2006, ex pupa of elm leaf beetle *G. luteola*.
Biology. Parasitoid of pupa of *G. luteola* (Coleoptera: Chrysomelidae).
Ditribution. Palearctic and Nearctic. This is the first report from Fars province of Iran.

Oomyzus gallerucae **(Fonscolombe, 1832)**

Synonyms. *Eulophus gallerucae* (Fonscolombe, 1832), *Tetracampe gallerucae* (Fonscolombe, 1832), *Tetrastichus gallerucae* (Fonscolombe, 1832)
Material examined. 5♀ & 2♂, Iran, Fars, Shiraz (29°41' N, 52°28' E, 1600 m), 16-19 August 2006, ex eggs of elm leaf beetle *G. luteola*.
Biology. Egg parasitoid of Chrysomelidae (Coleoptera).
Distribution. Palearctic, Nearctic and Oriental. This is the first report from Fars province of Iran.

Genus *Sigmophora* Rondani, 1867

Sigmophora Rondani, 1867:40. Type species *S. scrophulariella* Rondani, by monotypy.
Diagnosis. Vertex with transverse carina behind posterior ocelli. Genal suture with triangular depression below eye, which occupying 0.33–0.5 of its length. Antenna with 3 discoid anelli in female and 2, in male. Scutellum with 2 pairs of hairs in posterior half. SMV with 4–6 dorsal setae. First tarsal segment of middle and hind tarsi slightly shorter than second one. Body from entirely yellow to entirely dark brown or black, without metallic shine. The species is trophically associated with Diptera (Cecidomyidae. Tephritidae).
Biology. Gregarious ectoparasitoid of the larvae and pupae of Cecidomyiidae (Diptera).
Distribution. Worldwide.
Identification. For key to the species see Graham (1987) and Ikeda (1999).

Sigmophora brevicornis (Panzer, 1804)

Synonyms. *Cynips brevicornis* Panzer, 1804, *Cirrospilus armaeus* Walker, 1839, *Eulophus verbasci* Dufour, 1837, *Sigmophora scrophulariella* Rondani, 1867, *Tetrastichus brevicornis* (Panzer, 1804), *Tetrastichus isaaci* Rohwer, 1921, *Tetrastichus sayatamabae* Ishii, 1950, *Tetrastichus tricolor* Ashmead, 1904, *Aprostocetus brevicornis* (Panzer, 1804).

Material examined. 2♀ & 2♂, Iran, Fars, Sepidan, Bereshneh (30°12' N, 52°02' E, 2080 m), 3-28 September 2006, ex ex galls of *Diplolepis rosae* (L.) (Hymenoptera: Cynipidae) on *Rosa canina* also with another parasitoids *Orthopelma mediator* (Thunberg) (Hymenoptera: Ichneumonidae), *Eurytoma rosae* Nees (Hymenoptera: Eurytomidae) and *Eupelmus urozonus* Dalman (Hymenoptera: Eupelmidae).

Biology. Parasitoid of Anobiidae and Apionidae (Coleoptera), Cecidomyiidae and Tephritidae (Diptera), Cynipidae, Eurytomidae and Tenthredinidae (Hymenoptera), Tortricidae and Yponomeutidae (Lepidoptera).

Distribution. Paleaerctic, Nearctic and Oriental.

This is the first report from Fars province of Iran.

DISCUSSION

Among the 15 species recorded in this paper, three species are new records for Iran including *Chrysocharis laomedon*, *Aprostocetus artemisicola*, *Neotrichoporoides szelenyii*. Also records of twelve previously recorded species of Eulophidae are confirmed. Most of the genera occur commonly in the other zoogeographical regions, 6 genera are cosmopolitan, and 3 genera are distributed throughout the Palearctic region and in other zoogeographical regions. The fauna of Iran does not exhibit any specific characters.

It seems that the Iranian fauna of Eulophidae is very rich and we should work further to understand the Eulophidae fauna of Iran, both, in more regions and also examine more material.

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NOTES ON FLIGHT PERIODS AND DISTRIBUTIONS OF SOME DRAGONFLIES IN TURKEY

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ABSTRACT: In this study new data on the flight periods of 11 spp. collected during 1996, 1997, 2001, 2002 and 2005-2009 years are presented. Among the species determined, *Anax ephippiger* (Burmeister) is the first dragonfly recorded in February in Turkey so far. In addition, new localities reported for *Coenagrion scitulum* (Rambur), *Aeshna mixta* Latreille, *Anax ephippiger*, *Gomphus flavipes* (Charpentier), *Gomphus vulgatissimus* (Linnaeus) and *Somatochlora meridionalis* Nielsen, which are poorly known from Turkey, are added to their distributional ranges.

KEY WORDS: dragonfly, flight period, distribution, Turkey

The studies concerned with Odonata fauna of Turkey so far have focused mainly on the distributions and descriptions of the species. Although the available studies, except for several early ones, include exact information about the record dates of the species, there was no special study so far emphasizing the flight periods of Turkish dragonflies. Recently, Kalkman & Van Pelt (2006a) prepared histograms for the flight periods based on present records of the mature specimens in order to reveal the seasonal ecology of the species occuring in Turkey in their review on flight periods of Turkish dragonflies. Similarly, Hope (2007) gave data on the flying season of dragonflies recorded in the south-west of Turkey.

Dragonfly records reported from Turkey thus far are limited mostly in a period between May and August, a time when the specimens are actively collected, and records for any other time outside this period are rather rare (Kalkman & Van Pelt, 2006a). Taking into consideration this available data on flying season of dragonflies, it appears that there is still lack of satisfactory data on both distributions and flight times of Turkish dragonflies.

The purpose of this study is to make contribution to the knowledge of flight period of Turkish dragonflies. Also, some localities where *Coenagrion puella*, *Coenagrion scitulum*, *Aeshna mixta*, *Anax ephippiger*, *Gomphus flavipes*, *Gomphus vulgatissimus* and *Somatochlora meridionalis* were recorded, are given as additional locality data for distributional ranges of these species.

MATERIAL AND METHODS

The material was collected in the different periods of 1996, 1997, 2001 and 2002 and between 2005 and 2009. Among the materials collected only those providing new data on distributions and flight periods of Turkish dragonflies were included in the study.

Localities for the recorded specimens are given below. Collecting dates of the species are indicated with the number of locality in result section according to the order listed in the collecting sites.

Collecting sites:
- Antalya province: (1) Antalya- Center (36˚91'N, 30˚68'E); (2) about 1 km east of Antalya Airport (36˚55'N, 30˚48'E), (3) Çakırlar (36˚50'N, 30˚33'E); (4) Elmalı (36˚44'N, 29˚55'E).
- Kırklareli province: (5) Çağlayık, (42˚03'N, 27˚31'E); (6) Demirköy- Velika stream, (41˚53'N, 27˚32'E); (7) between Devletliağaç and Malkoçlar, 6. km, (42˚01'N, 29˚00'E); (8) between İğneada and Sislioba, (41˚85'N, 27˚79'E); (9) İğneada (41˚87'N, 27˚98'E); (10) Kıyıköy- Kıyıköy dam, (41˚53'N, 27˚57'E); (11) Kurudere, (41º5'N, 27˚32' E); (12) Yiğitbaşı (41˚93'N, 27˚65'E).
- Edirne province: (13) Edirne- Center, (41˚40'N, 26˚31E); (14) Enez, (40˚43'N, 26˚04'E); (15) Lalapaşa- Uzunbayır, (41˚91'N, 26˚61'E); (16) Sarayiçi- Tavuk woodland, (41˚41'N, 26˚33'E); (17) Süloğlu, (41˚61'N, 26˚54'E); (18) Trakya University Campus, (41˚38'N, 26˚37'E).

RESULTS

Coenagrion puella (Linnaeus, 1758)

Material Examined: loc.7, 24.05.2008, 3 males; loc.8, 26.06.2008, 2 males, 1 female; loc.11, 23.06.2008, 1 male; loc.17, 24.05.2002, 1 male ; loc.18, 15.05.2002, 1 male; 31.05.2006, 2 males; 24.04.2007, 2 males; 09.05.2007, 4 males, 2 females; 16.05.2007, 4 males, 2 females; 23.05.2007, 4 males, 2 females; 20.06.2007, 1 male; 17.04.2008 1 male, 1 female (teneral); 01.05.2008, 2 males, 2 females (one female- teneral); 15.05.2008, 1 male; 21.05.2008, 1 male, 1 female.

Coenagrion scitulum (Rambur, 1842)

Material Examined: loc.15, 05.07.1997, 1 male, 1 female; loc.18, 01.06.2006, 1 male; 23.06.2006, 1 male; 23.05.2007, 3 males, 1 female; 20.06.2007, 3 males, 1 female; 26.06.2007, 1 male.

Ischnura elegans (Vander Linden, 1820)

Material Examined: loc.18, 17.04.2007, 1 male; 24.04.2007, 1 male, 1 female; 25.04.2007, 2 males.

Aeshna mixta Latreille, 1805

Material Examined: loc.1, 13.10.1996, 1 female; loc.6, 26.07.2001, 1 female; loc.13, 09.10.2007, 1 male; loc.14, 09.07.2008, 1 female.

Anax ephippiger (Burmeister, 1839)

Material Examined: loc.2, 01.02.2009, 2 females; loc.3, 20.08.1996, 1 male; loc.4, 17.09.2008, 1 female; loc.18, 17.10.2002, 1 female.

Gomphus flavipes (Charpentier, 1825)

Material Examined: loc18, 30.05.2007, 1 male.

Gomphus vulgatissimus (Linnaeus, 1758)

Material Examined: loc.5, 17.07.2001, 1 male; loc.10, 18.06.2001, 1 male; loc.16, 12.05.2002, 8 males, 6 females; 21.05.2002, 1 male; 25.05.2002, 1 male, 1 female; 06.06.2002, 1 male, 2 females; loc.18, 16.05.2007, 1 female.

Cordulegaster insignis Schneider, 1845

Material Examined: loc.18, 18.05.2001, 1 female; 06.06.2001, 2 males, 3 females; 04.06.2002, 1 male; 31.05.2006, 1 male; 23.06.2006, 1 male; 25.05.2007, 1 female; 21.05.2008, 1 male, 1 female.

Somatochlora meridionalis Nielsen, 1935

Material Examined : loc.9, 14.08.1997, 1 male; loc.12, 26.07.2001, 1 male.

***Orthetrum albistylum* (Selys, 1848)**

Material Examined : loc.13, 30.07.2007, 1 female; loc.16, 21.05.2002, 1 male; loc.18, 28.05.2002, 1 male; 23.05.2007, 1 female; 01.05.2008, 1 female.

***Sympetrum striolatum* (Charpentier, 1840)**

Material Examined : loc.18, 16.12.2005, 1 female.

DISCUSSION

Turkey has different climate characteristics due to its geographical location and irregular topography. There are significant differences in terms of temperature between the geographical regions of Turkey from north to south and from west to east. Temperature has a noteworthy effect not only on the larval development of dragonflies but also on the length of flight seasons of adults. Consequently, one might expect the dragonflies in the Mediterranean region to the south of the country where the climate is temperate to have longer flying seasons than those recorded in the north of the country. Data based on a comparison of flight periods of the dragonflies recorded in the southwestern Turkey and Europe support this expectation (Hope, 2007). Despite the fact that our knowledge of Turkish dragonflies increased especially by the studies of the research of the last decade, what we know currently about the flight periods of dragonflies and especially about the distributions of rare species in Turkey are still very limited. When flying seasons of Turkish dragonflies are considered, it appears that there are missing time gaps within the known flying seasons of many species during which the species was not recorded. Also the records reported within months except May-August period are also rare. One of the reasons for such time gaps is that the aims of the studies were primarily to reveal the distributions of the species, and the studies performed during months outside the May-August flight periods are generally rare in number.

The early records of *Coenagrion puella* are known from April in Europe (Dijkstra & Lewington, 2006), but, this species has not been recorded within this month from Turkey so far. However, it was recorded on 17 April 2008 from Edirne province, Turkish Thrace.

Coenagrion scitulum is known among the uncommon dragonflies in Turkey. The species was found in a new locality to the north of Edirne province. Taking into consideration the former records of *C. scitulum*, it appears that the earliest flight period of this species is known from mid May (Kalkman, 2006). This species was also recorded from Turkish Thrace during this time, but, there exist no record for *C. scitulum* within early June from Turkey so far. However, a record dating 01 June 2006 from Turkish Thrace within this study was added to its flight knowledge.

Flight period of *Ischnura elegans* lies from late April to late September in central and north Europe (Dijkstra & Lewington, 2006). There are a few records of this species during April from Anatolia (Kalkman et al., 2004; Salur & Kıyak, 2006, 2007). Similarly, it was also found in middle and late April in Turkish Thrace.

According to the present data, *Aeshna mixta* is a rarely distributed in Turkey, and there are large gaps in the western-Anatolia and the southeastern Anatolia regions within its distributional range in the country (Kalkman & Van Pelt, 2006a). Recently, *A. mixta* was reported from only Muğla province in the western Anatolia (Hope, 2007; Salur & Kıyak, 2007). Although this species is known from Alanya (Kalkman et al., 2004), it was also given from Antalya province located in the east of Muğla province with this study, which is a new locality for its distributional range.

Anax ephippiger is one of the best-known migrant dragonflies, and the distributional range of the species includes Africa, Arabia and India in the east (Corbet, 1999). Although its distribution in Turkey is not well known, it is obvious that there has been an increase in records since 2005. Moreover, Hope (2008a) proved for the first time that *A. ephippiger* breeds in Turkey. The exuviae of the species were recorded in Muğla province in southwestern Anatolia. According to the histograms of flight periods and the last reported distributional data of the species, the records do not come from February, October and December (Kalkman & Van Pelt, 2006a; Salur & Kıyak, 2006, 2007; Hope, 2007, 2008a; Miroğlu & Kartal, 2008). Moreover no adult dragonfly has been recorded so far in February in Turkey. On 01 February 2009 many active *Anax ephippiger* specimens, of which two females were caught, were observed in about 1 km east of Antalya Airport, Antalya province. The cuticles of the specimens were not entirely hard, the blue saddles on the 2^{nd} abdominal segment were not developed yet. So, regarding these features, it is most likely that the species also breeds within this area. *A. ephippiger* is also given firstly from October in this study.

The adult season of *Gomphus flavipes* is from early June to early October (Dijkstra & Lewington, 2006). This species was found in the last week of May in Trakya University Campus, Edirne province. Consequently, adult *flavipes* is likely to be encountered in an earlier date of May in the region in the future. Although this species is already known from Edirne province (Hacet & Aktaç, 2008), our present record belongs to a different locality.

Gomphus vulgatissimus is known from a few sites in Turkish Thrace in Turkey (Yazıcıoğlu, 1982; Hacet & Aktaç, 1994, 2004, 2008; Kalkman &Van Pelt, 2006b). Kıyıköy and Çağlayık towns of Kırklareli province are two new localities recorded for the species. Also, the record dates of *G. vulgatissimus* given in this paper are contributory data for its flight period.

Early records of *Cordulegaster insignis* came from mid May by Hope (2007) and Salur & Kıyak (2006, 2007) from Anatolia. The species was also recorded early within this period from Turkish Thrace.

Somatochlora meridionalis has a flying duration continuing from the end of May to August in its distributional range, southeastern Europe (Dijkstra & Lewington, 2006). There are few records of the species from western Anatolia (Kemny, 1908; Demirsoy, 1982; Schneider, 1986; Hope, 2008b). *S. meridionalis* is relatively well known from Turkish Thrace (Yazıcıoğlu, 1982; Hacet & Aktaç, 1997, 2004). The species was found here, in August, and two new localities were added to its Turkish Thrace distribution.

The adult season of *Orthetrum albistylum* in Europe is from the end of May to mid September (Dijkstra & Lewington, 2006). There is no record of this species from May in Turkey so far. All *O. albistylum* records given in May-period in this present study are new data for its flight period in Turkey. Moreover, although the beginning of the flight period of the species is reported as the end of May in Europe (Dijkstra & Lewington, 2006), it was found on an earlier date on 01 May 2008 in Turkish Thrace.

Sympetrum striolatum is one of the dragonflies found within autumn season in Europe (Dijkstra & Lewington, 2006). The adult season in Europe starts in early June and lasts in November with rare records in December (Dijkstra & Lewington, 2006). A record on 6 January 2005 in the Czech Republic is an interesting one for the species (Dolny & Pavlík, 2007). In Turkish Thrace, one alive female specimen was found in the greenhouse in the garden of Department of Biology in the Campus of Trakya University on 16 December 2005.

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WEEVILS (COLEOPTERA: CURCULIONIDAE) FROM IRANIAN RICE FIELDS AND SURROUNDING GRASSLANDS

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ABSTRACT: In a total of 45 species of 22 genera including, *Stenocarus*, *Tychius*, *Ceutorhynchus*, *Curculio*, *Archarius, Coniatus*, *Donus*, *Hypera*, *Limobius*, *Conorhynchus*, *Pachycerus*, *Cleonis*, *Coniocleonus*, *Chromoderus*, *Bothynoderes*, *Rhinocyllus*, *Bangasternus*, *Microlarinus*, *Eustenopus*, *Larinus*, *Lixus*, *Hypolixus*, *Otiorhynchus* and 5 subfamilies including, Ceutorhynchinae, Curculioninae, Hyperinae, Lixinae and Entiminae were collected from Iranian rice fields and surrounding grasslands.

KEY WORDS: Curculionidae, Fauna, Rice field, Iran

The number of described beetle species is about 400,000 (Spangler, 1982; Hammond, 1992), with weevils (Coleoptera: Curculionoidea) (62,000) comprising 15.5% of this number. Interestingly, this is about the same proportion encountered by Linnaeus 250 years ago, when barely 100 weevil species were known (Oberprieler et al., 2007). The most recent comprehensive tally of the number of Curculionoidea (Kuschel, 1995) yielded a total of 5,087 described genera and 56,920 species (status at about 1988). Adding the genera and species newly described in the last 20 years raises these numbers to 5,604 and 61,868, an increase of 10% and 8.7%, respectively. The recent comprehensive world catalogue of weevil genera (Alonso-Zarazaga & Lyal, 1999, 2002; Lyal & Alonso-Zarazaga, 2006) recognizes 5,464 valid weevil genera (status at 1999), including fossils but excluding Scolytinae and Platypodinae, which number 225 genera (5 837 species) and 41 genera (1,463 species), respectively, after Wood & Bright (1992) and Bright & Skidmore (1997). Excluding fossils (about 100 genera) and including the latter two groups yields a total of 5,630 genera of weevils, slightly more than the number extrapolated from Kuschel's count but more accurate (though excluding genera described after 1999). A figure of 5,800 genera and 62,000 species is therefore a best estimate of the described diversity of Curculionoidea, comparable with Lawrence's (1982) and Watt's (1982) respective earlier estimates of 60,000 and 65,000.

The family Curculionidae is an order of magnitude larger than any other in weevils and comprises in excess of 80% of all weevil species (with about 4,600 genera and 51,000 described species). Its stupendous species richness is a principal factor in the large size of the hytophaga and in fact of all Coleoptera, thus in Haldane's Inordinate Fondness for beetles. Curculionidae occur all over the world, from the arctic zone in the north to the subantarctic islands in the south, from beaches to mountain tops, from deserts to rainforests. They feed on virtually all plants, mainly ngiosperms but also gymnosperms, pteridophytes, bryophytes and lichens and occasionally they even browse on algae and cyanobacteria. Unlike all other weevil families, curculionids also make extensive use of monocotyledons as hosts, the basal subfamilies Dryophthorinae and Brachycerinae being predominantly associated with them and several taxa of other subfamilies as well. It is therefore likely that monocotyledons constitute the ancestral hosts of Curculionidae and that they may have played a pivotal role in the diversification of the family (Marvaldi et al., 2002; Oberprieler, 2004).

Rice, the daily food of nearly half the world's population, is the foundation of national stability and economic growth in many developing countries. It is the source of one quarter of global food energy and - for the world's poor - the largest food source. It is also the single largest use of land for producing food and the biggest employer and income generator for rural people in the developing world. Rice production has been described as the single most important economic activity on Earth. Because rice occupies approximately 9% of the planet's arable land, it is also a key area of concern - and of opportunity - in environmental protection (Heinrichs and Barrion, 2004). Several insects are active in the rice fields and around lands all over the world which one of them are weevils. Since the fauna of weevils' fauna was not studied in Iranian rice fields so far, their fauna is studied in this research.

MATERIAL AND METHOD

Materials have been collected by sweeping net and aspirator from the rice fields and surrounding grasslands in different regions of Iran. The sampled regions were East Azarbaijan, Guilan, Mazandaran, Golestan, Zanjan, Chaharmahal & Bakhtiari, Isfahan and Khuzestan provinces. In addition to the collected specimen by the authors, several other collected specimens by many researchers and amateur students have also been included in this study. The information concerning the species' name, describer, locality and the date of collection, place/plant on which the species were collected and the number of species (in brackets) was also given. Although the name of the plants on which the specimens collected has been given, this doesn't necessarily mean that they are the host of the species. In this paper, classification and nomenclature of Curculionids suggested by Alonso-Zarazaga & Lyal (1999) and Colonnelli (2003) have been followed.

RESULTS

In this study, 45 species of 22 genera and 5 subfamilies were collected from Iranian rice fields and surrounding grasslands. The list of species is given below:

Subfamily Ceutorhynchinae Gistel, 1848
Tribe *Ceutorhynchini* Gistel, 1848
Genus *Stenocarus* Thomson, 1859

***Stenocarus ruficornis* (Stephens, 1831)**

Material: East Azarbaijan province, Arasbaran (2), 24.VII.2005, *Amaranthus* sp. (Amaranthaceae).

Distribution: Western and Central Palaearctic.

Genus *Ceutorhynchus* Germar, 1824

***Ceutorhynchus aenescens* Schultze, 1895**
Material: Mazandaran province, Savadkooh (1), 2.V.1999, Rice field.
Distribution: Kazakhstan, Middle Asia, Asia minor.

***Ceutorhynchus coarctatus* Gyllenhal, 1837**
Material: Zanjan province, Zanjan (1), 8.VIII.2002, Rice field.
Distribution: Western and Central Palaearctic.

***Ceutorhynchus difficilis* Schultze, 1898**
Material: Chaharmahal & Bakhtiari province, Shahrekord (1), 24.VI.2006, *Amaranthus graecizans* (Amaranthacea).
Distribution: South-eastern Europe, Caucasus, Transcaucasia, Middle Asia, Asia minor.

***Ceutorhynchus rapae* Gyllenhal, 1837**
Material: East Azarbaijan province, Arasbaran (3), 24.VII.2005, *Myrtus communis* (Myrtaceae).
Distribution: Palaearctic.

Subfamily Curculioninae Latreille, 1802
Tribe Tychiini Gistel, 1848
Genus *Tychius* Germar, 1817

***Tychius aureolus* Kiesenwetter, 1851**
Material: Isfahan province, Najaf-Abad (2), 21.V.2000, *Cucurbita pepo* (Cucurbitaceae). Chaharmahal & Bakhtiari province, Shahrekord (1), 25.VI.2006, Rice field.
Distribution: Western and Central Palaearctic.

***Tychius caldarai* Dieckmann, 1986**
Material: Mazandaran province, Amol (2), 11.IV.2002, *Amaranthus graecizans* (Amaranthacea).
Distribution: Europe, Asia minor.

***Tychius graecus* Kiesenwetter, 1864**
Material: East Azarbaijan province, Arasbaran (3), 26.VII.2005, *Adiantum capillus - veneris* (Adiantaceae).
Distribution: Greece, Asia minor.

***Tychius junceus* (Reich, 1797)**
Material: Isfahan province, Lenjan (1), 17.VIII.2000, Rice field.
Distribution: Western and Central Palaearctic.

***Tychius meliloti* Stephens, 1831**
Material: Chaharmahal & Bakhtiari province, Shahrekord (2), 22.VI.2006, *Eragrostis poaeoides* (Gramineae).
Distribution: Western and Central Palaearctic.

Tribe Curculionini Latreille, 1802
Genus *Curculio* Linnaeus, 1758

***Curculio glandium* Marsham, 1802**
Material: East Azarbaijan province, Arasbaran (4), 24.VII.2005, *Rosa persica* (Rosaceae).
Distribution: Western Palaearctic.

Genus *Archarius* Gistel, 1856

***Archarius crux* (Fabricius, 1776)**
Material: Mazandaran province, Sari (2), 19.IX.2001, Rice field.
Distribution: Western and Central Palaearctic.

***Archarius salicivorus* (Paykull, 1792)**
Material: Mazandaran province, Savadkooh (1), 21.IX.2001, *Rubus hyrcanus* (Rosaceae).
Distribution: Palaearctic.

Subfamily Hyperinae Marseul, 1863
Tribe Hyperini Marseul, 1863
Genus *Donus* Jekel, 1845

***Donus comatus* (Boheman, 1842)**
Material: East Azarbaijan province, Arasbaran (2), 25.VII.2005, *Rumex crispus* (Polygonaceae).

Distribution: Europe.

Genus *Hypera* Germar, 1817

***Hypera constans* (Boheman, 1834)**
Material: Isfahan province, Lenjan (1), 17.VIII.2000, *Tribulus terrestris* (Zygophyllaceae).
Distribution: Western Palaearctic.

***Hypera cumana* (Petri, 1901)**
Material: Guilan province, Fooman (1), 14.IV.2004, Rice field.
Distribution: South-eastern Europe, Asia minor.

***Hypera maculipennis* (Fairmaire, 1859)**
Material: Golestan province, Gorgan (1), 11.VII.2003, *Urtica dioica* (Urticaceae).
Distribution: Southern Europe, North Africa, Asia minor.

Genus *Antidonus* Bedel, 1886

***Antidonus zoilus* (Scopoli, 1763)**
Material: Mazandaran province, Behshahr (2), 15.V.2005, Rice field; Chaharmahal & Bakhtiari province, Shahrekord (1), 25.VI.2006, *Amaranthus retroflexus* (Amaranthacea).
Distribution: Holarctic.

Genus *Limobius* Schönherr, 1843

***Limobius borealis* (Paykull, 1792)**
Material: East Azarbaijan province, Arasbaran (2), 24.VII.2005, Rice field.
Distribution: Western and Central Palaearctic.

Genus *Coniatus* Germar, 1817

***Coniatus tamarisci* (Fabricius, 1787)**
Material: Golestan province, Gorgan (2), 11.VII.2003, *Corchorus olitorius* (Tilliaceae).
Distribution: Canary Islands, Mediterranean, Asia minor.

Subfamily Lixinae Schoenherr, 1823
Tribe Rhinocyllini Lacordaire, 1863
Genus *Rhinocyllus* Germar, 1817

***Rhinocyllus conicus* (Frölich, 1792)**
Material: East Azarbaijan province, Arasbaran (2), 26.VII.2005, *Sonchus asper* (Compositeae).
Distribution: Western and Central Palaearctic.

Genus *Bangasternus* Gozis, 1882

***Bangasternus fausti* (Reitter, 1890)**
Material: Guilan province, Roodsar (1), 17.IV.2004, Rice field. Zanjan province, Zanjan (1), 24.V.2005, *Medicago polymorpha* (Leguminosae).
Distribution: Europe, Transcaucasia, Iran.

***Bangasternus planifrons* (Brullè, 1832)**
Material: Chaharmahal & Bakhtiari province, Shahrekord (1), 25.VI.2006, *Ricinus communis* (Euphorbiaceae).
Distribution: Southern Europe, Middle Asia, Asia minor.

Tribe Lixini Schoenherr, 1823
Genus *Microlarinus* Hochhuth, 1847

***Microlarinus lareynii* (Jacquilin du Val, 1852)**
Material: Isfahan province, Lenjan (2), 17.VIII.2000, *Berberis vulgaris* (Berberidaceae).
Distribution: North Africa, Southern Europe, Iran.

Genus *Eustenopus* Petri , 1907

***Eustenopus villosus* (Boheman, 1843)**
Material: Golestan province, Kordkoy (2), 3.V.2003, Rice field.
Distribution: Greece, Caucasus, Asia minor.

Genus *Larinus* Dejean, 1821

***Larinus brevis* (Herbst, 1795)**
Material: Khuzestan province, Ahwaz (3), 10.IV.2001, *Sorghum halepense* (Gramineae).
Distribution: Western and Central Palaearctic.

***Larinus cynarae* (Fabricius, 1787)**
Material: Guilan province, Rasht (2), 16.IV.2004, *Mentha piperita* (Labiatea).
Distribution: North Africa, Southern Europe, Iran.

***Larinus latus* (Herbst, 1784)**
Material: East Azarbaijan province, Arasbaran (5), 25.VII.2005, *Raphanus raphanistram* (Brassicaceae).
Distribution: Southern Europe, Caucasus, Transcaucasia, Asia minor.

***Larinus rudicollis* Petri, 1907**
Material: Golestan province, Kordkoy (2), 3.V.2003, *Lactuca scariola* (Asteraceae).
Distribution: North Africa, Caucasus, Asia minor.

***Larinus ursus* (Fabricius, 1792)**
Material: Zanjan province, Zanjan (3), 8.VIII.2002, *Carthamus tinctorius* (Compositeae).
Distribution: Western Palaearctic.

Genus *Lixus* Fabricius, 1801

***Lixus circumcinctus* Boheman, 1836**
Material: East Azarbaijan province, Arasbaran (3), 24.VII.2005, Rice field.
Distribution: Transcaucasia, Middle Asia, Asia minor.

***Lixus incanescens* Boheman, 1836**
Material: Chaharmahal & Bakhtiari province, Shahrekord (1), 24.VI.2006, *Euphorbia heteradenia* (Euphorbiaceae).
Distribution: South-eastern Europe, Caucasus, Middle Asia, Iran.

***Lixus obesus* Petri, 1904**
Material: Mazandaran province, Ghaemshahr (2), 26.VI.2004, Rice field.
Distribution: Caucasus, Asia minor.

***Lixus speciosus* Miller, 1861**
Material: Zanjan province, Zanjan (1), 9.VIII.2002, *Avena fatua* (Gramineae).
Distribution: Caucasus, Asia minor.

Genus *Hypolixus* Desbrochers, 1898

***Hypolixus nubilosus* (Boheman, 1836)**
Material: Guilan province, Amlash (2), VII.2003, *Amaranthus blitoides* (Amaranthacea). Mazandaran province, Chalus (1), 6.X.2004, *Daucus carota* (Apiaceae).
Distribution: Africa, Asia minor, Arabia.

Tribe Cleonini Schoenherr, 1826

Genus *Conorhynchus* Motschulsky, 1860

***Conorhynchus nigrivittis* (Pallas, 1781)**
Material: Khuzestan province, Ahwaz (1), 10.IV.2001, *Carthamus oxyacantha* (Compositeae). Mazandaran province, Nooshahr (2), 10.IV.2003, *Glycyrrhiza glabra* (Leguminosae).
Distribution: The south and southeast of the European part of Russia, Kazakhstan, Turkmenistan, Western Siberia, Iran, China.

Genus *Pachycerus* Schönherr, 1823

***Pachycerus cordiger* (Germar, 1819)**
Material: Chaharmahal & Bakhtiari province, Shahrekord (2), 24.VI.2006, Rice field.
Distribution: Europe, the Mediterranean, Caucasus, Transcaucasia, Kazakhstan, Middle Asia, Iran.

Genus *Cleonis* Dejean, 1821

***Cleonis piger* (Scopoli, 1763)**
Material: Mazandaran province, Kiakola (1), 28.VII.2003, Rice field.
Distribution: Europe, Morocco, Caucasus, Kazakhstan, Middle Asia, the Amur region.

Genus *Plagiographus* Chevrolat, 1873

***Coniocleonus nigrosuturatus* (Goeze, 1777)**

Material: Mazandaran province, Behshahr (1), 22.IV.2001, *Polygonum convolvulus* (Polygonaceae).

Distribution: Islands Balearskie, Portugal, Spain, France, Italy (including Sicily), Austria, Belgium, Bulgaria, Croatia, Czechia, Greece (including Cyprus), Hungary, Moldova, Poland, Ukraine, the south of the European part of Russia, Crimea, Caucasus and Transcaucasia, Turkmenistan, Uzbekistan, Asia Minor, Asia minor, Northern Africa (Egypt, Morocco), Вост. India.

Genus *Bothynoderes* Schoenherr, 1823

***Bothynoderes affinis* (Schrank, 1781)**

Material: Zanjan province, Zanjan (2), 8.VIII.2002, Rice field.

Distribution: France (including Corsica), Greece, Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, the Great Britain, Bulgaria, Croatia, Czechia, Denmark, Holland, Finland, Sweden, Germany, Hungary, Macedonia, Moldova, Poland, Slovakia, Slovenia, Ukraine, Crimea, the south of the European part of Russia, Caucasus, Kazakhstan, Turkmenistan, Uzbekistan, Western Siberia, where it is small. Asia, Iran.

Genus *Asproparthenis* Gozis, 1886

***Bothynoderes carinatus* (Zoubkoff, 1829)**

Material: Guilan province, Rasht (1), 16.IV.2004, *Rosa hemisphaerica* (Rosaceae).

Distribution: The south of the European part of Russia, Kazakhstan, Asia minor

***Bothynoderes punctiventris* (Germar, 1794)**

Material: Mazandaran province, Ghaemshahr (1), 26.VI.2004, *Helianthus anuus* (Compositeae).

Distribution: Western and Central Palaearctic.

Subfamily Entiminae Schoenherr, 1823

Genus *Otiorhynchus* (Germar, 1822)

***Otiorhynchus* (*Choilisanus*) *balcanicus* Stierlin, 1861**

Material: East Azarbaijan province, Arasbaran (1), 26.VII.2005, *Hedera helix* (Araliaceae).

Distribution: Greece, Caucasus, Asia minor.

***Otiorhynchus* (*Choilisanus*) *grandicollis* Boheman, 1843**

Material: Mazanaran province, Joibar (1), 11.VIII.2000, *Acer hyrcanum* (Aceraceae). Golestan province, Kordkoy (1), 19.V.2003, *Amaranthus albus* (Amaranthacea).

Distribution: Caucasus, Asia minor

***Otiorhynchus* (*Nehrodistus*) *turca* Boheman in Schönherr, 1843**

Material: Chaharmahal & Bakhtiari province, Shahrekord (2), 24.VI.2006, *Lactuca orientalis* (Asteraceae).

Distribution: Caucasus, Asia minor

DISCUSSION

The results of the present research indicated that there is a diverse fauna of weevils in Iranian rice fields and surrounding grasslands. In addition to the almost specimens which were collected from rice fields, several specimens were collected from different weeds from 20 families including, Aceraceae, Adiantaceae, Amaranthaceae, Apiaceae, Araliaceae, Asteraceae, Berberidaceae, Brassicaceae, Compositeae, Cucurbitaceae, Euphorbiaceae, Gramineae, Labiatea, Leguminosae, Myrtaceae, Polygonaceae, Rosaceae, Tilliaceae, Urticaceae and Zygophyllaceae. Since Iran is a large country incorporating various geographical regions and climates, very diverse fauna of Curculionidae is expected to be in different agroecosystems. Surely, to find new species and distributional records, more studies and surveys should be conducted on this important insect group in different regions of Iran especially in agricultural fields and orchards.

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CHECKLIST OF BRACONIDAE (INSECTA: HYMENOPTERA) FROM IRAN

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ABSTRACT: The Braconidae Nees, 1811 (Insecta: Hymenoptera) of Iran are reviewed based on available literatures. Two-hundred and two species are listed (as genus-species) from Agathidınae (4-4), Aphidiinae (12 -55), Brachistinae (1-2), Braconinae (7-33), Cardiochilinae (2-4), Cheloninae (3-24), Doryctinae (7-7), Euphorinae (6-12), Helconinae (2-3), Homolobinae (1-1), Hormiinae (2-2), Macrocentrinae (1-2), Microgastrinae (6-30), Microtypinae (1-1), Miracinae (1-1), Opiınae (4-7), Orgilinae (1-5), Pambolinae (1-1) and Rogadinae (2-8).

KEY WORDS: Hymenoptera, Braconidae, Distribution, Iran, Palaearctic region.

The family Braconidae constitutes one of the most species-rich families of insects with approximately 18,000 valid species (Yu et al., 2006). It includes important natural enemies of many harmful insects widely distributed in major insect orders such as Coleoptera, Diptera, Lepidoptera and Homoptera (Shaw and Huddleston, 1991; Wharton, 1993; Wharton et al., 1997). Until recently, the family was also thought to be solely parasitic, but a few instances of phytophagy have been recorded in recent years (Austin and Dangerfield, 1998; Marsh et al., 2000).

The studies on Braconidae in Iran are very restricted and have been conducted by foreign researchers. The first published records of Iranian Braconidae were those by Szépligeti (1901) who reported some braconid parasitoids. Several species were subsequently recorded by Telenga (1936, 1941), Hedwig (1957), Hellen (1958), Mackauer (1960), Fischer (1963), Davatchi and Chodjai (1969) and Stary (1974, 1975, 1979, 1981). Modares Awal (1997) cited some species of braconids in his list of agricultural pests and their natural enemies in Iran.

Although many studies have been conducted on the Braconidae of Iran (Monajemi and Esmaili, 1981; Al-e-Mansour and Mostafavi, 1993; Mojeni, 1994; Starý et al., 2000; Achterberg and Mehrnejad, 2002; Bagheri and Basiri, 2004; Mehrparvar et al., 2005; Dezianian and Quicke, 2006; and Rakhshani et al., 2007a, 2007b 2008a, 2008b), their results were scattered in different publications and have never been summarized. The present list was compiled to provide a reference for future studies on this family in Iran.

MATERIALS AND METHODS

The present checklist aims at reviewing as many references as possible to the Braconidae and listing every species with an Iranian record. We follow the classification and taxonomic arrangement of Yu et al. (2006).

List of the species

Two-hundred two Braconidae species belonging to 64 genera and 19 subfamilies are listed in alphabetic order as follows:

Subfamily Agathidinae Haliday, 1833
Genus *Agathis* Latreille, 1805
***Agathis nigra* Nees von Esenbeck, 1812**
Records of Iran: Hellén (1956); Tobias (1986); Simbolotti and Achterberg (1999).
Genus *Coccygidium* Saussure, 1892
***Coccygidium transcaspicum* (Kokujev, 1902)**
Records of Iran: Telenga (1955); Hedwig (1957); Tobias (1986); Sharkey (1998).
Genus *Cremnops* Foerster, 1862
***Cremnops richteri* Hedwig, 1957**
Record of Iran: Hedwig (1957).
Genus *Disophrys* Foerster, 1862
***Disophrys caesa* (Klug, 1835)**
Record of Iran: Hedwig (1957).

Subfamily Aphidiinae Haliday, 1833
Genus *Adialytus* Foerster, 1862
***Adialytus ambiguus* (Haliday, 1834)**
Records of Iran: Starý (1979); Starý (1981); Starý et al. (2000).
***Adialytus salicaphis* (Fitch, 1855)**
Records of Iran: Starý (1979); Yaghubi and Sahragard (1998); Starý et al. (2000); Rakhshani et al. (2006a).
***Adialytus thelaxis* (Starý, 1961)**
Records of Iran: Starý (1979); Starý et al. (2000).
Genus *Aphidius* Nees von Esenbeck, 1819
***Aphidius* (*Aphidius*) *asteris* Haliday, 1834**
Records of Iran: Yaghubi and Sahragard (1998); Starý (1979); Starý et al.(2000); Rakhshani et al. (2008a).
***Aphidius* (*Aphidius*) *colemani* Viereck, 1912**
Records of Iran: Starý (1975, 1979); Starý et al. (2000); Rakhshani et al. (2005a, 2006a, 2008a).
***Aphidius* (*Aphidius*) *eadyi* Starý, González and Hall, 1980**
Records of Iran: Starý (1979); Starý et al. (1980, 2000); Pennacchio (1989); Rakhshani et al. (2006a, 2008a).
***Aphidius* (*Aphidius*) *ervi* Haliday, 1834**
Records of Iran: Starý (1974, 1979); Gonzalez et al. (1978); Starý and Gonzalez (1978); Monajemi and Esmaili (1981); Starý et al. (2000); Rakhshani et al. (2006a, 2008a).
***Aphidius* (*Aphidius*) *funebris* Mackauer, 1961**
Records of Iran: Starý (1979); Starý et al. (2000); Rakhshani et al. (2008a).
***Aphidius iranicus* Rakhshani and Starý, 2007**
Record of Iran: Tomanovic et.al (2007).
***Aphidius* (*Aphidius*) *matricariae* Haliday, 1834**
Records of Iran: Starý (1979); Pike and Starý (1996); Yaghubi and Sahragard (1998); Starý et al. (2000); Rakhshani et al. (2008a, 2008b).
***Aphidius* (*Aphidius*) *persicus* Rakhshani and Starý, 2006**
Record of Iran: Rakhshani et al. (2006c, 2008a); Rakhshani et al. (2008a).
***Aphidius* (*Aphidius*) *popovi* Starý, 1978**
Record of Iran: Khayat-Zadeh et al. (2001); Rakhshani et al. (2008a).
***Aphidius* (*Aphidius*) *rhopalosiphi* De Stefani-Perez, 1902**
Records of Iran: Mojeni (1994); Starý et al. (2000); Rakhshani et al. (2008a).
***Aphidius* (*Aphidius*) *rosae* Haliday, 1833**
Record of Iran: Mehrparvar et al. (2005); Rakhshani et al. (2008a).
***Aphidius* (*Aphidius*) *salicis* Haliday, 1834**
Records of Iran: Starý (1979); Starý et al.(2000); Rakhshani et al. (2006b, 2007b).
***Aphidius* (*Aphidius*) *setiger* (Mackauer, 1961)**
Records of Iran: Starý (1979); Starý et al.(2000); Rakhshani et al. (2008a).
***Aphidius* (*Aphidius*) *smithi* Sharma and Subba Rao, 1959**
Records of Iran: Starý (1974, 1979); Gonzalez et al. (1978); Starý and Gonzalez (1978); Monajemi and Esmaili (1981); Yaghubi and Sahragard (1998); Starý et al. (2000); Rakhshani et al (2006a, 2008a).

***Aphidius* (*Aphidius*) *urticae* Haliday, 1834**
Records of Iran: Starý (1974, 1979); Gonzalez et al. (1978); Starý and Gonzalez (1978); Monajemi and Esmaili (1981); Starý et al. (2000); Rakhshani et al. (2008a).
***Aphidius* (*Aphidius*) *uzbekistanicus* Luzhetzki, 1960**
Records of Iran: Starý (1979, 1981); Starý et al. (2000); Rakhshani et al. (2008a, 2008b).
***Aphidius* (*Euaphidius*) *cingulatus* Ruthe, 1859**
Records of Iran: Starý (1979); Starý et al. (2000); Babaee et al. (2004); Rakhshani et al. (2006b, 2007b, 2008a).

Genus *Binodoxys* Mackauer, 1960

***Binodoxys acalephae* (Marshall, 1896)**
Records of Iran: Starý (1979); Starý et al. (2000); Rakhshani et al. (2005a).
***Binodoxys angelicae* (Haliday, 1833)**
Records of Iran: Starý (1979); Yaghubi and Sahragard (1998); Starý et al. (2000); Rakhshani et al. (2005a); Moodi and Mosaddegh (2006).
***Binodoxys brevicornis* (Haliday, 1833)**
Records of Iran: Yaghubi and Sahragard (1998); Starý et al. (2000); Rakhshani et al. (2006b, 2007b).
***Binodoxys heraclei* (Haliday, 1833)**
Records of Iran: Rakhshani et al. (2006b, 2007b).

Genus *Betuloxys* Mackauer, 1960

***Betuloxys hortorum* (Starý, 1960)**
Records of Iran: Starý (1979); Starý et al. (2000).

Genus *Diaeretiella* Starý, 1960

***Diaeretiella rapae* (McIntosh, 1855)**
Records of Iran: Starý (1979, 1981); Yaghubi and Sahragard (1998); Starý et al. (2000); Lotfalizadeh and van Veen (2004); Rakhshani et al. (2006a).

Genus *Ephedrus* Haliday, 1833

***Ephedrus* (*Ephedrus*) *cerasicola* Starý, 1962**
Record of Iran: Starý et al. (2000).
***Ephedrus* (*Ephedrus*) *chaitophori* Gärdenfors, 1986**
Records of Iran: Rakhshani et al. (2006b, 2007b).
***Ephedrus* (*Ephedrus*) *helleni* Mackauer, 1968**
Records of Iran: Starý (1979); Starý et al. (2000); Rakhshani et al. (2006b, 2007b).
***Ephedrus* (*Ephedrus*) *laevicollis* (Thomson, 1895)**
Record of Iran: Starý (1979).
***Ephedrus* (*Ephedrus*) *niger* Gautier, Bonnamour and Gaumont, 1929**
Records of Iran: Starý (1979); Yaghubi and Sahragard (1998); Starý et al. (2000).
***Ephedrus* (*Ephedrus*) *persicae* Froggatt, 1904**
Records of Iran: Starý (1979); Yaghubi and Sahragard (1998); Starý et al. (2000); Rakhshani et al.(2005a, 2008b).
***Ephedrus* (*Ephedrus*) *plagiator* (Nees von Esenbeck, 1811)**
Records of Iran: Starý (1979); Yaghubi and Sahragard (1998); Starý et al. (2000); Rakhshani et al.(2008b).

Genus *Lysaphidus* Smith, 1944

***Lysaphidus arvensis* Starý, 1960**
Records of Iran: Starý (1979); Starý et al. (2000).

Genus *Lysiphlebus* Foerster, 1862

***Lysiphlebus* (*Phlebus*) *confusus* Tremblay and Eady, 1978**
Records of Iran: Yaghubi and Sahragard (1998); Starý et al. (2000); Rakhshani et al. (2005a, 2006a, 2006b, 2007b).
***Lysiphlebus* (*Phlebus*) *desertorum* Starý, 1965**
Records of Iran: Starý (1979); Yaghubi and Sahragard (1998); Starý et al. (2000).
***Lysiphlebus* (*Phlebus*) *fabarum* (Marshall, 1896)**
Records of Iran: Starý (1979); Monajemi and Esmaili (1981); Finlayson (1990); Yaghubi and Sahragard (1998); Starý et al. (2000); Rakhshani et al. (2005a, 2006a, 2008b).
***Lysiphlebus* (*Phlebus*) *testaceipes* (Cresson, 1880)**
Record of Iran: Rakhshani et al. (2005a).

Genus *Pauesia* Quilis, 1931

***Pauesia* (*Paraphidius*) *antennata* (Mukerji, 1950)**
Records of Iran: Starý (1979); Starý et al. (2000); Rakhshani et al. (2005b).
***Pauesia* (*Pauesiella*) *hazratbalensis* Bhagat, 1981**
Record of Iran: Starý et al. (2005).

