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NEW RECORDS FOR PALAEARCTIC CERAMBYCIDAE FROM IRAN WITH ZOOGEOGRAPHICAL REMARKS (COL.: CERAMBYCOIDEA: CERAMBYCIDAE)

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ABSTRACT: The paper gives some new records (one tribus, three genera, one subgenus and three species) based on three new species for Palaearctic and Iranian Cerambycidae as *Dorysthenes* (*Baladeva*) *walkeri* (Waterhouse, 1840), *Pachyteria dimidiata* Westwood, 1848 and *Diastocera wallichi* (Hope, 1831).

KEY WORDS: Cerambycidae, Palaearctic region, Iran, New records.

The longhorned beetles or Cerambycidae are often classified together with Chrysomelidae and Bruchidae in the superfamily Chrysomeloidea. But, some authors including ourselves recognized Cerambycidae as a separate superfamily Cerambycoidea. Cerambycoidea Latreille, 1802 is a superfamily of the order Coleoptera (suborder Polyphaga, infraorder Cucujiformia). The concept of the subdivision of Cerambycidae into several families has prevailed recently. Cerambycidae divided into several subfamilies. These are Parandrinae, Prioninae, Lepturinae, Necydalinae, Aseminae, Spondylidinae, Dorcasominae, Cerambycinae and Lamiinae. All subfamilies are represented in Iran.

Most of the longhorned beetles are elongate and cylindrical with long antennae. The eyes are usually strongly notched. The fourth tarsal segment is small and concealed in the notch of the third segment. It is often very difficult to see. Both the Cerambycidae and Chrysomelidae have this type of tarsal structure, and these groups are sometimes diffucult to separate. The Cerambycidae are separated from Chrysomelidae by the presence of apical spines on the tibiae. Also, the Cerambycidae are separated from the closely related Bruchidae by the normally developed last segment of the abdomen. The pygidium is usually hidden under the elytra in Cerambycidae, but it is always large and prominent in Bruchidae.

All the members of longhorned beetles are xylophagous and phytophagous. Larvae of longhorned beetles develop in plant tissues. Most of the beetles are wood-boring in the larval stage and many species are very destructive to forests, fruit trees and to freshly cut logs. They have larval tunnels in the wood (both living and dead plants). The species attack various types of trees and shrubs. A few will attack living trees, but most species appear to prefer freshly cut logs or weakened and dying trees or branches. Larvae pupate either in host plants or in soil. Adults of the longhorned beetles can be found on flowers, leaves, wood, herbs etc.

Iran is bordered on the north by the Caspian Sea, Armenia, Azerbaijan and Turkmenistan, on the east by Afghanistan and Pakistan, on the south by the Persian Gulf and the Gulf of Oman, and on the west by Iraq and Turkey (Map 1). Its area is 1.648.000 square kilometers, of which 14% is arable land, 8% is forest, 47% is natural (i.e. non-arable) pastures and the remaining 31% is varied arid environments, including salt swamps, sand and gravel deserts and bare-rock high mountains. In general, Iran consists of a central plateau, 1000 to 1500 m above sea level. Two great deserts, Dasht-é Kavir and Dasht-é Lut frame most of the north-east and east of this area. The central plateau is surrounded by mountain ranges of varying heights. Most rivers drain into the Persian Gulf, the Caspian Sea and into some of the salty lakes of the interior. The Persian Gulf is 965 km long. Its easternmost section, east of the Strait of Hormoz is the Gulf of Oman (Hangay et al., 2005). In other words, Iran is situated in Southwest Asia, bordering the Gulf of Oman, the Persian Gulf, and the Caspian Sea, between Iraq and Pakistan.

The vast, arid, and physiographically complex tract stretching across North Africa, southwestern Asia, and northwestern India is home to a complex range of species, many of them distinct from those of sub-Saharan Africa, tropical Asia, and northern temperate Eurasia. Their relations at the generic and family levels are, however, for the most part with those of Eurasia, and they form part of the fauna classically termed Palaearctic. Iran is the most geographically complex area within this region and consequently has the greatest biological diversity for its size in southwestern Asia. Except for faunal elements shared with other regions, southwestern Asian species are distributed between two broad types of landscape. One is the region generally known as the Iranian plateau, stretching from the Anatolian highlands across Persia and Afghanistan to the Solayman range in the southeast. Species occupying this area have been labeled Irano-Turanian by most zoogeographers. Anderson (in Camb. Hist. Iran) divided them into Iranian elements, restricted to the uplands, and Aralo-Caspian elements, concentrated mainly on the plains and basins of Turkmenistan and neighboring republics of Central Asia. The second major landscape type, encompassing the low-lying desert areas along the southern margins of the Palaearctic from North Africa to northwestern India, is home to the Saharo-Sindian group of fauna. Within these regions are species and associations of species with much more restricted distribution. Considering the fauna of western Asia as a whole, various authors have introduced a confusing array of terms, attempting to systematize patterns of distribution within particular taxa. In addition to the labels already mentioned, there are Holarctic for the temperate and boreal latitudes of the northern hemisphere, including North America; Western and Eastern Palaearctic; Euro-Siberian for the northern latitudes of the Palaearctic; Eremian for Saharo-Sindian plus the arid portions of Irano-Turanian; Ethiopian or Afrotropical for sub-Saharan Africa; Oriental for southern and southeastern Asia, Paleotropical for Ethiopian plus Oriental; Mediterranean for southern Europe and the North African littoral plus the Levant; and various subdivisions that are more or less self-explanatory. Although some authors have used these terms descriptively, to others they have implied areas of origin. When used here they are simply descriptive (Anderson, 2007).

Anderson (2007) also stated that Iran has 13 faunal areas. These are as follows. The central plateau, The Urmia basin, The Sistan basin, The Caspian region, The Khuzestan plain and the Persian Gulf coast, Persian Baluchistan and the Makran coast, The Turkmen steppe, The Mogan steppe, The Zagros, The western foothills of the Zagros, The Alborz, The Kopet-Dag, Islands of the Persian Gulf.

According to Anderson (2007), the faunal area “Persian Baluchistan and the Makran coast” includes two main elements as Iranian elements and Saharo-Sindian elements. It is primarily in Baluchistan and the Makran that a few Oriental elements, wide-ranging species of broad ecological tolerance, exist in Iran. The faunal area “the western foothills of the Zagros” includes some species that are most closely related to species of highland Arabia, others to those of Baluchistan and Sind. The faunal area “Islands of the Persian Gulf” seems to represent the Saharo-Sindian group.

So it is known clearly that Iranian fauna includes some Oriental species. This work is another evidence of this status. On the other hand, three unknown species for Palaearctic region are recorded for the first time with this study. These oriental species are *Dorysthenes walkeri* (Waterhouse, 1840), *Pachyteria dimidiata* Westwood, 1848 and *Diastocera wallichi* (Hope, 1831).

More than 2,000 plant species are grown in Iran. The land covered by Iran’s natural flora is four times that of the Europe’s (Map 2).

The Persian fauna is known in piecemeal fashion from studies of various groups of animals, but there has so far been no coordinated effort to record the entire range systematically, as there has been for the Persian flora and for the fauna of the former Soviet Union, former British India, and the Arabian Peninsula. In Persia some invertebrate groups have been studied systematically, and studies have been undertaken for all vertebrate groups.

Insects constitute the largest segment of Persian fauna normally. Although there has been no comprehensive treatment, there is a large literature on individual species. An important series, "Contribution à la faune de l'Iran" has been published in Annales de Société Entomologique de France. Cerambycidae by Villiers (1967) was dealt with in part I of the works for Iranian fauna. Subsequently, Abai (1969) was given a list of Iranian Cerambycidae. Other previous works were either short notes on short-lived expeditions or about at most a province and its environment. Also, works including description of new taxons are sometimes encountered. As opposed to this, European fauna has almost been investigated entirely as mentioned in Sama (2002) and Russian fauna has also been given mainly in Danilevsky (2008).

Historically, the first list related with Iranian Cerambycidae was realized by H. Mirzayans (1950) with only 39 species. A. Villiers collected some species of Cerambycidae from Eastern and Southern parts of Iran until 1965. Then, he published it in 1967 as seen above. This study included 240 species and 15 subpecies. In which, 2 genera, 3 species and 1 subspecies were identified as new taxa. In 1969, M. Abai gave list of Cerambycidae family in Iran with 104 species and 4 subspecies. Recently, M. M. Awal (1997) also gave 199 longhorned beetles species in his study entitled "List of agricultural pests and their natural enemies in Iran". In 2004, H. Borumand also presented a list of Cerambycidae in Hayk Mirzayans Insect Museum of Iran with 132 species and 4 subspecies.

Especially since the last century, works on Iranian longicorn beetles increased as chiefly faunistic and taxonomic works. Recently, they continue with an increased speed. E. g. Villiers (1960, 1967, 1970, 1973), Abai (1969), Holzschuh (1977, 1979, 1981), Danilevsky (1998), Sama & Rejzek (2001, 2002), Rejzek et al. (2003), Danilevsky (2004), Sama et al. (2005) and Danilevsky (2006) can state as the recent important works on Iranian Cerambycidae. Knowledge about Iranian longicorn beetles, however, is far from satisfactory.

Superfamily CERAMBYCOIDEA Latreille, 1802

The superfamily includes currently 4 family as Cerambycidae Latreille, 1802; Disteniidae Thomson, 1860; Oxypeltidae Lacordaire, 1869 and Vesperidae Mulsant, 1839 (incl. Anoplodermatinae Guérin-Méneville, 1840 and Philinae Thomson, 1860).

Family CERAMBYCIDAE Latreille, 1802

The Cerambycidae is one of the largest families of Coleoptera. Body lenght varies from 2.5 mm to slightly over 17 cm. It is distributed world-wide. The family that is commonly called long-horned beetles, longicorns, capricorns, timber beetles, round-headed borers, goat beetles (bockkäfer), sawyer beetles includes currently 9 subfamily as Parandrinae Blanchard, 1845; Prioninae Latreille, 1802; Lepturinae Latreille, 1802; Necydalinae Latreille, 1825; Aseminae Thomson, 1860; Spondylidinae Audinet-Serville, 1832; Dorcasominae Lacordaire, 1869; Cerambycinae Latreille, 1802 and Lamiinae Latreille, 1825 according to our approach.

Subfamily PRIONINAE Latreille, 1802

= Prioniens Latreille, 1804
= Prionida Leach, 1814
= Prionidae Samouelle, 1819
= Prionitae Thomson, 1860
= Prionides Lacordaire, 1869

The subfamily currently includes at least 18 tribes as Acanthinoderini Thomson, 1864; Acanthophorini Thomson, 1864; Aegosomatini Thomson, 1860; Anacolini Thomson, 1857; Callipogonini Thomson, 1860; Calocomini Galileo et Martins, 1993; Cantharocnemini Lameere, 1912; Erichsoniini Thomson, 1860; Eurypodini Gahan, 1906; Macrodontiini Thomson, 1860; Macrotomini Thomson, 1860; Mallaspini Thomson, 1860; Mallodontini Thomson, 1860; Meroscelisini Thomson, 1860; Nothophysini Lameere, 1912; Prionini Latreille, 1802; Solenopterini Lacordaire, 1869 and Tereticini Lameere, 1912. The fossil genus *Xyleoconites* Haupt, 1950 is Prioninae incertae sedis. The 4 tribes Acanthophorini, Aegosomatini, Macrotomini and Prionini are represented in Iran.

Tribe PRIONINI Latreille, 1804

= Prionites Fairmaire, 1864
= Titanitae Thomson, 1864 partim
= Psalidognathitae Thomson,1864
= Derobrachynae Pascoe, 1869
= Titanii Lameere, 1904 partim
= Prioni Lameere, 1919

The tribe includes currently 27 genera as *Apterocaulus* Fairmaire, 1864; *Braderochus* Buquet, 1852; *Brephilydia* Pascoe, 1871; *Callistoprionus* Tippmann, 1953; *Derobrachus* Audinet-Serville, 1832; *Dorysthenes* Vigors, 1826; *Emphiesmenus* Lansberge, 1884; *Guedesia* Ferreria & Veiga Ferreira, 1952; *Mesoprionus* Jakovlev, 1887; *Microarthron* Pic, 1900; *Miniprionus* Danilevsky, 1999; *Monocladum* Pic, 1892; *Neosarmydus* Fisher, 1935; *Orthosoma* Audinet-Serville, 1832; *Osphyron* Pascoe, 1869; *Paradandamis* Aurivillius, 1922; *Pogonarthron* Semenov, 1900; *Polyarthron* Audinet-Serville, 1832; *Polylobarthron* Semenov, 1900; *Prionacalus* White, 1845; *Prionomma* White, 1853; *Prionus* Geoffroy, 1762; *Priotyrannus* Thomson, 1857; *Psalidognathus* Gray et Griffith, 1831; *Pseudoprionus* Pic, 1898; *Psilotarsus* Motschulsky, 1860 and *Titanus* Audinet-Serville, 1832. The 15 species of 7 genera as *Prionus burdajewiezi* Bodemeyer, 1930; *Prionus coriarius* (Linnaeus, 1758); *Prionus sterbai* Heyrovský, 1950; *Mesoprionus angustatus* Jakovlev, 1887; *Mesoprionus asiaticus* (Faldermann, 1837); *Mesoprionus consimilis* (Holzschuh, 1981); *Mesoprionus lesnei* (Semenov, 1933); *Mesoprionus persicus* (Redtenbacher, 1850); *Mesoprionus petrovitzi* (Holzschuh, 1981); *Mesoprionus schaufussi* Jakovlev, 1887; *Psilotarsus brachypterus* (Gebler, 1830); *Pogonarthron minutum* (Pic, 1905); *Pseudoprionus bienerti* (Heyden, 1885); *Microarthron komarowi* (Dohrn, 1885) and *Monocladum iranicum* Villiers, 1961 are represented in Iran.

Genus *DORYSTHENES* Vigors, 1826
(New for Pal. Reg. and Iran)

= *Dissosternus* Hope, 1833 (Subgen. type: *Dissosternus pertii* Hope)
= *Cyrtognathus* Faldermann, 1835 (Subgen. type: *Prionus paradoxus* Faldermann)
= *Baladeva* Waterhouse, 1840 (Subgen. type: *Baldeva walkeri* Waterhouse)
= *Lophosternus* Guérin-Méneville, 1844 (Subgen. type: *Lophosternus buqueti* Guerin-Meneville)
= *Cyrtosternus* Guérin-Méneville, 1844 (Subgen. type: *Prionus indicus* Hope)
= *Paraphrus* Thomson, 1860 (Subgen. type: *Paraphrus granulosus* Thomson)
= *Opisognathus* Thomson, 1860 (Subgen. type: *Opisognathus forficatus* Thomson)
= *Prionomimus* Lameere, 1912 (Subgen. type: *Prionomimus pici* Lameere)

Type species: *Prionus rostratus* Fabricius, 1792

Dorysthenes Vigors, 1826, Zool. Journ., 2 (8), 514. (type-species : *Prionus rostratus* Fabricius, 1792). Subgenera: *Dissosternus* Hope, 1833: 64 (type species: *Dissosternus pertii* Hope); *Cyrtognathus* Faldermann, 1835: 431 (type species: *Prionus paradoxus* Faldermann); *Baladeva* Waterhouse, 1840: 225 (type species: *Baldeva walkeri* Waterhouse); *Lophosternus* Guérin-Méneville, 1844: 209 (type species: *Lophosternus buqueti* Guerin-Meneville); *Cyrtosternus* Guérin-Méneville, 1844: 210 (type species: *Prionus indicus* Hope); *Paraphrus* Thomson, 1860: 330 (type species: *Paraphrus granulosus* Thomson); *Opisognathus* Thomson, 1860: 330 (type species: *Opisognathus forficatus* Thomson); *Prionomimus* Lameere, 1912: 176 (type species: *Prionomimus pici* Lameere).

The oriental genus includes currently 23 species of 8 subgenera in the world. These subgenera are *Baladeva* Waterhouse, 1840; *Cyrtognathus* Faldermann, 1835; *Dissosternus* Hope, 1833; *Dorysthenes* Vigors, 1826; *Lophosternus* Guérin-Méneville, 1844; *Opisognathus* Thomson, 1860; *Paraphrus* J. Thomson, 1860 and *Prionomimus* Lameere, 1912. The genus is recorded for the first time for Iran and Palaearctic region.

Subgenus *BALADEVA* Waterhouse, 1840
(New for Pal. Reg. and Iran)

Type species: *Baladeva walkeri* Waterhouse, 1840

The subgenus known orientalic until now includes currently only two species as *Dorysthenes sternalis* (Fairmaire, 1902) occurs in China and Vietnam and *Dorysthenes walkeri* (Waterhouse, 1840). The subgenus is recorded for the first time for Iran and Palaearctic region.

Dorysthenes* (*Baladeva*) *walkeri (Waterhouse, 1840)
(New for Pal. Reg. and Iran) (Fig. 1)

= *Baladeva walkeri* Waterhouse, 1840 (Original designation)

This species was originally described by Waterhouse as *Baladeva walkeri* Waterhouse, 1840. It is recorded for the first time for Iran and Palaearctic region.

MATERIAL EXAMINED: Iran: East Azerbaijan province: Arasbaran, 13.07.2005, leg. M. Havaskary, 1 specimen.

DISTRIBUTION: Myanmar, Thailand, Laos, China, Vietnam (Map 3)

CHOROTYPE: Oriental + now SW-Asiatic (?)

Subfamily CERAMBYCINAE Latreille, 1802
= Cerambycitae Thomson, 1860

The subfamily currently includes at least 90 tribes as Acangassuini Galileo & Martins, 2001; Agallissini LeConte, 1873; Achrysonini Lacordaire, 1869; Alanizini Di Iorio, 2003; Anaglyptini Lacordaire, 1869; Ancylocerini LeConte, 1873; Aphanasiini Thomson, 1860; Aphneopini Aurivillius, 1912; Basipterini Fragoso, Monné & Seabra, 1987; Bimiini Lacordaire, 1869; Bothriospilini Lane, 1950; Callidiini Mulsant, 1839; Callidiopini Lacordaire, 1869; Callichromatini Blanchard, 1845; Cerambycini Latreille, 1804; Certallini Audinet-Serville, 1834; Childonini Waterhouse, 1879; Cleomenini Lacordaire, 1869; Clytini Mulsant, 1839; Compsocerini Thomson,1864; Curiini LeConte, 1873; Deilini Faimaire, 1864; Dejanirini Villiers, 1966; Diorini Lane, 1950; Distichocerini Kirby, 1818; Dodecosini Aurivillius, 1912; Dryobiini Linsley, 1964; Eburiini Blanchard, 1845; Ectenessini Martins & Galileo, 1998; Elaphidiini Thomson, 1864; Eligmodermini Lacordaire, 1869; Erlandiini Aurivillius, 1912; Eumichthini Linsley, 1940; Gahaniini Quentin et Villiers, 1969; Glaucytini Lacordaire, 1869; Graciliini Mulsant, 1839; Hesperophanini Mulsant, 1839; Hesthesini Kirby, 1818; Heteropsini Lacordaire, 1869; Holopleurini Chemsak & Linsley, 1974; Hyboderini Linsley, 1940; Ibidionini Thomson, 1860; Lissonotini Thomson, 1860; Luscosmodicini Martins, 2003; Macronini Lacordaire, 1869; Megacoelini Quentin et Villiers, 1969; Molorchini Mulsant, 1863; Nathriini Linsley, 1963; Navomorphini Thomson, 1860; Necydalopsini Blanchard, 1851; Neocorini Martins, 2005; Neostenini Pascoe, 1857; Obriini Mulsant, 1839; Opsimini LeConte, 1873; Oxycoleini Martins & Galileo, 2003; Paraholopterini Martins, 1997; Phalotini Pascoe, 1863; Phlyctaenodini Newman, 1841; Piezocerini Lacordaire, 1869; Platyarthrini Bates, 1870; Plectogasterini Quentin et Villiers, 1969; Pleiarthrocerini Lane, 1950; Protaxini Gahan, 1906; Prothemini Pascoe, 1869; Psebiini Lacordaire, 1869; Pseudocephalini Aurivillius, 1912; Psilomorphini Saunders, 1850; Pteroplatini Thomson, 1860; Pyrestini Lacordaire, 1869; Rhagiomorphini Newman, 1840; Rhinotragini Thomson, 1860; Rhopalophorini Blanchard, 1845; Smodicini Lacordaire, 1869; Spintheriini Thomson, 1860; Stenoderini Pascoe, 1869; Stenopterini Fairmaire, 1868; Strongylurini Pascoe, 1869; Sydacini Martins, 1997; Tessarommatini Newman, 1840; Thraniini Gahan, 1906; Thyrsiini Marinoni & Napp, 1984; Tillomorphini Lacordaire, 1869; Torneutini Thomson, 1860; Tragocerini Latreille, 1829; Trachyderini Dupont, 1836; Trichomesini

Pascoe, 1859; Tropocalymmatini Thomson, 1864; Typhocesini Pascoe, 1863; Uracanthini Lacordaire, 1869 and Xystrocerini Blanchard, 1845. Danilevsky (2007a) stated that "*according to personal communication of Zahaikevitch (1983), in Cerambycinae several supertribes could be criated: Cerambycites, Rosaliites, Callidiites, Clytites, Callichromites, Molorchites. The last supertribed is the most specialized one*". Anyway, the 15 tribes Anaglyptini, Callidiini, Callichromatini, Cerambycini, Certallini, Clytini, Graciliini, Hesperophanini, Hylotropini, Molorchini, Nathriini, Obriini, Stenopterini, Trachyderini and Xystrocerini are represented in Iran.

Tribe CALLICHROMATINI Blanchard, 1845

= Callichromini Thomson, 1860

The tribe includes currently 75 genera as *Agaleptus* Gahan, 1904; *Amblyonitum* Bates, 1879; *Anubis* Thomson, 1864; *Aphrodisium* Thomson, 1864; *Aromia* Audinet-Serville, 1833; *Aromiella* Podaný, 1971; *Asmedia* Pascoe, 1866; *Beaveriella* Napp & Martins, 2005; *Bradycnemis* Waterhouse, 1877; *Callichroma* Latreille, 1816; *Callixanthospila* Adlbauer, 2000; *Cataphrodisium* Aurivillius, 1907; *Chelidonium* Thomson, 1864; *Chloridolum* Thomson, 1864; *Chromazilus* Thomson, 1864; *Cloniophorus* Quedenfeldt, 1882; *Closteromerus* Dejean, 1835; *Cnemidochroma* Schmidt, 1924; *Compsomera* White, 1855; *Conamblys* Schmidt, 1922; *Cotychroma* Martins & Napp, 2005; *Dictator* Thomson, 1878; *Diotecnon* Schmidt, 1924; *Dubianella* Morati & Huet, 2004; *Embrikstrandia* Plavilstshikov, 1931; *Eugoa* Fahreus, 1872; *Euporus* Audinet-Serville, 1834; *Gauresthes* Bates, 1889; *Gestriana* Podaný, 1971; *Guitelia* Oberthür, 1911; *Helemaeus* Perroud, 1855; *Helymaeus* Thomson, 1864; *Huedepohliana* Heffern, 2002; *Hybunca* Schmidt, 1922; *Hylomela* Gahan, 1904; *Hypargyra* Gahan, 1890; *Hypatium* Thomson, 1864; *Hypocrites* Fahraeus, 1871; *Ipothalia* Pascoe, 1867; *Jonthodes* Audinet-Serville, 1834; *Jonthodina* Achard, 1911; *Leptosiella* Morati & Huet, 2004; *Linsleychroma* Giesbert, 1998; *Litopus* Audinet-Serville, 1834; *Mattania* Fairmaire, 1894; *Mecosaspis* Thomson 1864; *Mionochroma* Schmidt, 1924; *Monnechroma* Napp & Martins, 2005; *Osphranteria* Redtenbacher, 1849; *Oxyprosopus* Thomson, 1864; *Pachyteria* Audinet-Serville, 1833; *Paraguitelia* Quentin et Villiers, 1971; *Parandrocephalus* Heller, 1916; *Philematium* Thomson, 1864; *Phrosyne* Murray, 1870; *Phyllocnema* Thomson, 1860; *Phyllomaeus* Schmidt, 1922; *Plinthocoelium* Schmidt, 1924; *Polyzonus* Laporte de Castelnau, 1840; *Promeces* Audinet-Serville, 1834; *Psephania* Morati & Huet, 2004; *Psilomastix* Fahraeus, 1872; *Quettania* Schwarzer, 1931; *Rhopalizus* Thomson, 1864; *Rhopalomeces* Schmidt, 1922; *Scalenus* Gistel, 1848; *Schmidtiana* Podaný, 1971; *Schmidtianum* Podaný, 1965; *Schwarzerion* Schmidt, 1924; *Synaptola* Bates, 1879; *Tarsotropidius* Schmidt, 1922; *Thompsoniana* Podaný, 1971; *Turkaromia* Danilevsky, 1993; *Xystochroma* Schmidt, 1924 and *Zonopterus* Hope, 1843. The 5 species of 2 genera as *Aromia moschata* (Linnaeus, 1758); *Osphranteria coerulescens* Redtenbacher, 1850; *Osphranteria lata* Pic, 1956; *Osphranteria richteri* Heyrovský, 1959 and *Osphranteria suaveolens* Redtenbacher, 1850 are represented in Iran.

Genus *PACHYTERIA* Audinet-Serville, 1833
(New for Pal. Reg. and Iran)

Type species: *Cerambyx fasciatus* Fabricius, 1775

Pachyteria Audinet-Serville, 1833, Ann. Soc. Ent. Fr., 2: 553 (type species: *Cerambyx fasciata* Fabricius, 1775) loc. cit. - Gahan, 1906, Fauna British India, Col., 1: 194, Aurivillius, 1912, Coleopt. Cat., 39: 299.

The oriental genus includes currently 31 species in the world. The genus is recorded for the first time for Iran and Palaearctic region.

Pachyteria dimidiata Westwood, 1848
(New for Pal. Reg. and Iran) (Fig. 2)

= *Pachyteria scheepmakeri* Ritsema, 1881
= *Pachyteria oberthüri* Ritsema, 1888
= *Pachyteria sheepmakeri* Aurivillius, 1912 (incorrect subsequent spelling)
= *Pachyteria luteofasciata* Pic, 1946
= *Pachyteria timorensis* Hayashi, 1994

This species is recorded for the first time for Iran and Palaearctic region.

MATERIAL EXAMINED: Iran: Semnan province: Semnan, 19.09.2002, leg. H. Sakenin, 1 specimen.

DISTRIBUTION: Malaysia (Sarawak), Myanmar, Thailand, Vietnam, Laos, Indonesia (Sumatra), India, Borneo, Sumatra (Map 4)

CHOROTYPE: Oriental + now SW-Asiatic (?)

Subfamily LAMIINAE Latreille, 1825

= Lamiariae Latreille, 1825
= Clinocephalides Mulsant, 1839
= Lamiitae (Latreille) Thomson, 1860
= Lamiides (Latreille) Mulsant, 1863
= Lamitae (Latreille) Thomson, 1864
= Lamiens (Latreille) Planet, 1924

The subfamily currently includes at least 74 tribes as Acanthocinini Blanchard, 1845; Acanthoderini Thomson, 1860; Acmocerini Thomson, 1860; Acrocinini Thomson, 1860; Aderpasini Thomson, 1864; Aerenicini Lacordaire, 1872; Agapanthiini Mulsant, 1839; Ancylonotini Lacordaire, 1869; Anisocerini Thomson, 1860; Apodasyini Lacordaire, 1872; Apomecynini Thomson, 1860; Batocerini Lacordaire, 1869; Calliini

Thomson, 1864; Ceroplesini Dejean, 1835; Cloniocerini Dejean, 1835; Colobotheini Thomson, 1860; Compsosomatini Thomson, 1857; Crossotini Thomson, 1864; Cyrtinini Thomson, 1864; Desmiphorini Thomson, 1860; Dorcadiini Latreille, 1825; Dorcaschematini Thomson, 1860; Elytracanthini Lane, 1955; Emphytoeciini Pascoe, 1864; Enicodini Thomson, 1860; Epicastini Thomson, 1864; Eupromerini Galileo & Martins, 1995; Falsamblesthiini Gilmour, 1961; Gnomini Thomson, 1864; Gyaritini Breuning, 1956; Hemilophini Thomson, 1868; Homonoeini Thomson, 1864; Hyborhabdini Aurivillius, 1911; Lamiini Latreille, 1825; Laticraniini Lane, 1959; Mauesini Lane, 1956; Megabasini Thomson, 1864; Mesosini Thomson, 1860; Metonini Pascoe, 1862; Moneilemini Thomson, 1864; Morimopsini Lacordaire, 1869; Nyctimenini Thomson, 1864; Oculariini Breuning, 1950; Onciderini Thomson, 1860; Onocephalini Thomson, 1860; Parmenini Mulsant, 1839; Petrognathini Blanchard, 1845; Phacellini Lacordaire, 1872; Phantasini Hunt & Breuning, 1957; Phrissomini Thomson, 1860; Phrynetini Thomson, 1864; Phytoeciini Pascoe, 1864; Pogonocherini Mulsant, 1839; Polyrhaphidini Thomson, 1860; Pretiliini Martins & Galileo, 1990; Proctocerini Aurivillius, 1921; Prosopocerini Thomson, 1868; Pteropliini Thomson, 1860; Rhodopinini Gressitt, 1951; Saperdini Mulsant, 1839; Stenobiini Breuning, 1950; Sternotomini Thomson, 1860; Tapeinini Thomson, 1857; Tetracopini Wollaston, 1873; Tetraopini Thomson, 1860; Tetropini Thomson, 1860; Theocridini Thomson, 1858; Tmesisternini Thomson, 1860; Tragocephalini Thomson, 1857; Velorini Thomson, 1864; Xenofreini Bates, 1885; Xenoleini Lacordaire, 1869; Xylorhizini Dejean, 1835 and Zygocerini Dejean, 1835. The 14 tribes Acanthocinini, Agapanthiini, Ancylonotini, Apodasyini, Apomecynini, Dorcadiini, Lamiini, Mesosini, Parmenini, Phytoeciini, Pteropliini, Saperdini and Tetropini are represented in Iran.

Tribe CEROPLESINI Thomson, 1860
(New for Pal. Reg. And Iran)

= Ceroplesitae Thomson, 1860
= Ceroplesides (Thomson) Lacordaire, 1872

The tribe includes currently 9 genera as *Analeptes* Gistl, 1847; *Ceroplesis* Dejean, 1835; *Cochliopalpus* Lacordaire, 1872; *Diastocera* Dejean, 1835; *Gnathoenia* Thomson, 1858; *Paranaleptes* Breuning, 1937; *Pterotragus* Chevrolat, 1856; *Pycnopsis* Thomson, 1857 and *Titoceres* Thomson, 1868. All genera are African except the oriental genus *Diastocera* Dejean, 1835. This tribe is recorded for the first time for Iran and Palaearctic region.

Genus *DIASTOCERA* Dejean, 1835
(New for Pal. Reg. and Iran)

= *Thysia* Thomson, 1860 (Type sp. *Lamia wallichi* Hope, 1831)
= *Thysiotes* Thomson, 1868 (Unnecessary replacement name for *Thysia* Thomson, 1860)

Type species: *Lamia tricincta* Duncan, 1835

Diastocera Dejean, 1835, Catal. Coléopt., ed. 2, 342 [n.n.]; Thomson 1857, Archives ent., 1, 183. (type species: *Lamia tricincta* Duncan, 1835) *loc. cit.* – Thomson, 1860, Essai d'une classification de la famille des cérambycides et matériaux pour servir à une monographie de cette famille, 96, - Thomson, 1868, XVII. Note rectificative. Physis Recueil d'Histoire Naturelle, Paris 2(6): 201.

The oriental genus is monotypic and it includes currently only 1 species with 3 subspecies in the world. The genus is recorded for the first time for Iran and Palaearctic region.

Diastocera wallichi (Hope, 1831)
(New for Pal. Reg. and Iran) (Fig. 3)

= *Lamia wallichi* Hope, 1831
= *Lamia tricincta* Duncan, 1835
= *Diastocera wallichi tricincta* (Duncan, 1835)
= *Ceroplesis tricincta* (Duncan, 1835) Laporte de Castelnau, 1840
= *Lamia trivittata* Gistl in Gistl & Bromme, 1850
= *Thysia tricincta* (Duncan, 1835) Pascoe, 1857
= *Thysia wallichi* (Hope, 1831) Thomson, 1860
= *Thysiotes wallichi* (Hope, 1831) Thomson, 1868
= *Diastocera wallichi tonkinensis* Kriesche, 1924
= *Diastocera savioi* Jen, 1932
= *Diastocera wallichi var. insularis* Fisher, 1935

This species is recorded for the first time for Iran and Palaearctic region. As commonly accepted that the species has 3 subspecies in the world. These are: - *Diastocera wallichi wallichi* (Hope, 1831) occurs in NE India (Assam), Myanmar, S China (Yunnan), NW Thailand, - *Diastocera wallichi tricincta* (Duncan, 1835) occurs in Malaysia, Borneo, Indonesia (Sumatra, Java, Celebes) and - *Diastocera wallichi tonkinensis* Kriesche, 1924 occurs in Thailand, China, Laos and Vietnam.

MATERIAL EXAMINED: Iran: Isfahan province: Najaf-Abad, 14.06.2005, leg. H. Rakhshani, 1 specimen.

DISTRIBUTION: India, Myanmar, China, Thailand, Malaysia, Borneo, Indonesia (Sumatra, Java, Celebes), Laos, Vietnam (Map 5)

CHOROTYPE: Oriental + now SW-Asiatic (?)

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LITERATURE CITED

Abai, M. 1969. List of Cerambycidae Family in Iran. Entomologie et Phytopathologie Appliquées, (Tehran) 28: 47-54.

Anderson, S. 2007. FAUNA, the assemblage of animal species, generally excluding domestic animals (q.v.), living within a defined geographical area or ecological zone. Fauna of Persia. Available from: http://www.iranica.com/articles/v9f4/v9f441a.html#i

Audinet-Serville, J. G. 1833. Nouvelle classification de la famille des longicornes (suite). Annales de la Société Entomologique de France, Paris. (1) 2: 528-573.

Aurivillius, C. 1912. Coleoptorum Catalogus, pars 39 [vol. 22], Cerambycidae: Cerambycinae. Berlin, W. Junk & S. Schenkling. 574 pp.

Awal, M. M. 1997. List of agricultural pests and their natural enemies in Iran. Ferdowsi University press. Iran, pp. 142-151.

Borumand, H. 2004. Insects of Iran. Coleoptera (XXIV): Chrysomeloidea. Fam. (158): Cerambycidae. Plant pests & diseases research institute, Insect Taxonomy Research Department, Publ. No: 10, pp. 1-49.

Danilevsky, M. L. 1998. Two new species of Dorcadion Dalman, 1817 (Coleoptera, Cerambycidae) from Iran. Elytron, 12: 49-54.

Danilevsky, M. L. 2004. Cortodera neali sp. n. from Iran and Dorcadion shirvanicum azerbajdzhanicum Plavilstshikov, 1937 stat. N. from Azerbajdzhan (Coleoptera, Cerambycidae). Les Cahiers Magellanes 32: 1-7.

Danilevsky, M. L. 2006. A revue of genus Apatophysis Chevrolat, 1860 of Iran (Coleoptera, Cerambycidae). Les Cahiers Magellanes 59: 1-11.

Danilevsky, M. L. 2008. Systematic list of Longicorn Beetles (Cerambycoidea) of the territory of the former USSR. Available from: http://www.cerambycidae.net/ (Updated 31.05.2008).

Dejean, P. F. M. A. 1835. Catalogue des coléoptères de la collection de M. le Comte Dejean. Méquignon-Marvis Père & Fils, 2e ed. livraison 4: 257-360. Paris.

Faldermann, F. 1835. Coleopterorum ab ill. Bungio in China boreali, Mongolia et montibus Altaicis collectorum, nec non ab ill. Turczaninoffio et Stschukino e provincia Irkutzk missorum illustrationes. Mémoires de l'Académie Impériale des Sciences de St.-Pétersbourg (6) 2: 337-464.

Gahan, C. J. 1906. On a collection of Longicorn Coleoptera from Selangor and Perak. Journal of the Federated Malay States Museums. Kuala Lumpur. 1:109-121. 1 pl.

Guérin-Méneville, F. E. 1844. Iconographie du Règne Animal de Georges Cuvier ou représentation d'après nature de l'une des espèces le plus remarquables et souvent non figurées de chaque genre d'animaux. Insectes. Paris. J. B. Baillère. 7: i-iv + 5-576.