Genus *Praon* Haliday, 1833

***Praon* (*Praon*) *abjectum* (Haliday, 1833)**
Record of Iran: Rakhshani et al.(2007a).
***Praon* (*Praon*) *barbatum* Mackauer, 1967**
Records of Iran: Gonzalez et al. (1978); Starý and Gonzalez, 1978; Rakhshani et al. (2007a).
***Praon* (*Praon*) *exsoletum* (Nees von Esenbeck, 1811)**
Records of Iran: van den Bosch (1957); Starý (1979); Monajemi and Esmaili (1981); Rakhshani et al. (2006a, 2007a); Starý et al. (2000).
***Praon (Praon) flavinode* (Haliday, 1833)**
Records of Iran: Starý (1979); Starý et al. (2000) Rakhshani et al. (2007a).
***Praon* (*Praon*) *orpheusi* Kavallieratos, Attanassiou and Tomanovic, 2003**
Record of Iran: Rakhshani et al. (2007a).
***Praon* (*Praon*) *rosaecole* Starý, 1961**
Record of Iran: Rakhshani et al. (2007a).
***Praon* (*Praon*) *volucre* (Haliday, 1833)**
Records of Iran: Starý (1979); Starý et al. (2000); Rakhshani et al. (2005a, 2006a, 2007a, 2008b).
***Praon* (*Praon*) *yomonae* Takada, 1968**
Record of Iran: Rakhshani et al. (2007a).

Genus *Tanytrichophorus* Mackauer, 1961

***Tanytrichophorus petiolaris* Mackauer, 1961**
Records of Iran: Mackauer (1961); Starý (1979); Starý et al.(2000).

Genus *Trioxys* Haliday, 1833

***Trioxys* (*Trioxys*) *asiaticus* Telenga, 1953**
Records of Iran: Mackauer (1960); Starý (1979); Starý et al. (2000).
***Trioxys* (*Trioxys*) *cirsii* (Curtis, 1831)**
Record of Iran: Starý et al. (2000).
***Trioxys* (*Trioxys*) *complanatus* Quilis, 1931**
Records of Iran: van den Bosch (1957); Starý(1979); Monajemi and Esmaili(1981); Starý et al.(2000); Rakhshani et al.(2006a).
***Trioxys* (*Trioxys*) *pallidus* (Haliday, 1833)**
Records of Iran: Starý (1979) Starý et al.(2000); Rakhshani et al. (2004).
***Trioxys* (*Trioxys*) *pannonicus* Starý, 1960**
Records of Iran: Starý (1979); Starý et al. (2000).
***Trioxys* (*Trioxys*) *tanaceticola* Starý, 1971**
Records of Iran: Starý (1979); Starý et al.(2000).

Subfamily Brachistinae Foerster, 1862

Genus *Schizoprymnus* Foerster, 1862

***Schizoprymnus obscurus* (Nees von Esenbeck, 1816)**
Records of Iran: Telenga (1941); Hellén (1958).
***Schizoprymnus pullatus* (Dahlbom, 1833)**
Record of Iran: Tobias (1986).

Subfamily Braconinae von Esenbeck, 1811

Genus *Baryproctus* Ashmead, 1900

***Baryproctus zarudnianus* Telenga, 1936**
Records of Iran: Telenga (1936); Shenefelt (1978)

Genus *Bracon* Fabricius, 1804

***Bracon* (*Bracon*) *chivensis* Telenga, 1936**
Record of Iran: Capek and Hofmann (1997).
***Bracon* (*Bracon*) *lefroyi* (Dudgeon and Gough, 1914)**
Record of Iran: Hussain et al. (1976).

***Bracon* (*Bracon*) *longicollis* Wesmael, 1838**
Records of Iran: Tobias (1976, 1986).
***Bracon* (*Bracon*) *luteator* Spinola, 1808**
Records of Iran: Beyarslan et al. (2005).
***Bracon* (*Bracon*) *minutator* (Fabricius, 1798)**
Records of Iran: Tobias (1961, 1976).
***Bracon* (*Bracon*) *scabriusculus* Dalla Torre, 1898**
Record of Iran: Telenga (1936).
***Bracon* (*Bracon*) *schmidti* Kokujev, 1912**
Records of Iran: Telenga (1936); Tobias (1976, 1986); Shenefelt (1978).
***Bracon* (*Cyanopterobracon*) *sabulosus* Szépligeti, 1896**
Records of Iran: Telenga(1936); Tobias (1976, 1986); Shenefelt (1978).
***Bracon* (*Glabrobracon*) *dilatus* Papp, 1999**
Record of Iran: Papp (1999).
***Bracon* (*Glabrobracon*) *variator* Nees von Esenbeck, 1811**
Records of Iran: Papp (1966, 1967); Capek and Hofmann (1997).
***Bracon* (*Habrobracon*) *excisus* (Tobias, 1957)**
Record of Iran: Haeselbarth (1983).
***Bracon* (*Habrobracon*) *hebetor* Say, 1836**
Records of Iran: Haeselbarth (1983); Noori (1994); Modarres Awal (1997); Dezianian and Jalali (2004).
***Bracon* (*Habrobracon*) *iranicus* (Fischer, 1972)**
Records of Iran: Fischer (1972a); Shenefelt (1978).
***Bracon* (*Habrobracon*) *nigricans* (Szépligeti, 1901)**
Record of Iran: Haeselbarth (1983).
***Bracon* (*Habrobracon*) *radialis* (Telenga, 1936)**
Record of Iran: Dezianian and Quicke (2006).
***Bracon* (*Rostrobracon*) *urinator* (Fabricius, 1798)**
Record of Iran: Telenga (1936).

Genus *Glyptomorpha* Holmgren, 1868

***Glyptomorpha* (*Glyptomorpha*) *pectoralis* (Brullé, 1832)**
Records of Iran: Shestakov (1926); Telenga (1936); Tobias (1976); Capek and Hofmann (1997).

Genus *Iphiaulax* Foerster, 1862

***Iphiaulax hians* Pérez, 1907**
Record of Iran: Telenga (1936).
***Iphiaulax impeditor* (Kokujev, 1898)**
Record of Iran: Fahringer (1926).
***Iphiaulax mactator* (Klug, 1817)**
Records of Iran: Tobias (1976, 1986).
***Iphiaulax mirabilis* (Hedwig, 1957)**
Record of Iran: Hedwig (1957).
***Iphiaulax perezi* (Fahringer, 1926)**
Record of Iran: Telenga (1936).

Genus *Pseudovipio* Szépligeti, 1896

***Pseudovipio kirmanensis* (Kokujev, 1907)**
Records of Iran: Kokujev (1907); Fahringer (1926); Telenga (1936); Hedwig (1957).
***Pseudovipio nigrirostris* (Kokujev, 1907)**
Records of Iran: Kokujev (1907); Fahringer (1926).
***Pseudovipio schaeuffelei* (Hedwig, 1957)**
Records of Iran: Hedwig (1957); Achterberg (1980).
***Pseudovipio tataricus* (Kokujev, 1898)**
Records of Iran: Telenga (1936); Shenefelt (1978).

Genus *Rhadinobracon* Szépligeti, 1906

***Rhadinobracon nigrocephalus* (Hedwig, 1957)**
Record of Iran: Hedwig (1957).
***Rhadinobracon zarudnyi* (Telenga, 1936)**
Records of Iran: Telenga (1936); Shenefelt (1978).

Genus *Vipio* Latreille, 1805

***Vipio* (*Vipio*) *mlokossewiczi* Kokujev, 1898**
Record of Iran: Telenga (1936).
***Vipio* (*Vipio*) *nomioides* Shestakov, 1926**
Records of Iran: Shestakov (1926); Telenga (1936); Tobias (1976, 1986).
***Vipio* (*Vipio*) *terrefactor* (Villers, 1789)**
Records of Iran: Szépligeti (1901); Telenga (1936); Tobias (1976, 1986).
***Vipio* (*Vipio*) *xanthurus* (Fahringer,1926)**
Record of Iran: Fahringer (1926).

Subfamily Cardiochilinae Ashmead, 1900

Genus *Cardiochiles* Nees von Esenbeck, 1819

***Cardiochiles saltator* (Fabricius, 1781)**
Records of Iran: Telenga (1955); Belokobylskij (1998).
***Cardiochiles tibialis* Hedwig, 1957**
Record of Iran: Hedwig (1957).
***Cardiochiles triplus* Shenefelt, 1973**
Record of Iran: Hedwig (1957).

Genus *Pseudcardiochilus* Hedwig, 1957

***Pseudcardiochilus abnormipes* Hedwig, 1957**
Records of Iran: Hedwig (1957); Achterberg (1980).

Subfamily Cheloninae Foerster, 1862

Genus *Ascogaster* Wesmael, 1835

***Ascogaster bicarinata* (Herrich-Schäffer, 1838)**
Records of Iran: Telenga (1941); Tobias (1976, 1986).
***Ascogaster caucasica* Kokujev, 1895**
Record of Iran: Huddleston (1984).

Genus *Chelonus* Panzer, 1806

***Chelonus* (*Chelonus*) *annulatus* (Nees von Esenbeck, 1816)**
Record of Iran: Telenga (1941).
***Chelonus* (*Chelonus*) *annulipes* Wesmael, 1835**
Records of Iran: Telenga (1941); Tobias (1976, 1986).
***Chelonus* (*Chelonus*) *breviventris* Thomson, 1874**
Record of Iran: Papp (1997).
***Chelonus* (*Chelonus*) *inanitus* (Linnaeus, 1767)**
Records of Iran: Aubert (1966); Davatchi and Shojai (1969); Khanjani (2004); Alizadeh and Javan Moghaddam (2004); Bagheri and Basiri (2004).
***Chelonus* (*Chelonus*) *iranicus* Tobias, 1972**
Record of Iran: Tobias (1972).
***Chelonus* (*Chelonus*) *kermakiae* (Tobias, 2001)**
Records of Iran: Achterberg and Mehrnejad (2002).
***Chelonus* (*Chelonus*) *medus* Telenga, 1941**
Record of Iran: Telenga (1941).
***Chelonus* (*Chelonus*) *oculator* (Fabricius, 1775)**
Records of Iran: Telenga (1941); Tobias (1976, 1986).
***Chelonus* (*Chelonus*) *scabrator* (Fabricius, 1793)**
Record of Iran: Telenga (1941).
***Chelonus* (*Chelonus*) *setaceus* Papp, 1993**
Record of Iran: Papp (1993).
***Chelonus* (*Chelonus*) *smirnovi* Telenga, 1953**
Record of Iran: Tobias (1976).
***Chelonus* (*Microchelonus*) *areolatus* Cameron, 1906**
Record of Iran: Papp (1996).
***Chelonus* (*Microchelonus*) *basalis* Curtis, 1837**
Record of Iran: Telenga (1941).
***Chelonus* (*Microchelonus*) *contractus* (Nees von Esenbeck, 1816)**
Record of Iran: Modarres Awal (1997).

***Chelonus (Microchelonus) depressus* Thomson, 1874**
Records of Iran: Davatchi and Shojai (1969); Jafaripour (1969).
***Chelonus* (*Microchelonus*) *iranicus* (Tobias, 2001)**
Record of Iran: Tobias (2001).
***Chelonus* (*Microchelonus*) *telengai* (Abdinbekova, 1965)**
Records of Iran: Abdinbekova (1965); Tobias (1976, 1986, 2001).

Genus *Phanerotoma* Wesmael, 1838

***Phanerotoma* (*Bracotritoma*) *parva* Kokujev, 1903**
Record of Iran: Al-e-Mansour and Mostafavi (1993).
***Phanerotoma* (*Phanerotoma*) *fracta* Kokujev, 1903**
Records of Iran: Hedwig (1957); Achterberg (1990).
***Phanerotoma* (*Phanerotoma*) *leucobasis* Kriechbaumer, 1894**
Records of Iran: Hedwig (1957); Achterberg (1990); Modarres Awal (1997).
***Phanerotoma* (*Bracotritoma*) *masiana* Fahringer, 1934**
Record of Iran: Al-e-Mansour and Mostafavi (1993).
***Phanerotoma* (*Phanerotoma*) *syleptae* Zettel, 1990**
Record of Iran: Zettel (1990).

Subfamily Doryctinae Foerster, 1862

Genus *Doryctes* Haliday, 1836

***Doryctes leucogaster* (Nees von Esenbeck, 1834)**
Records of Iran: Telenga (1941); Shenefelt and Marsh (1976); Tobias (1976); Belokobylskij and Tobias (1986).

Genus *Ecphylus* Foerster, 1862

***Ecphylus* (*Ecphylus*) *silesiacus* (Ratzeburg, 1848)**
Records of Iran: Aubert (1966); Hedqvist (1967); Shenefelt and Marsh (1976); Modarres Awal (1997).

Genus *Leluthia* Cameron, 1887

***Leluthia ruguloscolyti* (Fischer, 1962)**
Records of Iran: Aubert (1966); Belokobylskij and Tobias (1986).

Genus *Ontsira* Cameron, 1900

***Ontsira imperator* (Haliday, 1836)**
Records of Iran: Telenga (1941); Hedwig (1957); Shenefelt and Marsh (1976).

Genus *Rhaconotus* Ruthe, 1854

***Rhaconotus* (*Rhaconotus*) *zarudnyi* Belokobylskij, 1990**
Record of Iran: Belokobylskij (1990).

Genus *Spathius* Nees von Esenbeck, 1819

***Spathius* (*Spathius*) *polonicus* Niezabitowski, 1910**
Records of Iran: Fischer (1970); Shenefelt and Marsh (1976); Belokobylskij (1989); Modarres Awal (1997).

Genus *Zombrus* Marshall, 1897

***Zombrus flavipennis* (Brullé, 1846)**
Record of Iran: Shenefelt and Marsh (1976).

Subfamily Euphorinae Foerster, 1862

Genus *Ecclitura* Kokujev, 1902

***Ecclitura primoris* Kokujev, 1902**
Records of Iran: Hedwig (1957); Haeselbarth (1973); Achterberg (1980); Tobias (1986).

Genus *Leiophron* Nees von Esenbeck, 1819

***Leiophron* (*Leiophron*) *pseudomitis* (Hedwig, 1957)**
Record of Iran: Hedwig (1957).

Genus *Meteorus* Haliday, 1835

***Meteorus obsoletus* (Wesmael, 1835)**
Record of Iran: Nikdel et al.(2004).
***Meteorus pendulus* (Müller, 1776)**
Records of Iran: Abbasipour (2001); Khanjani (2004).
***Meteorus pulchricornis* (Wesmael, 1835)**
Record of Iran: Herard et al.(1979).

***Meteorus rubens* (Nees von Esenbeck, 1811)**
Records of Iran: Aubert (1966); Davatchi and Shojai (1969); Modarres Awal (1997); Alizadeh and Javan Moghaddam (2004).
***Meteorus versicolor* (Wesmael, 1835)**
Record of Iran: Nikdel et al. (2004).

Genus *Perilitus* Nees von Esenbeck, 1819

***Perilitus* (*Microctonus*) *aethiopoides* (Loan, 1975)**
Record of Iran: Arbab and McNeill (2001).
***Perilitus* (*Microctonus*) *colesi* (Drea, 1968)**
Record of Iran: Bartlett (1978).
***Perilitus* (*Perilitus*) *flavobasalis* Hedwig, 1957**
Record of Iran: Hedwig (1957).

Genus *Peristenus* FOERSTER,1862

***Peristenus rubricollis* (Thomson, 1892)**
Record of Iran: Khanjani (2004).

Genus *Wesmaelia* Foerster, 1862

***Wesmaelia petiolata* (Wollaston, 1858)**
Record of Iran: Belokobylskij (1992).

Subfamily Helconinae Foerster, 1862

Genus *Aspicolpus* Wesmael, 1838

***Aspicolpus borealis* (Thomson, 1892)**
Record of Iran: Hedwig (1957).

Genus *Helcon* Nees von Esenbeck, 1812

***Helcon claviventris* Wesmael, 1835**
Record of Iran: Hedwig (1957).
***Helcon heinrichi* Hedqvist, 1967**
Record of Iran: Hedqvist (1967).

Subfamily Homolobinae Achterberg, 1979

Genus *Homolobus* Foerster, 1862

***Homolobus* (*Apatia*) *ophioninus* (Vachal, 1907)**
Record of Iran: Achterberg (1979).

Subfamily Hormiinae Foerster, 1862

Genus *Hormius* Nees von Esenbeck, 1819

***Hormius sculpturatus* Tobias, 1967**
Record of Iran: Al-e-Mansour and Mostafavi (1993).

Genus *Hormisca* Telenga, 1941

***Hormisca tatianae* Telenga, 1941**
Records of Iran: Telenga (1941); Shenefelt (1975); Belokobylskij and Tobias (1986).

Subfamily Macrocentrinae Foerster, 1862

Genus *Macrocentrus* Curtis, 1833

***Macrocentrus collaris* (Spinola, 1808)**
Record of Iran: Aubert (1966).
***Macrocentrus flavus* Vollenhoven, 1878**
Record of Iran: Achterberg (1993).

Subfamily Microgastrinae Foerster, 1862

Genus *Apanteles* Foerster, 1862

***Apanteles* (*Apanteles*) *bicolor* (Nees von Esenbeck, 1834)**
Record of Iran: Modarres Awal (1997).
***Apanteles* (*Apanteles*) *galleriae* Wilkinson, 1932**
Record of Iran: Modarres Awal (1997).
***Apanteles* (*Apanteles*) *iranicus* Telenga, 1955**
Records of Iran: Telenga (1955); Tobias (1986).
***Apanteles* (*Apanteles*) *lacteicolor* Viereck, 1911**
Record of Iran: Herard et al. (1979).

***Apanteles* (*Apanteles*) *lacteus* (Nees von Esenbeck, 1834)**
Record of Iran: Telenga (1955).
***Apanteles* (*Apanteles*) *obscurus* (Nees von Esenbeck, 1834)**
Record of Iran: Capek and Hofmann (1997).
***Apanteles* (*Apanteles*) *viminetorum* (Wesmael, 1837)**
Record of Iran: Telenga (1955).

Genus *Cotesia* Cameron, 1891

***Cotesia chilonis* (Matsumura, 1910)**
Records of Iran: Rassipour (1983); Modarres Awal (1997).
***Cotesia glomerata* (Linnaeus, 1758)**
Records of Iran: Davatchi and Shojaii (1969); Alizadeh and Javan Moghaddam (2004).
***Cotesia juniperatae* (Bouché, 1834)**
Records of Iran: Davatchi and Shojaii (1969); Modarres Awal (1997).
***Cotesia kazak* (Telenga, 1949)**
Records of Iran: Davatchi and Shojaii (1969); Modarres Awal (1997).
***Cotesia melanoscela* (Ratzeburg, 1844)**
Records of Iran: Herard et al. (1979); Modarres Awal (1997).
***Cotesia ofella* (Nixon, 1974)**
Record of Iran: Karimpour et al. (2001).
***Cotesia rubecula* (Marshall, 1885)**
Record of Iran: Khanjani (2006).
***Cotesia ruficrus* (Haliday, 1834)**
Records of Iran: Siahpoush et al.(1993); Modarres Awal (1997); Khanjani (2004).
***Cotesia saltator* (Thunberg, 1824)**
Record of Iran: Papp (1987).
***Cotesia specularis* (Szépligeti, 1896)**
Record of Iran: Papp (1986).
***Cotesia telengai* (Tobias, 1972)**
Record of Iran: Papp (1986).
***Cotesia tibialis* (Curtis, 1830)**
Record of Iran: Aubert (1966).
***Cotesia vanessae* (Reinhard, 1880)**
Record of Iran: Karimpour et al. (2001).
***Cotesia vestalis* (Haliday, 1834)**
Records of Iran: Telenga (1955); Karimpour et al. (2005); Golizadeh et al. (2005).

Genus *Diolcogaster* Ashmead, 1900

***Diolcogaster mayae* (Shestakov, 1932)**
Records of Iran: Hedwig (1957); Telenga (1955); Tobias (1976, 1986); Achterberg (1980); Al-e-Mansour and Mostafavi (1993).

Genus *Microgaster* Latreille, 1805

***Microgaster australis* Thomson, 1895**
Record of Iran: Tobias (1986).
***Microgaster rufipes* Nees von Esenbeck, 1834**
Record of Iran: Telenga (1955).

Genus *Microplitis* Foerster, 1862

***Microplitis aduncus* (Ruthe, 1860)**
Record of Iran: Papp (1984).
***Microplitis deprimator* (Fabricius, 1798)**
Record of Iran: Nixon (1968).
***Microplitis ochraceus* Szépligeti, 1896**
Records of Iran: Telenga (1955); Tobias (1976, 1986); Papp (1984).
***Microplitis scrophulariae* Szépligeti, 1898**
Record of Iran: Tobias (1976).

Genus *Protapanteles* Ashmead, 1898

***Protapanteles* (*Protapanteles*) *liparidis* (Bouché, 1834)**
Records of Iran: Herard et al. (1979); Modarres Awal (1997).
***Protapantales* (*Protoapantales*) *thompsoni* (Lyle, 1927)**
Record sof Iran: Khanjani (2004).

Subfamily Microtypinae Szépligeti, 1908
Genus *Microtypus* Ratzeburg, 1848
***Microtypus desertorum* Shestakov,1932**
Record of Iran: Hedwig (1957).

Subfamily Miracinae Viereck, 1918
Genus *Centistidea* Rohwer, 1914
***Centistidea* (*Paracentistidea*) *pistaciella* Achterberg and Mehrnejad, 2002**
Record of Iran: Achterberg and Mehrnejad (2002).

Subfamily Opiinae Blanchard, 1845
Genus *Eurytenes* Foerster, 1862
***Eurytenes* (*Xynobiotenes*) *scutellatus* (Fischer, 1962)**
Record of Iran: Fischer (1990).
Genus *Fopius* Wharton, 1987
***Fopius carpomyiae* (Silvestri, 1916)**
Record of Iran: Farrar and Chou (2000)
Genus *Opius* Wesmael, 1835
***Opius* (*Apodesmia*) *sharynensis* Fischer, 2001**
Record of Iran: Fischer (2001).
***Opius* (*Nosopoea*) *maculipes* Wesmael, 1835**
Record of Iran: Fischer (1990).
***Opius* (*Nosopoea*) *teheranensis* Fischer, 1990**
Record of Iran: Fischer (1990).
***Opius* (*Opiothorax*) *abditus* Fischer, 1960**
Record of Iran: Fischer (1960, 1972b).
Genus *Phaedrotoma* Foerster, 1862
***Phaedrotoma exigua* (Wesmael, 1835)**
Record of Iran: Fischer (1990).

Subfamily Orgilinae Ashmead, 1900
Genus *Orgilus* Haliday, 1833
***Orgilus* (*Orgilus*) *abbreviator* (Ratzeburg, 1852)**
Record of Iran: Taeger (1989).
***Orgilus* (*Orgilus*) *jennieae* Marsh, 1979**
Record of Iran: Khanjani (2006).
***Orgilus* (*Orgilus*) *meyeri* Telenga, 1933**
Record of Iran: Taeger (1989).
***Orgilus* (*Orgilus*) *obscurator* (Nees von Esenbeck, 1812)**
Records of Iran: Sabzevari (1968); Modarres Awal (1997).
***Orgilus* (*Orgilus*) *tobiasi* Taeger, 1989**
Record of Iran: Taeger (1989).

Subfamily Pambolinae Marshall, 1885
Genus *Pambolus* Haliday, 1836
***Pambolus* (*Phaenodus*) *pallipes* (Foerster, 1862)**
Record of Iran: Belokobylskij (1998).

Subfamily Rogadinae Foerster, 1862
Genus *Aleiodes* Wesmael, 1838
***Aleiodes* (*Aleiodes*) *bicolor* (Spinola, 1808)**
Records of Iran: Telenga (1941); Hedwig (1957).
***Aleiodes* (*Aleiodes*) *circumscriptus* (Nees von Esenbeck, 1834)**
Record of Iran: Telenga (1941).
***Aleiodes* (*Aleiodes*) *nocturnus* (Telenga, 1941)**
Record of Iran: Shenefelt (1975).
***Aleiodes* (*Aleiodes*) *testaceus* (Spinola,1808)**
Record of Iran: Hedwig (1957).

***Aleiodes* (*Chelonorhogas*) *agilis* (Telenga, 1941)**
Records of Iran: Telenga (1941); Shenefelt (1975); Tobias (1976, 1986).
***Aleiodes* (*Neorhogas*) *dimidiatus* (Spinola, 1808)**
Record of Iran: Telenga (1941).
***Aleiodes* (*Neorhogas*) *ductor* (Thunberg, 1824)**
Records of Iran: Hedwig (1957); Tobias (1976, 1986).

Genus *Yelicones* Cameron, 1887

***Yelicones iranus* (Fischer, 1963)**
Record of Iran: Fischer (1963).

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EFFECTS OF THE INSECT GROWTH REGULATOR PYRIPROXYFEN ON IMMATURE STAGES OF SUNN PEST, *EURYGASTER INTEGRICEPS* PUTON (HETEROPTERA: SCUTELLERIDAE)

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ABSTRACT: The effect of insect growth regulator (pyriproxyfen) on immature stages (eggs and nymphs) of Sunn pest, *Eurygaster integriceps* Puton (Heteroptera: Scutelleridae), which is of great importance in wheat and barley fields as nymphal and adult stages, was determined. When one day old eggs were treated with concentrations of 0.0, 0.1, 10, 100 and 1000 ppm, the egg hatchability were 96.90, 92.38, 98.4, 93.21 and 55.23 %, respectively. Similar results obtained when 3 day-old eggs were treated. However, when 5 day-old eggs were treated, no significant differences in egg hatchability between treatments observed ($F = 1.51$, $P > 0.01$). Adult weight was significantly influenced by treatment of nymphal instars. Treatments of first nymphal instars caused significant differences in adult weight between control and treatments ($F = 25.63$, $P < 0.01$). Adult weights were 102.5, 86.14, 69.47, 56.84, 62.11, and 64.56 mg when first instar nymphs were treated with concentrations of 0.0, 0.1, 10, 100 and 1000 ppm pyriproxyfen, respectively. Reduction of adult weight was significantly more when the nymphs were treated with high concentrations of pyriproxyfen. Nymphal developmental time was not significantly affected by pyriproxyfen treatment ($P > 0.1$). Adult emergence, sex ratio, nymphal survival rate and adults abnormalities were also affected by pyriproxyfen treatments of nymphs.

KEY WORDS: *Eurygaster integriceps*, immature stages, pyriproxyfen

Modern insecticide research started almost 65 years ago with the chlorinated hydrocarbons, followed shortly by the organophosphates, methylcarbamates and botanicals e.g. pyrithrins and their analogs. The use of these conventional organic insecticides to control insect pests has given rise to problems of the proliferation of resistance and accumulation of residue in the environment with adverse ecological effects (Hoffmann and Lorenz, 1997). In the search for safer insecticide technologies, *i.e.*, more selective modes of action and reduced risks for non-target organisms and the environment, progress has been made in the last two decades with the development of natural and synthetic compounds capable of interfering with the processes of growth, development and metamorphosis of the target insects (Smet et al., 1990; Oberlander et al.; 1978, 1997).

Since the early 1970s, numerous analogs of JH (juvenoids) have been tested for insecticidal activity (Sehnal, 1976). Most of the early analogs resemble JH in their basic terpenoid structure. The first juvenoids were farnesol and farnesal isolated from insects themselves (Dhadialla et al. 1998). The 'paper factor' (Slama and Williams, 1965), now called juvabione, represents a group of hormone mimics present in a variety of plants where they may function as defensive mechanisms against herbivorous insects (Dhadialla et a. 2005). Two very active JH analogs, methoprene and hydroprene lack the epoxide function present in JH. More recently, several highly active compounds with less apparent similarity to JH (aromatic non-terpenoidal JH analogs) like fenoxycarb, pyriproxyfen and diofenolan have been synthesized (Dhadialla et al. 1998; Dhadialla et a. 2005). These chemicals have been called insect growth regulators (IGR) or third-generation insecticides (Williams, 1967). IGRs differ widely from the commonly used insecticides, as they exert their insecticidal effects through their influence on development, metamorphosis and reproduction of the target insects by disrupting the normal activity of the endocrine system (Smet et al., 1990; Oberlander et al., 1997).

In the European corn borer, *Ostrinia nubilalis*, application of fenoxycarb during the second to fourth larval instars had no effect on the duration of these instars. However, the duration of the resulting fifth instars increased significantly (Gadenne et al., 1990). Applications of fenoxycarb in the fifth instar produced different effects, depending upon the dose and the timing of application, which resulted in production of supernumerary or permanent larvae, or of larval-pupal intermediates (Gadenne et al., 1990). Li and Chen (2001) observed significant effects of fenoxycarb on all immature stages (eggs, three larval instars and pupae) of *Chrysoperla rufilabris* when tested at three concentrations of (0.1, 1.0 and 10.0 mg [AI]/l). Fenoxycarb had ovicidal effect, lethal effect on larvae and pupae. Also, fenoxycarb significantly delayed the developmental times from the stage treated to adult emergence for all immatures of *C. rufilabris* that successfully developed to adults by 3.2-4.6, 2.3-3.0, 2.1-2.8, and 4.6-7.5 days when egg, first, second and third instars were treated, respectively (Li and Chen, 2001).

Hatakoshi et al. (1991) found that pyriproxyfen was much more potent in inducing supernumerary larvae than methoprene and JH I when injected into last larval-stage of *Spodoptera litura*. Treatment of *C. fumiferana* larvae with fenoxycarb resulted in larval-pupal intermediates and production of deformed pupae (Mulye and Gordon, 1989; Hicks and Gordon, 1992). Related morphogenetic effects have been observed with fenoxycarb for *Heliothis virescens* (Mauchamp et al. 1989). Application of fenoxycarb to the fifth instar of the German cockroach, *Blattella germanica*, not only induced morphological deformities but also induced sterility in adults. The sterility seems to have been transferred from treated males mated to untreated females, which suggests effects on sperm (King and Bennett, 1990). Similar sterility effects were also obtained for *C. fumiferana* (Hicks and Gordon, 1992). Topical application of fenoxycarb suppressed egg production by queens of the red imported fire ant, *Solenopsis invicta* (Banks et al. 1988), and reduced both egg production and hatching in the California fivespined ips, *Ips paraconfusus* (Chen & Borden, 1989). Pyriproxyfen decreased ecdysteroid titer in the hemolymph of the mealworm (*Tenebrio molitor*) when applied to the notum of the newly ecdysed pupae.

In addition, the treatment induced an increase of the protein in the hemolymph of the treated species (Aribi et al., 2005). Supernumerary-molt nymphs with 1-3 extra molts were found when the first three nymphal instars of turnip aphid, *Lipaphis erysimi* were exposed to juvenile hormone analog, pyriproxyfen, and all these nymphs died prematurely. The longevity of all pyriproxyfen-treated *L. erysimi* nymphs and adults and the fecundity of treated adults were reduced by 50% (Liu & Chen, 2001).

Since, there are no published reports on the effects of pyriproxyfen on the Sunn pest, the aim of the current study was to determine the effect of pyriproxyfen on immature stages of Sunn pest, *Eurygaster integriceps* Puton (Heteroptera: Scutelleridae) that is of great importance in wheat and barley fields as nymphal and adult stages in the wide area of the Near and Middle East, West and Central Asia. There is hope that the insect control strategies based on the insect endocrine system will help to overcome residual toxicity and development of resistant strains for conventional insecticides especially of organophosphorus insecticide (e.g. fenitrothion) which are used extensively in order to control this insect.

Studying the effects of pyriproxyfen on the critical life stages of Sunn pest will help in their proper management. The critical life stages of Sunn pest that are at risk due to spraying of pyriproxyfen are the eggs (embryonic development), nymphal instars and the adults. Therefore, in this study the effects of pyriproxyfen on the hatchability of the insect's eggs, insects' developmental time, adults' weight, adults' emergence, adults' sex ratio, and survival rate of nymphal stages were assessed.

MATERIALS AND METHODS

Insects

The insects were collected before oviposition from Mash-had wheat farms in Mash-had province, Iran. The colony (Adult insects) was maintained and reared on wheat plants or wheat kernels (nymphs) in the laboratory at 25 ±2 °C, 65 % relative humidity and a photoperiod of 14 h light: 10 h dark (LD 14:10). All tests were run at the mentioned condition.

Insecticide

Pyriproxyfen (registered as ADMIRAL® 10 % EC, Sumitomo Chemical Co.) were used in bioassays.

Egg bioassays

The insect rearing boxes were investigated daily and newly laid eggs (0-24 h) were chosen and left in plastic Petri dishes (9.0 cm diam.) until they developed to the desired age. Three different batches of 1.0 (0-24h), 3.0, and 5.0 day-old eggs were selected and used for egg bioassays. In this assay, five concentrations of 0.0 (Control), 0.1, 10, 100, and 1000 ppm of pyriproxyfen were prepared in distilled water. For each egg batch one assay was made. Each assay consisted of five treatments (five different concentrations of pyriproxyfen) and each treatment (insecticide concentration) had five replications. In each replication 50 eggs were used. The whole experiment was repeated twice.

The selected eggs were dipped in the pyriproxyfen solutions for 5 s. The treated eggs were placed in a Petri dishes lined with a Whatman No. 1 filter paper for 2 h to air dry. Then, the eggs were transferred to a rearing box and their hatching was recorded daily.

Residual bioassay

Pyriproxyfen was dissolved in acetone to give six concentrations of 0.01, 0.1, 10, 100, 1000 ppm.

Petri dishes (9 cm diam.) lined with Whatman No. 1 filter paper and 1000 µl of each concentration were applied to the filter paper followed by air drying for 2 hour at room temperature. Controls were treated with acetone alone.

For this assay, for each nymphal stadium one assay was made. Since Sunn pest have five nymphal stages, five different assays were run. To obtain desired stages of nymphs, eggs with the same age were separated and allowed to hatch in the rearing box. After the eggs hatched, the nymphs were reared and fed with 12 h-soaked wheat kernels until they developed to the desired instars.

Nymphs of 0-12 h after hatching were considered first instar and nymphs of 0-12 h after first, second, third, and fourth ecdysis were considered second, third, fourth, and fifth instars, respectively. As mentioned before, for each nymphal instar one assay was made. Each assay consisted of six treatments (six different concentrations of pyriproxyfen) and each treatment was replicated six times using

15 nymphs per replicate. The whole experiment was repeated twice. Mortality (survival rate) was recorded daily until nymphs moult to the adults.

Effect of pyriproxyfen on insect development

One assay as described in the previous section (residual assay) was set up to test the effect of pyriproxyfen on insect growth and development. The parameters recorded were developmental time (the period between eclosion from egg to adult emergence for the first instar nymphs and the period between nymphal stages and adult emergence for the other nymphal stages), adults' weight (the weights of individual emerging adult), adult sex ratio (the numbers of females emerged relative to the numbers of adults emerged), percentage of adult emergence (the numbers of emerging adults relative to the initial cohort size) and percentage of adult abnormalities (the numbers of abnormal adults emerged relative to the numbers of emerged adults). Abnormal adults were defined as adults with some degree of deformation in antennae, legs, wings, mouthparts (beak).

Data analysis

Data was submitted to analysis of variance (ANOVA) and mean comparison was made using Duncan test in a completely randomized design. ANOVA was used to evaluate treatment effects on nymphal developmental time, survival rate, adults' weight, adults' emergence, sex ratio (percent female emergence), and adults' abnormalities.

RESULTS

Effects of pyriproxyfen on eggs hatchability (embryonic development)

The effect of pyriproxyfen on different stages of embryonic development of Sunn pest is shown in table 1. There were significant differences in 1 day-old eggs treatments ($F = 14.75$, $P < 0.01$) (Table 1). In one day-old egg treatment, hatchability in concentrations of 0.0, 0.1, 10, and 100 ppm were 96.90, 92.38, 98.4 and 93.21%, respectively. There were no differences between egg hatchability in concentrations of 0.1, 10, and 100 ppm and that in control (Table 1). Survival rate was significantly lower when the nymphs were treated with the highest concentration. When one day-old egg was treated with concentration of 1000 ppm, only 55.23 % of eggs were survived. Similar results obtained when 3 day-old eggs were treated with different concentrations of pyriproxyfen. Similar to treated 1 day-old eggs, survival rates of 3 day-old eggs were significantly different among concentrations ($F = 16.1$, $P < 0.01$). Survival rate of 3 day-old eggs when treated with concentrations of 1000 ppm was 71.42 % which was significantly different from the other concentrations used. However, when 5 day-old eggs were treated, no significant differences between treatments were observed ($F = 1.51$, $P > 0.01$). When 5 day-old eggs treated with concentrations of 0.0, 0.1, 10, 100, and 1000 ppm, percentage of egg hatching were 100, 97.14, 95.37, 100, and 92.91, respectively. Even at a high dose (1000 ppm), the percentage of egg hatching (92.91%) was not significantly different from the other concentrations.

Effect of pyriproxyfen on insect developmental time

As can be seen from table 2, there were no significant differences in the developmental duration between treatments ($P > 0.1$). The developmental duration to adults in treated first instar nymphs with concentrations of 0.0, 0.01, 0.1, 10, 100, and 1000 ppm of pyriproxyfen were 26.5, 28, 29, 27.5, 30, and 28.5 days, respectively (Table 2). Thus, when first instar nymphs were treated, there were no significant effect on the subsequent development of the first instar to adults ($F = 2.36$, $P > 0.1$). However, developmental duration was longest at high concentrations. Similar results were obtained when second, third, fourth and fifth instars were treated. Generally, the developmental times of treated nymphs in high doses (100 and 1000 ppm) were delayed slightly. The duration of nymphal instars when first instar nymphs were treated with concentrations of 100 and 1000 ppm were 30 and 28.5 days, while that in control was 26.5 days (table 2).

Effect of pyriproxyfen on survival rate

When first instar nymphs were treated, percentage of mortality was significantly different among the five concentrations used ($P < 0.01$). Similar results were obtained when nymphs of the other instars were treated.

Survival rate was significantly lower when the nymphs were treated with the highest dose (1000 ppm) (Table 3). Mortality was no more than 12% in controls, while mortality at highest dose against first, second, third, fourth and fifth instar nymphs were 52.03, 51.92, 66.06, 38.85, and 59.21%, respectively (Table 3).

Effect of pyriproxyfen on adults' weight

When all five nymphal instars were treated, there were significant differences in adult weight among treatments (Table 4). Generally, adults in the controls weighed consistently more than those in pyriproxyfen treatments. Treatments of first nymphal instars caused significant differences between control and treatments ($F = 25.63$, $P < 0.01$). Reduction of adult weight was significantly more when the nymphs were treated with high concentrations of pyriproxyfen (Table 4). When first instar nymphs were treated with concentrations of 0.0 (control) and 1000 ppm, adults weight were102.5 and 64.56 mg, respectively. Adult weight reductions were 16 and 38% when first instar nymphs were treated with concentrations of 0.01 and 1000 ppm, respectively. Younger nymphs (first, second and third instar nymphs) were more affected than older nymphs. For example treatments of younger nymphs with different concentrations of pyriproxyfen caused significant differences in adult weight between control and treatments ($P < 0.01$), whereas treatment of older nymphs (fourth and fifth instar nymphs) did not produce significant differences between control and treatments ($P > 0.01$).

First, second, third, and fourth instar nymphs treated with concentration of 1000 ppm adults' weight were 64.56, 60.17, 63.83, 72.34, and 80 mg, respectively (Table 4). As a result, higher nymphal stages less reduction of adult weight observed. For example, when first instar nymphs were treated with high concentration of pyriproxyfen (1000 ppm) adult weight was 64.56 mg while adult weight which obtained from treatment of fifth instar with the same concentration of pyriproxyfen was 80.32 mg.

Effect of pyriproxyfen on adults' emergence and their sex ratios

Adult emergence was affected by pyriproxyfen treatments and as pyriproxyfen concentrations increased the percentage of adult emergence decreased (Table 5). Significant differences were found between treatments and control when first, second, third, fourth and fifth instar nymphs were treated ($P < 0.01$). In comparison with the control the lowest adult emergence was observed when fifth instar nymphs were treated with a concentration of 1000 ppm that the percentage of adult emergence was about 46%. Whereas, nymphs treated with a concentration of 1000 ppm in the first instar, percentage of adult emergence was about 53 %.

Adult sex ratios were affected by nymphal treatments (Table 6). Treatment of nymphal stages with pyriproxyfen caused a significant difference from 1♂: 1♀in each case.

When first instar nymphs were treated with concentrations of 0.01 and 1000 ppm, percentage of female individuals in the populations were 52.78 and 18.06 %, respectively ($F = 10.46$, $P < 0.01$) (Table 6). The effect of pyriproxyfen on adult sex ratio was more on younger instars than older instars. For example, when first and fifth instars were treated with concentrations of 1000 ppm, percentages of adult females were 18.06 and 43.08, respectively.

Effect of pyriproxyfen on the emergence of deformed adults

Pyriproxyfen had strong effect on production of abnormal adults (Table 7). Treatment of fifth instar nymphs with different concentration of pyriproxyfen caused significant differences in production of deformed adults between treatments and control ($F = 43.41$, $P < 0.01$). For example when first and fifth instar nymphs were treated with 0.01 and 1000 ppm, percentage of deformed adults were 46.78 and 83.97, respectively.

DISCUSSION

The presented data showed that application of pyriproxyfen to eggs and nymphs of Sunn pest (*Eurygaster integriceps*) resulted in increased mortality and slight prolonged development of nymphs. Pyriproxyfen showed significant ovicidal effect when younger eggs were treated depending on concentration used. For example, when first, second and third instar nymphs were treated at 1000 ppm survival rates were 55.23, 71.42 and 92.91%, respectively. Similar results have been reported when fenoxycarb tested on eggs of *Chrysoperla rufilabris* (Neuroptera: Chrysopidae) (Liu & Chen, 2001) or topical application of fenoxycarb to adult insects of California fivespined ips, *Ips paraconfusus*, reduced both egg production by females and egg hatching (Chen & Borden, 1989).

Liu & Chen (2001) reported egg hatching rate of 66.7% when they applied a concentration of 10 mg (AI L^{-1}) of fenoxycarb. Bhargava and Urs (1993) reported mortality effects on the eggs of rice moth (*Corcyra cephalonica*) exposed to various doses of hydroprene. Among the three age groups of eggs that they exposed to hydroprene, the hatching percentage was highly reduced in the freshly laid eggs (0-12 h old) compared to older eggs. Also, embryonic effects of fenoxycarb have been observed in the eggs of the eastern spruce budworm (*Choristoneura fumiferana*) (Hicks & Gordon, 1992), and the cat flea (*Ctenocephalides felis*) (Marchiondo et al., 1990). It has been reported that juvenile hormone analogs (JHAs) are more effective at the beginning stage of metamorphosis and embryogenesis in insects, such as freshly ecdysed last larval instars, freshly ecdysed pupal instars, and freshly deposited eggs (Dhadialla et al., 1998; Tunaz & Uygun, 2004). Thus embryogenesis is disrupted when young eggs are treated with JHAs. Eggs exposed to fenoxycarb and other juvenile hormone analogs show disruption of the blastoderm with associated cellular and organelle disruption (Dhadialla et al., 1998).

Application of pyriproxyfen to different stages (early and late nymphal instars) of Sunn pest nymphs did not significantly affect nymphal developmental time although slight increase in developmental time was observed when younger instars were treated with high concentrations of pyriporxyfen. The number of days taken for first nymphal instar to emerge as adults in control was 26.5 days, which was the shortest time, while days taken for first instar treatments with 100 and 1000 ppm were 30 and 28.5 days, respectively. So, the longest development time was observed when first nymphal instar treated with the highest concentrations of pyriproxyfen.

In the European corn borer, *O. nubilalis*, application of fenoxycarb during the second to fourth larval instars had no effect on the duration of these instars, while the duration of the resulting fifth instars increased significantly (Gadenne et al., 1990).

Apart from developmental time, which was not strongly affected by the IGR, the other parameters including percentage of adult emergence, adult weight, adult sex ratio, and deformed adults were strongly affected by pyriproxyfen. As reported in the literature (Koehler & Patterson, 1991; Dhadialla et al., 1998; Kostyukovsky et al., 2000).

Adult weights in Sunn pest were strongly affected by pyriproxyfen. For example in control the adult insect weigh more that 100 mg while first nymphal instars, which treatment with highest dose, weigh about 64. 56 mg. Weight is the main feature of the adult insects that influence its reproductive competitiveness (Slansky & Scriber, 1985). Weight is an indicator of the amount of energy and nutrients stored in the body which can influence mate-seeking, dispersal flights and fecundity. Presumably, as a consequence of weight importance, insect larvae or nymphs have evolved a means to evaluate their body weight prior to making the neurohormonal decision to go to the next stage (Nijhout, 1994; Nation, 2002).

Pyriproxyfen affects the hormonal balance in insects and results in a strong suppression of embryogenesis, metamorphosis, and adult formation. Accumulated nymphal mortality was as high as 66% in the treated nymphs. Highest mortality (66 and 59 %) occurred in the fourth and fifth nymphal instars and lowest mortality occurred in the third nymphal instars (36.85%) followed by second (51.92%) and first nymphal instars (52.03%). Results of the current study showed that pyriproxyfen can cause direct mortality as well as strong sublethal effects on treated nymphs. These effects are in accordance with the response of *Aphis gossypi* to pyriproxyfen (Wood & Godrey, 1998), *Myzus persicae* to pyriproxyfen (Hatakoshi et al., 1991), *Lipaphis erysimi* to pyriproxyfen (Liu & Chen, 2001), hydroprene and methoprene (Sidhu & Arora, 1990), stored product insects such as *Tribolium castaneum* and *Sitophilus oryzae* to pyriproxyfen (Kostyukovsky et al., 2000), and Hyposoter didymator to pyriproxyfen (Schneider et al., 2004).

Treatment of fifth instar nymphs with different concentrations of pyriproxyfen caused significant differences in production of deformed adults e.g. highest dose produced 83.97 % of deformed adults. Abnormalities effect was more than any other effects observed. These results showed that pyriproxyfen has a more potent juvenilizing effect than the other effects on Sunn pest. Similar results were reported by Singh (1992) and Liu & Chen (2001) who found that pyriproxyfen causes some degree of abnormalities in treated *Lipaphis erysimi*. In insects the principal hormones involved in the life processes of insects include neurohormones (neuropeptides), ecdysteroids (molting hormones) and the sesquiterpenoid juvenile hormones (JHs). In general ecdysone (hydroxylated steroid) is involved in molting and juvenile hormone (sesquiterpene) is involved in maintaining the insects in current form (Status quo) (Hoffmann & Lorenz, 1997; Gade et al., 1997; Goodman & Granger, 2005). In insects with incomplete metamorphosis such as Sunn pest at the time of the final molt, JH is absent and the adult emerges. Therefore, persistence of JH or juvenile hormone analogs (JHA) during that time, depending upon the dose and time of application, give rise to abnormal adults.

In conclusion it should be mentioned that pyriproxyfen could cause direct mortality (lethal effects) on eggs and nymphs and sub-lethal effects such as reduction of the insect weight, disruption of sex ratio, production of abnormal adults and to some extent interference in the nymphal longevity. All these effects were observed in laboratory conditions. Further investigations of the effect of pyriproxyfen on Sunn pest population should be conducted on a larger scale under field conditions.

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Table 1. The effect of different concentrations of Pyriproxyfen on hatchability of different ages of egg (1, 3, and 5 day-old eggs) of the Sunn pest.

Concentration (PPM)	*Percentage of eggs hatchability (Means ± se)*		
	1 day-old egg treatment	3 day-old egg treatment	5 day-old egg treatment
0.0 (control)	96.90 ± 1.76 [a]	100 ± 0.0 [a]	100 ± 0.0 [a]
0.1	92.38 ± 4 [a]	100 ± 5.06 [a]	97.14 ± 2.86 [a]
10	98.0 ± 4.1 [a]	97.14 ± 2.8 [a]	95.37 ± 4.8 [a]
100	93.21 ± 4.17 [a]	92.86 ± 3.3 [a]	100 ± 0 [a]
1000	55.23 ± 4.2 [a]	71.42 ± 1.75 [b]	92.91 ± 1.2 [a]
F	16.115	14.750	1.516
P	< 0.01	< 0.01	> 0.01

Means in the same column followed by the same letters do not differ significantly at 0.01 (Duncan test).