Hangay, G., Nádai, L. & Székely, K. 2005. Report on Hungarian entomological expeditions to Iran. Folia Historico Naturalia Musei Matraensis, 29: 7-18.

Heffern, D. J. 2005. Catalog and Bibliography of Longhorned Beetles from Borneo (Coleoptera: Cerambycidae). Electronic Version. Available from: http://www.cerambycids.com/borneo/Borneo_Catalog_Electronic_Version_2005-1.pdf

Holzschuh, C. 1977. Neue Bockkäfer aus Anatolien und Iran (Col., Cerambycidae). Koleopterologische Rundschau, Wien, 53: 127-136.

Holzschuh, C. 1979. Vier neue Bockkafer aus der Palaearktischen region (Col., Cerambycidae). Koleopterologische Rundschau, Wien, 54: 113-118.

Holzschuh, C. 1981. Zwanzig neue Bockkafer aus Europa und Asien (Cerambycidae, Col.). Koleopterologische Rundschau, Wien, 55: 91-
112.

Hope, F. W. 1833. On the characters of several new genera and species of coleopterous insects. Proceedings of the Zoological Society of London, 1: 61-64.

Lameere, A. 1912. Révision des prionides. Bruxelles. Vingt-deuxième mémoire - Addenda et Corrigenda. Mémoires de la Société Entomologique de Belgique, 21:113-188.

Mirzayans, H. 1950. Quelques cerambycides de L'Iran. Ent. Phyt. Appliq. 10: 12-21.

Rejzek, M., Sama, G., Alziar, G. & Sadlo, J. 2003. Host plants of longhorn beetles from the Balkan Peninsula, Asia Minor and Iran (part II). Biocosme Mesogéen, 19 (4): 161-189.

Sama, G. 2002. Atlas of the Cerambycidae of Europe and the Mediterranean Area, Volume I, Kabourek, Zlin, 173 pp.

Sama, G. & Rejzek, M. 2001. Helladia imperialis, espèce nouvelle de l'Iran (Coleoptera: Cerambycidae: Phytoeciini). Biocosme Mésogéen, Nice, 17 (3): 239-246.

Sama, G. & Rejzek, M. 2002. Two new Cerambycidae from Turkey and Iran (Insecta Coleoptera Cerambycidae). Quaderno di Studi e Notizie di Storia Naturale della Romagna (Quad. Studi Nat. Romagna): 16 suppl.: 105-110.

Sama, G., Fallahzadeh, M. & Rapuzzi, P. 2005. Notes on some Cerambycidae from Iran with description of two new species. (Insecta Coleoptera Cerambycidae). Quaderno di Studi e Notizie di Storia Naturale della Romagna (Quad. Studi Nat. Romagna): 20 suppl.: 123-132.

Species 2000. 2008. Annual Checklist. Available from: http://www.species2000.org/

Tavakilian, G. 2008. CERAMBYCIDAE. Institute de recherché pour le développement. Available from : https://www.orleans.ird.fr/titan/

Thomson, J. 1857. Diagnoses de cérambycides nouveaux ou peu connus de ma collection qui seront décrits prochainement. Archives Entomologiques, Paris. 1: 169-194.

Thomson, J. 1860. Essai d'une classification de la famille des cérambycides et matériaux pour servir à une monographie de cette famille. Paris. 404 pp.

Thomson, J. 1868. XVII. Note rectificative. Physis Recueil d'Histoire Naturelle, Paris. 2 (6): 201.

Vigors, N. 1826. Descriptions of some rare, interesting, or hitherto uncharacterised subjects of zoology. The Zoological Journal, London. 2: 234-242; 510-516.

Villiers A. 1960. Une nouvelle Phytoecia palearctique: Helladia iranica n. sp. L'Entomologiste, 16 (5-6): 99-102.

Villiers, A. 1967. Contribution à la faune de l'Iran. I. -Coléoptères Cerambycidae-. Annales de la Société Entomologique de France (N.S.) 3 (2): 327-379.

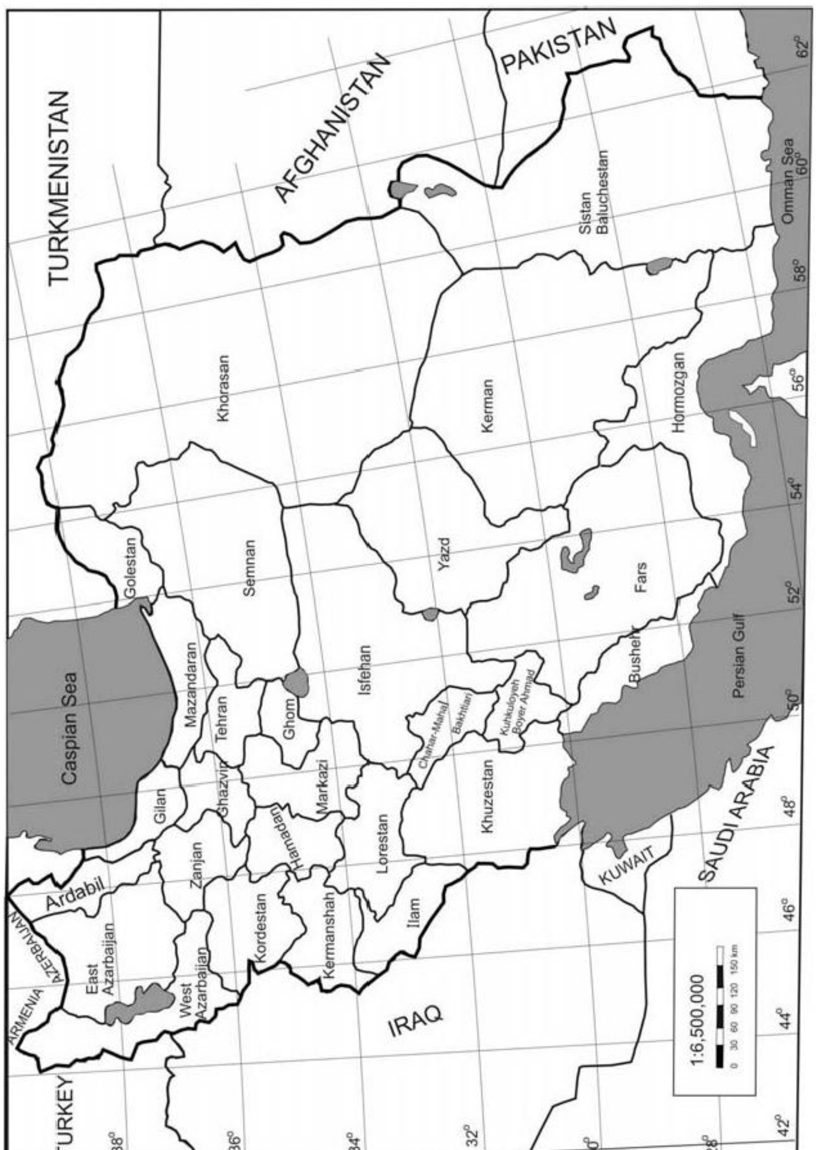
Villiers, A. 1970. Cérambycides récoltés en Iran par MM. R. Naviaux et M. Rapilly. L'Entomologiste, Paris 26 (5-6): 133-137.

Villiers, A. 1973. A propos d'un nouveau Procallimus d'Iran (Col. Cerambcidae Stenopterini). L'Entomologiste, Paris 29 (1): 33-38.

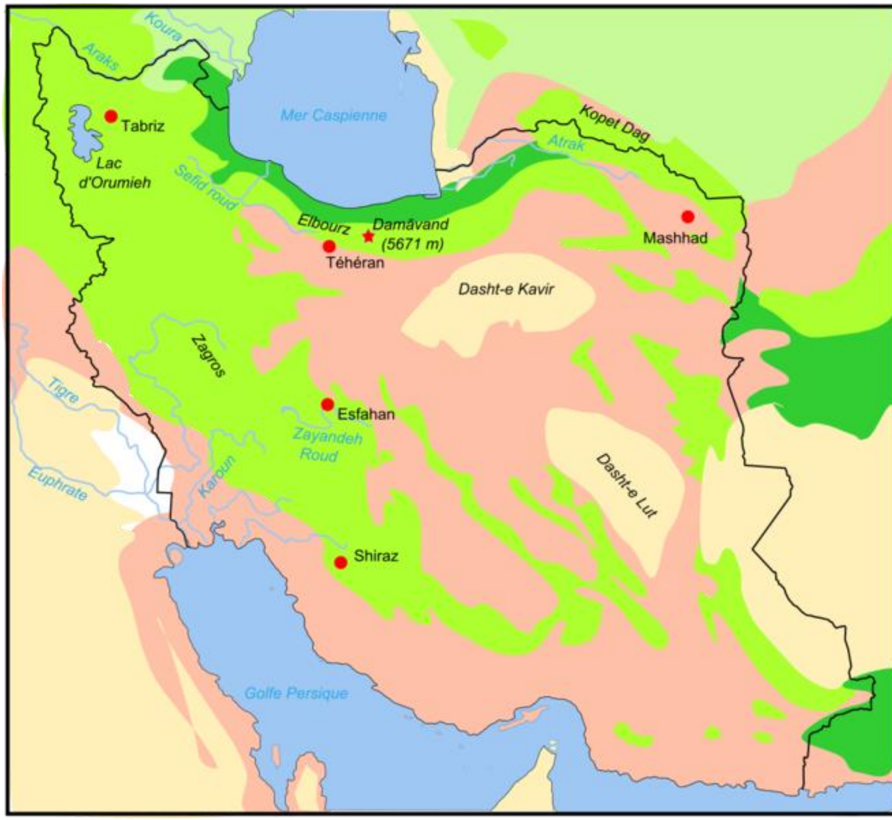
Vitali, F. 2008. Cerambycoidea.com. The first Web-site about the World-wide Cerambycoidea. Available from: http://www.cerambycoidea.com/

Waterhouse, G. R. 1840. Descriptions of two new coleopterous insects, from the Collection of Sir Patrick Walker. The Transactions of the Entomological Society of London 2: 225-229.

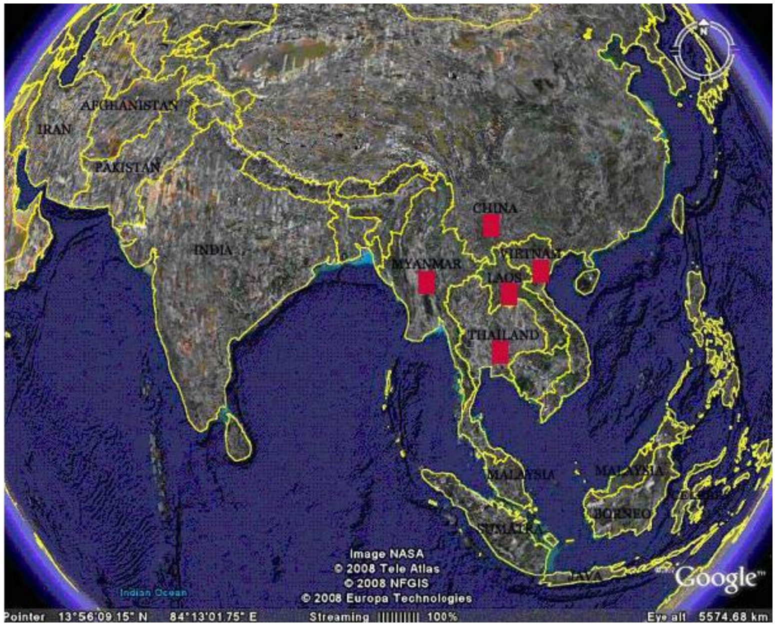
Zicha, O., Hrb, J., Maňas, M. & Novák, J. 2008. Biolib.cz. Available from: http://www.biolib.cz/en/main/



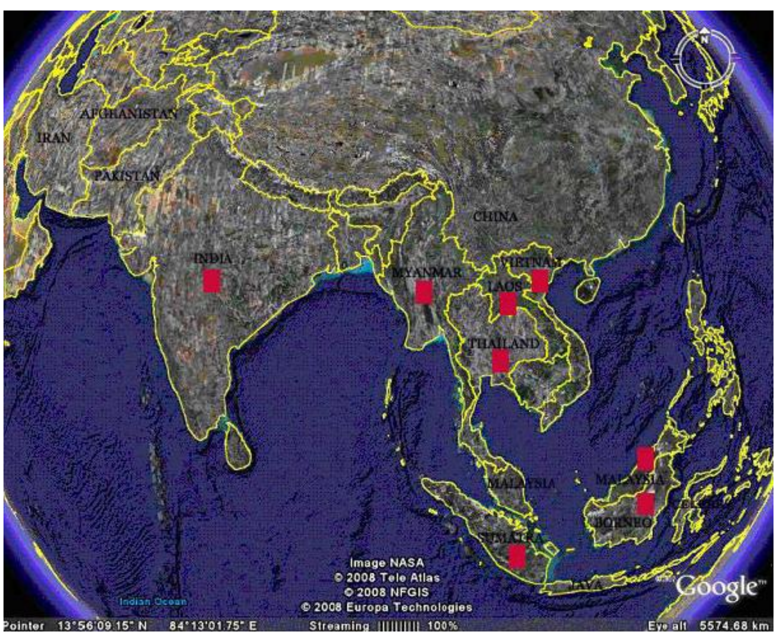
Map 1. The provinces of Iran.



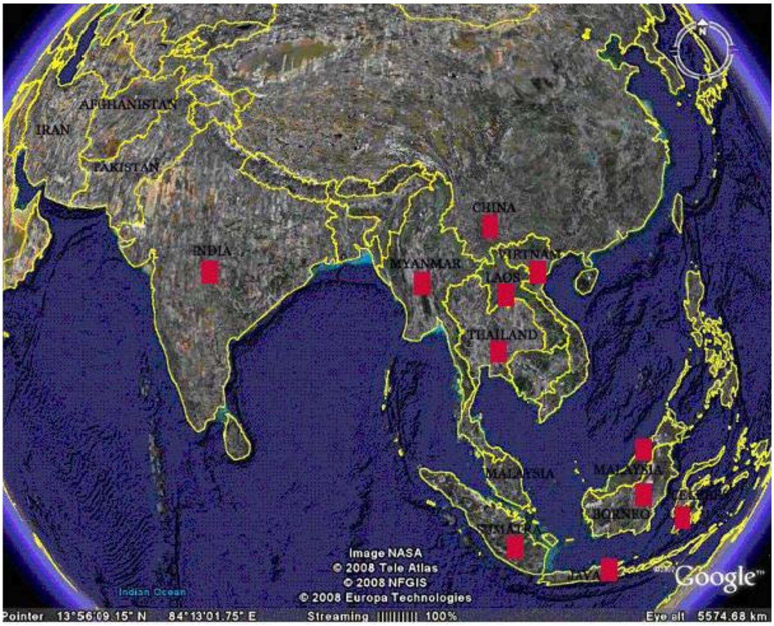
Map 2. Map of biotopes of Iran Forest steppe Forests and woodlands Semi-desert Desert lowlands Steppe Salted alluvial marshes (from Wikipedia, 2007).



Map 3. The known distribution of *Dorysthenes walkeri* (Waterhouse, 1840) (from Google Earth)



Map 4. The known distribution of *Pachyteria dimidiata* Westwood, 1848 (from Google Earth)



Map 5. The known distribution of *Diastocera wallichi* (Hope, 1831) (from Google Earth)

Figure 1. *Dorysthenes walkeri* (Waterhouse, 1840)

Figure 2. *Pachyteria dimidiata* Westwood, 1848

Figure 3. *Diastocera wallichi* (Hope, 1831)

AN INVESTIGATION ON SOME HETEROPTERA IN MARAND REGION (IRAN)

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[Hassazadeh, M., Pourabad, R. F. & Shayesteh, N. 2009. An investigation on some Heteroptera in Marand region (Iran). Munis Entomology & Zoology, 4 (1): 19-24**]**

ABSTRACT:During 2005- 2006 an investigation was carried out on Heteroptera fauna of Marand region and environs in East Azarbaijan province (located in the northwest of Iran).The specimens were collected from trees, weeds, fields of cereals, hibernating habitats, soil and water by sweep net, aspirator and light trap. All species are first records from the studied region**.**

KEY WORDS: Heteroptera, Marand, fauna, predator

The Heteroptera are very important from an agricultural point of view. In this suborder there are aquatic, semi-aquatic and terrestrial species some of which are serious agricultural and silvicultural pests. On the other hand, predacious bugs reduce the number of agricultural pests and may be used in biological control.Because of these reasons; identification of Heteroptera is important (Linnavuori & Hosseini, 2000).

The Heteroptera insects feed on plant juices or live as predators. Many of such insects that feed on the plant are known as serious plant pests (Safavi, 1973).

The damage caused by the insect as a result of sucking sap from food plants, is often increased by the salivary enzymes, which may considerably alter the quality of plant products such as the baking quality of wheat. On the other hand, many predators, catch other insects and Acarina, and very beneficial from an agricultural point of view (Linnavuori & Hosseini, 2000).

MATERIAL AND METHODS

Marand is notable for its agricultural products but no faunestic investigation on invertebrates has been carried out. This is the first report of Heteroptera fauna of the region.

The study carried out during 2005-2006, and Heteroptera insects of Marand and environ collected from different plant hosts by different methods.

Marand (38°, 17' - 38°, 53' N, 45°, 14' - 46°, 12' E) is located on the northwest of East Azarbaijan province of Iran.

The climate is cold, semidried with the annual rainfall of 280-440mm. Wheat, barley, apple and stone fruits are the usual crops in the region.

The visible specimens that weren't very swift were trapped by hand but small species were collected by aspirator, some of the bugs were collected by sweep net from weeds and some of them by light trap. The specimens were put into jars filled with 70% alcohol.

RESULTS

In this study 29 species belonging to thirteen families of the Heteroptera have been studied.

Family Corixidae Leach, 1815

Corixa punctata (Illiger, 1807)

Material examined: Yekan dizaj: 4 specimens, June 2005. From water.

Family Notonectidae Latreille, 1802

Notonecta glauca Linnaeus, 1858

Material examined: Bangi: 2 specimens, July 2006. From water.

Family Tingidae Laport, 1877

Stephanitis pyri (Fabricius, 1775)

Material examined: Yekan dizaj: 1 specimen, May 2005. On garden apple.

Note: This species has been collected from different regions of Iran on apple, pear, cherry, peach, japanese quince, pyrus, white-thorn, plum, roses, malus, cerasus, alder, oak (Modarres Awal, 2002).

Family Miridae Hahn, 1831

Adelphocoris lineolatus Geoze, 1778

Material examined: Anamagh: 3 specimens, June 2005. On Lucerne.

Note: The species has generally distribution in Iran on sugar-beet, cotton, tamarisk, sainfoin (Modarres Awal, 2002).

Deraeocoris punctulatus (Fallen, 1801)

Material examined: Braham: 3 specimens, April 2005. On weeds.

Lygus rugulipennis Poppius, 1911

Material examined: Bangi: 2 specimens, June 2005, July 2006. On potato.

Family Anthocoridae Fieber, 1836

Anthocoris nemorum (Linnaeus, 1761)

Material examined: Marand: 2 specimens, July 2005. On garden apple.

Note: Predator of *Psylla pyricola, Anthonomus pomorum, Euzophera bigella, Hyponomeuta malinellus* and aphids (Modarres Awal, 2002).

Anthocoris nemoralis (Fabricius, 1794)

Material examined: Marand: 3 specimens, July 2006. On garden pear.

Note: Predator of aphids and *Psylla pyricola.*

Family Nabidae Costa, 1852

Nabis Pseudoferrus Remane, 1949

Material examined: Ordakloo :2 specimens, May 2005. On Lucerne.

Note: The species is predator and collected on sainfoin and Lucerne (Modarres Awal, 2002).

Coreidae Leach, 1815 Family

Coreus marginatus Linnaeus, 1758

Material examined: Bahram: 3 specimens, May 2005, 2 specimens, June 2006. On *Cirsium.*

Family Pyrrhocoridae Dohrn, 1859

Pyrrhocoris apterus Linnaeus, 1768

Material examined: Marand: 4 specimens, June 2005. On weeds.

Note: The species has been collected from East Azarbaijan, Khorasan, Tehran, Khozestan, Fars, Gilan and Gorgan provinces in Iran (Modarres Awal, 2002).

Family Alydidae Amyot and Servill, 1843

Camptopus lateralis (Germar, 1817)

Material examined: Marand: 6 specimens, April 2005. On lucene.

Family Rhopalidae Amyot and Servill, 1843

Corizus hyoscyami Linnaeus, 1758

Material examined: Ordakloo: 3 specimens, May 2005; **Marand:** 2 specimens, June 2006. On weeds.

Family Cydnidae Billberg, 1820

Cydnus aterrimus Foster, 1771

Material examined: Marand: 1 specimen, May 2005**.** On lucerne.

Family Scutelleridae Leach, 1815

Eurygaster integriceps Puton, 1886

Material examined:Marand: 8 specimens, June 2005. On wheat.

Note: This species has generally distribution in Iran (Modarrese Awal, 2002).

Eurygaster maura (Linnaeus, 1758)

Material examined: Marand: 5 specimens, May 2006. On wheat.

Odontotarsus robustus Jakovlev, 1883

Material examined: Bangi: 1 specimen, May 2006. On weeds.

Family Pentatomidae Leach, 1815

Aelia rostrata Bohemann, 1852

Material examined: Bahram: 1 specimen, June 2005. On wild graminae.

Note: Wheat, barley and wild graminae are the host of the species (Modarreas Awal, 2002).

Apodiphus amygdali Germar, 1817

Material examined: Marand: 5 specimens, July 2005. On apricot.

Note: This species has been collected from Tehran, Fars, Markazi. Kerman, Hormozgan, Semnan, Balouchestan, Esfahan provinces in Iran on poplar, almond, apricot, oriental plane, pistachio, tamarisk, oak, tung (Modarres Awal,2002).

Apodiphus integriceps Horvath, 1888

Material examined: Marand: 4 specimens, June 2006. On poplar.

Carpocoris fuscispinus (Bohemann, 1849)

Material examined: Marand: 2 specimens, July 2005. On lucern.

Note: The species has distribution in East Azarbaijan, Mazandaran, Zanjan, Tehran, Esfahan, Khorasan, Loretan in Iran on Lucerne, lupine, wheat, sugar-beet (Modarres Awal,2002).

Carpocoris lunata Fallen, 1852

Material examined: Bangi: 4 specimens, May 2006. On cereals.

Carpocoris purpureipennis (DeGeer, 1773)

Material examined: Marand: 5 specimens, August 2005. On weeds.

Dolycoris baccarum Linnaeus, 1758

Material examined: Anamagh: 3 specimens, June 2005. On lucerne.

Eurydema ornatum (Linnaeus, 1758)

Material examined: Marand: 2 specimens, April 2005. On cabbage.

Note: The species has been collected from different regions of Iran on turnip, cabbage, colza, mustard, wheat, radish and cultivated and wild crucifereae family plants (Modarres Awal, 2002).

Eurydema ventrale Kolenati, 1864

Material examined: Anamagh: 1 specimen, April 2006. On cabbage.

Graphosoma lineatum (Linnaeuse, 1758)

Material examined: Marand: 5 specimens, June 2005. On wild crucifereae.

Neottiglossa irana Wagner, 1963

Material examined: Bahram: 1 specimen, April 2005. On weeds

Palomena prasina (Linnaeus, 1761)

Material examined: Marand: 3 specimens, June 2006. On weeds.

Among the species found in this study, *Eurygaster integriceps* and *Camptopus lateralis* had the highest frequency and convertibly family of *Stephanitis pyri* had the minimum.

LITERATURE CITED

Borror, D. G., Triplehron, C. A. & Johnson, N. F. 1989. An introduction to the study of insects (6th edition). Philadelphia: Saunders College Publishing, 875 pp.

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. & Hosseini, R. 2000. Heteroptera of Guilan (part 1). Guilan University, 94 pp.

Lodos, N. 1982. Entomology of Turkey. Vol. II. General, Applied, Faunestic.Egean Üniversitesi Matbasi, 591 pp.

Lodos, N. & Onder, F. 1986. Heteroptera Türkiye ve Palearktik Bölge familyarlar hakkinda Genel Bilgi. Ege Üniversitesi Ziraat Facültesi, 111 pp.

Modarres Awal, M. 1997. Determination of some fauna of Cimicomo - rpha and Pentatomorpha (Het.) present in Tabriz area .Agricultural Science Journal.Tabriz Universiy pub., 7 (3,4): 43-56.

Modarres Awal, M. 2002. List of agricultural pests and their natural enemies in Iran. III. Ed, Univ. Ferdowsi, Mashhad, 429 pp.

Safavi, M., 1973. Cle dé détermination des families d' Hémiptéres Hétérotéres de l Iran. J. E. S. I. 1(1): 3-11.

A NOTE ON BAIT TRAP COLLECTED LONGHORN BEETLES (CERAMBYCIDAE) OF WESTERN TURKEY

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[Tezcan, S. & Can, P. 2009. A note on bait trap collected Longhorn Beetles (Cerambycidae) of western Turkey. Munis Entomology & Zoology, 4 (1): 25-28**]**

ABSTRACT: In this paper, information is given on 10 species of Cerambycidae collected by fermenting bait traps from western Turkey. Of these species, three (*Trichoferus preissi*, *T. spartii*, *Cerambyx welensii*) were recorded for the first time from İzmir, two (*T. kotschyi*, *C. cerdo*) from Manisa provinces and three (*Trichoferus kotschyi, T. preissi*, *Cerambyx welensii*) were recorded for the first time from Aegean Region of Turkey, respectively.

KEY WORDS: Cerambycidae, Fauna, Western Turkey, Bait trap.

Some data on the Longhorn beetle fauna of Western Turkey has been given by İyriboz (1938, 1940), Gül-Zümreoğlu (1972, 1975), Lodos (1998), Tezcan & Rejzek (2002) and Özdikmen (2008a, b) and recently detailed information on 134 species has been given by Özdikmen (2008b).

In this paper, the monitoring of Cerambycidae species occurring in the Turkish pine (*Pinus brutia* Ten.) (Pinales: Pinaceae) seed orchards by using a fermenting bait trap collection method is described.

MATERIAL AND METHODS

The beetles were collected in two pine seed orchards in western Turkey: Kınık (İzmir, 39° 04´N 27° 18´E), and Gelenbe (Manisa-Kırkağaç, 39° 11´N 27° 49´E). The specimens were collected during the months of June-September, 1999 by using fermenting bait traps. For this purpose, a total of 4 fermenting bait traps were hung in each orchard. The traps were charged with a mixture containing wine (100 ml), water (900 ml), sugar (25 g), and vinegar (25 ml) (Ulu et al. 1995). The traps were checked for the presence of beetles weekly intervals starting from beginning of June until the end of September.

All specimens were identified by M. Rejzek (Czech Republic) and were deposited in the collection of the Prof. Dr. Niyazi Lodos Museum (LEMT), Plant Protection Department, Faculty of Agriculture, Ege University, İzmir, Turkey.

Recent publication of Özdikmen (2008b) were used to give the distribution of each species in Turkey without given cited previous publications. If needed, Özdikmen (2008b) can be studied for detailed literature.

RESULTS

Cerambycinae

Hesperophanini

Hesperophanes sericeus (Fabricius, 1787)

Distribution in Turkey: Aydın, Denizli, Erzincan, Isparta, İzmir (Dikili) (Özdikmen, 2008b).

Material examined: İzmir (Kınık), 16.08.1999, 1 specimen.

Biology: Polyphagous on deciduous trees and shrubs *Juglans*, *Ficus*, *Vitis*, *Platanus*, *Quercus*, etc. (Hoskovec & Rejzek, 2008). No significance for pine seed orchards.

Trichoferus fasciculatus (Faldermann, 1837)

Distribution in Turkey: Ankara, Antalya, Bartın, Bursa, İzmir (Kemalpaşa-Ören), Manisa (Muradiye), Muğla, Trabzon (Özdikmen, 2008b).

Material examined: Manisa (Kırkağaç-Gelenbe), 12.07.1999, 1 specimen.

Biology: Polyphagous in deciduous trees. It develops in *Ficus*, *Sorbus*, *Rhus*, *Nerium*, *Vitis*, *Paliurus*, *Spartium*, *Castanea*, *Ulmus*, *Morus*, *Punica*, *Rubus*, *Cytisus*, *Robinia*, *Ceratonia*, *Pistacia*, *Ziziphus*, *Coronilla*, etc. (Hoskovec & Rejzek, 2008). No significance for pine seed orchards.

Trichoferus griseus (Fabricius, 1792)

Distribution in Turkey: Adana, Antalya, Aydın, Gaziantep, Hatay, İçel, İzmir (Bornova, Çeşme, Dikili, Güzelyalı, Kemalpaşa-Ören, Ödemiş, Tire), Konya, Manisa (Muradiye), Osmaniye (Özdikmen, 2008b).

Material examined: Manisa (Kırkağaç-Gelenbe), 19.08.1999, 1 specimen.

Biology: Polyphagous in deciduous trees (Hoskovec & Rejzek, 2008). No significance for pine seed orchards.

Trichoferus kotschyi (Ganglbauer, 1883)

Distribution in Turkey: South Turkey (Sama & Makris, 2001); Mersin (Hoskovec & Rejzek, 2008).

Material examined: Manisa (Kırkağaç-Gelenbe), 19.08.1999, 1 specimen.

Biology: It develops in *Quercus* spp., *Ceratonia siliqua*, but also in dead herbaceous plants (Hoskovec & Rejzek, 2008). No significance for pine seed orchards.

Remarks: First record for Manisa province and Aegean Region of Turkey. It is a rare species. Dauber (2004) gave this species as a new record for Europe (from Samos Island).

Trichoferus preissi Heyden, 1894

Distribution in Turkey: Southern Turkey (Sama & Makris, 2001); Western Turkey (Hoskovec & Rejzek, 2008).

Material examined: İzmir (Kınık), 23.08.1999, 5 specimens; 02.09.1999, 1 specimen; 22.09.1999, 1 specimen. Totally 7 specimens.

Biology: Polyphagous in deciduous trees (Hoskovec & Rejzek, 2008). No significance for pine seed orchards.

Remarks: First record for İzmir province and Aegean Region of Turkey.

Trichoferus spartii (Müller, 1948)

Distribution in Turkey: İçel, Manisa (Muradiye) (Özdikmen, 2008b).

Material examined: İzmir (Kınık), 02.09.1999, 1 specimen. Manisa (Kırkağaç-Gelenbe), 12.07.1999, 1 specimen. Totally 2 specimens.

Biology: It develops in *Spartium*, *Rhus*, *Paliurus*, *Coronilla* spp. (Hoskovec & Rejzek, 2008). No significance for pine seed orchards.

Remarks: First record for İzmir province.

Cerambycini

Cerambyx cerdo Linnaeus, 1758

Distribution in Turkey: Adana, Adıyaman, Ankara, Antalya, Artvin, Bartın, Bursa, Çanakkale, Denizli, Hatay, İçel, İstanbul, İzmir (Bergama, Bornova, Kemalpaşa-Armutlu), Kahramanmaraş, Kastamonu, Kayseri, Kırklareli, Kocaeli, Muğla, Niğde, Osmaniye, Sakarya, Samsun, Sinop, Şırnak, Tunceli (Özdikmen, 2008b).

Material examined: Manisa (Kırkağaç-Gelenbe), 12.08.1999, 1 specimen.

Biology: Polyphagous in deciduous trees including *Quercus* spp. (Hoskovec & Rejzek, 2008). No significance for pine seed orchards.

Remarks: First record for Manisa province. The examined specimen in this paper belongs to the subspecies *Cerambyx cerdo acuminatus* (Motschulsky, 1852).

Cerambyx welensii Küster, 1846

Distribution in Turkey: Adıyaman, Antalya, İçel, İstanbul, Kahramanmaraş, Karaman (Özdikmen, 2008b).

Material examined: İzmir (Kınık), 08.07.1999, 1 specimen.

Biology: It develops in *Quercus* spp. (Lieutier, 2004). No significance for pine seed orchards.

Remarks: First record for İzmir province and Aegean Region of Turkey.

Acanthocinini

Acanthocinus griseus (Fabricius, 1792)

Distribution in Turkey: Adana, Antalya, Bursa, Denizli, Edirne, Erzurum, Hatay, İçel, İzmir (Bornova), Konya, Manisa, Muğla, Trabzon (Özdikmen, 2008b).

Material examined: İzmir (Kınık), 23.08.1999, 3 specimens.

Biology: It develops mainly in coniferous trees (*Pinus*, *Picea*, *Abies*). It was also reported from oak (*Quercus*) (Hoskovec & Rejzek, 2008).

Clytini

Plagionotus detritus (Linnaeus, 1758)

Distribution in Turkey: Adana, Antalya, Erzurum, Hatay, İstanbul, Kahramanmaraş, Manisa (Muradiye), Sinop, Trabzon (Özdikmen, 2008b).

Material examined: Manisa (Kırkağaç-Gelenbe), 05.08.1999, 1 specimen.

Biology: Polyphagous in deciduous trees including *Quercus* spp. (Hoskovec & Rejzek, 2008). No significance for pine seed orchards.

DISCUSSION

In this study 10 species belonging to Cerambycidae were recorded for İzmir and Manisa provinces. Of these species, three (*Trichoferus preissi*, *T. spartii*, *Cerambyx welensii*) were recorded for the first time from İzmir, two (*T. kotschyi*, *C. cerdo*) from Manisa provinces and three (*Trichoferus kotschyi, T. preissi*, *Cerambyx welensii*) were recorded for the first time from the Aegean Region of Turkey, respectively.

Among those *A. griseus* may develop in coniferous trees. The rest of them have no significance for pine seed orchards. Probably they are travellers from areas adjacent to the orchards.

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LITERATURE CITED

Dauber, D. 2004. Beitrag zur Kenntnis der Cerambycidenfauna von Samos (Coleoptera, Cerambycidae). Linzer biologische Beitrage, 36 (1): 81-88.

Gül-Zümreoğlu, S. 1972. Catalogue of Insect and common pests (1928-1969). T. C. Publications of Agriculture Ministry, Bornova, İzmir, 119 pp.

Gül-Zümreoğlu, S. 1975. Investigations on taxonomy, host plants and distribution of the Longhorned Beetles (Cerambycidae-Coleoptera) in Aegean Region. T. C. Ministry of Food, Agriculture and Stockbreeding, No : 28, , İstiklal Press, İzmir, 208 pp.

Hoskovec, M. & Rejzek, M. 2008. Longhorn Beetles (Cerambycidae) of the West Palearctic region. http://www.cerambyx.uochb.cz/tk.htm

İyriboz, N. 1938. Bağ Hastalıkları. T. C. Ziraat Vekaleti Neşriyatı Umumi Sayı: 323, Ankara, 109-111.

İyriboz, N. 1940. İncir Hastalıkları. T. C. Ziraat Vekaleti Neşriyatı Umumi Sayı: 489, İzmir, 44-47.

Lieutier, F. 2004. Bark and Wood Boring Insects in Living Trees in Europe: A Synthesis. Springer, 569 pp.

Lodos, N. 1998. Turkish Entomology VI (General, Applied and Faunistic). Ege Ü. Ziraat Fak. Yayınları No: 529, E. Ü. Faculty of Agriculture Press, İzmir, 300 pp.

Özdikmen, H. 2008a. The Longicorn beetles of Turkey (Coleoptera: Cerambycidae) Part II- Marmara Region. Munis Entomology & Zoology, 3 (1): 7-152.

Özdikmen, H. 2008b. The Longicorn beetles of Turkey (Coleoptera: Cerambycidae) Part III- Aegean Region. Munis Entomology & Zoology, 3 (1): 355-436.

Sama, G. & Makris, C. 2001. Description of *Trichoferus georgioui* sp. nov. from Cyprus (Coleoptera: Cerambycidae). Entomologische Zeitschrift, 111 (6): 166-167.

Tezcan, S. & Rejzek, M. 2002. Longhorn beetles (Coleoptera: Cerambycidae) recorded in cherry orchards in Western Turkey. Zoology in the Middle East, 27: 91-100.

Ulu, O., Önuçar, A., Zümreoğlu, A., Uzun, S., Ergüden, T. M., Aykaç, K., Kılıç, M., Çakır, O., Ceylan, S. & Koçlu, T. 1995. Kiraz bahçelerinde entegre mücadele araştırma, geliştirme ve uygulama projesi. BKA/U17, 1. Dilim sonuç raporu (Unpublished report), İzmir, 84 pp.

A REVIEW ON THE GENERA *PSEUDOVADONIA* LOBANOV ET AL., 1981 AND *VADONIA* MULSANT, 1863 (COLEOPTERA: CERAMBYCIDAE: LEPTURINAE)

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[Özdikmen, H. & Turgut, S. 2009. A review on the genera *Pseudovadonia* Lobanov et al., 1981 and *Vadonia* Mulsant, 1863 (Coleoptera: Cerambycidae: Lepturinae). Munis Entomology & Zoology 4 (1): 29-52**]**

ABSTRACT: All taxa of the genera *Pseudovadonia* Lobanov et al., 1981 and *Vadonia* Mulsant, 1863 in the whole world are evaluated. These genera are also discussed in detail. The main aim of this catalogic work is to clarify current status of the genera in the world.

KEY WORDS: *Pseudovadonia, Vadonia,* Lepturinae, Lepturini, Cerambycidae.

Subfamily LEPTURINAE Latreille, 1802

Tribe LEPTURINI Kirby, 1837

= Lepturidae Kirby, 1837
= Lepturaires Mulsant, 1839
= Lepturitae Thomson, 1864

The tribe includes currently at least 109 genera as *Acanthoptura* Fairmaire, 1894; *Alosterna* Mulsant, 1863; *Analeptura* Linsley & Chemsak, 1976; *Anastrangalia* Casey, 1924; *Anoplodera* Mulsant, 1839; *Asilaris* Pascoe, 1866; *Batesiata* Miroshnikov, 1998; *Bellamira* LeConte, 1873; *Brachyleptura* Casey, 1913; *Carlandrea* Sama & Rapuzzi, 1999; *Cerrostrangalia* Hovore & Chemsak, 2005; *Charisalia* Casey, 1913; *Chloriolaus* Bates, 1885; *Chontalia* Bates, 1872; *Choriolaus* Bates, 1885; *Corennys* Bates, 1884; *Cornumutila* Letzner, 1843; *Cribroleptura* Vives, 2000; *Cyphonotida* Casey, 1913; *Dokhtouroffia* Ganglbauer, 1886; *Dorcasina* Casey, 1913; *Elacomia* Heller, 1916; *Ephies* Pascoe, 1866; *Etorofus* Matsushita, 1933; *Eurylemma* Chemsak & Linsley, 1974; *Euryptera* Lepeletier & Audinet-Serville in Latreille, 1828; *Eustrangalis* Bates, 1884; *Formosopyrrhona* Hayashi, 1957; *Fortuneleptura* Villiers, 1979; *Gnathostrangalia* Hayashi & Villiers, 1985; *Hayashiella* Vives & N.Ohbayashi, 2001; *Idiopidonia* Swaine & Hopping, 1928; *Idiostrangalia* Nakane & Ohbayashi, 1957; *Japanostrangalia* Nakane & Ohbayashi, 1957; *Judolia* Mulsant, 1863; *Judolidia* Plavilstshikov, 1936; *Kanekoa* Matsushita & Tamanuki, 1942; *Kanoa* Matsushita, 1933; *Katarinia* Holzschuh, 1991; *Kirgizobia* Danilevsky, 1992; *Leptalia* LeConte, 1873; *Leptochoriolaus* Chemsak & Linsley, 1976; *Leptostrangalia* Nakane & Ohbayashi, 1959; *Leptura* Linnaeus, 1758; *Lepturalia* Reitter, 1913; *Lepturobosca* Reitter, 1913; *Lepturopsis* Linsley & Chemsak, 1976; *Lycidocerus* Chemsak & Linsley, 1976; *Lycochoriolaus* Linsley & Chemsak, 1976; *Lycomorphoides* Linsley, 1970; *Lygistopteroides* Linsley & Chemsak, 1971; *Macrochoriolaus* Linsley, 1970; *Macroleptura* Nakane et Ohbayashi, 1957; *Megachoriolaus* Linsley, 1970; *Meloemorpha* Chemsak & Linsley, 1976; *Metalloleptura* Gressitt & Rondon, 1970; *Metastrangalis* Hayashi, 1960; *Mimiptera* Linsley, 1961; *Mimostrangalia* Nakane & Ohbayashi, 1957; *Mordellistenomimus* Chemsak & Linsley, 1976; *Munamizoa* Matsushita &

Tamanuki, 1940; *Nemognathomimus* Chemsak & Linsley, 1976; *Neobellamira* Swaine & Hopping, 1928; *Neoleptura* Thomson, 1860; *Neopiciella* Sama, 1988; *Nivellia* Mulsant, 1863; *Nustera* Villiers, 1974; *Ocalemia* Pascoe, 1858; *Oedecnema* Thomson, 1857; *Ohbayashia* Hayashi, 1958; *Orthochoriolaus* Linsley & Chemsak, 1976; *Ortholeptura* Casey, 1913; *Pachytodes* Pic, 1891; *Papuleptura* Gressitt, 1959; *Paracorymbia* Miroshnikov, 1998; *Paranaspia* Matsushita & Tamanuki, 1940; *Parastrangalis* Ganglbauer, 1889; *Pedostrangalia* Sokolov, 1897; *Platerosida* Linsley, 1970; *Pseudalosterna* Plavilstshikov, 1934; *Pseudoparanaspia* Hayashi, 1977; *Pseudophistomis* Linsley & Chemsak, 1971; *Pseudostrangalia* Swaine & Hopping, 1928; *Pseudotypocerus* Linsley & Chemsak, 1971; *Pseudovadonia* Lobanov , Danilevsky et Murzin, 1981; *Pygoleptura* Linsley & Chemsak, 1976; *Pygostrangalia* Hayashi, 1976; *Pyrocalymma* Thomson, 1864; *Pyrotrichus* LeConte, 1862; *Pyrrhona* Bates, 1884; *Rapuzziana* Danilevsky, 2006; *Robustoanoplodera*; *Rutpela* Nakane et Ohbayashi, 1957; *Stenelytrana* Gistel, 1848; *Stenoleptura* Gressitt, 1935; *Stenostrophia* Casey, 1913; *Stenurella* Villiers, 1974; *Stictoleptura* Casey, 1924; *Strangalepta* Casey, 1913; *Strangalia* Audinet-Serville, 1835; *Strangalidium* Giesbert, 1997; *Strangaliella* Bates, 1884; *Strangalomorpha* Solsky, 1873; *Strophiona* Casey, 1913; *Trachysida* Casey, 1913; *Trigonarthris* Haldeman, 1847; *Trypogeus* Lacordaire, 1869; *Typocerus* LeConte, 1850; *Vadonia* Mulsant, 1863 and *Xestoleptura* Casey, 1913. However, *Cortodera* Mulsant, 1863 and *Grammoptera* Audinet-Serville, 1835 was placed in the tribe Lepturini by Villiers (1978) and Vitali (2007).

Genus *PSEUDOVADONIA* Lobanov, Danilevsky & Murzin, 1981

= *Pseudalasterna* Auct.
= *Vadonia* Auct. partim
= *Leptura* Auct. partim
= *Anoplodera* Auct. partim

Type species: *Leptura livida* Fabricius, 1776

Body short and wide. Head broad at the level of eyes, temples reduced completely, mouth narrow and lengthened, cheeks so long as the half of eyes. Eyes large, hard but dilated. Antennae inserted at the level of the lower edge of the eye, very thickened towards the apex, exceed three fifth of elytra in males, more thick and exceeding only barely the middle of the elytron in the females; scape very arched and flattened underneath; second article equal to one third of the third, third article almost equal to the fourth, the fifth a little longer, following articles thickened and diminished size.

Pronotum a little longer than wide, very shrunk forward, rounded laterally, with the fine swelling collar and a transverse depression in front of the base. Pronotum strongly bisinuate, side rounded, nonprojecting angles. Scutellum subtriangular, bifid in the apex. Elytra relatively short, convex, separately round in the apex. Legs rather short, middle and hind tibiae rather strongly thickened in the apex. First article of hind tarsi longer than the two following joined articles together.

Larval development is in humus particles of soil and parts of the roots infested by fungus *Marasmius oreades* (Bolt.). Pupation is in late spring or early summer in the soil. Adults can be found on flowers.

The Palaearctic genus is monotypic.

livida Fabricius, 1776
ssp. ***livida*** Fabricius, 1776
ssp. ***pecta*** Daniel & Daniel, 1891
ssp. ***desbrochersi*** Pic, 1891

Original combination: *Leptura livida* Fabricius, 1776

Other names. *pastinacea* Panzer, 1795; *bicarinata* Arn., 1869; *caucasica* Daniel & Daniel, 1891 (nomen nudum); *corallipes* Reitter, 1894; *bicarinatoides* Plavilstshikov, 1936; *steigerwaldi* Heyrovský, 1955

The species is represented by three subspecies in Turkey. *P. livida desbrochersi* (Pic, 1891) occurs in East or North-East Turkey, *P. livida pecta* (Daniel & Daniel, 1891) occurs in South and West Turkey and the nominative *P. livida livida* occurs in other parts of Turkey. However, we think that the real status of distribution patterns of these subspecies needs to be clarified. According to Sama (2002), the taxonomy of this species needs revision. In Danilevsky (2008b) stated that "*according to J. Vořišek (personal communication,1992), Pseudovadonia livida livida does not occur eastwards France; in Italy - Pseudovadonia livida pecta; in Greece, Black sea coast of Bulgaria, Transcaucasie and Turkey - Pseudovadonia livida desbrochersi Pic; but near Sochi - Pseudovadonia livida pecta*". Also, "*Pseudovadonia livida caucasica Daniel was recorded for Mashuk and Zheleznovodsk. The taxon was never described, so Pseudovadonia livida caucasica Runich, Kasatkin, Lantzov, 2000 must be regarded as nomen nudum*". Danilevsky (2008b) stated that "*As it was reliably mentioned by G. Sama (2002), Pseudovadonia livida consists of many morphological determined populations, which need to be adequately reflected in nomenclature (different length, color and direction of elytral and pronotal pubescence, different color of legs and abdomen). For example it was mentioned (Sama, 2002), that populations from Middle East looks closer to European populations than to Anatolian. Leptura livida was described from Germany. Specimens (my materials and collection of Zoological Museum of Moscow University) from France, Germany, Austria, Czechia, Hungary and Greece seem to have relatively longer pronotal erect pubescence, than specimens from Italy (type locality of Vadonia livida pecta), Bulgaria, Ukraine, Russia and Kazakhstan. So, traditional separation of the east subspecies Pseudovadonia livida pecta seems to be adequate. Besides the black abdomen in females is rather typical for western populations Including Italy and Greece. All known to me females from Bulgaria, Moldavia, Ukraine, Russia, Kazakhstan, Caucasus and Turkey have red abdomen. Certain populations of P. livida from Transcaucasia and Turkey consist only of specimens with totally red legs (Armenia: Amberd-Biurakan, Goris, Khosrov; Georgia: Aspindza, Atskuri; Azerbajdzhan: Adzhikent; Turkey: Kagyzman, Sarykamysh), others are similar to East European populations with black legs (Armenia: Takerlu-Artavaz, Kirovakan-Vanadzor, Goris; Georgia: Mtzheta, Dviri, Borzhomi; Azerbajdzhan: Altyagach; Turkey: Kazikoporan). I regard them as two subspecies. P. livida with red legs was described several times: Vadonia livida var. desbrochersi from Bitlis (Turkey), Leptura l. var. corallipes from Armenia. I do not know specimens from Bitlis and provisionally regard both names as synonyms, so the name of the reg-legs subspecies is P. livida desbrochersi (= corallipes). Populations with partly red legs also exist (Artvin env., Turkey). Certain Transcaucasian populations are characterized by much shorter elytral and* *pronotal erect pubescence, than P. l. pecta (similar form seems to be known from Spain); Transcaucasian subspecies with black legs and short pubescence most probably needs a new name*".

RECORDS IN TURKEY: İstanbul prov.: Alem Mountain (Bodemeyer, 1906); Amasya prov., Gümüşhane prov.: Torul, Bayburt prov. and Erzurum prov.: Kop Mountain as *Leptura livida pecta* (Villiers, 1959); İstanbul prov.: Polonez village / Alem Mountain / Beykoz / Anadoluhisarı / Çengelköy, İzmir prov.: near Central / Kemalpaşa / Efes / Bergama, Antalya prov.: near Central / Belkıs (Aspendos, Cumali) / Antitoros Mountains (Bey Mountains / Korkuteli) / Alanya and near, Isparta prov.: Eğirdir and near as *Leptura livida* m. *pecta* (Demelt & Alkan, 1962); Ankara prov. (Villiers, 1967); Ankara prov. (Tuatay et al., 1972); Turkey (Demelt, 1963; Lobanov et al., 1981; Danilevsky & Miroshnikov, 1985; Svacha & Danilevsky, 1988; Althoff & Danilevsky, 1997; Lodos, 1998; Sama & Rapuzzi, 2000; Sama, 2002); Turkey as *P. livida pecta* (Daniel, 1891) (Demelt, 1963; Lobanov et al., 1981; Danilevsky & Miroshnikov, 1985); Giresun prov.: Kümbet (Sama, 1982); Ankara prov.: Kalecik (Öymen, 1987); Antalya prov.: Kemer / Kumluca (Yeniceköy) / Termessos / Manavgat-Sorgun, İçel prov.: Erdemli (Aslanlı), Osmaniye prov.: Nurdağı pass as *Pseudovadonia livida pecta* (Adlbauer, 1988); Antalya prov.: Arapsuyu, Artvin prov.: Ardanuç (Akarsu) / Şavşat (Çayağzı) / Çalmaşur (Karagöl) / Yusufeli (Sarıgöl), Bayburt prov.: Maden, Bilecik prov.: Central, Erzincan prov.: Ballıköy / Kemaliye, Erzurum prov.: Central (Palandöken) / Ilıca (Atlıkonak) / İspir / Oltu (Sütkans) / Pazarroad (Gölyurt pass) / Şenkaya (Turnalı) / Tortum (Aşağı Meydanlar), Kars prov.: Sarıkamış (Akkurt) / Karakurt (Şeytangeçmez) (Tozlu et al., 2002); Isparta prov.: Yalvaç (Bağkonak, Sultan mountains), Uşak prov.: Ulubey (Ovacık village, Gökgöz hill), Gümüşhane prov.: Kelkit (Günyurdu village) (Özdikmen & Çağlar, 2004); Ankara prov.: Central / Çubuk (Karagöl), Kars prov.: Sarıkamış, Isparta prov.: Gölcük (Çakıören) (Özdikmen et al., 2005); Manisa prov.: Turgutlu Çardağı (Aysekisi hill / Domunludeve valley), İzmir prov.: Menderes (Efem çukuru village), Kocaeli prov.: İzmit (Ballıkayalar Natural Park / Beşkayalar Natural Park,), Osmaniye prov.: Zorkun plateau road (Olukbaşı place) / Yarpuz road (Karataş place) / Bahçe (Yaylalar village), Gaziantep prov.: Nurdağı (plateau of Kazdere village) / Kuşçubeli pass, Hatay prov.: Hassa (Zeytinoba village, Aktepe) (Özdikmen & Demirel, 2005); Antalya prov.: Irmasan pass, Artvin prov.: from Şavşat to Çam pass, Bolu prov.: Abant, Bursa prov.: Uludağ / Central, Çankırı prov.: Çerkeş, Kırklareli prov.: Demirköy, Hatay prov.: Yayladağı, İçel prov.: Erdemli-Güzeloluk / Güzeloluk / Silifke (Ortagören to Mut), Rize prov.: İkizdere, Samsun prov.: Kavak (Hacılar pass) (Malmusi & Saltini, 2005); Adıyaman prov.: Nemrut Mountain, Artvin prov.: from Şavşat to Çam pass, Bitlis prov.: Güroymak, Erzurum prov.: İspir-Çamlıkaya / İspir, Kars prov.: Sarıkamış, Rize prov.: Artvin-Şavşat / Şavşat-Çam pass as *P. livida desbrochersi* (Pic, 1891) (Malmusi & Saltini, 2005); Ankara prov.: Beytepe (Özdikmen & Demir, 2006); Ankara prov.: Kızılcahamam (Güvem / Yenimahalle village / the peak of Bel), Niğde prov.: Altunhisar-Çiftlik road (entry of Çiftlik) (Özdikmen, 2006); Karabük prov.: Safranbolu (Bulak village, Mencilis Cave env., Gürleyik National Park), between Eflani–Pınarbaşı, Kastamonu prov.: Küre (Masruf pass env.), Ağılı–Azdavay road (Yumacık village), Azdavay, between Azdavay–Pınarbaşı, Pınarbaşı–Azdavay road (Karafasıl village), Küre–Seydiler road (Masruf pass), Pınarözü, Yaralıgöz pass, Dipsiz Göl National Park, Ilgaz–Kastamonu road (Kadın Çayırı village), Tosya (Ilgaz), Hanönü env., Şenpazar-Azdavay road (Yumacık village), Doğanyurt-Şenpazar road, between Daday-Araç, between Araç-Kurşunlu (Boyalı), Bolu prov.:

Mengen (Devrek–Mengen), Bartın prov.: Kalecik village, Artvin prov.: Karagöl (Özdikmen, 2007) (Map 1)

DISTRIBUTION: Europe (Portugal, Spain, France, Italy, Sicily, Albania, Slovenia, Croatia, Bosnia-Herzegovina, Serbia, Macedonia, Greece, Bulgaria, European Turkey, Romania, Hungary, Austria, Switzerland, Belgium, Netherlands, Denmark, Germany, Luxembourg, Great Britain, Ireland, Czechia, Slovakia, Poland, Estonia, Latvia, Lithuania, Belorussia, Ukraine, Crimea, Moldavia, European Russia, European Kazakhstan), Siberia, China, Caucasus, Transcaucasia, Armenia, Turkey, Lebanon, Syria, Israel, Iran

CHOROTYPE: Sibero-European + E-Mediterranean (Palaestino-Taurian)

Genus *VADONIA* Mulsant, 1863

= *Neovadonia* Kaszab, 1938
= *Leptura* Auct. partim
= *Anoplodera* Auct. partim

Type species: *Leptura unipunctata* Fabricius, 1787

As *Pseudovadonia* Lobanov et al., 1981 but scutellum triangular, not truncate, broader, temples longer, subangular behind, third article of antennae distinctly longer than the fourth, elytra more lengthened, subtruncate in the apex, metasternum without longitudinal carinae.

Larval development is unknown for most species of the genus. Probably, larvae are in underground parts of herbaceous living plants (e. g. according to Svacha & Danilevsky, 1988, *Knautia arvensis, Scabiosa ochroleuca, Euphorbia niciciana*). Bense (1995) stated that development for many species of the genus is in *Euphorbia* species probably. Pupations are unobserved in general. Adults can be found on the host plants probably and on flowers.

The main aim of this catalogic work is to clarify current status of the genus in the world. As commonly accepted that this chiefly Palaearctic genus *Vadonia* Mulsant, 1863 (except the orientalic species *V. eckweileri* Holzschuh, 1989 from Pakistan) is represented by 23 species (with 16 subspecies) in the whole world. Fourteen species are endemic to different countries. In Turkey, it is represented by 15 species as *Vadonia bicolor* (Redtenbacher, 1850), *Vadonia bipunctata* (Fabricius, 1781), *Vadonia bisignata* (Brullé, 1832), *Vadonia bitlisiensis* (Chevrolat, 1882), *Vadonia bolognai* Sama, 1982, *Vadonia ciliciensis* K. Daniel & J. Daniel, 1891, *Vadonia danielorum* Holzschuh, 1984, *Vadonia frater* Holzschuh, 1981, *Vadonia imitatrix* K. Daniel & J. Daniel, 1891, *Vadonia instigmata* (Pic, 1889), *Vadonia ispirensis* Holzschuh, 1993, *Vadonia moesiaca* K. Daniel & J. Daniel, 1891, *Vadonia monostigma* Ganglbauer, 1881, *Vadonia soror* Holzschuh, 1981 and *Vadonia unipunctata* (Fabricius, 1787). The seven species as *Vadonia bolognai* Sama, 1982, *Vadonia ciliciensis* K. Daniel & J. Daniel, 1891, *Vadonia danielorum* Holzschuh, 1984, *Vadonia frater* Holzschuh, 1981, *Vadonia instigmata* (Pic, 1889), *Vadonia ispirensis* Holzschuh, 1993 and *Vadonia soror* Holzschuh, 1981 are endemic to Turkey. The four species as *Vadonia aspoeckorum* Holzschuh, 1975, *Vadonia insidiosa* Holzschuh, 1984, *Vadonia mainoldii* Pesarini & Sabbadini, 2004 and *Vadonia parnassensis* (Pic, 1925) are endemic to Greece. On the other side, *Vadonia eckweileri* Holzschuh, 1989, *Vadonia hirsuta* K. Daniel & J. Daniel, 1891 and *Vadonia saucia* (Mulsant et Godart, 1855) are endemic to Pakistan, Romania and Crimea respectively. All taxa of this genus in the world are presented as follows:

aspoeckorum Holzschuh, 1975

Original combination: *Vadonia aspoeckorum* Holzschuh, 1975

This species was synonymized by Slama & Slamova (1996) with *Vadonia parnassensis* (Pic, 1925). However, it was restored by Pesarini & Sabbadini (2004).

DISTRIBUTION: Greece
CHOROTYPE: Greek endemic

bicolor Redtenbacher, 1850

Original combination: *Leptura bicolor* Redtenbacher, 1850

Other names. *tuerki* Heyden, 1879

RECORDS IN TURKEY: Turkey (Lobanov et al., 1981); Northern Turkey (Danilevsky & Miroshnikov, 1985) (Map 2)

DISTRIBUTION: Caucasus, NE Turkey, Iran
CHOROTYPE: SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

bipunctata Fabricius, 1781

- ssp. ***bipunctata*** Fabricius, 1781
- ssp. ***steveni*** Sperk, 1835
- ssp. ***adusta*** Kraatz, 1859
- ssp. ***mulsantiana*** Plavilstshikov, 1936
- ssp. ***puchneri*** Holzschuh, 2007

Original combination: *Leptura bipunctata* Fabricius, 1781

Other names. *fischeri* Zubkov, 1829; *litigiosa* Mulsant, 1863; *globicollis* Desbrochers, 1870; *laterimaculata* Motschulsky, 1875; *pfuhli* Reineck, 1920; *rufonotata* Pic, 1926; *sareptana* Pic, 1941; *beckeri* Pic, 1941; *bilitigiosa* Pic, 1941.

The systematics of this species was evaluated by Danilevsky (2008a,b) in detail. Now we share the approach of Danilevsky about this subject. According to this status, *Vadonia bipunctata* Fabricius, 1781 has five subspecies as *Vadonia bipunctata bipunctata* Fabricius, 1781 occurs in European Russia, Slovakia, European Kazakhstan, *Vadonia bipunctata steveni* Sperk, 1835 that was given by Sama (2002) as a separate species occurs in Europe (Moldova, West and Central Ukraine), *Vadonia bipunctata adusta* Kraatz, 1859 occurs in Europe (Slovenia, Macedonia, Hungary, Slovakia, Romania, ?Bulgaria), *Vadonia bipunctata mulsantiana* Plavilstshikov, 1936 occurs in South Ukraine, Moldova, European Russia and *Vadonia bipunctata puchneri* Holzschuh, 2007 occurs in Ukraine, Crimea, European Russia. Shortly, the nominate subspecies is eastern populations of this species. Other subspecies are more or less western populations of it. This species was recorded from Turkey as *Leptura bipunctata mulsantiana*.

Danilevsky (2008b) stated that "*Vadonia bipunctata from Crimea was described as a separate species V. puchneri Holzschuh, 2007 ("10km N Eupatoria, Suvorovo"[Suvorovskoe] and "40km 40 km NE Eupatoria, Krasnoyarske" [36km NNW Evpatoria, Kraskoyarskoe]) on the base of rough pronotal punctation (similar to V.unipunctata). The main character of V. bipunctata is the shape of parameres, which are long and narrow – finger-like, while in V. unipunctata (which is often sympatric with V.bipunctata) parameres are strongly dilated, flat. Vadonia bipunctata with rough pronotal punctation is widely distributed in Ukraine (from about Ochakov and Kherson to Donetzk and Lugansk) and in South Russia from about Rostov region to North Caucasus (Teberda, Piatigorsk). In Crimea such specimens are known everywhere with the exception of south coast (from Tarkhankut cape to Evpatoria and Simferopol environs, and then to Belogorsk, Kazantip and Kerch; specimens from Dzhankoj have a little less rough punctation. Inside this area certain populations of V. bipunctata have very fine pronotum as in typical populations from the East (Askania-Nova, Sochi, Eysk). Specimens from the north part of Odessa region, Dnepropetrovsk and from near Kiev, as well as certain specimens from near Kerson have moderately rough pronotum, which look as a transition from rough pronotum of V. b. puchneri (similar to V. unipunctata) and V. b. steveni to finer pronotum of V. b. mulsantiana and V. b. bipunctata. Specimens of V. b. bipunctata with rough pronotal punctation (as well as with a single spine of hind tibiae) were mentioned by A. I. Kostin (1973: 147) from Kazakhstan. That is why he wrongly supposed: bipunctata = unipunctata = steveni. Parameres in V. bipunctata puchneri (from Ochakov, Kerson, Evpatoria, Simferopol, Kerch, Dzhankoj, Donetzk, Lugansk, Rostov, Piatigorsk and Teberda) are usually wider than in V. b. bipunctata, V. b. mulsantiana or V. b. steveni (never close to V.unipunctata), but in general rather variable and often indistingushed from parameres of other subspecies. Apex of aedeagus in V. unipunctata has a distinct swelling, which is specially big and arrow-like in V. saucia. In V. bipunctata apex of aedeagus is never modified. The presence of long erect setae on hind femora of V. bipunctata is also a very important character. In V. b. puchneri erect setae of hind femora are usually not so long and dense as in other subspecies, but transitional situations are also known. The finest pronotal punctation (nearly indistinct) can be observed in certain specimens of V. bipunctata from NE Kazakhstan (Naurzum – ZMM). Generally very fine, small pronotal punctation is more usual for eastern populations (Kazakhstan: Kapchagaj, Aktjubinsk, Karachocat near north bank of Aral see, Janvartzevo and Uralsk environs, Urda in the north-west Kazakhstan; Russia: Orenburg and Volgograd regions, Dagestan, Sochi, north part of Rostov region. But in Emba-city environs (NW Kazakhstan) pronotal punctation of V.bipunctata is moderately big. Several Ukranean populations also consist of specimens with fine punctation (Cherkasy, Askania-Nova, Nikolaev, Odessa region), but other populations have moderately big pronotal punctation: Kharkov environs, north part of Odessa region, Kiev environs (that is close to Podolia – type area of V. steveni). Possibly the description of several other local subspecies of V. bipunctata is desirable, as near Askania-Nova in Ukraine specimens with very fine pronotal punctation are distributed, specimens from Piatigorsk have the roughest pronotum known in the species. The stable pale elytral color of certain easten populations (Urda environs) could be also the reason for a subspecies* *separation. V. b. bipunctata from Sarepta was described as Leptura (Vadonia) saucia var. beckeri Pic, 1941 (: 14) and Vadonia steveni var. sareptana Pic, 1941 (: 15). Vadonia bipunctata beckeri Pic, 1941 could be accepted as a valid name for those eastern V. bipunctata populations, which consist of specimens with partly black elytra. The name var. bilitigiosa Pic, 1941 (: 15) was proposed as a replacing name for Leptura steveni ab. litigiosa Muls. sensu Plav., 1936 (: 343, 556 – so, for V. bipunctata steveni) as Mulsant (1863) described ab. litigiosa from Austria - there it is Vadonia bipunctata adusta (Kraatz, 1859)*".

Danilevsky (2008a) also stated that "*Leptura (Vadonia) bipunctata mulsantina was described without published holotype and precisely mentioned type locality. Lectotype (my designation, in press) of Leptura bipunctata mulsantiana (designated as "Type" by Plavilstshikov in Moscow Zoological Museum) has the label: "Bessarabia, circ. Izmail, 2.6.1915 P.Elsky". Specimen is relatively light with black elytral apex and black suture. The series of paralectotypes (16ex. - each designated as "cotype") includes specimens from Crimea (and so V.b.puchneri Holz.), Ekaterinoslav (=Dnepropetrovsk), Chir river, Kustanaj, Uralsk, Kislovodsk. Lectotype is a member of a big series of specimens with same label ("Bessarabia, circ. Izmail, 2.6.1915 P.Elsky") identified by N.N. Plavilstshikov as Vadonia steveni (type locality – Podolia! – West Ukraine northwards upper half of Dnestr river). V. steveni is traditionally regarded as a species with males with a single spine on hind male tibia. Now I see, that this character is not of species level. Such specimens (with a single hind tibia spine) are known among different V. bipunctata (described from "Siberia") with different type of pronotal punctation from different parts of its area (Kazakhstan, south Russia, Ukraine), but dominated in the West. Inside a homogeneous series of V. bipunctata from Nikolaev (S Ukraine, ZIN) three males have one spine on hind tibiae and one male has two spines on hind tibiae. Among two males of V. bipunctata from Sochi (NW Caucasus, ZIN) one has two spines on hind tibia, another – one spine on hind tibia. A male with one spine on hind tibiae is also known from Eysk (N Krasnodar region, ZIN). A homogeneous series from near Izmail (type locality of V. b. mulsantiana) with 4 similar males has 1 male with a single hind tibia spine identified by Plavilstshikov as V.steveni, 1 male with different left and right hind tibiae (with a single spine and with a pair of spines) also identified by Plavilstshikov as V. steveni, and two males with paired hind tibiae spines: one of them was designated as a "type" of L. b. mulsantiana, but another was also identified as V. steveni, but its paired spines are conjugated! The presence of specimens with one tibiae spine in Central Kazakhstan (Aktiubinsk region) was mentioned by A. I. Kostin (1973). Generally two spines of hind tibiae in westertn populations often are situated much closer to each other, than in eastern populations. My series from Hungary totally consists of males with one hind tibiae spine – so called "Vadonia steveni", but pronotal and elytral punctation here differs from typical Ukranian specimens and from Russian specimens. This form can be named V. bipunctata adusta Kraatz, 1859. According to G. Sama (personal message of 2006 based on published data), the type series of V. steveni also includes males with one and two hind tibiae spines (G. Sama wrongly believes now that it represents two different species). I don't know specimens from Podolia (type locality of V. steveni), but specimens from the north part of Odessa region, from near Kiev and from near Dnepropetrovsk have considerably rougher pronotal punctation, than in specimens from near Izmail or from Askania-Nova. So, populations from West and Central Ukrane can be separated as V. bipunctata steveni (Podolia,* *north part of Odessa region, Kiev region, Dnepropetrovsk region). Populations from South Ukraine and Moldavia represent another subspecies with finer pronotum - V. b. mulsantiana (Izmail, Dolinkoe – northwards Odessa, Nikolaev, Askania-Nova). Both western subspecies often includes males with a single hind tibiae spine. to the west from about Podolia or from about Izmail. Yellow elytral color in both is much darker (orange-brown), than pale (yellow) elytral color of the nominative subspecies or in V. b. puchneri. The occurrence of very dark (nearly black) and pale specimens in Orenburg region can not be the reason to reject the separation of the species in two subspecies, as it was proposed by A. Shapovalov et al. (2006). In general the specimens V. b. bipunctata with wide black elytral areas (sometimes elytra are nearly totally black) are known from the east part of species area (Orenburg, north Kazakhstan, Volgograd environs, Tchir river valley), though populations with all specimens pale are also known in the east: north shore of Aral see, Mugodzhary Mts, Astrakhan region eastwards Volga river. All eastern populations (from Orenburg to Volgograd regions) are now preliminary regarded by me as V. b. bipunctata. The record of V. bipunctata for Iran (Daniel & Daniel, 1891; Plavilstshikov, 1936) looks strange, as it is not known to me (very rare?) from Transcaucasia, neither from Turkmenia*".

RECORDS IN TURKEY: İstanbul prov.: Polonez village (Demelt & Alkan, 1962); İstanbul prov.: Polonez village as *Leptura bipunctata* m. *mulsantiana* (Demelt, 1963); Turkey (Lodos, 1998) (Map 3)

DISTRIBUTION: European Russia, European Kazakhstan, Moldova, Ukraine, Slovenia, Macedonia, Hungary, Slovakia, Romania, ?Bulgaria, Crimea, NW Turkey, ?Turkmenia, ?Iran
CHOROTYPE: European or Turano-European

bisignata Brullé, 1832

= ssp. ***bisignata*** Brulléi 1832
= ssp. ***laurae*** Pesarini et Sabbadini, 2007

Original combination: *Leptura bisignata* Brullé, 1832

Other names. *grandicollis* Mulsant, 1863; *inapicalis* Pic, 1897

According to Pesarini & Sabbadini (2007), *Vadonia bisignata mahri* Holzschuh, 1986 that is described from eastern Greek Macedonia is a form of *Vadonia dojranensis* Holzschuh, 1984. However, they described a new subspecies, *Vadonia bisignata laurae,* from Greece in their paper. So this species has two subspecies again. The nominative subspecies, *Vadonia bisignata bisignata* (Brullé, 1832) occurs in Bulgaria, Greece, ?European Turkey and *Vadonia bisignata laurae* Pesarini & Sabbadini, 2007 occurs only in Greece (NW Greece and W Greek Macedonia).
RECORDS IN TURKEY: Turkey (Winkler, 1924-1932; Lodos, 1998); Antalya prov.: Antitoros Mountains (Bey Mountains) (Demelt & Alkan, 1962); Antalya prov.: Bey Mountain / Alanya, Isparta prov. (Demelt, 1963); European Turkey (Althoff & Danilevsky, 1997); Artvin prov.: Yusufeli (Tauzin, 2000) (Map 4)

DISTRIBUTION: Greece, Bulgaria, ?European Turkey, ?Ukraine
CHOROTYPE: Turano-Mediterranean (Balkano-Anatolian)

bitlisiensis Chevrolat, 1882

Original combination: *Leptura bitlisiensis* Chevrolat, 1882

Other names. *bistigmata* Pic, 1889; *cribricollis* Pic, 1889; *armeniaca* Pic, 1903

Vadonia bitlisiensis var. *instigmata* Pic, 1889 was accepted by some authors as a separate species. *Vadonia instigmata* (Pic, 1889) differs from this species mainly by completely red eltra and having any black point on elytra. So it is evaluated as a separate species in this work.

RECORDS IN TURKEY: Bitlis prov. (Pic, 1889); Van prov.: Çatak road (Görentaç village), North-East Turkey, East Anatolian Region (Villiers, 1959); Tunceli prov.: Selepür (Demelt, 1967); Turkey (Lobanov et al., 1981; Danilevsky & Miroshnikov, 1985; Lodos, 1998; Erzurum prov.: Pasinler (Adlbauer, 1988); Gümüşhane prov.: Köse (Tauzin, 2000); Bilecik prov.: Central, Erzincan prov.: Kemaliye, Erzurum prov.: Dumlu (Köşk) / Güngörmez / Kargapazarı Mts. / Aşkale / Hacıhamza / Ilıca / Sorkunlu / İspir (Madenköprübaşı) / Oltu (Sütkans) / Pasinler (Çalıyazı) / Tortum / Aksu / Uzundere (Dikyar) (Tozlu et al., 2002) (Map 5)

DISTRIBUTION: Caucasus (Armenia), E Turkey
CHOROTYPE: SW-Asiatic (Anatolo-Caucasian)

bolognai Sama, 1982

Original combination: *Vadonia bolognai* Sama, 1982

This species is endemic to Turkey.

RECORDS IN TURKEY: Holotype: Samsun prov.: Kavak (Sama, 1982); Amasya prov.: Aydınca (İnegöl Mountain), Samsun prov.: Kavak (Hacılar pass), Kastamonu prov.: Yaraligöz (Malmusi & Saltini, 2005) (Map 6)

DISTRIBUTION: N Turkey
CHOROTYPE: N-Anatolian

ciliciensis K. Daniel & J. Daniel, 1891

Original combination: *Vadonia ciliciensis* K. Daniel & J. Daniel, 1891

This species is endemic to Turkey.

RECORDS IN TURKEY: Turkey (Winkler, 1924-1932; Acatay, 1963); Burdur prov.: Bucak (Kavacık forest), Antalya prov.: Elmalı (Çığlıkara, Suluçukur place and Bucak forest) (Tosun, 1975); Denizli prov.: Acıpayam and Tavas, Burdur prov.: Bucak, Antalya prov.: Elmalı (Çanakçıoğlu, 1983); Turkey (Lodos, 1998) (Map 7)

DISTRIBUTION: S and SW Turkey
CHOROTYPE: Anatolian

danielorum Holzschuh, 1984

Original combination: *Vadonia danielorum* Holzschuh, 1984

This species is endemic to Turkey.