Table 2. Effects of pyriproxyfen on the duration of nymphal period of Sunn pest when nymphs treated at different developmental stages.

Concentration (PPM)	*Stages treated and developmental time to adult (Mean ±se)*				
	1st instar	2nd instar	3rd instar	4th instar	5th instar
0.0 (control)	26.5±0.5 [a]	26±1 [a]	20±1 [a]	15±1 [a]	10±0.5 [a]
0.01	28±1 [ab]	26.5±1.5 [a]	20.5±1.5 [a]	14.5±0.5 [a]	11.5±0 [b]
0.1	29±1 [ab]	28.5±0.5 [a]	22±1 [a]	16±1 [a]	10.5±0.5 [ab]
10	27.5±0.5 [ab]	26±0 [a]	20±1 [a]	16.5±0.5 [a]	10±0 [a]
100	30±1 [b]	26±1 [a]	21±1 [a]	15.5±1.5 [a]	10.5±0.5 [ab]
1000	28.5±0.5 [ab]	26±0 [a]	21.5±0.5 [a]	16±1 [a]	10±0 [a]
F	2.360	1.333	0.615	0.565	2.733
P	> 0.1	> 0.1	> 0.1	> 0.1	> 0.1

Means in the same column followed by the same letters do not differ significantly at 0.01 (Duncan test).

Table 3. Accumulated mortalities of Sunn pest nymphs when five different nymphal insatrs treated with five concentrations of pyriproxyfen and water (control).

Concentration (PPM)	*Stages treated and percentage mortality (Mean ±se)*				
	1st instar	2nd instar	3rd instar	4th instar	5th instar
0.0 (control)	11.39 ± 0.6	9.46 ± 0.11	12. 47 ± 2.03	11.95 ± 1.51	5.67 ± 0.91
0.01	38.31 ± 1.16	55.75 ± 4.91	17.70 ± 3.43	54.81 ± 18.98	16.66 ± 2.38
0.1	28.94 ± 1.67	37.42 ± 1.71	19.29 ± 0.7	65.90 ± 2.28	25.82 ± 2.75
10	51.9 ± 5.25	47.22 ± 2.78	25.68 ± 7.67	64.5 ± 0.87	33.78 ± 1.75
100	56.15 ± 0.98	39.11 ± 7.56	25.92 ± 2.43	74.82 ± 3.43	30.17 ± 0.59
1000	52.03 ± 6.6	51. 92 ± 1.92	36.85 ± 9.60	66.06 ± 4.53	59.21 ± 2.69

Table 4. Effects of pyriproxyfen on the adults weight of Sunn pest when nymphs treated at different developmental stages.

Concentration (PPM)	*Stages treated and adult weight (mg) (Mean ± se)*				
	1st instar	2nd instar	3rd instar	4th instar	5th instar
0.0 (control)	102.5±1.8 [a]	97.20±1.2 [a]	94.75±2.8 [a]	104.03±3 [a]	104.1±1.2 [a]
0.01	86.14±6.7 [b]	65.85±2.1 [b]	75.88±0.3 [b]	89.73±9.6 [ab]	99.90±0.4 [ab]
0.1	69.47±1 [C]	64.25±1.7 [b]	71.50±3.5 [bc]	79.89±4.4 [b]	94.02±2 [abc]
10	56.84±0.4 [d]	53.65±2.6 [c]	55.06±3.3 [d]	76.43±2.7 [b]	86.30±1.8 [cd]
100	62.11±4.3 [cd]	59.31±5.2 [bc]	65.83±2.8 [bc]	78.24±3.9 [b]	88.44±4.8b [cd]
1000	64.56±10.9 [cd]	60.17±1.1 [bc]	63.83±1.3 [cd]	72.34±5.5 [b]	80.32±6.5 [d]
F	25.636	26.683	20.410	5.042	5.805
P	0.0006	0.0005	0.0011	0.0369	0.0269

Means in the same column followed by the same letters do not differ significantly at 0.01 (Duncan test).

Table 5. Effects of pyriproxyfen on the percentage of adults emergence of Sunn pest when nymphs treated at different developmental stages.

	Stages treated and percentage of adult emergence (Mean ± se)				
Concentration (PPM)	1st instar	2nd instar	3rd instar	4th instar	5th instar
0.0 (control)	59.7±0.9a	58±1.5a	62.18±9.2a	70.4±0.1a	94.32±0.9a
0.01	26.19±1.1bc	31.34±2.7b	35.63±1.44b	66.03±4.5ab	83.33±2.3b
0.1	27.38±10b	16.19±3.5c	15.47±1.1b	66.33±2.7ab	74.17±2.7c
10	16.36±1.2bc	15.97±0.5c	11.41±0.83bc	53.28±6.25bc	67.21±1.7c
100	12.56±0.4c	12.01±2.6c	7.93±2.4c	48.76±4.82c	69.12±0.1c
1000	13.18±5bc	9.61±2.4c	8.20±2.7c	41.45±6.1c	40.78±2.69d
F	18.278	56.277	8.268	6.292	80.568
P	0.0014	0.0001	0.0115	0.0223	0.000

Means in the same column followed by the same letters do not differ significantly at 0.01 (Duncan test).

Table 6. Effects of pyriproxyfen on the sex ratio (% female) of Sunn pest when nymphs treated at different developmental stages.

Concentration (PPM)	*Stages treated and sex ratio(%famale)*				
	1st instar	2nd instar	3rd instar	4th instar	5th instar
0.0 (control)	57.17±1.1a	43.74±0.2a	46.83±0.9a	66.38±0.2a	53.40±0.6a
0.01	52.78±2.2a	34.23±4.2ab	29.28±0.7a	52.32±7.7b	47.72±2.2ab
0.1	24.69±3.5b	31.73±6.7ab	28.57±1.1b	45.56±2.7bc	42.72±2.7b
10	27.93±0.8b	24.44±2.2bc	25.00±1b	39.50bc±5.5bc	43.75±2b
100	22.14±6.6b	24.36±2.9bc	22.50±2.5bc	32.92±0.4c	42.22±2.2b
1000	18.06±5b	9.090±3.2c	19.64±5.3bc	34.15±9.1c	43.08±1.9b
F	10.462	5.517	15.232	9.902	3.587
P	0.0063	0.0302	0.0023	0.0073	0.0757

Means in the same column followed by the same letters do not differ significantly at 0.01 (Duncan test).

Table 7. Percentage of deformed adults of the Sunn pest when fifth instar nymphs treated with different concentration of pyriproxyfen.

Concentration (PPM)	Percentage of deformed adults after 5th instar treatment
0.0 (control)	0.0±0a
0.01	46.78±6.804b
0.1	54.76±4.77bc
10	66.74±5.89c
100	58.22±5.17.8bc
1000	83.97±1.94d
F	43.415
P	0.0002

Means in the same column followed by the same letters do not differ significantly at 0.01 (Duncan test).

AN ANNOTATED CHECKLIST OF GENUS *PHYTOSCAPHUS* SCHOENHERR (COLEOPTERA: CURCULIONIDAE: CYPHICERINI)

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[**Ayri, S. & Ramamurthy, V. V.** 2010. An annotated checklist of genus *Phytoscaphus* Schoenherr (Coleoptera: Curculionidae: Cyphicerini). Munis Entomology & Zoology, 5 (1): 198-203]

ABSTRACT: *Phytoscaphus* is an entimine genus of which 57 species are known so far. An annotated checklist prepared including its synonyms and different subspecies indicate that this genus is predominantly tropical with most of the species known from the Oriental region.

KEY WORDS: *Phytoscaphus,* checklist, synonyms, distribution

The weevils or snout beetles of the superfamily Curculionoidea are the most important insect herbivores, with Curculionidae being the largest of these groups with approximately 60,000 species under 6000 genera (Marvaldi & Lanteri, 2005). Broad nosed weevils of the subfamily Entiminae are one of its largest groups distributed throughout the world particularly in tropics with 55 tribes, 1340 genera (Nikolai et al., 2006) and 12,000 species (Alonso-Zarazaga & Lyal, 1999).

Phytoscaphus is one such entimine genus first described by Schoenherr (1826), and this stands currently under subtribe Phytoscaphina of the tribe Chyphicerini (Alonso-Zarazaga & Lyal, 1999). Economic importance of this group reveals that it infests a number of crops (Nayar et al., 1975; Butani & Jotwani, 1984; Varma et al., 1988; Mukunthan & Sardana, 1989; Zhou & Zhou, 1989; Varma & Tandan, 1996; Ding et al., 2000).

In view of its economic importance, taxonomic studies are imminent and as a prelude to such studies an annotated checklist had been prepared. The checklist reveals that it is well known from Indian subcontinent, south East Asian countries (Cambodia, Vietnam, Laos, Taiwan, Philippines and Indonesia), China, Japan, Africa and Afghanistan showing that it is largely Oriental. Myanmar and India are the regions from where 46 species have been reported with most taxonomic work done from the eighteenth century to the beginning of the nineteenth. Except for Pajni (1990) the studies were lacking indicating the need for a revisionary study. These studies have revealed the following significant findings:

Persual of literature reveals that among the species of *Phytoscaphus* the earliest known was *P. triangularis* described under *Curculio* (Olivier, 1807) as *Curculio triangularis* (Olivier) which was later assigned to the genus *Phytoscaphus* by Schoenherr (1826). Motschulsky (1858) assigned subgenus *Rhypochromus* to *Phytoscaphus* and described five species under it namely *cruciger*, *laticollis*, *obliquus*, *ornatus* and *setifer* mainly from Myanmar. Among the Indian fauna the earliest known species was *inductus* and it was directly described under *Phytoscaphus* by Boheman in Schoenherr (1843).

Review of literature reveals lapses in the descriptions warranting an extensive taxonomic study. The present contribution enlists the 57 species alongwith the historic details of subgenera, synonyms, subspecies and distribution.

Genus *Phytoscaphus* Schoenherr

Phytoscaphus Schoenherr, 1826: 210
Cnemodon Schoenherr, 1823: 1145; Alonso-Zarazaga & Lyal, 1999: 154
Phitoscaphus Thon in Ersch, J. S. & Gruber, J. G, 1836: 349 (Incorrect original spelling); Alonso-Zarazaga & Lyal, 1999: 154
**Rhypochromus* Motschulsky, 1858: 83 (Subgenus of *Phytoscaphus*); Alonso-Zarazaga & Lyal, 1999: 154
Rypochromus Lacordaire, 1863: 622 (Incorrect original spelling); Alonso-Zarazaga & Lyal, 1999: 154

Type species (by original designation) -*Curculio triangularis* Olivier, 1807: 420

1. *alternans* Faust, 1894: 216 [Myanmar, Laos]
    interstitialis Aurivillius, 1891: 215; Schenkling & Marshall, 1931: 23
2. *annamensis* Faust, 1892: 512 [Vietnam]
3. *arcticollis* Boheman in Schoenherr, 1843: 415 [Philippines]
    articollis Schoenherr 1843: 447; Schenkling & Marshall, 1931: 23
    var. *banahaonus* Marshall, 1926: 351
    var. *cretaceus* Marshall, 1926: 351

articollis Schoenherr see *arcticollis*
4. *aversus* Pajni, 1990: 308 [Myanmar]
5. *burmica* Pajni, 1990: 304 [Myanmar]
6. *carinirostris* Faust, 1894: 213 [Myanmar]
7. *chlorohumeralis* Pajni, 1990: 324 [Myanmar]
8. *chlorolateralus* Pajni, 1990: 332 [India]
9. *chloroticoides* Voss, 1959: 100 [Afghanistan]
10. *chloroticus* Boheman in Schoenherr, 1843: 413 [India, Myanmar, Japan, Cambodia, India, Sri Lanka]
    chloroticus ab. *cuprescens* Aurivillius, 1891: 215; Schenkling & Marshall, 1931: 23
11. *ciliatus* Roelofs, 1873: 176 [Japan]
    ciliaris Sharp, 1896: 112; Schenkling & Marshall, 1931: 23

ciliaris Sharp see *ciliatus*
crassirostris Faust, 1897: 385 to *Crinorrhinus* Marshall, 1941: 373
12. *crispus* Pajni, 1990: 318 [India]
13. *cruciger* Motschulsky, 1858: 85* [Myanmar]

cuprescens Aurivillius see *chloroticus*
14. *decorus* Pajni, 1990: 310 [India]
15. *delusus* Pajni, 1990: 326 [Myanmar]
16. *dentirostris* Voss, 1958: 28 [China]

dissimilis Marshall, 1915: 377 to *Parascaphus* Marshall, 1944: 445
17. *egregius* Faust, 1897: 385 [India]
18. *elegans* Hoffman, 1966: 82 [Afghanistan]

erro Pascoe see *triangularis*
19. *formosanus* Matsumura, 1911: 142 [Taiwan]
20. *foveifrons* Faust, 1897: 386 [India]
21. *fractivirgatus* Marshall, 1923: 283 [India]
22. *fuscofasciatus* Pajni, 1990: 339 [India]
23. *gossypii* Chao, 1974: 482 [China]
24. *himalayanus* Faust, 1891: 274 [Myanmar]
25. *ictericus* Boheman in Schoenherr,1834: 643 [Africa]
26. *imitator* Faust, 1894: 215 [Myanmar]

immeritus Schoenherr, 1826: 212 to *Chloebius* Schoenherr, 1826: 211

27. *inductus* Boheman in Schoenherr, 1843: 411 [India]
    nepalensis Boheman in Schoenherr, 1843: 412; Schenkling & Marshall, 1931: 24
    nepalensis Boheman in Schoenherr var. *similis* Faust,1891: 274
interstitialis Aurivillius see *alternans*
28. *kaulbacki* Pajni, 1990: 341 [Myanmar]
29. *laticollis* Motschulsky, 1858: 84* [Myanmar]
30. *leporinus* Faust, 1892: 192 [Indonesia]
31. *limis* Pajni, 1990: 335 [Myanmar]
32. *lineatus* Faust, 1891: 274 [India]
    similis Faust, 1891: 274; Schenkling & Marshall, 1931: 24
    var. *lineatus plagiatus* Pajni, 1990: 308
33. *liratirostris* Pajni, 1990: 337 [India]
lixabundus Boheman in Schoenherr see *triangularis*
34. *lobbichleri* Voss, 1962: (1-12) [Nepal]
35. *marshalli* (Pajni & Chhibba, 1972: 695) [India]
    Diatropus marshalli Pajni & Chhibba, 1972: 695; Pajni, 1990: 343
nepalensis Boheman var *similis* see *inductus*
nubilus Faust, 1894: 218 to *Pseudophytoscaphus* Pajni, 1990: 281
36. *obliquus* Motschulsky , 1858: 84* [Myanmar]
37. *onustus* Pascoe, 1885: 217 [Indonesia]
38. *ornatus* Motschulsky, 1858: 85* [Myanmar]
39. *orthideres* Pajni, 1990: 314 [India]
40. *parilis* Faust, 1894: 219 [Myanmar]
41. *perversus* Faust, 1894: 217 [Myanmar]
    var. *despectus* Faust, 1894: 217
42. *porcellus* Faust, 1894: 220 [Myanmar]
43. *setifer* Motschulsky1858: 84* [Myanmar, Indonesia]
44. *setosus* Aurivillius,1891: 216 [Laos]
45. *siamensis* Boheman in Schoenherr, 1843: 414 [Sri Lanka, Myanmar, Indonesia, Philippines]
    var. *geminatus*, Faust, 1894: 215
46. *signatus* Pajni, 1990: 328 [Myanmar]
similis Faust see *lineatus*
47. *subfasciatus* Voss, 1932: 290 [Szetschwan]
48. *suspensus* Pajni, 1990: 323 [Myanmar]
49. *suturalis* Pascoe, 1885: 218 [Indonesia]
50. *tamarixus* Pajni, 1990: 312 [India]
51. *tenuirostris* Marshall, 1923: 285 [India]
52. *trepidus* Faust, 1894: 220 [Myanmar]
53. *triangularis* (Olivier, 1807: 420) [Myanmar, India, Cambodia, China, Indonesia, Afghanistan]
    Curculio triangularis Olivier,1807: 420; Schoenherr, 1826: 210
    erro Pascoe, 1885: 217; Schenkling & Marshall, 1931: 24
    lixabundus, Boheman in Schoenherr, 1834: 642; Schenkling & Marshall, 1931: 24
54. *vagenotatus* Pajni, 1990: 348 [Myanmar]
55. *vicinus* Voss, 1937: 249 [China]
56. *virgatus* Pajni, 1990: 316 [India]
57. *xiphias* Faust, 1894: 218 [Myanmar]

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NOMENCLATURAL NOTES ON SOME AMBIREGNAL GENERIC NAMES (COMMENTS TO ÖZDİKMEN, 2009)

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[**Nakada, T.** 2010. Nomenclatural notes on some ambiregnal generic names (comments to Özdikmen, 2009). Munis Entomology & Zoology, 5 (1): 204-208]

ABSTRACT: Nomenclatural notes on some ambiregnal generic names (comments to Özdikmen, 2009) are given in the text with a single new substitute name: *Pyrrhotriadinium* nom. nov. pro *Triadinium* Dodge, 1981.

KEY WORDS: Nomenclature, ambiregnal generic names.

Özdikmen (2009) surveyed invalid names among Protozoa, and detected forty-eight junior homonyms under International Code of Zoological Nomenclature (ICZN). He proposed substitute names for them under ICZN. Among the forty-eight junior homonyms, twelve generic names were names of Phytomastigophorea, and two were of Euglenoidea or Euglenida. Because these taxa have been studied by both zoologist and botanists, their names are covered by both ICZN and International Code of Botanical Nomenclature (ICBN). The nomenclatural changes of such "ambiregnal" taxa should be performed with attention to names published under both ICZN and ICBN to avoid unnecessary nomenclatural confusions, and I reviewed the nomenclatural status of these fourteen names under ICBN (summarized in Table 1).

Except for *Goniodoma* Stein, *Normandia* Zügel and *Dinema* Perty, all the ambiregnal names are not "later homonyms" under ICBN (ICBN use the term "later homonym" for "junior homonym"), and the eleven generic names are still "legitimate" (equivalent to "available") under ICBN. *Goniodoma* Stein, *Normandia* Zügel and *Dinema* Perty were later homonyms under ICBN, and I considered the nomenclatural status of substitute names proposed by Özdikmen (2009), *Yesevius* Özdikmen, *Zugelia* Özdikmen and *Elifa* Özdikmen. In addition, a new substitute name is needed for *Triadinium* Dodge, which Özdikmen (2009) treated as a synonym of *Goniodoma*.

TAXONOMY

1. *Heteraulacus* Diesing, *Goniodoma* Stein and *Yesevius* Özdikmen (Dinoflagellida / Dinophyceae)

Before Stein (1883) established *Goniodoma* Stein, Diesing (1850) established a genus *Heteraulacus* Diesing and including *Heteraulacus acuminatus* (Ehrenberg), *H. adriaticus* (Schmarda), *H. fuscus* (Ehrenberg) and *H. monas* (Ehrenberg). Although the former species was the type species of *Goniodoma* Stein as *Goniodoma acuminatum* (Ehrenberg), Loeblich Jr & Loeblich III (1966) designated *H. acuminatus* as type of *Heteraulacus*, and the genus *Goniodoma* Stein became a junior objective (later homotypic) synonym of *Heteraulacus*. Therefore, the proposal of a substitute name *Yesevius* Özdikmen for *Goniodoma*

(Özdikmen, 2009) is invalid (or illegitimate) as an unnecessary junior objective (later homotypic) synonym of *Heteraulacus* Diesing under both ICZN and ICBN.

ICZN / ICBN

Heteraulacus Diesing, 1850. Systema Helminthum, 1. 100.

Type species: *Heteraulacus acuminatus* (Ehrenberg, 1835) based on *Peridinium acuminatum* Ehrenberg, 1835.

Synonyms: *Peridinium* Ehrenberg, 1830 (in part); *Goniodoma* Stein, 1883. (non Zeller, 1849); *Yesevius* Özdikmen, 2009.

2. *Triadinium* Dodge and *Pyrrhotriadinium* Nakada nom. nov. (Dinoflagellida / Dinophyceae)

"*Goniodoma*" *acuminatum* was often treated as a senior (earlier) synonym of "*Goniodoma*" *polyedricum* (Porchet, 1883). However, Dodge (1981) pointed out that they were not synonymous and the organism often assigned to "*Goniodoma*" *acuminatum* was indeed "*Goniodoma*" *polyedricum*. According to Dodge (1981), this species does not belong to *Heteraulacus*, and he established a new genus *Triadinium* Dodge with *Triadinium polyedricum* (Porchet) as type. Although *Triadinium polyedricum* is correct name for the species under ICBN, the generic name "*Triadinium*" was preoccupied by a ciliate genus *Triadinium* Fiorentini, 1890, and invalid under ICZN. Therefore, a substitute name for *Triadinium* Dodge under ICZN is here proposed.

ICZN

Pyrrhotriadinium Nakada, nom. nov.

pro *Triadinium* Dodge, 1981. Br. Phycol. J. 16. 278. (non Fiorentini, 1890).

Type species: *Pyrrhotriadinium polyedricum* (Pouchet, 1883) comb. nov. based on *Peridinium polyedricum* Pouchet, 1883.

Synonyms: *Peridinium* Ehrenberg, 1830 (in part); *Heteraulacus* Diesing, 1850 (in part); *Goniodoma* Stein, 1883 (in part; non Zeller, 1849).

Etymology: from the Greek prefix "pyrrho-" (meaning fire-red, flame-coloured) indicating the affiliation to Dinoflagellida (Pyrrhophyta) and the preexisting generic name *Triadinium*.

In addition, new combinations are proposed. Note that a substitute name for *Triadiniidae* Dodge (or *Goniodomidae*) is currently unnecessary, because this taxon may be classified in a family with available name (e.g. *Pyrophacidae* = *Pyrophacaceae*, *Ostreopsidae* = *Ostreopsidaceae*; see also Fensoome et al., 1993; Dodge & Lee, 2000).

Pyrrhotriadinium polyedricum (Porchet, 1883) comb. nov.

Basionym: *Peridinium polyedricum* Pouchet, 1883. J. Anat. Physiol., Paris. 19. 440. pl. 20, fig. 34.

Synonyms: *Goniodoma polyedricum* (Pouchet, 1883); *Heteraulacus polyedricus* (Pouchet, 1883).

Pyrrhotriadinium sphaericum (Murray & Whitting, 1899) comb. nov.

Basionym: *Goniodoma sphaericum* Murray & Whitting, 1899. Trans. Linn. Soc. London Bot. Ser. 2. 5. 325. pl. 27, fig. 3.

Synonym: *Heteraulacus sphaericum* (Murray & Whitting, 1899).

ICBN

Triadinium Dodge, 1981. Br. Phycol. J. 16. 278.

Type species: *Triadinium polyedricum* (Pouchet, 1883) based on *Peridinium polyedricum* Pouchet, 1883.

Synonyms: *Peridinium* Ehrenberg, 1830 (in part); *Heteraulacus* Diesing, 1850 (in part); *Goniodoma* Stein, 1883 (in part); *Pyrrhotriadinium* Nakada nom. nov..

3. *Normandia* Zügel and *Zugelia* Özdikmen (Dinoflagellida / Dinophyceae)

Normandia Zügel, 1994 was published as a generic name of fossil dinoflagellates, but the generic name was preoccupied by *Normandia* Pic, 1900 under ICZN and by *Normandia* Hooker, 1872 under ICBN. Therefore, the substitute name *Zugelia* Özdikmen under ICZN is also correct under ICBN.

ICZN / ICBN

Zugelia Özdikmen, 2009. Mun. Ent. Zool. 4. 237.

Type species: *Zugelia circumperforata* (Zügel, 1994) based on *Normandia circumperforata* Zügel, 1994.

Synonym: *Normandia* Zügel, 1994 (non Pic, 1900; non Hooker, 1872).

4. *Elifa* Özdikmen, *Dinema* Perty and *Dinematomonas* Silva (Euglenoidea / Euglenophyceae).

Dinema Perty, 1852 was published as a generic name of euglenids, but the generic name was preoccupied by *Dinema* Fairmaire, 1849 under ICZN and by *Dinema* Lindley, 1831 under ICBN. Silva (1960) published a substitute (replacement) name *Dinematomonas* Silva, and this name is available under ICZN (and valid under ICBN). Therefore, the proposal of a substitute name, *Elifa* Özdikmen, for *Dinema* Perty (Özdikmen, 2009) is invalid (or illegitimate) as an unnecessary junior objective (later homotypic) synonym of *Dinematomonas* Silva under both ICZN and ICBN.

ICZN / ICBN

Dinematomonas Silva, 1960. Taxon, 9. 20.

Type species: *Dinematomonas griseola* (Perty, 1852) based on *Dinema griseola* Perty, 1852.

Synonym: *Dinema* Perty, 1852 (non Fairmaire, 1849; non Lindley, 1831); *Elifa* Özdikmen, 2009.

CONCLUDING REMARKS

Proposals of substitute (replacement) names for invalid (or illegitimate) names are important tasks in the taxonomy. Although a zoologist often pays attention only to ICZN and botanist only to ICBN, it is important to survey synonymy and/or homonymy under both ICZN and ICBN in dealing with ambiregnal taxa, such as phytoflagellates, zoosporic fungi, slime molds etc.

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Table 1. Comparisons of valid and correct generic names of ambiregnal taxa treated by Özdikmen (2009). Names discussed in the text are shown with bold face.

	Substitute name by Özdikmen (2009)	**Valid name under ICZN**	**Correct name under ICBN**
Durotrigia	*Baileyella*	*Baileyella*	*Durotrigia*
Edwardsiella	*Novedwardsiella*	*Novedwardsiella*	*Edwardsiella*
Fentonia	*Neofentonia*	*Neofentonia*	*Fentonia*
Gippslandia	*Neogippslandia*	*Neogippslandia*	*Gippslandia*
Goniodoma	***Yesevius***	***Heteraulacus* / *Pyrrhotriadinium***	***Heteraulacus* / *Triadinium***
Hannaites	*Akbuluta*	*Akbuluta*	*Hannaites*
Hanusia	*Phia*	*Phia*	*Hanusia*
Herdmania	*Dodgeia*	*Dodgeia*	*Herdmania*
Lundiella	*Yildizia*	*Yildizia*	*Lundiella*
Normandia	***Zugelia***	***Zugelia***	***Zugelia***
Suessia	*Baserus*	*Baserus*	*Suessia*
Wanneria	*Belowius*	*Belowius*	*Wanneria*
Dinema	***Elifa***	***Dinematomonas***	***Dinematomonas***
Metanema	*Semihia*	*Semihia*	*Metanema*

GROUND BEETLES (COLEOPTERA: CARABIDAE) AS BIOINDICATORS OF HUMAN IMPACT

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ABSTRACT: Bioindicators are broadly used in scientific research to quantify environmental impacts such as the effects of disturbances due to anthropogenic activities. Ground beetles (Coleoptera: Carabidae) are frequently used to indicate habitat alteration since they are affected by anthropogenic activities such as urbanization, crop and forest management, overgrazing by domestic livestock, tourist flow in natural landscapes and soil pollution. Moreover carabids are well known both taxonomically and ecologically, are extremely sensitive to several abiotic and biotic factors, respond quickly to habitat alteration and can be easily and cost-effectively collected by using classic pitfall traps. For these reasons this group of ground-dwelling arthropods are increasingly being used in ecological studies in order to evaluate the environmental impacts of man in terrestrial ecosystems. In this work we present several case studies where carabids were employed as a bioindicator group of metal pollution.

KEY WORDS: bioindicators, carabid, environmental impacts, pollution

Environmental pollution is the release of chemical waste that causes detrimental effects on the environment. Environmental pollution is often divided into pollution of water supplies, the atmosphere, and the soil. In his book *Environmental Chemistry,* Manahan (2004) lists several different types of pollutants, including toxic inorganic and organic compounds, high concentrations of normally innocuous compounds, and heat and noise. While much pollution is produced by the chemical industry, domestic sources include human waste and automobile exhaust (http://www.chemistryexplained.com/Di-Fa/Environmental-Pollution.html).

Environmental pollution has different effects on different living things, including insect groups. The ground beetles (Coleoptera, Carabidae), as their popular English name implies, are largely confined to the ground. Logically, the influence of soil properties on their distribution soon became the subject of interest and experimental study (Thiele, 1977). Some of the especially important chemical properties of the soil which might exert an influence on the distribution of carabids include pH value, sodium chloride and calcium content (Thiele, 1977).

In the context of biodiversity, the term “indicator” is often used with very different definitions. These can be classified into at least four categories: (a) biotic indicators of abiotic conditions (Platen, 1995; Stumpf, 1997); (b) biotic indicators of human practices, including, e.g., pollution sensitive species (Basedow, 1990); (c) goal parameters, which are deducted from normally set nature conservation aims and translate these into measurable features, e.g., species diversity of a certain taxon (May, 1995); (d) correlates of goal parameters, which make it possible to reduce labour and costs in assessing biodiversity and at the same time minimise loss of information (Döring et al., 2003).

A bioindicator can be loosely defined as a species or a species group that reflects the abiotic or biotic state of the environment, represents the impact of environmental change on a habitat, community or ecosystems, or indicates the diversity of other species (McGeoch, 1998). Many species of ground beetles fulfil at least one of these criteria (Rainio & Niemelä, 2003).

Bioindicators are also a good way to monitor the effects of toxic materials on organisms (Bridgham, 1988). This might be difficult to assess through direct toxicity level assessment in nature.

Environmental change can cause different kinds of effects in the indicator species, including physiological changes or changes in species number or abundance (Rainio & Niemelä, 2003). The response of the species can be seen within the organism (e.g. heavy-metal concentrations), at the species level (species number and abundance) or at the community level (relations between species, e.g. pest–predator). Increase or decrease of species number or abundance might be caused directly by changes in abiotic and/ or biotic factors (Blake et al., 1996) or indirectly by change of assemblages of other species (Haila et al., 1994).

Changes in morphological characteristics of organisms have been used successfully as indicators of habitat quality and disturbance (Lagisz, 2008). At the interspecific level, body size generally is expected to decrease with increasing stress, because large organisms are assumed to be more sensitive to environmental disturbance compared with small-bodied, hardy, and fast-reproducing organisms. At the intraspecific level, a similar relationship between body size and environmental stress also is observed (e.g. Lagisz, 2008).

Human activities have caused severe pollution with heavy metals in aquatic and terrestrial ecosystems of many countries (Lagisz & Laskowski, 2008). Because heavy metals are non-degradable, they tend to accumulate in organisms' tissues and can be passed along food-chains, becoming toxic at high concentrations (Hopkin & Martin, 1985; Hopkin, 1989; Lagisz & Laskowski, 2008). Toxic effects can occur at all levels of biological organization, with toxins influencing ecological interactions such as predation, parasitism, competition, and the structure of communities and ecosystems (Hoffman & Parsons, 1994; Walker et al., 2001). Thus, one of the important challenges in ecotoxicology is assessing the effects of pollutants passed to higher levels of food-webs and their wider consequences (Grant, 2002).

In this brief review, we give examples of studies on the effects of some pollutants on ground beetle species. We then consider whether carabid populations or communities can be used as indicators of such pollution.

Effects of metal pollution on individual carabid beetles

As already stated, carabid beetles exemplify the ground-dwelling fauna strongly linked to soil characteristics. They are a well-studied group, frequently discussed in research papers concerning the effects of environmental changes, such as land management, fragmentation, and pollution. This taxonomic group is a poor accumulator of heavy metals; therefore, internal concentration of contaminants cannot be used as simple indicator of exposure levels (Lagisz, 2008). Consequently, direct toxicity of metals on individuals is not expected. However, a few recent studies have shown that accumulated toxic metals in carabid beetles can affect both physiology (Lagisz et al., 2002; Stone et al., 2002; Lagisz & Laskowski, 2008) and susceptibility to additional stressors (Stone et al., 2001). In the carabid *Poecilus cupreus*, high copper levels experienced by the beetle larvae, as well as having a direct toxic effect, altered the locomotor behaviour of the resulting adults (Bayley et al., 1995). This was presumed to result from developmental damage caused in the larval growth stages.

Other studies concerning toxic effects of metals in carabids have concentrated on reproduction parameters (e.g. Lagisz & Laskowski, 2008). Kramarz and Laskowski (1997) described a significant decrease in the number of eggs laid by *Poecilus cupreus*, after zinc treatment. Lagisz et al. (2002) showed a negative correlation between field exposure to chronic pollutants and production of eggs in *Pterostichus oblongopunctatus* collected along a metal-pollution gradient near Olkusz. Generally body size is likely to be reduced by pollution stress (Lagisz, 2008) but Zygmunt et al. (2006) found that the body size of *P. oblongopunctatus* actually increased along a gradient of increasing metal contamination. The calorific content of the beetles was not altered. The authors attributed the increase in body size to altered interspecies competition. This implies that other, competing, species were more adversely affected by the pollution, but more work would be needed to prove this. Skalski et al. (2002) showed that the timing of the seasonal occurrence and therefore phenology of ground beetles varied along a pollution gradient.

A few studies have shown the negative influence of metal pollution on gamete quality (Au et al., 2001) and hatchability of invertebrate eggs (Schmidt et al., 1992; Gomot 1998). In line with the above findings, it has been shown that quality of eggs produced by *P. oblongopunctatus* can be affected by metal pollution (Lagisz & Laskowski, 2008). In heavily air-polluted pine forests, genetic studies showed that the degree of polymorphism in various Coleoptera, including Carabidae, increased within the centre of pollution (Schneider et al., 1984).

The low hatching rate of eggs laid by females collected from the contaminated site suggests that *P. oblongopunctatus* is not fully able to protect developing eggs from toxic effects of metals (Lagisz & Laskowski, 2008). If this is the case, chronic long-term effects of metals are likely to be more dangerous in this species, especially if they are subjected to additional stressors causing reduction of egg production and/or life-span (Lagisz & Laskowski, 2008).

Any effects of pollutants may also interact with, or be dependant on, other environmental variables such as temperature (Bednarska & Laskowski, 2008). Bednarska et al. (2008) showed that the effect of nickel pollution on adult *P. oblongopunctatus* interacted not only with temperature, but also with that of the pesticide chlorpyrifos. A later study has shown that the same interactions affect the larval stage of the same species (Bednarska & Laskowski, 2009).

Maryański et al. (2002) found that feeding *Poecilus cupreus* with food contaminated by either zinc or cadmium resulted in smaller adults, but their body mass and calorific value was not reduced. Zinc concentrations were regulated in the beetles and were independent of contamination level, whereas cadmium accumulated and its concentration in the beetles increased with increasing contamination level: this has implications for higher predators that might feed on the carabid beetles. Lagisz (2008) also showed an effect of long-lasting, heavy metal pollution on the morphology of *P. oblongopunctatus* from heavily contaminated sites. The smaller adult body size of the beetles, expressed as shorter elytra, may reflect lower habitat quality. Such a change in body size may incur long-term negative effects of metal pollution on fitness (Lagisz, 2008).

Lagisz & Laskowski (2008) presented one of very few studies showing intergenerational effects of terrestrial pollution by heavy metals in a terrestrial predatory invertebrate. They demonstrated that *P. oblongopunctatus* inhabiting metal polluted environment have altered life-history parameters in comparison to those from reference area populations.

Effects of metal pollution on carabid assemblages

Despite these effects on individual species, there are relatively few examples of an overall population or community effect of pollution on carabid beetles. Šustek (1994) showed that nickel pollution reduced the species numbers of three families of beetles including Carabidae, as well as causing changes in carabid sex ratios. Read et al. (1987) found that the numbers of individuals and species of Carabidae at each site along a heavy metal gradient were not significantly correlated with metal concentration. However, species diversities (Shannon Weiner H') were correlated with the pollution level. Later dates of median capture of total Carabidae were found in the sites nearest to the pollution source. This also occurred with a common species, *Nebria brevicollis*. At the most polluted site, this species also showed an absence of its usual summer diapause, possibly related to scarcity of prey. Numbers of spring breeding species were negatively correlated with metal concentration but autumn breeders were positively correlated. The sites were also differed significantly in the relative distributions of individuals in each of four size categories.

However, in a subsequent ordination analysis of the same sites (Read et al., 1988) no clear patterns were shown when examining size or breeding season in carabids in relation to pollution. A similar study by Lock et al. (2001) concluded that activity and species richness of carabid beetles were not significantly correlated with total zinc concentration nor with the water-soluble and the calcium chloride extractable concentration. In fact, despite the high soil concentrations, carabid beetles did not seem to be affected in the study area. Jarošík (1983) also found no difference in carabid diversity in floodplain forests affected by different emissions of carbon disulphide and hydrogen sulphide.

CONCLUSIONS

It is evident from this relatively superficial review, that metal pollution, although not necessarily toxic to the ground beetle species studied, can affect their physiology, behaviour and reproductive ability. Despite this, there may be no clear effects on carabid assemblages in the field. The lack of overall community effects in some studies may be because diversity indices are not a suitable way of assessing the impact of environmental change on ground beetles. Belaoussoff et. al. (2003) found that there was no single diversity index or model that was better than any other at detecting disturbance. Their results were supplemented by a meta-analysis of 45 published data sets for the same taxon but in different habitats. They concluded that diversity indices and models are not useful for detecting the possible effect of disturbance on assemblages of carabid beetles. In a review of ground beetles as bio-indicators, Rainio & Niemelä (2003) also concluded that there is not enough research to determine how suitable carabids are for biodiversity studies, or how well they represent the response of other species. They concluded that carabids are useful bioindicators, but as crucial understanding of their relationship with other species is incomplete, they should be used with caution.

A further limitation of existing work on the effects of metal pollution on ground beetles, is that much existing recent work, as cited in this review, has been carried out on a restricted range of species in the genera *Pterostichus* and *Poecilus*, which latter genus was until recently considered as part of *Pterostichus* anyway. These species are relatively large, can be collected in substantial numbers and are rearable in the laboratory; they are also predatory so that the effects of contaminated prey organisms can be assessed. However many other carabids have differing life styles, including those that are either omnivorous scavengers, or which feed partially or even entirely on plant matter, including seeds. This includes many of the large tribes Harpalini and Zabriini, with speciose genera such as *Harpalus* and *Amara*. It is evident that the species of ground beetles already studied show marked effects of metal pollution. But only when similar studies are applied to a much wider range of carabid species will we be able to understand more fully any interspecific interactions, or the effects of metal pollution on these beetles at the assemblage or community level.

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STUDY OF COTTON BOLLWORM, *HELICOVERPA ARMIGERA* HÜBNER (LEPIDOPTERA: NOCTUIDAE) USING DYAR'S RULE

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ABSTRACT: Discrimination of different larval instars of insects is important in morphological, physiological and toxicological studies under laboratory conditions. The morphometric study of different parts of an insect's body is needed to obtain an index to distinguish different larval instars. In this study, Dyar's rule stating the ratio of size of each sclerotized body part in successive instars is in a constant range was studied on different larval instars of cotton bollworm, *Helicoverpa armigera*. The insects were reared at 26±2°C, 60±5% RH and a photoperiod of 16: 8 (L: D) h. for 10 generations. One hundred larvae of each instar were randomly selected and width of head capsule in widest region, as well as length and width of stigmata located on prothorax and first and last abdominal segments were measured by calibrated micrometer. A frequency distribution plot showed that due to overlap in stigmata dimension, size of the stigmata was not a suitable index for distinguishing different larval instars in this insect. The widths of head capsule for 1st to 6th larval instars were 0.257-0.314, 0.4-0.485, 0.6-0.743, 0.96-1.2, 1.5-1.8 and 2.55-2.8 mm, respectively. Dyar's ratios for 1st to 6th larval instar intervals were obtained 1.52, 1.512, 1.631, 1.612 and 1.552, respectively. There was no overlap in the data range; therefore, head capsule width can be used with high confidence as an index to distinguish larval instars. Linear regression analysis revealed significant effect of larval instars on head capsule (R^2 =0.999). Despite strong relationship between dimension of stigmata and instar numbers, some strong overlapping in stigmata dimensions in subsequent instars decreased the usefulness of stigmata dimensions for instar discrimination. Overlapping particularly in the first abdominal stigmata was more than others.

KEY WORDS: Larval instars, sclerotized, head capsule, stigmata.

The American bollworm, *Helicoverpa armigera* (Hübner) (Lep., Noctuidae), is one of the important pests of cotton, tomatoes, chickpea, tobacco, corn, sesame, hemp, sunflower, etc. in almost all of the agricultural areas of the world and causes both quantitative and qualitative damages (Fitt, 1989 and Matthews, 1999).

The effect of insecticides on the insects may vary based on developmental stages, and the proper timing of insecticides application generally depends on the predominance of a particular instar in field and laboratory experiments. Therefore, identification of instar is very important for both ecological studies and application of control measures. Information about life history of insects is important for understanding population dynamics, life table analysis, key factor analysis and other important ecological investigations, to determine their community structure.

During their immature development, larvae of insects and other arthropods moult regularly. This moulting process is under endocrine control, and follows the secretion of prothoracicotropic, ecdysone and juvenile hormones. As a result, the larval period of insects is divided into several discrete stages (Nation, 2002). The period between two successive moults is usually called an instar (Esperk et al., 2007).

Morphometric studies of different parts of an insect's body are needed to obtain an index to distinguish different larval instars. In different insects almost several instars are present at the same time and their size distribution overlap to some extent. Therefore, determination of appropriate instar for individual sampling is a major problem (Logan et al., 1998). Morphometric characters widely used by researchers to determine different developmental stages (Fink 1984, stark 1988, Holloway 1991, Guglielmino et al., 2006, Kayss et al., 2006).

Growth of insect larvae is discontinuous, with the most measurable change in size occurring following moults (Chapman, 1982). Heavily sclerotized structures, such as head capsules, remain approximately without change during an instar. Dyar was the first to suggest frequency distributions of head capsule width for instar determination more than 115 years ago (Dyar, 1890), and this has been successfully applied many times since (Logan, 1998).

Several studies have been undertaken to determine the number of larval instars in different insects. Danks and Corbet (1973), Savignac and Maire (1981) used head capsule to study insects Larval instar determination from genera *Aedes*, *Culex*, *Anopheles* and *Culiseta*. Hoddle (1990) determined three larval instars for *Apion ulicis* based on head capsule measurement ant Dyar's rule.

Logan et al. (1998) used a computer program according to the head capsule for determining instars of Mountain pine Beetle. Hammack et al. (2003), Larocque, (2001), Rodriguez-Loeches and Barro (2008) used head capsule for instar determination. The body length and head capsule width was found to be the best criterion for the larval instar determination in *Neochetina eichhorniae* (Oke, 2009).

Several mathematical models have been used to describe linear measurements of sclerotized parts in successive instars. Linear progression, $y = a+bx$, and the geometric progression $\boldsymbol{y}=a\ b^x$ which terms Dyar's rule were often used by entomologists to ascertain the actual number of instars (Klingenberg and Zimmermann, 1992). According to this law, the head capsule of caterpillars grows in a geometric progression, increasing in width at each moult by a constant ratio for a given species. This rule is also applied to many other parts of the body, such as body weight, larval length, length of posterior segment of prothorax, diameter of eye, etc. (Dyar, 1890). Another method is frequency, which is a simple and easy method for field population. Instars are indirectly determined through a plot of the number of individuals per size class, where each distinct peak in the plot infers one instar (Fink, 1984).

Hardwick found 30% larva matured in 5 instars, 69% in 6 instars and only 1% in 7 instars (Matthews, 1999). Rearing insects in controlled conditions that adjusts for the nearly best condition for insect's development and monitoring developmental stages for larval moulting is the best way for studying the life cycle of insects (Fink, 1984).

In this study some morphometric properties of all larval stages of cotton bollworm were studied and Dyar's rule was investigated. Larval head capsule width, and also prothorasic stigmata dimension in addition to first and last abdominal stigmata were studied.

MATERIAL AND METHODS

Insect: Insects used in this study were obtained from *H. armigeta* colony available in the department of plant protection, university of Tabriz. Insects reared in controlled condition of 26±2°C, 60±5% relative humidity and a photoperiod of 16: 8 (L: D) h. on artificial diet based on cowpea, for 10 generations. A strong homogenate population of insects allowed us to obtain sufficient number of larvae from each instars in the same generation.

Measurements: Daily monitoring of larvae carried out to record stage of development. The larvae of each instar were randomly selected and the width of the head capsule in the widest region as well as the length and the width of stigmata located on prothorax and first and last abdominal segments were measured by calibrated the micrometer located on a stereomicroscope.

Data analysis: Regression and correlation analysis were performed using SPSS (*ver.* 15.0) and MSTAT-C software. Analysis of variance was carried out based on one way ANOVA and the means were compared using Duncan's multiple-range test.

RESULTS AND DISCUSSION

Head Capsule Width: The head capsule width was relatively constant within the six instars. There was no overlapping in extremes of measurements between instars. The widths of head capsule in 1st to 6th larval instars were 0.257-0.314, 0.4-0.485, 0.6-0.743, 0.96-1.2, 1.5-1.8 and 2.55-2.8 mm, respectively (Table 1). Analysis of variance revealed significant differences ($p<0.05$) among different instars with respect to head capsule width. Mean comparison indicated significant differences among all the instars with maximum and minimum head capsule width in 1st and 6th instars, respectively.

Linear regression analysis showed significant relationship between larval instars and head capsule width (R^2 =0.999) (Fig. 2). Therefore head capsule width could be used for the estimation of larval instar in laboratory populations of cotton bollworm. The instars can be readily separated because of any overlapping in range of distinct instars. The frequency distribution of larval head capsule widths measured in this study is shown in Fig. 1. Dyar's ratio for subsequent instars was 1.52, 1.512, 1.631, 1.612 and 1.552 for first to last larval instars, respectively (Table 1).

Width and Length of Stigmata: There was significant difference among larval instars for stigmata dimension as revealed by analysis of variance ($p<0.05$). Mean comparison showed significant increase in the stigmata dimension from 1st to 6th instars.

Dyar's ratio measured for dimension of stigmata in different segments ranged from 1.667-1.911 and 1.454-1.937 for length and width of prothorax stigmata, 1.786-2.304 and 1.5-2.086 for length and width of first abdominal stigmata and 1.759-2.075 and 1.395-1.950 for length and width of last abdominal stigmata, respectively (Table 2).

A significant relationship was observed between instars and stigmata dimension as revealed by regression analysis (R^2= S1: 0.988 and 0.973, S8: 0.996 and 0.985, T: 0.996 and 0.984) (Fig. 3). In spite of the significant relationship between instar numbers and stigma dimension, overlapping was observed in stigmata dimensions in subsequent instars (Fig. 4), therefore, this may be resulted in decreased power of stigmata dimensions for instar estimation. Overlapping in the first abdominal stigmata was more than the others.

No significant correlation was observed between head capsule width and stigmata dimensions in larval instars of cotton bollworm except for prothorax length in 3rd instar and first abdominal stigmata width in 2nd instar larvae, however, the level of correlations was too low to be predictive. It suggested that head capsule width and stigmata dimensions grow independently through an insect's development.

Dyar's ratio ranges for stigmata were wider than head capsule dimension producing problems in diagnosis of two subsequent instars. Under constant food and other environmental factors, it is easer to study insects, since complexity of factors can variously affect biology of insects. Safranek and Williams (1984) showed that in normal feeding conditions, tobacco hornworm exhibits remarkable adherence to Dyar's rule. Kingsolver (2007) by studying laboratory and field's populations of *Manduca sexta* demonstrated that field population while feeding on a modified artificial diet showed substantial intraspecific variation in number of larval instars. Intra-specific variability in number of larval instars is widespread across insect taxa. Temperature, photoperiod, food quality and quantity, humidity, rearing density, physical condition, inheritance, and sex are the most common factors influencing number of instars (Esperk et al., 2007).

Hsia and Kao (1987) determined six larval instars for corn earworm larvae using the head capsule. Larval mean head capsule widths for insects reared in 28˚C were 0.28, 0.42, 0.71, 1.07, 1.73 and 2.91 mm for first to last larval instars, respectively. This in addition to Dyar's ratio confirmed our results with a little difference. Different research suggested Dyar's rule as a suitable criterion for instar determination and head capsule width as a reliable measurement for instar determination (Agrawal and Kumar Pati 2002, Francisco and Prado 2001, Stein 1981 and Donnell 1967). Head capsule growth is basically restricted to the period of ecdysis therefore the head sizes of successive larval instars tend to follow a regular progression.

Our observations indicated that the studied *H. armigera* colony in the measured individuals, had at least six larval instars and head capsule width in order with Dyar's rule was useful for distinguishing larval instars. Whereas overlapping in stigmata dimension reduced usefulness of this measure for larva instars determination. Therefore, it is not possible to use measurement of any sclerotized part of insect's body according to Dyar's rule for instar determination. Some researchers reported Dyar's rule for instar determination (Enrique 2006, Garcia-Barros 2006, Klingenberg and Zimmermann 1992, Fink 1984). However, Gaines and Campbell (1935) did not recommend Dyar's rule for instar determination because it may indicate false instars.

It should be mentioned that the growth of insects through time is not constant, since different ecological and physiological factors affect growth rate. Tateishi and Shimizu (1988) and Tateishi et al. (1989) studied hormonal bases of moulting and titer of PTTH before and after moulting with some evidence for unequal number of larval instars in common Armyworm populations. They reported that weight of larva in recent instar could determine the number of instars.

It is suggested that Dyar's ratio could be calculated for each insect and in distinct growing conditions. In spite of a linear relationship between larval instar and dimension of stigmata it is recommended not to use any sclerotized part of *H. armigera* larva for determination of larval instars. It is clear that the recent study has been carried out using laboratory homogenate population, thus extension of these results to field populations may cause some differences.

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Table 1. Mean, Standard Error (SE), Standard Deviation (SD), maximum, Minimum and Dyar's ratio in head capsule width of *H. armigera* different larval instars.

Larval instar	Mean	SE	SD	Min	Max	Dyar's ratio
I	0.280	0.001	0.012	0.257	0.314	1.520
II	0.426	0.002	0.021	0.400	0.486	1.512
III	0.644	0.004	0.038	0.600	0.743	1.631
VI	1.050	0.007	0.066	0.960	1.200	1.612
V	1.693	0.007	0.075	1.500	1.800	1.552
VI	2.628	0.006	0.060	2.550	2.800	

Table 2. Mean, Standard Error (SE), Standard Deviation (SD), maximum, Minimum and Dyar's ratio in stigmata of *H. armigera* larval instars (T: prothorax, S1and S8: first and last abdominal stigmata)

Instar		T						S1						S8					
		Mean	SE	SD	Min	Max	Dyar's Ratio	Mean	SE	SD	Min	Max	Dyar's Ratio	Mean	SE	SD	Min	Max	Dyar's Ratio
I	Length	0.024	0.002	0.007	0.014	0.029	1.911	0.016	0.001	0.005	0.014	0.029	2.304	0.029	0.000	0.000	0.029	0.029	2.075
II	Length	0.046	0.002	0.010	0.029	0.057	1.723	0.038	0.002	0.007	0.029	0.043	1.773	0.059	0.002	0.007	0.043	0.071	1.662
III	Length	0.080	0.002	0.011	0.071	0.100	1.712	0.067	0.002	0.010	0.057	0.086	1.655	0.099	0.002	0.010	0.086	0.114	1.763
IV	Length	0.137	0.005	0.021	0.117	0.167	1.557	0.111	0.004	0.019	0.083	0.167	1.544	0.174	0.005	0.023	0.150	0.233	1.591
V	Length	0.213	0.004	0.020	0.167	0.233	1.677	0.172	0.004	0.016	0.133	0.200	1.786	0.277	0.006	0.029	0.233	0.333	1.759
VI	Length	0.357	0.007	0.031	0.300	0.433		0.307	0.004	0.017	0.267	0.333		0.487	0.010	0.044	0.367	0.567	
I	Width	0.023	0.002	0.007	0.014	0.029	1.937	0.016	0.001	0.005	0.014	0.029	2.086	0.029	0.000	0.000	0.029	0.029	1.95
II	Width	0.044	0.002	0.009	0.029	0.057	1.725	0.034	0.002	0.007	0.029	0.043	1.770	0.056	0.001	0.006	0.043	0.071	1.589
III	Width	0.076	0.002	0.011	0.057	0.100	1.461	0.061	0.001	0.006	0.057	0.071	1.712	0.089	0.002	0.007	0.071	0.100	1.627
IV	Width	0.112	0.004	0.017	0.080	0.133	1.477	0.104	0.003	0.015	0.080	0.133	1.282	0.144	0.004	0.016	0.117	0.167	1.433
V	Width	0.165	0.004	0.017	0.133	0.200	1.454	0.133	0.003	0.015	0.100	0.167	1.5	0.207	0.004	0.017	0.167	0.233	1.395
VI	Width	0.240	0.004	0.017	0.200	0.267		0.200	0.002	0.011	0.167	0.233		0.288	0.006	0.027	0.233	0.333	

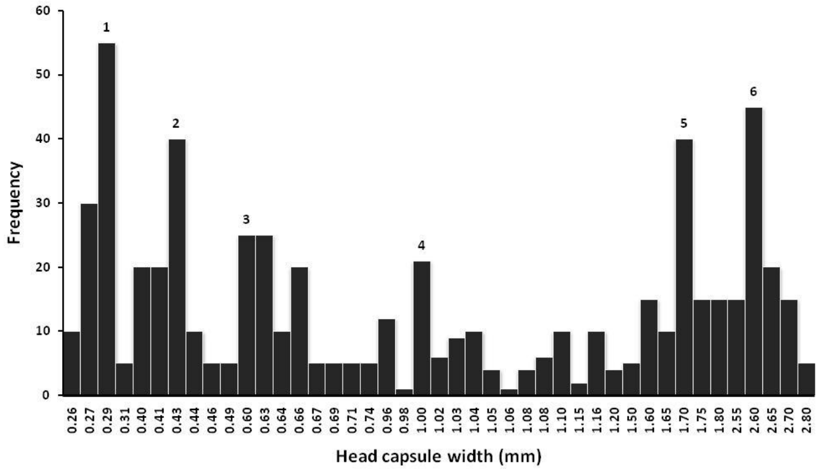

Figure 1. Head capsule width frequency histogram for *H. armigera* larvae.

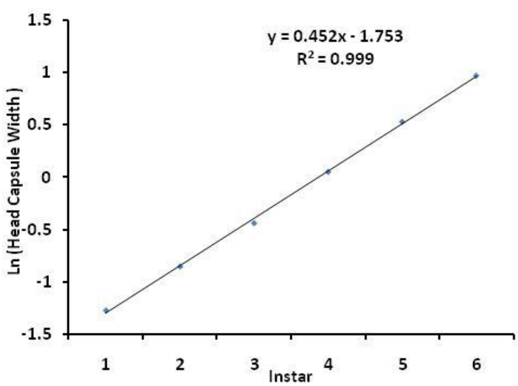

Figure 2. Relationship between head capsule width and instar of *H. armigera*.

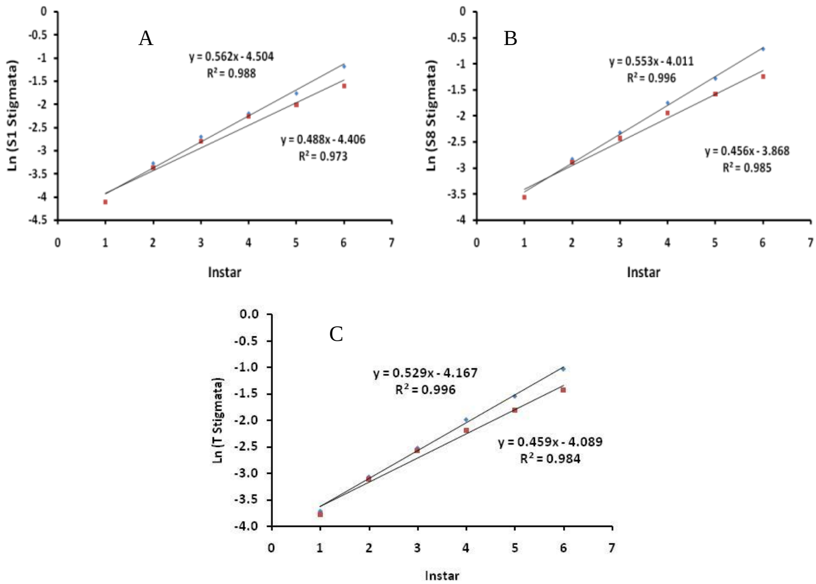

Figure 3. Relationship between different stigmata dimension and instar of *H. armigera*
A: First abdominal stigmata (S1), B: Last abdominal stigmata (S8), C: Prothorax stigmata (T)
■Width of stigmata, ◆Length of stigmata

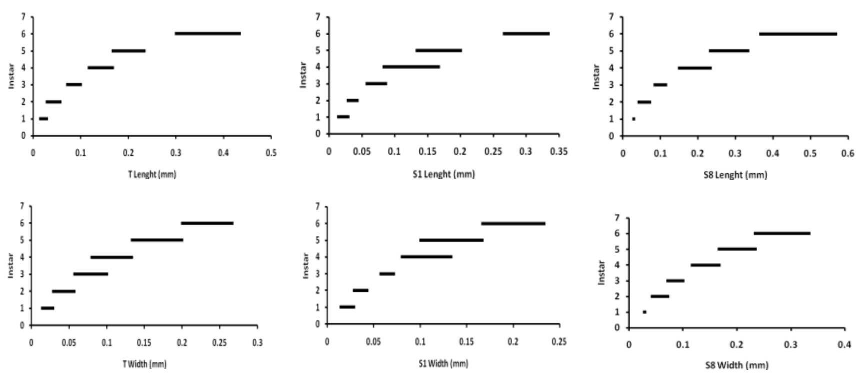

Figure 4. Relationship between stigmata dimension and instars of *H. armigera*, shows some overlapping in width and length range in subsequent instars. T: Protorax stigmata, S1: First abdominal stigmata, S8: Last abdominal stigmata.

NEW AND HITHERTO UNKNOWN NURSERY WEB SPIDER SPECIES (ARANEAE: PISAURIDAE) FROM THE RESERVE FORESTS OF DOOARS, WEST BENGAL, INDIA

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ABSTRACT: The paper deals with the taxonomy of a new species and a hitherto unknown species of Nursery web spider from the Reserve Forests of Dooars, West Bengal, India. The species *Thalassius pseudoalbocinctus* is recognized as new to science, and hence described and illustrated. Hitherto unknown species *Polyboea zonaformis* (Wang) is being reported for the first time from India.

KEY WORDS: *Thalassius, Polyboea*, new species, unknown species, Forests, West Bengal, India.

Indian nursery web spiders have previously been treated by Pocock (1900), Tikader (1970), Patel (1987), Patel & Reddy (1990), Reddy & Patel (1993), Jose *et.al.* (2003, 2007) and Biswas & Roy (2005). The current World list of spiders include 339 pisaurid species under 53 genera (Platnick, 2009). In India they are represented by 20 species belonging to 9 genera (Sebastian & Peter, 2009). So far one *Polyboea* species *P. vulpina* Thorell and two *Thalassius* species *T. albocinctus* Thorell and *T. phipsoni* FOP Cambridge are known from India (Sebastian & Peter, 2009). Our attempt to assess the taxonomic diversity of spiders of Reserve Forests of Dooars and Darjeeling, West Bengal has resulted in the recognition of a new species, *Thalassius pseudoalbocinctus* and a hitherto unknown species, *Polyboea zonaformis* (Wang) (Zhang *et al*, 2004) from India. These are described and illustrated.

MATERIALS AND METHODS

Collection and preservation of the spider specimens were done following Tikader (1987). The materials were studied using Stereo Zoom Binocular Microscope, model Zeiss SV- 11. The measurements indicated in the text are in millimeters, made with an eye piece graticule.

Abbreviations: AME= anterior median eyes, ALE= anterior lateral eyes, PME= posterior median eyes, PLE= posterior lateral eyes.

Thalassius pseudoalbocinctus sp. nov.

Female (Holotype):
Total length- 11.79, carapace length- 4.46, carapace width-3.46, abdominal length- 7.1, abdominal width- 3.4. Cephalothorax (Fig. 1) brown, longer than wide, convex, medially wider, narrow and rectangular in front, covered with hairs and pubescence, with a broad midlongitudinal brown band, laterally with creamy white broad band extending throughout, anterolateral angles with brown patch, cephalic region high with deeply distinct cervical furrows; thoracic fovea longitudinal, deep, with distinct radii. Eyes 8, white, in 2 rows, all encircled by black rims, these broad on posterolaterals, anterolaterals and posterolaterals close, former smallest, later largest, anteromedians twice of anterolaterals, subequal to posteromedians, anterior row short, strongly recurved, posterior row recurved, ocular quad squarish. Inter ocular distance: AME–AME=0.33, ALE–AME=0.2, ALE–ALE=1.0, PME–PME=0.33, PLE–PME=0.33, PLE–PLE=1.33, ALE–PLE=0.2, AME–PME=0.26. Clypeus brown, broad. Chelicerae (Fig. 2) reddish brown, elongate, nearly as long as wide, each margin with 3 teeth, retromarginal teeth large and similar, one of the promarginal tooth minute, rest similar, fangs dark brown, robust, strongly curved. Both labium and maxillae (Fig. 3) brown, anteriorly scopulate, maxillae gauntlet, labium medially wide, basally notched; sternum (Fig. 4) yellow, wider than long, anterior margin concave, posteriorly produced and bluntly pointed, clothed with long brown hairs. Legs long, proximally yellow and distally yellow brown, clothed with hairs and spines, each tibia with 3 pairs of dorsal and 4 pairs of ventral long spines, each metatarsi with 6 pairs of spines, 3 dorsal and 3 ventral, tarsi and metatarsi scopulate, tarsal claw 3, 3rd claw toothless, rest with 8 teeth. Leg formula 2143.

Table 1: Length of legs of female holotype of *Thalassius pseudoalbocinctus* sp. nov. (in mm)

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	4.18	1.36	4.81	3.09	1.09	14.53
II	4.0	1.63	4.72	3.18	1.36	14.89
III	3.54	1.18	3.81	2.54	0.81	11.88
IV	3.54	1.18	3.81	2.54	1.36	12.43

Abdomen (Fig. 1) brown, cucumber like, posteriorly narrowing, medially wide, dorsum entirely margined by a creamy white broad band enclosing the brown one, this further basally enclosing a pale dagger shaped band, brown band with a small inward notch at the posterior 1/3, with 5 pairs of midlongitudinal sigilla, clothed with thin hairs; venter pale with a brown midlongitudinal band in between epigastric furrow and spinnerets, clothed with thick yellow and brown hairs, spinnerets basally brown and apically yellow.

Epigynum-Internal Genitalia (Fig.5 & 6): Epigynal lateral lobes posteriorly broad, converging, and anteriorly diverging; Copulatory duct bean shaped, horizontal; uterus rhomboid, fertilization duct and copulatory opening evident.

Material Examined: Holotype: ♀, Bichabhanga, Gorumara National Park, Jalpaiguri, West Bengal, 20.ix.2007, Coll. S. Saha. Paratype: 1♀, Rajabhatkhawa, Buxa Tiger Reserve, Jalpaiguri, West Bengal, 21.ii.2008, Coll. D. Raychaudhuri.
Type Deposition: Entomology Laboratory, Department of Zoology, University of Calcutta, Regn. No. EZC 0019-09.
Distribution: India: West Bengal.
Etymology: The species name is derived from its closest ally *Thalassius albocinctus* (Doleschall).
Remarks: The species appears to be closely allied to *Thalassius albocinctus* (Doleschall), but can be separated by i) Epigynal lateral lobes broad posteriorly; copulatory duct bean shaped, horizontal; uterus rhomboid; fertilization duct evident (epigynal lateral lobes long, posteriorly not so broad; copulatory duct elongate, perpendicular, sub parallel; uterus triangular; fertilization duct not evident in *T. albocinctus*), ii) sternum broad, wider than long (sternum longer than wide in *T. albocinctus*), iii) chelicerae nearly as long as wide (chelicerae more than twice longer than wide in *T. albocinctus*), iv) maxillae gauntlet (maxillae not gauntlet in *T. albocinctus*), v) abdominal dorsum with a median brown band, 5 pairs of sigilla and without white spots (abdominal dorsum with a median black band, 6 pairs of sigilla and white spots in *T. albocinctus*), vi) cephalothorax with a midlongitudinal brown band and anterolateral angle with a brown patch (cephalothorax with a midlongitudinal blackish brown band and anterolateral angle without any patch in *T. albocinctus*). Such differences appear to justify the erection of a new species.

Polyboea zonaformis (Wang)

Pisaura zonaformis Wang 1993, Acta zootaxon. sin. 18**:** 157.
Polyboea zonaformis (Wang); Zhang, J. X. & C. Zhang 2003, Acta arachnol. sin. 12**:** 15.

Female:
Total length-6.35, carapace length-2.11, carapace width-2.05, abdominal length-4.17, abdominal width-1.58. Cephalothorax (Fig. 7) yellowish brown, anteriorly narrowed and rectangular, posteriorly globose, broadest at middle, middorsally with a yellowish band extending from posterior eyes to base, sub dorsally and further marginally with similar parallel bands, clothed with hairs and pubescence; cephalic region raised with indistinct cervical furrows; thoracic fovea longitudinal, radii distinct. Eyes 8, pearly white, except anteromedians rest on tubercles, rimed with black, anteromedians smallest, anterolaterals larger than posteromedians, anterior row slightly procurved, posterior row strongly recurved, thus forming 3 rows of eyes, ocular quad anteriorly narrow, posteriorly broad, longer than wide. Inter ocular distance: AME–AME=0.11, ALE–AME=0.23, ALE–ALE=0.76, PME–PME=0.23, PLE–PME=0.35, PLE–PLE= 0.88, ALE–PLE=0.47, AME–PME= 0.17. Clypeus yellowish brown, measurable. Chelicerae (Fig. 8) yellow, slender, long, anteriorly scopulate, promargin with 3 teeth, intermediate one larger and retromargin with 2 similar teeth, fangs brown, strongly curved. Both maxillae and labium (Fig.9) yellow, anteriorly scopulate, maxillae elongate, basally narrow, broadest at apex, labium slightly longer than wide, basally notched, apical margin nearly straight; sternum (Fig. 10) yellow, broadly cordate, anterior margin straight, posteriorly produced, clothed with black and brown hairs and pubescence. Legs yellowish brown, slender, clothed with hairs and spines, each femora with 10 dorsal and 7 ventral spines, each tibia except I with 3 dorsal, 2 dorsolateral, 3 ventral and 5 ventrolateral long spines, tibia I with 4 dorsal, 2

dorsolateral and 10 ventrolateral spines, tarsal claw 3, 3rd one toothless, rest with 10 teeth, 6 large and 4 small. Leg formula 2143.

Table 2: Length of legs of female of *Polyboea zonaformis (Wang)* (in mm)

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	3.63	0.81	4.0	3.54	1.54	13.52
II	3.72	0.81	4.0	3.45	1.63	13.61
III	2.90	0.63	2.90	3.09	1.18	11.51
IV	3.54	0.63	3.36	4.09	1.54	13.16

Abdomen (Fig. 7) yellow, elongate, anteriorly broad, posteriorly narrowing, dorsum medially with a longitudinal, broad, brownish black 'y' shaped band, further posteriorly decorated as in Fig.7, anteriorly clothed with spine like hairs, these posteriorly rather long, rest clothed with small hairs and pubescence; venter greyish brown with pale to dark brown longitudinal bands, clothed with variably developed brown and black hairs, spinnerets greyish brown.

Epigynum-Internal Genitalia (Fig. 11 & 12): Epigynal folds parallel, anteriorly divergent; lateral lobes of epigynum transverse, rectangular, anteriorly wide, both anterior and posterior margins incurved; carina lip like, incurved; fossae close. Copulatory duct of vulva wide, membranous, forming 2 sac like loops, 2nd loop shorter; head of spermatheca bifid, directed anteriorly and outwardly; spermathecal duct looped; base of spermatheca glandular; fertilization duct cylindrical, sub parallel.

Male:
Similar to female in general aspects and colour pattern. Slightly smaller than female and has smaller legs.

Total length-6.28, carapace length- 2.35, carapace width-2.4, abdominal length-3.88, abdominal width-1.58

Inter ocular distance: AME–AME=0.11, ALE–AME=0.23, ALE–ALE=0.76, PME–PME=0.23, PLE–PME=0.41, PLE–PLE= 0.94, ALE–PLE= 0.58, AME–PME= 0.23.

Table 3: Length of legs of male of *Polyboea zonaformis* (Wang) (in mm)

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	3.4	1.13	3.33	3.13	1.46	12.45
II	3.53	0.90	3.53	2.33	1.6	11.89
III	2.73	0.66	2.66	1.83	0.76	8.64
IV	3.46	0.73	3.13	3.60	1.46	12.38

Leg formula 1423.

Palp (Fig 13 & 14): Retrolateral tibial apophysis digitiform; median apophysis small, distal end with a small hook; conductor moderately long, twisted clockwise; tegulum with conspicuous retrolateral peak; distal tegular apophysis long, with a narrow base and broad tip, with a hook and a wing; embolus moderately long.

Material Examined: 1♀,1♂ Sevok, Mahananda Wildlife Sanctuary, Darjeeling, West Bengal, 29.ix.2007; 2♀♀, Gorumara, 18.v.2007; 3♀♀ Murti, Gorumara National Park, Jalpaiguri, West Bengal, 28.x.2008; 1♀ Jayanti, 16.x.2007, 2♀♀, Gadadhar, Buxa Tiger Reserve, Jalpaiguri, West Bengal, 17.ii.2008, Coll. S. Sen.

Material Deposition: Materials are deposited in the collection of Entomology Laboratory, Department of Zoology, University of Calcutta.

Distribution: China (Zhang *et. al.*, 2004; Platnick, 2009), Laos (Platnick, 2009), India (New record): West Bengal.

Remarks: The newly recorded species *P. zonaformis* (Wang) differs from the only known Indian species *P. vulpina* Thorell in the following characters:

Female: Head of spermatheca bifid, directed anteriorly and upwardly; spermathecal duct with a loop; fertilization duct cylindrical, sub parallel (head of spermatheca bent, pointing anteriorly; spermathecal duct with 4 loops; fertilization duct small and indistinct in *P. vulpina* Thorell).

Male: Conductor moderately long, twisted clockwise, without guiding lamellae; median apophysis small, distal end with a small hook; distal tegular apophysis long, with a narrow base and broad tip, with a hook and a wing; embolus moderately long (conductor long with a narrow base and broad tip, tip curved in a spiral, with 2 long guiding lamellae; median apophysis sub triangular with a large hook; distal tibial apophysis small with a fringed wing; embolus long in *P. vulpina* Thorell).

ACKNOWLEDGEMENT

We thank DBT, Govt. of India (BT/PR6391/NDB/51/078/2005 dt. 20.11.2006) for sponsoring the project and Dept. of Forest, Govt. of West Bengal and the Head, Dept. of Zoology, University of Calcutta for necessary support.

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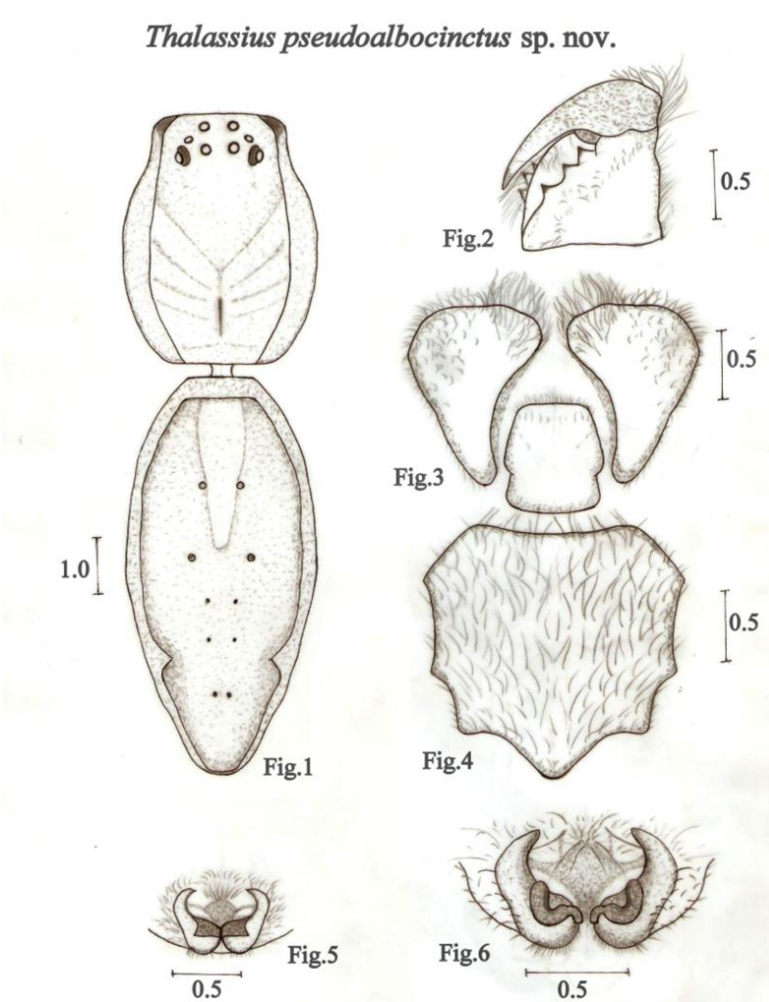
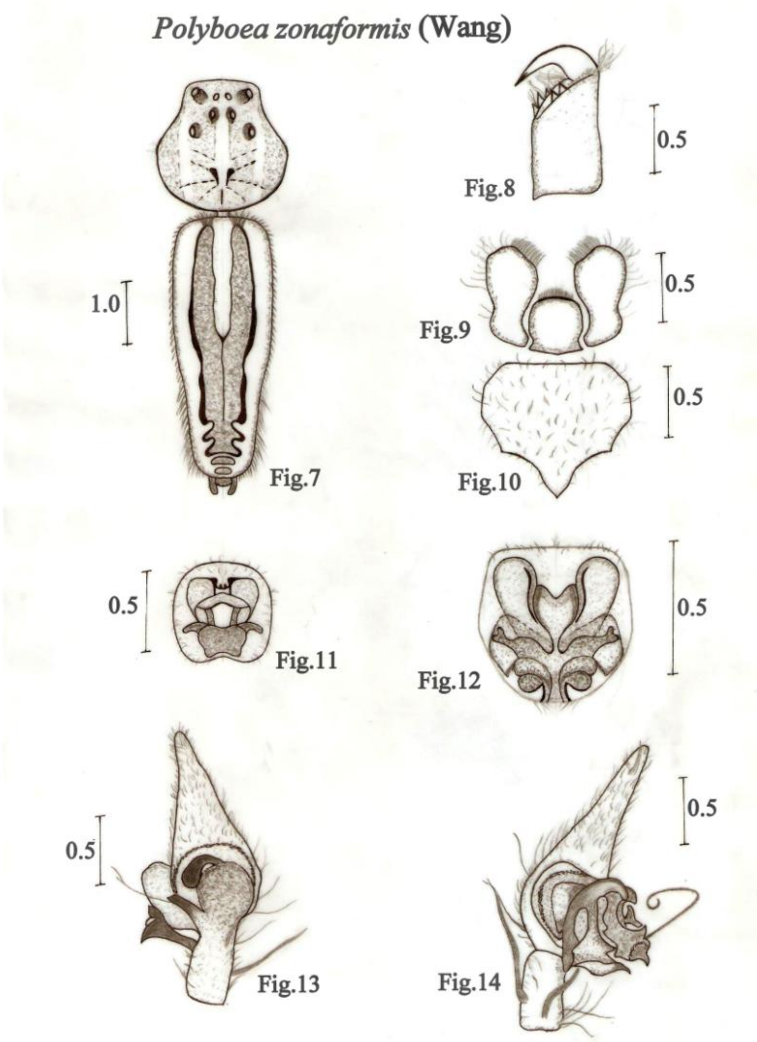


Figures 1-6: *Thalassius pseudoalbocinctus* sp. nov.: Female: 1. Whole body, 2. Chelicerae, 3. Maxillae and labium, 4. Sternum, 5. Epigynum, 6. Internal genitalia



Figures 7- 14: *Polyboea zonaformis* (Wang): Female: 7. Whole body, 8. Chelicerae, 9. Maxillae and labium, 10. Sternum, 11. Epigynum, 12. Internal genitalia. Male palp: 13. Ventral view, 14. Lateral view.

COMPOUNDS IN METATHORACIC GLANDS OF ADULTS OF THE SUNN PEST, *EURYGASTER INTEGRICEPS* (PUTON)(HETEROPTERA: SCUTELLERIDAE)

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[Hassani, S., Pour Abad, R. F., Djozan, D. & Fazel, M. M. 2010. Compounds in metathoracic glands of adults of the Sunn Pest, *Eurygaster integriceps* (Puton) (Heteroptera: Scutelleridae). Munis Entomology & Zoology, 5 (1): 232-239**]**

ABSTRACT: Sunn Pest, *Eurygaster integriceps* (Puton) (Heteroptera: Scutelleridae) is a serious pest of wheat and barley in countries of west and central Asia. The contents of metathoracic glands (MTG) of adults of the sunn pest *E. integriceps* were tested by two methods *in vitro* and *in vivo*. Volatiles were collected by solid-phase microextraction (SPME) fibers. Chemical composition of the glandular secretion was identified by gas chromatography (GC), coupled GC-mass spectrometry, matching retention times and mass spectra with those of authentic samples. No sexual dimorphism exists in the glandular composition in this species. A total of 7 compounds (E)-2-Hexenal, 2(5H)-Furanone, 5-Ethyle, 2-Hexen-1-ol, acetate, Limonene, 5-Decyne, Tridecane and Nonadecane were identified. Among the identified compounds (E)-2-Hexenal and Tridecane comprised nearly 95% of the total secretion in both females and males. In the MTG of both females and males of *E. integriceps*, (E)-2-Hexenal was determined in maximum amount and 2(5H)-Furanone,5-Ethyle was determined in minimum amount. Comparing results of *in vitro* and *in vivo* SPME sampling methods indicates that *in-vivo* method had high quality for detecting compounds than *in vitro* method. Quantity and area under GC peaks increased in *in vivo* method.

KEY WORDS: GC-MS, SPME, Scent glands, (E)-2-Hexenal, Tridecane.

Stink bugs produce large quantities of strong-smelling and irritating defensive chemicals, which are released when the bugs are disturbed or molested (Aldrich, 1988).

Odorous compounds are produced by the scent gland of adult and immatures. The scent glands are epidermal glands formed from epidermis by invaginations. The name is originated from the parts of the body (abdomen, metathorax). Production, storage and finally release of odoriferous substances are the main physiological function of the scent glands in Heteroptera (Staddon, 1979). Different roles such as defense against predation, alarm, mating, aggregation have been reported by researchers for the scent gland compounds (Ho & Millar, 2001).

Sunn Pest, *Eurygaster integriceps* (Puton), is a serious pest of wheat and barley in countries of west and central Asia. Nymphs and adults cause damage via feeding on leaves, stems and grains. During feeding they inject chemicals that reduce the baking quality of flour made from damaged grains (Parker et al., 2002).

The main objective of this study was to characterize the exuded compounds produced in the metathoracic glands of the Sunn pest, *E. integriceps* adults. This information could be used in developing a new management strategy in the control of insects and as a tool to anticipate and predict potential damage to cereals. Rudimentary identification of compounds was made by using gas chromatography (GC) and final identification of extracted compounds carried out by GC coupled mass spectrometry (GC-MS).

MATERIAL AND METHODS

Insects

Adults *E. integriceps* were collected from wheat plants in the Hamedan region, from May through July, 2007. Insects were reared and maintained at 22-24°C and 60±10% RH With a 16: 8 (L:D) photoperiodic regime in plastic jars in the laboratory. Bugs were maintained on fresh host-plants until dissection.

Extraction

To prevent the premature discharge of gland contents, mature bugs were killed by freezing (Marques et al., 2007). Then an adult of *E. integriceps* was pinned in a Petri dish with the dorsal side up. The dissection process consisted of cutting the dorsal abdominal edges of the insect cuticle up to the metathoracic region and under the scutelum. The dorsal abdominal cuticle was pulled back and the viscera were removed (fig1-A). The scent gland complex, located at the ventral abdominal metathoracic region, could be reached and removed with the aid of small surgical scissors (Zarbin et al., 2000). The 20 glands reservoir of male and female were removed and immersed in 1ml dichloromethane and stored at -20°C until analysis.

In other method (*in vivo*), 3 alive insects were transferred into 4 ml vials, excited by shaking vial, up and down, 12 times. Released volatile compounds were adsorbed on modified HB pencil lead fiber in a diameter of 0.35mm, length 60mm from Rotring Co.(Germany), prepared as described below, was mounted in the homemade SPME device and the exposed fiber was trimmed to 2cm (Djozan et al., 2005). Fiber was located on the head space of vials (fig1-B), for 30 minutes, then injected to GC and GC-MS for identification. Adsorbed volatile compounds, were desorbed in the GC-MS injection port at 260°C for 1 min.

Chemical analysis

Gas chromatography – MS analysis of volatiles collected on SPME fibers was carried out by GC-MS with a Agilent 6890 series fitted with a HP-5MS column (30m×0.25mm I.,D. ×0.25μm film) and interfaced to an Agilent 5973 mass selective detector (electron impact ionization, 106 eV). The GC was programmed at 60°C/2 min, then 5° C/min to 140 °C, then 20° C/min to 220 °C. Helium carrier gas was programmed for constant flow (2 ml/min). the injection at 260 °C was splitless for 1 min. Compounds were tentatively identified by GC-MS, and identifications were confirmed by comparison of the retention times and mass spectra with those of authentic samples. The relative amount of each compound was determined from the area under GC peaks (Durak & Kalender, 2007a).

RESULTS

Analysis of MTG of *E. integriceps* was carried out separately for both sexes, by two methods *in vitro* and *in vivo* SPME sampling.

(E)-2-Hexenal, 2(5H)-Furanone,5-Ethyle, 2-Hexen-1-ol,acetate, Limonene, 5-Decyne, Tridecane and Nonadecane were determined in the male and female. In the analysis of MTG of both sexes of *E. integriceps*, (E)-2-Hexenal was determined in the largest amount and 2(5H)-furanone,5-ethyle was determined in the smallest quantity. All of the chemical compounds are qualitatively similar on each male and female but they have slight differences in their quantity (fig. 2 and table 1).

Results of *in vitro* and *in vivo* methods indicates that *in vivo* method had a higher quality for detecting compounds than *in vitro* method, for example, 2-Hexen-1-ol,acetate only detected by *in vivo* method (fig 3). Also area under GC peaks increase in *in vivo* method (table 2).The advantages of the *in vivo* methods are: no need for solvent and dissection. In addition, this method needs fewer samples. Also compounds can be identified without changes in their type and relative ratio.

DISCUSSION

Compounds of Heteroptera scent glands have 2-15 carbon chain lengths and are most commonly acidics, aldehydes, ketones, acetone, alcohols and esters (Staddon, 1979; Aldrich, 1988). The main function of these compounds is defense, alarm, mating and aggregation (Regnier & Low, 1968).

The contents of metathoracıc glands of adults of the sunn pest *E. integriceps* were analyzed by two methods *in vitro* and *in vivo* and 7 different chemical substances were determined for both sexes. In the male and females of *E. integriceps* the following substances were found**:** Aldehyde, lactone, acetate, cycloalcen, alcene and two types of alcanes. The components of MTG of adults in both sexes of the Sunn pest were similar and typical of what has been reported for several other Heteroptera species (Aldrich, 1988). In addition to biosynthetic parsimony, the similarity in the defensive chemical blends shared by numerous species may provide another benefit of serving as a generic warning signal and strong deterrent to attack. These blends of hydrocarbons with aldehydes and esters appear to be highly conserved, being shared both within and across genera and even between bug families (Aldrich, 1995). The aldehydes and esters are strongly scented and are strong irritants, providing both an easily detected warning signal and a strong defense. The function of the hydrocarbons is less clear, but they may serve as solvent and as controlled-release substrates for the more volatile aldehydes (Remold, 1962; Gunawardena & Herath, 1991).

One of the main compounds detected in MTG of *E. integriceps*, is (E)-2-Hexenal as reported in other species of Heteroptera. This compound has been identified in many species of Pentatomide (Aldrich, 1988; Ho & Millar, 2001; Zarbin et al., 2000), Rhopalidae (Aldrich, 1988), Lygaeida (Staddon & Olagbemiro, 1984), Coreidae (Steinbauer & Davier, 1995), Alydidae (Yasuda et al., 2007), Miridae (Drijfhout et al., 2007), *Hotea gambae* (Aldrich, 1988) and *E. maura* (Durak & Kalender, 2007a) (scutelleridae). This component has also been found in aphid sexual pheromone (Kye & Hardie, 2002). It becomes attractant at low concentrations and as a repellent at high concentrations (Durak & Kalender, 2007a). (E)-2-Hexenal may possess two functions: 1) as a defense against predators and 2) as an alerting pheromone warning and dispersing other individuals in an aggregation (Calam & Youdeowei, 1968). Levinson and Barllan (1971) bioassayed the major components of the bed bug scent glands and found that (E)-2-Hexenal has been categorized as a bed bug alarm pheromone (Levinson & Barllan, 1971 and Levinson et al., 1974). This compound is toxic to dipteran eggs and perhaps provides protection against tachinid eggs (Aldrich, 1978).

Tridecane, another main compound detected in this study, was found in MTG of other bugs especially several species of pentatomidae (Borges et al., 2001; Ho & Millar, 2001; Zarbin et al., 2000), Pyrrhocoridae, lygaeidae (Aldrich, 1988), *E. maura* (Durak & Kalender, 2007a) and *Pachycoris stallii* (Williams et al., 2001) (Scutelleridae). Promotion of penetration of the toxic scent carbonyls through cuticle in arthropode predators and acting as fixative, to delay the evaporation of the scent carbonyls from the body surface of the scent emitter are two main function of Tridecane in insects (Staddon, 1979). This component also was identified in compounds of alarm pheromone in ants (Regnier and Law, 1968).

It was reported for pentatomid that (E)-2-Hexenal and n-Tridecane were more effective as repellents to insects when combined than when individually tested. Furthermore, other n-alkanes when combined with (E)-2-Hexenal were not as effective deterrents towards other insects as n-Tridecane. Hence, n-Tridecane appears to be the optimal n-alkane to work synergistically with the other scent compounds (Zarbin et al., 2000).

2(5H)-Furanone,5-Ethyle is antifungal and antibacterial compound (Paulitz et al., 2000; Johne et al., 2006) and acts against *Fusarium*, *Pythium*, *Rhizoctonia*, *Thielaviopsis* and *Trichoderma* (Paulitz et al., 2000). This compound was identified in sexual pheromones of *Eurycolis florionda* (Slaughter, 1999) and *Popillia japonica* (Nation, 2002) and MTG of *Graphosoma semipunctatum* (Durak & Kalender, 2007b).

Limonene is a plant monoterpenoide with antibacterial function (Dormsn & Deans, 2000). this compound has been reported in defense pheromone of *Hotea gambiae* (Scutelleridae) (Aldrich, 1988) and *Sehrious cinctus cinctus* (Cydnidae), also as aggregation pheromone in *Cimex lectularius* (Cimicidae) (Siljander et al., 2008) and Scolytidae beetles (Hick et al., 1999).

5-Decyne, it is the first report of this compound in Heteroptera MTG although 1-Decyne has been reported in the anterior glands of Dysdercus *cingulatus* that may be involved in maintaining aggregation (Farine et al., 1992). Biological function of this compound in MTG still needs further study.

Nonadecane compound were identified as toxic, irritant or repellant in different insects (Zarbin et al., 2000). It is released by stink-bugs in response to disturbance, showing that they are responsible for chemical defenses (Durak & Kalender, 2007a) and may also have the same function in *E. integriceps*. Also it is found in *Nezara viridula* (Aldrich et al., 2005), *E. maura* (Durak & Kalender, 2007a) MTG and *Oecophylla smaragdina* (Keegans et al., 1991).

2-Hexen-1-ol,acetate, had been reported from MTG of *Dolycoris baccarum* (Durak, 2008) and in released compounds from damaged leaf of *Macaranga myrmecophytes* (Inui & Itioka, 2007).

As the *E. integriceps* has two behavioral phases: 1) At the end of feeding, adults aggregate on the nearest fields to hibernating sites and after they migrating collectively to mountain. 2) At the spring, migration again takes place collectively and most of them temporarily establish on the nearest fields. Then they disperse to adjacent fields. In attention to our obtained results and other researches it may be supposed that the MTG components, specially Tridecane and (E)-2-Hexenal act critically in two behavioral phases. So that we can use these components for repelling or aggregating in our expected locations and then controlling them. Also it has been reported that the egg parasitoid *Trissolcus basalis* utilizes a defensive substance produced by its host bug as a long-range attractant kairomone (Zarbin et al., 2000). So the MTG components of adults suun pest could be used as kairomone to synchronize the parasitoid population at the beginning of the host flight season and pave the way for the development of invaluable tools in integrated pest management programs for this important pest.

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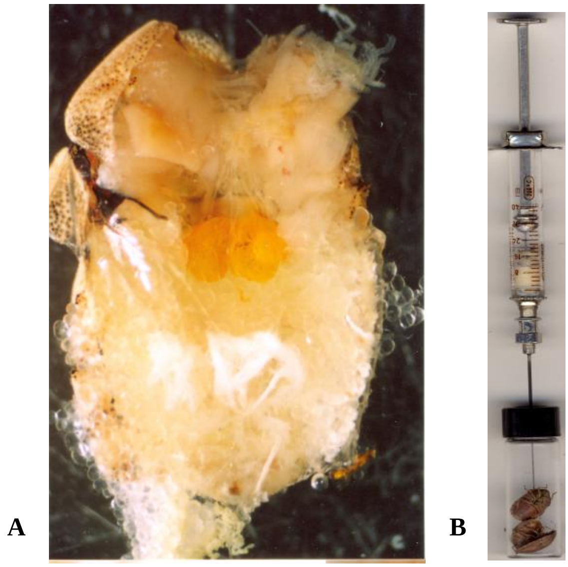

Figure 1. Sampling methods of contents of metathoracıc glands of adults of the *E. integriceps,* A) *In vitro* B) *In vivo*

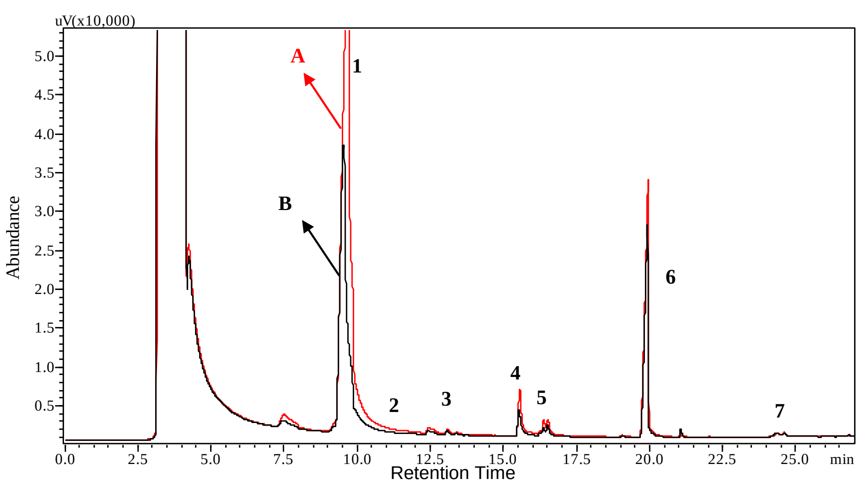

Figure 2. Gas chromatograms of metathoracic scent gland contents from *E. integriceps*, (A)Female, (B) Male. Compounds numbers 1.(E)-2-Hexenal 2.2(5H)-Furanone,5-Ethyle 3.2-Hexen-1-ol,acetate 4.Limonene 5. 5-Decyne 6.Tridecane 7.Nonadecane

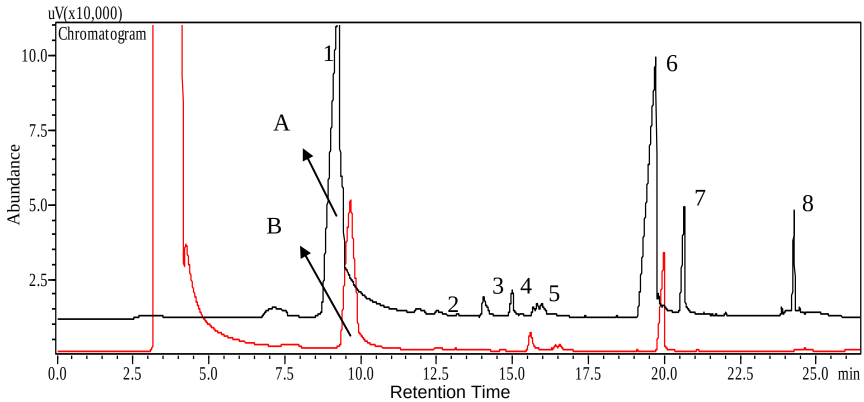

Figure 3. Gas chromatograms of metathoracic scent gland contents from *E. integriceps* in two methods *in vivo* (A) and *in vitro* (B).

Table 1. percentage of compounds in metathoracic gland contents of female and male of *E. integriceps.*

Groups	Chemical compounds	Percentage of compounds	
		Female	**Male**
Aldehyde	(E)-2-Hexenal	78/1	74/70
lactone	2(5H)-Furanone,5-Ethyle	0/1	0/11
acetate	2-Hexen-1-ol,acetate	2/59	3/14
cycloalcen	Limonene	0/28	0/27
alcene	5-Decyne	0/32	0/44
alcanes	Tridecane	18/11	20/98
	Nonadecane	0/5	0/36

Table 2. comparing area under peaks of detected compounds from *E. integriceps* in two methods (*in vivo* and *in vitro*).