RECORDS IN TURKEY: Antalya prov.: Taşağıl, Termessos (Adlbauer, 1992) (Map 8)

DISTRIBUTION: S Turkey
CHOROTYPE: Anatolian

dojranensis Holzschuh, 1984

= ssp. ***dojranensis*** Holzschuh, 1984
= ssp. ***mahri*** Holzschuh, 1986

Original combination: *Vadonia dojranensis* Holzschuh, 1984

According to Pesarini & Sabbadini (2007), *Vadonia bisignata mahri* Holzschuh, 1986 that described from eastern Greek Macedonia is a form of *Vadonia dojranensis* Holzschuh, 1984. This species has two subspecies. The nominative subspecies, *Vadonia dojranensis dojranensis* Holzschuh, 1984 occurs in Macedonia and *Vadonia dojranensis mahri* (Holzschuh, 1986) occurs in Greece and Bulgaria.

Danilevsky (2008a) stated that "*The area of Vadonia dojranensis was mistakenly mentioned as "BG" (Bulgaria) by Althoff and Danilevsky (1997: 12), as it was described from Rep. of Macedonia. I've got a pair from Bulgaria with label: "Bulgaria mer., Kresna, VI.1982 Strba leg." The species was also recorded for Bulgaria (Kalimansti env. in Pirin) by E. Migliaccio et al. (2007). V. dojranensis from Bulgaria is V. dojranensis mahri*".

DISTRIBUTION: Macedonia, Greece, Bulgaria
CHOROTYPE: East Mediterranean (NE Mediterranean) or ?Turano-Mediterranean (Balkano-Anatolian)

eckweileri Holzschuh, 1989

Original combination: *Vadonia eckweileri* Holzschuh, 1989

This species is endemic to Pakistan.

DISTRIBUTION: Pakistan
CHOROTYPE: Asiatic or Orientalic

frater Holzschuh, 1981

Original combination: *Vadonia frater* Holzschuh, 1981

This species is endemic to Turkey.

RECORDS IN TURKEY: Adana prov.: Nurdağı pass (Holzschuh, 1981) (Map 9)

DISTRIBUTION: Turkey
CHOROTYPE: Anatolian

hirsuta K. Daniel & J. Daniel, 1891

Original combination: *Vadonia hirsuta* K. Daniel & J. Daniel, 1891

This species is endemic to Romania. Danilevsky (2008a) stated that "Vadonia hirsuta was often considered as an individual variation of V. unipunctata. It was regarded as a species by Panin, Savulescu (1961), Althoff, Danilevsky (1997), Miroshnikov (1998: 407). The considerable defference in the shape of aedeagus apex between V. hirsuta and V. unipunctata was shown by R. Serafim (2006).

DISTRIBUTION: Romania
CHOROTYPE: Romanian endemic

imitatrix K. Daniel & J. Daniel, 1891

Original combination: *Vadonia imitatrix* K. Daniel & J. Daniel, 1891

Other names: *saucia* Ganglbauer, 1881; *externerufa* Pic, 1926; *koechlini* Pic, 1926

RECORDS IN TURKEY: European Turkey as *V. i.* a. *externerufa* Pic, 1926 and *V. i.* a. *koechlini* Pic, 1926 (Winkler, 1924-1932); Turkey (Lodos, 1998) (Map 10)
DISTRIBUTION: Europe (Italy, Croatia and Bosnia and Herzegovina, Serbia, ?Bulgaria), European Turkey
CHOROTYPE: E-Mediterranean (NE-Mediterranean)

insidiosa Holzschuh, 1984

Original combination: *Vadonia insidiosa* Holzschuh, 1984

This species is endemic to Greece.

DISTRIBUTION: Greece
CHOROTYPE: Greek endemic

instigmata Pic, 1889

Original combination: *Vadonia bitlisiensis* var. *instigmata* Pic, 1889

This species is endemic to Turkey. This species is accepted by some authors as a synonym of *Vadonia bitlisiensis* (Chevrolat, 1882). *Vadonia instigmata* (Pic, 1889) differs from it mainly by completely red eltra and having any black point on elytra. So it is evaluated as a separate species in this work.

RECORDS IN TURKEY: Bitlis prov. (Pic, 1889); Adıyaman prov.: Arsameia (Old Kahta) and peak region of Nemrut Mt. (Rejzek & Hoskovec, 1999); Adıyaman prov.: Nemrut Mt. (Malmusi & Saltini, 2005) (Map 11)

DISTRIBUTION: SE Turkey
CHOROTYPE: Anatolian

ispirensis Holzschuh, 1993

Original combination: *Vadonia ispirensis* Holzschuh, 1993

This species is endemic to Turkey.

RECORDS IN TURKEY: Erzurum prov.: Ispir (Holzschuh, 1993; Malmusi & Saltini, 2005) (Map 12)

DISTRIBUTION: NE Turkey
CHOROTYPE: Anatolian

mainoldii Pesarini & Sabbadini, 2004

Original combination: *Vadonia mainoldii* Pesarini & Sabbadini, 2004

This species is endemic to Greece.

DISTRIBUTION: Greece
CHOROTYPE: Greek endemic

moesiaca K. Daniel & J. Daniel, 1891

Original combination: *Vadonia moesiaca* K. Daniel & J. Daniel, 1891

RECORDS IN TURKEY: Turkey (Winkler, 1924-1932; Lodos, 1998); Antalya prov.: Taşağıl (Adlbauer, 1988); Çankırı prov.: Çerkeş, Kırklareli prov.: Demirköy (Malmusi & Saltini, 2005) (Map 13)

DISTRIBUTION: Serbia, Macedonia, Greece, Bulgaria, Turkey
CHOROTYPE: Turano-Mediterranean (Balkano-Anatolian)

monostigma Ganglbauer, 1881

Original combination: *Vadonia monostigma* Ganglbauer, 1881

RECORDS IN TURKEY: Turkey (Winkler, 1924-1932; Lodos, 1998); Antalya prov.: Bey Mountains (Antitoros) (Demelt & Alkan, 1962; Demelt, 1963); Amasya prov. (Gfeller, 1972); Amasya prov.: Central / Merzifon, Samsun prov.: Çakallı (Kavak), Kastamonu prov.: Yaralıgöz (Devrekani) / Akkaya (Adlbauer, 1992); Bolu prov.: Abant, Samsun prov.: Kavak (Hacılar pass) (Malmusi & Saltini, 2005) (Map 14)

DISTRIBUTION: Greece, Turkey
CHOROTYPE: Turano-Mediterranean (Balkano-Anatolian)

parnassensis Pic, 1925

Original combination: *Leptura bisignata* var. *parnassensis* Pic, 1925

This species is endemic to Greece.

DISTRIBUTION: Greece
CHOROTYPE: Greek endemic

saucia Mulsant et Godart, 1855

Original combination: *Leptura bipunctata* var. *saucia* Mulsant et Godart, 1855

This species is endemic to Crimea.

Danilevsky (2008a,b) stated that "*I know 7 totally black specimens (my collection and collection of Moscow Zoological Museum) from Crimea: Simferopol, Bajdary, Koreiz, Mukhalatka (between Faros and Alupka) described as Leptura saucia Mulsant et Godart, 1855. The identification is based on the original description (type locality – Crimea) of totally black specimen with small yellow spots near humeri. All series are characterized by very rough elytral and pronotal punctation, as well as by the absence of erect setae along hind femora and represent a local taxon close to V. unipunctata (not V. bipunctata! as it was considered by K. Daniel & J. Daniel, 1891; Plavilstshikov,1936 and Sama, 2002) with typically shaped (axe-like) parameres of V. unipunctata, but with very special big triangilar swelling of aedeagus apex. Populations of V. saucia distributed along south bank of Crimean peninsula from about Simferopol to Staryj Krym also include yellow specimens with black spots. Holzschuh (2007) supported traditional opinion and attributed V. saucia to V.bipunctata on the base of wrong interpretaion of the description by K. Daniel & J. Daniel (1891: 20), who in fact wrote nothing about genital structures of the type of V. saucia. It is evident that V. saucia is unknown for Holzschuh and his statement: "Die Zuordnung [of V. saucia] als Unterart zu V. unipunctata war wohl nur deshalb moglich, dass keine Untersuchung der Parameren vorgenommen wurde." was wrong*".

DISTRIBUTION: Crimea
CHOROTYPE: Crimean endemic

soror Holzschuh, 1981
= ssp. ***soror*** Holzschuh, 1981
= ssp. ***tauricola*** Holzschuh, 1993

Original combination: *Vadonia soror* Holzschuh, 1981

This species has two subspecies. The nominative subspecies, *Vadonia soror soror* Holzschuh, 1981 and *Vadonia soror tauricola* Holzschuh, 1993. Both are distributed in S Turkey. So it is endemic to Turkey. Içel record of Adlbauer (1988) should be *Vadonia soror taurica* Holzschuh, 1993.

RECORDS IN TURKEY: Denizli prov.: Pamukkale (Holzschuh, 1981); İçel prov.: Silifke (Gülnar) and Kuzucubelen (Adlbauer, 1988); Antalya prov. as ssp. *tauricola* (Hoskovec & Rejzek, 2008)(Map 15)

DISTRIBUTION: Turkey
CHOROTYPE: Anatolian

unipunctata Fabricius, 1787
= ssp. ***unipunctata*** Fabricius, 1787
= ssp. ***dalmatina*** Müller, 1906
= ssp. ***ohridensis*** Holzschuh, 1989
= ssp. ***makedonica*** Holzschuh, 1989
= ssp. ***syricola*** Holzscuh, 1993

Original combination: *Leptura unipunctata* Fabricius, 1787

Other names: *unistigmata* Pic, 1891; *occidentalis* Daniel & Daniel, 1891; *obscurepilosa* Pic, 1892; *jacqueti* Pic, 1900; *xambeui* Pic, 1900

This species is the type species of *Vadonia* Mulsant, 1863. As commonly accepted it has five subspecies in the world. The species is represented by the nominative subspecies in Turkey. The other known subspecies, *V. unipunctata dalmatina* Müller, 1906 occurs in Croatia, Bosnia and Herzegovina, ?Greece, *V. unipunctata ohridensis* Holzschuh, 1989 occurs in Macedonia, *V. unipunctata makedonica* Holzschuh, 1989 occurs in Greece and *V. unipunctata syricola* Holzschuh, 1993 occurs in Syria.

RECORDS IN TURKEY: Antalya prov.: Toros Mountains, Niğde prov.: Çamardı (Bodemeyer, 1900); Isparta prov.: Eğirdir, Ankara prov.: Gölbaşı, Afyon prov. (Demelt & Alkan, 1962; Demelt, 1963); Amasya prov. (Villiers, 1967); Bingöl prov., Elazığ prov.: Harput, Nevşehir [Kayseri] prov.: Ürgüp (Göreme), Malatya prov.: Darende (Fuchs & Breuning, 1971); Isparta prov. (Tuatay et al., 1972); İzmir prov.: Kemalpaşa (Gül-Zümreoğlu, 1975); Erzurum prov. and near (Özbek, 1978); Turkey (Lobanov et al., 1981; Danilevsky & Miroshnikov, 1985; Svacha & Danilevsky, 1988; Althoff & Danilevsky, 1997; Lodos, 1998; Sama, 2002); Ankara prov.: Kavaklıdere, Amasya prov.: Ezinepazarı (Öymen, 1987); Uşak prov.: Banaz, Nevşehir prov.: Göreme, Aksaray prov.: Sultanhanı, Afyon prov.: Dinar, Burdur prov.: Bucak, Niğde prov.: Çiftehan (Adlbauer, 1988); Artvin prov.: Şavşat (Karagöl), Bilecik prov.: Central, Bayburt prov.: Aydıntepe, Erzurum prov.: 4. Kuyu / University Campus / Kargapazarı Mts. / Horasan (Okçular) / İspir (Madenköprübaşı) / Oltu (Başaklı) / Çamlıbel / Sarısaz / Sütkans / Olur (Coşkunlar) / Pazarroad (Kartal Plateau) / Tortum (Çiftlik) / Pehlivanlı / Uzundere (Dikyar) / Öşvank / Şelale, Kars prov.: Sarıkamış, Sivas prov.: Central, Tokat prov.: Central (Tozlu et al., 2002); Isparta prov.: Yalvaç (Eleği village) (Özdikmen & Çağlar, 2004); Isparta prov. (Özdikmen et al., 2005); Kocaeli prov.: İzmit (Ballıkayalar Natural Park), Osmaniye prov.: Yarpuz road (Karataş place) / Yeşil village (Hasanbeyli) (Özdikmen & Demirel, 2005); Artvin prov.: Şavşat / from Şavşat to Çam pass, Bitlis prov.: Güroymak, Çankırı prov.: Çerkeş, Erzurum prov.: İspir / İspir-Çamlıkaya / from Pazarroad to Gölyurt pass, Kayseri prov., Kars prov.: Sarıkamış / Karakurt, Kırşehir prov.: Mucur, Kastamonu prov.: Yaraligöz, Rize prov.: Şavşat-Çam pass (Malmusi & Saltini, 2005); Kahramanmaraş prov.: Afşin (Kabaağaç / Emirli (Gergel) / Göksun (Göksun-

Çardak road, Gücük plateau / Mehmetbey (Özdikmen & Okutaner, 2006); Osmaniye prov.: Central, Kastamonu prov.: Kastamonu–Tosya road (Tosya–Ilgaz pass), Ağılı–Azdavay road (Yumacık village), between Azdavay–Pınarbaşı, Pınarbaşı–Azdavay road (Karafasıl village), Azdavay (Ballıdağ Wild Life Protection District), Küre (Masruf pass env.), Devrekani–Çatalzeytin road, Yaralıgöz pass, Tosya–Ilgaz pass, Tosya–Kastamonu road, Bolu prov.: Devrek–Mengen road, Mengen (Devrek–Mengen), Yeniçağa, Karabük prov.: between Eflani–Pınarbaşı, Afyon prov.: Erkmen valley, Artvin prov.: Karagöl (Okurlar district) (Map 16)

DISTRIBUTION: Europe (Spain, France, Italy, Croatia, Bosnia-Herzegovina, Serbia, Macedonia, Greece, Bulgaria, European Turkey, Romania, Hungary, Austria, Czechia, Slovakia, Poland, ?Latvia, Ukraine, Crimea, Moldavia, European Russia, European Kazakhstan), ?North Africa (Algeria, Morocco), Caucasus, Transcaucasia, Near East, Turkey, Iran, Syria, Lebanon
CHOROTYPE: Turano-European or Turano-Europeo-Mediterranean. According to Sama (2002), the records from North Africa are erroneous.

LITERATURE CITED

Acatay, A. 1963. Tatbiki orman entomolojisi. İstanbul Üniversitesi Yay., İstanbul, 1068: 169 pp.

Adlbauer, K. 1988. Neues zur Taxonomie und Faunistik der Bockkäferfauna der Türkei (Coleoptera, Cerambycidae). Entomofauna, 9 (12): 257-297.

Adlbauer, K. 1992. Zur Faunistik und Taxonomie der Bockkäferfauna der Türkei II (Coleoptera, Cerambycidae). Entomofauna, 13 (30): 485-509.

Althoff, J. & Danilevsky, M. L. 1997. A Check-List of Longicorn Beetles (Coleoptera, Cerambycoidea) of Europe. Slovensko Entomološko Društvo Štefana Michielija. Ljubljana, 64 pp.

Bense, U. 1995. Longhorn Beetles, Illustrated key to the Cerambycidae and Vesperidae of Europe. Margraf Verlag, Germany, 512 pp.

Bodemeyer, H. E. V. 1906. Beitrage zur Käferfauna von Klein Asien - Deutsche Entomologische Zeitschrift, 2: 417-437.

Çanakçıoğlu, H. 1983. Orman Entomolojisi: Özel bölüm. İstanbul Üniversitesi Orman Fakültesi Yay. No: 349, İstanbul, 535 pp.

Daniel, K. & Daniel, J. 1891. Revision der mit Leptura unipunctata F. und fulva Deg. verwandten Arten. Coleopteren-Studien, 1: 1-40.

Danilevsky, M. L. & Miroshnikov A. I. 1985. Timber-Beetles of Caucasus (Coleoptera, Cerambycidae). The Key. Krasnodar, 419 pp.

Demelt, C. V. 1963. Beitrag zur Kenntnis der Cerambycidenfauna Kleinasiens und 13. Beitrag zur Biologie palaearkt. Cerambyciden, sowie Beschreibung einer neuen Oberea-Art. Entomologische Blatter, 59 (3) : 132-151.

Demelt, C. V. & Alkan, B. 1962. Short information of Cerambycidae Fauna of Turkey. Bitki Koruma Bülteni, 2 (10): 49-56.

Gfeller, W. 1972. Cerambycidae (Coleoptera) der Türkei-Persienexpedition 1970 der Herren Dr. H. c. W. Wittmer und U. v. Botmer. Mitteilungen der Entomologischen Geselschaft Basel, 22 (1): 1-8.

Holzschuh, C. 1975. Neue westpalaearktischer Bockkäfer aus den Gattungen Cortodera, Vadonia und Agapanthia (Coleoptera: Cerambycidae). Zeitschrift der Arbeitsgemeinschaft österreichischer Entomologen 26 (2-4): 77-90.

Holzschuh, C. 1981. Zwanzig neue Bockkafer aus Europa und Asien (Cerambycidae, Col.). Koleopt. Rundschau, 55: 91-112.

Holzschuh, C. 1984. Beschreibung von 21 neuen Bockkafern aus Europa und Asien (Cerambycidae, Col.). Koleopt. Rundschau, 57: 141-165.

Holzschuh, C. 1981. Zwanzig neue Bockkafer aus Europa und Asien (Cerambycidae, Col.). Koleopt. Rundschau, 55: 91-112.

Holzschuh, C. 1993. Sechzig neue Bockkafer aus Europa und Asien, vorwiegend aus China und Thailand (Coleoptera: Disteniidae und Cerambycidae). Neue Bockkafer aus Europa and Asien. IV.- FBVA-Berichte. Schriftenrteiche der Forstlichen Bundesversuchsanstalt Wien, 75: 63 pp.

Lobanov, A. L., Danilevsky, M. L. & Murzin, S. V. 1981. Systematic list of longicorn beetles (Coleoptera, Cerambycidae) of the USSR I. Revue d'Entomol., LX, 4, 1981: 784-803.

Lodos, N. 1998. Entomology of Turkey VI (General, Aplied and Faunistic). Ege Ü. Ziraat Fak. Yayınları No: 529, E. Ü. Faculty of Agriculture Press, İzmir, 300 pp.

Malmusi, M. & Saltini, L. 2005. Cerambycidae raccolti dai componenti del Gruppo Modenese Scienze Naturali durante escursioni in Turchia tra il 1987-2003 (Contributo alla Fauna dei Cerambycidae di Turchia). Quaderno di studi e notizie di storia naturale della Romagna, n. 21, 28 pp. (unpublished).

Öymen, T. 1987. The Forest Cerambycidae of Turkey. İ. Ü. Forest Faculty, İstanbul, 146 pp.

Özdikmen, H. 2006. Contribution to the knowledge of Turkish longicorn beetles fauna (Coleoptera: Cerambycidae). *Munis Entomology & Zoology*, 1 (1): 71-90.

Özdikmen, H. 2007. The Longicorn Beetles of Turkey (Coleoptera: Cerambycidae) Part I - Black Sea Region. Munis Entomology & Zoology 2 (2): 179-422.

Özdikmen, H. & Çağlar, Ü. 2004. Contribution to the knowledge of longhorned bettles (Coleoptera, Cerambycidae) from Turkey, Subfamilies Prioninae, Lepturinae, Spondylidinae and Cerambycinae. *J. Ent. Res. Soc.,* 6 (1): 39-69.

Özdikmen, H. & Demir, H. 2006. Notes on longicorn beetles fauna of Turkey (Coleoptera: Cerambycidae). *Munis Entomology & Zoology*, 1 (1): 157-166.

Özdikmen, H. & Demirel, E. 2005. Additional Notes to the Knowledge of Longhorned Beetle Collection from Zoological Museum of Gazi University, Ankara, Turkey (GUZM) for Turkish Fauna (Coleoptera, Cerambycidae). *J. Ent. Res. Soc.*, 7 (3): 13-38.

Özdikmen, H., Özdemir, Y. & Turgut, S. 2005. Longhorned Beetles Collection of the Nazife Tuatay Plant Protection Museum, Ankara, Turkey (Coleoptera, Cerambycidae). *J. Ent. Res. Soc.,* 7 (2): 1-33.

Pesarini, C. & Sabbadini, A. 2004. Descrizione di due nuove specie di Lepturini di Grecia, note sulle specie affini e considerazioni sistematiche, sinonimiche e nomenclatoriali (Coleoptera Cerambycidae). Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano 145 (1): 157-172.

Pesarini, C. & Sabbadini, A. 2007. Notes on some longhorn beetles from Continental Greece, with description of two new subspecies (Coleoptera: Cerambycidae).- Atti della Societa Italiana di Scienze Naturali e del Museo Civico di Storia Naturale in Milano. 2007 Gennaio; 148 (1): 17-34.

Rejzek, M. & Hoskovec, M. 1999. Cerambycidae of Nemrut Dağı National Park (Anatolia, South-East Turkey). Biocosme Mésogéen, Nice, 15 (4): 257-272.

Sama, G. 1982. Contributo allo studio dei coleotteri Cerambycidae di Grecia e Asia Minore. Fragmenta Entomologica, Roma, 16 (2): 205-227.

Sama, G. 2002. Atlas of the Cerambycidae of Europe and the Mediterranean Area, Volume I, Kabourek, Zlin, 173 pp.

Sama, G. & Rapuzzi, P. 2000. Note Preliminaire pour une faune des Cerambycidae du Liban (Coleoptera, Cerambycidae). Lambillionea, 100 (1): 7-23.

Slama, M. & Slamova, J. 1996. Contribution to the recognition of Greek and Yugoslavian longicorn beetles (Coleoptera, Cerambycidae). Biocosme Mésogéen, Nice 12 (4): 117-143.

Svacha, P. & Danilevsky, M. L. 1986. Cerambycoid Larvae of Europe and Soviet Union (Coleoptera, Cerambycoidea), Part I. Acta Universitatis Carolinae – Biologica, 30: 1-186.

Svacha, P. & Danilevsky, M. L. 1988. Cerambycoid Larvae of Europe and Soviet Union (Coleoptera, Cerambycoidea), Part III. Acta Universitatis Carolinae – Biologica, 32: 1-205.

Tauzin, P. 2000. Complement a l'inventaire des Coleopteres Cerambycidae de Turquie. L'Entomologiste, 56 (4): 151-153.

Tosun, İ. 1975. Akdeniz Bölgesi iğne yapraklı ormanlarında zarar yapan böcekler ve önemli türlerin parazit ve yırtıcıları üzerine araştırmalar. İstanbul 201 pp.

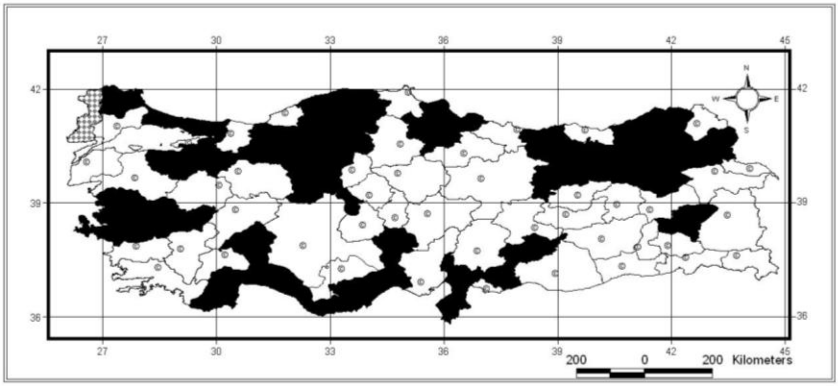
Tozlu, G., Rejzek, M. & Özbek, H. 2002. A contribution to the knowledge of Cerambycidae (Coleoptera) fauna of Turkey. Part I: Subfamilies Prioninae to Cerambycinae. Biocosme Mèsogèen, Nice, 19 (1-2): 55-94.

Villiers, A. 1959. Cérambycides de Turquie. L' Entomologiste, 15 (1-2): 7-11.

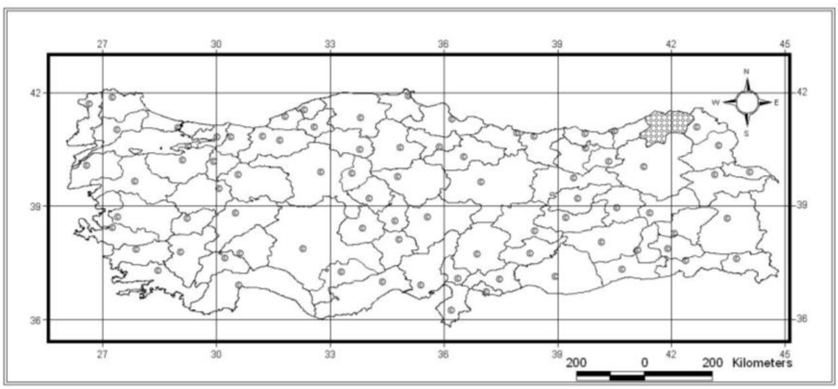
Villiers, A. 1978. Faune des Coleopteres de France, 1. Cerambycidae. Paris, 636 pp.

Vitali, F. 2007. Biolib.cz. Available from: http://www.biolib.cz/

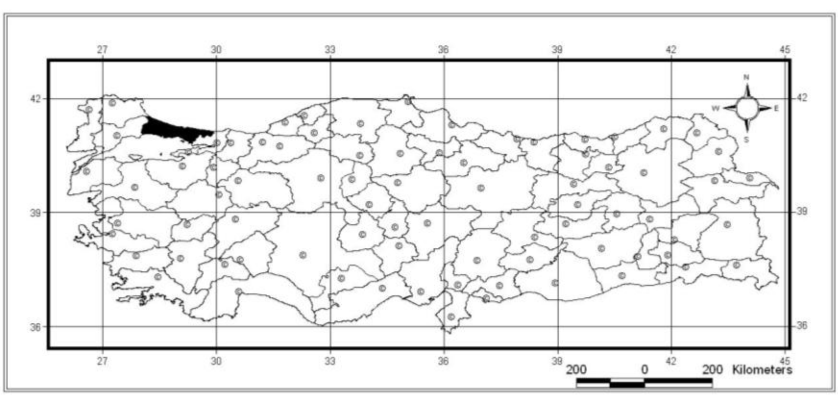
Winkler, A. 1924-1932. Catalogus Coleopterorum regionis palaearcticae. Verlag von Albert Winkler, 1135-1226.



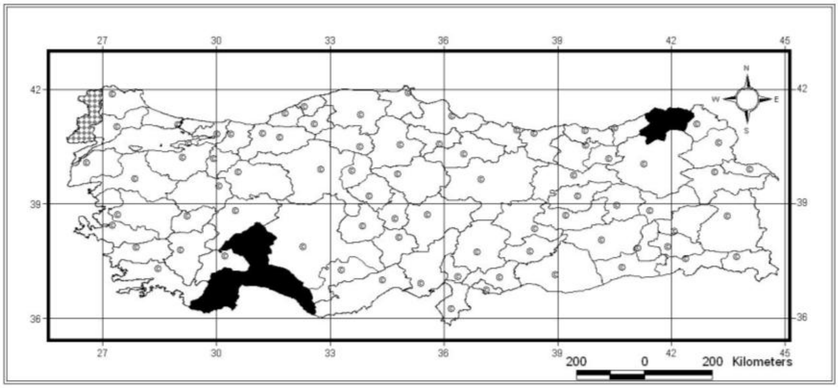
Map 1. *Pseudovadonia livida* (Fabricius, 1776): Distribution patterns in Turkey.



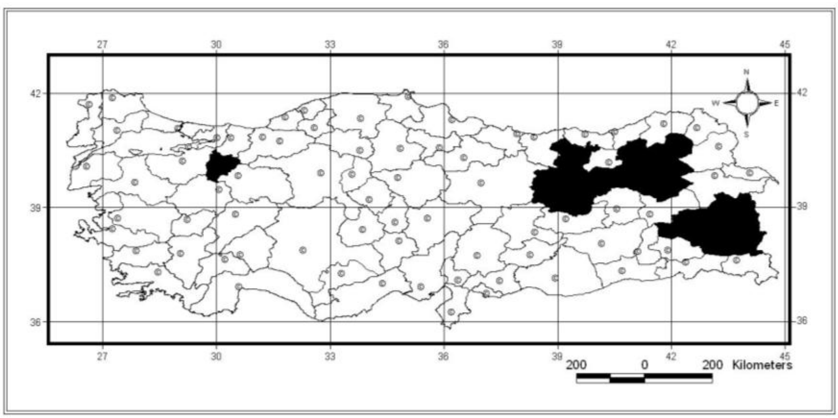
Map 2. *Vadonia bicolor* (Redtenbacher, 1850): Distribution patterns in Turkey.



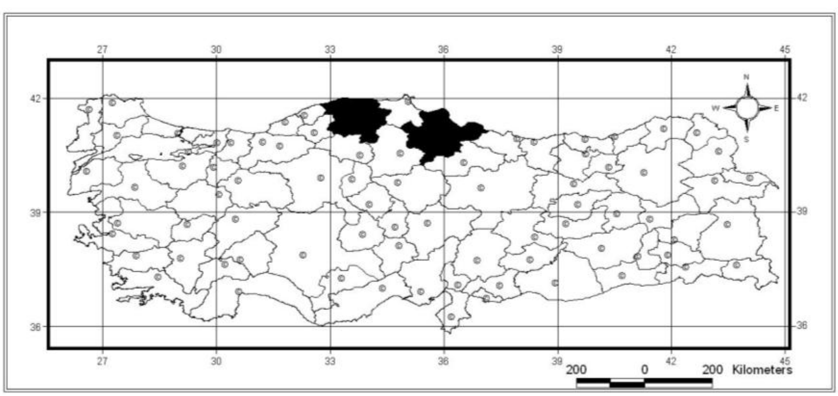
Map 3. *Vadonia bipunctata* (Fabricius, 1781): Distribution patterns in Turkey.



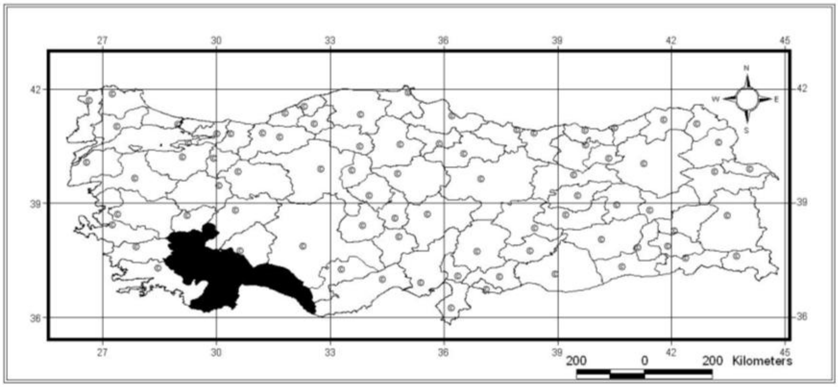
Map 4. *Vadonia bisignata* (Brullé, 1832): Distribution patterns in Turkey.



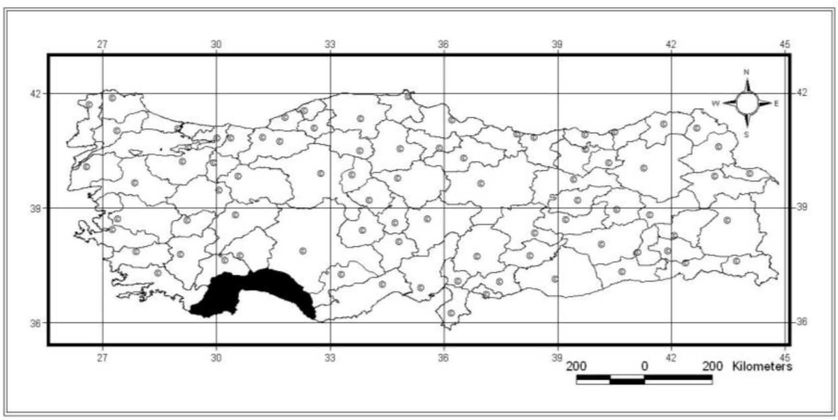
Map 5. *Vadonia bitlisiensis* (Chevrolat, 1882): Distribution patterns in Turkey.



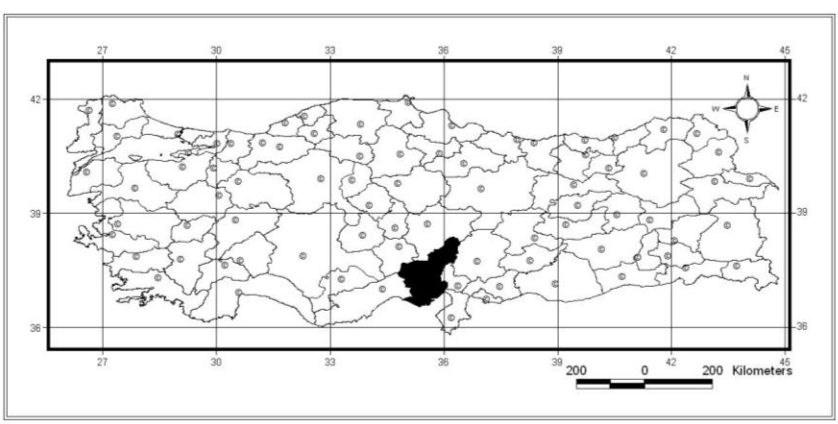
Map 6. *Vadonia bolognai* Sama, 1982: Distribution patterns in Turkey.



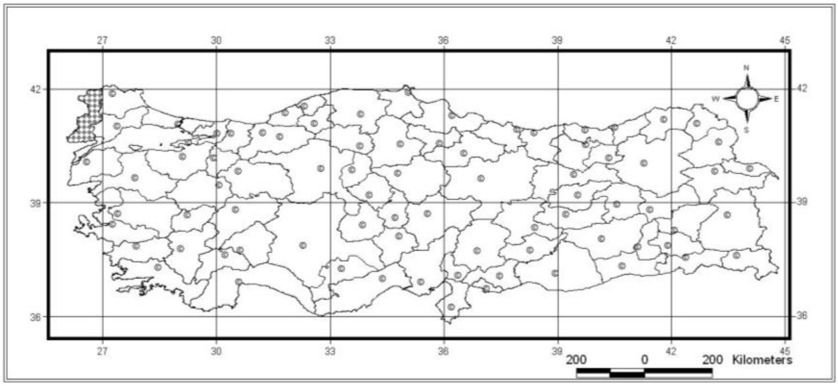
Map 7. *Vadonia ciliciensis* K. Daniel & J. Daniel, 1891: Distribution patterns in Turkey.



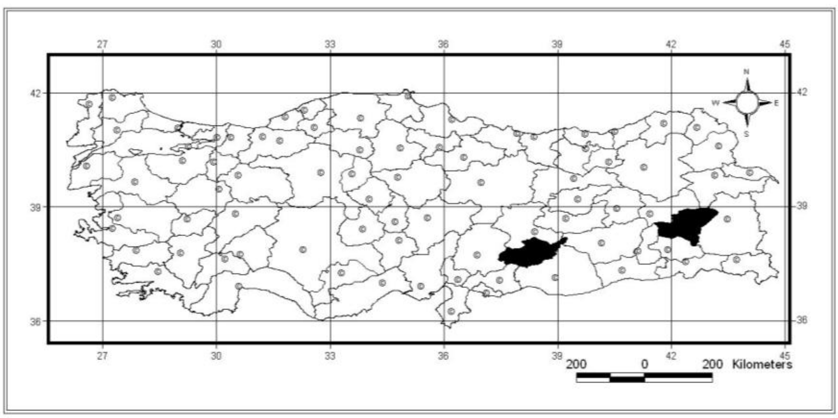
Map 8. *Vadonia danielorum* Holzschuh, 1984: Distribution patterns in Turkey.