Peak number	Groups	Compounds	Area under GC peaks	
			In vivo	***In vitro***
1	Aldehyde	(E)-2-Hexenal	2513364.7	1375086
2	lactone	2(5H)-Furanone,5-Ethyle	16619.8	4402
3	acetate	2-Hexen-1-ol,acetate	75036	-
4	cycloalcen	Limonene	61649.8	47105.5
5	alcene	5-Decyne	52129.7	1770
6	alcane	Tridecane	1632330.1	279040.2
7	-	unknown	290397.4	1541.8
8	alcane	Nonadecane	135689.1	2614.6

THE EFFECT OF METHOPRENE ON TOTAL HEMOCYTE COUNTS AND HISTOPATHOLOGY OF HEMOCYTES IN *PAPILIO DEMOLEUS* L. (LEPIDOPTERA)

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ABSTRACT: The Juvenile hormone analogue (JHA) methoprene (ZR-515) was employed for its effects on total hemocyte counts (THC) and pathological symptoms in *Papilio demoleus* L. The results show that the low dose (1µg/µL acetone) effects cause THC reduction in general and of PLs, ADs and SPs in Particular. The hitspathological symptoms were observed as changes in PLs form. However, the high dose (100µg/µL acetone) produced imperfect and perfect supernumerary larval instars whose THC declined considerably. Extreme pathological symptoms in cell membrane, cytoplasm and nucleus were observed. The possible significance of these changes are discussed.

KEY WORDS: methoprene, hemocytes, histopathology, *Papilio demoleus*

Very little work has been carried out on the role of endocrine organs and hormones on the hematology of insects. Injection of β-ecdysone into the posterior hormone–deficient–half of the mid–ligatured larvae of *Spodoptera litura* showed that THC, which was drastically reduced after ligature, sharply rose after injection of the hormone (Prasada Rao et al., 1984). THC count was reduced following treatment of fifth instar nymphs of *Dysdercus cingulatus* with β-ecdysone and makisterone A (a phytoecdysone) (Ahmad, 1995). Injection of triol (an analogue of molting hormone) and makisterone A in the fifth instar hopper *Hieroglymphus nigrorepletrus* produced pathological symptoms (Ahmad and Khan, 1988). Similar effects have also been observed earlier by synthethic insecticides (Arvy et al., 1950; Roy and Bagchi, 1975; Zaidi and Khan, 1977; Azam and Ilyas, 1986; Younes et al., 1999, Sabri and Tariq, 2004).

In contradiction to these results is the increase in THC by some insecticides (Khalid et al., 2001; Haq et al., 2005). Phytochemicals such as plumbagin produced surface deformities in all cell types and loss of filopods in some (Saxena and Tikku, 1990). Neem gold used on larval *Spodoptera litura* brought about histopathological changes and decrease in THC of some cell types (Sharma et al., 2003). It has been shown that treating the hemocytes of *Galleria mellonella in vitro* by 20-hydroxydysone (20-E) led to a dose-dependent decrease in total cell and granulocyte number (Izzetoglu and Karacali, 2003). One aspect of hemocyte function is encapsulation of invading foreign bodies where the number of hemocytes is a key factor in combating the organism. It has been shown that the process of encapsulation has been reduced on injection of JH to *Tenebrio molitor* L..

In the view of the above studies we tried to find out if there is any relationship between hemocyte number and increasing JH in hemolymph or there is any malfunction after JH incorporation in a holometabolous insect.

MATERIAL AND METHODS

Insect *Papilio demoleus* L. eggs were collected from lemon nurseries and bred in a controlled condition (28±2 ^{o}C, 16: 8 LD and % 65±5 RH), the hatched larvae were provided daily with fresh lemon leaves. Second day old Vth instar larvae were used for the experiment.

To study total hemocyte counts (THC) the hemolymph was drawn into a Thoma white blood cell pipette up to 0.5 mark and diluted up to the 11 mark with tauber–yeager fluid (Tauber & Yeager, 1934). The pipette was then shaken for several minutes and the first three drops were discarded. A double line with improved Neubauer ruling Hemocytometer was filed with diluted hemolymph and the hemocytes counted in its four corner and one central (1mm^2) squares under a microscope (Olympus, Japan). If the distribution of cells in all the squares were not even, the sample was discarded. The number of circulating hemocytes per cubic millimeter (mm^3) was calculated using the following formula of Jones (1962).

$$\frac{\text{Hemocytes in five 1mm}^2 \times \text{Dilution} \times \text{Depth factor of chamber}}{\text{No. of squares counted}}$$

Where dilution = 20 times, Depth factor of the chamber = 10 (constant) and No. of squares counted = 5.

For blood smear slide preparation, a small drop of heat–fixed hemolymph was obtained by clipping of the proleg present on the 7th abdominal segment of the larva or piercing the cuticle of the pupa. The drop was then drawn into a thin film by the edge of another slide and the film air–dried before staining. For staining, the stock solution of Giemsa stain prepared by the method of Yeager (1945) was diluted 10 times with distilled water. The air dried smear was stained with the diluted stain for 20 minutes and subsequently differentiated in dilute lithium carbonate solution for red staining structures and then in Hcl acidified distilled water for blue staining structures. The slide was rinsed in distilled water and mounted in DPX. To determine the DHC, cell categories were counted in 200 cells chosen from random areas of the stained blood smear by a laboratory blood cell counter.

The juvenile hormone analogue (JHA) Methoprene, (ZR-515), generously supplied by Dr. F. Sehnal of Institute of Entomology, Academy of sciences Czeck Republic, were employed in this study. It was diluted in acetone and applied by a micro-applicator on the dorsum of the posterior abdominal segment in doses 1 and 100 µg/µl of acetone. Controls received 1µl of acetone alone.

RESULTS

Low dose effects

Doses of 1µg/L did not interrupt normal metamorphosis of the insect but affected the THC and morphology of hemocytes. The THC was drastically reduced (Table1) with the decline in population mainly of the PLs, ADs and SPs. Besides, the PLs also lost their typical spindle shape to acquire a some what rounded form with an irregular boundary (Figs 1-4).

High dose effects

High doses interfered with the normal development of the insect and resulted in the production of imperfect and perfect supernumerary larval molts. Imperfect supernumerary larvae had a new larval cuticle below the old one but the insect failed to ecdyse, while the perfect supernumerary larvae had normally molted into larval 6^{th} instars. Due to the tissue breakdown and the resulting turbidity in the hemolymph, the THC could not be determined in the imperfect supernumerary larvae. In the perfect supernumerary larva, the THC was determined in 1,2 and 3 day old larvae and it was found to be much lower not only to the corresponding stages but also to older stages of the normal 5^{th} instar larva (Table 2).

Effect on hemocyte morphology

The juvenoid employed in this study seem to affect every part of the hemocyte, i.e., cell membrane, cytoplasm and nucleus. The most sensitive cells were found to be the PLs and GRs and the most resistant ones to be the oenocytes (OEs).

Some cells loose their smooth cell boundary to become irregular (Fig. 5). Surface projections are exhibited by the PLs where cell membrane shows distinct lobes due to parts of the cytoplasm projecting into it (Fig. 2).

Thinning of the cytoplasm, is mostly observed in the PLs (Fig. 5). Vacuolisation of cytoplasm : In the GRs, SPs and ADs (but not PLs and OEs), the cytoplasm get vacuolised. The vacuoles may fill the entire cytoplasmic area (Fig. 5).

Changes affecting nucleus are seen as eccentrically pushed nuclei, under this effect, the nucleus of the cells is pushed towards the periphery, sometimes accompanied by reduction in the nuclear size (Fig. 5). In nuclear expulsion, the nucleus is pushed almost beyond the broken cell boundary as if to be thrown out, is observed in the GRs (Fig. 7).

In the PLs and PRs a furrow seems to cleave the nuclei into two halves (Fig. 8). Cellular Clumping is another feature where large patches of cytoplasm are seen to include several nuclei. This seems to have resulted from the fusion of several cells and subsequent loss of their cell boundaries (Fig. 9).

DISCUSSION

Our previous study showed six types of hemocytes in *Papilio demoleus*. They are the prohemocytes (PRs), plasmatocytes (PLs), granulocytes (GRs), spherulocytes (SPs),oenocytoids (OEs), adipohemocytes (ADs) and two subtypes, the vermicytes (VEs) and podocytes (POs) (Jalali and Salehi, 2008). However in the present investigation only two major hemocyte types were considered based on their role in immunity i.e., plasmatocytes and granulocytes. They showed sensitivity to the presence of excess JH and their THC changed drastically with various morphological symptoms.

Rizki (1957, 1962) was perhaps the first to provide direct evidence of hormonal regulation of hemocytes activity in *Drosophila* subsequently, a number of studies have, by extirpation and implantation experiments or by application of hormones, shown that the endocrine organs indeed regulate hemocyte populations and differentiation (Hoffman, 1970; Judy and Marks, 1971; Prasada Rao, et al., 1984; Ahmad and Khan, 1988). However, there are very few papers on the effects of hormones or their analogues on hemocytes . One with ecdyson (Judy and Marks, 1971, Prasada Rao et al., 1984; Ahmad and Khan, 1988) and one with juvenoid

(Gupta, 1985). Of the papers with ecdyson, (Judy & Marks, 1971) shows an increase in the migratory activity of the hemoytes *in vitro*, the other (Prasada Rao *et al*., 1984), an in crease in the THC and the third one (Ahmad and Khan, 1985), production of certain pathological conditions in the hemocytes. About the work with juvenoid, Gupta (1985) injected a juvenoid into the last nymphal instar of cockroach and found a 50% reduction of hemocytes in the adult. Since the adult hemocyte count tallied with that of the nymphal count, he postulated that the analogue had a juvenilizing effect on these cells.

In the present study with the juvenoid, methoprene, there was found, significant reduction in the THC of the treated insects and since a number of pathological symptoms were also observed. Hence, this reduction could be due to the death of pathological cells by degeneration. The pathological symptoms produced by the analogue treated every component of the cells: cell membrane, cytoplasm and nucleus. These changes, interestingly , are similar to those produced by some of the insecticides (Yeager and Manson, 1942; Gupta and Sutherland, 1968, Zaidi and Khan, 1977; Azam and Ilyas, 1986 and Younes et al., 1999; Khalid et al., 2001; Haq et al., 2005) and exotoxines of some microorganisms (Venkova, 1972).

Phytochemicals like plumbagin and neem produced somewhat similar effects (Saxena and Tikku, 1990; Sharma et al., 2003). It would thus appear that the hormone analogues – both juvenoids and ecdysteroids affect hemocytes as toxins rather than as hormones, i.e., not the way, they affect (inhibit) development of tissues like epidermis and germ cells. The possible explanation to this differential action could be that in other tissues, the hormones may be acting at the genetic level (in the nucleus), in the hemocytes they seem to affect only the cellular contents, strikingly, in almost all cases studied, only the PLs and GRs have been found to be the most sensitive cells and OEs, the most resistant ones. They remain unaffected even when all other cell types show one or the other kind of pathological symptoms. Interestingly the PLs and GRs are also the main phagocytic hemocytes in most of the insects studied (Crossley, 1964; Akai and Sato, 1973). The reason for the greater hormone sensitivity of these cells could be that, being phagocytic they are prone to be attracted to any foreign substance including synthetic analogues, and these are likely to suffer greater exposure to hormones than other cell types . OEs being thick (Zaidi and Khan, 1977; Gupta, 1979) may resist penetration of the hormone and so remaining unaffected.

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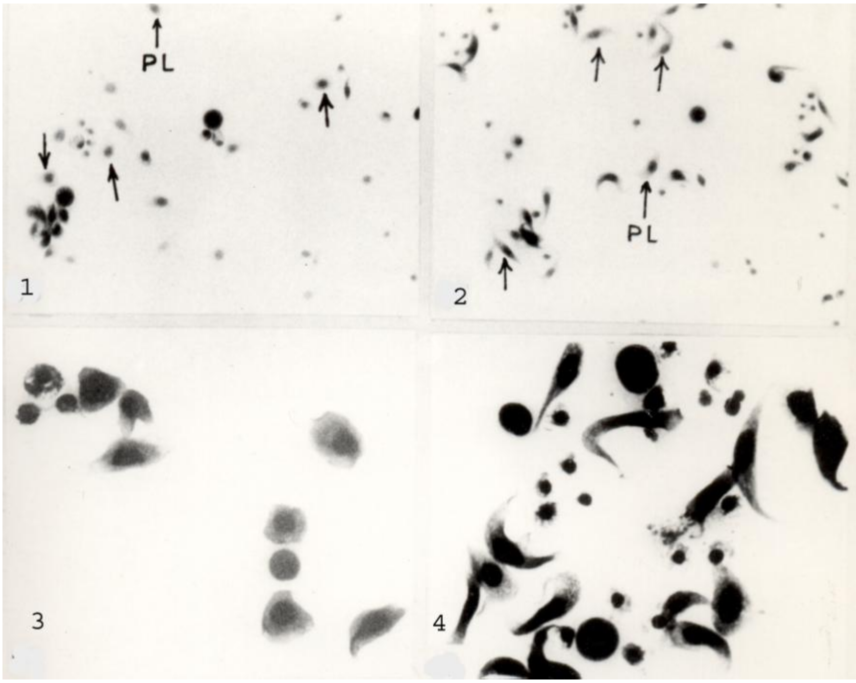
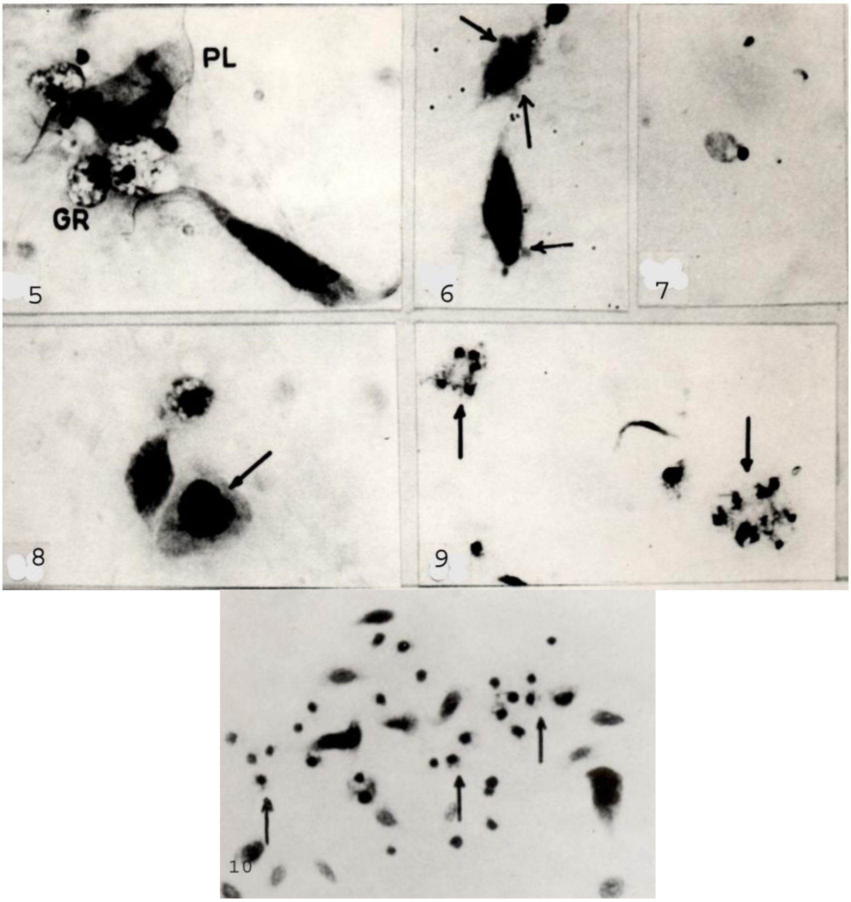


Figures 1-4. 1) Low dose JHA effects showing rounding up of PLs, X600. 2) Control of fig. 1. showing normal spindle-shaped PLs X600. 3) Low dose JHA effect in a magnified view to show irregularity in the cell boundary of rounded PLs. (oil), X1500. 4) Low dose JHA effect in a magnified view to show smooth cell boundary of spindle-shaped PLs. (oil) X1500.

Table 1. Low dose JHA effect on the THC.

Hours after Treatment	Insect No.	THC/mm³±SE		*P* values
		JHA- treated	Control	
24	10	7800.0 ± 406.4	9500 ± 423.0	<0.01
48 (prepupa)	10	13130.0 ± 1026.0	17864 ± 1264.6	<0.01
72 $(\text{Pupa})_1$	10	3330.2 ± 312.3	5261 ± 316.7	<0.001
96 $(\text{Pupa})_2$	10	2733.3 ± 394.5	4328 ± 763.5	Ns
120 $(\text{Pupa})_3$	10	1472.8 ± 196.1	2255 ± 422.8	Ns

Figures subscripted to instars indicate age(Days) Ns. = Not significant



Figures 5-10. 5) High dose JHA effect showing irregular cell boundary and thinning of cytoplasm of PL, vacuolization of cytoplasm and eccentrically pushed nuclei in GRs (oil), X1500. 6) High dose JHA effect showing cytoplasmic bulges in the PLs (arrows) (oil), X1500. 7) High dose JHA effect showing nuclear expulsion possibly from a GR. X600. 8) High dose JHA effect showing lobed (cleaved) nuleus in a PL. (oil), X1500. 9) High dose JHA effect showing cell-clumping. X900. 10) Control showing normal GRs (arrows), X600.

Table 2. High dose JHA effect on the THC.

Days after Treatment	Insect No.	THC/mm^3±SE		P values
		JHA- treated (VI instar)	V instar* Control	
1	10	2223 ± 392.0	6505.4 ± 661.7423.0	<0.001
2	10	1983 ± 245.3	9440.0 ± 822.7	<0.001
3	10	1245 ± 198.5	8616.0 ± 539.8	<0.001

* Since there could not be a control for the supernumerary (VI) instar, the V instar data are included for comparison.

HOST PREFERENCE AND LIFE CYCLE PARAMETERS OF *CHROMATOMYA HORTICOLA* GOUREAU (DIPTERA: AGROMYZIDAE) ON CANOLA CULTIVARS

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[Fathi, S. A. A. 2010. Host preference and life cycle parameters of *Chromatomya horticola* Goureau (Diptera: Agromyzidae) on canola cultivars. Munis Entomology & Zoology, 5 (1): 247-252**]**

ABSTRACT: *Chromatomyia horticola* Goureau (Diptera: Agromyzidae) is a pest of canola crop, *Brassica napus* L., in the Ardabil region. The resistance of six canola cultivars to *C. horticola* was studied in the two following experiments: (1) host feeding selection and (2) life cycle study. The host feeding selection of females, were carried out in a greenhouse at 23±1°C, 50±5% RH and 14L:10D; the number of punctures and mines on Hyola401, RGS003 and Opera was significantly lower than that on Talayh. In the life cycle study, the development, survivorship and reproduction of *C. horticola* raised on five canola cultivars, was studied under defined condition. The female lifetime of leafminer was 27.43d on Talayh, 28.67d on Zarfam, 29.8d on RGS003, 30.2d on Hyola401 and 32.5d on Opera; the female lifetime on Opera, Hyola401 and RGS003 was significantly longer than that on Talayh. The mean lifetime fecundity of leafminer on Talayh, Zarfam, RGS003, Hyola401 and Opera was 80.15, 82.18, 74.4, 76.1 and 67.57 eggs, respectively. Based on these results, we conclude that Talayh is the most suitable and Opera is the least suitable host plant for *C. horticola*.

KEY WORDS: *Chromatomyia horticola*, host suitability, life-history parameters, leafminer

Chromatomyia horticola Goureau (Diptera: Agromyzidae) is a pest of canola crop, *Brassica napus* L., in the Ardabil region. Saljoqi et al. (2006) reported that *C. horticola* is a major pest of canola crop in Pakistan. Different species of leafminers might gradually become a serious pest of cultivated crops, due to high fecundity, short generation time, a wide range of host plants and their dispersal ability (Leibee, 1984; Parrella, 1987; Minkenberg, 1988; Mason et al., 1989; Zou et al., 1998; Wei et al., 2000; Saljoqi et al., 2006). Punctures caused by females of different species of leafminers during the feeding and oviposition processes can result in a stippled appearance on foliage, especially at the leaf tip and along the leaf margins (Parrella et al., 1985; Parrella, 1987; Wei et al., 2000). However, the major form of damage is the mining of leaves by larvae, which results in destruction of leaf mesophyll. The mine becomes noticeable about three to four days after oviposition and becomes larger in size as the larva matures. The pattern of mining is irregular. Both leaf mining and stippling can greatly depress the level of photosynthesis in the plant (Leibee, 1984; Parrella, 1987; Zou et al., 1998; Capinera, 2008).

Growers depend on insecticides for suppression of leafminers. However, different species of leafminers are capable of becoming resistant to insecticides, due to high fecundity and short generation time (Parrella, 1987; Zou et al., 1998; Wei et al., 2000). Moreover, the negative environmental impacts of insecticides have promoted the other alternative approaches such as host plant resistance. Host plant resistance is part of an effective strategy of integrated pest management programs that can reduce leafminer damage. So, the application of resistance plant cultivars has economical, ecological and environmental benefits (Smith, 1989).

Regardless of broad publications about plant characteristics that provide mechanisms of resistance, no study has been carried out about the resistance of canola (*Brassica napus* L.) cultivars to *C. horticola*. The purpose of this research was to the determination the host feeding selection of females on canola cultivars, and the study of the life cycle parameters of this leafminer on canola cultivars.

MATERIAL AND METHODS

Plant Collections

Two seeds of each cultivar were planted in pots, 20cm in diameter, filled with suitable soil at 10 replicates. Plants were grown at 23±1°C, 50±5% RH and 14L:10D. No pesticides were applied to the plants. The canola cultivars at seedlings stage with six leaves were used for these experiments; due to damage of leafminer to mature plants they have no influence on the growth of the plant. In contrast, seedlings are severely weakened by leafminer damage.

Insect and General Rearing Procedure

The primary population of leafminer was collected on cabbage in the Agricultural Station of the University of Mohaghegh Ardabili in June-2008. Leaves with larvae were collected and kept in culture dishes. To avoid a collected plant effect on the following experiments, the leafminer were reared on cabbage, *brassica oleracea* L. The leafminer colony was maintained in a polypropylene box (50cm diameter and 50cm depth) under laboratory defined conditions. A 40cm diameter hole was cut into the box lid, and this hole was covered by a nylon screen (ca. 0.1mm mesh). After two or three generations, 2-d old females were used for the experiments.

Host Feeding Selection

Host feeding selection of leafminer females was tested for six canola cultivars including: Zarfam, RGS003, Opera, Option500 and Hyola401 with Talayh as control cultivar. These experiments were conducted at seedlings stage with six leaves in a greenhouse at 23±1°C, 50±5% RH and 14L:10D. One test plant (*N* 10 for each cultivar) was placed in one circle route in a plastic box (2m diameter and 70cm depth). Ten females, 2-d old, from the stock leafminer colony were released in this box. The top of this box was covered using a nylon screen and kept for 4 day. After 4 days, the number of feeding punctures and mines on each cultivar in box was counted. Each treatment was replicated 10 times.

Life Cycle Study

The life cycle parameters of leafminer were studied on a middle leaf at seedling stage of five canola cultivars. One egg, selected randomly from eggs laid on a leaf and the other eggs were removed from the test plant leaves. Then each leaf with one egg of leafminer was restricted using a clip cage (6cm diameter and 1.5cm depth). Each clip cage has a mesh lid (2cm diameter) for ventilation. The margin of clip cages were covered with sponge to suppress injury to leaf tissue when linked to the leaf. The plants were then maintained under defined conditions in a greenhouse. The clip cages were monitored daily to egg hatching and to measure development time and survival of larvae and pupa. These observations were recorded until emergence of adults. The sex of emerged adults on each cultivar was recorded. At the emergence of adult, one pair leafminer was transferred to a new cage for ovipositing. The leaf in the cage was cut daily, and the oviposited eggs in the leaf were counted under a stereomicroscope. One pair leafminer was placed in new cage each day. Daily observations were made until the death of all adults. If a female died within the first 24h, she was replaced with a newly emerged and mated female. In this experiment, the number of eggs hatched, incubation period, and development time, longevity of female and fecundity on each cultivar were recorded. Each treatment was replicated 25 times.

Data Analysis

Prior to analysis, in order to correct for the heterogeneity of variance, all the data were log-transformed log(x+2). In the laboratory experiments, the data of the host feeding selection and the life cycle parameters of leafminer on canola cultivars were analyzed by one-way ANOVA, and the differences were compared by the Tukey's HSD test or Student-Newman-Keuls test (PROC ANOVA, SAS Institute 1999).

RESULTS

Host Feeding Selection

In the host feeding selection of leafminer, the lowest and highest number of punctures was significantly observed on Hyola401 and on Talayh, respectively. The number of punctures on Option500 and Zarfam was significantly higher than that on RGS003 and Opera (df= 5, 54; F= 34.05; P= 0.0001) (Table 1). The number of mines on Hyola401, RGS003 and Opera was significantly lower than that on Talayh. The number of mines on Zarfam and Option500 was moderate (df= 5, 54; F= 4.05; P= 0.0034) (Table 1).

Life Cycle Study

The life cycle parameters of leafminer reared on the five canola cultivars are summarized in Table 3. The incubation period of leafminer ranged from 2.41d to 2.82d and was not significantly different among the five canola cultivars (df= 4, 80; F= 0.92; P= 0.454) (Table 2).

The development time of larvae on Opera was significantly longer than that on Talayh and Zarfam. The development time of larvae on RGS003 and Hyola401 was significantly shorter than that on Opera, and was longer compare to that on Talayh and Zarfam (df= 4, 56; F= 15.47; P= 0.0001) (Table 2).

The development time of pupa was not significantly different among the five canola cultivars (df= 4, 46; F= 0.86; P= 0.49) (Table 2).

The longevity of female and male was not significantly different among the five cultivars (df= 4, 23; F= 2.4; P= 0.07 and df= 4, 18; F= 0.56; P= 0.69). The females reared on Opera had a significantly longer lifetime than those reared on Talayh and Zarfam. The females reared on RGS003 and Hyola401 was moderate lifetime among the five cultivars (df= 4, 23; F= 8.14; P= 0.0003). The males reared on RGS003, Hyola401 and Opera had a significantly longer lifetime than those reared on Talayh and Zarfam (df= 4, 18; F= 7.6; P= 0.0009) (Table 2).

The lifetime fecundity on Talayh and Zarfam was significantly higher compared to that on Opera and RGS003. The lifetime fecundity on Hyola401 was moderate among the five cultivars (df= 4, 46; F= 4.28; P= 0.005) (Table 2).

The egg-to-adult survival of leafminer was decreased in the following order: Talayh, Zarfam, Hyola401, RGS003 and Opera, respectively (Table 2).

The ratio of females that emerged in the development experiment was 0.54 on Talayh, 0.53 on Zarfam, 0.55 on RGS003, 0.56 on Hyola401 and 0.57 on Opera, respectively (Table 2).

DISCUSSION

In this study, the resistance of six canola cultivars to *Chromatomia horticola* was studied in the two following experiments: (1) host feeding selection and (2) life table study. In the host feeding selection experiments, the number of punctures and mines on Hyola401, RGS003 and Opera was significantly lower than that on Talayh. The canola cultivars with more feeding punctures and mines were more favored by females of leafminer. Therefore, Talayh was more favored and Opera was less favored by females of leafminer. It was reported that the number of feeding punctures and live larvae in mines in leaves was considered as an indicator of host feeding selection of *Liriomyza huidobrensis* (Blanchard) (Wolfenbarger, 1954; Wolfenbarger & Wolfenbarger, 1966; Zehnder & Trumble, 1985; Wei et al., 2000).

This study demonstrated that the type of canola cultivars had a significant effect on the development, survival and reproduction of leafminer. The development time, survivorship and fecundity of insects, reflects the suitability of the host plant (Smith, 1989; Panda & khush, 1995). However, the survival and lifetime fecundity of leafminer varied across cultivars of canola. In this study, development time was shorter and survival was higher in leafminer reared on Talayh than those reared on RGS003, Hyola401 and Opera. Moreover, our measurement of fecundity of leafminer reared on Talayh (80.15 eggs) and Zarfam (82.18 eggs) was higher than those reared on Opera (67.57 eggs), RGS003 (74.4 eggs) and Hyola401 (76.1 eggs). These results obtained in our study suggest that Talayh is the most suitable cultivar and Opera is the least suitable cultivars for *C. horticola*. The generation times of *Liriomyza trifolii* (Burgess) was reported 19d to 28d depending on host plant and temperature (Parrella et al., 1983; Leibee, 1984; Minkenberg, 1988; Capinera, 2008). However, to obtain further precise life-history parameters of *C. horticola*, we should study the effect of host plant leaf stages on the development and reproduction of *C. horticola*. Differences in the population growth rate of a pest reared on different host plants influence the effectiveness of using natural enemies such as biological control agents (Yano, 2004).

No study in the resistance of plant to *C. horticola* has been carried out. Host feeding selection of different species of leafminers was influenced by the differences in plant materials (Parrella et al., 1983; Carolina et al., 1992). Leafminers preferred to feed and deposit eggs on plants with high nitrogen content (Minkenberg & Fredrix, 1989; Minkenberg & Ottenheim, 1990). It was reported that distribution, density and length of leaf trichome affect the host selection of leafminers, the mobility and its feeding activities; high trichome density acts as a physical deterrent to *L. trifolli* (Fagoonee & Toory, 1983; Knodel-Montz et al., 1985; Alanerb et al., 1993). Whereas, Wei et al. (2000) were found that the density and length of leaf trichomes are not the main factors that influence the host feeding selection of *L. huidobrensis*. They concluded that the leaf physical structure, such as its thickness, thickness of the epidermis wall, densities of the palisade and spongy tissues, and so on, can play very important roles in the feeding and ovipositing by female leafminers and mining and development of larvae *L. huidobrensis*. Thickness of the epidermis wall most significantly correlated with host feeding selection by female *L. huidobrensis*, among characteristics of leaf tissue structure (Wei et al., 2000). The differences in these reported results may be due to the difference of the tested plant materials.

In this study, we conclude that Talayh is the most suitable and Opera is the least suitable host plant for *C. horticola*. These results can be used in integrated pest management.

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Table 1. Mean (±SE) number of punctures and mines of *Chromatomia horticola* on six canola cultivars.

Cultivar	The number of punctures per leaf	The number of mines per leaf
Talayh	16.9±1.02 a	1.9±0.22 a
Option500	14.4±1.06 b	1.2±0.44 ab
Zarfam	13.3±1.15 b	1.3±0.47 ab
RGS003	12.4±1.16 c	0.9±0.4 b
Opera	10.4±1.01 d	1±0.57 b
Hyola401	8.9±1.12 e	0.7±0.34 b

Means followed by the different letter within a column are significantly different (Tukey's HSD test; P<0.05)

Table 2. Mean (±SE) of life cycle parameters of *Chromatomia horticola* on five canola cultivars.

life cycle parameters	Talayh	Zarfam	RGS003	Hyola401	Opera
The incubation period (day)	2.41±0.35 a	2.53±0.44 a	2.64±0.55 a	2.76±0.58 a	2.82±0.57 a
The development time of larvae (day)	3.86±0.46 c	4.46±0.54 c	5.17±0.66 b	5.33±0.69 b	6.5±0.68 a
The development time pupa (day)	8.08±0.45 a	8.09±0.66 a	8.4±0.95 a	8.3±0.75 a	8.86±0.64 a
The longevity of female (day)	12.86±0.95 a	13.67±0.36 a	14.2±0.59 a	14.33±0.57 a	14.25±0.89 a
The lifetime of female (day)	27.43±1.2 c	28.67±0.96 bc	29.8±1.05 b	30.2±1.13 b	32.5±1.22 a
The longevity of male (day)	4.17±0.53 a	4±0.5 a	3.8±0.59 a	4±0.57 a	3.33±0.81 a
The lifetime of male (day)	22.5±0.97 b	23.8±1.26 b	26.4±1.54 a	27±0.58 a	28±1.87 a
The lifetime fecundity	80.15±6.7 a	82.18±4.6 a	74.4±4.41 b	76.1±3.2 ab	67.57±6.2 b
The total survival (%)	71	65	53	59	47
The female sex ratio	0.54	0.53	0.55	0.56	0.57

Means followed by the different letter within a row are significantly different (Student-Newman-Keuls test; P<0.05)

CIMICOMORPHA AND PENTATOMOMORPHA (HETEROPTERA) OF ALFALFA FROM MASHHAD AND VICINITY, NE IRAN

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ABSTRACT: The representatives of the insect order Heteroptera are active as pests or natural enemies on deferent agricultural crops. During 2006-2007, several sampling projects were conducted to identify active true bugs on Alfalfa in Mashhad and its environs (northeast Iran, Khorasan-Razavi province). In total, 34 species belonging to 24 genera and 8 families were identified. Among them *Orius niger* Wolff, 1804 (Anthocoridae) was the predominant species for Alfalfa fields in the studied area. In additional to the faunistic survey, distribution of all the species is reviewed.

KEY WORDS: Alfalfa, True Bugs, Heteroptera, Distribution, Predominant Species, Mashhad, Iran

Khorasan with an area of 315,686 km^2 is the largest region in Iran, located in its North East, and divided recently into three provinces: North Khorasan, Khorasan Razavi and South Khorasan. Khorasan Razavi Province (150,000 km^2) is situated between North and South Khorasan, also surrounded by Semnan and Yazd in the west, and Turkmenistan and Afghanistan in the east. From a climatic viewpoint, this province is placed in the Northern temperate zone. Mashhad County (ca. 992–1184 m above sea level) is as a center for this province.

Heteroptera fauna of Khorasan was so far studied and published by Modaress Awal (1993, 2008) and Linnavuori & Modaress Awal (1998, 1999a,b) in different regions and several hosts plants, but the reasearch was not focused on particular crops so far. The present research is thus focused on Alfalfa to determine species of pests and predatory bugs and their dominance in Mashhad County.

MATERIAL AND METHOD

The sampling of the material was performed by sweeping of the plants by insect net and the collected bugs were taken directly by forceps. Specimens were collected at 10 different localities: Esmailabad, Bozmarghi, Chenaran, Soran, Shabani, Shirhesar, Kazemabad, Golmakan, Fields of Astane Ghods and Agriculture field of Ferdowsi Unversity. For identifying the material the following papers by Anufriev et al. (1988), Pericart (1972, 1998), Kment & Jindra (2008), Safavi (1979) and Borror (1989) were used. The distributional of data are based on papers by Aukema & Rieger (2006), Study Khorasan fauna (Awal (1993, 1998, 2008), Linnavuori (2007a,b,c, 2008), Linnavouri & Awal (1998, 1999a,b), Hoberlandt (1954, 1984, 1995), China & Miller (1959), Erfanfar & Ostovan, (2002), Pour-Abad (2000) and Ghahari et al. (2009), as well as the insect collection of Agriculture College of the Ferdowsi University and material collected by the first author. All examined materials are preserved in the insect collection of Ferdowsi University.

RESULTS

In total, 34 species of 24 genera representing 8 families (i.e., Alydidae, Anthocoridae, Berytidae, Lygaeidae, Nabidae, Miridae, Pentatomidae, Rhopalidae) were collected from Mashhad and its vicinity. List of the species is given below.

SUBORDER CIMICOMORPHA
Anthocoridae Amyot and Serville, 1843
Anthocorinae Fieber, 1836

Anthocoris pilosus Jakovlev, 1877

Material examined: Bozmarghi, 3 spec., 25.VII.2006; Shirhesar, 2 spec., 12.IX.2007. **Distribution in Khorasan:** Anbaran of Mashhad, Kharg of Qouchan, Nodeh of Bojnord. **Distribution in Iran:** East Azarbaijan, Fars. **Range:**Widespread in Europe and Palaearctic Asia.

Orius niger Wolff, 1804

Material examined: Esmailabad, many spec., 12.VII.2006 & 18.V.2007; Soran, many spec., 14.VI.2006 & 15.VI.2007; Kazemabad, 8 spec., 13.VII.2007; Bozmarghi, many spec., 20.VII.2006 & 27.VI.2007; Shabani, many spec., 11.V.2007; Field of Astane Ghods, many spec., 17.IX.2007; Golmakan, many spec., 23.VI.2006 & 27.V.2007; Field of Agriculture college, many spec., 12.IX.2007; Shirhesar, many spec., 12.IX.2007; Chenaran, 4 spec., 14.VII.2006 & 1 spec., 27.V.2007. **Distribution in Khorasan:** Esfarayen, Shirvan, Ashkhaneh, Nodeh of Bujnord, Qouchan. **Distribution in Iran:** East Azarbaijan, Fras, Hamedan, Isfahan, Kermanshah, Kordestan, Markazi, Semnan, Tehran, West Azarbaijan.
Range: Widespread in Europe (from Great Britain to Russia), North Africa (Algeria, Egypt, Libya, Morocco, Tunisia), and Palaearctic Asia (from Turkey to India and China).

Orius horvathi Reuter, 1884

Material examined from alfalfa fields Shirhesar, 7 spec., 12.IX.2007; Golmakan, 1 spec., 23.VI.2006 & 2 spec., 27.V.2007; Field of Agricalture College, 4 spec., 17.IX.2007; Shabani, 3 spec., 7.IX.2007; Bozmargi, 1 spec., 20.VII.2006 & 2 spec., 31.VIII.2007; Field of Astane Ghods, many spec., 16.IX.2007; Esmailabad, many spec., 18.V.2007; Soran, 6 spec., 13.IV.2007; Kazemabad, 2 spec., 13.VII.2007. **Distribution in Khorasan:** Kharg of Qouchan, Nodeh of Bojnord.**Distribution in Iran:** Fars, Kerman. **Range:**Widespread in Europe (from France to Russia), Morocco, and Palaearcic Asia (from Turkey to China).

Nabidae Reuter, 1890
Nabinae Reuter, 1890

Nabis palifer Seidenstücker, 1954

Material examined: Field of Astane Ghods, 3 spec., 17.IX.2007; Field of Agricalture College, 2 spec., 17.IX.2007; Soran, 4 spec. 15.VI.2006 & 3 spec., 15.VI.2007. **Distribution in Khorasan:** Anbaran of Mashhad, Daragaz, Dehshor, Kashmar, Kharg of Qouchan, Lake Bazangam of Sarakhs, Lotfabad of Mashhad, Parvand of Sabzevar, Sazevar, Tabas, Zamansoofi of Bojnord, Mashhad. **Distribution in Iran:** Esat Azarbaijan, Fars, West Azarbaijan. **Range:**From the Balkan Peninsula and the Middle East to China.

Nabis pseudoferus Remane, 1949

Material examined: Field of Astane Ghods, 1 spec., 17.IX.2007; Soran, 6 spec., 15.VI.2007; Bozmargi, 1 spec., 27.VII.2007.; Shabani, I spec., 11.V.2007; Esmailabad, 1 spec., 20.IV.2007. **Distribution in Khorasan:** Golestan National Park of Bojnord, Golmakan and Torghabeh of Mashhad, Mashhad, Qouchan , Gadamgah of Nishabour. **Distribution in Iran:** East Azarbaijan. **Range:**European extending to Azerbaijan, Armenia, Turkey and Georgia.

Miridae Hahn, 1831
Mirinae Amyot and Serville, 1843

Adelphocoris lineolatus Goeze, 1778
Material examined: Golmakan, 6 spec., 23.VI.2006 & 1 spec., 27.V.2007; Bozmargi, 14 spec., 20.VII.2006 & 8 spec., 7.IX.2007; Field of Astane Ghods, many spec., 17.IX.2007; Field of Agriculture College, many spec., 17.IX.2007; Soran, many spec., 15.VI.2007; Shabani, 3 spec., 11.V.2007; Esmailabad, many spec., 18.V.2007; Kazemabad, 2 spec., 13.VII.2007, Chenaran, many spec., 4.VII.2006. **Distribution in Khorasan:** Bojnord, Golestan Park & Nodeh of Bojnord, Daragaz, Feyzabad, Kashmar, Khalkanlod & Kharg of Qouchan, Lotabad, Lake Bazangan, Mashhad, Torogh of Mashhad, Sabzevar, Sarakhs, Tabas, Esfarayen, Ashkhaneh, Jajrom, Shirvan. **Distribution in Iran:** General distribution. **Range:**Holopalaearctic.

Eurystylus bellevoyei Reuter, 1879
Material examined: Golmakan, 1 spec., 27.V.2007; Field of Astane Ghods, many spec., 17.IX.2007; Field of Agriculture College, many spec., 17.VIII.2007; Shirhesar, 2 spec., 12.VIII.2007; Bozmargi, many spec., 7.IX.2007; Kazemabad, many spec., 13.VII 2007. **Distribution in Khorasan:** Canchiroc of Tabas, Feyzabad, Shandiz of Mashhad. **Distribution in Iran:** Gilan, Kerman, Zanjan. **Range:**Eremian with a wide range in the Holomediterranean and Sudanese subregions.

Lygus gemellatus Herrich-Schaeffer, 1835
Material examined: Kazemabad, 2 spec., 13.VII.2007; Soran, 10 spec., 15.VI.2007; Chenaran, 8 spec., 4.VII.2006 & 7 spec., 27.V.2007. **Distribution in Khorasan:** Anbaran and Tous of Mashhad, Sarakhs, Mashhad, Fariman Bojnord. Golestan Park. Zaman Soofi & Nodeh, of Bojnord, Daragaz, Feyzabad, Kashmar, kalkan & khargh of Qouchan, Lake Bazangan of Sarakhs, Lotfabad, Sabzevar-Near Parand, Tabas, Zoshk of Shandiz. **Distribution in Iran:** Ardabil, East Azarbaijan, Gilan, Golestan, Mazandaran, Tehran. **Range:**Holopalaearctic.

Lygus pratensis Linnaeus, 1758
Material examined: Golmakan, many spec., 27.V.2007; Field of Astane Ghods, 4 spec., 17.IX.2007; Field of Agriculture College, 3 spec., 17.VIII.2007; Bozmarghi, 2 spec., 7.IX.2007; Shabani, many spec., 11.V.2007; Esmailabad, 9 spec., 18.V.2007; Soran, many spec., 15.VI.2007. **Distribution in Khorasan:** Golestan Park of Bojnord, Fariman, Mashhad, Shirvan, Sarakhs, Torghabeh, Zoshk and Tous of Mashhad. **Distribution in Iran:** Generally distributed. **Range:**Holopalaearctic.

Lygus rugulipennis Poppius, 1911
Material examined: Field of Astane Ghods, 1 spec., 17.IX.2007; Field of Agriculture College, 3 spec., 17.VIII.2007; Shirhesar, 1 spec., 12.IX.2007; Soran, many spec., 15.VI.2007; Chenaran, 2 spec., 27.V.2007; Kazemabad, 10 spec., 13.VII.2007; Esmailabad, 3 spec., 18.V.2007; Bozmargi, 1 ex, 20.VII.2006 & 1 spec., 7.IX.2007; Shabani, 2 spec., 11.V.2007. **Distribution in Khorasan:** Mashhad, Shirvan, Lake Bazangan, Khal Kanlod Lotfabad of Qouchan, Bojnord-Nodeh, Sarakhs, Zoshk of Shandiz. **Distribution in Iran:** Ardabil, East Azarbaijan, Hamedan, Golestan, Tehran, Zanjan. **Range:**Holopalaearcic.

Polymerus cognatus Fieber, 1858
Material examined: Field of Astan Ghods, 1 spec., 17.IX.2007. **Distribution in Khorasan:** Nodeh of Bojnord, Sabzevar. **In Iran provices**: Ardabil, Gilan, Golestan, Tehran, Zanjan. **Range:**Holopalaearctic.

***Polymerus vulneratus* Panzer, 1806**
Material examined: Field of Astane Ghods, 1 spec., 17.IX.2007; Field of Agriculture College, 2 spec., 17.VIII.2007; Chenaran, 8 spec., 4.VII.2006 & 6 spec., 27.V.2007; Esmailabad, many spec., 18.V.2007; Bozmargi, many spec., 7.IX.2007; Shabani, 8 spec., 11.V.2007; Soran, many spec., 14.VI.2006 & 15.VI.2007; Kazemabad, many spec., 13.VII.2007. **Distribution in Khorasan:** Daragaz, Lotfabad, Sarakhs, Bazangan of Mashhad. **Distribution in Iran:** Ardabil, East Azarbaijan, Gilan, Tehran, Zanjan**.** **Range:**Holopalaearctic.

***Stenodema turanicum* Reuter, 1904**
Material examined: Soran, 1 spec., 15.VI.2007. **Distribution in Khorasan:** Bojnord, Nodeh & Zamansoofi of Bojnord, Kharag of Qouchan, Zoshk near Shandiz, Tabas, Tous of Mashhad, Khangiran of Sarakhs. **Distribution in Iran:** Balouchestan, East Azarbaijan, Kerman, Markazi. **Range:**Bulgaria, Greece, Macedonia, South of Russia, Middle East including Iraq extending to central Asia, Mongolia and China.

Phylinae Douglas and Scott, 1865

***Campylomma diversicornis* Reuter, 1878**
Material examined: Field of Astane Ghods, 1 spec., 17.IX.2007**. Distribution in Khorasan:**Tabas, Chirco & Dehshor of Tabas, Feyzabad, Lotfabad, Sabzevar, Paevand of Sabzevar, Sarakhs. **Distribution in Iran:** Widespread. **Range:**Bulgaria, Greece, Middle East, including Iraq, Israel, Saudi Arabia, extending to central Asia, China and Pakistan.

***Campylomma verbasci* Meyer-Dür, 1843**
Material examined: Field of Astane Ghods, 4 spec., 17.IX.2007; Chenaran, 8 spec., 27.V.2007; Shabani, 5 spec., 11.V.2007; Esmailabad, 8 spec., 12.VII.2006 & 5 spec., 18.V.2007; Bozmarghi, 3 spec., 7.IX.2007; Shirhesar, 2 spec., 12.IX.2007; Golmakan, 7 spec., 27.V.2007. **Distribution in Khorasan:** Bojnord, Zaman Soofi, Nodeh & Zard of Bojnurd, Khalkanlod of Qouchan, Feyzabad, Tabas. **Distribution in Iran:** Ardabil, Gilan, Khuzestan, Tehran, Zanjan, West Azarbaijan. **Range:**Holoarctic.

Deraeocorinae Douglas and Scott, 1865

***Deraeocoris punctulatus* Fallen, 1807**
Material examined: Field of Astane Ghods, many spec., 17.IX.2007; Shirhesar, 3 spec., 12.IX.2007; Kazemabad, 2 spec., 13.VII.2007; Field of Agriculture Collage, 1 spec., 17.VIII.2007; Shabani, many spec., 11.V.2007; Chenaran, many spec., 27.V.2007; Soran, many spec., 15.VI.2007. **Distribution in Khorasan:** Nodeh of Bojnord, Daragaz, Tabas , Dehshor of Tabas, Feyzabad, Khalkanlod of Qouchan, Zaman Soofi, Sazevar, Hesar and Torogh of Mashhad. **Distribution in Iran:** Ardabil, Gilan, Fars, Isfahan, Tehran, Zanjan. **Range:**Euro-Siberian.

***Deraeocoris serenus* Douglas-Scott, 1868**
Material examined: Field of Astane Ghods, 2 spec., 17.IX.2007; Soran, 3 spec., 15.VI.2007; Esmailabad, 1 spec., 18.V.2007; Chenaran, 1 spec., 27.V.2007; Shabani, 2 spec., 11.V.2007; Kazemabad, many spec., 13.VII.2007. **Distribution in Khorasan:** Bojnord, Nodeh of Bojnord, Daragaz, Kashmar, Khalkanlood & Kharag of Qouchan, Lotfabad, Sabzevar, Parand of Sabzevar, Tabas, Shandiz and Torogh of Mashhad. **Distribution in Iran:** Generally distributed. **Range:**Holomediterranean.

SUBORDER PENTATOMOMORPHA

Berytidae Fieber, 1851
Metacanthinae Douglas and Scott, 1865

Metacanthus meridionalis Costa, 1843

Material examined: Field of Agriculture College, 1 spec., 17.IX.2007. **Distribution in Khorasan:** Mashhad. **Distribution in Iran:** Gilan. **Outside Iran**: North-Mediterranean, extending to Middle East and Middle Asia.

Lygaeidae Schilling, 1829
Geocorinae Stål, 1862

Geocoris arenarius Jakovlev, 1867

Material examined: Field of Astane Ghods, 3 spec., 17.IX.2007. **Distribution in Khorasan:** Gezel Hesar of Chenaran, Akhlamad of Mashhad. **Distribution in Iran:** Ardabil. **Range:**in Europe. Italy, Hungary, Romania, Ukraine, South Russia and Ghafghaz.

Geocoris megacephalus Rossi, 1790

Material examined: Field of Astane Ghods, 1 spec., 17.IX.2007. **Distribution in Khorasan:** Sharif Abad & Akhlamad of Mashhad. **In Iran Province:** Gilan, Golestan, Tehran, Zanjan. **Range:**Holomediterranean, extending to the Middle East and Middle Asia.

Orsillinae Stål, 1872

Nysius cymoides Spinola, 1837

Material examined: Bozmarghi, 1 spec., 7.VIII.2007; Shirhesar, 2 spec., 12. VII.2007. **Distribution in Khorasan:** Gazi of Bojnord, Hakim Abad of Chenaran, Sharif Abad of Mashhad, Khangiran of Sarakhs. **Distribution in Iran:** Ardabil, Gilan, Golestan, Mazandaran, Semnan, Tehran, Zanjan. **Range:**Holomediterranean, extending to Central Europe, the Middle Asia and Sudan.

Oxycareninae Stål, 1862

Leptodemus minutus Jakovlev, 1876

Material examined: Field of Astane Ghods, 3 spec., 17.IX.2007. **Distribution in Khorasan:** Nasrabad of Torbate Jam, Mashhad. **Distribution in Iran:** Tehran, Gilan, Zanjan, Kerman. **Range:**South Europe, Middle East, Middle Asia, Sudan.

Alydidae Amyot and Serville, 1843
Alydinae Amyot and Serville, 1843

Camptopus lateralis Germar, 1817

Material examined: Field of Agriculture College, 1 spec., 12.IX.2007; Soran, 2 spec., 15.VI.2006 & 1 spec., 13.VIII.2007; Field of Astane Ghods, 1 spec., 17.IX.2007. **Distribution in Khorasan:** Fariman, Mashhad, Shandiz and Tous of Mashhad, kuhe Hezar masjed of Kalate Naderi, Gadamgah of Neishabour, Dolatabad of Sarakhs. **Distribution in Iran:** Ardabil, Baluchestan, East Azarbaijan, Fars, Gilan, Golestan, Khozestan, Markazi, Mazandaran, Semnan, Tehran, Zanjan. **Range:**Holomediterranean, extending to central Europe, the Middle East, Middle Asia and the Oriental region.

Rhopalidae Amyot and Serville, 1843
Rhopalinae Amyot and Serville, 1843

Brachycareus tigrinus Schilling, 1829

Material examined: Soran, 1 spec., 13.VIII.2007. **Distribution in Khorasan:** Hakimabad of Chenaran, Fariman, Akhlamad-Delbaran & Golmakan of Mashhad, Nishabour. **Distribution in Iran:** Ardabil, Gilan, Golestan, Mazandaran, Tehran, Zanjan. **Range:**Holarctic.

Liorhyssus hyalinus Fabricius, 1794

Material examined: Soran, 8 spec., 14.VI.2006 & 10 spec., 15.VI.2007; Field of Astane Ghods, 1 spec., 17.IX.2007; Kazemabad, 1 spec., 13.VII.2007; Esmailabad, 2 spec., 18.V.2007; Golmakan, many spec., 27.V.2007. **Distribution in Khorasan:** Gouch Galeh of Bojnord, Najaf Abad of Qouchan. **Distribution in Iran:** Ardabil, East Azarbaijan, Gilan, Golestan, Semnan, Tehran, Zanjan. **Range:**Pontomediterranean.

Rhopalus parumpunctatus Schilling 1829

Material examined: Soran, 2 spec., 13.IV.2007; Golmakan, 1 spec., 27.V.2007. **Distribution in Khorasan:** Mashhad. **Distribution in Iran:** Ardabil, East Azarbaijan, Gilan, Golestan, Semnan, Tehran, Zanjan. **Range:**Holopalaearctic.

Pentatomidae Leach, 1815
Pentatominae Amyot and Serville, 1843

Eysarcoris ventralis Westwood, 1837

Material examined: Field of Agricalture College, 2 spec., 12.IV.2007; Soran 4 spec. 15.VI.2006. **Distribution in Khorasan:** Bajgiran, Mashhad, Akhlamad of Mashhad, Nishabour, Najafabad of Qouchan, Shirvan. **Distribution in Iran:** Ardabil, Gilan, Golestan, Kerman, Markazi, Mazandaran, Semnan, Tehran, Zanjan. **Range:**Mediterranean origin, extending to Central Europe, the Middle East, Central Asia and far into the Oriental and Ethiopian regions.

Aelia acuminata Linnaeus, 1758

Material examined: Soran, 4 spec., 15.VI.2006 & 13.IV.2007. **Distribution in Khorasan:** Radkan of Chenaran, Anbaran and Torogh of Mashhad, Mashhad, Dolat Abad-Lake Bazangan of Sarakhs, Tabas, Daregaz, Golestan park of Bojnord. **Distribution in Iran:** Ardabil, East Azarbaijan, Esfahan, Fars, Gilan, Golestan, Kerman, Kermanshah, kuordestan, Lorestan, Mazandaran, Tehran, West Azarbaijan, Zanjan. **Range:**Turkey, Azerbaijan, Armenia, Iraq and Central Asia.

Eurydema ventralis Kolenati, 1846

Material examined: Field of Agriculture College, 1 spec., 17.VIII.2007. **Distribution in Khorasan:** Mashhad. **Distribution in Iran:** East Azarbaijan. **Range:**Central and South Europe, North of Africa, Middle East including Iraq, Afghanistan, China.

Eurydema ornatum Linnaeus, 1758

Material examined: Golmakan, 3 spec., 27.V.2007; Bozmarghi, 1 spec., 7.IX.2007; Chenaran, 2 spec., 4.VII.2006. **Distribution in Khorasan:** Ghazi of Bojnord, Daregaz, Fariman, Zoshk of Mashhad, Darroud of Neishabour, Shirvan. **Distribution in Iran:** Ardabil, East Azarbaijan, Fars, Gilan, Golestan, kerman, Ilam, Mazandaran, Tehran, West Azarbaijan, Zanjan. **Range:**Holopalaearctic, extending to Ethiopia, India, and Pakistan.

Dolycoris baccarum Linnaeus, 1758

Material examined: Golmakan, 2 spec., 27.V.2007; Soran, 1 spec., 13.IV.2007; Chenaran, 3 spec., 4.VII.2006. **Distribution in Khorasan:** Ashkhaneh of Bojnord, Daregaz, Delbaran of Mashhad, Shandiz of Mashhad, Golshan of Neishabour, Hasanabad of Qouchan, Lotfabad of Sabzevar, Gonbadli of Sarakhs, Ziyarat of Shirvan, Torbate Jam. **Distribution in Iran:** Ardabil, East Azarbaijan, Fars, Isfahan, Gilan, Golestan, Tehran, West Azarbaijan, Zanjan. **Range:**Holopalaearctic, also in India and Pakistan.

Dolycoris penicillatus Horvath, 1904

Material examined: Golmakan, 1 spec., 27.V.2007; Field of Agricalture College, 1 spec., 12.IV.2007. **Distribution in Khorasan:** Bildar of Mashhad, Golmakan of Mashhad, Golshan of Neishabour, Farouj of Qouchan, Bojnord, Dolatabad of Sarakhs. **Distribution in Iran:** Ardabil, Bushehr, East Azarbaijan, Chahar Mahal, Fars, Ghazvin, Hormozgan, Isfahan, Kermanshah, Kerman, Kohkiloye & Boyeir Ahmad, Khuzestan, Lorestan, Markazi, Semnan, Sistan & Baluchestan, Tehran, Yazd. **Range:**Middle-Asian from Afghanistan, Kazakhstan, Kirgizia, Tadzhikistan, Turkmenistan, Uzbekistan, and China.

***Holcostethus strictus* Fieber, 1803**
Material examined: Bozmarghi, 1 spec., 27.VII.2007
Distribution in Khorasan: Golkhandan of Daregaz, Delbaran-Vakilabad of Mashhad, Jafarabad of Qouchan, Norouzabad of Sarakhs.
Distribution in Iran: Ardabil, East Azarbaijan, Kerman.
Range: The Middle East.

***Carpocoris coreanus* Distant, 1899**
Material examined: Kazemabad, 2 spec., 13.VII.2007; Shabani, 2 spec., 11.V.2007; Soran, 2 spec., 15.VI.2007; Field of Astane Ghods, 1 spec., 17.IX.2007; Chenaran, 2 spec., 4.VII.2006. **Distribution in Khorasan:** Hakimabad of Chenaran, Fariman, Anbaran Sofla-Jagharg of Mashhad, Neishabour, Darroud of Neishabour, Hasanabad of Qouchan, Soltanabad of Sabzevar, Sarakhs, Shirvan, Ziyarat of Shirvan, Birjand. **Distribution in Iran:** Ardabil, East Azarbaijan, Gilan, Semnan, Tehran, Zanjan. **Range:**Eastern Palaearctic Asia, extending to southern Russia, the Middle East and Pakistan.

DOMINANCE

Based on statistic computations *Orius niger* Wolff, 1804 (Anthocoridae) resulted as the predominant species for Alfalfa fields in the studied area. Also *Adelphocoris lineolatus* Goeze, 1778 (Miridae) is a principal pest for Alfalfa between collected materials.

***Orius niger* Wolff, 1804 (Anthocoridae)**

Very small species, length 1.7-2.3 mm. Pronotum with narrow collar. Tibia without fossula spongiosa, circularly curved. Shiny black, antenna yellowish, 1st segment black. Hemelytra yellowish-brown, with cuneus and apical margin of corium black.

Membrane yellowish, femora, middle and hind tibiae black, fore tibiae and apices of fore femora pale yellowish. Antennae in male incrassate, in female gracile. Posterior lobe of pronotum fine punctate. (Adapted from Linnavouri & Hosseini, 2000).

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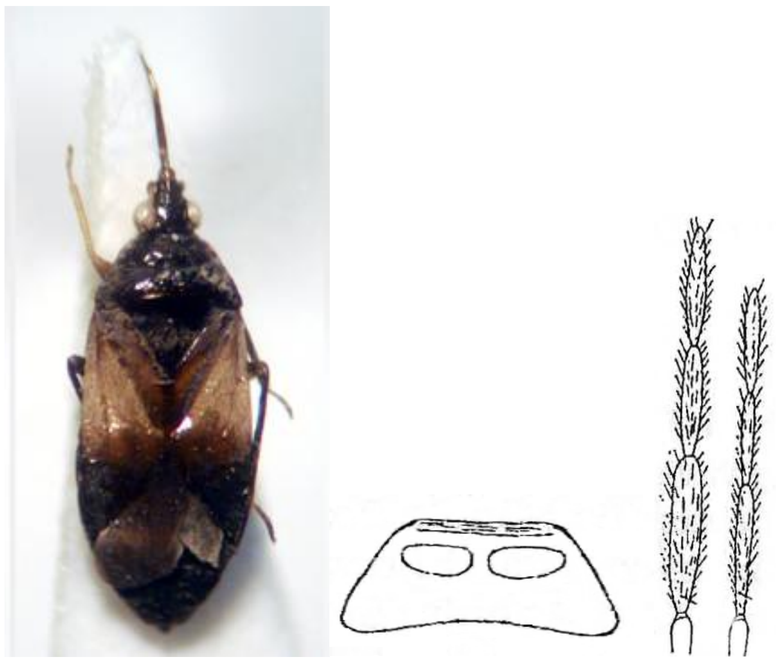

A **B** **C**

Figure 1. *Orius niger* Wolff, 1804 A. Original photo, B. Pronotum, C. Antenna in male and female.

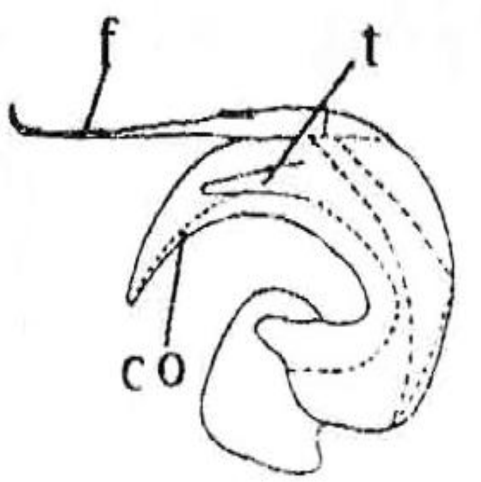

Figure 2. Style: (CO=Conical Process, t=tooth, f=flagellum) (After Pericart 1972).

SUBSTITUTE NAMES FOR THREE PALAEARCTIC FLY GENUS GROUP NAMES (DIPTERA: LIMONIIDAE AND DOLICHOPODIDAE)

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[Özdikmen, H. 2010. Substitute names for three Palaearctic fly genus group names (Diptera: Limoniidae and Dolichopodidae). Munis Entomology & Zoology, 5 (1): 262-265**]**

ABSTRACT: Three junior homonyms were detected among dipter genera and the following replacement names are proposed: *Neopelosia* nom. nov. for *Pelosia* Rondani, 1856 (nec Hübner, [1819]), *Hoplobasis* (*Novolunaria*) nom. nov. for *Hoplobasis* (*Lunaria*) Savchenko, 1982 (nec Fabricius, 1823; non Gray, 1847; non Jin et al., 1979) and *Sphyrotarsus* (*Ozmena*) nom. nov. for *Sphyrotarsus* (*Takagia*) Negrobov, 1973 (nec Matsumuro, 1942; non Tang, 1984). Accordingly, new combinations are herein proposed for the species currently included in these genus group: *Neopelosia albifrons* (Rondani, 1856) comb. nov., *Hoplobasis* (*Novolunaria*) *amselina* (Nielsen, 1961) comb. nov., *Hoplobasis* (*Novolunaria*) *idiophallus* (Savchenko, 1973) comb. nov. and *Sphyrotarsus* (*Ozmena*) *stackelbergi* Negrobov, 1965 comb. nov..

KEY WORDS: nomenclatural changes, homonymy, replacement names, Limoniidae, Dolichopodidae, Diptera, new combinations.

In an effort to reduce the number of homonyms in Diptera, I found three genus group taxa whose names had been previously published for other taxa, making them junior homonyms. In accordance with the International Code of Zoological Nomenclature, I propose substitute names for these genus group names.

Family LIMONIIDAE
Genus *NEOPELOSIA* nom. nov.

Pelosia Rondani, 1856. Dipt. ital. Prodr., 1, 185. (Diptera: Nematocera: Tipuloidea: Limoniidae: Limoniinae). Preoccupied by *Pelosia* Hübner, [1819]. Verz. bekannt. Schmett., (11) 165. (Lepidoptera: Noctuoidea: Arctiidae: Lithosiinae).

Remarks on nomenclatural changes:

The name *Pelosia* was initially introduced by Hübner [1819] for a moth genus (with the type species *Phalaena muscerda* Hufnagel, 1766 by original monotypy from India, Assam). It is still used as a valid genus name. It has one generic synonym as *Menexus* Brunner von Wattenwyl, 1893. It has twelve species (including the type species) now as *Menexenus adveniens* Brunner von Wattenwyl, 1907; *M. batesii* (Kirby, 1896); *M. fruhstorferi* Brunner von Wattenwyl, 1907; *M. lacertinus* (Westwood, 1848); *M. nudiusculus* Hausleithner, 1992; *M. obtuselobatus* Brunner von Wattenwyl, 1907; *M. obtusespinosus* Sinéty, 1901; *M. perdentatus* Brunner von Wattenwyl, 1907; *M. quadrilobatus* Brunner von Wattenwyl, 1907; *M. rotunginus* Giglio-Tos, 1914; *M. semiarmatus* (Westwood, 1848) and *M. tenmalainus* Günther, 1938.

Subsequently, Rondani (1856) described a new limoniids genus (with the type species *Pelosia albifrons* Rondani, 1856 from Italy) under the same generic name.

It is also still used as a valid genus name. It has no any generic synonym. It is monotypic genus now.

Thus, the genus *Pelosia* Rondani, 1856 is a junior homonym of the genus *Pelosia* Hübner, [1819]. According to Article 60 of the International Code of Zoological Nomenclature, I propose for the genus *Pelosia* Rondani, 1856 the new replacement name *Neopelosia* **nom. nov.**

Etymology: from the Latin prefix "-neo" (meaning in English "new").

Summary of nomenclatural changes:

Neopelosia **nom. nov.**
pro *Pelosia* Rondani, 1856 (nec Hübner, [1819]).

Neopelosia albifrons (Rondani, 1856) **comb. nov.**
from *Pelosia albifrons* Rondani, 1856
Distribution: Italy [Westpalaearctic].

Genus *HOPLOBASIS* Osten Sacken, 1869
Subgenus *NOVOLUNARIA* nom. nov.

Lunaria Savchenko, 1982. Fauna Ukraini 14 (3): 182. (Diptera: Nematocera: Tipuloidea: Limoniidae: Chioneinae: *Hoplobasis*). Preoccupied by *Lunaria* Fabricius, 1823. Fortegnelse, 93. (Mollusca: Gastropoda).

Remarks on nomenclatural changes:

Savchenko (1982) described the limoniids subgenus *Lunaria* in the genus *Ilisia* Rondani, 1856 with the type species *Ilisia idiophallus* Savchenko, 1973 from West Palaearctic region. It is still used as a valid subgenus name of the genus *Hoplobasis* Osten Sacken, 1869. It has no any generic synonym. It has two species (including the type species) now.

Two additional homonyms have been noticed until now. *Lunaria* Gray, 1847 which is a lapsus for a bivalve genus *Lunarca* Gray, 1842. *Lunaria* Jin, Sun, Ye, 1979 which was a triassic rhynchonellides genus in Brachiopoda. Jin et al. (1997) replaced it with a new name *Lunarhynchia* as a junior homonym.

Since, the generic names were already preoccupied by a molluscan genus also called *Lunaria* by Fabricius (1823).

Thus, the genus group name *Lunaria* Savchenko, 1982 is a junior homonym of the generic name *Lunaria* Fabricius, 1823. According to Article 60 of the International Code of Zoological Nomenclature, I propose a new replacement name *Novolunaria* **nom. nov.** for *Lunaria* Savchenko, 1982.

Etymology: from the Latin word "novus" (meaning in English "new").

Summary of nomenclatural changes:

Genus *Hoplobasis* Osten Sacken, 1869

Subgenus *Novolunaria* **nom. nov.**
pro *Lunaria* Savchenko, 1982 (nec Fabricius, 1823; non Gray, 1847; non Jin et al., 1979)

Hoplobasis (*Novolunaria*) *amselina* (Nielsen, 1961) **comb. nov.**
Syn.: *Hoplolabis (Lunaria) amseliana* (Nielsen, 1961)

Erioptera amseliana Nielsen, 1961
Distribution: Armenia, Turkmenistan, Tajikistan, Kirgizia, Afghanistan [Westpalaearctic and Eastpalaearctic].

Hoplobasis (*Novolunaria*) *idiophallus* (Savchenko, 1973) **comb. nov.**
Syn.: *Hoplolabis (Lunaria) idiophallus* (Savchenko, 1973)
Ilisia idiophallus Savchenko, 1973
Distribution: Bulgaria, Romania, Slovakia, Switzerland, Ukraine (Carpathians) [Westpalaearctic].

Family DOLICHOPODIDAE
Genus *SPHYROTARSUS* Mik, 1874
Subgenus *OZMENA* nom. nov.

Takagia Negrobov, 1973. Zool. Zh. 52: 1520. (Diptera: Brachycera: Dolichopodidae). Preoccupied by *Takagia* Matsumura, 1942. Insecta matsum., 16, 83. (Hemiptera: Cercopoidea: Aphrophoridae).

Remarks on nomenclatural changes:

Negrobov (1973) described the long-legged flies subgenus *Takagia* in the genus *Sphyrotarsus* Mik, 1874 with the type species *Sphyrotarsus stackelbergi* Negrobov, 1965 by monotypy and original designation from Shugnan, river Gunt, Khorog, Gorno-Badakhshan region, Tajikistan. It is still used as a valid subgenus name of the genus *Sphyrotarsus* Mik, 1874. It has no any generic synonym. It is monotypic subgenus now.

An additional homonym has been noticed until now. *Takagia* Tang, 1984 which was a scale insects genus in the family Diaspididae (Hemiptera: Coccoidea). Ben-Dov in Ben-Dov & German (2003) replaced it with a new name *Sadaotakagia* as a junior homonym.

Since, the generic names were already preoccupied by an monotypic aphrophorid genus also called *Takagia* by Matsumuro (1942) with the type species *Takagia lugubris* (Lethierry, 1876). It is still used as a valid genus name in the family Aphrophoridae (Hemiptera: Cercopoidea).

Thus, the genus group name *Takagia* Negrobov, 1973 is a junior homonym of the generic name *Takagia* Matsumuro, 1942. According to Article 60 of the International Code of Zoological Nomenclature, I propose a new replacement name *Ozmena* **nom. nov.** for *Takagia* Negrobov, 1973.

Etymology: This name is dedicated to my student Tuğçe Özmen (Turkey).

Summary of nomenclatural changes:

Genus *Sphyrotarsus* Mik, 1874
= *Hydrobius* Oldenberg, 1916 (nomen nudum)
Type species: *Sphyrotarsus argyrostomus* Mik, 1874 (by monotypy)

Subgenus *Sphyrotarsus* Mik, 1874

Sphyrotarsus (*Sphyrotarsus*) *argyrostomus* Mik, 1874
Distribution: Austria, France, Switzerland, Italy [Westpalaearctic].

Sphyrotarsus (*Sphyrotarsus*) *caucasicus* Negrobov, 1965
Distribution: Russia [Palaearctic].

Sphyrotarsus (*Sphyrotarsus*) *hervebazini* Parent, 1914
Distribution: France, Switzerland [Westpalaearctic].

Sphyrotarsus (*Sphyrotarsus*) *hessei* Parent, 1914
Distribution: France, Italy [Westpalaearctic].

Sphyrotarsus (*Sphyrotarsus*) *hygrophilus* Becker, 1891
Distribution: Austria, France, Switzerland [Westpalaearctic].

Sphyrotarsus (*Sphyrotarsus*) *parenti* Hesse, 1933
Distribution: France [Westpalaearctic].

Subgenus *Ozmena* **nom. nov.**
pro *Takagia* Negrobov, 1973 (nec Matsumuro, 1942; non Tang, 1984).

Sphyrotarsus (*Ozmena*) *stackelbergi* Negrobov, 1965 **comb. nov.**
from *Sphyrotarsus* (*Takagia*) *stackelbergi* Negrobov, 1965
Sphyrotarsus stackelbergi Negrobov, 1965
Distribution: Tajikistan [Palaearctic].

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MORPHOLOGICAL DIFFERENCES IN METATHORACIC GLANDS OF DIFFERENT POPULATIONS OF SUNN PEST, *EURYGASTER INTEGRICEPS* PUT. (HETEROPTERA: SCUTELLERIDAE)

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[Hassani, S., Pour Abad, R. F., Fazel, M. M. & Mohammadi, D. 2010. Morphological differences in metathoracic glands of different populations of Sunn Pest, *Eurygaster integriceps* Put. (Heteroptera: Scutelleridae). Munis Entomology & Zoology, 5 (1): 266-269**]**

ABSTRACT: Metathoracic scent glands could only be observed in adults of Heteroptera. These glands are located between metathoracic legs which pour open near leg's coxa. Reservoirs are the main part of glands. Metathoracic scent glands of *E. integriceps* have an orange median reservoir and two colorless secretory tubules that their secretions directly release to median reservoir. Wave shaped accessory glands can be observed on the median reservoir. Dimension of glands directly relates with rate of secretion. Morphological characters of active and hibernating populations of sunn pest scent glands were studied in collected populations from Hamedan and Tabriz. After dissection scent gland dimension was measured by micrometer. Width and length of glands in widest and longest region were measured. Mean dimension of scent glands in active populations of Hamedan and Tabriz were 2.58±0.049 and 2.6±0.083 mm in males and 2.47±0.083 and 2.45±0.102 mm in females respectively. Also these dimensions in males of Hamedan and Tabriz overwriting Populations were 2.75±.088 and 2.79±0.082 mm and in females were 2.7±0.07 and 2.69±0.076 mm. Statistical analysis showed no significant differences in male and female glands dimension of each population. Glands dimension in active and Hibernating populations differed significantly ($p<0.05$).

KEY WORDS: Metathoracic gland, Sunn Pest, *Eurygaster integriceps*

The scent glands in true bugs consist of integument similar in basic structure to that forming the body wall (Staddon, 1972). The scent glands are named depending on their position in the body, for example dorso-abdominal and metathoracic glands (Aldrich, 1988). The scent glands can be found in nymphs and also in adults of some families of true bugs. In nymphs these glands located in abdominal segments with opening to dorsal and named dorso-abdominal glands but metathoracic scent glands could be only observed in adults of heteroptera (Durak and Kalendar,(b and c) 2007). These glands are located between the metathoracic legs which pour open near the leg's coxa. Reservoirs are the main part of glands. The adult scent gland complex of both males and females consists of a median ventral metathoracic scent reservoir, which is orange-yellow in color, and paired colorless lateral glands sometimes called accessory glands. The lateral glands discharge through ducts into the reservoir, which also receives secretions from the gland cells which form its epithelium. The glands open to the exterior on the ventral surface (Zarbin et al., 2000). Scent gland function in bugs in different literatures has been investigated and defence against predators and microorganisms, specific patterns of behavior including alarm, aggregation and mating or sexual behaviour are examples of these functions (Staddon, 1979).

Dimension of glands directly relates with the rate of secretion activity. In this study size of metathoracic scent glands of male and female insects in active and hibernating populations from two different places in Iran were studied.

MATERIAL AND METHODS

Adult insects were collected from Hibernating and activation places from Hamedan and Tabriz. Insects reared on wheat until dissection. An adult *E. integriceps* was pinned in a Petri dish with the dorsal side up. Anesthetized insects were used for dissection. The dissection process consisted of cutting the dorsal abdominal edges of the insect cuticle up to the metathoracic region and under the scutelum. The dorsal abdominal cuticle was pulled back and the viscera were removed. The scent gland complex, located at the ventral abdominal metathoracic region, could be reached. Calibrated micrometer located on a stereomicroscope was used and the width and length of scent glands were recorded. Male and female insects in both active and hibernating populations were studied separately. Data analysis was carried out with MSTAT-C software and the means compared using Duncan's multiple tests.

RESULTS AND DISCUSSION

Average scent glands dimension for active and Hibernating population of Hamedan were 2.47±0.083 and 2.70±0.07 mm for female and 2.58±0.049 and 2.75±0.088 mm for male insects. Also these measurements for active and Hibernating population of Tabriz were 2.45±0.102 and 2.69±0.076 mm for female and 2.6±0.083 and 2.79±0.082 mm for male insects respectively. Data analysis (Table 1) showed that, differences between metathoracic scent glands dimension in male and female insects were not significant. But in male insects in both populations the MSG dimension was more than females (Fig. 1). About populations, the results indicated that, there were significant differences in active and hibernating populations of both sampling places (Tabriz and Hamedan). In hibernating individuals dimension of metathoracic scent glands were more than the active ones (Fig. 1).

The same dimension of scent glands in male and female insects was observed by Aldrich et al. (1978). They showed that in *nezara viridula*, in both sexes scent glands are small an equal in size. But in other studies dimension of male and female scent glands were different. Farshbaf and Atalay (1993) studied the dimension of *Eurydema ornatum* sent glands. They showed that in male and female insects differences in width and length of scent glands was significant and male insects have larger scent glands. In another study these reserchers studied *Eurydema ventral* metathoracic scent glands and showed that differences in MSG dimension in male and female insects were significant (Farshbaf and Atalay 1994).

Differences in quality and quantity of MSG composition were investigated by researchers. Durak and Kalender (2007 a), showed that in *Eurygaster maura* some compounds only in male or female insects are detectable. About the same compounds in some cases quantity of them differs in male and female insects. Results of this study showed some differences in male and female MSG dimension, although the differences were not statistically significant. Male insects in both populations have larger MSG. Borges et al. (2001), studied diapause morph of *Euschistus servus* and showed that some compounds in active and diapause morph of this bug are different. There is a compound that presents only in active morph. If we suggest that the dimension of MSG is related with its secretion activity there should be differences in active and hibernating also in male and female insects of sunn pest. This is because male and female insects and also active and non active populations have different ecological behaviours and their need for some responses to environmental conditions are different.

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Table 1. Data analysis of MSG dimension of *E. integriceps*.

SOV	df	SS	MS	F
Sex	1	0.338	0.338	2.606^{ns}
Population	3	1.459	0.486	3.754*
Sex×Population	3	0.075	0.025	0.192^{ns}
error	152	19.695	0.130	
Total	159	21.567		

Ns: non significant, *: significant in 0.5% level

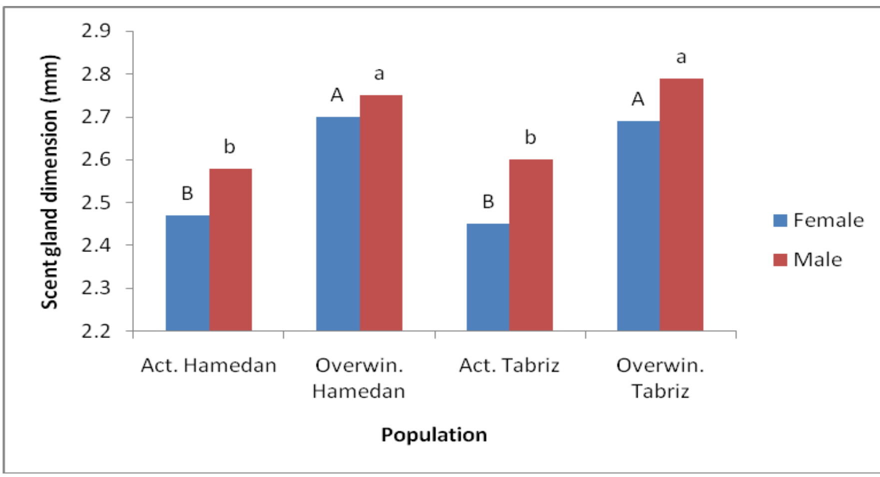

Figure 1. Metathoracic scent glands dimension in male and females of active and Hibernating populations of *E. integriceps*.

INTRODUCTION TO HOVER FLIES (DIPTERA: SYRPHIDAE) OF SUNFLOWER AND PUMPKIN FIELDS IN WEST AZERBAYJAN PROVINCE- IRAN

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[Khaghaninia, S. Jafarlu, M., Khiaban, N. G. & Askari, O. 2010. Introduction to hover flies (Diptera: Syrphidae) of sunflower and pumpkin fields in West Azerbayjan province-Iran. Munis Entomology & Zoology, 5 (1): 270-277**]**

ABSTRACT: In order to study hover flies in sunflower and pumpkin fields as well as grasslands of Khoy region in Iran, this study was carried out during 2008- 2009. The specimens were collected using malaise trap and hand net in fourteen localities. Among of 653 collected specimens, 44 species belonged to 25 genera and two subfamilies were verified that all of them are as new records for studied area and two species, *Cheilosia proxima* and *Cheilosia Sahlbergi*, are new records for Iran fauna.

KEY WORDS: Fauna, Khoy region, hover flies, flower flies, pollinator, Syrphidae.

Khoy region, with an area of 5548 Square kilometers, located in north west of Iran, is the most important center for roasted seed including sunflower seed and pumpkin seed as well as honey production in terms of quality and quantities in Iran. Syrphidae is one of the largest families of the order Diptera, which comprises the popularly called hover flies or flower flies. Among many interesting attributes is their famous precision at hovering. They have the ability to keep the body motionless in the air for quite a period of time during flight. This is the most significant character of these flies, coupled usually with their yellow banded abdomens. The adults commonly visit flowers (Kevan & Baker 1983) and use the nectar for energy and/or pollen for proteins, lipids and vitamins (Faegri & van der Pijl, 1979 and Saribiyik, 2003). These floral resources enhance the longevity and fecundity of adult flies (Topham and Beardsley, 1975). These flies are common pollinators almost wherever flowers are found, being absent only in truly arid areas and the Polar Regions. For this reason, it can be predictable that these pollinator species have a striking role in producing seed and honey in this area. Recently, the fauna of syrphid has been studied by the related taxonomists as well in Iran (Modarres Awal, 1997, Khiaban et al. 1998, Dousti, 1999, Gharali et al. 2000, Alichi et al. 2002, Gharali et al. 2002, Goldasteh et al. 2002, Sadeghi et al. 2002, Golmohammadi & Khiaban, 2004, Gilasian, 2005). Checklists of Iranian hover flies were listed by Peck (1988) and Dousti & Hayat (2006). Unfortunately, so far the syrphid fauna of this region has not been well known thus it is the subject of the present study.

MATERIAL AND METHODS

Studied specimens were collected once a week, during 2008- 2009. Flies were caught using sweeping entomological net and malaise trap in fourteen localities which are situated near the sunflower and pumpkin fields as well as grasslands (Fig. 1). The collected specimens were placed in ordinary paper envelopes after killing them in cyanid bottle in order to bring them to the laboratory. The collection thus brought was placed in a desiccator (having water at its bottom) for about 24 h in order to soak and soften them. Thereafter, they were pinned using 000, 00, 0, 1 and 2 mounted pins and their wings and legs set on appropriate setting boards to facilitate morphological studies and the others were put into tubes filled with 70% alcohol. For identification, the materials were examined under a Nikon (SMZ 1000) binocular microscope manufactured in Japan. The identification was made up to the specific level with the help of relevant literature such as Bezzi (1966), Vockeroth & Tompson (1987), Bei- Bienko (1988), Stubbs & Falk (2002) and Lyneborg & Barkemeyer (2005).

RESULTS

The present investigation has richly yielded 44 species, which are arranged in 25 genera and two subfamilies. All of the verified species are as new records for the studied region and two species (marked by an asterisk) are newly introduced to Iran fauna that are totally listed as follows:

Subfamily Syrphinae

***Dasysyrphus albostriatus* (Fallén, 1817):** Syrphici Sveciae: 42 (*Scaeva*). Type locality: Scania = prov. Skane] (Sweden).
Material examined: 5 specimens (3♂♂, 2♀♀).
Distribution: From Fennoscandia south to Iberia; from Ireland eastwards through central and southern Europe (Italy, the former Yugoslavia) to Crete, Turkey and European parts of Russia (from the north to the Crimea and the Caucasus); into central Asia to Tuva; north Africa; Japan, Iran.
***Epistrophe euchroma* (Kowarz, 1885):** Wien. Ent. Ztg, 4: 135 and 167 (*Syrphus*). Type locality: “Bohmen; Asch” [=Czechoslovakia: As].
Material examined: 9 specimens (5♂♂, 4♀♀).
Distribution: Northern Fennoscandia south to the Pyrenees and central Spain; from Britain (southern England) eastwards through central Europe into Russia, reaching the Caucasus in the south and eastern Siberia (Yakut) in Asia. Iran.
***Episyrphus balteatus* (De Geer, 1776):** Mém. Ins., 6: 116 (*Musca*). Type locality: not given (Sweden).
Material examined: 13 specimens (4♂♂, 9♀♀).
Distribution: Fennoscandia to the Mediterranean; Canary Isles, Azores and N Africa; Ireland through Eurasia to the Pacific coast; south through the Oriental region to Sri Lanka;Australia. This is an extremely migratory species with records from offshore islands of northern Europe. Iran.
***Scaeva albomaculata* (Macquart, 1842):** Mém. Soc. Sci. Agric. Lille, 1841(1): 146 and Dipt. exot., 2(2): 86 (*Syrphus*). Type localities:”Mont-sinai” (Egypt).”Alger” (Algeria).
Material examined: 8 specimens (2♂♂, 6♀♀).
Distribution: Iberian peninsula and round the Mediterranean basin to Morocco; Canary Islands; eastward through southern Russia, the Caucasus and southern Siberia to the far east and northern China; Afghanistan, Mongolia; highly migratory and occasionally reaches as far north as Britain. Iran.
***Scaeva pyrastri* (Linnaeus, 1758):** Syst. Nat., Ed. 10, 1: 594 (*Musca*). Type locality: Svecia (Sweden).
Material examined: 13 specimens (5♂♂, 8♀♀).
Distribution: Fennoscandia south to Iberia, the Mediterranean, Canary Isles and North Africa; from Ireland east through much of Europe and Asia Minor into European Russia; through Siberia from the Urals to the Pacific coast (Kuril Isles); India; China; North America from Alaska to California and New Mexico. Iran.
***Eupeodes corollae* (Fabricius, 1794):** Entom. Syst., 4: 306 (*Syrphus*). Type locality: Kilia [=Kiel] [Germany].
Material examined: 10 specimens (4♂♂, 6♀♀).

Distribution: From Iceland, Fennoscandia and the Faroes south to Iberia, the Mediterranean, Madeira, the Canary Isles and N Africa; coastal States of Africa down to and including S Africa; Mauritius; from Ireland eastwards through most of Europe into European parts of Russia; through Siberia from the Urals to the Pacific coast; Japan; China; Formosa. Iran.

***Eupeodes luniger* (Meigen, 1822):** Syst. Beschr., 3: 300 (*Syrphus*). Type locality: not given (aus der Baumhauerischen Sammlung) (Europe).

Material examined: 8 specimens (4♂♂, 4♀♀).

Distribution: From Fennoscandia south to Iberia, the Mediterranean, Madeira and N Africa; from Ireland eastwards through most of Europe into European parts of Russia and Asia Minor (including Turkey); in Siberia from the Urals to the Pacific coast (Kuril Isles); Japan; India; Iran.

***Eupeodes nuba* (Wiedemann, 1830):** Aussereurop. Zweifl. Insekt., 2: 136 (*Syrphus*). Type locality: ''Nubien'' (Sudan).

Material examined: 14 specimens (8♂♂, 6♀♀).

Distribution: Canary Isles, Mediterranean basin, from southern France to Italy (Sicily) and parts of the former Yugoslavia, Crete, Cyprus, Lebanon, Israel, Egypt and Morocco; Switzerland in central Europe, Roumania; Transcausasus and south-western parts of Asia (Uzbekistan, Kirghizistan, Tajikistan) to Afghanistan and Mongolia. In eastern parts of the Afrotropical region from Ethiopia south to South Africa (inclusive), Iran.

***Epistrophe euchroma* (Kowarz, 1885):** Wien. Ent. Ztg, 4: 135 and 167 (*Syrphus*) .Type locality: "Bohmen; Asch" [=Czechoslovakia: As].

Material examined: 3 specimens (1♂, 2♀♀).

Distribution: Northern Fennoscandia south to the Pyrenees and central Spain; from Britain (southern England) eastwards through central Europe into Russia, reaching the Caucasus in the south and eastern Siberia (Yakut) in Asia, Iran.

***Ischidon aegyptius* (Wiedemann, 1830):** Aussereurop. Zweifl. Insekt, 2: 133 (*Syrphus*). Type localities: "Egypten und Nubin" (Egypt and Sudan).

Material examined: 1 specimen (1♂).

Distribution: Throughout the Afrotropical region and into N Africa to the coast of the Mediterranean and Yemen; southern Spain, southern Italy, the Balearic Islands and the Canaries, Iran.

***Sphaerophoria rueppelli* (Wiedemann, 1830):** Aussereurop. zweifl. Insekt., 2: 141 (*Syrphus*). Type locality: Nubien; Abyssinia (lectotype des. Vockeroth, 1971:1633).

Material examined: 18 specimens (8♂♂, 10♀♀).

Distribution: From southern Norway and Sweden south to North Africa and the Canary Isles; from Ireland east through central and southern Europe, including Greece, Turkey and Mediterranean islands into Asia Minor, Russia and Afghanistan and on to the Pacific coast , China and Korea; in eastern parts of the Afrotropical region south to Kenya, Iran.

***Sphaerophoria scripta* (Linnaeus, 1758):** Syst. Nat., Ed. 10, 1: 594 (*Musca*).Type locality: ''Svecia'' (Sweden); ''Uppsala, Sweden'' (lectoype des. Vockeroth, 1971: 1633).

Material examined: 25 specimens (12♂♂, 13♀♀).

Distribution: A highly migratory species; southwest Greenland, Iceland and Fennoscandia south to the Mediterranean, the Canary Isles and N Africa; from Ireland eastwards through much of the Palaearctic to the Pacific coast of Asia; Kashmir and Nepal, Iran.

***Sphaerophoria turkmenica* Bankowska, 1964:** Annls zool., Warsz., 22(15): 345 (*Sphaerophoria*). Type locality: ''Turkmenische SSR, West Kopet Dag, Berg Siunt''.

Material examined: 11 specimens (3♂♂, 8♀♀).

Distribution: Romania, USSR-South European territory, Transcaucasus, Soviet Middle Asia, Afghanistan (Peck, 1988) and Turkey (Hayat & Alaoglu, 1990), Iran.

***Syrphus ribesii* (Linnaeus, 1758):** Syst. Nat., Ed. 10, 1: 593 (*Musca*). Type locality: Svecia. (Sweden).

Material examined: 15 specimens (6♂♂, 9♀♀).

Distribution: From Iceland and Fennoscandia south to Iberia and the Mediterranean; Canary Isles; from Ireland eastwards through most of Europe into Turkey, European parts of Russia and Afghanistan; from the Urals to the Pacific coast (Kuril Isles); Japan; North America from Alaska south to central parts of the USA, Iran.

***Syrphus vitripennis* Meigen, 1822:** Syst. Beschr., 3: 308 (*Syrphus*). Type locality: not given (Europe).

Material examined: 17 specimens (8♂♂, 9♀♀).
Distribution: Throughout most of the Palaearctic region, including N Africa; in North America from Alaska to California; Formosa, Iran.
***Xanthogramma pedissequum* (Harris, 1776):** Expos. Eng. Ins.: 61, tab. XV, fig. 19 (*Musca*). Type locality: not given (England).
Material examined: 5 specimens (4♂♂, 1♀♀).
Distribution: Uncertain, due to confusion with related species, but from from Britain and Atlantic seabord countries south to the Paris basin and into central Europe to the Alps (France, Switzerland), Iran.
***Chrysotoxum elegans* Loew, 1841:** Stettin. ent. Ztg, 2: 140 (*Chrysotoxum*). Type locality: "Wien" (Austria).
Material examined: 8 specimens (4♂♂, 4♀♀).
Distribution: Fennoscandia south to Iberia and the Mediterranean; through central and southern Europe into European parts of Russia as far as the Caucasus Mountains and into Turkey, Iran.
***Chrysotoxum veralli* Collin, 1940:** Entomologist's mon. Mag., 76: 155 (*Chrysotoxum*, for *Chrysotoxum octomaculatum*: Verrall, 1901: British flies, 8: 647, not Curtis, 1837; misidentiflcation). Type localities "at Harpenden (Herts.), from Timworth (Suffolk), Chippenham Fen and Fleam Dyke (Cambs.), and Fowl Mere near Wretham (Norfolk)" (Great Britain).
Material examined: 6 specimens (2♂♂, 4♀♀).
Distribution: Denmark south to central France; Britain (Wales and central/southern England) eastwards through central Europe into European parts of Russia to the Caucasus and on into eastern Siberia, Iran.
***Melanostoma mellinum* (Linnaeus, 1758):** Syst. Nat., Ed. 10, 1: 593 (*Musca*). Type-locality: Svecia (Sweden).
Material examined: 19 specimens (8♂♂, 11♀♀).
Distribution: From Iceland and Fennoscandia south to Iberia, the Mediterranean and North Africa; from Ireland eastwards through most of Europe into European parts of Russia; Siberia from the Urals to the Pacific coast; North America from Alaska to Quebec and south to Washington, Iran.
***Paragus tibialis* (Fallén, 1817):** Syrphici Sveciae: 60 (*Pipiza*). Type locality: in Vestrogothia; in arvis montosis Scaniae [=prov. Vastergotland and prov. Skane] (Sweden).
Material examined: 9 specimens (5♂♂, 4♀♀).
Distribution: Uncertain at present, due to confusion with other species until recently; apparently occurs from southern Norway, Sweden and Denmark south to the Mediterranean coast of Europe, North Africa and the Canary Isles; from Britain (southern England) eastwards through central and southern Europe to the former Yugoslavia, Turkey, Israel, Nearctic and Oriental Regions, Iran.
***Paragus albifrons* (Fallén, 1817):** Syrphici Sveciae: 60 (*Pipiza*). Type locality: "prope Stenshufvud Scaniae" (Sweden).
Material examined: 6 specimens (2♂♂, 4♀♀).
Distribution: From southern Norway and Denmark south to the Mediterranean; from Britain (southern England) eastwards through central and southern Europe (Italy, the former Yugoslavia, Bulgaria) into European parts of Russia and the Caucasus and on to the Pacific; Iran, Afghanistan and Mongolia (Speight, 2005) and Turkey (Düzgüneş et al., 1982), Iran.
***Paragus bicolor* (Fabricius, 1794):** Entom. Syst., 4: 297 (*Syrphus*). Type locality: "Barbariae" [= NW Africa].
Material examined: 22 specimens (8♂♂, 14♀♀).
Distribution: From Belgium (extinct) south to the Mediterranean and North Africa; from France eastwards through central and southern Europe to Mongolia; Iran and Afghanistan; North America, Iran.
***Paragus compeditus* Wiedemann, 1830:** Aussereurop. Zweifl. Insekt., 2:89 (*Paragus*). Type locality: "Egypten" (Egypt).
Material examined: 18 specimens (7♂♂, 11♀♀).
Distribution: USSR-South European territory, Transcaucasus, Kazakhstan, Soviet Middle Asia, Iran, Afghanistan, North China, Egypt (Peck, 1988) and Turkey (Hayat & Clauusen, 1997), Iran.

***Paragus quadrifasciatus* Meigen, 1822:** Syst. Beschr., 3: 181 (*Paragus*). Type locality: Frankreich (France).
Material examined: 21 specimens (9♂♂, 12♀♀).
Distribution: From northern France (Brittany) south to the Mediterranean and North Africa; from Portugal eastwards through southern and central Europe to Roumania, Greece (including Crete and Rhodes), Turkey, Iran and the Caucasus; European parts of Russia eastwards through Kazakhstan, Tadjikistan etc. to the far east; northern China, Korea, Japan, Iran.