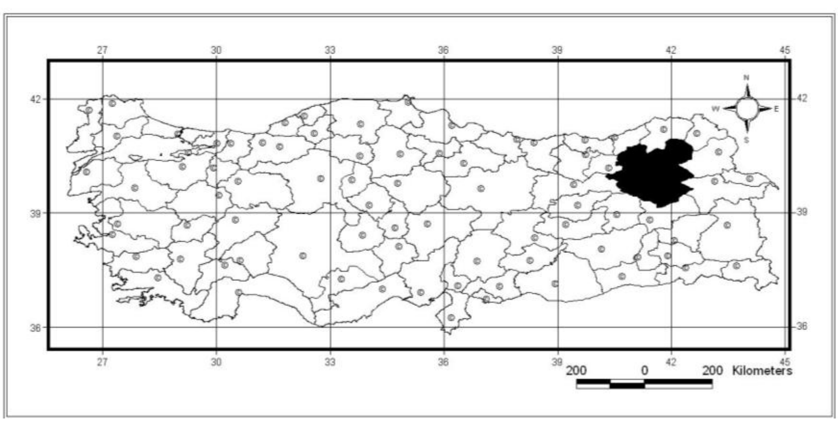
Map 9. *Vadonia frater* Holzschuh, 1981: Distribution patterns in Turkey.



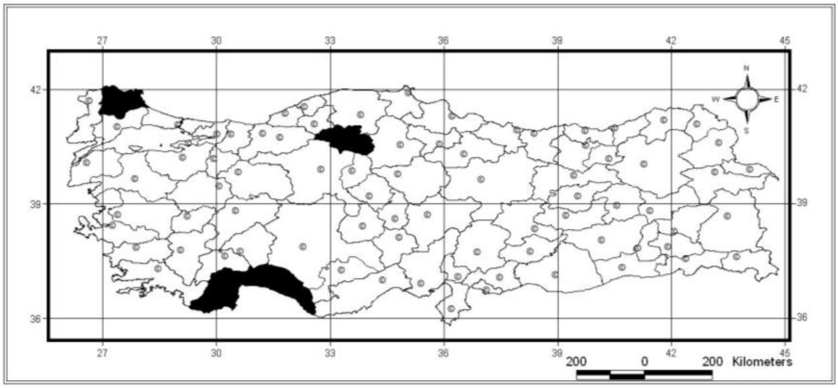
Map 10. *Vadonia imitatrix* K. Daniel & J. Daniel, 1891: Distribution patterns in Turkey.



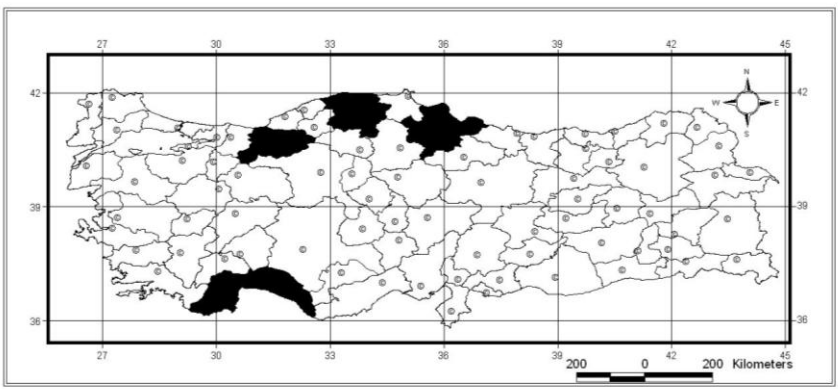
Map 11. *Vadonia instigmata* (Pic, 1889): Distribution patterns in Turkey.



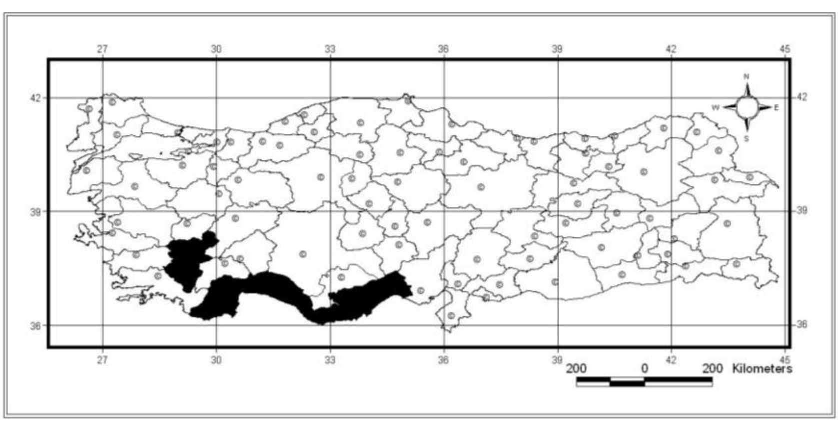
Map 12. *Vadonia ispirensis* Holzschuh, 1993: Distribution patterns in Turkey.



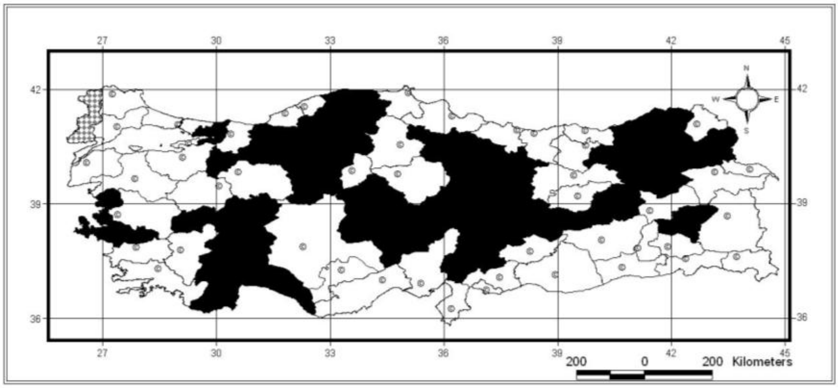
Map 13. *Vadonia moesiaca* K. Daniel & J. Daniel, 1891: Distribution patterns in Turkey.



Map 14. *Vadonia monostigma* Ganglbauer, 1881: Distribution patterns in Turkey.



Map 15. *Vadonia soror* Holzschuh, 1981: Distribution patterns in Turkey.



Map 16. *Vadonia unipunctata* (Fabricius, 1787): Distribution patterns in Turkey.

PREVALENCE OF *EIMERIA* SPECIES AMONG BROILER CHICKS IN TABRIZ (NORTHWEST OF IRAN)

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[**Nematollahi, A., Moghaddam, Gh. & Pourabad, R. F.** 2009. Prevalence of *Eimeria* species among broiler chicks in Tabriz (Northwestern of Iran). Munis Entomology & Zoology, 4 (1): 53-58]

ABSTRACT: Five chicks (2–6 weeks of age) were taken randomly from each of 218 broiler farms in Tabriz northwest of Iran. These chicks were submitted for post-mortem and parasitological examinations. Five *Eimeria* spp. were identified: *E. acervulina*, *E. tenella*, *E. necatrix*, *E. maxima* and *E. mitis*. The overall prevalence of *Eimeria* spp. among examined farms was 55.96 % (122 of 218 farms). *E. acervulina* was the most prevalent species (23.58%). Prevalences did not vary by flock size. Also, neither the use of coccidiostat nor previous coccidiosis clinical outbreaks were associated with the prevalence of infestation. The prevalence of infestation increased with the age of the chickens. Chickens with 5 weeks of age showed the highest prevalence of infestation.

Coccidiosis is one of the most important and common diseases that affect poultry, it results in a great economic loss all over the world (Braunius, 1980). It is caused by the genus *Eimeria* of an Apicomplexa protozoan parasite (Shirley, 1995). This parasitic infection occurs in the epithelial cells of the intestine, despite the advances in nutrition, chemotherapy, management and genetics (Magner, 1991). Most *Eimeria* species affect birds between 3 and 18 weeks of age and can cause high mortality in young chicks (McDougald, & Mattiello, 1997).

About 1800 *Eimeria* species affect the intestinal mucosa of different animals and birds (Shirley, 1995). In the domestic fowl *Gallus gallus*, nine *Eimeria* species are recognized: *E. brunetti, E. maxima, E. necatrix* and *E. tenella* are highly pathogenic, *E. acervulina, E. mitis* and *E. mivati* are rather less pathogenic, and *E. praecox* and *E. hagani* are regarded as the least pathogenic(Thebo, et al., 1988). Bad management (such as wet litter that encourages oocyst sporulation, contaminated drinkers and feeders, bad ventilation, and high stocking density) can exacerbate the clinical signs (Ruff, 1993).

Coccidiosis can be controlled by good management including good ventilation, dry and clean litter (Jordan, 1995), cleaning and decontamination of drinkers and feeders (Gross, 1985), and proper stocking density in the farm (Jordan, 1995).

We studied the prevalence of *Eimeria* spp. among broiler farms in northwest Iran. Also, we tested the risk factors of flock size, use of coccidiostats, and prior clinical coccidiosis.

MATERIALS AND METHODS

Study site

The survey was undertaking from September 2005 to December 2006 in 218 chicken farms. An average population of 5 000 000 broiler-chicks distributed over 500 chicken farms exists in this area. The houses of farms were built of brick and cement and are of different sizes. The method of housing the broilers is an intensive deep-litter system. Before birds were placed, the houses were cleaned, washed, disinfected and provided with new wood shavings. During the rearing period, the birds received mash feed. The broiler-chickens were slaughtered at an average of 48 days of age with an average live weight of 1.8 kg. The broiler-chickens are produced in different broiler parent stocks and hatcheries in Iran. The most-common breed broiler was the Ross308.

Sample size determination

A sample of five birds per 10 000 is sufficient to diagnose coccidiosis (Mattiellio, 1990). Because the prevalence of coccidiosis in chicken farms in Iran has not been reported, the prevalence of infection in each farm was assumed to be 50%. The desired sample size was 218 houses (houses typically have <10 000 chickens each), using a 95% level of confidence and 5% desired absolute precision (Thrusfield, 1995). 218 chicken farms were randomly selected by using a random-numbers table; we also used such a table to select one house per farm. Randomly selected farms were initially contacted by veterinary services.

Sampling

Five chicks from each house were selected. The chicks were brought to the laboratory of parasitology in faculty of veterinary medicine in university of Tabriz for necropsy. All viscera were examined for gross pathological changes and the mucos of duodenum, jejunum, ileum and the caeci were examined for the presence of *Eimeria* spp. Stage according to the method described by Mattiellio (Mattiellio, 1990).

Parasitological technique

Wet smears of mucosa were prepared from intestinal and caecal scraping for microscopic examination of *Eimeria* spp. and *Eimeria* spp. identified according on the site of infection and oocysts morphology including size, color presence or absence of micropyle, cap and time of sporulation (Soulsby, 1982). Sporulation was performed in wet chamber at 24-26^{oC} in a 2.5% aqueous solution of potassium dichromate ($K_2Cr_2O_7$).

At the same time that chicks were sampled, litter samples were collected for counting of oocysts in litter. A modification of the McMaster's oocyst-counting technique was used (Soulsby, 1982). Litter samples were thoroughly homogenized by manual mixing. Then, a 9 g sample was weighed and soaked in 126 ml of water and allowed to stand overnight. Next morning, the samples were vigorously shaken to break up the feces. Then, each sample was sieved through a tea strainer. The strained samples were poured into a 15 ml centrifuge tube. The tubes were centrifuged at 2000 rpm for 5 min. The supernatant fluid was decanted and sediment was mixed with a saturated solution of sugar in the centrifuge tube. The suspension was thoroughly mixed and a sample was taken and placed in a McMaster's chamber. The number of oocysts within each ruled area, multiplied by 100 represents the number per gram of the original sample collected around the drinker and feeders of the same house from which chickens were collected on each farm.

Data collection

Information collected at the time of sampling included farmer's name, address, farm location, flock age, flock size and use of coccidiostats in the feed for that flock and previous coccidiosis infection within the last year in the farm.

Statistical analyses

Data comparing prevalence by risk factors were analyzed using chi-square with a significance level of $p<0.05$. 95% confidence intervals were calculated for the prevalence.

RESULTS

Five *Eimeria* spp. was identified in naturally infected birds in northwest Iran.The overall prevalence of *Eimeria* spp.infection among examined farms was 55.96 % (122 of 218 farms). *E. acervulina* was the most prevalence species (Table 1). All farms had multiple infections.

Table 1. Prevalence of five *Eimeria* spp. among 218 broiler farms in west north Iran.

Eimeria spp.	Broiler farms	
	No. of positive	% of positive
E. acervulina	52	23.58
E. tenella	31	14.22
E. necatrix	22	10.09
E. maxima	12	5.5
E. mitis	5	2.29

No significant difference was observed between the prevalence of infection among farms of different flock size. Also, neither the use of coccidiostat nor previous coccidiosis clinical outbreaks were associated with the prevalence of coccidiosis (Table 2).

Table 2. Prevalence of coccidiosis among 218 broiler-chicks farm.

Risk factor	Level of risk factor	No. of farm	No. of positive farm	% of positive farm
Flock size	2000-4000	14	8	57.14
	4000-8000	81	53	65.43
	8000-10000	123	72	58.53
Use of coccidiostat	Yes	180	83	46.1
	No	38	23	60.52
Previous coccidiosis infection	Yes	203	117	57.63
	No	15	9	60

The prevalence of infection increased with the age of the chickens. Chickens with 5 weeks of age showed the highest prevalence of infection. The median number of oocyst/gr of litter in the 5 weeks old chickens was higher than for other age of chickens (Table 3).

Table 3. Prevalence of coccidiosis and median of oocysts of litter in chicken farms by age.

Age(Week)	No. of farm	No. of positive farm	% of positive farm	Oocyst/gr median
2	31	16	51.61	120
3	42	28	66.66	300
4	63	41	65.07	420
5	52	40	76.92	600
6	30	16	53.33	140

DISCUSSION

In this study, the prevalence of *Eimeria* spp. in broiler farms in Tabriz was 55.96%.This rate is high compared to results of other survey in iran where Razmi and Kalideri (2000) reported 38% (Razmi, & Kalideri, 2000).The Poor management practices in Tabriz area broiler farmers might be a direct cause. Also one cause of this difference might be due to the different season in which survey was undertaken.

The biologic characteristics of coccidian of chickens are well known and variable,and can be identified on the basis of oocyst size (McDougald, & Mattiello, 1997). This study showed that five *Eimeria* spp. was identified in naturally infected birds (*E. acervulina, E. tenella, E. necatrix, E. maxima* and *E. mitis*). These results are in agreement with reports from Sweden, France, and Argentina and Jordan (Except *E. brunetti*) suggesting that those species of *Eimeria* are widespread in most countries where poultry are produced on a commercial basis (Al-Natour

& Suleiman, 2002; McDougald, & Mattiello, 1997; Thebo, et al., 1988; Williams, et al., 1996).

This survey showed that the size of flock is not effective in the rate of infestation to *Eimeria*.This result is not in agreement with other surveys in Iran and Netherlands that express the prevalence of coccidiosis increased with flock size (Braunius, 1980; Razmi, & Kalideri, 2000).

There was no significant different in the prevalence of *Eimeria* and previous coccidiosis This result is in agreement with the experience of Razmi and Kalidari (2000) and Al natour and et al (2002) and expressed the role of good results of disinfectant material in prevention of disease after an outbreak of it in the other period of breeding (Al-Natour & Suleiman, 2002; Razmi, & Kalideri, 2000). Also there was no significant difference in prevalence of *Eimeria* and and use of coccidiostats. This might be due to misuse of coccidiostats (dose or improper mixing in feed)or the development of local strain of *Eimeria* to variable compounds.

The results of this study showed that the prevalence of *Eimeria* and the median of oocyst/gr of litter increased with age and is picked in 5 weeks. This result is in agreement to the experiences of Long and Rowell (1975), McDougald and Reid (1991) and is not in agreement with Chapman and Johnson (1992), Stayer et al (1995) experiences (Chapman, & Johnson, 1992; Long, & Rowell, 1975; McDougald, & Mattiello, 1997; Stayer et al., 1995). In many studies the occurance period of coccidiosis is related to species of *Eimeria* and the type of anticoccidial drugs. Therefore, differences in management of the anticoccidial programs may have contributed to this difference.

LITERATURE CITED

Al-Natour, M. Q. & Suleiman, M. 2002. Flock–level prevalence of *Eimeria* species among broiler chicks in northern Jordan. Preventive veterinary medicine, 53 (3): 305-310.

Braunius, W. W. 1980. Monitoring the biological performance in broilers with special regard to subclinical coccidiosis. Archiv fur Geflugelkunde, 44: 183–187.

Chapman, H. D. & Johnson, G. B. 1992. Oocyst of *Eimeria* in the litter of broilers reared to eight weeks of age. Poultry sciences, 7 (8): 1342-1347.

Gross, W. B. 1985. Effect of social environment and oocyst dose on resistance and immunity to *Eimeria tenella* challenge. Avian Dis., 29: 1018–1029.

Jordan, F. T. W. 1995. Poultry diseases. Third edition, the cambridge university press. 226-236 pp.

Long, P. L. & Rowell, J. R. 1975. Sampling broiler house litter for coccidial oocysts. Br. Poultry Sci., 16: 583–592.

Magner, B. Rl. 1991. Anticoccidials. Veterinary Applied Pharmacology and Therapeutics, 5th Edition. ELBS, Bailliere Tindall, London, pp. 549–563.

Mattiellio, R. 1990. Detect subclinical coccidiosis, Misset. World Poultry. Misset (October/November), pp. 82–83.

McDougald, L. F. & Mattiello, R. A. 1997. Survey of coccidia on 43 poultry farms in Argentina. Avian Dis**.**, 41 (3): 923–929.

Razmi, G. R. & Kalideri, G. A. 2000. Prevalence of subclinical coccidiosis in broiler-chicken farms in the municipality of mashad, Iran. Preventive veterinay medicine, 44 (2): 247-253 .

Ruff, M. D. 1993. External and internal factors affecting the severity of avian coccidiosis. In: Proceedings of the Sixth International Coccidiosis Conference, June 21–25, pp. 73–79.

Shirley, M. W. 1995. *Eimeria* spp. and strains of chickens. Guidelines on Techniques in Coccidiosis Research. European Commission, Directorate General XII, Science Research and Development, Agriculture Biotechnology, L-2820 Luxemburg, pp. 1–34.

Soulsby, E. J. L. 1982. Helminths, Arthropods and protozoa of domesticated animals . Academic press . London: 630-639.

Stayer, P. A., Pote, L. & Mand, K. 1995. A comparison fo *Eimeria* cysts isolated from litter and fecal samples from broiler house at two farm. Poultry sciences, 74 (2): 26-32.

Thebo, P., Uggla, A. & Hooshmand-Rad, P. 1988. Identification of seven *Eimeria* species in Swedish domestic fowl. Avian Pathol., 27: 613–617.

Thrusfield, M. 1995. Veterinary Epidemiology. Blackwell Science, London, pp. 182.

Williams, R. B., Bushell, A. C., Reperant, J. M., Doy, T. G., Morgan, J. H., Shirley, M. W., Yvore, P., Carr, M. M. & Fremont, Y. 1996. A survey of *Eimeria* species in commercially reared chickens in France during 1994. Avian Pathol., 25: 13–130.

LONGHORNED BEETLES OF ANKARA REGION IN TURKEY (COLEOPTERA: CERAMBYCIDAE)

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[Özdikmen, H., Turgut, S. & Güzel, S. 2009. Longhorned beetles of Ankara region in Turkey (Coleoptera: Cerambycidae). Munis Entomology & Zoology, 4 (1): 59-102**]**

ABSTRACT: This work is the first attempt for entire longhorned beetles fauna of Ankara. All known taxa from Ankara province are given with some new faunistical data in the present text. *Aegosoma scabricorne* (Scopoli, 1763) for subfamily Prioninae, *Chlorophorus cursor* Rapuzzi & Sama, 1999 and *Chlorophorus trifasciatus* (Fabricius, 1781) for subfamily Cerambycinae and *Oberea oculata* (Linnaeus, 1758) for subfamily Lamiinae are recorded for the first time for Ankara's fauna. Longhorned beetles fauna of this region is about one fifth (20 %) of the fauna of Turkey, while the territorial area of Ankara is 3.19 % of whole Turkey. This work is introduced that Ankara's fauna is important for Turkey and is one of the richest faunas among the other Turkish provinces. A simple faunistical list for Ankara is also presented at the end of this work.

KEY WORDS: Cerambycidae, Coleoptera, fauna, new records, Ankara, Turkey

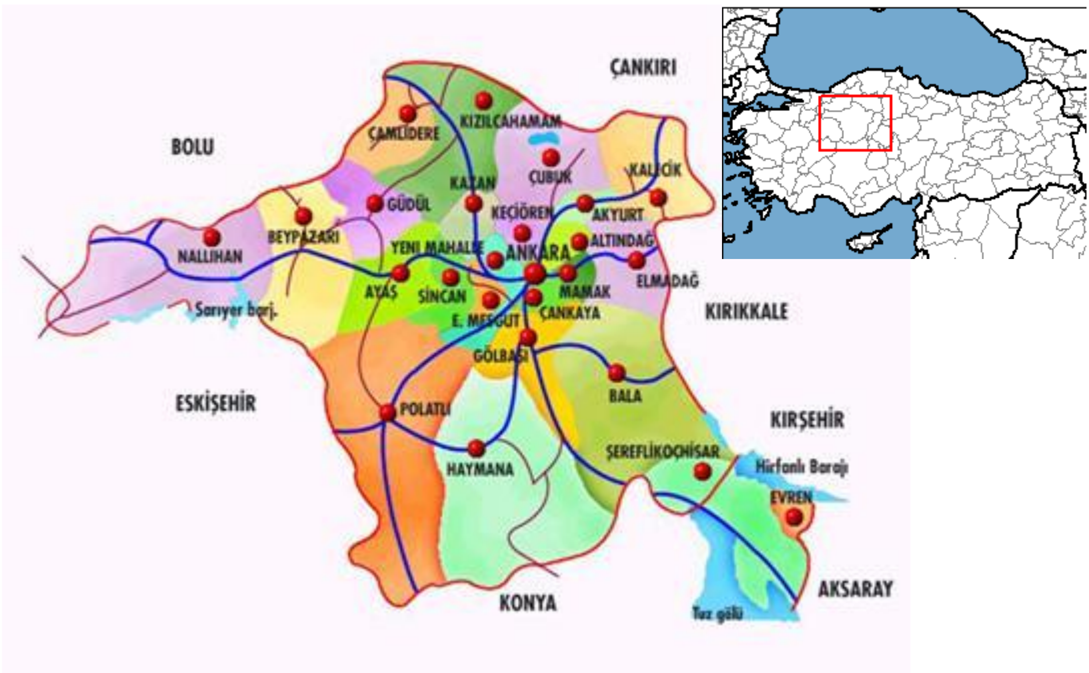
Ankara is an ancient city and it is the capital city of Turkey and the country's second largest city after İstanbul. As with many ancient cities, Ankara has gone by several names over the ages: The Hittites gave it the name "Ankuwash" before 1200 BC. The Galatians and Romans called it "Ancyra". In the classical, Hellenistic, and Byzantine periods it was known as "Ánkyra". It was also known as "Angora" after it fell to the Seljuks in 1073, and was so known up until 1930.

Ankara is located at 39°57' North, 32°53' East coordinates. It is placed in NW of Central Anatolian Region of Turkey (in Upper Sakarya Part). It is bounded by Kırşehir and Kırıkkale provinces in the East, Bilecik and Eskişehir provinces in the West, Çankırı province in the North, Bolu province in the Northwest and Konya and Aksaray provinces in the South (Map 1).

Except the lakes (6.194 km²), the area of Ankara is 24.521 km² that is 3.19 % of the area of whole Turkey. It has a mean elevation between 830 and 890 m as average altitude.

Ankara is situated on the large plains of central Anatolia, with mountain forests to the north and the dry plain of Konya to the south. The mountains in N and NW of Ankara are covered with forest areas partly. The plain is irrigated by the Kızılırmak and Sakarya River systems, the Sarıyar reservoir and many natural lakes and pools. 50% of the land is used for agriculture, 28% is forest and another 10% is meadow and grazing land. The large salt lake (Tuz Gölü) partly lies in the province. The highest point is the Işık Dağı (2,015 m). The widest valley is the Polatlı valley (3.789 km²).

Ankara is one of the driest places in Turkey and is surrounded by a barren steppe vegetation. The climate is hot and dry in summer, cold and snowing in winter, wetter in the north of the province than the dry plains to the south. Rainfall occurs mostly during the spring and autumn.



Map 1. Ankara region.

Ankara has two different types of vegetation, namely "Step vegetation" and "Forest vegetation". Step vegetation is more widespread than forest vegetation. It is common in deep-set areas and on the plateaus. The forest vegetation occurs in isolated mountains on platoes (e.g. Beynam forest) and in mountainous areas of the North. The forest vegetation beginning from near Kızılcahamam in N Ankara becomes frequent in the mountainous areas of the North. Coniferous plants are common in these areas. Soğuksu National Park in Kızılcahamam has been selected as a single nature protection zone in Ankara.

Ankara has a rich fauna. Longhorned beetles fauna of this region is about one fifth (20 %) of the fauna of the whole territory of Turkey, while the territorial area of Ankara is 3.19 % of the area of Turkey. It is a transition gate for Euxine, Mediterranean and Irano-Turan elements phytogeographycally. On the other side, it is related with Paphlagonia (the mountainous area between Bithynia and Pontus on the Black Sea coast, bordered by the ancient Halys river to the east) in the North, Bithynia (the mountainous area between Thrace and Paphlagonia, the territory of Bithynia was restricted to an area west of the Sangarius River (now Sakarya River) in the North and North-west, Phrygia (this ancient district is located between Galatia and Lydia on the east and west and Bithynia on north) in the West, Lycaonia (this ancient district is located between Galatia and Cilicia on the north and south and Phrygia and Cappadocia on the west and east) in the South and Cappadocia (this ancient district is located in north of Taurus Mts. and Galatia on the northwest and Pontus on the northeast) in the far South-east in ancient geography. The modern capital of Turkey, Ankara (ancient Ancyra), was also the capital of ancient Galatia (the region lies in the basins of the present-day Kızılırmak and Delice rivers, on the great central plateau of Turkey) (Map 2).

Map 2. Ancient Ankara (Ancyra) region.

The data on this fauna has accumulated in a piecemeal fashion over the twentieth century and this century especially. Various authors have reported some partial data on the fauna in their different works. However, most of works were completed in a short time and their works did not focus on fauna of Ankara generally. So the longhorned beetles fauna of Ankara has not been studied completely until now. Especially the recent works of Özdikmen et al. (2005), Özdikmen & Demir (2006), Özdikmen (2006 and 2007) are important on this subject. More detailed information of most evaluated species in the text can obtain in the works of Özdikmen (2007 and 2008a,b).

In this work, some new faunistical data are presented. Besides, according to cited literatures, all known taxa from Ankara province are also given in the text. *Aegosoma scabricorne* (Scopoli, 1763) for subfamily Prioninae, *Chlorophorus cursor* Rapuzzi & Sama, 1999 and *Chlorophorus trifasciatus* (Fabricius, 1781) for subfamily Cerambycinae and *Oberea oculata* (Linnaeus, 1758) for subfamily Lamiinae are recorded for the first time for Ankara's fauna. So we determined that the longhorned beetles fauna of Ankara province consists of 119 species (belong to 6 subfamily, 27 tribe, 56 genera). However, it must be suppose that the fauna is richer from determining fauna now. Since some known taxa in Turkish fauna should be presented in this region. But the taxa which can be supposed in this area are not mentioned in the present text. Consequently it would be expected that a number of additional species and new records are to be expected to occur in Ankara region.

Finally, this work indicates that Ankara's fauna is important for Turkey and is one of the richest faunas among the Turkish provinces. We propose that at least a protection area for step vegetation must be designated to protect this rich fauna for the future.

ARRANGEMENT OF INFORMATION

Information in the present text is given in the following order:

The subfamily and the tribe names are given simply.

For the genus and subgenus names, the type species are provided under the taxon names.

For each species, the whole subspecies are provided under the taxon names.

The data, **Material examined, Records in Ankara, Records in Turkey, Remarks** and **Chorotype** under the title for each taxon is given.

Material examined. Material examined that is provided for only some taxons covers the original records for Ankara province in Turkey. The most materials were collected by authors from various localities in Ankara. They are deposited in Gazi University (Ankara).

The data under the title of Material examined are given according to the following outline as possible as:

Ankara(1): Kızılcahamam(2), Güvem(3), 14.05.1997(4), 1200 m(5), 2 specimens(6), leg. H. Özdikmen(7) ((1) Administrative district (Province); (2) Town; (3) Village; (4) Collecting date (day/month/year); (5) Altitude; (6) Number of specimens; (7) The name of collector).

Records in Ankara. These parts include previous records that have been given by various authors in different literatures from Ankara. The whole records are evaluated with localities in related references. Each record is accompanied by the author's name and publication date of the related reference.

Records in Turkey. The abbreviations of the provinces and lands in Turkey are given in paranthesis. These parts include previous records that have been given by various authors in different literatures.

Remarks. In these parts, taxonomical and nomenclatural problems are discussed for some taxons and are given regional and general distribution range in Turkey chiefly.

Chorotype. The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999). In the text, a possible chorotype description can be identified for each taxon. But this kind of description can not be possible for some taxons, so two or more chorotypes are used for them.

CLASSIFICATION

In this paper, classification and nomenclature of the longhorn beetles suggested by Sama (2002) and Danilevsky (2008a,b) are followed chiefly. Within the subfamilies all genera are listed in the same order in Danilevsky (2008b). Within the genera the species are listed alphabetically. Each name of a species or subspecies is accompanied by the author's name and description date.

ABREVIATIONS OF THE PROVINCES AND LANDS IN TURKEY

ADANA (AD)	ELAZIĞ (EL)	MANİSA (MN)
ADIYAMAN (ADY)	ERZİNCAN (ER)	MARDİN (MR)
AFYON (AF)	ERZURUM (EZ)	MUĞLA (MG)
AĞRI (AG)	ESKİŞEHİR (ES)	MUŞ (MU)
AKSARAY (AK)	GAZİANTEP (GA)	NEVŞEHİR (NE)
AMASYA (AM)	GİRESUN (GI)	NİĞDE (NI)
ANKARA (AN)	GÜMÜŞHANE (GU)	ORDU (OR)
ANTALYA (ANT)	HAKKARİ (HA)	OSMANİYE (OS)
ARDAHAN (AR)	HATAY (HT)	RİZE (RI)
ARTVİN (ART)	IĞDIR (IG)	SAKARYA (SA)
AYDIN (AY)	ISPARTA (IP)	SAMSUN (SM)
BALIKESİR (BL)	İÇEL (IC)	SİİRT (SI)
BARTIN (BR)	İSTANBUL (IS)	SİNOP (SN)
BATMAN (BA)	İZMİR (IZ)	SİVAS (SV)
BAYBURT (BY)	KAHRAMANMARAŞ (KA)	ŞANLIURFA (SU)
BİLECİK (BI)	KARABÜK (KR)	ŞIRNAK (SK)
BİNGÖL (BN)	KARAMAN (KM)	TEKİRDAĞ (TE)
BİTLİS (BT)	KARS (KAR)	TOKAT (TO)
BOLU (BO)	KASTAMONU (KS)	TRABZON (TB)
BURDUR (BU)	KAYSERİ (KY)	TUNCELİ (TU)
BURSA (BS)	KIRIKKALE (KI)	UŞAK (US)
ÇANAKKALE (CA)	KIRKLARELİ (KK)	VAN (VA)
ÇANKIRI (CN)	KIRŞEHİR (KIR)	YALOVA (YA)
ÇORUM (CO)	KİLİS (KL)	YOZGAT (YO)
DENİZLİ (DE)	KOCAELİ (KO)	ZONGULDAK (ZO)
DİYARBAKIR (DI)	KONYA (KN)	THRACIA (=EUROPEAN TUR.) (TRA)
DÜZCE (DU)	KÜTAHYA (KU)	TURKEY (TUR)
EDİRNE (ED)	MALATYA (MA)	

Family CERAMBYCIDAE

Subfamily PRIONINAE

Tribe ERGATINI

***Ergates* Serville, 1832**
[Type sp.: *Prionus serrarius* Panzer, 1793 = Cerambyx faber Linnaeus, 1767]

***Ergates faber* (Linnaeus, 1761)**
= ssp. *faber* Linnaeus, 1767
= ssp. *opifex* Mulsant, 1851

Records in Ankara prov.: Kızılcahamam (Çamkoru) (Özdikmen & Şahin, 2006).
Records in Turkey: (AN-ANT-ART-BO-BS-DU-KA-KS-KO-SN-TB-TRA-TUR)
Remarks: The species distributes mostly in N Turkey. It is represented by the nominative subspecies in Turkey. The other known subspecies, *E. faber opifex* Mulsant, 1851 occurring in North Africa (Morocco and Algeria), Italy and Sicily.
Chorotype: Turano-Europeo-Mediterranean.

Tribe AEGOSOMATINI

***Aegosoma* Serville, 1832**
[Type sp.: *Cerambyx scabricornis* Scopoli, 1763]

***Aegosoma scabricorne* (Scopoli, 1763)**

Material examined: Ankara prov.: Kayaş, Bayındır dam env., 03.07.2003, 895 m., 1 specimen and 20.07.2004, 895 m., 1 specimen, leg. S. Güzel.
Records in Turkey: (AN-ANT-BL-BR-GU-IP-IS-KA-KN-KR-SM-VA-TRA-TUR)
Remarks: New to Ankara province. According to distribution in Turkey of host plants, probably the species distributes widely in Turkey.
Chorotype: Turano-European.

Tribe PRIONINI

***Prionus* Geoffroy, 1762**
[Type sp.: *Cerambyx coriarius* Linnaeus, 1758]

***Prionus coriarius* (Linnaeus, 1758)**

Records in Ankara prov.: Kızılcahamam (Çamkoru) (Özdikmen & Şahin, 2006).
Records in Turkey: (AN-ANT-ART-AY-BL-BO-BU-HT-KA-KK-KO-KS-RI-SN-TB-TRA-TUR)
Remarks: According to distribution in Turkey of host plants, probably the species distributes rather widely in Turkey.
Chorotype: Sibero-European + Turano-Europeo-Mediterranean.

***Mesoprionus* Jakovlev, 1887**
[Type sp.: *Mesoprionus angustatus* Jakovlev, 1887]

***Mesoprionus besicanus* (Fairmaire, 1855)**

Records in Ankara prov.: Kalecik (Yeşildere) (Özdikmen & Demir, 2006).
Records in Turkey: (AD-AN-ANT-BI-BS-BU-CA-DE-ER-EZ-IC-IS-IZ-KI-KL-KN-KU-KY-MG-NE-TRA-TUR-US)
Remarks: The species distributes mostly in west half of Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian).

Subfamily LEPTURINAE

Tribe RHAMNUSIINI

***Rhamnusium* Latreille, 1829**
[Type sp.: *Callidium salicis* Fabricius, 1787 = *Cerambyx bicolor* Schrank, 1781]

***Rhamnusium graecum* Schaufuss, 1862**
= ssp. *graecum* Schaufuss, 1862
= ssp. *italicum* Müller, 1966

Records in Ankara prov.: Kızılcahamam (Svacha & Danilevsky, 1988).
Records in Turkey: (AN-IS-TRA-TUR)
Remarks: The species distributes in N and NW Turkey. It is represented by the nominotypical subspecies in Turkey. Known other subspecies *R. graecum italicum* Müller, 1966 occurs only in Italy.
Chorotype: Turano-Mediterranean (Turano-Apenninian).

***Rhamnusium testaceipenne* Pic, 1897**

Records in Ankara prov.: Çubuk (Demelt, 1963).
Records in Turkey: (AN-TUR)
Remarks: The species distributes only in N Turkey.
Chorotype: Turanian (Ponto-Caspian).

Tribe RHAGIINI

***Rhagium* Fabricius, 1775**
[Type sp.: *Cerambyx inquisitor* Linnaeus, 1758]

Subgenus *Rhagium* Fabricius, 1775
[Type sp.: *Cerambyx inquisitor* Linnaeus, 1758]

***Rhagium inquisitor* (Linnaeus, 1758)**
= ssp. *inquisitor* Linnaeus, 1758
= ssp. *stshukini* Semenov, 1897
= ssp. *rugipenne* Reitter, 1898
= ssp. *fortipes* Reitter, 1898
= ssp. *cedri* Reymond, 1953

Records in Ankara prov.: Kızılcahamam (Alkan, 1946; Demelt, 1967).
Records in Turkey: (AM-AN-ANT-ART-BO-BS-BU-DU-EZ-GI-GU-IS-KR-KAR-KS-OR-RI-SA-SN-TB-TRA-TUR)
Remarks: The species has five distinct subspecies in the World. In Turkey, it is represented by three subspecies. *R. inquisitor stshukini* Semenov, 1897 occurs only in NE Turkey, *R. inquisitor fortipes* Reitter, 1898 occurs only in SE Turkey and the nominative *R. inquisitor inquisitor* (Linnaeus, 1758) occurs in other parts of Turkey. Known other subspecies, *R. inquisitor cedri* Raymond & Reid, 1953 occurs in North Africa (Morocco and Algeria), *R. inquisitor rugipenne* Reitter, 1898 occurs in European Russia, Siberia, China and Mongolia. According to Sama (2002), *R. japonicum* Bates, 1884 occurs in Kunashir Island to Japan is a subspecies of *R. inquisitor*.
Chorotype: Holarctic.