Subfamily Milesiinae
***Cheilosia scutellata* (Fallén, 1817):** Syrphici Sveciae: 55 (*Eristalis*). Type localities: "Esperod Scaniae, Aras Wermlandiae" (Sweden).
Material examined: 25 specimens (9♂♂, 16♀♀).
Distribution: Fennoscandia south to Iberia and round the Mediterranean to Greece, Turkey and North Africa; from Ireland eastwards through Eurasia to the Pacific coast, Iran.
***Cheilosia latifacies* Loew, 1857:** Verh. zool. –bot. Ver. Wien, 7: 593 (*Cheilosia*). Type locality: "Brussa" [=Bursa] (Turkey).
Material examined: 16 specimens (7♂♂, 9♀♀).
Distribution: Poland, Czech Republic and Slovakia, France, Switzerland, Spain, Italy, The former Yugoslavia, Roumania, USSR-South European territory, Transcaucasus, Soviet Middle Asia, Turkey, Afghanistan and Algeria.
***_Cheilosia proxima_ (Zetterstedt, 1843):** Dipt. Scand., 2:792 (Eristalis). Type- locality: "in Ostrogothia ...; ad Haradshammar" (Sweden)
Material examined: 12 specimens (4♂♂, 8♀♀).
Distribution: Europe: from Scandinavia to Italy, Yugoslavia, Bulgaria, USSR: from Leningrad to Transcaucasia, West Siberia, Far East.
***New record for the fauna of Iran.**
***_Cheilosia Sahlbergi_ (Becker, 1894):** Nova Acta Acad. Caesar. Leop. Carol., 62 (3): 354 (Chilosia). Type localities: "Bergun, Schweiz, Finnland" (Switzerland, Finland).
Material examined: 3 specimens (1♂, 2♀♀).
Distribution: Europe: Norway, Finland, Great Britain, Poland, Czechoslovakia, Switzerland, Romania, Bulgaria, USSR: North European territory (Kola peninsula), Central European territory (Latvian, Lithuanian), Transcaucasia.
***New record for the fauna of Iran.**
***Volucella inanis* (Linnaeus, 1758):** Syst. Nat., Ed. 10, 1: 595 (*Musca*). Type locality: "Europa".
Material examined: 11 specimens (5♂♂, 6♀♀).
Distribution: From southern Fennoscandia south to Spain and the Mediterranean (including islands, e.g. Crete), north Africa and Asia Minor (Syria); from Britain (southern England) eastwards through central and southern Europe into Turkey and European parts of Russia and on through Siberia to the Pacific; Afghanistan, Mongolia, China, Iran.
***Volucella zonaria* (Poda, 1761):** Insect. Mus. Graecensis: 118 (*Conops*). Type locality: not given ("ad Graecium") [= environs of Graz] (Austria).
Material examined: 17 specimens (10♂♂, 7♀♀).
Distribution: From Poland south to the Mediterranean (including islands, e.g. Crete) and North Africa; from Britain (southern England) eastwards through central and southern Europe (Italy, the former Yugoslavia, Greece) into Turkey and European parts of Russia and on through Siberia to the Pacific; Mongolia, Iran.
***Eumerus sogdianus* Stackelberg, 1952:** Trudy zoll Inst., 12: 390 (*Eumerus*) Type–locality: Tajikistan: Stalinabad [=Dushanbe] calley of the r. Kafernighan.
Material examined: 23 specimens (9♂♂, 14♀♀).
Distribution: Denmark south to southern Spain; from Belgium eastwards through central and southern Europe into European parts of Russia and on into central Asia (Kazakhstan, Tajikistan, Uzbekistan, Mongolia); China, Iran.
***Merodon nanus* (Sack, 1931):** 31. Syrphidae, Fliegen pal. Reg., 4(4): 322 (*Lampetia*). Type locality: Kurdistan [=on borders of Iran, Iraq and Turkey].
Material examined: 16 specimens (9♂♂, 7♀♀).
Distribution: The former Yugoslavia, Bulgaria, USSR-Transcaucasus (Georgia and Armenia), Iraq and Turkey, Iran.

***Ceriana conopsoides* (Linnaeus, 1758):** Syst. Nat., Ed. 10, 1: 590 (*Musca*). Type locality: Europa.
Material examined: 3 specimens (1♂, 2♀♀).
Distribution: Finland south to the Mediterranean and North Africa; France east through central Europe and on into Asiatic parts of Russia to the Pacific; China, Iran.
***Neoascia podagrica* (Fabricius, 1775):** Syst. entom.: 768 (*Syrphus*). Type locality: "Dania".
Material examined: 9 specimens (6♂♂, 3♀♀).
Distribution: From Fennoscandia south to Iberia and the Mediterranean, including Madeira, Cyprus and Crete; N Africa; from Ireland eastwards through northern, central and southern Europe (Italy, the former Yugoslavia, Greece) to Turkey and Israel; European parts of Russia and on into western Siberia as far as Cis-Baikal, Iran.
***Eristalinus sepulchralis* (Linnaeus, 1785):** Syst. Nat., Ed.10, 1: 596 (*Musca)*. Type locality: "Europa".
Material examined: 26 specimens (11♂♂, 15♀♀).
Distribution: Fennoscandia south to Iberia and the Mediterranean, including North Africa; from Ireland through most of Europe into Turkey and European parts of Russia; through Siberia to the Pacific coast; Japan; China; India, Iran.
***Eristalinus taeniops* (Wiedemann, 1818):** Zool. Meg., Kiel, 1(2): 42 (*Eristalis)*. Type-locality: "Vorgebirge der Guten Hoffnung" [=Cape] (South Africa).
Material examined: 19 specimens (10♂♂, 9♀♀).
Distribution: Portugal, Spain and round the Mediterranean basin (southern France including Corsica, Italy including Sardinia and Sicily, parts of the former Yugoslavia, Albania, Roumania, Cyprus, Greece (including Crete and Rhodes), Turkey, Lebanon, Israel, North Africa (Syria, Egypt, Libya, Tunisia, Morocco), Canary Islands, Transcaucasus; in eastern parts of the Afrotropical region down to South Africa (inclusive) and in Nepal and parts of Pakistan and northern India in the Oriental region , Iran.
***Eristalinus aeneus* (Scopoli, 1763):** Ent. Carniolica: 356 sex?; (*Conops*).Type locality: Idria (Yugoslavia)
Material examined: 25 specimens (16♂♂, 9♀♀).
Distribution: Cosmopolitan; southern Sweden south to N Africa and the Canary Isles; on into the Afrotropical region south to Kenya and Tanzania; from Ireland eastwards through central and southern Europe and on through Russia and China to the Pacific and south into the Oriental region; Mauritius; in North America from Minnesota and Ontario south to California and Texas; Hawaii, Australia and the Gilbert and Ellis islands in Australasia; Bermuda, Iran.
***Eristalinus megacephalus* (Rossi, 1794):** Mantissa insectorum, 2: 63 (*Syrphus)*. Type locality: not given ("Etruria") [=Toscana] (Italy).
Material examined: 28 specimens (15♂♂, 13♀♀).
Distribution: Southern Spain and coastal parts of Italy round the Mediterranean basin (including islands, e.g. Corsica, Malta, Sicily, Crete) to Turkey and on into Egypt and North Africa; southwards through the Afrotropical region to South Africa, Iran.
***Eristalis arbustorum* (Linnaeus, 1758):** Syst. Nat., Ed. 10, 1: 591 (*Musca*).Type locality: Europa.
Material examined: 37 specimens (18♂♂, 19♀♀).
Distribution: Throughout the Palaearctic region, including North Africa; North America from Wisconsin to Labrador and south to Kansas and South Carolina; reaches the Oriental region in northern India, Iran.
***Eristalis tenax* (Linnaeus, 1758):** Syst. Nat., Ed. 10, 1: 591 (*Musca*).Type locality: Svecia (Sweden).
Material examined: 29 specimens (12♂♂, 17♀♀).
Distribution: Highly migratory; cosmopolitan; the most widely distributed syrphid species in the world, known from all regions except the Antarctic; found throughout Europe except in the far north, Iran.
***Helophilus trivittatus* (Fabricius, 1805):** Syst. Antl.: 235 (*Eristalis*). Type locality: "Austria"
Material examined: 24 specimens (14♂♂, 10♀♀).
Distribution: From Fennoscandia south to the Mediterranean and from Ireland eastwards through Eurasia to the Pacific, Afghanistan, Iran.

***Myathropa florea* (Linnaeus, 1758):** Syst. Nat. Ed. 10, 1: 591 (*Musca*). Type locality: Europa.
Material examined: 8 specimens (3♂♂, 5♀♀).
Distribution: From Fennoscandia south to Iberia and the Mediterranean, the Canary Isles and North Africa; from Ireland eastwards through Eurasia to the Pacific coast, Iran.
***Syritta pipiens* (Linnaeus, 1758):** Syst. Nat., Ed.10, 1: 594 (*Musca*).Type locality: Europa.
Material examined: 35 specimens (22♂♂, 13♀♀).
Distribution: Becoming cosmopolitan; known from most of the Palaearctic, including North Africa, most of North America, South America and the Oriental region. But records from the Afrotropical region are apparently erroneous, Iran.
***Tropidia scita* (Harris, 1780)**: Expos. Eng. Ins.: 107 (*Musca*). Type locality: not given (England).
Material examined: 3 specimens (2♂♂, 1♀).
Distribution: From Fennoscandia south to central France; from Ireland eastwards through central Europe and on through Russia to the Caucasus and in Asia as far as the Pacific coast and Japan, Iran.

CONCLUSION

Our study indicated that species belonged to subfamily Eristaline were the most common and conspicuous flower flies at the working area. The most abundant pollinators in sunflower and pumpkin fields belonged to *Eristalinus*, *Eristalis*, *Syritta*, *Eumerus* and *Helophilus* whereas the ones at grasslands related *to Eristalis*, *Eristalinus*, *Cheilosia* and *Merodon*. The samples showed that the density of *Volucella* genera get rise at the end of growth season. Among the studied predators, the members of genera *Episyrphus*, *Scaeva*, *Eupodes* and *Syrphus* and the individuals of genera *Paragus* and *Sphaerophoria* were conspicuous in studied fields and grasslands respectively. The specimens caught by malaise traps were female biased which is in agreement with the findings of Hagvar and Nilson (2007) indicating that female flight behavior makes females more vulnerable to Malaise traps than males.

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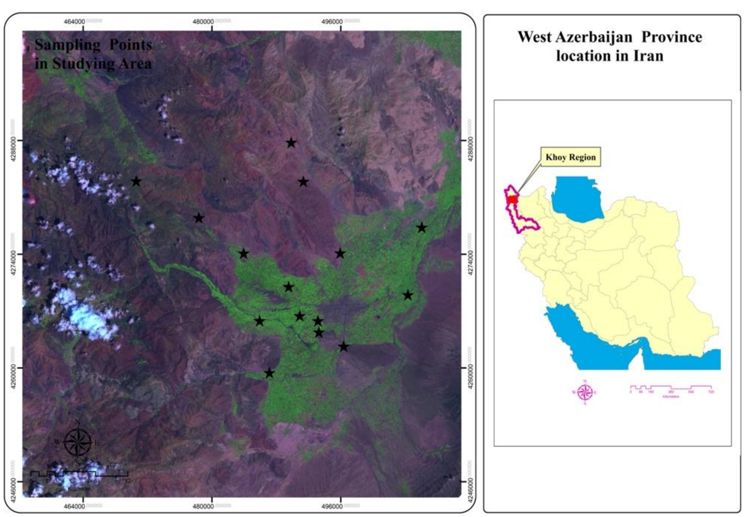

Figure 1. Location of sampling points on satellite image (SPOT) of Khoy region.

SOME AQUATIC COLEOPTERA FROM ANKARA PROVINCE, TURKEY

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ABSTRACT: Fourty species of water beetle were recorded from 36 sites in Ankara. Twenty-one species appeared to be new for the area.

KEY WORDS: Coleoptera, Gyrinidae, Noteridae, Dytiscidae, Hydrophilidae, Helophoridae, fauna, Ankara province, Turkey.

The aquatic Coleoptera fauna of Ankara is imperfectly known. 54 Species of aquatic beetles have been recorded from the studied region in the following published works, D'Orchymont (1932), Gentili & Chiesa (1975), Angus (1988; 1992), Gentili (1981; 2000), Van Berge Henegouwen (1986), Schödl (1991; 1998), Mart & Erman (2001), İncekara et al. (2003) Darılmaz & Kıyak, 2009.

The aim of this study was to make a contribution to Turkish aquatic beetles fauna.

MATERIALS AND METHOD

This study is based on 642 specimens of aquatic beetles and all the specimens were collected by the first author from Ankara province, between April – September in 2006 and 2007. Specimens were collected from a spring water area, with a sieve, ladle and net having a 1 mm mesh size. The beetles were killed with 70% alcohol and in the laboratory were cleaned of muddy remnant on their surfaces with a small paintbrush. Aedeagophore was dissected under the stereo-microscope and on to add 10% KOH solution for about 1-2 hours. Materials have been deposited in the Gazi University Zoological Museum (=ZMGU), Ankara, Turkey.

A list of localites is given in Table 1. The 'List of species' gives the sampling locations for each species. The dates of sampling and total number of individuals are also noted. Species new for Ankara are marked with an asteriks.

RESULTS

Familya Gyrinidae

***_Aulonogyrus concinnus_ Klug, 1834**

Materials: Ankara: 9 males, 6 females, T12, 06.05.2007.

***_Gyrinus urinator_ Illiger, 1807**

Materials: Ankara: 1 males, 3 females, T6, 12.05.2007.

***_Orectochilus villosus_ O.F. Müller, 1776**

Materials: Ankara: 2 males, 3 females, T20, 08.07.2007.

Familya Haliplidae

***_Haliplus heydeni_ Wehncke, 1875**

Materials: Ankara: 2 males, T8, 13.09.2006; 1 female, T26, 02.08.2007; 1 female, T27, 05.08.2007; 9 males, 4 females, T36, 15.08.2007.

***_Peltodytes caesus_ (Duftschmid, 1805)**

Materials: Ankara: 1 male, 1 female, T6, 12.05.2007; 3 males, T27, 05.08.2007.

Familya Noteridae

Noterus clavicornis (De Geer, 1774)

Materials: Ankara: 6 males, 2 females, T6, 12.05.2007; 1 male, T3, 14.04.2007; 2 males, 3 females, T13, 06.05.2007; 2 males, 4 females, T14, 14.04.2007; 7 males, 4 females, T25, 02.08.2007; 1 male, T3, 02.08.2007; 9 males, 3 females, T29, 05.08.2007; 1 male, T10, 05.08.2007; 2 males, 4 females, T34, 15.08.2007; 5 males, 8 females, T36, 15.08.2007; 1 male, T8, 22.08.2007.

Familya Dytiscidae

***_Agabus bipustulatus_ (Linnaeus, 1767)**

Materials: Ankara: 1 male, T4, 04.05.2007; 1 male, T5, 22.05.2007; 1 male, 1 female, T6, 12.05.2007; 2 males, 3 females, T27, 05.08.2007.

***_Agabus conspersus_ (Marsham, 1802)**

Materials: Ankara: 2 females, T6, 12.05.2007; 1 male, 1 female, T27, 05.08.2007.

***_Agabus nebulosus_ (Forster, 1771)**

Materials: Ankara: 1 female, T6, 12.05.2007.

***_Ilybius fuliginosus_ (Fabricius, 1792)**

Materials: Ankara: 2 females, T5, 22.05.2007; 3 males, 1 female, T27, 05.08.2007; 2 males, T36, 15.08.2007.

***_Platambus lunulatus_ (Fischer von Waldheim, 1829)**

Materials: Ankara: 1 male, T17, 26.05.2007.

***_Platambus maculatus_ (Linnaeus, 1758)**

Materials: Ankara: 4 males, 2 females, T2, 02.06.2007; 1 female, T5, 22.05.2007; 4 males, 3 females, T20, 08.07.2007.

***_Rhantus suturalis_ (W.S. MacLeay, 1825)**

Materials: Ankara: 1 male, T6, 12.05.2007.

***_Acilius sulcatus_ (Linnaeus, 1758)**

Materials: Ankara: 1 male, T3, 17.09.2006.

***_Graphoderus cinereus_ (Linnaeus, 1758)**

Materials: Ankara: 1 male, T10, 05.08.2007.

Bidessus calabricus Guignot, 1957

Materials: Ankara: 1 male, 3 females, T5, 22.05.2007.

Bidessus exornatus (Reiche & Saulcy, 1855)

Materials: Ankara: 1 male, T5, 04.08.2007.

Hydroglyphus geminus (Fabricius, 1792)

Materials: Ankara: 1 males, T4, 04.05.2007; 5 males, 2 females, T13, 06.05.2007; 1 male, T11, 02.06.2007; 1 male, T12, 06.05.2007; 1 female, T15, 14.04.2007; 1 female, T20, 08.07.2007; 10 males, 6 females, T4, 31.07.2007; 1 male, 3 females, T23, 31.07.2007; 14 males, 6 females, T24, 02.08.2007; 2 males, 2 females, T5, 04.08.2007; 1 male, 1 female, T10, 05.08.2007; 2 males, T14, 14.08.2007; 4 males, 1 female, T34, 15.08.2007.

***_Hydroporus palustris_ Linnaeus, 1761**

Materials: Ankara: 3 males, T8, 08.07.2007; 1 female, T3, 02.08.2007; 2 females, T24, 02.08.2007; 3 males, 1 female, T3, 02.08.2007.

***Scarodytes halensis* (Fabricius, 1787)**

Materials: Ankara: 1 male, T3, 17.09.2006; 9 males, 4 females, T5, 22.05.2007; 8 males, 6 females, T6, 12.05.2007; 7 males, 2 females, T17, 26.05.2007. 2 males, 5 females, T5, 04.08.2007; 6 males, 5 females, T30, 05.08.2007; 1 male, T36, 15.08.2007.

****Hydrovatus cuspidatus* (Kunze, 1818)**

Materials: Ankara: 1 male, T24, 02.08.2007.

****Hygrotus inaequalis* (Fabricius, 1777)**

Materials: Ankara: 1 male, T8, 08.07.2007; 2 males, T3, 02.08.2007; 1 male, 1 female, T3, 02.08.2007; 3 males, 1 female, T14, 14.08.2007.

****Laccophilus hyalinus* (DeGeer, 1774)**

Materials: Ankara: 14 males, 3 females, T1, 23.09.2006; 2 males, 1 female, T5, 22.05.2007; 2 females, T7, 23.09.2006; 1 male, T8, 13.09.2006; 5 males, 6 females, T7, 23.04.2007; 1 female, T10, 23.04.2007; 2 males, T1, 23.04.2007; 3 males, 1 female, T15, 14.04.2007; 3 males, T16, 14.04.2007; 1 female, T19, 30.05.2007; 1 female, T20, 08.07.2007; 3 males, 1 female, T8, 08.07.2007; 6 males, 3 females, T27, 05.08.2007; 2 males, 1 female, T10, 05.08.2007; 1 male, T33, 05.08.2007; 1 male, 3 females, T36, 15.08.2007; 1 male, T8, 22.08.2007.

***Laccophilus minutus* (Linnaeus, 1758)**

Materials: Ankara: 1 male, T4, 04.05.2007; 2 males, T6, 12.05.2007; 1 male, 1 female, T9, 06.05.2007; 2 males, T3, 14.04.2007; 1 male, T24, 02.08.2007; 1 male, 1 female, T25, 02.08.2007; 2 males, T3, 02.08.2007; 1 male, 2 females, T34, 15.08.2007; 1 female, T36; 15.08.2007.

Family Helophoridae

***Helophorus nubilus* (Fabricius, 1777)**

Materials: Ankara: 1 male, T4, 04.05.2007; 2 males, T22, 31.07.2007.

***Helophorus brevipalpis* Bedel, 1881**

Materials: Ankara: 8 males, 4 females, T19, 30.05.2007.

***Helophorus daedalus* d'Orchymont, 1932**

Materials: Ankara: 2 males, 1 female, T26, 02.08.2007.

***Helophorus discrepans* Rey, 1885**

Materials: Ankara: 4 males, 2 females, T6, 12.05.2007.

Familya Hydrophilidae

***Anacaena limbata* (Fabricius, 1792)**

Materials: Ankara: 2 males, 3 females, T27, 05.08.2007.

****Berosus frontifoveatus* Kuwert, 1888**

Materials: Ankara: 5 males, 7 females, T1, 23.04.2007.

***Berosus spinosus* (Steven, 1808)**

Materials: Ankara: 1 male, 3 females, T7, 23.04.2007

***Enochrus bicolor* (Fabricius, 1792)**

Materials: Ankara: 2 males, 1 female, T5, 22.05.2007; 1 female, T1, 23.04.2007; 2 male, 1 female, T19, 30.05.2007; 5 males, 3 females, T5, 04.08.2007; 1 male, T32, 05.08.2007.

****Enochrus fuscipennis* (Thomson, 1884)**

Materials: Ankara: 5 males, 1 female, T24, 02.08.2007; 1 female, T25, 02.08.2007; 3 males, 3 females, T27, 05.08.2007.

***Helochares lividus* (Forster, 1771)**

Materials: Ankara: 2 males, T6, 12.05.2007; 4 males, 5 females, T24, 02.08.2007; 1 female, T25, 02.08.2007; 1 female, T26, 02.08.2007; 4 males, 3 females, T10, 05.08.2007; 8 males, 4 females, T14, 14.08.2007; 1 male, 2 females, T36, 15.08.2007.

***_Helochares obscurus_ (O. F. Müller, 1776)**

Materials: Ankara: 4 males, 5 females, T11, 02.06.2007; 2 males, T3, 14.04.2007; 2 males, T13, 06.05.2007; 5 males, 1 females, T14, 14.04.2007; 1 female, T26, 02.08.2007.

Hydrobius fuscipes (Linnaeus, 1758)

Materials: Ankara: 1 male, T3, 14.04.2007; 1 female, T3, 02.08.2007.

Laccobius obscuratus aegaeus Gentili, 1974

Materials: Ankara: 1 male, T17, 26.05.2007; 5 males, 7 females, T26, 02.08.2007.

Laccobius simulatrix d'Orchymont, 1932

Materials: Ankara: 4 males, 2 females, T6, 12.05.2007; 2 males, T23, 31.07.2007; 20 males, 3 females, T24, 02.08.2007; 2 males, 3 females, T10, 05.08.2007.

Laccobius striatulus (Fabricius, 1801)

Materials: Ankara: 4 males, 2 females, T5, 22.05.2007; 10 males, 8 females, T20, 08.07.2007; 7 males, 4 females, T26, 02.08.2007; 10 males, 5 females, T5, 04.08.2007.

Laccobius syriacus Guillebeau, 1896

Materials: Ankara: 2 males, T27, 05.08.2007; 1 male, 2 females, T31, 05.08.2007; 2 females, T34, 15.08.2007; 5 males, 1 female, T36, 15.08.2007; 3 females, T7, 23.09.2006.

As a result of the present work, in freshwater habitats of Ankara Province, 40 aquatic beetle species (Coleoptera: Gyrinidae, Noteridae, Dytiscidae, Hydrophilidae and Helophoridae) beloning to 26 genera and 6 families were recorded at 36 sites. Of these, 21 species are recorded from the Ankara Region of Turkey for the first time.

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Table 1. List of sampling sites in Ankara Province (Abbreviations: No.= number, Abbr.= abbreviations of the site).

No.	Sampling site	Coordinates		Habitat	Abbr.
1.	Kuş cenneti/Çayırhan	40° 6'N	31°35'E	stream	T_1
2.	Kışlacık/Çubuk	40°23'N	32°56'E	stream	T_2
3.	Işıkdağı/Kızılcahamam	40°38'N	32°45'E	lake	T_3
4.	Köprübelde/K.Keçili	39°34'N	33°25'E	stream	T_4
5.	Handere/Çubuk	40°15'N	33°11'E	stream	T_5
6.	Yukarı Çavundur/Çubuk	40°20'N	33°03'E	puddle	T_6
7.	Sarıyar Barajı/Nallıhan	40° 2'N	31°24'E	lake	T_7
8.	Karagöl/Çubuk	40°24'N	32°54'E	lake	T_8
9.	Kumocakları/K.Keçili/Bala	39°32'N	33°25'E	stream	T_9
10.	Akçakonak köyü/Beypazarı	40° 6'N	32° 1'E	stream	T_{10}
11.	Aykayası/Çubuk	40°28'N	32°56'E	puddle	T_{11}
12.	Kalecik/Ankara	40° 3'N	33°26'E	stream	T_{12}
13.	Büyükboyalık/Bala	39°33'N	33°15'E	stream	T_{13}
14.	Çamkoru/Çamlıdere	40°33'N	32°28'E	lake	T_{14}
15.	Üçbaş köyü/Kızılcahamam	40°24'N	32°41'E	Puddle	T_{15}
16.	Oğlakçı köyü/ Kızılcahamam	40°31'N	32°39'E	puddle	T_{16}
17.	Sarıkoz köyü/Çubuk	40°20'N	33° 0'E	puddle	T_{17}
18.	Merkez/Çubuk	40°12'N	33° 2'E	stream	T_{18}
19.	Çubuk Çayı/Güldarpı/Çubuk	40°11'N	33° 1'E	stream	T_{19}
20.	Yeşilkent/Çubuk	40°26'N	32°54'E	stream	T_{20}
21.	Köprübelde/K.keçili/Kırıkkale	40° 3'N	33°26'E	stream	T_{21}
22.	Kesikköprü/Bala	39°23'N	33°24'E	stream	T_{22}
23.	Acısu/Kesikköprü/Bala	39°27'N	33°18'E	puddle	T_{23}
24.	Değirmenönü/ Kızılcahamam	40°20'N	32°31'E	stream	T_{24}
25.	Çay köyü/ Kızılcahamam	40°26'N	32°38'E	stream	T_{25}
26.	Sayhamamı/ Kızılcahamam	40°35'N	32°39'E	stream	T_{26}
27.	Çanıllı/Ayaş	40°09'N	32°24'E	puddle	T_{27}
28.	Orta Bereket/Ayaş	40°07'N	32°25'E	puddle	T_{28}
29.	Kirazdibi piknik alanı/Ayaş	40°00'N	32°20'E	puddle	T_{29}
30.	Ilıca/endik mevki/Ayaş	40°03'N	32°15'E	stream	T_{30}
31.	Ilıca/suat mevki/Ayaş	40°03'N	32°15'E	stream	T_{31}
32.	Uluköy/Çayırhan/Nallıhan	40°08'N	31° 39'E	stream	T_{32}
33.	Emremsultan/Nallıhan	40° 4'N	31°23'E	stream	T_{33}
34.	Çeltikçi/Kızılcahamam	40°23'N	32°37'E	stream	T_{34}
35.	Yeşilöz/Güdül	40°14'N	32°15'E	stream	T_{35}
36.	Sorgun/Güdül	40°20'N	32°16'E	stream	T_{36}

A NEW NAME FOR THE ORIENTAL SUBGENUS *SRILANKANA* JIN, 1992 OF THE GENUS *DECOLYA* BOLIVAR, 1900 (ORTHOPTERA: TETTIGONIIDAE)

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[Özdikmen, H. 2010. A new name for the oriental subgenus *Srilankana* Jin, 1992 of the genus *Decolya* Bolivar, 1900 (Orthoptera: Tettigoniidae). Munis Entomology & Zoology, 5 (1): 283-285**]**

ABSTRACT. A junior homonym was detected among oriental katydids genus group names and the following replacement name is proposed: *Eusrilankana* nom. nov. for *Srilankana* Jin, 1992. Accordingly, new combinations are herein proposed for the species currently included in this subgenus: *Decolya* (*Eusrilankana*) *confusa* (Henry, 1934) comb. nov., *Decolya* (*Eusrilankana*) *elegans* (Henry, 1934) comb. nov., *Decolya* (*Eusrilankana*) *kalugallae* (Kevan, 1992) comb. nov., *Decolya* (*Eusrilankana*) *kelletti* (Henry, 1932) comb. nov., *Decolya* (*Eusrilankana*) *mousakandae* (Henry, 1934) comb. nov., *Decolya* (*Eusrilankana*) *petiyagallae* (Henry, 1932) comb. nov., *Decolya* (*Eusrilankana*) *phillipsi* (Henry, 1934) comb. nov., *Decolya* (*Eusrilankana*) *roseopicta* (Uvarov, 1927) comb. nov., *Decolya* (*Eusrilankana*) *splendens* (Henry, 1932) comb. nov. and *Decolya* (*Eusrilankana*) *uvarovi* (Henry, 1932) comb. nov..

KEYWORDS. Nomenclatural changes, homonymy, replacement names, Tettigoniidae, Orthoptera, new combinations.

In an effort to reduce the number of homonyms in Tettigoniidae, I found one katydids subgenus whose name had been previously published for other taxon, making them junior homonym. In accordance with the International Code of Zoological Nomenclature, I propose substitute name for this subgenus.

Family TETIGONIIDAE
Genus *DECOLYA* Bolivar, 1900
Subgenus *EUSRILANKANA* nom. nov.

Srilankana Jin, 1992. Theses Zool. 18: 42. (Orthoptera: Ensifera: Tettigonioidea: Tettigoniidae: Listroscelidinae: Phisidini: Phisidina: *Decolya*). Preoccupied by *Srilankana* Matile, 1990. Mem Mus Natl Hist Nat Ser A Zool 148: 185. (Diptera: Mycetophiloidea: Keroplatidae: Macrocerinae: Robsonomyiini).

Remarks on nomenclatural changes:

The genus name *Srilankana* was initially introduced by Matile (1990) for a fly genus (with the type species *Srilankana mirabilis* Matile, 1990 by monotypy from Sri Lanka). It is still used as a valid genus name. It has no generic synonym. It is a monotypic genus now.

Subsequently, Jin (1992) described a new oriental katydid subgenus of the genus *Decolya* Bolivar, 1900 (with the type species *Decolya roseopicta* Uvarov, 1927 from Sri Lanka) under the same generic name in the family Tettigoniidae. *Decolya* Bolivar, 1900 has two subgenus as the nominotypical subgenus *Decolya* Bolivar, 1900 and *Srilankana* Jin, 1992. It is also still used as a valid genus group name. It has no any generic synonym. It has ten species (including the type species) now (Eades & Otte, 2009).

Thus, the genus group name *Srilankana* Jin, 1992 is a junior homonym of the genus *Srilankana* Matile, 1990. According to Article 60 of the International Code of Zoological Nomenclature, I propose for the genus group name *Srilankana* Jin, 1992 the new replacement name *Eusrilankana* **nom. nov.**

Etymology: from the Latin prefix "-eu" (meaning in English "real") and the preexisting genus name *Srilankana*.

Summary of nomenclatural changes:

Genus *Decolya* Bolivar, 1900

Subgenus *Decolya* Bolivar, 1900

Decolya (*Decolya*) *inexspectata* Chopard, 1957
Type locality: Africa, Western Indian Ocean, Reunion.

Decolya (*Decolya*) *visenda* Bolivar, 1900
Type locality: Asia-Tropical, Indian Subcontinent, India, S: Madras State, Kodai Canal.

Subgenus *Eusrilankana* **nom. nov.**
pro *Srilankana* Jin, 19912 (nec Matile, 1990).

Decolya (*Eusrilankana*) *confusa* (Henry, 1934) **comb. nov.**
from *Decolya* (*Srilankana*) *confusa* Henry, 1934
Decolya confusa Henry, 1934
Type locality: Asia-Tropical, Indian Subcontinent, Sri Lanka, Labugama.

Decolya (*Eusrilankana*) *elegans* (Henry, 1934) **comb. nov.**
from *Decolya* (*Srilankana*) *elegans* Henry, 1934
Decolya elegans Henry, 1934
Type locality: Asia-Tropical, Indian Subcontinent, Sri Lanka, Mousakande, Gammaduwa.

Decolya (*Eusrilankana*) *kalugallae* (Kevan, 1992) **comb. nov.**
from *Decolya* (*Srilankana*) *kalugallae* Kevan, 1992
Type locality: Asia-Tropical, Indian Subcontinent, Sri Lanka, Kalugalla.

Decolya (*Eusrilankana*) *kelletti* (Henry, 1932) **comb. nov.**
from *Decolya* (*Srilankana*) *kelletti* (Henry, 1932)
Phisis kelletti Henry, 1932
Type locality: Asia-Tropical, Indian Subcontinent, Sri Lanka, Ougaldowa Estate, Belihuloya.

Decolya (*Eusrilankana*) *mousakandae* (Henry, 1934) **comb. nov.**
from *Decolya* (*Srilankana*) *mousakandae* Henry, 1934
Decolya mousakandae Henry, 1934
Type locality: Asia-Tropical, Indian Subcontinent, Sri Lanka, Mousakende.

Decolya (*Eusrilankana*) *petiyagallae* (Henry, 1932) **comb. nov.**
from *Decolya* (*Srilankana*) *petiyagallae* Henry, 1932

Decolya petiyagallae Henry, 1932
Type locality: Asia-Tropical, Indian Subcontinent, Sri Lanka, Balangoda.

Decolya (*Eusrilankana*) *phillipsi* (Henry, 1934) **comb. nov.**
from *Decolya* (*Srilankana*) *phillipsi* Henry, 1934
Decolya phillipsi Henry, 1934
Type locality: Asia-Tropical, Indian Subcontinent, Sri Lanka, Mousakanda, Gammaduwa.

Decolya (*Eusrilankana*) *roseopicta* (Uvarov, 1927) **comb. nov.**
from *Decolya* (*Srilankana*) *roseopicta* Uvarov, 1927
Decolya roseopicta Uvarov, 1927
Type locality: Asia-Tropical, Indian Subcontinent, Sri Lanka, Woodside Urugalla.

Decolya (*Eusrilankana*) *splendens* (Henry, 1932) **comb. nov.**
from *Decolya* (*Srilankana*) *splendens* Henry, 1932
Decolya splendens Henry, 1932
Type locality: Asia-Tropical, Indian Subcontinent, Sri Lanka, Labugama.

Decolya (*Eusrilankana*) *uvarovi* (Henry, 1932) **comb. nov.**
from *Decolya* (*Srilankana*) *uvarovi* Henry, 1932
Decolya uvarovi Henry, 1932
Type locality: Asia-Tropical, Indian Subcontinent, Sri Lanka, Halgala.

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THE LAND SNAILS OF KÂHTA, ADIYAMAN, TURKEY (MOLLUSCA: GASTROPODA: PULMONATA)

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[Gümüş, B. A. 2010. The land snails of Kâhta, Adıyaman, Turkey (Mollusca: Gastropoda: Pulmonata). Munis Entomology & Zoology, 5 (1): 286-289**]**

ABSTRACT: The results of the malacofaunal studies in Kâhta, Adıyaman, Turkey are given.

KEYWORDS: Mollusca, land snails, Kâhta, Adıyaman, Turkey.

Turkey is an important zoogeographical region of the Western Palaearctic, situated on the gateway between Europe and Asia and has affinities with the European, Caucasian, Turanian, and Eremial faunas. Owing to this, the Turkish fauna shows external penetration with some local radiation (Cook, 1997). In addition, it has an interesting aquatic and terrestrial mollusc fauna, which is richer than the adjacent areas of Europe and other countries (Demirsoy, 1999). From this point of view the author has started her malacological surveys all around her country in order to contribute additional data to the Turkish malacofauna since 2000. The malacofaunal data reported from the study area was obtained from the author's malacological survey in company with her sister in 2002.

Turkish malacofauna attracted the foreign scientists at the beginning of the 18th century. Some Turkish malacologists have also been publishing the results of their malacofaunal studies in recent years. Meanwhile, there are international joint projects running about the Turkish malacofauna.

The terrestrial gastropods (Mollusca, Gastropoda, Pulmonata) live under the ground litter in the woods, and in the crevices of limestone rocks, castlean walls, and under stones, occasionally in beach debris. Some species prefer damp shady places whereas other species prefer to aestivate on limestone outcrops exposed to sunlight. The troglobiotic and the troglophilic landsnails inhabit the caves. Some of the Blind Snails (Ferussaciidae) are usually found in subterranean environment and they intrusively feed on fungi, molds, algae and decaying organisms (Mienis, 1992; Schütt, 2005).

Since the landsnails are sensetive to climatic and ecological changes, they can be used as indicators of natural climatic conditions. Thus, they are useful for reconstructing past environments (Bar-Yosef Mayer, 2002; Gümüş, 2009). In addition, the malacofaunal data is being used for the studies in the fields of biogeography, phylogeography, biodiversity, ecology and bio-conservation.

The administrative district of Kâhta (Arsemania), is an important archaeological site located in the northeast of Adıyaman. It has an 1488 m^2 area bordering to Gerger (Adıyaman) in the east, Şanlıurfa in the south, and Malatya in the northeast. The streams of Kâhta and Kalburlu reach Atatürk Dam that was built on the valley of Fırat River.

MATERIAL AND METHODS

The gastropod specimens collected from the study area were identified using the existing literature (Schnell, 1979; Gittenberger & Menkhorst, 1991; 1993; Hausdorf, 1996; Neubert et al., 2000; Şeşen & Schütt, 2003; Schütt, 2005). The specimens collected, identified and labelled are being preserved in the author's special mollusc collection. The study area is located at a high altitute of 2500 metres above sea level and surrounded with limestone rocks. The vegetation is consisted of shrubs, brushwood, pistachio, and pine trees. The gastropod species identified during this study are listed below.

Gastropoda, Pulmonata (=Euthyneura), Stylommatophora

Pupilloidea, Orculidae, Orculinae STEENBERG, 1925
***Orculella* STEENBERG, 1925**
***Orculella sirianocoriensis* (MOUSSON, 1854)**

Distribution in Turkey: The Mediterranean, the Eastern, and the Southeast Anatolia regions (İçel, Adana, Hatay, Kahramanmaraş, Gaziantep, Adıyaman, Urfa, Diyarbakır, Mardin, Siirt, Bitlis, Van, Hakkâri).
Range: Cyprus, Turkey, Israel, Lebanon, Syria, Iraq, Iran.
Habitat: On limestone in highlands (Hausdorf, 1996; Schütt, 2005).

Enoidea, Enidae, Eninae, Enini B. B. WOODWARD, 1903 (1880)
***Turanena* LINDHOLM, 1922**
***Turanena forcartiana* P. SCHNELL, 1979**

Distribution in Turkey: The Inner, the Western Black Sea, and the Eastern Anatolia regions (Çorum, Sivas, Kayseri, Malatya, Kâhta-Adıyaman, Tokat).
Range: It is an endemic species for Turkey, and Kâhta-Adıyaman is the "type locality" of this species.
Habitat: In the crevices of the limestone rocks (Schnell, 1979; Gittenberger & Menkhorst, 1993; Schütt, 2005).

Enoidea, Enidae, Eninae, Enini B. B. WOODWARD, 1903 (1880)
***Pseudochondrula* P. HESSE, 1933**
***Pseudochondrula arctespira* (MOUSSON, 1874)**

Distribution in Turkey: The Eastern, and the Southeast Anatolia regions (Malatya, Elazığ, Adıyaman, Gaziantep, Şanlıurfa, Diyarbakır, Mardin).
Range: Between Aleppo (Syria) and the eastern regions of Turkey.
Habitat: Calcareous territories and relictary forests (Schütt, 2005).

Enoidea, Enidae, Buliminae KOBELT, 1880
***Buliminus* H. BECK, 1937**
***Buliminus alepensis* (L. PFEIFFER, 1841)**

Distribution in Turkey: The Mediterranean, the Eastern, and the Southeast Anatolia regions (Hatay, Malatya, Mardin, Elazığ, Siirt, Diyarbakır, Adıyaman, Gaziantep, Kahramanmaraş, Adana).
Range: Turkey, Northern Syria, Lebanon, Israel.
Habitat: Stony, summer-hot, dry localities (Şeşen & Schütt, 2003; Schütt, 2005).

Enoidea, Enidae, Buliminnae KOBELT, 1880
***Pene* PALLARY, 1929**
***Pene sidoniensis edessanus* (KOBELT, 1899)**

Distribution in Turkey: The Mediterranean, and the Southeast Anatolia regions (Adıyaman, Gaziantep, Kahramanmaraş, Şanlıurfa, Diyarbakır).
Range: It is an abundant and a widespread species in suitable habitats from Israel, Western Syria to the uppermost Fırat-Dicle area.
Habitat: Rocky scrub and brushwood, calcareous screes (Gittenberger & Menkhorst, 1991; Schütt, 2005).

Achatinoidea, Ferussaciidae, Ferussaciinae BOURGUIGNAT, 1833
***Cecilioides* FÉRUSSAC, 1814**
***Cecilioides minuta* (MOUSSON, 1874)**

Distribution in Turkey: The Mediterranean, and the Southeast Anatolia regions (Adana, Hatay, Şanlıurfa, Diyarbakır, Mardin). Kâhta, Adıyaman is recorded as "a new locality" for this species in the present study.
Range: Turkey and Syria.
Habitat: Subterranous species, in interstices of sandy soil, feeding on plant roots, mycel, or in the crevices of limestone rocks (Neubert et al., 2000; Schütt, 2005).

Helicoidea, Hygromiidae, Hygromiinae TRYON, 1866
***Xeropicta* MONTEROSATO, 1892**
***Xeropicta* cf. *derbentina* (KRYNICKI, 1836)**

Distribution in Turkey: The Aegean, The Mediterranean, the Inner, the Eastern, and the Southeast Anatolia regions.
Range: It is one of the most widespread and frequent species, unfortunately the boundaries are unknown, caused by uncertain differantiation of similar taxa. The taxa *X. krynickii, X. derbentina, X. vestalis* and *X. smyrnocretica* are closely related, and are possibly the members of a subspecies-complex, which still has to be investigated.
Habitat: This species inhabits of all nature and types, except extremely damp, or wet sites. The limestone soil is preferred (Schütt, 2005).

RESULTS

In conclusion, 6 species and 1 subspecies of land snails are investigated and recorded in this study. In addition, Kâhta, Adıyaman is recorded as "a new locality" for *Cecilioides minuta*. After examining the previous literature it appeared that no malacofaunal data except *Turanena forcartiana* had been recorded already from the study area. The rest of the taxa (*Orculella sirianocoriensis*, *Pseudochondrula arctespira, Buliminus alepensis, Pene sidoniensis edessanus, and Xeropicta* cf. *derbentina*) had been recorded from Adıyaman and its vicinities, besides the exact localities had not been given. Three species that had been recorded from Adıyaman; *Orculella heterostropha* (O. Boettger, 1905), *Eopolita derbentina* (O. Boettger, 1886), and *Assyriella guttata* (Olivier, 1804) were not found during the field surveys. The evaluation of the information coming from the habitats of the species distributed in the study area, confirms the geographical characteristics of the region. The distribution of the species from the study area in Syria, Israel, Lebanon, Iran and Iraq indicates the penetration of the Turanian and the Eremial land snails into the Southeast Anatolia region.

The author hopes very much that this faunal study will be useful for the Turkish malacofaunal database and that there will be young biologists who are willing to study in the field of malacology in the near future in her country.

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SCIENTIFIC NOTE

THE NEARCTIC GENUS *TOREUS* MELANDER, 1906 VS. *TOREUS* PURCELL, 1903: THE NEED FOR A REPLACEMENT NAME (DIPTERA: EMPIDIDAE)

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[Özdikmen, H. & Başar, K. 2010. The nearctic genus *Toreus* Melander, 1906 vs. *Toreus* Purcell, 1903: The need for a replacement name (Diptera: Empididae). Munis Entomology & Zoology, 5 (1): 290**]**

Genus *MELANDERALUS* nom. nov.

Toreus Melander, 1906. Ent. News, 17, 376. (Diptera: Brachycera: Empidoidea: Empididae). Preoccupied by *Toreus* Purcell, 1903. Ann. S. Afr. Mus., 3, 9. (Arachnida: Solifugae: Ceromidae).

Remarks on nomenclatural changes: The genus *Toreus* was erected by Purcell (1903) for a solifugae genus with the type species *Ceroma capensis* Purcell, 1899 from S Africa. It is still used as a valid genus name. It has no any generic synonym. It is monotypic genus now.

Subsequently, the same genus name was proposed by Melander (1906) for a nearctic fly with the type species *Empis neomexicanus* Melander, 1902 in the family Empididae. It is still used as a valid genus name (Sinclair & Cumming, 2006). However, according to some authors, the status of genus *Toreus* is ambiguous. It has no any generic synonym. It is monotypic genus now.

Thus, the genus *Toreus* Melander, 1906 is a junior homonym of the genus *Toreus* Purcell, 1903. According to Article 60 of the International Code of Zoological Nomenclature, we propose for the genus *Toreus* Melander, 1906 the new replacement name *Melanderalus* **nom. nov.**

Etymology: This name is dedicated to A. L. Melander who is current author of the preexisting genus *Toreus*.

Summary of nomenclatural changes:
Melanderalus **nom. nov.**
pro *Toreus* Melander, 1906 (nec Purcell, 1903).
Melanderalus neomexicanus (Melander, 1902) **comb. nov.**
from *Melanderalus neomexicanus* (Melander, 1902)
Empis neomexicanus Melander, 1902
Distribution: Nearctic.

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SCIENTIFIC NOTE

A NOMENCLATURAL CHANGE FOR THE PREOCCUPIED FOSSIL GENUS NAME *FAVUS* LAVIANO & SKELTON, 1992 (MOLLUSCA: BIVALVIA: RADIOLITIDAE)

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[**Özdikmen, H.** 2010. A nomenclatural change for the preoccupied fossil genus name *Favus* Laviano & Skelton, 1992 (Mollusca: Bivalvia: Radiolitidae). Munis Entomology & Zoology, 5 (1): 291-292**]**

Family RADIOLITIDAE
Genus *TEKIRDAGENSIS* nom. nov.

Favus Laviano & Skelton, 1992. Geol. Rom. 28: 62. (Mollusca: Bivalvia: Heterodonta: Heterodonta: Hippuritoida: Hippuritacea: Radiolitidae). Preoccupied by *Favus* Lanchester, 1900. Proc. zool. Soc. London, 1900, 767. (Crustacea: Decapoda: Leucosioidea: Leucosiidae: Ebaliinae).

Firstly, Schafhaeutl (1850) proposed the genus name *Favus*. According to "Official Lists and Indexes of Names in Zoology" of ICZN, *Favus* Schafhaeutl, 1850, *Geogn. Unters. Südbay, Alpengeb.*: 44 suppressed under the plenary power for the purposes of both the Principle of Priority and the Principle of Homonymy (Direction 24).

Then, the crustacean genus *Favus* was described by Lanchester (1900) with the type species *Favus granulatus* Lanchester, 1900. According to "Official Lists and Indexes of Names in Zoology" of ICZN, *Favus* Lanchester, 1900, *Proc. zool. Soc. London*, 1900: 767 conserved under the plenary power (Op. 73, Direction 25 available). So it is still used as a valid genus name in Decapoda (Crustacea) (e.g. Ng et al., 2008).

Later, Laviano & Skelton (1992) erected the fossil genus *Favus* with the type species *Favus antei* Laviano & Skelton, 1992 from Çerkezköy (Tekirdağ province), which is in a Campanian shallow subtidal limestone in Turkey. It is still used as a valid generic name in Hippuritoida (Bivalvia).

Thus, the genus *Favus* Laviano & Skelton, 1992 is a junior homonym of *Favus* Lanchester, 1900. So I propose *Tekirdagensis* as a replacement name for *Favus* Laviano & Skelton, 1992.

Etymology: The name is derived from the type locality name "Tekirdağ".