***Stenocorus* Geoffroy, 1762**
[Type sp.: *Leptura meridiana* Linnaeus, 1758]

Subgenus *Anisorus* Mulsant, 1862
[Type sp.: *Cerambyx quercus* Götz, 1783]

Remarks: Danilevsky (2008a,b) regarded as a subgenus of *Stenocorus* Geoffroy, 1762. According to Sama (2002), *Anisorus* Mulsant, 1862 is a separate genus.

***Stenocorus quercus* (Götz, 1783)**
= ssp. *quercus* Götz, 1783
= ?ssp. *aureopubens* Pic, 1908
= ?ssp. *punctipennis* Reitter, 1914

Records in Ankara prov.: Kızılcahamam as *Stenocorus quercus* m. *magdalenae* Pic u. *discoideus* Reitter (Demelt, 1967).
Records in Turkey: (AN-BN-EZ-RI-TRA-TUR)
Remarks: The species distributes in N Turkey. It is represented by the nominative subspecies in Turkey. Known other subspecies, *A. quercus aureopubens* Pic, 1908 that was proposed by Danilevsky (2008b) for Transcaucasian populations occurs only in Caucasia and NE Turkey. According to Sama (2002), specimens from the Pelopennese (Greece) do not differ significantly from Central European populations. So he gave *Stenocorus quercus* ssp. *punctipennis* Reitter, 1914 as a synonym.
Chorotype: Sibero-European.

***Acmaeops* LeConte, 1850**
[Type sp.: *Leptura proteus* Kirby, 1837]

***Acmaeops marginatus* (Fabricius, 1781)**

Records in Ankara prov.: Kızılcahamam as *A. marginata* m. *spadicea* (Demelt, 1967); Kızılcahamam (Sama, 2002).
Records in Turkey: (AM-AN)
Remarks: The species distributes in N Turkey.
Chorotype: Sibero-European.

***Dinoptera* Mulsant, 1863**
[Original designation as subgenus of *Acmeops* LeConte, 1850. Type sp.: *Leptura collaris* Linnaeus, 1758]

***Dinoptera collaris* (Linnaeus, 1758)**

Records in Ankara prov.: Işık Mountain (Demelt, 1963); Kızılcahamam (Soğuksu National Park and Aköz village) (Özdikmen, 2006).
Records in Turkey: (AM-AN-ART-BO-BS-CN-EZ-IC-IP-IS-KS-KO-KR-RI-SM-TRA-TUR)
Remarks: The species distributes rather widely in Turkey.
Chorotype: Sibero-European.

***Cortodera* Mulsant, 1863**
[Type sp.: *Grammoptera spinosula* Mulsant, 1839 = *Leptura humeralis* Schaller, 1783]

***Cortodera alpina* Hampe, 1870**
= ssp. *alpina* Hampe, 1870
= ssp. *starcki* Reitter, 1888
= ssp. *umbripennis* Reitter, 1890
= ssp. *rosti* Pic, 1892
= ssp. *fischtensis* Starck, 1894
= ssp. *xanthoptera* Pic, 1898

Records in Ankara prov.: Çubuk dam as *Cortodera umbripennis* (Demelt, 1963).
Records in Turkey: (AN-ANT-AR-ART-EZ-IC-KAR-KN-MU-NI-VA-TUR)
Remarks: The species distributes rather widely in Turkey. It is represented by two subspecies in Turkey. These are *C. alpina xanthoptera* Pic, 1898 occurs in S Turkey and *C. alpina umbripennis* Reitter, 1890 occurs in other parts of Turkey. The nominotypical

subspecies (*C. alpina alpina* Hampe, 1870) and known other subspecies (*C. alpina starcki* Reitter, 1888; *C. alpina rosti* Pic, 1892 and *C. alpina fischtensis* Starck, 1894) occur only in Caucasus.
Chorotype: SW-Asiatic (Anatolo-Caucasian + ? Irano-Caucasian + ? Irano-Anatolian) + Turano-Mediterranean (Balkano-Anatolian).

***Cortodera colchica* Reitter, 1890**
= ssp. *colchica* Reitter, 1890
= ssp. *rutilipes* Reitter, 1890
= ssp. *danczenkoi* Danilevsky, 1985
= ssp. *kalashiani* Danilevsky, 2000

Records in Ankara prov.: Kızılcahamam (Soğuksu National Park) as *C. holosericea* (Özdikmen, 2003a); Kızılcahamam (Yukarı Çanlı) (Özdikmen, 2003a,b and 2006).
Records in Turkey: (AD-ADY-AK-AN-ANT-ART-BN-BU-BY-EZ-HA-IC-KAR-KY-KN-SV-TUR)
Remarks: The species distributes rather widely in Turkey. It is represented by two subspecies in Turkey. These are *C. colchica rutilipes* Reitter, 1890 occurs in NE Turkey (Erzurum prov. env.) and the nominotypical subspecies *C. colchica colchica* Reitter, 1890 occurs in other parts of Turkey. Known other subspecies *C. colchica danczenkoi* Danilevsky, 1985 and *C. colchica kalashiani* Danilevsky, 2000 occur only in Caucasus.
Chorotype: SW-Asiatic (Anatolo-Caucasian).

***Cortodera differens* (Pic, 1898)**

Records in Ankara prov.: Angora (=Ankara prov.) as *C. discolor* v. *variipes* Ganglbauer, 1897 (Winkler, 1924-1932); Kızılcahamam as *C. discolor differens* Pic, 1898 (Demelt, 1967); Kızılcahamam (Adlbauer, 1992); Kızılcahamam (Güvem village) (Özdikmen, 2008).
Records in Turkey: (AN-ANT)
Remarks: The species distributes only in western half of Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian).

***Cortodera femorata* (Fabricius, 1787)**

Records in Ankara prov.: Kızılcahamam (Soğuksu National Park, Güvem village) (Özdikmen, 2006).
Records in Turkey: (AN-AK)
Remarks: The species distributes probably in NW and C Turkey (western half of Turkey).
Chorotype: European.

***Cortodera flavimana* (Waltl, 1838)**
= ssp. *flavimana* Waltl, 1838
= ssp. *brachialis* Ganglbauer, 1897

Material examined: Ankara prov.: Kızılcahamam, Salin village, 20.05.2005, 2100 m., 115 specimens, leg. S. Güzel; Kızılcahamam, Işık Mountain, 21.05.2005, 2230 m., 14 specimens, leg. S. Güzel; Şereflikoçhisar, Kale district, 22.03.2006, 980 m., 1 specimen, leg. S. Güzel; Bağlum, 13.07.2005, 1170 m., 1 specimen, leg. S. Güzel; Kızılcahamam, Soğuksu National Park, 21.05.2006, 18 specimens, leg. S. Turgut.
Records in Ankara prov.: Kızılcahamam (Gfeller, 1972); Kızılcahamam (Central, Güvem, Yukarı Çanlı, Soğuksu National Park) (Özdikmen, 2003a and 2006); Çubuk (Karagöl) (Özdikmen et al., 2005); Kızılcahamam (Işık Mountain) (Özdikmen & Demir, 2006).
Records in Turkey: (AD-AF-AK-AN-ANT-ART-BO-BS-BY-CN-EZ-GU-IC-IP-IS-IZ- NI-KA-KAR—KN-KO-KR-KS-KY-RI-SM-SN-SV-TO-YO-TRA-TUR)
Remarks: The species distributes widely in Turkey due to the host plant, *Ranunculus*, is a cosmopolite genus of plants. It has variability in elytral coloration. So, it is possible represented by several subspecies (presumably some of them in local areas) in Turkey. But distribution patterns of the potential subspecies need to be clarified. For example, there are two distinct subspecies of *C. flavimana* (*C. flavimana flavimana* (Waltl, 1838) and *C.*

flavimana brachialis Ganglbauer, 1897 (Greece and West Turkey) in Europe. Up to now, both two subspecies (*C. flavimana flavimana* and *C. flavimana brachialis* Ganglbauer, 1897) of the species has been known in Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian).

Cortodera humeralis **(Schaller, 1783)**

Records in Ankara prov.: Kızılcahamam (Köroğlu Mountains) (Adlbauer, 1992); Kızılcahamam (Soğuksu National Park, Güvem) (Özdikmen, 2003a and 206).
Records in Turkey: (AN-ART-BO-TRA)
Remarks: The species distributes in N Turkey. According to Sama (2002), *C. humeralis orientalis* Adlbauer, 1988 that described as a subspecies of *C. humeralis*, is a distinct species that occurs only in S Turkey.
Chorotype: S-European.

Cortodera syriaca **Pic, 1901**
= ssp. *syriaca* Pic, 1901
= ssp. *nigroapicalis* Holzschuh, 1981

Records in Ankara prov.: Şereflikoçhisar (Malmusi & Saltini, 2005).
Records in Turkey: (ADY-AK-AN-IC-KA-MU-TUR)
Remarks: The species distributes mostly in Eastern half of Turkey. It is represented by both subspecies in Turkey. *Cortodera syriaca nigroapicalis* Holzschuh, 1981 occurs only in SE Turkey and the nominative subspecies occurs in other parts of Turkey.
Chorotype: SW-Asiatic (Anatolo-Caucasian).

Cortodera villosa **Heyden, 1876**
= ssp. *villosa* Heyden, 1876
= ssp. *circassica* Reitter, 1890
= ssp. *major* Miroshnikov, 2007
= ssp. *nakhichevanica* Miroshnikov, 2007

Records in Ankara prov.: Ankara prov. (Özdikmen, 2003b).
Records in Turkey: (AN)
Remarks: Probably the species distributes only in N Turkey. It is represented by the nominative subspecies in Turkey. The other subspecies, *Cortodera villosa villosa* Heyden, 1876 occurs E Europe, *Cortodera villosa circassica* Reitter, 1890 and *Cortodera villosa nakhichevanica* Miroshnikov, 2007 occur only in Caucasus and *Cortodera villosa major* Miroshnikov, 2007 occurs only in European Russia.
Chorotype: E-European.

Grammoptera **Serville, 1835**
[Type sp.: *Leptura praeusta* Fabricius, 1787 = *Leptura ustulata* Schaller, 1783]

Grammoptera abdominalis **(Stephens, 1831)**

Records in Ankara prov.: Kızılcahamam as *G. variegata* (Germ.) (Demelt, 1967).
Records in Turkey: (AN-BO-GU-TUR)
Remarks: The species distributes in N Turkey.
Chorotype: European.

Grammoptera ustulata **(Schaller, 1783)**

Records in Ankara prov.: Kızılcahamam (Demelt, 1967); Kızılcahamam (Soğuksu National Park) (Özdikmen, 2006).
Records in Turkey: (AN-BO-GU-TO-TUR)
Remarks: The species distributes in N Turkey.
Chorotype: European.

Tribe LEPTURINI

***Vadonia* Mulsant, 1863**
[Type sp.: *Leptura unipunctata* Fabricius, 1787]

***Vadonia unipunctata* (Fabricius, 1787)**
= ssp. *unipunctata* Fabricius, 1787
= ssp. *dalmatina* Müller, 1906
= ssp. *ohridensis* Holzschuh, 1989
= ssp. *makedonica* Holzschuh, 1989
= ssp. *syricola* Holzscuh, 1993

Material examined: Ankara prov.: Beytepe, 16.06.2005, 985 m., 19 specimens, leg. S. Güzel; İncek, 28.06.2006, 1070 m., 2 specimens, leg. S. Güzel.
Records in Ankara prov.: Gölbaşı (Demelt & Alkan, 1962; Demelt, 1963); Central (Kavaklıdere) (Öymen, 1987); Kızılcahamam (Işık Mountain, Aköz village, Güvem, Yukarı Çanlı) (Özdikmen, 2006).
Records in Turkey: (AF-AK-AM-AN-ANT-ART-BI-BN-BO-BT-BU-BY-CN-EL-EZ-IP-IZ-KA-KAR-KIR-KO-KR-KS-KY-MA-NE-NI-OS-RI-SV-TO-US-TRA-TUR)
Remarks: The species distributes widely in Turkey. It is represented by the nominative subspecies in Turkey. The other known subspecies, *V. unipunctata dalmatina* Müller, 1906 occurs in Croatia, Bosnia and Herzegovina, ? Greece, *V. unipunctata ohridensis* Holzschuh, 1989 occurs in Macedonia, *V. unipunctata makedonica* Holzschuh, 1989 occurs in Greece and *V. unipunctata syricola* Holzschuh, 1993 occurs in Syria.
Chorotype: Turano-European or Turano-Europeo-Mediterranean. According to Sama (2002), the records from North Africa are erroneous.

***Pseudovadonia* Lobanov, Danilevsky et Murzin, 1981**
[Type sp.: *Leptura livida* Fabricius, 1776]

***Pseudovadonia livida* (Fabricius, 1776)**
= ssp. *livida* Fabricius, 1776
= ssp. *pecta* Daniel & Daniel, 1891
= ssp. *desbrochersi* Pic, 1891

Material examined: Ankara: E Beytepe, 12.07.2004, 980 m., 1 specimen, leg. S. Güzel; Bağlum, 06.07.2005, 1170 m., 1 specimen, 11.07.2005, 1 specimen, 13.07.2005, 4 specimens, leg. S. Güzel; Şereflikoçhisar, Gülhöyük, 22.05.2006, 980 m., 1 specimen, leg. S. Güzel; İncek, 28.06.2006, 1075 m., 5 specimens, leg. S. Güzel.
Records in Ankara prov.: Ankara prov. (Villiers, 1967; Tuatay et al., 1972); Kalecik (Öymen, 1987); Central and Çubuk (Karagöl) (Özdikmen et al., 2005); Kızılcahamam (Güvem, Yenimahalle village, the peak of Bel) (Özdikmen, 2006).
Records in Turkey: (ADY-AM-AN-ANT-ART-BI-BO-BR-BS-BT-BY-CN-ER-EZ-GA-GI-GU-HT-IC-IP-IS-IZ-KAR-KK-KO-KR-KS-MN-NI-OS-RI-SM-US-TRA-TUR)
Remarks: The species distributes widely in Turkey. It is represented by three subspecies in Turkey. *P. livida desbrochersi* (Pic, 1891) occurs in E or NE Turkey, *P. livida pecta* (Adlbauer, 1988) occurs in S and W Turkey and the nominative *P. livida livida* occurs in other parts of Turkey. I think that the real status of distribution patterns of these subspecies needs to be clarified.
Chorotype: Sibero-European + E-Mediterranean (Palaestino-Taurian).

***Anoplodera* Mulsant, 1839**
[Type sp.: *Leptura sexguttata* Fabricius, 1775]

***Anoplodera rufipes* (Schaller, 1783)**
= ssp. *rufipes* Schaller, 1783
= ssp. *lucidipes* Sama, 1999
= ssp. *izzilloi* Sama, 1999

Records in Ankara prov.: Kızılcahamam (Demelt, 1963, 1967).
Records in Turkey: (AN-BN-BO-BU-EZ-GU-IC-KS-OR-RI-TB-TUR)
Remarks: The species distributes rather widely in Turkey. The species is represented by two subspecies in Turkey. *A. rufipes lucidipes* Sama, 1999 occurs only in S Turkey and the nominative *A. rufipes rufipes* occurs mostly in N Turkey. *A. rufipes izzilloi* Sama, 1999 occurs only in Italy.
Chorotype: Sibero-European.

***Stictoleptura* Casey, 1924**
[Type sp.: *Leptura cribripennis* LeConte, 1859]

***Stictoleptura cordigera* (Füsslins, 1775)**
= ssp. *cordigera* Füsslins, 1775
= ssp. *illyrica* Müller, 1948
= ssp. *romanica* Podany, 1964
= ssp. *anojaensis* Slama, 1982

Material examined: Ankara prov.: Beytepe, 850 m, 07.07.2004 and 12.07.2004, 2 specimens, leg. S. Güzel; N Bağlum, 13.07.2005, 1170 m., 2 specimens, leg. S. Güzel.
Records in Ankara prov.: Beypazarı (Dereli village) (Özdikmen, 2006).
Records in Turkey: (ADY-AK-AN-ANT-ART-BL-BN-BO-BT-BU-CA-DE-ED-EZ-GA-GU-HT-IC-IS-IZ-KA-KK-KN-KO-MG-MN-MU-NE-NI-OS-TE-TU-YA-TRA-TUR)
Remarks: The species distributes widely in Turkey. According to Sama (2002), the species really is represented by two subspecies in Turkey. *S. cordigera anojaensis* Slama, 1982 that was described from Crete occurs also in SW Turkey (Sama, 2002) and the nominative *S. cordigera cordigera* occurs in other parts of Turkey. The other known subspecies, *S. cordigera illyrica* (Müller, 1948) occurs in Western Balkans (Croatia, Bosnia and Herzegovina, Serbia, Albania and Greece) and *S. cordigera romanica* Podany, 1964 occurs in Eastern Balkans (Romania and Bulgaria) and ? European Turkey.
Chorotype: Turano-European.

***Stictoleptura tesserula* (Charpentier, 1825)**

Records in Ankara prov.: Kızılcahamam (Central, Soğuksu National Park) (Özdikmen, 2006).
Records in Turkey: (EZ-KN-KR-KS-RI-TUR)
Remarks: The species distributes mostly in N Turkey.
Chorotype: Turano-European (Turano-Sarmato-Pannonian + Ponto-Pannonian).

***Anastrangalia* Casey, 1924**
[Type sp.: *Leptura sanguinea* LeConte, 1859]

***Anastrangalia sanguinolenta* (Linnaeus, 1761)**

Records in Ankara prov.: Beynam Forest (Özdikmen et al., 2005); Ankara prov.: Kızılcahamam (Çamkoru) (Özdikmen & Şahin, 2006); Kızılcahamam (Central, Soğuksu National Park, Işık Mountain, Güvem) (Özdikmen, 2006).
Records in Turkey: (AM-AN-ART-BO-BS-EZ-GI-GU-KAR-KR-KS-KY-SM-SN-TB-TO-YO-TUR)
Remarks: The species distributes in N Turkey.
Chorotype: Sibero-European or European. According to Sama (2002) records from Siberia not confirmed by Cherepanov (1990).

***Pachytodes* Pic, 1891**
[Type sp.: *Leptura cerambyciformes* Schrank, 1781]

***Pachytodes erraticus* (Dalman, 1817)**
= ssp. *erraticus* Dalman, 1817
= ssp. *erythrura* Küster, 1848

= ssp. *bottcheri* Pic, 1911

Material examined: Ankara prov.: N Bağlum, 06.07.2005, 1190 m., 19 specimens, leg. S. Güzel; Bağlum, 11.07.2005, 1170 m., 3 specimens, 13.07.2005, 2 specimens, leg. S. Güzel.
Records in Ankara prov.: Kızılcahamam (Soğuksu National Park) (Özdikmen et al., 2005); Kızılcahamam (Işık Mountain, Yukarı Çanlı village) (Özdikmen & Demir, 2006); Kızılcahamam (Soğuksu National Park, Işık Mountain, Güvem, Yenimahalle village, Yasin village, Yukarı Çanlı), Beypazarı (Dereli village) (Özdikmen, 2006).
Records in Turkey: (AF-AM-AN-ANT-ART-BI-BO-BR-BS-BT-CN-CO-EL-ER-EZ-GA-GU-HAT-IP-IS-IZ-KAR-KK-KO-KN-KR-KS-MN-MU-RI-SM-SN-SV-TB-TO-TU-YO-ZO-TRA-TUR)
Remarks: The species distributes widely in Turkey. It has been widely accepted that the species has three subspecies. The Eastern Palaearctic subspecies, *P. erraticus bottcheri* Pic, 1911 occurs in Siberia, Kazakhstan and China, *P. erraticus erythrura* Küster, 1848 occurs in S parts of the distribution area of the nominative subspecies and the nominative *P. erraticus erraticus* Dalman, 1817 occurs in other parts of Palaearctic Region including Turkey. Namely, the species is represented by two subspecies in Turkey: *P. erraticus erythrura* Küster, 1848 in S Turkey and *P. erraticus erraticus* Dalman, 1817 in other parts of Turkey.
Chorotype: Sibero-European.

***Leptura* Linnaeus, 1758**
[Type sp.: *Leptura quadrifasciata* Linnaeus, 1758]

***Leptura quadrifasciata* Linnaeus, 1758**
= ssp. *quadrifasciata* Linnaeus, 1758
= ssp. *caucasica* Plavilstshikov, 1924

Records in Ankara prov.: Beytepe (Özdikmen, 2007).
Records in Turkey: (AN-ART-BO-GI-IS-KAR-KR-KS-RI-SV-TB-TRA-TUR)
Remarks: The species is represented by two subspecies in Turkey. These are *L. quadrifasciata caucasica* Plavilstshikov, 1924 (Caucasus, Iran, Turkey) and the nominative *L. quadrifasciata quadrifasciata*. Both subspecies distribute in North Turkey.
Chorotype: Sibero-European.

***Stenurella* Villiers, 1974**
[Type sp.: *Leptura melanura* Linnaeus, 1758]

***Stenurella bifasciata* (Müller, 1776)**
= ssp. *bifasciata* Müller, 1776
= ssp. *nigrosuturalis* Reitter, 1895
= ssp. *limbiventris* Reitter, 1898

Material examined: Ankara prov.: Bağlum, 06.07.2005, 1170 m., 1 specimen, 11.07.2005, 2 specimens, 13.07.2005, 1 specimen, leg. S. Güzel.
Records in Ankara prov.: Kızılcahamam (Soğuksu National Park) (Özdikmen et al., 2005); Ankara prov. (Malmusi & Saltini, 2005); Kızılcahamam (Central, Soğuksu National Park, Işık Mountain, S of New dam, Güvem, Yasin village, the peak of Bel, Yukarı Çanlı), Beypazarı (Dereli village) (Özdikmen, 2006).
Records in Turkey: (AD-AF-AK-AM-AN-ANT-ART-BI-BN-BO-BR-BS-BT-BU-CA-CN-CO-ER-EZ-GA-GU-HT-IC-IZ-KA-KK-KN-KO-KR-KS-KY-MG-MN-NE-OS-RI-SM-TB-US-YA-YO-ZO-TUR)
Remarks: The species distributes widely in Turkey. It is represented by three subspecies in Turkey. *S. bifasciata nigrosuturalis* (Reitter, 1895) occurs in SE Turkey and Lebanon and Syria, *S. bifasciata limbiventris* (Reitter, 1898) occurs only in N Turkey and the nominative *S. bifasciata bifasciata* (Müller, 1776) occurs in other parts of Turkey.
Chorotype: Sibero-European + SW-Asiatic.

***Stenurella septempunctata* (Fabricius, 1792)**
= ssp. *septempunctata* Fabricius, 1792
= ssp. *anatolica* Heyrovský, 1961

Records in Ankara prov.: Azapderesi (Özdikmen & Demir, 2006); Kızılcahamam (Central, Soğuksu National Park, Işık Mountain, Güvem), Beypazarı (Dereli village) (Özdikmen, 2006).
Records in Turkey: (AF-AM-AN-ART-BI-BO-BS-CA-EZ-GU-IS-IZ-KK-KO-KR-KS-RI-SM-TO-TB-YA-YO-ZO-TUR)
Remarks: The species distributes mostly in N Turkey and Northern Central Turkey. There are two distinct subspecies in the World. These are; the nominative *S. septempunctata septempunctata* (Fabricius, 1792) and *S. septempunctata anatolica* Heyrovský, 1961 occurs in Balkans (from Bulgaria), Transcaucasia and Turkey.
Chorotype: Turano-European (Ponto-Pannonian + Turano-Sarmato-Pannonian) + Turano-Mediterranean (Turano-Apenninian).

Subfamily ASEMINAE

Tribe ASEMINI

***Asemum* Eschscholtz, 1830**
[Type sp.: *Cerambyx striatus* Linnaeus, 1758]

***Asemum tenuicorne* Kraatz, 1879**

Records in Ankara prov.: Kızılcahamam (Demelt, 1967; Özdikmen & Turgut, 2006).
Records in Turkey: (AN-TUR)
Remarks: The species probably distributes rather widely in Turkey (especially N, C and SE Turkey).
Chorotype: S-European.

***Arhopalus* Serville, 1834**
[Type sp.: *Cerambyx rusticus* Linnaeus, 1758]

***Arhopalus rusticus* (Linnaeus, 1758)**
= ssp. *rusticus* Linnaeus, 1758
= ssp. *nubilus* LeConte, 1850
= ssp. *montanus* LeConte, 1873
= ssp. *obsoletus* Randall, 1838
= ssp. *hesperus* Chemsak & Linsley, 1965

Records in Ankara prov.: Ankara prov. (Öymen, 1987; Tozlu et al., 2002; Özdikmen & Turgut, 2006); Kızılcahamam (Soğuksu National Park) (Özdikmen, 2006 and 2007).
Records in Turkey: (AN-ANT-ART-BL-BO-BU-BY-DE-GU-IS-KAR-KR-KS-KU-MG-OR-RI-SM-SN-TB-TO-TUR)
Remarks: The species distributes rather widely in Turkey. It is represented by the nominotypical subspecies in Palaearctic Region (incl. Turkey). Known other subspecies are distributed in Nearctic Region. These are; *A. rusticus montanus* (LeConte, 1873) occurs in United States, Mexico, *A. rusticus nubilus* (LeConte, 1850) occurs in United States, Mexico, Jamaica, Bahamas, *A. rusticus obsoletus* (Randall, 1838) occurs in United States, Guatemala, Honduras, Canada, Mexico and *A. rusticus hesperus* Chemsak & Linsley, 1965 occurs in United States.
Chorotype: Holarctic.

***Arhopalus tristis* (Fabricius, 1787)**

Records in Ankara prov.: Botanic Garden (Öymen, 1987; Özdikmen & Turgut, 2006).
Records in Turkey: (AD-AM-AN-ANT-AY-BI-BO-CA-ES-HT-IZ-KK-KU-MG-TO-TUR)
Remarks: The species probably distributes rather widely in Turkey.

Chorotype: Palearctic.

Subfamily SPONDYLIDINAE

Tribe SPONDYLIDINI

***Spondylis* Fabricius, 1775**
[Type sp.: *Attelabus buprestoides* Linnaeus, 1758]

***Spondylis buprestoides* (Linnaeus, 1758)**

Records in Ankara prov.: Kızılcahamam (Demelt, 1967; Özdikmen & Turgut, 2006); Kızılcahamam (Çamkoru) (Özdikmen & Şahin, 2006); Kızılcahamam (Soğuksu National Park) (Özdikmen, 2006).
Records in Turkey: (AN-ART-BS-IS-KAR-KR-SN-TB-TUR)
Remarks: The species distributes mostly in N Turkey.
Chorotype: Sibero-European or Sibero-European + N-Africa. Because, according to Sama (2002), records from North Africa (Morocco) need confirmation.

Subfamily CERAMBYCINAE

Tribe HESPEROPHANINI

***Trichoferus* Wollaston, 1854**
[Type sp.: *Trichoferus senex* Wollaston, 1854 = *Trichoferus fasciculatus senex* Wollaston, 1854]

***Trichoferus fasciculatus* (Faldermann, 1837)**
= ssp. *fasciculatus* Faldermann, 1837
= ssp. *senex* Wollaston, 1854

Material examined: Ankara prov.: Etlik, 31.07.2008, 850 m., 1 specimen, leg. K. Arslan.
Records in Ankara prov.: Kızılcahamam (Soğuksu National Park) (Özdikmen, 2006).
Records in Turkey: (AN-ANT-BR-BS-IZ-MG-MN-TB-TUR)
Remarks: The species probably distributes rather widely in Turkey. The species is represented by the nominative subspecies *T. fasciculatus fasciculatus* in Turkey. Other subspecies *T. fasciculatus senex* Wollaston, 1854 was described from local populations in Canary Islands and Madeira.
Chorotype: Turano-Mediterranean.

***Stromatium* Serville, 1834**
[Type sp.: *Callidium barbatum* Fabricius, 1775]

***Stromatium unicolor* (Olivier, 1795)**

Records in Ankara prov.: Ankara prov. (Özdikmen & Şahin, 2006).
Records in Turkey: (AD-AF-AM-AN-ANT-BL-BS-CA-DE-EL-ER-EZ-GA-GI-GU-HT-IC-IS-IZ-KA-KK-MA-MG-MN-OR-OS-SM-TB-TRA-TUR)
Remarks: The species distributes widely in Turkey.
Chorotype: Subcosmopolitan (Nearctic + Neotropic + Mediterranean + Centralasiatic).

Tribe CERAMBYCINI

***Cerambyx* Linnaeus, 1758**
[Type sp.: *Cerambyx cerdo* Linnaeus, 1758]

Subgenus *Cerambyx* Linnaeus, 1758
[Type sp.: *Cerambyx cerdo* Linnaeus, 1758]

***Cerambyx carinatus* (Küster, 1846)**

Records in Ankara prov.: Güdül, Beytepe (Özdikmen, 2007).
Records in Turkey: (AN-AY-DE-IZ-MN-TUR)
Remarks: Probably the species distributes mostly in Southwestern Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian).

***Cerambyx cerdo* Linnaeus, 1758**
= ssp. *cerdo* Linnaeus, 1758
= ssp. *mirbecki* Lucas, 1842
= ssp. *acuminatus* Motschulsky, 1852
= ssp. *pfisteri* Stierlin, 1864

Material examined: Ankara prov.: Kayaş, 20.07.2003, 870 m., 1 specimen, leg. S. Güzel.
Records in Ankara prov.: Hacıkadın (Özdikmen et al., 2005); Kayaş (Bayındır dam env.) (Özdikmen & Demir, 2006).
Records in Turkey: (AD-ADY-AN-ANT-ART-BR-BS-CA-DE-HT-IC-IS-IZ-KA-KK-KO-KS-KY-MG-NI-OS-SA-SK-SM-SN-TU-TRA-TUR)
Remarks: The species distributes widely in Turkey. There are four subspecies in the World. These are; *C. cerdo acuminatus* (Motschulsky, 1852) (in Crimea, Turkey, Lebanon, Syria), *C. cerdo pfisteri* Stierlin, 1864 (in Sicily, ?Italy, ?Malta, ?Greece), *C. cerdo mirbecki* Lucas, 1842 (Portugal, Spain, Algeria, Morocco) and the nominative *C. cerdo cerdo*. But, the species is represented by two subspecies, *C. cerdo cerdo* and *C. cerdo acuminatus* (Motschulsky, 1852), in Turkey. In Sama (2002), he did not accept as distinct subspecies *C. cerdo acuminatus* (Motschulsky, 1852) and *C. cerdo pfisteri* Stierlin, 1864 due to large variability of *C. cerdo* in the size and body shape. We share the same idea, as seen above because of the known data of *C. cerdo acuminatus* (Motschulsky, 1852) in Turkey is unavailable to the allopatric distribution rule of subspecies theorically.
Chorotype: Turano-Europeo-Mediterranean.

***Cerambyx dux* (Faldermann, 1837)**

Records in Ankara prov.: Ankara prov. (Özdikmen et al., 2005).
Records in Turkey: (AD-ADY-AN-ANT-BI-BN-BS-BU-DE-EL-ER-EZ-GA-HT-IC-IP-IS-IZ-KA-KAR-KK-KN-KS-KY-MA-MG-NI-OS-TO-TU-VA-TUR)
Remarks: The species distributes widely in Turkey.
Chorotype: Turano-Mediterranean (Turano-Balkan).

Subgenus *Microcerambyx* Miksic et Georgijevic, 1973
[Type sp.: *Cerambyx scopolii* Füsslins, 1775]

***Cerambyx scopolii* Fusslins, 1775**
= ssp. *scopolii* Fusslins, 1775
= ssp. *nitidus* Pic, 1892

Records in Ankara prov.: Keçiören (Özdikmen, 2006).
Records in Turkey: (AN-ANT-ART-BN-BO-ED-IC-IS-KAR-KK-NI-OS-RI-SA-SM-SN-TB-TO-TRA-TUR)
Remarks: The species distributes widely in Turkey (Especially in N Turkey). The species is represented by two subspecies in Turkey. *C. scopolii nitidus* (Pic, 1892) occurs only in S Turkey and the nominative *C. scopolii scopolii* occurs in other parts of Turkey. According to Sama (2002), *C. paludivagus* Lucas, 1846 is a distinct species in North Africa and not a form of *C. scopolii*.
Chorotype: European. According to Sama (2002), records from North Africa are belonging to *C. paludivagus* Lucas, 1846.

Tribe PURPURICENINI

***Purpuricenus* Dejean, 1821**
[Type sp.: *Cerambyx kaehleri* Linnaeus, 1758]

***Purpuricenus budensis* (Götz, 1783)**
= ssp. *budensis* Götz, 1783
= ? ssp. *bitlisiensis* Pic, 1902
= ? ssp. *caucasicus* Pic, 1902
= ssp. *interscapillatus* Plavilstshikov, 1937
= ssp. *productus* Plavistshikov, 1940

Records in Ankara prov.: Ankara prov. (Lodos, 1998); Kazan (Orhaniye village) (Özdikmen & Çağlar, 2004); Ankara prov. (Özdikmen, et al., 2005).
Records in Turkey: (AD-ADY-AF-AM-AN-ANT-ART-AY-BL-BN-BO-BS-BU-CA-CO-DE-ED-EZ-GA-GU-HT-IC-IP-IS-IZ-KA-KI-KN-KO-MG-MN-MU-NI-OS-RI-SI-SM-SN-TO-TU-YO-TUR)
Distribution: Europe (Spain, France, Italy, Albania, Slovenia, Croatia, Bosnia-Herzegovina, Serbia, Macedonia, Greece, Bulgaria, Romania, Hungary, Slovakia, Ukraine, Crimea, Moldavia, European Russia), Caucasus, Transcaucasia, Turkey, Iran, Middle East.
Remarks: The species distributes widely in Turkey. The species is represented by three (or four) subspecies in Turkey. *P. budensis productus* Plavistshikov, 1940 occurs in S Turkey, *P. budensis interscapillatus* Plavilstshikov, 1937 occurs in SW and S Turkey and the nominative *P. budensis budensis* (Götz, 1783) occurs in other parts of Turkey (? *P. budensis bitlisiensis* Pic, 1902 occurs in SE Turkey). According to Danilevsky & Miroshnikov (1985), *Purpuricenus caucasicus* Pic, 1902 that is distributed in Crimea, Caucasus and possibly in Europe is a distinct species. Later, Sabbadini & Pesarini (1992) stated that *P. caucasicus* Pic, 1902 is a subspecies of *Purpuricenus budensis* from Armenia and Turkey. However, Sama (2002) mentioned that many taxa described by Pic as varieties from Eastern Mediterranean were distinct species (*P. bitlisiensis* Pic, 1902; *P. caucasicus* Pic, 1902; *P. nigronotatus* Pic, 1907; *P. longevittatus* Pic, 1950). We share the same idea for *Purpuricenus caucasicus* Pic, 1902, as seen above because of the known data of this taxon in Turkey is unavailable to the allopatric distribution rule of subspecies theorically. The real status of these taxa needs to be revised.
Chorotype: Turano-Europeo-Mediterranean.