Summary of nomenclatural changes:

Tekirdagensis **nom. nov.**
pro *Favus* Laviano & Skelton, 1992 (non Lanchester, 1900; nec Schafhaeutl, 1850)

Tekirdagensis antei (Laviano & Skelton, 1992) **comb. nov.**
from *Favus antei* Laviano & Skelton, 1992

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Lanchester, F. W. 1900. On a collection of Crustacea made at Singapore and Malacca. – Part I. Crustacea, Brachyura. Proceedings of the Zoological Society of London, 1900: 719-770.

Laviano, A. & Skelton, P. W. 1992. *Favus antei*, a new genus and species of a bizarre "big cell" radiolitid from the Upper Cretaceous of eastern Tethys. Geologica Romana, 28: 61-77.

Ng, P. K. L., Guinot, D. & Davie, P. J. F. 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. The Raffles Bulletin of Zoology, 17: 1-286.

Schafhaeutl, K. E. 1850. Geognostische Untersuchungen des südbayerischen Alpengebirges. München, p. 44.

SCIENTIFIC NOTE

BRASILOMYIA NOM. NOV., A NEW NAME FOR THE PREOCCUPIED TACHINID GENUS *PLATYPHASMIA* TOWNSEND, 1935 (DIPTERA: TACHINIDAE)

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[Özdikmen, H. 2010. *Brasilomyia* nom. nov., a new name for the preoccupied tachinid genus *Platyphasia* Townsend, 1935 (Diptera: Tachinidae). Munis Entomology & Zoology, 5 (1): 293-294**]**

Family TACHINIDAE
Genus *BRASILOMYIA* nom. nov.

Platyphasia Townsend, 1935. Rev. Ent. Rio de Janeiro, 5, 216. (Insecta: Diptera: Tachinidae: Phasiinae: Trichopodini). Preoccupied by *Platyphasia* Skuse, 1890. Proc. Linn. Soc. N.S. Wales, (2) 5, 84. (Insecta: Diptera: Tipulidae).

Remarks on nomenclatural change: Townsend (1935) described the monotypic genus *Platyphasia* for a Neotropical tachinid fly with the type species *Platyphasia similis* Townsend, 1935 from Brasil (São Paulo, São Vicente). It is stil used as a valid genus name (e.g. Toma & Nihei, 2006; O'hara, 2008).

Unfortunately, the generic name was already preoccupied by Skuse (1890), who had described the Australian genus *Platyphasia* for a crane fly with the type species *Platyphasia princeps* Skuse, 1890. It is still used as a valid genus name in the family Tipulidae (e.g. Oosterbroek, 2007). Oosterbroek (2007) gave 7 species within the genus as *P. eximia* Alexander, 1928 [Australia (NSW)], *P. pictonensis* Dobrotworsky, 1971 [Australia (Tas)], *P. princeps* Skuse, 1890 [Australia (NSW)], *P. rawlinsoni* Dobrotworsky, 1971 [Australia (NSW)], *P. regina* Alexander, 1922 [Australia (NSW) and Australia (Qld)], *P. tasmaniensis* Dobrotworsky, 1971 [Australia (Tas)] and *P. wilsoni* Alexander, 1929 [Australia (Vic)].

Thus, the genus name *Platyphasia* Townsend, 1935 is a junior homonym of the genus name *Platyphasia* Skuse, 1890. So I propose a new replacement name *Brasilomyia* **nom. nov.** for *Platyphasia* Townsend, 1935.

Etymology: This name is dedicated to the type locality of the type species, *Platyphasia similis* Townsend, 1935.

Summary of nomenclatural changes:

Brasilomyia **nom. nov.**
pro *Platyphasia* Townsend, 1935 (non Skuse, 1890)

Brasilomyia similis (Townsend, 1935) **comb. nov.**
from *Platyphasia similis* Townsend, 1935

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Oosterbroek, P. 2007. Family Tipulidae. In: Evenhuis, N. L. (ed.), Catalog of the Diptera of the Australasian and Oceanian Regions. Online version. Available from: http://hbs.bishopmuseum.org/aocat/tipulidae.html (Last accessed: 224.05.2007)

Skuse, F. A. A. 1890. Diptera of Australia. Part VIII. The Tipulidae longipalpi. Proceedings of the Linnean Society of New South Wales, 5 (2): 53–139.

Toma, R. & Nihei, S. S. 2006. Catálogo do material-tipo de Tachinidae (Diptera) depositado no Museu de Zoologia da Universidade de São Paulo. Revista Brasileira de Entomologia, 50 (2): 240-256.

Townsend, C. H. T. 1935. New South American oestroidea (Dipt.). Revista de Entomologia, 5: 216–233.

SCIENTIFIC NOTE

A COMMENT ON IRANIAN ENSIGN WASPS (HYMENOPTERA: EVANOIDEA: EVANIIDAE)

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[**Ghahari, H. & Deans, A. R.** 2010. A Comment on Iranian Ensign Wasps (Hymenoptera: Evanoidea: Evaniidae). Munis Entomology & Zoology, 5 (1): 295-296]

Insects in the family Evaniidae (Hymenoptera: Evanioidea) develop as solitary egg predators within the oothecae of cockroaches (Dictyoptera: Blattaria). A total of 439 extant (plus 19 fossil) species and 21 extant (plus 11 fossil) genera are recognized as valid. The superfamily Evanioidea is monophyletic and sister to Ceraphronoidea + Proctotrupoidea + Platygastroidea + Cynipoidea + Chalcidoidea (Deans 2005, Deans & Huben 2003, Deans & Kawada 2008). The fauna of these beneficial insects has not been studied in Iran very well and the single paper is Tirgari (1975) with two species from one genus. With attention to many ambiguities in Iranian insects fauna and especially preventing the probable scientific mistakes, revising the old data which have been fundamentally changed is very necessary. Therefore, the poor fauna of Iranian Evaniidae is discussed in this paper. Two ensign wasps including, *Evania caspia* Eichwald 1830 and *Evania cribrata* Semenow 1892 were collected by the first author and other researchers from many regions of Iran. The voucher specimens are deposited in the collections of the authors.

Genus *Evania* Fabricius, 1775

Type species: *Sphex appendigaster* (Linnaeus), designated by Latreille (1810).
Number of valid species: 67 (33 confirmed spp. + 34 spp. incertae sedis).

Evania caspia Eichwald 1830

Syn.: *Evania dimidiata* Spinola, 1838; *Evania abyssinica* Westwood, 1841; *Evania thoracica* Guérin-Méneville 1844; *Evania dimidiata* var. *rufa* Magretti, 1884; *Evania dimidiata dimidiata* Kieffer, 1912; *Evania* (*Evania*) *dimidiata*: Hedicke 1939.
Distribution in Iran (Provinces): East Azarbaijan, Golestan, Guilan, Isfahan, Markazi, Mazandaran, Semnan, Tehran.
Distribution outside Iran: Azerbaijan, Egypt, Ethiopia, Israel, Libya, Sudan, Transcaucuses, Turkmenistan.
Material examined: Semnan province: Damghan, iv.2001 (1 specimen), leg. H. Sakenin, det. A. Deans; Golestan province: Gorgan, v.2003 (2 specimens), leg. H. Ghahari, det. A. Deans; Semnan province: Semnan, iv.2005 (4 specimens), leg. H. Sakenin, det. A. Deans; Tehran province: Shahreyar, vii.2006 (3 specimens), leg. H. Ghahari, det. A. Deans; East Azarbaijan province: Ahar, viii.2006 (2 specimens), leg. M. Havaskary, det. A. Deans; Mazandaran province: Ghaemshahr, vi.2006 (3 specimens), leg. H. Ghahari, det. A. Deans.
Comment: *Evania caspia* Eichwald 1830 was listed as a potential synonym of *Evania dimidiata* Spinola, 1838 by Dalla Torre (1902) and was later formally synonymized by Hedicke (1939). Dalla Torre and Hedicke both treated *dimidiata* as the name with priority. Eichwald (1830), however, published his name prior to Spinola (1838), and the correct name for this species should be *Evania caspia* Eichwald. *Evania dimidiata* Spinola does not

satisfy ICZN condition 23.9.1.2 for reversal of precedence and is a junior synonym of *Evania caspia* Eichwald (Deans 2005).

Evania cribrata Semenow 1892

Syn.: *Evania schlettereri* Kohl, 1892; *Evania schlettererii* {sic}: Dalla Torre 1902; *Evania* subg. *Evania cribrata*: Hedicke 1939.
Distribution in Iran (Provinces): East Azarbaijan, Isfahan, Khuzestan, Mazandaran, West Azarbaijan, Yazd.
Distribution outside Iran: Armenia, Azerbaijan, Georgia, Russia (Caucuses and Transcaucuses).
Material examined: Mazandaran province: Ghaemshahr, vi.2006 (1 specimen), leg. H. Ghahari, det. A. Deans; East Azarbaijan province: Arasbaran, viii.2006 (1 specimen), leg. M. Havaskary, det. A. Deans.

Iran is a large country and also with diverse fauna of cockroaches as the main hosts of ensign wasps. Therefore, more species of Evaniidae is expected for Iranian fauna which can be surveyed by researchers as an interesting research and valuable topic.

ACKNOWLEDGEMENTS

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SCIENTIFIC NOTE

TABACHNICKIA NOM. NOV., A NEW NAME FOR THE PREOCCUPIED SPONGE GENUS *PLATELLA* TABACHNICK, 1988 (PORIFERA: HEXACTENELLIDA)

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[Özdikmen, H. 2010. *Tabachnickia* nom. nov., a new name for the preoccupied sponge genus *Platella* Tabachnick, 1988 (Porifera: Hexactenellida). Munis Entomology & Zoology, 5 (1): 297-298**]**

Family HYALONEMATIDAE
Genus *TABACHNICKIA* nom. nov.

Platella Tabachnick, 1988. In Academy of Sciences of the USSR. Structural and functional researches of the marine benthos. Academy of Sciences of the USSR, Moscow: 52. (Porifera: Hexactenellida: Amphidiscophora: Amphidiscosida: Hyalonematidae). Preoccupied by *Platella* Coryell & Fields, 1937. Amer. Mus. Novit., no. 956, 3. (Crustaceae: Ostracoda: Podocopa: Platycopida: Platycopina: Cytherelloidea: Cytherellidae).

Remarks on nomenclatural change: Tabachnick (1988) described a monotypic genus *Platella* for a sponge with the type species *Platella polybasalia* Tabachnick, 1988 by the original designation from Central Pacific. It is stil used as a valid genus name (e.g. Tabachnick & Menshenina, 2002).

Unfortunately, the generic name was already preoccupied by Coryell & Fields (1937), who had described the genus *Platella* for a fossil ostracod with the type species *Platella gatunensis* Coryell & Fields, 1937 from Panama. Then Puri (1960) described a new species in the genus as *Platella mulleri* Puri, 1960. It was assigned to Cytherellidae by Benson et al. (1961); and to Platycopida by Sepkoski (2002).

Thus, the genus name *Platella* Tabachnick, 1988 is a junior homonym of the genus name *Platella* Coryell & Fields, 1937. So I propose a new replacement name *Tabachnickia* **nom. nov.** for *Platella* Tabachnick, 1988.

Etymology: This name is dedicated to K. R. Tabachnick who is current author of the genus *Platella*.

Summary of nomenclatural changes:

Tabachnickia **nom. nov.**
pro *Platella* Tabachnick, 1988 (non Coryell & Fields, 1937)

Tabachnickia polybasalia (Tabachnick, 1988) **comb. nov.**
from *Platella polybasalia* Tabachnick, 1988

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Tabachnick, K. R. 1988. Hexactinellid sponges from the mountains of the West Pacific. Pp. 49-64, 123. In: Shirshov, P. P. (Ed.), Structural and Functional Researches of the Marine Benthos. Academy of Sciences of the USSR: Moscow.

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SCIENTIFIC NOTE

NURAYA NOM. NOV., A SUBSTITUTE NAME FOR THE PREOCCUPIED GENUS *MICROTRIGONIA* NAKANO, 1957 (BIVALVIA: TRIGONIIDAE)

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[Özdikmen, H. & Akbulut, A. 2010. *Nuraya* nom. nov., a substitute name for the preoccupied genus *Microtrigonia* Nakano, 1957 (Bivalvia: Trigoniidae). Munis Entomology & Zoology, 5 (1): 299-300**]**

Family TRIGONIIDAE
Genus *NURAYA* nom. nov.

Microtrigonia Nakano, 1957. Jap. J. Geol. Geogr. 28: 116, 117. (Bivalvia: Palaeoheterodonta: Trigonioida: Trigoniacea: Trigoniidae). Preoccupied by *Microtrigonia* Förster, 1903. Ann. Mus. Hungar., 1, 524. (Insecta: Odonata: Anisoptera: Libelluloidea: Libellulidae).

Förster (1903) established the dragonfly genus *Microtrigonia* with the type species *Microtrigonia marsupialis* Förster, 1903 from New Guinea. It is still used as a valid genus name in Odonata. The genus has three species as *Microtrigonia gomphoides* Lieftinck, 1933; *Microtrigonia marsupialis* Förster, 1903 and *Microtrigonia petaurinia* Lieftinck, 1949.

Subsequently, the genus name *Microtrigonia* was proposed by Nakano (1957) for fossil trigoniids with the type species *Microtrigonia amanoi* Nakano, 1957 from Japan. It is still used as a valid genus name in Trigoniidae. The genus has four species.

Thus, the genus name *Microtrigonia* Nakano, 1957 is a junior homonym of *Microtrigonia* Förster, 1903. So we peopose *Nuraya* **nom. nov.** as a replacement name for *Microtrigonia* Nakano, 1957.

Etymology: The name is dedicated to Prof. Dr. Nuray Akbulut (Turkey) who is wife of the second author. Gender is feminine.

Summary of nomenclatural changes:

Nuraya **nom. nov.**
pro *Microtrigonia* Nakano, 1957 (non Förster, 1903)

Nuraya amanoi (Nakano, 1957) **comb. nov.**
from *Microtrigonia amanoi* Nakano, 1957

Holotype from Ukimizu, Kashima (Shimokoshiki), Kagoshima Pref.
Age and distribution: Santonian or Campanian. Himenoura group (upper part) in Shi mokoshiki island.

Nuraya minima (Nakano, 1957) **comb. nov.**
from *Microtrigonia minima* Nakano, 1957

Holotype from Mitsukawa, Sumoto (Awaji), Hyogo Pref.
Age and distribution: Campanian-Maestrichtian. Izumi group (Shichi shale and Kitaama sandstone and shale) in Awaji island.

Nuraya tuberculata (Nakano, 1957) **comb. nov.**
from *Microtrigonia tuberculata* (Nakano, 1957)
Apiotrigonia tuberculata Nakano, 1957

Holotype from Hansanji, Seidan (Awaji), Hyogo Pref.
Age and distribution: Campanian. Izumi group (Shichi shale) in Awaji island.

Nuraya imutensis (Tashiro, 1972) **comb. nov.**
from *Microtrigonia imutensis* Tashiro, 1972

Holotype from Ukimizu, Kashima (Shimokoshiki), Kagoshima Pref.
Age and distribution: Santonian or Campanian, Himenoura group (upper part) in Shi mokoshiki island.

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SCIENTIFIC NOTE

A SUBSTITUTE NAME FOR THE PREOCCUPIED GENUS *BRACHYLEPIS* KARPENKO & GULYAEV, 1999 (CESTODA: CYCLOPHYLLIDEA: HYMENOLEPIDIDAE)

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[**Özdikmen, H.** 2010. A substitute name for the preoccupied genus *Brachylepis* Karpenko & Gulyaev, 1999 (Cestoda: Cyclophyllidea: Hymenolepididae). Munis Entomology & Zoology, 5 (1): 301-302]

Family HYMENOLEPIDIDAE
Genus *NOVOBRACHYLEPIS* nom. nov.

Brachylepis Karpenko & Gulyaev, 1999. Parazitologiya (St Petersb) 33 (5), 417. (Cestoda: Cyclophyllidae: Hymenolepididae: Hymenolepidinae). Preoccupied by *Brachylepis* Kolbe, 1894. Ann. Soc. ent. Belgique, 38, 552, 560. (Insecta: Coleoptera: Scarabaeidae: Melolonthinae).

Remarks: Kolbe (1894) described the monotypic African genus *Brachylepis* with the type species *Coniopholis elephas* Gerstäcker, 1867 from E Africa (Endara) in Melolonthinae. It is stil used as a valid genus name (e.g. Harrison, 2009).

Later, Karpenko & Gulyaev (1999) described the genus *Brachylepis* with the type species *Mathevolepis morosovi* Karpenko, 1994 by original designation from Russia associated with common shrews (*Sorex*) in Siberia and Russian Far East. Three species were removed from the genus *Mathevolepis* and were transfered to the genus *Brachylepis* by Karpenko & Gulyaev (1999) as *Brachylepis morosovi* (Karpenko, 1994), *B. sorextscherskii* (Morosov, 1957) and *B. triovaria* (Karpenko, 1990). Then, the species, *B. gulyaevi* was described by Kornienko & Lykova (2005) from shrews (*Sorex*) of the North-Eastern Altai.

Thus, the genus group names *Brachylepis* Karpenko & Gulyaev, 1999 is a junior homonym of the genus *Brachylepis* Kolbe, 1894. So I propose a new replacement name *Novobrachylepis* **nom. nov.** for *Brachylepis* Karpenko & Gulyaev, 1999. The name is from the Latin prefix "novo" (meaning "new" in English).

Summary of nomenclatural changes:
Novobrachylepis **nom. nov.**
    pro *Brachylepis* Karpenko & Gulyaev, 1999 (non Kolbe, 1894)
Novobrachylepis gulyaevi (Kornienko & Lykova, 2005) **comb. nov.**
    from *Brachylepis gulyaevi* Kornienko & Lykova, 2005
Novobrachylepis morosovi (Karpenko, 1994) **comb. nov.**
    from *Brachylepis morosovi* (Karpenko, 1994)
Novobrachylepis sorextscherskii (Morosov, 1957) **comb. nov.**
    from *Brachylepis sorextscherskii* (Morosov, 1957)
Novobrachylepis triovaria (Karpenko, 1990) **comb. nov.**
    from *Brachylepis triovaria* (Karpenko, 1990)

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Karpenko, S. V. & Gulyaev, V. D. 1999. *Brachylepis* gen. n.- a new genus of cestodes (Cyclophyllidea: Hymenolepididae) from shrews in Siberia and the Far East. Parazitologiia, 33 (5): 410-419.

Kolbe, H. J. 1894. Beiträge zur Kenntniss der Melolonthiden. Annales de la Société Entomologique de Belgique, 38: 548-577.

Kornienko, S. A. & Lykova, K. A. 2005. *Brachylepis gulyaevi* nov. sp. (Cestoda: Cyclophyllidea: Hymenolepididae) - a new species of cestodes from shrews of the North-Eastern Altai. Parazitologiia, 39 (3): 252-256.

SCIENTIFIC NOTE

DAYMFUS NOM. NOV., A SUBSTITUTE NAME FOR THE PREOCCUPIED GENUS *STRZELECKIA* DAY, 1999 (HEMIPTERA: MEMBRACIDAE)

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[**Özdikmen, H. & Demir, E.** 2010. *Daymfus* nom. nov., a substitute name for the preoccupied genus *Strzeleckia* Day, 1999 (Hemiptera: Membracidae). Munis Entomology & Zoology, 5 (1): 303]

Family MEMBRACIDAE
Genus *DAYMFUS* nom. nov.

Strzeleckia Day, 1999. Invertebr. Taxon 13 (4): 718. (Insecta: Hemiptera: Membracidae: Centrotinae: Terentiini). Preoccupied by *Strzeleckia* Cribb & Spratt, 1991. Syst. Parasitol. 19 (1): 74. (Digenea: Hasstilesiidae).

Remarks: Day (1999) described the monotypic Australian genus *Strzeleckia* with the type species *Strzeleckia montanus* Day, 1999 by original designation from New South Wales (Australia) in Hemiptera.

Later, Cribb & Spratt (1991) also described the monotypic genus *Strzeleckia* with the type species *Strzeleckia major* Cribb & Spratt, 1991 by original designation from Australia in Digenea.

Thus, the genus group name *Strzeleckia* Day, 1999 is a junior homonym of the genus *Strzeleckia* Cribb & Spratt, 1991. So I propose a new replacement name *Daymfus* **nom. nov.** for *Strzeleckia* Day, 1999. The name is dedicated M. F. Day who is the current author of the preexisting genus *Strzeleckia*.

Summary of nomenclatural changes:

Daymfus **nom. nov.**
pro *Strzeleckia* Day, 1999 (non Cribb & Spratt, 1991)

Daymfus montanus (Day, 1999) **comb. nov.**
from *Strzeleckia montanus* Day, 1999

LITERATURE CITED

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SCIENTIFIC NOTE

A NECESSARY CHANGE FOR THE PREOCCUPIED FOSSIL GENUS NAME *PLATYCHITON* HOARE, 2001 (MOLLUSCA: POLYPLACOPHORA)

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[Özdikmen, H. 2010. A necessary change for the preoccupied fossil genus name *Platychiton* Hoare, 2001 (Mollusca: Polyplacophora). Munis Entomology & Zoology, 5 (1): 304**]**

Family LEPIDOPLEURIDAE
Genus *HOAREUS* nom. nov.

Platychiton Hoare, 2001. J. Paleontol. 75 (1), Jan: 67. (Mollusca: Polyplacophora: Lepidopleurida: Lepidopleuridae). Preoccupied by *Platychiton* Beier, 1960. Tierreich 74: 258. (Insecta: Orthoptera: Ensifera: Tettigonioidea: Tettigoniidae: Pseudophyllinae).

The neotropical katydid genus *Platychiton* was described by Beier (1960) with the type species *Platychiton surinamus* Beier, 1960 from Surinam. It is still used as a valid genus name in Orthoptera. It has three species as *Platychiton amazonicus* Beier, 1960 from Brazil, *Platychiton brunneus* Beier, 1960 from Guyana and *Platychiton surinamus* Beier, 1960.

Subsequently, Hoare (2001) erected the fossil mollusc genus *Platychiton* with the type species *Platychiton gerki* Hoare, 2001 from the Missisippian (Osagean) of Iowa in USA. He gave the species *Platychiton*? *dalriensis* (Etheridge, 1882) as the other species with a question mark in his work.

Thus, the genus *Platychiton* Hoare, 2001 is a junior homonym of the genus *Platychiton* Beier, 1960. So I propose *Hoareus* **nom. nov.** as a replacement name for *Platychiton* Hoare, 2001.

Etymology: The name is dedicated to R. D. Hoare who is the author of the preexisting genus *Platychiton*.

Summary of nomenclatural changes:
Hoareus **nom. nov.**
    pro *Platychiton* Hoare, 2001 (non Beier, 1960)
Hoareus gerki (Hoare, 2001) **comb. nov.**
    from *Platychiton gerki* Hoare, 2001
Hoareus? *dalriensis* (Etheridge, 1882) **comb. nov.**
    from *Platychiton*? *dalriensis* (Etheridge, 1882)

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SCIENTIFIC NOTE

CROWNOCEPHALUS NOM. NOV., A NEW NAME FOR THE PREOCCUPIED GENERIC NAME *SIMOCEPHALUS* (*CORONOCEPHALUS*) ORLOVA-BIENKOWSKAJA, 1995 (CLADOCERA: DAPHNIIDAE)

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[**Özdikmen, H. & Akbulut, N.** 2010. *Crownocephalus* nom. nov., a new name for the preoccupied generic name *Simocephalus* (*Coronocephalus*) Orlova-Bienkowskaja, 1995 (Cladocera: Daphniidae). Munis Entomology & Zoology, 5 (1): 305-306**]**

Family DAPHNIIDAE
Genus *CROWNOCEPHALUS* nom. nov.

Coronocephalus Orlova-Bienkowskaja, 1995. Zool. Zh. 74 (8), Avgust: 58. (Branchiopoda: Phyllopoda: Diplostraca: Cladocera: Anomopoda: Daphniidae: Daphniinae: *Simocephalus*). Preoccupied by *Coronocephalus* Grabau, 1924. Stratigraphy of China, 1, Palaeozoic & Older, Geol. Surv. China, 438. (Trilobita: Phacopida: Encrinuridae).

Grabau (1924) erected the trilobite genus *Coronocephalus* with the type species *Encrinurus* (*Coronocephalus*) *rex* Grabau, 1924 from Kaochiapien Sh, Jiangsu, China. It is still used as a valid genus name in Trilobita (e.g. Jell & Adrain, 2002).

Subsequently, the genus group name *Coronocephalus* was proposed by Orlova-Bienkowskaja (1995) for a subgenus of the cladoceran genus *Simocephalus* Schoedler, 1858. It is still used as a valid generic name in Cladocera (e.g. Orlova-Bienkowskaja, 1998, 2001). The subgenus has three species.

Thus, the genus group name *Coronocephalus* Orlova-Bienkowskaja, 1995 is a junior homonym of *Coronocephalus* Grabau, 1924. So we peopose *Crownocephalus* **nom. nov.** as a replacement name for *Coronocephalus* Orlova-Bienkowskaja, 1995.

Etymology: The name is derived from the English word "crown".

Summary of nomenclatural changes:

Crownocephalus **nom. nov.**
pro *Coronocephalus* Orlova-Bienkowskaja, 1995 (non Grabau, 1924)

Simocephalus (*Crownocephalus*) *mirabilis* Orlova-Bienkowskaja, 1995 **comb. nov.**
from *Simocephalus* (*Coronocephalus*) *mirabilis* Orlova-Bienkowskaja, 1995

Simocephalus (*Crownocephalus*) *semiserratus* Sars, 1901 **comb. nov.**
from *Simocephalus* (*Coronocephalus*) *semiserratus* Sars, 1901

Simocephalus (*Crownocephalus*) *serrulatus* (Koch, 1841) **comb. nov.**
from *Simocephalus* (*Coronocephalus*) *serrulatus* (Koch, 1841)

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SCIENTIFIC NOTE

SEVEN SPECIES AS NEW RECORDS FOR HOVER FLIES FAUNA OF IRAN (DIPTERA, SYRPHIDAE) FROM QARADAG FORESTS

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[**Khaghaninia, S., Pour Abad, R. F., Hayat, R.** 2010. Seven species as new records for hover flies fauna of Iran (Diptera, Syrphidae) from Qaradag Forests. Munis Entomology & Zoology, 5 (1): 307-308]

Syrphidae is one of the largest families of the order Diptera with more than 6000 described species over the world. This large family consists of small to medium flies 6- 18 mm long, most of which have yellow and black striped bodies resembling bees or wasps. Adults often hover near flowers and feed on nectar and pollen (Faegri and van der Pijl, 1979 and Sarıbıyık, 2003). These floral resources enhance the longevity and fecundity of adult flies (Topham and Beardsley, 1975). These flies are common pollinators almost wherever flowers are found. Larvae are pale green to yellow maggots resembling slugs which pupate on plants or in the soil enclosed in a puparium. Larvae pray on aphids, scales and other insects. They may consume up to 400 aphids as larvae so they are good natural enemies particularly in the Syrphinae subfamily. Recently, the fauna of syrphids has been studied by the related taxonomists in Iran (Khiaban et al. 1998, Alichi et al. 2002, Gharali et al. 2002, Goldasteh et al. 2002, Gilasian, 2005). Checklists of Iranian hover flies were listed by Peck (1988) and Dousti and Hayat (2006). Unfortunately, so far the syrphid fauna of Qaradag forests, registered biosphere in East Azarbaijan province, has not been well known thus it is the subject of this present study. Studied specimens were collected twice a month, during 2009. Flies were caught using common handy entomological net and malaise trap in 35 localities which are situated in forests as well as grasslands in studied area. The identification was made up to the specific level with the help of relevant literature such as Bei- Bienko (1988), Stubbs and Falk (2002) and Lyneborg and Barkemeyer (2005). Seven species introduced for Iran Syrphid fauna as new records by present study which are listed as follows:

Cheilosia aerea Dufour, 1848
Cheilosia cumanica Szilády, 1938
Chrysogaster basalis Loew, 1857
Eumerus lucidus Loew, 1848

Melanogaster nuda (Macquart, 1829)
Merodon aberrans Egger, 1860
Pipizella divicoi (Goeldlin de Tiefenau, 1974)

The authors express their sincere thanks to Dr. Claus Claussen (Flensburg, Germany) who kindly identified and confirmed the species.

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Dousti, A. F. & Hayat, R. 2006. A catalogue of the Syrphidae (Insecta: Diptera) of Iran. J. Entomol. Res. Soc., 8 (3): 5-38.

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SCIENTIFIC NOTE

FIRST RECORD FOR SEVEN SPECIES OF LEAF BUGS (HEMIPTERA, MIRIDAE) FOR IRAN INSECT FAUNA FROM EAST AZARBAYJAN PROVINCE

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[**Khaghaninia, S., Pour Abad, R. F., Askari, O.** 2010. First record for seven species of leaf bugs (Hemiptera, Miridae) for Iran insect fauna from East Azarbayjan province. Munis Entomology & Zoology, 5 (1): 309-310]

Miridae, leaf bugs or plant bugs, is the largest family in the order of Hemiptera, consisting of about 800 genera and several thousand species throughout the world so that its members are to be found on vegetation almost everywhere. Some are very abundant, most species are plant feeders, but a few are predaceous on other insects. Some of the plant-feeding species are pests of cultivated plants (Krezhner & Yachevski, 1964 and Lodos & Önder, 1986). The Miridae are diurnal but are occasionally attracted to light (Miller, 1971). Members of this group can be recognized by the presence of a cuneus and only one or two closed cells at the base of the membrane (Linnavuori, 1965 and Borror et al., 1989). They are variously coloured, but mostly pale. After the final ecdysis when the insect becomes adult the colour develops gradually. They are generally rather delicate, soft-bodied insects, usually between 3 and 10 millimeters in length, with four-segmented rostrum and three-segmented tarsi, having large eye but no ocelli (Lodos, 1982 and Dolling & Palmer, 1991).

Recently, some studies have been carried out on Heteroptera particularly on mirids in Iran (Hosseini et al., 2002, Sedghian et al., 2004, Yarmand et al., 2004 and Askari et al., 2009). A survey was conducted on Heteroptera fauna of East Azarbayjan province, located in north west part of Iran, during 2009. The verified specimens were collected by sweeping handy entomological net and malaise trap from different localities of studied area particularly Qaradag forests and Gunber valley. Seven species of mirids are introduced newly for Iran insect fauna by the present study and are listed as follows:

Leptopterna ferrugata (Fallen, 1807)
Stenodema calcarata (Fallen, 1807)
Mermitelocerus schmidtii (Fieber, 1836)
Hadrodemus m-flavum Fabricius, 1781
Globiceps flavomaculatus (Fabricius, 1794)
Exentricus planicornis (H-S., 1836)
Hadrodemus noualhieri (Reuter, 1896)

The authors acknowledge the help of Dr. Meral Fent (University of Trakya, Edirne, Turkey) who kindly verified and confirmed the species.

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Dolling, W. R. & Palmer, J. M. 1991. Biology of the plant bugs (Hemiptera: Miridae): pests, predators, opportunists. Cornell University Press. 355 pp.

Hosseini, R., Sahragard, A., Hajizade, J. & Linnavori, R. E. 2002. Taxonomic Investigation on Miridae family in Guilan province. 15th Iranian plant protection congress, 1.307.

Kerzhner, I. M. & Yachevski, T. I. 1964. "Order Hemiptera (Heteroptera), 851-1118" In: Keys to insects of the European USSR.Vol.1, Apterygota, Paleoptera, Hemimetabola (Ed.G.Ya.Bei-Bienko). Israel Program for Scientific Translation Ltd, 1214 pp.

Linnavuori, R. E. 1965. Studies on the South and East Mediterranean Hemipterous Fauna. 67 pp.

Lodos, N. 1982. Entomology of Turkey. Vol. II. General applied, Faunistic, Egean Universitesi Matbasi. 472 pp.

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Yarmand H., Sadeghi, S. E., Asgari, H., Mehrabi, A. & Matocq, A. 2004. Diversity of some Miridae (Heteroptera) species associated with forests and rangelands of Iran, 16th Iranian plant protection congress, 1.154

SCIENTIFIC NOTE

NEW SYNONYMS IN CICADELLIDAE (HEMIPTERA)

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[**Özdikmen, H. & Demir, E.** 2010. New synonyms in Cicadellidae (Hemiptera). Munis Entomology & Zoology, 5 (1): 311]

In the family Cicadellidae, the generic names *Suarezia* Linnavuori & DeLong, 1978 and *Nollia* Hamilton, 1983 are invalid, as they are junior homonyms of the names *Suarezia* Budde-Lund, 1904 in Isopoda (Crustacea) and *Nollia* Eisenack, 1979 in Protozoa respectively. A replacement name *Suarezilinna* was proposed by McKamey (2003) instead of *Suarezia* Linnavuori & DeLong, 1978 and a replacement name *Lonnia* was proposed by McKamey (2005) instead of *Nollia* Hamilton, 1983 for this purpose. Recently, Özdikmen & Demir (2008) proposed unnecessarily new names, *Neosuarezia* for *Suarezia* Linnavuori & DeLong, 1978 nec *Suarezia* Budde-Lund, 1904 and *Nallia* for *Nollia* Hamilton, 1983 nec *Nollia* Eisenack, 1979.

So *Neosuarezia* Özdikmen & Demir, 2008 and *Nallia* Özdikmen & Demir, 2008 are junior objective synonyms of *Suarezilinna* McKamey, 2003 *and Lonnia* McKamey, 2005; therefore, they can not be used validly for taxa under the Law of Priority of the ICZN. Consequently, we proposed here *Neosuarezia* Özdikmen & Demir, 2008 and *Nallia* Özdikmen & Demir, 2008 as invalid names and junior objective synonyms of *Suarezilinna* McKamey, 2003 and *Lonnia* McKamey, 2005.

Cicadellidae
Deltocephalinae
Athysanini
Suarezilinna McKamey, 2003
= *Suarezia* Linnavuori & DeLong, 1978 nec *Suarezia* Budde-Lund, 1904
= *Neosuarezia* Özdikmen & Demir, 2008 (**syn. n.**)

Macropsinae
Neopsini
Lonnia McKamey, 2005
= *Nollia* Hamilton, 1983 nec *Nollia* Eisenack, 1979
= *Nallia* Özdikmen & Demir, 2008 (**syn. n.**)

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International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

McKamey, S. H. 2003. Some new generic names in the Cicadellidae (Hemiptera: Deltocephalinae, Selenocephalinae). Proc. Entomol. Soc. Wash., 105 (2): 447-451.

McKamey, S. H. 2005. More new generic names in the Cicadellidae (Hemiptera). Proceedings of the Entomological Society of Washington, 108 (3): 502-510.

Özdikmen, H. & Demir, E. 2008. New replacement names for two Neotropical leafhopper genera (Hemiptera: Cicadellidae). Entomological News, 119 (3): 322-324.

SCIENTIFIC NOTE

BELLESUS NOM. NOV., A NEW NAME FOR THE NEOTROPICAL GENUS *ARACHNOMIMUS* BELLÉS, 1985 (COLEOPTERA: PTINIDAE)

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[Özdikmen, H. 2010. *Bellesus* nom. nov., a new name for the neotropical genus *Arachnomimus* Bellés, 1985 (Coleoptera: Ptinidae). Munis Entomology & Zoology, 5 (1): 312**]**

Family PTINIDAE
Genus *BELLESUS* nom. nov.

Arachnomimus Bellés, 1985. Miscellania zool. 9: 229. (Coleoptera: Ptinidae: Ptininae). Preoccupied by *Arachnomimus* Saussure, 1897. Biol. Centr. Amer., Zool., Orth., 1, 251. (Orthoptera: Ensifera: Gryllidae: Phalangopsinae).

Remarks on nomenclatural change: Bellés (1985) described a neotropical genus *Arachnomimus* with the type species *Arachnomimus cristithorax* Bellés, 1985 by original designation and monotypy from Venezuela. It is stil used as a valid monotypic genus name in the subfamily Ptininae (Coleoptera: Ptinidae).

Unfortunately, the generic name was already preoccupied by Saussure (1897), who had proposed the genus name *Arachnomimus*. Saussure (1878) described a genus *Arachnopsis* with the type species *Arachnopsis nietneri* Saussure, 1878 from Asia. Then Saussure (1897) replaced the genus name as *Arachnomimus* necessarily. Because *Arachnopsis* Saussure, 1878 (Insecta: Orthoptera) was a junior homonym of *Arachnopsis* Stimpson, 1870 (Crustacea). It is stil used as a valid genus name in Orthoptera. It has two subgenera and eleven species now.

Thus, the genus name *Arachnomimus* Bellés, 1985 is a junior homonym of the genus name *Arachnomimus* Saussure, 1897. So I propose a new replacement name *Bellesus* **nom. nov.** for *Arachnomimus* Bellés, 1985.

Etymology: This name is dedicated to X. Bellés who is the current author of the genus *Arachnomimus*.

Summary of nomenclatural changes:

Bellesus **nom. nov.**
pro *Arachnomimus* Bellés, 1985 (non Saussure, 1897)

Bellesus cristithorax (Bellés, 1985) **comb. nov.**
from *Arachnomimus cristithorax* Bellés, 1985

LITERATURE CITED

Bellés, X. 1985. Descripcion y posicion sistematica de *Arachnomimus cristithorax* n. gen. n. sp. (Coleoptera, Ptinidae) de Venezuela. *Miscellania Zoologica* (Barcelona), 9: 229-232.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

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Saussure, H. de. 1897. Orthoptera. Fam. Gryllidae. Biologia Centrali-Americana, 1: 217-284.

SCIENTIFIC NOTE

BATTLE OF REPLACEMENT NAMES FOR THE GENERA IN CHALCIDOIDEA (HYMENOPTERA)

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[**Özdikmen, H. & Darılmaz, M. C.** 2010. Battle of replacement names of the genera in Chalcidoidea (Hymenoptera). Munis Entomology & Zoology, 5 (1): 313-314]

In the superfamily Chalcidoidea, the generic names *Babina* Boucek, 1993, *Briania* Boucek, 1988, *Duartea* Boucek, 1993 and *Cairnsia* Boucek, 1988 (Pteromalidae: Pteromalinae), *Cerna* Boucek, 1988 and *Edgaria* Boucek, 1988 (Pteromalidae: Ormocerinae), *Susteraia* Boucek, 1972 (Pteromalidae: Miscogasterinae) and *Tenka* Boucek, 1988 (Agaonidae: Sycoryctinae) are invalid, as they are junior homonyms of the names *Babina* Thompson, 1912 (Amphibia: Ranidae), *Briania* Chasen & Kloss, 1930 (Aves), *Duartea* Mendes, 1959 (Brachiopoda: Rugosochonetidae) and *Cairnsia* Blackburn, 1895 (Coleoptera: Cerambycidae), *Cerna* Klimaszewski, 1974 (Homoptera: Aphalaridae), *Edgaria* Klimaszewski, 1974 (Gastropoda: Paludomidae), *Susteraia* Bechyne, 1950 (Coleoptera: Chrysomelidae) and *Tenka* Barrande, 1881 (Bivalvia: Lunulacardiidae) respectively.

Replacement names, *Canada* for *Babina* Boucek, 1993, *Guinea* for *Briania* Boucek, 1988, *Doganlaria* for *Duartea* Boucek, 1993 and *Ezgia* for *Cairnsia* Boucek, 1988 (Pteromalidae: Pteromalinae), *Australicesa* for *Cerna* Boucek, 1988 and *Queenslandia* for *Edgaria* Boucek, 1988 (Pteromalidae: Ormocerinae), *Yusufia* for *Susteraia* Boucek, 1972 (Pteromalidae: Miscogasterinae) and *Bouceka* for *Tenka* Boucek, 1988 (Agaonidae: Sycoryctinae) were proposed by Koçak & Kemal (2008 in October) for this purpose. Nearly simultanously, Özdikmen & Darılmaz (2009 in January) proposed unnecessarily new names for these eight genera as *Neobabina* for *Babina* Boucek, 1993 (nec Thompson, 1912), *Austrobriania* for *Briania* Boucek, 1988 (nec Chasen & Kloss, 1930), *Noyesiella* for *Duartea* Boucek, 1993 (nec Mendes, 1959) and *Neocairnsia* for *Cairnsia* Boucek, 1988 (nec Blackburn, 1895) in Pteromalidae: Pteromalinae, *Boucekocerna* for *Cerna* Boucek, 1988 (nec Klimaszewski, 1974) and *Neoedgaria* for *Edgaria* Boucek, 1988 (nec Klimaszewski, 1974) in Pteromalidae: Ormocerinae, *Neosusteraia* for *Susteraia* Boucek, 1972 (nec Bechyne, 1950) in Pteromalidae: Miscogasterinae and *Hymenotenka* for *Tenka* Boucek, 1988 (nec Barrande, 1881) in Agaonidae: Sycoryctinae.

So *Neobabina* Özdikmen & Darılmaz, 2009, *Austrobriania* Özdikmen & Darılmaz, 2009, *Noyesiella* Özdikmen & Darılmaz, 2009 and *Neocairnsia* Özdikmen & Darılmaz, 2009 (Pteromalidae: Pteromalinae), *Boucekocerna* Özdikmen & Darılmaz, 2009 and *Neoedgaria* Özdikmen & Darılmaz, 2009 (Pteromalidae: Ormocerinae), *Neosusteraia* Özdikmen & Darılmaz, 2009 (Pteromalidae: Miscogasterinae) and *Hymenotenka* Özdikmen & Darılmaz, 2009 (Agaonidae: Sycoryctinae) are junior objective synonyms of *Canada* Koçak & Kemal, 2008, *Guinea* Koçak & Kemal, 2008, *Doganlaria* Koçak & Kemal, 2008 and *Ezgia* Koçak & Kemal, 2008 (Pteromalidae: Pteromalinae), *Australicesa* Koçak & Kemal, 2008 and *Queenslandia* Koçak & Kemal, 2008 (Pteromalidae: Ormocerinae), *Yusufia* Koçak & Kemal, 2008 (Pteromalidae: Miscogasterinae) and *Bouceka* Koçak & Kemal, 2008 (Agaonidae: Sycoryctinae); therefore, they can not be used validly for taxa under the Law of Priority of the ICZN.

Order Hymenoptera
Superfamily Chalcidoidea
Family Pteromalidae
Subfamily Pteromalinae

Canada Koçak & Kemal, 2008
= *Babina* Boucek, 1993 nec Thomson, 1912
= *Neobabina* Özdikmen & Darılmaz, 2009 (**syn. n.**)
Guinea Koçak & Kemal, 2008
= *Briania* Boucek, 1988 nec Chasen & Kloss, 1930
= *Austrobriania* Özdikmen & Darılmaz, 2009 (**syn. n.**)
Doganlaria Koçak & Kemal, 2008
= *Duartea* Boucek, 1993 nec Mendes, 1959
= *Noyesiella* Özdikmen & Darılmaz, 2009 (**syn. n.**)
Ezgia Koçak & Kemal, 2008
= *Cairnsia* Boucek, 1988 nec Blackburn, 1895
= *Neocairnsia* Özdikmen & Darılmaz, 2009 (**syn. n.**)

Subfamily Ormocerinae

Australicesa Koçak & Kemal, 2008
= *Cerna* Boucek, 1988 nec Klimaszewski, 1974
= *Boucekocerna* Özdikmen & Darılmaz, 2009 (**syn. n.**)
Queenslandia Koçak & Kemal, 2008
= *Edgaria* Boucek, 1988 nec Klimaszewski, 1974
= *Neoedgaria* Özdikmen & Darılmaz, 2009 (**syn. n.**)

Subfamily Miscogasterinae

Australicesa Koçak & Kemal, 2008
= *Susteraia* Boucek, 1972 nec Bechyne, 1950
= *Neosusteraia* Özdikmen & Darılmaz, 2009 (**syn. n.**)

Family Agaonidae
Subfamily Sycoryctinae

Australicesa Koçak & Kemal, 2008
= *Tenka* Boucek, 1988 nec Barrande, 1881
= *Hymenotenka* Özdikmen & Darılmaz, 2009 (**syn. n.**)

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SCIENTIFIC NOTE

SUBSTITUTE NAMES FOR THREE GENERA OF OSTRACODA (CRUSTACEA)

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[**Özdikmen, H.** 2010. Substitute names for three genera of Ostracoda (Crustacea). Munis Entomology & Zoology 5 (1): 315-316**]**

Order PALAEOCOPIDA
Genus *CEMALIA* nom. nov.

Delosia Gailite, 1967. in Gailite,Rybnikova & Ul'st, Stratigraphy, fauna and conditions of origin of Silurian rocks of the central Baltic region. Inst. Geol. (Riga), Ministr. Geol. SSSR, 'Zinatne', Riga: 92. (Crustacea: Ostracoda: Palaeocopida). Preoccupied by *Delosia* Bolivar, 1924. Ann. Mag. nat. Hist., (9) 13, 338. (Insecta: Blattodea: Blaberoidea: Blattellidae: Pseudophyllodromiinae).

Remarks on nomenclatural change: Firstly, the blattellid genus *Delosia* was erected by Bolivar (1924). It is still used as an available valid genus name in Blattellidae (Blattodea).

Subsequently, the ostracod genus *Delosia* was established by Gailite (1967). Also, it is still used as a valid generic name.

Thus the genus *Delosia* Gailite, 1967 is a junior homonym of the valid genus name *Delosia* Bolivar, 1924. So I propose here that *Delosia* Gailite, 1967 should be replaced with the new name *Cemalia*, as a replacement name.

Etymology: The name is dedicated to Prof. Dr. Cemal Tunoğlu (Turkey) who is working on fossil Ostracoda.

Order PODOCOPIDA
Genus *AYSEGULINA* nom. nov.

Limburgina Deroo, 1966. Meded. geol. Sticht. (C) 5 (2) no. 2, 149. (Crustacea: Ostracoda: Podocopida). Preoccupied by *Limburgina* Laurentiaux, 1950. Meded. geol. Stichting geol. Bur. Heerlen, (N.S.), no. 4, 14. (Insecta: Paoliida=Protoptera).

Remarks on nomenclatural change: The genus *Limburgina* was described by Laurentiaux (1950). It is still used as an available valid genus name in Insecta.

Subsequently, the genus *Limburgina* was erected by Deroo (1966) in Ostracoda. Also, it is still used as a valid generic name.

Thus the genus name *Limburgina* Deroo, 1966 is a junior homonym of the valid genus name *Limburgina* Laurentiaux, 1950. So I propose here that *Limburgina* Deroo, 1966 1959 should be replaced with the new name *Aysegulina*, as a replacement name.

Etymology: The name is dedicated to Ayşegül Turgut (Turkey).

Order PLATYCOPIDA
Genus *BEKTASIA* nom. nov.

Reubenella Sohn, 1968. Bull. geol. Surv. Israel No. 44: 17. (Crustacea: Ostracoda: Palaeocopida). Preoccupied by *Reubenella* Lochman, 1966. J. Paleont. 40: 542. (Trilobita: Corynexochida: Leiostegiina: Leiostegioidea: Leiostegiidae).

Remarks on nomenclatural change: Firstly, the trilobite genus *Reubenella* was erected by Lochman (1966). It is still used as an available valid genus name in Trilobita.

Subsequently, the ostracod genus *Reubenella* was established by Sohn (1968). Also, it is still used as a valid generic name.

Thus the genus *Reubenella* Sohn, 1968 is a junior homonym of the valid genus name *Reubenella* Lochman, 1966. So I propose here that *Reubenella* Sohn, 1968 should be replaced with the new name *Bektasia*, as a replacement name.

Etymology: The name is dedicated to Bektaş Özbek (Turkey).

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