Tribe CALLICHROMATINI

***Aromia* Serville, 1833**
[Type sp.: *Cerambyx moschatus* Linnaeus, 1758]

***Aromia moschata* (Linnaeus, 1758)**
= ssp. *moschata* Linnaeus, 1758
= ssp. *ambrosiaca* Stevens, 1809
= ssp. *vetusta* Jankowsky, 1934
= ssp. *cruenta* Bogatschev, 1962
= ssp. *sumbarensis* Danilevsky, 2007
= ssp. *jankovskyi* Danilevsky, 2007

Records in Ankara prov.: Ankara prov. (Özdikmen, et al., 2005).
Records in Turkey: (AD-ADY-AN-ANT-ART-AY-BI-BL-BN-BS-BU-CA-EZ-IC-IP-IS-IZ-KA-KO-MN-SM-TO-TU-YO-TRA-TUR)
Remarks: The species distributes widely in Turkey. According to Sama (2002), three subspecies are recognized. The nominative *Aromia moschata moschata* occurs from the great part of Europe to Baikal Lake, *Aromia moschata ambrosiaca* (Stevens, 1809) occurs from Mediterranean Region and North Africa to Central Asia including Turkey, Middle East and Caucasus and *Aromia moschata orientalis* Plavilstshikov, 1932 occurs from Baikal Lake to Japan. However, according to Danilevsky (2008b), the species has four subspecies as the nominative *A. moschata moschata* (Linnaeus, 1758) occurring from Central and Northern

Europe including Balkans to East Siberia and Central Asia, *A. moschata ambrosiaca* (Steven, 1809) occurs in North Africa, Southern Europe, Near East and Iran, *A. moschata vetusta* Jankowsky, 1934 occurs in Kazakhstan and *A. moschata cruenta* Bogatschev, 1962 occurs in Central Asia. Besides, he regarded *Aromia orientalis* Plavilstshikov, 1932 as a distinct species. We agree with the approach of Danilevsky (2008b). However, Ohbayashi & Niisato (2007) mentioned that *A. orientalis* is a subspecies of *A. moschata*. Finally, according to Danilevsky (2008c), *A. moschata* has six subspecies with *A. moschata sumbarensis* Danilevsky, 2007 from Turkmenia and *A. moschata jankovskyi* Danilevsky, 2007 from Kirgizia. Apparently, *Aromia moschata* is represented by two subspecies in Turkey. The nominative *Aromia moschata moschata* (Linnaeus, 1758) and *Aromia moschata ambrosiaca* (Steven, 1809) (= *thoracica* Fischer, 1824).
Chorotype: Palearctic.

Tribe <u>GRACILIINI</u>

***Penichroa* Stephens, 1839**
[Type sp.: *Callidium fasciatum* Stephens, 1831]

***Penichroa fasciata* (Stephens, 1831)**

Material examined: Ankara prov.: Keçiören, Pınarbaşı, 02.07.2005, 890 m., 1 specimen, 08.08.2005, 1 specimen, leg. S. Güzel.
Records in Ankara prov.: Ayaş (Başbereket village), Mamak (Misket district), Etimesgut (Park of Alparslan Türkeş) (Özdikmen, 2006).
Records in Turkey: (AM-AN-ANT-IC-SM-TO-YO-TRA-TUR)
Remarks: The species distributes rather widely in Turkey.
Chorotype: Turano-Europeo-Mediterranean + Nearctic.

Tribe <u>MOLORCHINI</u>

***Molorchus* Fabricius, 1792**
[Type sp.: *Necydalis minor* Linnaeus, 1767]

Subgenus *Glaphyra* Newman, 1840
[Type sp.: *Glaphyra semiusta* Newman, 1840]

Remarks: Sama (2002) gave *Glaphyra* Newman, 1840 as a distinct genus.

***Molorchus kiesenwetteri* Mulsant et Rey, 1861**
= ssp.*kiesenwetteri* Mulsant et Rey, 1861
= ssp. *hircus* Abeille de Perrin, 1881

Records in Ankara prov.: Asia Minor as *M. kiesenwetteri angorensis* Pic, 1912 (Winkler, 1924-1932); Kızılcahamam (Köroğlu Mountains) (Adlbauer, 1992).
Records in Turkey: (AM-AN-ANT-BI-IC-IZ-KN-KS-TRA-TUR)
Remarks: The species distributes rather widely in Turkey. It is represented by two subspecies in Turkey. *G. kiesenwetteri hircus* (Abeille de Perrin, 1881) occurs mostly in S and SW Turkey and the nominative *G. kiesenwetteri kiesenwetteri* (Mulsant et Rey, 1861) occurs in other parts of Turkey.
Chorotype: Turano-Mediterranean (Turano-E-Mediterranean + Turano-Apenninian) + Turano-European (Turano-Sarmato-Pannonian + Ponto-Pannonian).

***Molorchus umbellatarum* (Schreber, 1759)**
= ssp. *umbellatarum* Schreber, 1759
= ssp. *diversipes* Pic, 1897
= ?ssp. *obscuripes* Müller, 1948

Records in Ankara prov.: Kızılcahamam (Demelt, 1967).
Records in Turkey: (AN-BO-IZ-TB-TRA-TUR)

Remarks: The species distributes mostly in N Turkey. It is represented by two subspecies in Turkey. *G. umbellatarum diversipes* (Pic, 1897) occurs in North-Eastern Turkey and the nominative *G. umbellatarum umbellatarum* (Schreber, 1759) occurs in other parts of Turkey. Known other subspecies, *G. umbellatarum obscuripes* Müller, 1948 occurs only in Italy. According to Sama (2002), *G. umbellatarum obscrupes* Müller, 1948 is not a subspecies.
Chorotype: European.

Tribe STENOPTERINI

***Stenopterus* Illiger, 1804**
[Type sp.: *Necydalis rufa* Linnaeus, 1767]

***Stenopterus rufus* (Linnaeus, 1767)**
= ssp. *rufus* Linnaeus, 1767
= ssp. *geniculatus* Kraatz, 1863
= ssp. *syriacus* Pic, 1892
= ?ssp. *transcaspicus* Plavilstshikov, 1940

Records in Ankara prov.: Kızılcahamam (Yukarı Çanlı) (Özdikmen, 2006).
Records in Turkey: (ADY-AM-AN-ANT-ART-BI-BO-BR-BS-CA-CN-CO-EZ-GA-GU-HT-IC-IS-IZ-KA-KK-KN-KO-KR-KS-KY-MN-NI-OS-RI-SM-SN-TB-TO-TU-YA-YO-TRA-TUR)
Remarks: The species distributes widely in Turkey. The species is represented by three subspecies in Turkey. *S. rufus geniculatus* Kraatz, 1863 occurs mostly in N Turkey, *S. rufus syriacus* Pic, 1892 occurs in S Turkey (Southern costal region and Amanos Mts.) (Sama, 1995) and the nominative *S. rufus rufus* (Linnaeus, 1767) occurs in other parts of Turkey. The other known subspecies *S. rufus transcaspicus* Plavilstshikov, 1940 distributes in Turkmenia, Sakhalin Island and Iran. Danilevsky (2008b) stated that "*According to J. Voricek (personal communication, 1992), Stenopterus rufus in Turkmenia is represented by S. r. transcaspicus Plav., 1940 (in fact the name was introduced as "morpha" and so infrasubspecific). The publication by Tozlu et al. (2005) of "Stenopterus rufus transcaspicus Plav., 1940" did not made the name valid. According to I. M. Kerzhner (personal message, 2006), following ICZN, after 1999 the validation of such name must be accompanied with special remark "ssp. n." or "stat. n.*"
Chorotype: Turano-European. According to Sama (2002), this species is not in North Africa.

***Callimus* Mulsant, 1846**
[Type sp.: *Callimus bourdini* Mulsant, 1846 = *Saperda angulata* Schrank, 1789]

Subgenus *Lampropterus* Mulsant, 1863
[Type sp.: *Necydalis femoratus* Germar, 1824]

***Callimus femoratus* (Germar, 1824)**

Records in Ankara prov.: Kızılcahamam (Güvem) (Özdikmen et al., 2005)
Records in Turkey: (AD-ADY-AM-AN-ANT-ART-BL-BN-BS-BU-CA-DI-ED-EZ-GA-HA-HT-IC-IS-IZ-KA-KI-KK-KN-MA-MG-MN-MU-NI-OS-YO-TRA-TUR)
Remarks: The species distributes widely in Turkey.
Chorotype: Turano-Mediterranean (Turano-E-Mediterranean).

Tribe CERTALLINI

***Certallum* Dejean, 1821**
[Type sp.: *Saperda ruficollis* Fabricius, 1787 = *Cerambyx ebulinus* Linnaeus, 1767]

***Certallum ebulinum* (Linnaeus, 1767)**
= ssp. *ebulinum* Linnaeus, 1767
= ?ssp. *ruficollis* Fabricius, 1787

Material examined: Ankara prov.: Kayaş, 10.05.2004, 874 m., 4 specimens, leg. S. Güzel; Kızılcahamam, Işık Mt., 20.05.2005, 2100 m., 1 specimen, leg. S. Güzel; Şereflikoçhisar, 17.04.2006, 980 m., 14 specimens, 29.05.2006, 3 specimens, leg. S. Güzel; Şereflikoçhisar, Hacı enbiya district, 08.05.2006, 990 m., 2 specimens, leg. S. Güzel.
Records in Ankara prov.: Ankara prov. (Tuatay et al., 1972); Beynam (Ex. - Gül-Zümreoğlu, 1975); Ankara prov. (Lodos, 1998); Şereflikoçhisar, Şereflikoçhisar-Ankara road, Central, Polatlı road 25. km, Entry of Temelli, Yenikent (Bucak village) (Özdikmen, 2006).
Records in Turkey: (AD-ADY-AK-AM-AN-ANT-AY-BI-BL-BS-CA-CN-DE-DI-ER-GA-HT-IC-IP-IS-IZ-KA-KN-KY-MG-MN-MR-NE-NI-OS-SN-SU-TB-?YO-TRA-TUR)
Remarks: The species distributes widely in Turkey. The species is represented by two subspecies in Turkey. *C. ebulinum ruficolle* (Fabricius, 1787) that distributed in Mediterranean Region (from Iberian peninsula to Iran including North Africa) occurs mostly in S Turkey and the nominative *C. ebulinum ebulinum* (Linnaeus, 1767) occurs in other parts of Turkey. According to Sama (1988), *C. ruficolle* is a subspecies of *C. ebulinum*. But according to Danilevsky, *C. ruficolle* is a synonym of *C. ebulinum*.
Chorotype: Turano-Europeo-Mediterranean.

Tribe HYLOTRUPINI

***Hylotrupes* Serville, 1834**
[Type sp.: *Cerambyx bajulus* Linnaeus, 1758]

***Hylotrupes bajulus* (Linnaeus, 1758)**

Records in Ankara prov.: Elmadağ (Villiers, 1967; Öymen, 1987); Elmadağ, Çamlıdere (Tozlu et al., 2002); Ankara prov. (Özdikmen, et al., 2005); Kızılcahamam (Çileklitepe) (Özdikmen, 2006).
Records in Turkey: (AD-AM-AN-ANT-ART-AY-BI-BO-BR-BS-CA-DE-DU-ER-EZ-GI-GU-HT-IC-IP-IS-IZ-KA-KAR-KN-KR-KS-KU-KY-RI-SN-SV-TB-US-ZO-TRA-TUR)
Remarks: The species distributes widely in Turkey.
Chorotype: Subcosmopolitan.

Tribe CALLIDIINI

***Ropalopus* Mulsant, 1839**
[Type sp.: *Callidium insubricum* Germar, 1824]

***Ropalopus clavipes* (Fabricius, 1775)**

Records in Ankara prov.: Ankara prov. (Özdikmen, et al., 2005).
Records in Turkey: (AD-ADY-AN-BL-BO-CN-CO-DE-ED-ER-HT-IC-IS-IZ-KO-KU-MN-MU-NI-OS-US-TRA-TUR)
Remarks: The species distributes widely in Turkey.
Chorotype: European or Sibero-European. Sama (2002) reported that this species distributed in Siberia too.

***Phymatodes* Mulsant, 1839**
[Type sp.: *Cerambyx variabilis* Linnaeus, 1761 = *Cerambyx testaceus* Linnaeus, 1758]

***Phymatodes testaceus* (Linnaeus, 1758)**

Records in Ankara prov.: Kızılcahamam (Soğuksu National Park), Beypazarı (Dereli village) (Özdikmen, 2006).
Records in Turkey: (ADY-AN-ANT-ART-BO-CA-GU-HT-IC-IS-NI-OS-TRA-TUR)
Remarks: The species distributes rather widely in Turkey.
Chorotype: Holarctic.

Tribe CLYTINI

***Echinocerus* Mulsant, 1863**
Type sp.: *Cerambyx floralis* Palas, 1773]

***Echinocerus floralis* (Pallas, 1773)**

Material examined: Ankara prov.: Beytepe, 17.07.2004, 985 m., 1 specimen, 16.06.2005, 1 specimen, leg. S. Güzel; İncek, 09.06.2005, 1070 m., 2 specimens, 28.07.2006, 36 specimens, leg. S. Güzel; Bağlum, 11.07.2005, 1170 m., 1 specimen, 13.07.2005, 2 specimens, leg. S. Güzel.
Records in Ankara prov.: Kavaklıdere (Villiers, 1967); Ankara prov. (Özer & Duran, 1968); Ayaş, Beynam Forest (Öymen, 1987); Çal Mountain, Azap Deresi, Kızılcahamam (Güvem, Bel Pınarı, Işık Mountain, Yukarı Çanlı) (Özdikmen & Demir, 2006); Kızılcahamam (Işık Mountain, Yenimahalle village, Yukarı Çanlı, Güvem, Yasin village, the peak of Bel) (Özdikmen, 2006) ; Beytepe (Maslak valley) (Özdikmen, 2007).
Records in Turkey: (AD-ADY-AF-AG-AM-AN-ANT-AR-ART-BI-BO-BS-BU-BY-CA-CN-CO-DE-EL-ER-ES-EZ-GI-GU-IC-IG-IP-IZ-KA-KAR-KIR-KK-KM-KN-KO-KR-KS-KY-MA-MN-MU-NI-OS-SM-SN-SV-TB-TO-TU-US-YO-ZO-TRA-TUR)
Remarks: The species distributes widely in Turkey.
Chorotype: Sibero-European.

***Chlorophorus* Chevrolat, 1863**
[Type sp.: *Callidium annularis* Fabricius, 1787]

***Chlorophorus aegyptiacus* (Fabricius, 1775)**

Records in Ankara prov.: Central (Bodenheimer, 1958).
Records in Turkey: (AM-AN-BL-BO-BS-CA-DE-HT-IS-IZ-MG-MN-TUR)
Remarks: The species distributes rather widely in western half of Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian).

***Chlorophorus cursor* Rapuzzi & Sama, 1999**

Material examined: Ankara prov.: İncek, 28.06.2006, 1075 m., 1 specimen, leg. S. Güzel.
Records in Turkey: (AN-BO)
Remarks: The species is endemic to Turkey and new to Ankara province. It distributes only in N Turkey.
Chorotype: N-Anatolian.

***Chlorophorus hungaricus* (Seidlitz, 1891)**

Material examined: Ankara prov.: İncek, 09.06.2005, 1070 m., 1 specimen, 28.06.2005, 1080 m., 1 specimen, leg. S. Güzel.
Records in Ankara prov.: Kızılcahamam (Işık Mountain) (Özdikmen, 2006).
Records in Turkey: (AD-AN-BO-BR-GA-IC-KA-KO-KR-KS-NI-OS-SV-TUR)
Remarks: The species distributes rather widely in Turkey.
Chorotype: Turano-European (Ponto-Pannonian).

***Chlorophorus sartor* (Müller, 1766)**

Records in Ankara prov.: Kızılcahamam (Soğuksu National Park) (Özdikmen et al., 2005); Kızılcahamam, Beypazarı (Dereli) (Özdikmen, 2006).
Records in Turkey: (AD-AM-AN-ANT-ART-AY-BI-BL-BR-BS-BU-CA-CN-DE-EL-ES-EZ-GA-GU-HT-IC-IP-IS-IZ-KA-KK-KN-KR-KS-KY-MG-MN-OS-RI-SM-SN-TE-YO-TRA-TUR)
Remarks: The species distributes widely in Turkey.
Chorotype: Turano-European. According to Sama (2002), the records from Siberia not confirmed.

***Chlorophorus trifasciatus* (Fabricius, 1781)**

Material examined: Ankara prov.: Bağlum, 13.07.2005, 1170 m., 1 specimen, leg. S. Güzel.
Records in Turkey: (AN-ANT-BI-IC-IS-KN-KO-KR-KS-KU-TUR)
Remarks: New to Ankara province. The species distributes rather widely in western half of Turkey.
Chorotype: Mediterranean.

***Chlorophorus varius* (Müller, 1766)**
= ssp. *varius* Müller, 1766
= ssp. *damascenus* Chevrolat, 1854
= ssp. *pieli* Pic, 1924

Material examined: Ankara prov.: Beytepe, 17.07.2004, 985 m., 5 specimens, leg. S. Güzel; N Bağlum, 11.07.2005, 1170 m., 2 specimens, leg. S. Güzel; Campus of ODTÜ, 12.08.2005, 960 m., 5 specimens, leg. S. Güzel; Polatlı, 07.06.2006, 850 m., 2 specimens, leg. S. Güzel; Şereflikoçhisar, 18.07.2006, 985 m., 3 specimens, leg. S. Güzel.
Records in Ankara prov.: Ankara prov. (İren & Ahmed, 1973); Central (Tozlu et al., 2002); Gölbaşı, Şereflikoçhisar, Çubuk (Özdikmen et al., 2005); Çubuk dam (Özdikmen, 2007).
Records in Turkey: (AD-ADY-AK-AM-AN-ANT-ART-AY-BI-BL-BO-BR-BU-CA-CN-DE-ER-ES-EZ-GU-HA-HT-IC-IG-IP-IS-IZ-KA-KI-KIR-KK-KM-KN-KO-KR-KS-KY-MA-MG-MN-MR-MU-NE-NI-OS-SU-TB-TO-US-ZO-VA-TRA-TUR)
Remarks: The species distributes widely in Turkey. The species is represented by two subspecies in Turkey. *C. varius damascenus* Chevrolat, 1854 occurs in S Turkey and the nominative *C. varius varius* (Müller, 1766) occurs in other parts of Turkey. Known other subspecies *C. varius pieli* (Pic, 1924) occurs in Vietnam and China.
Chorotype: Palearctic.

***Xylotrechus* Chevrolat, 1860**
[Type sp.: *Clytus sartorii* Chevrolat, 1860]

Subgenus *Xylotrechus* Chevrolat, 1860
[Type sp.: *Clytus sartorii* Chevrolat, 1860]

***Xylotrechus rusticus* (Linnaeus, 1758)**

Records in Ankara prov.: Ankara prov.: Bağlum (Özdikmen, 2006).
Records in Turkey: (AN-BO-BU-CN-DU-ES-IS-IZ-KAR-KK-KN-KO-KS-KY-MU-SA-SM-TO-TU-TUR)
Remarks: The species distributes widely in Turkey.
Chorotype: Palearctic.

***Clytus* Laicharting, 1784**
[Type sp.: *Cerambyx arietis* Linnaeus, 1758]

***Clytus arietis* (Linnaeus, 1758)**
= ssp. *arietis* Linnaeus, 1758
= ssp. *lederi* Ganglbauer, 1881
= ssp. *oblitus* Roubal, 1932

Records in Ankara prov.: Kızılcahamam (Yenimahalle village) (Özdikmen, 2006).
Records in Turkey: (AM-AN-ART-BO-CA-CN-DU-EZ-GU-IS-KO-KS-SM-TB-ZO-TRA-TUR)
Remarks: The species distributes in N and E Turkey. The species has three subspecies in the World. It is represented by two subspecies in Turkey. *C. arietis lederi* Ganglbauer, 1881 occurs in Caucasus (Talysh, Kopet-Dag and North Iran), E Turkey and the nominative *C.*

arietis arietis (Linnaeus, 1758) occurs in other parts of N Turkey. Another subspecies is *C. arietis oblitus* Roubal, 1932 occurs only in Caucasus.
Chorotype: European.

***Clytus rhamni* Germar, 1817**
= ssp. *rhamni* Germar, 1817
= ssp. *temesiensis* Germar, 1824
= ssp. *bellieri* Gautier, 1862

Records in Ankara prov.: Kızılcahamam (Işık Mountain, Yukarı Çanlı) (Özdikmen & Demir, 2006); Kızılcahamam (S of Dam, Güvem, Yasin village, Yukarı Çanlı), Beypazarı (Dereli village) (Özdikmen, 2006).
Records in Turkey: (AD-ADY-AM-AN-ANT-ART-BI-BS-BY-CA-CN-GA-GU-HT-IC-IP-IS-IZ-KA-KK-KN-KO-KR-KS-KY-MA-OS-RI-SM-SN-SV-TO-YA-YO-TRA-TUR)
Remarks: The species distributes widely in Turkey. The species is represented by two subspecies in Turkey. *C. rhamni temesiensis* Germar, 1824 occurs in S Turkey and the nominative *C. rhamni rhamni* Germar, 1817 occurs in other parts of Turkey. The other known subspecies, *C. rhamni bellieri* Gautier, 1862, occurs in Western Mediterranean, Central Europe, Sicily and Italy.
Chorotype: European.

***Clytus schurmanni* Sama, 1996**

Material examined: Ankara prov.: Bağlum, 06.07.2005, 1175 m., 4 specimens, 11.07.2005, 1 specimen, 13.07.2005, 1 specimen, leg. S. Güzel.
Records in Ankara prov.: Kızılcahamam (Işık Mountain) as *C. schneideri* Kiesenwetter, 1879 (Demelt, 1967); Çubuk dam as *C. schneideri* Kiesenwetter, 1879 (Gül-Zümreoğlu, 1975); Kızılcahamam as *C. schneideri* Kiesenwetter, 1879 (Adlbauer, 1992); Kızılcahamam (Central, Işık Mountain) (Sama, 1996); Ankara prov. as *C. schneideri* Kiesenwetter, 1879 (Lodos, 1998); Kızılcahamam (Soğuksu National Park), Sincan (Mülk, Ayaş Mountain) (Özdikmen & Demir, 2006); Kızılcahamam (Soğuksu National Park), Beypazarı (Dereli village) (Özdikmen, 2006).
Records in Turkey: (AM-AN-BO-CN-CO-IZ-KIR-KR-KS-TO-YO-TUR)
Remarks: The species distributes mostly in central parts of N Turkey. It is endemic to Turkey.
Chorotype: Anatolian.

Subfamily LAMIINAE

Tribe LAMIINI

***Morimus* Brullé, 1832**
[Type sp.: *Lamia lugubris* Fabricius, 1832 = *Cerambyx asper* Sulzer, 1776]

***Morimus asper* (Sulzer, 1776)**

Records in Ankara prov.: Kızılcahamam (Çamkoru) (Özdikmen & Şahin, 2006); Nallıhan (Özdikmen, 2007).
Records in Turkey: (AN-ART-GI-GU-IS-RI-SN-TB-TRA-TUR)
Remarks: The species distributes in N Turkey.
Chorotype: S-European.

***Morimus funereus* (Mulsant, 1863)**

Material examined: Ankara prov.: Beypazarı, Akçalı village, 15.05.2004, 730 m., 1 specimen, leg. S. Güzel.
Records in Ankara prov.: Central, Hacıkadın (Özdikmen et al., 2005); Kızılcahamam (Soğuksu National Park), Beypazarı (Akçalı village, İnözüderesi) (Özdikmen & Demir, 2006); Kızılcahamam (Çamkoru) (Özdikmen & Şahin, 2006); Güdül (Özdikmen, 2007).

Records in Turkey: (AM-AN-ANT-BI-BO-BR-BS-BU-CA-DU-KK-KO-TO-TUR)
Remarks: The species distributes only in Northern West half of Turkey.
Chorotype: Turano-European (Ponto-Pannonian).

***Morimus orientalis* (Reitter, 1894)**

Records in Ankara prov.: Kızılcahamam (Soğuksu National Park) (Özdikmen & Demir, 2006).
Records in Turkey: (EZ-IS-SA-TRA-TUR)
Remarks: Probably it distributes rather widely in Turkey.
Chorotype: SW-Asiatic (Irano-Anatolian).

Tribe DORCADIINI

***Dorcadion* Dalman, 1817**
[Type sp.: *Cerambyx glycyrrhizae* Pallas, 1771]

Subgenus *Carinatodorcadion* Breuning, 1943
[Type sp.: *Cerambyx carinatus* Pallas, 1771 (nomen protectum)]

***Dorcadion carinatum* (Pallas, 1771)**
= ssp. *carinatum* Pallas, 1771
= ssp. *cylindraceum* Reitter, 1886
= ssp. *igrenum* Danilevsky, 1998
= ssp. *sunzhenum* Danilevsky, 1998
= ssp. *uralense* Danilevsky, 1998

Records in Ankara prov.: Beynam (Özdikmen & Hasbenli, 2004).
Records in Turkey: (AM-AN-AR-KAR-RI)
Remarks: The species distributes in N Turkey. The subspecies structure of *D. carinatum* was revised by Danilevsky (1998). However, Danilevsky (1998) has never mentioned the occurrence of *D. carinatum* in Turkey. Probably it represented by the nominative subspecies in Turkey. The other known subspecies *D. carinatum cylindraceum* Reitter, 1886 occurs in E Caucasus (Dagestan: Derbent, Azerbaijan), *D. carinatum uralense* Danilevsky, 1998 occurs in Kazakhstan, *D. carinatum sunzhenum* Danilevsky, 1998 occurs in N Caucasus and *D. carinatum igrenum* Danilevsky, 1998 occurs in Ukraine, Southern half of European part of Russia. On the other hand, according to Danilevsky (1998) distribution patterns of the nominative subspecies *D. carinatum carinatum* never reach to Turkey in the South. As seen above, *D. carinatum* is represented by three subspecies in Caucasus (two of them in N Caucasus and the other one in E Caucasus). For this reason, the Turkish populations of *D. carinatum* may be belong to a different subspecies.
Chorotype: Turanian (Ponto-Caspian).

Subgenus *Cribridorcadion* Pic, 1901
[Type sp.: *Dorcadion mniszechi* Kraatz, 1873]

***Dorcadion arenarium* (Scopoli, 1763)**
= ssp. *arenarium* Scopoli, 1763
= ssp. *abruptum* Germar, 1839
= ssp. *lemniscatum* Küster, 1847
= ssp. *subcarinatum* Müller, 1905
= ssp. *dalmatium* Müller, 1905
= ssp. *velebiticum* Müller, 1905
= ssp. *brattiense* Müller, 1905
= ssp. *hypsophilum* Müller, 1905
= ssp. *muelleri* Depoli, 1912
= ssp. *rubrimembre* Pic, 1917
= ssp. *shkypetarum* Heyrovsky, 1937

Records in Ankara prov.: Çubuk dam (Önalp, 1990).
Records in Turkey: (AM-AN-KS-TUR)
Remarks: The species distributes mostly in N of Central Turkey. It is represented by the nominative subspecies in Turkey. The other known subspecies, *D. arenarium abruptum* Germar, 1839 occurs in Arbe Island, Hvar Island (Bosnia and Herzegovina, Croatia), *D. arenarium lemniscatum* Küster, 1847 occurs in Bosnia and Herzegovina, Croatia, *D. arenarium subcarinatum* Müller, 1905 occurs in Northern Italy: Elba Island (Italy, France), *D. arenarium dalmatinum* Müller, 1905 occurs in Pago and Eso Islands (Bosnia and Herzegovina, Croatia), *D. arenarium velebiticum* Müller, 1905 occurs in Velebit and Mossor Mts. (Bosnia and Herzegovina, Croatia), *D. arenarium brattiense* Müller, 1905 occurs in Brazza and Solta Islands (Bosnia and Herzegovina, Croatia), *D. arenarium hypsophylum* Müller, 1905 occurs in Dalmatia and Montenegro (Bosnia and Herzegovina, Yugoslavia, Croatia), *D. arenarium muelleri* Depoli, 1912 occurs in Quernero, Cherso Island, Ossero (Bosnia and Herzegovina, Croatia), *D. arenarium rubrimembre* Pic, 1917 occurs in Southern Dalmatia, Montenegro, Northern Albania (Bosnia and Herzegovina, Albania, Yugoslavia, Croatia), *D. arenarium shkypetarum* Heyrovsky, 1937 occurs in Albania.
Chorotype: Turano-European (Ponto-Pannonian).

***Dorcadion bangi* Heyden, 1894**
= ssp. *bangi* Heyden, 1894
= ssp. *heinzorum* Braun, 1975
= ssp. *roridum* Pesarini & Sabbadini, 1999

Records in Ankara prov.: Elmadağ (Özdikmen et al., 2005).
Records in Turkey: (AN-BO-CO-KR-KS)
Remarks: The species is endemic to Turkey. It is represented by three subspecies. The nominative *D. bangi bangi* Heyden, 1894 occurs only in West parts of Western Black Sea Region (Kastamonu and Bolu provinces) and *D. bangi roridum* Pesarini & Sabbadini, 1999 and *D. bangi heinzorum* Braun, 1975 occurs probably eastward from the distribution patterns of nominative subspecies.
Chorotype: N-Anatolian.

***Dorcadion bodemeyeri* Daniel, 1900**

Records in Ankara prov.: Gölbaşı (Demelt, 1963); Central and Gölbaşı (Önalp, 1990).
Records in Turkey: (AF-AM-AN-ES-IZ-KN-TUR)
Remarks: The species is endemic to Turkey and it distributes mostly in the western half of Anatolia.
Chorotype: Anatolian.

***Dorcadion boluense* Breuning, 1962**
= ssp. *boluense* Breuning, 1962
= ssp. *imitator* Pesarini & Sabbdini, 1999
= ssp. *corallinum* Pesarini & Sabbdini, 1999

Material examined: Ankara prov.: Ankara –Ayaş road, 17.04.2005, 1480 m., 33 specimens, leg. S. Güzel; Kızılcahamam, Salin Köyü, 20.05.2005, 2100 m., 7 specimens, leg. S. Güzel; Şereflikoçhisar, Kale district, 22.03.2006, 985 m., 3 specimens, leg. S. Güzel.
Records in Ankara prov.: Kızılcahamam (Işık Mountain, Güvem, Çamlıdere) (Braun, 1978); Kızılcahamam (Sama, 1982); Çal Mountain (Özdikmen & Demir, 2006); Kızılcahamam (Yukarı Çanlı) (Özdikmen, 2006).
Records in Turkey: (AN-BO-TUR)
Distribution: Turkey.
Remarks: The species is endemic to Turkey and it distributes in N and NW Turkey. It is represented by three subspecies in Turkey. These are the nominotypical subspecies *D. boluense boluense* Breuning, 1962, *D. boluense imitator* Pesarini & Sabbadini, 1999 and *D. boluense corallinum* Pesarini & Sabbadini, 1999.
Chorotype: NW-Anatolian.

***Dorcadion cinerarium* (Fabricius, 1787)**
= ssp. *cinerarium* Fabricius, 1787
= ssp. *caucasicum* Küster, 1847
= ? ssp. *susheriense* Breuning, 1970
= ssp. *gorodinskii* Danilevsky, 1996

Records in Ankara prov.: Ankara prov. as *D. c.* m. *corallicorne* / Ankara prov. as *D. c.* m. *sericatulum* (Breuning, 1962); Elmadağ as *D. c. micans* (Demelt, 1963); Gölbaşı as *D. cinerarium* m. *cinerarium* (Perissinotto & Luchini, 1966); Gölbaşı as *D. c. micans* (Perissinotto & Luchini, 1966); Gölbaşı as *D. cinerarium* m. *caucasicum* (Perissinotto & Luchini, 1966); Gölbaşı, Central, Elmadağ (Braun, 1978); Ankara prov. (from map in Braun, 1979); Keçiören (Bağlum), Çal Mt. (Çaytepe) (Özdikmen & Demir, 2006); Kepekli, Yenikent (İlyakut village), Eğmir lake (Özdikmen, 2006). Also, old records that were given as *D. sericatum* Krynicki, 1832 should be *D. cinerarium*. These are: Beynam, Elmadağ, Hüseyin Gazi Mountain, Dam I (Önalp, 1990); Beynam (Özdikmen & Hasbenli, 2004); Hüseyin Gazi Mountain (Özdikmen et al., 2005).
Records in Turkey: (AM-AN-ANT-BS-CA-CN-CO-ER-ES-EZ-GA-GU-IC-IS-IZ-KA-KI-KM-KS-KY-NI-OR-SM-SU-SV-TO-US-VA-YO-TUR)
Remarks: The species distributes rather widely in Turkey. It has many different populations that are placed mostly in local areas in Turkey. The real status of taxonomies and distribution patterns of the populations needs to be revised. For example, Braun (1979) stated *D. cinerarium susheriense* Breuning, 1970 that described from N Turkey as based on only two specimens could be just a variation of *D. cinerarium*. Also according to Braun (1979), *D. paracinerarium* Breuning, 1974 is a synonym of *D. cinerarium* (Fabricius, 1787) as morpha and *D. heinzi* Breuning, 1964 that described from Eğribel pass in Giresun province (N Turkey) as a subspecies of *D. cinerarium* is a separate species. Also *D. caucasicum* Küster, 1847 has been widely accepted as a subspecies of *D. cinerarium*. According to Danilevsky (2008b), *D. cinerarium danczenkoi* Danilevsky, 1996 is a separate species. Danilevsky et al. (2005) proposed *D. caucasicum* as a subspecies of *D. cinerarium*. Known other subspecies, *D. cinerarium gorodinskii* Danilevsky, 1996 occurs in Ukraine.
Chorotype: SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian) + Turanian (Ponto-Caspian).

***Dorcadion divisum* Germar, 1839**
ssp. *divisum* Germar, 1839
ssp. *mytilinense* Kraatz, 1873
ssp. *bleusei* Pic, 1899
ssp. *rhodicum* Della Bufa, 1924
ssp. *chioticum* Breuning, 1946
ssp. *subdivisum* Breuning, 1955
ssp. *parteinterruptum* Breuning, 1962

Records in Ankara prov.: Gölbaşı as *D. divisum ssp. subdivisum* Breuning, 1955 (Fuchs et Breuning, 1971); Ankara prov. (Özdikmen, 2006).
Records in Turkey: (AD-ADY-AN-BL-BS-BU-CA-DI-ES-IP-IZ-KN-MN-MR-NI-SV-TRA-TUR)
Remarks: Probably the species distributes rather widely in Turlkey. It is represented by two subspecies in Turkey as the nominotypical subspecies and *D. divisum subdivisum* Breuning, 1955. However, the taxonomic status in Turkey of this species is unclear.
Chorotype: Turano-Mediterranean (Balkano-Anatolian).

***Dorcadion escherichi* Ganglbauer, 1897**

Records in Ankara prov.: Turkey as *D. angorense* (Winkler, 1924-1932; Lodos, 1998); Ankara prov. as the type loc. of *Dorcadion escherichi* Ganglbauer, 1897 (Bodemeyer, 1900); Ankara prov. (Breuning, 1962); Gölbaşı (Braun, 1978); Central, Hüseyin Gazi Mountain (Önalp, 1990).
Records in Turkey: (AM-AN-BI-KN-TO-TUR)
Distribution: Turkey.

Remarks: The species is endemic to Turkey and it distributes in C and C parts of N Turkey. According to some authors, *D. angorense* Ganglbaueri 1897 is a separate species.
Chorotype: Anatolian.

***Dorcadion haemorrhoidale* Hampe, 1852**

Records in Ankara prov.: Ankara prov. (Önalp, 1990).
Records in Turkey: (AG-AN-EZ-TUR)
Remarks: The species distributes in N Turkey.
Chorotype: SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian).

***Dorcadion infernale* Mulsant et Rey, 1863**
= ssp. *infernale* Mulsant et Rey, 1863
= ssp. *asperatum* Breuning, 1947

Material examined: Ankara prov.: Ayaş-Polatlı road, 17.04.2005, 1380 m., 3 specimens, leg. S. Güzel.
Records in Ankara prov.: Ankara prov. (Önalp, 1990) Beynam (Özdikmen & Hasbenli, 2004); Bayındır Dam and Ayaş-Polatlı road (Sarıoba env.) (Özdikmen, 2006).
Records in Turkey: (AM-AN-ANT-BI-BU-CO-DI-ES-IC-IZ-KA-KN-NI-SV-US-TUR)
Distribution: Turkey.
Remarks: The species is endemic to Turkey and it distributes rather widely in Turkey. It represented by two subspecies in Turkey. *Dorcadion infernale asperatum* Breuning, 1947 occurs in SE Turkey (Diyarbakır province) and the nominative *D. infernale infernale* Mulsant et Rey, 1863 occurs in other parts of Turkey.
Chorotype: Anatolian.

***Dorcadion kindermanni* Waltl, 1838**

Records in Ankara prov.: Beynam Forest, Hüseyin Gazi Mountain (Önalp, 1990).
Records in Turkey: (AN-IZ-TRA-TUR-US)
Distribution: Turkey.
Remarks: The species is endemic to Turkey and it distributes mostly in west half of Turkey.
Chorotype: W-Anatolian.

***Dorcadion olympicum* Kraatz, 1873**
ssp. *olympicum* Kraatz, 1873
ssp. *flavosuturale* Kratschmer, 1987

Records in Ankara prov.: Ankara prov. (Önalp, 1990).
Records in Turkey: (AN-BI-BS-IS-KU-TRA-TUR)
Remarks: The species distributes mostly in NW Turkey. It is represented by both subspecies in Turkey. – *convexum* Breuning, 1943 which the type locality is Anatolia: ?Kütahya prov.: Akdağ was given by Bruning (1962) as a subspecies of *D. olympicum*.
Chorotype: Turano-Mediterranean (Balkano-Anatolian).

***Dorcadion parallelum* Küster, 1847**

Records in Ankara prov.: Central, Hüseyin Gazi Mountain, Lalabel (Önalp, 1990).
Records in Turkey: (AM-AN-CO-TO-YO-TUR)
Remarks: The species distributes mostly in N of C parts of Turkey.
Chorotype: SW-Asiatic (Syro-Anatolian).

***Dorcadion pararufipenne* Braun, 1976**
= ssp. *pararufipenne* Braun, 1976
= ssp. *rassei* Braun, 1976

Records in Ankara prov.: Bayındır Dam, Ayaş road (Başayaş village env.), Çubuk (Özdikmen, 2006).
Records in Turkey: (AN-BO)
Distribution: Turkey.
Remarks: The species is endemic to Turkey and it distributes in a local area of N Turkey. The species is represented by two subspecies in Turkey. Both subspecies distribute in Bolu and Ankara provinces of N Turkey. The nominative *D. pararufipenne pararufipenne* Braun, 1976 and *D. pararufipenne rassei* Braun, 1976 occurs probably eastward from the distribution patterns of nominative subspecies.
Chorotype: NW-Anatolian.

***Dorcadion rufipenne* Breuning, 1946**
= ssp. *rufipenne* Breuning, 1946
= ssp. *major* Breuning, 1962

Records in Ankara prov.: Kızılcahamam (Akdoğan) (Braun, 1978).
Records in Turkey: (AN-KS-SN)
Remarks: The species is endemic to Turkey and it distributes in C parts of N Turkey. The species is represented by two subspecies in Turkey. The nominative *D. rufipenne rufipenne* Breuning, 1946 occurs in Kastamonu prov. and *D. rufipenne major* Breuning, 1962 occurs in S Sinop prov. (Eastern subspecies). According to Braun (1978), *D. boluense* is a subspecies of *D. rufipenne* Breuning, 1946. According to Pesarini & Sabbadini (1999), *D. boluense* is a distinct species. On the other hand, some authors regard – *rufipenne* Breuning, 1962 as a subspecies of *D. subsericatum* Pic, 1901.
Chorotype: N-Anatolian.

***Dorcadion scabricolle* Dalman, 1817**
= ssp. *scabricolle* Dalman, 1817
= ? ssp. *sevangense* Reitter, 1889
= ssp. *caramanicum* Daniel, 1903
= ssp. *paphlagonicum* Breuning, 1962
= ssp. *balikesirense* Breuning, 1962
= ssp. *nakhiczevanum* Danilevsky, 1999
= ssp. *paiz* Danilevsky, 1999

Material examined: Ankara prov.: Ayaş, 17.04.2005, 1490 m., 1 specimen, leg. S. Güzel; Kızılcahamam, Işık Dağı, 20.05.2005, 2230 m., 13 specimens, leg. S. Güzel.
Records in Ankara prov.: Central, Kızılcahamam (Central, Güvem) (Braun, 1978); Ankara prov. (from map in Braun, 1978); Güvem (Adlbauer, 1988); Central, Gölbaşı, Çal Mt., Hüseyin Gazi Mt. (Önalp, 1990); Çal Mountain (Özdikmen & Demir, 2006); Kızılcahamam (Yukarı Çanlı, Salin village, Yenimahalle village), Ayaş road (Başayaş village env.) (Özdikmen, 2006).
Records in Turkey: (AD-AF-AG-AN-ANT-AR-BI-BL-BS-CO-ER-EZ-GU-IC-IP-KA-KAR-KN-KS-KY-MA-NI-SV-US-VA-YO-TUR)
Remarks: The species distributes widely in Turkey. It is represented by four subspecies in Turkey. *D. scabricolle caramanicum* Daniel, 1903 (Southern subspecies) occurs in Cilician Taurus (SE Turkey), *D. scabricolle paphlagonicum* Breuning, 1962 (Northern subspecies) occurs in Kastamonu province of N Turkey, *D. scabricolle balikesirense* Breuning, 1962 (Western subspecies) occurs in Balıkesir province of NW Turkey and the nominative *D. scabricolle scabricolle* Dalman, 1817 that described from Georgia occurs in Transcaucasia and Armenia to Anatolia. The other known subspecies of this species are *D. scabricolle nakhiczevanum* Danilevsky, 1999 and *D. scabricolle paiz* Danilevsky, 1999 occur in Caucasus. According to Braun (1978), *D. sevangense* Reitter, 1889 that described from Transcaucasia as *D. scabricolle* v. *sevangensis* is a distinct species. He mentioned that it separated clearly from *D. scabricolle*. According to Danilevsky (2008b), - *sevangense* Reitter, 1889 is a subspecies of *D. scabricolle*.
Chorotype: SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian).

***Dorcadion septemlineatum* Waltl, 1838**
= ssp. *septemlineatum* Waltl, 1838
= ssp. *novemlineatum* Kraatz, 1873
= ssp. *octolineatum* Kraatz, 1873
= ssp. *abanti* Braun, 1976

Records in Ankara prov.: Central, Soğuksu National Park, Karagöl (Önalp, 1990).
Records in Turkey: (AF-AN-BI-BL-BO-BS-BU-CA-ES-GA-IP-IS-KN-KO-KR-KU-SA-TRA-TUR)
Remarks: The species distributes rather widely in Turkey (especially west half of Turkey). The species is represented by four subspecies in Turkey. *D. septemlineatum octolineatum* Kraatz, 1873 occurs in NW Anatolia: Bursa prov. and Karaköy, *D. septemlineatum novemlineatum* Kraatz, 1873 occurs in Bilecik and Eskişehir provinces (NW Anatolia), *D. septemlineatum abanti* Braun, 1976 occurs in Bolu province (NW Anatolia) and the nominative *D. septemlineatum septemlineatum* Waltl, 1838 occurs mainly in European Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian).

***Dorcadion subsericatum* Pic, 1901**
= ssp. *subsericatum* Pic, 1901
= ssp. *vulneratum* Pesarini & Sabbadini, 1999

Records in Ankara prov.: Ankara prov. (Adlbauer, 1992); Bayındır Dam, Ayaş road (Başayaş village env.), Çubuk (Özdikmen, 2006).
Records in Turkey: (AN-CN-KN-KS)
Remarks: The species is endemic to Turkey and it distributes rather widely in Turkey. It is represented by two subspecies in Turkey.
Chorotype: Anatolian.

***Dorcadion subvestitum* Daniel, 1900**

Records in Ankara prov.: Ankara prov. (Önalp, 1990).
Records in Turkey: (AM-AN-ES-IZ-KN-MA-NI-TUR)
Distribution: Turkey.
Remarks: The species is endemic to Turkey and probably it distributes rather widely in Turkey.
Chorotype: Anatolian.

Tribe <u>POGONOCHERINI</u>

***Pogonocherus* Dejean, 1821**
[Type sp.: *Cerambyx hispidulus* Piller et Mitterpacher, 1783]

Subgenus *Pityphilus* Mulsant, 1862
[Type sp.: *Cerambyx ovatus* Goeze, 1777]

***Pogonocherus decoratus* Fairmaire, 1855**

Records in Ankara prov.: Kızılcahamam (Demelt, 1967).
Records in Turkey: (AN-BO-KS-TUR)
Remarks: The species distributes in N Turkey.
Chorotype: European or Sibero-European.

Tribe <u>ACANTHOCININI</u>

***Acanthocinus* Dejean, 1821**
[Type sp.: *Cerambyx aedilis* Linnaeus, 1758]

***Acanthocinus aedilis* (Linnaeus, 1758)**

Records in Ankara prov.: Kızılcahamam (Alkan, 1946); Demetevler (Özdikmen & Demir, 2006); Beytepe (Özdikmen, 2007).
Records in Turkey: (AM-AN-ANT-ART-BI-BL-BO-BS-CA-DE-ES-EZ-GI-GU-IP-IZ-KAR-KR-KS-KU-MG-SN-TO-TRA-TUR)
Remarks: The species distributes widely in Turkey.
Chorotype: Sibero-European.

***Leiopus* Serville, 1835**
[Type sp.: *Cerambyx nebulosus* Linnaeus, 1758]

***Leiopus femoratus* Fairmaire, 1859**

Records in Ankara prov.: Soğuksu National Park (Özdikmen, 2007).
Records in Turkey: (AM-AN-ART-BL-CA-IS-KS-TO-TRA-TUR)
Remarks: The species distributes mostly in N Turkey.
Chorotype: Turano-European.

Tribe <u>TETRAOPINI</u>

***Tetrops* Stephens, 1829**
[Type sp.: *Leptura praeusta* Linnaeus, 1758]

***Tetrops praeusta* (Linnaeus, 1758)**
= ssp. *praeusta* Linnaeus, 1758
= ssp. *algirica* Chobaut, 1893
= ssp. *anatolica* Özdikmen & Turgut, 2008

Records in Ankara prov.: Kızılcahamam (Gfeller, 1972); between Sereflikoçhisar-Evren (Özdikmen, 2006).
Records in Turkey: (AN-ANT-BI-CO-IS-NI-SA-SM-SN-TRA-TUR)
Remarks: The species distributes rather widely in Turkey (especially west half of Turkey). It is represented by two subspecies in Turkey. The nominative and *T. praeusta anatolica* that was recenly described by Özdikmen & Turgut (2008a) occurs only in S Turkey. The other known subspecies, *T. praeusta algirica* (Chobaut, 1893) occurs only in N Africa (Algeria).
Chorotype: Palearctic.

Tribe <u>SAPERDINI</u>

***Saperda* Fabricius, 1775**
[Type sp.: *Cerambyx scalaris* Linnaeus, 1758]

Subgenus *Anaerea* Mulsant, 1839
[Type sp.: *Cerambyx carcharias* Linnaeus, 1758]

***Saperda carcharias* (Linnaeus, 1758)**

Records in Ankara prov.: Kızılcahamam (Çamkoru) (Özdikmen & Şahin, 2006).
Records in Turkey: (AN-BS-DE-EZ-IS-IZ-KAR-MN-TB-TRA-TUR)
Remarks: The species distributes in N and W Turkey.
Chorotype: Sibero-European.

Tribe <u>PHYTOECIINI</u>

***Oberea* Dejean, 1835**
[Type sp.: *Cerambyx oculatus* Linnaeus, 1758]

Subgenus *Oberea* Dejean, 1835
[Type sp.: *Cerambyx oculatus* Linnaeus, 1758]

***Oberea oculata* (Linnaeus, 1758)**

Material examined: Ankara prov.: Kayaş, Bayındır dam env., 02.07.2003, 890 m., 1 specimen, leg. S. Güzel.
Records in Turkey: (AD-ADY-AN-ANT-DE-EZ-HT-IC-IP-IZ-KA-KN-KO-MG-NI-TU-TRA-TUR)
Remarks: The species is new to Ankara province and it distributes widely distributed in Turkey.
Chorotype: Palaearctic.

Subgenus *Amaurostoma* Müller, 1906
[Type sp.: *Cerambyx erythrocephalus* Schrank, 1776]

***Oberea erythrocephala* (Schrank, 1776)**
= ssp. *erythrocephala* Schrank, 1776
= ssp. *taygetana* Pic, 1901
= ssp. *calvescens* Müller, 1948
= ssp. *schurmanni* Heyrovsky, 1962
= ssp. *amanica* Holzschuh, 1993

Records in Ankara prov.: Kızılcahamam (Soğuksu National Park) as *O. erythrocephala schurmanni* (Özdikmen, 2006).
Records in Turkey: (AF-AM-AN-ANT-ART-BY-CO-ER-EZ-GU-IS-KA-KAR-KO-KS-NI-OS-SV-VA-TRA-TUR)
Remarks: The species distributes widely in Turkey. It is represented by four subspecies in Turkey. *O. erythrocephala taygetana* Pic, 1901 occurs only in a local area of C parts of S Turkey, *O. erythrocephala amanica* Holzschuh, 1993 occurs in NE Turkey, *O. erythrocephala schurmanni* Heyrovsky, 1962 occurs mainly in C, S and E Turkey and *O. erythrocephala erythrocephala* (Schrank, 1776) occurs in the other parts of Turkey (especially European Turkey, NW and W Anatolia). The other known subspecies, *O. erythrocephala canescens* Müller, 1948 occurs only in Italy. According to Adlbauer (1988), *O. taygetana* Pic, 1901 is a subspecies of *O. erythrocephala* (Schrank, 1776) based on the specimens from Nurdağı pass. Clearly, *Oberea taygetana* was described as a species. It was treated later, however, as a variation by *Oberea erythrocephala*. Recently, it has been mentioned again as a species. For example, *O. taygetana* Pic, 1901 in Althoff & Danilevsky (1997) and Danilevsky (2005b) gave as a separate species. Now I accept the approach in Adlbauer (1988). Because, Adlbauer (1988) stated that the specimens of Osmaniye province (Nurdağı pass) differed from typical specimens with very shining surface and a little smaller body. In any case, the specimens from Nurdağı pass are still different from those.
Chorotype: Palearctic.

***Oberea ressli* Demelt, 1963**
= ssp. *ressli* Demelt, 1963
= ssp. *taygetana* Demelt, 1963

Records in Ankara prov.: Kızılcahamam as the type loc. of *O. ressli* (Demelt, 1963); Kızılcahamam (Adlbauer, 1988; Rejzek et al., 2001); Kızılcahamam (Central, Güvem, Işık Mts.) (Özdikmen et al., 2005).
Records in Turkey: (AN-CN-MN-TUR)
Distribution: Turkey.
Remarks: The species is endemic to Turkey and it distributes in N parts of C Anatolian Region and W parts of Turkey. It is represented by two subspecies in Turkey. These are the nominotypical subspecies *O. ressli ressli* Demelt, 1963 and *O. ressli taygetana* Demelt, 1963 (western subspecies).
Chorotype: Anatolian.

***Oxylia* Mulsant, 1863**
[Type sp.: *Oxylia duponcheli* Brullé, 1832]

***Oxylia argentata* (Ménetries, 1832)**

Records in Ankara prov.: Elmadağ (Breuning et Villiers, 1967); Kızılcahamam (Aköz village) (Özdikmen, 2006).
Records in Turkey: (ADY-AG-AN-ANT-ART-BT-BY-CO-DI-EL-ER-EZ-GU-HT-IC-IP-KAR-KI-KN-KS-NI-YO-TUR)
Remarks: The species distributes rather widely in Turkey.
Chorotype: SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian) + Turanian (Ponto-Caspian).

***Oxylia duponcheli* (Brullé, 1832)**

Records in Ankara prov.: Bağlum, Kızılcahamam (Güvem) (Özdikmen et al., 2005); Çal Mountain (Özdikmen & Demir, 2006).
Records in Turkey: (AK-AN-ART-ES-IC-KA-KM-MA-MN-OS-TUR)
Remarks: The species distributes rather widely in Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian).

***Coptosia* Fairmaire, 1864**
[Type sp.: *Phytoecia compacta* Menetries, 1832]
(See the remarks under the genus name *Phytoecia* Dejean, 1821)

***Coptosia albovittigera* (Heyden, 1863)**

Records in Ankara prov.: Kazan (Orhaniye village) (Özdikmen & Hasbenli, 2004).
Records in Turkey: (ADY-AN-BI-MA-TUR)
Remarks: Probably the species distributes rather widely in Turkey (especially west half of Turkey).
Chorotype: Turano-Mediterranean (Balkano-Anatolian).

***Helladia* Fairmaire, 1864**
[Type sp.: *Saperda millefolii* Adams, 1817]
(See the remarks under the genus name *Phytoecia* Dejean, 1821)

***Helladia humeralis* (Waltl, 1838)**

Material examined: Ankara prov.: Kayaş, 10.05.2004, 874 m., 5 specimens, leg. S. Güzel; Şereflikoçhisar, Hacı enbiya district, 08.05.2006, 990 m., 1 specimen, leg. S. Güzel.
Records in Ankara prov.: near Eymir lake (Gül-Zümreoğlu, 1975); Şereflikoçhisar (Özdikmen, 2006).
Records in Turkey: (AD-ADY-AK-AM-AN-ANT-AY-BU-DE-DI-ED-ES-HA-HT-IC-IP-IZ-KA-KN-MN-NI-OS-US-TUR)
Remarks: The species distributes widely in Turkey. Probably it may be represented by two subspecies in Turkey. One of them occurs mostly in N Turkey and the other ones occurs in S Turkey. Besides, according to Danilevsky (2008b), this species is represented by the nominotypical subspecies in Balkans, Caucasus, Near East and Iran.
Chorotype: E-Mediterranean (Palaestino-Cyprioto-Taurian + NE-Mediterranean).

***Helladia praetextata* (Steven, 1817)**
= ssp. *praetextata* Steven, 1817
= ssp. *nigricollis* Pic, 1891

Records in Ankara prov.: Kızılcahamam (Soğuksu National Park) (Özdikmen & Demir, 2006; Özdikmen,2006).
Records in Turkey: (AN-BY-DU-EZ-GU-HT-IC-KS-SV-ZO-TUR)

Remarks: The species distributes rather widely in Turkey. It is represented by two subspecies in Turkey. *H. praetextata nigricollis* Pic, 1891 occurs in S Turkey and the nominative *H. praetextata praetextata* (Steven, 1817) occurs mostly in N Turkey.
Chorotype: E-Mediterranean (NE-Mediterranean + Palaestino-Taurian).

***Neomusaria* Plavilstshikov, 1928**
[Type sp.: *Saperda balcanica* Frivaldsky, 1835]
(See the remarks under the genus name *Phytoecia* Dejean, 1821)

***Neomusaria balcanica* (Frivaldsky, 1835)**

Records in Ankara prov.: Kızılcahamam, Işık Mt. (Demelt, 1967); Kızılcahamam (Yenimahalle village) (Özdikmen, 2006).
Records in Turkey: (AM-AN-HA-MR-KR-KS-TU-TRA-TUR)
Remarks: The species distributes rather widely in Turkey (from European Turkey to Hakkari province). Probably *N. balcanica subvitticollis* occurs probably only in C part of N Turkey. The real taxonomic status of - *subvitticollis* needs to be clarified.
Chorotype: Turano-Mediterranean (Balkano-Anatolian).

***Neomusaria pauliraputii* Sama, 1993**

Material examined: Ankara prov.: A.O.Ç., 13.06.2004, 870 m., 7 specimens, 15.06.2004, 877 m., 1 specimen, leg. S. Güzel.
Records in Ankara prov.: Çal Mountain, Kızılcahamam (Soğuksu National Park) as *N. merkli* (Özdikmen & Demir, 2006).
Records in Turkey: (AN-BI-CN-ES-IZ-MN-TRA-TUR)
Remarks: The species is endemic to Turkey. Probably it distributes rather widely in W and C Turkey.

***Phytoecia* Dejean, 1835**
[Type sp.: *Saperda cylindrica* Fabricius, 1775 = *Cerambyx cylindricus* Linnaeus, 1758]

Remarks: *Coptosia* Fairmaire, 1864, *Helladia* Fairmaire, 1864, *Neomusaria* Plavilstshikov, 1928, *Opsilia* Mulsant, 1863 and *Blepisanis* Pascoe, 1866 which are given as separate genera in the text has been regarded by some authors as subgenera of *Phytoecia* Dejean, 1835.

***Phytoecia caerulea* (Scopoli, 1772)**
= ssp. *caerulea* Scopoli, 1772
= ssp. *baccueti* Brullé, 1832
= ssp. *gilvimana* Ménetries, 1832
= ssp. *bethseba* Reiche & Saulcy, 1858

Material examined: Ankara prov.: Kayaş, 10.05.2004, 874 m., 1 specimen, leg. S. Güzel; Bayındır dam env., 03.06.2004, 890 m., 1 specimen, 08.06.2004, 4 specimens, leg. S. Güzel; Beytepe, 16.06.2005, 980 m., 1 specimen, leg. S. Güzel; Şereflikoçhisar, Kale district, 22.03.2006, 985 m., 2 specimens, leg. S. Güzel; Şereflikoçhisar, 17.04.2006, 990 m., 2 specimens, leg. S. Güzel; E Şereflikoçhisar, 29.04.2006, 995 m., 5 specimens, leg. S. Güzel; Şereflikoçhisar, Hacı enbiya district, 08.05.2006, 990 m., 5 specimens, leg. S. Güzel; Gölbaşı, 11.06.2006, 975 m., 1 specimen, leg. S. Güzel; İncek, 08.06.2006, 1070 m., 1 specimen, leg. S. Güzel.
Records in Ankara prov.: Beynam (Gül-Zümreoğlu, 1975); Çubuk, Elmadağ, Polatlı, Ayaş (Ilıca), Bağlum, Central, Kazan, Beynam (Özdikmen et al., 2005); Central, Şereflikoçhisar-Ankara road, between Konya Makası-Şereflikoçhisar (Özdikmen, 2006).
Records in Turkey: (AD-AF-AK-AN-ANT-AY-BI-BO-BU-DE-DU-ES-EZ-IC-IP-IS-IZ-KA-KM-KN-KR-KS-KU-KY-MG-MN-NE-NI-OS-SM-SV-YO-TRA-TUR)
Remarks: The species distributes widely in Turkey. It is represented by three subspecies in Turkey. *P. caerulea baccueti* (Brullé, 1832) occurs in S and W Turkey, *P. caerulea gilvimana* Ménetries, 1832 occurs in E Central Anatolia and C parts of N Turkey and *P.*

caerulea caerulea (Scopoli, 1772) occurs in other parts of Turkey (especially European Turkey and NE Turkey). Known other subspecies, *P. caerulea bethseba* Reiche & Saulcy, 1858 occurs in Palestine, Iraq, Jordan, Lebanon and Syria.
Chorotype: Turano-European.

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

Material examined: Ankara prov.: A.O.Ç., 21.06.2004, 870 m., 1 specimen, leg. S. Güzel; Beytepe, 07.07.2004, 985 m., 2 specimens, leg. S. Güzel.
Records in Ankara prov.: Kızılcahamam (Salin village, Yukarı Çanlı, Yenimahalle village) (Özdikmen, 2006).
Records in Turkey: (AN-IS-IZ-KA-KO-KS-KY-NI-TRA-TUR)
Remarks: The species probably distributes rather widely in Turkey.
Chorotype: Sibero-European.

***Phytoecia geniculata* Mulsant, 1863**

Records in Ankara prov.: Gölbaşı (Örencik village) (Özdikmen, 2006).
Records in Turkey: (AD-AN-ANT-AY-BI-BS-BU-DE-ED-GA-HT-IC-IS-IZ-KA-KS-MN-OS-TRA-TUR)
Remarks: The species probably distributes rather widely in Turkey.
Chorotype: E-Mediterranean (Aegean + NE-Mediterranean + Palaestino-Cyprioto-Taurian).

***Phytoecia icterica* (Schaller, 1783)**
= ssp. *icterica* Schaller, 1783
= ssp. *annulipes* Mulsant, 1863

Material examined: Ankara prov.: A.O.Ç., 07.06.2004, 870 m., 3 specimens, 15.06.2004, 1 specimen, leg. S. Güzel.
Records in Ankara prov.: Kızılcahamam (Soğuksu National Park) (Özdikmen & Demir, 2006); Kızılcahamam (Yenimahalle village) as *P. icterica annulipes* (Özdikmen, 2006).
Records in Turkey: (AF-AN-BO-BT-BY-CO-EZ-HT-IS-KA-KAR-KN-KS-KU-OS-YO-TRA-TUR)
Remarks: The species probably distributes rather widely in Turkey. The species is represented by two subspecies in Turkey. *P. icterica annulipes* Mulsant, 1863 and the nominative *P. icterica icterica* (Schaller, 1783). For the present, the exact distribution patterns of these subspecies in Turkey need to be clarified. Therefore, *P. icterica annulipes* regarded as a separate species (e.g. Danilevsky, 2008b). The materials in this work belong to the nominative subspecies.
Chorotype: Turano-European.

***Phytoecia pubescens* Pic, 1895**

Material examined: Ankara prov.: İncek, 28.06.2006, 1085 m., 2 specimens, leg. S. Güzel.
Records in Ankara prov.: The species has been reported into two different types as *P. pubescens* Pic, 1895 and *P. manicata* Reiche et Saulcy, 1858 (old records from N Turkey) from Turkey. As *P. manicata* Reiche et Saulcy, 1858: Kızılcahamam (Soğuksu National Park) (Özdikmen & Demir, 2006).
Records in Turkey: (AM-AN-KO-TUR)
Remarks: The species distributes in N Turkey. Danilevsky (2008b) stated "*According to Danilevsky (1993), Ph. pubescens (= Ph. glaphyra) was usually mixed with Ph. manicata. Ph. manicata is known only from Syria and neighbour territories and differs by spines of posterior male coxae (so can be mixed with small Ph. cylindrica). That is why the record of Ph. manicata for Caucasus (Danilevsky, Miroshnikov, 1985) was wrong. Ph. pubescens is distributed in Balcan Peninsula, Near and Middle East and is rather common in Transcaucasia*". We share Danilevsky's opinion. For this reason, reported records from Northern Turkey as *P. manicata* should be referred to as *P. pubescens*.

Chorotype: Turano-Mediterranean (Turano-E-Mediterranean).

***Phytoecia virgula* (Charpentier, 1825)**

Material examined: Ankara prov.: A.O.Ç., 13.06.2004, 870 m., 1 specimen, 21.06.2004, 1 specimen, leg. S. Güzel; Şereflikoçhisar, Gülhöyük, 22.05.2006, 980 m., 1 specimen, leg. S. Güzel; Gölbaşı, 11.06.2006, 975 m., 1 specimen, leg. S. Güzel.
Records in Ankara prov.: Keçiören (Breuning et Villiers, 1967); Beynam, near Eymir lake (Gül-Zümreoğlu, 1975); Bala (Öymen, 1987); Beynam, Çubuk dam, Kızılcahamam, Kazan (Orhaniye) (Özdikmen et al., 2005); Kızılcahamam (Işık Mountain), Şereflikoçhisar (Özdikmen, 2006).
Records in Turkey: (ADY-AK-AM-AN-BI-BN-BO-BR-BU-DE-ER-ES-EZ-HT-IP-IS-IZ-KA-KAR-KN-KR-KS-MN-NI-TRA-TUR)
Remarks: The species distributes rather widely in Turkey.
Chorotype: Turano-European.

***Opsilia* Mulsant, 1862**
[Type sp.: *Opsilia flavicans* Mulsant, 1862 = *Leptura coerulescens* Scopoli, 1763]
(See the remarks under the genus name *Phytoecia* Dejean, 1821)

***Opsilia coerulescens* (Scopoli, 1763)**
= ssp. *coerulescens* Scopoli, 1763
= ssp. *cretensis* Breuning, 1947

Material examined: Ankara prov.: Bağlum, 06.07.2005, 1170 m., 2 specimens, leg. S. Güzel; Şereflikoçhisar, 17.04.2006, 980 m., 1 specimen, leg. S. Güzel; Polatlı, 07.06.2006, 850 m., 1 specimen, leg. S. Güzel; Gölbaşı, 11.06.2006, 975 m., 2 specimens, leg. S. Güzel.
Records in Ankara prov.: Çubuk (Breuning et Villiers, 1967); Çubuk as *Opsilia coerulescens grisescens* (Breuning et Villiers, 1967); near Çubuk dam (Gül-Zümreoğlu, 1975); Central, Eymir, Çubuk, Ayaş (Ilıca, Sirkeli), Kazan (Özdikmen et al., 2005); Kızılcahamam (Soğuksu National Park, Salin village, Yenimahalle village) (Özdikmen & Demir, 2006); Kızılcahamam (Aköz village, Yukarı Çanlı, Güvem) (Özdikmen, 2006).
Records in Turkey: (AD-ADY-AK-AM-AN-ANT-AR-ART-AY-BO-BS-BU-BY-CN-CO-DE-DI-ER-ES-EZ-GA-GU-IC-IP-IS-IZ-KA-KAR-KIR-KK-KM-KN-KS-KY-MA-MG-MN-NE-NI-OS-SM-SN-SV-TB-YO-ZO-TRA-TUR)
Remarks: The species distributes widely in Turkey. The species is represented by the nominotypical subspecies in Turkey. The other known subspecies *Opsilia coerulescens cretensis* Breuning, 1947 occurs only in Crete.
Chorotype: Sibero-European + Mediterranean.

***Blepisanis* Pascoe, 1866**
[Type sp.: *Phytoecia melanocephala* Fabricius, 1787]
(See the remarks under the genus name *Phytoecia* Dejean, 1821)

***Blepisanis vittipennis* (Reiche, 1877)**
= ssp. *vittipennis* Reiche, 1877
= ssp. *prawei* Plavilstshikov, 1926
= ssp. *inhumeralis* Pic, 1900

Material examined: Ankara prov.: Beytepe, 15.07.2004, 985 m., 2 specimens, leg. S. Güzel; Bağlum, 06.07.2005, 1175 m., 5 specimens, 11.07.2005, 1170 m., 3 specimens, leg. S. Güzel.
Records in Ankara prov.: Ankara prov. (Breuning et Villiers, 1967); Kızılcahamam (Adlbauer, 1992); Sincan (Mülk, Ayaş Mt.) (Özdikmen & Demir, 2006); Kızılcahamam (Soğuksu National Park) (Özdikmen, 2006).
Records in Turkey: (AD-ADY-AN-ANT-BU-DE-ER-EZ-IZ-KA-KN-MN-NI-OS-YO-TUR)
Remarks: The species distributes widely in Turkey. It is represented by three subspecies in Turkey. *B. vittipennis inhumeralis* that was restored by Özdikmen & Turgut (2008b) occurs only in S Turkey, *B. vittipennis prawei* that was accepted by some authors as a separate

species occurs in NE Turkey (in addition Caucasus, Iran and Central Asia) and the nominative subspecies occurs in other parts of Turkey.
Chorotype: E-Mediterranean.

Tribe AGAPANTHIINI

***Calamobius* Guérin, 1846**
[Type sp.: *Cerambyx gracilis* Creutzer, 1799. = *Saperda filum* Rossi, 1790]

***Calamobius filum* (Rossi, 1790)**

Records in Ankara prov.: Kızılcahamam (Yenimahalle, Aköz village) (Özdikmen & Demir, 2006).
Records in Turkey: (AD-AN-ANT-BO-BS-BU-CA-GA-HT-IC-IP-IS-IZ-KA-KO-MG-MN-OS-SA-TRA-TUR)
Remarks: The species distributes rather widely in Turkey (especially west half of Turkey).
Chorotype: Turano-Europeo-Mediterranean.

***Agapanthia* Serville, 1835**
[Type sp.: *Saperda cardui* Fabricius, 1801 = *Cerambyx cardui* Linnaeus, 1767]

Subgenus *Agapanthia* Serville, 1835
[Type sp.: *Saperda cardui* Fabricius, 1801 = *Cerambyx cardui* Linnaeus, 1767]

***Agapanthia cardui* (Linnaeus, 1767)**
= ssp. *cardui* Linnaeus, 1767
= ssp. *pannonica* Kratochvil, 1985

Material examined: Ankara prov.: A.O.Ç., 07.06.2004, 870 m., 15 specimens, 13.06.2004, 4 specimens, 15.06.2004, 14 specimens, 21.06.2004, 4 specimens, leg. S. Güzel; Bayındır dam env., 09.06.2004, 895 m., 1 specimen, 23.06.2004, 1 specimen, leg. S. Güzel; Beytepe, 12.07.2004, 990 m., 1 specimen, 17.07.2004, 4 specimens, leg. S. Güzel; Bağlum, 11.07.2005, 1170 m., 1 specimen, leg. S. Güzel; between Ankara-Polatlı, 07.06.2006, 865 m., 2 specimens, leg. S. Güzel; Gölbaşı, 11.06.2006, 975 m., 2 specimens, leg. S. Güzel.
Records in Ankara prov.: Çubuk Dam-I, Gölbaşı (Kepekli Boğazı), Ayaş Beli (Önalp, 1989); Ayaş (İlhan, İlyakut, Ilıca), Central, Bağlum, Beypazarı (Özdikmen et al., 2005); Sincan (Mülk, Ayaş Mountain) (Özdikmen & Demir, 2006); Kızılcahamam (Güvem, Aköz village), Polatlı (Özdikmen, 2006).
Records in Turkey: (AD-AN-ANT-ART-AY-BI-BN-BS-BU-BY-CA-CN-DE-DI-ED-EL-ER-ES-EZ-GU-HT-IC-IS-IZ-KA-KAR-KIR-KK-KN-KO-KS-MG-MN-OS-RI-SI-SV-TRA-TUR)
Remarks: The species distributes widely in Turkey. It is represented by both subspecies in Turkey. The "northern phenotype" or *A. cardui pannonica* Kratochvil, 1985 occurs in N Turkey and the "southern phenotype" or *A. cardui cardui* (Linnaeus, 1767) occurs mostly in S and W Turkey).
Chorotype: European + Mediterranean.

***Agapanthia fallax* Holzschuh, 1973**

Records in Ankara prov.: Ankara prov. (Özdikmen et al, 2005).
Records in Turkey: (AN-HA-MU-TUR)
Remarks: The species is endemic to Turkey and probably the species mostly distributes in SE Turkey.
Chorotype: Anatolian.

***Agapanthia frivaldszkyi* Ganglbauer, 1884**

Records in Ankara prov.: Ankara prov.: Atatürk Orman Çiftliği (Önalp, 1988).
Records in Turkey: (AM-AN-BI-?DE-IC-IP-IS-MU-NI-SA-TUR)
Remarks: The species distributes rather widely in Turkey.

Chorotype: Turano-Mediterranean (Balkano-Anatolian).

***Agapanthia violacea* (Fabricius, 1775)**

Material examined: Ankara prov.: Gölbaşı, 11.06.2006, 975 m., 1 specimen, leg. S. Güzel.
Records in Ankara prov.: Dam (Önalp, 1988); Bağlum (Özdikmen et al., 2005).
Records in Turkey: (AD-AF-AK-AN-BI-BO-BS-CO-DE-DU-ED-EZ-HT-IC-IP-IS-IZ-KA-KIR-KK-KN-KO-KR-KS-KY-MG-MN-NE-NI-SA-ZO-TRA-TUR)
Remarks: The species distributes widely in Turkey. In some previous works, *A. intermedia* Ganglbauer, 1884 was given as a synonym of *A. violacea*. But according to Svacha (2001), both are separate taxons with regard to morphologies of immature stages. This opinion was also accepted by Sama (2002). Moreover, Danilevsky shares it.
Chorotype: Turano-European or Sibero-European. Since, according to Sama (2002), records from Middle East and Central Asia need confirmation as they may refer to other closely related species.
Subgenus *Epoptes* Gistel, 1857
[Type sp.: *Saperda asphodeli* Latreille, 1804]

***Agapanthia asphodeli* (Latreille, 1804)**

Records in Ankara prov.: Ankara prov. (Önalp, 1989); Gölbaşı (Özdikmen et al., 2005); Kızılcahamam (Işık Mt., Soğuksu National Park, Aköz village) (Özdikmen, 2006).
Records in Turkey: (AD-AN-ANT-AY-BI-CA-HT-IP-IZ-YO-TUR)
Remarks: The species distributes mostly in west half of Turkey.
Chorotype: European. According to Sama (2002) "*records from Middle East need confirmation because of possible confusion with other related species (e. g. A. pustilifera Pic, 1905) and nearly all records from North Africa refer to A. zappii Sama, 1987*".

***Agapanthia dahli* (Richter, 1821)**

Records in Ankara prov.: Ankara prov. (Önalp, 1989).
Records in Turkey: (AD-AN-BS-EZ-GA-GU-HT-OS-SI-TUR)
Remarks: The species distributes rather widely in Turkey. *A. dahli nicosiensis* Pic, 1927 from Cyprus is a distinct species.
Chorotype: Turano-European or Sibero-European. Since, according to Sama (2002) most records from East Mediterranean and Central Asia of this species probably belong to different species.

***Agapanthia detrita* Kraatz, 1882**

Records in Ankara prov.: Ankara prov. (Önalp, 1989).
Records in Turkey: (AN-EZ-HT)
Remarks: The species distributes rather widely but local in Turkey. According to known distributional patterns of this species, perhaps it may be another species that is conspecific to *A. detrita* from Turkey
Chorotype: Turanian.

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

Records in Ankara prov.: Kızılcahamam (Azapderesi), Gölbaşı (Önalp, 1988); Kızılcahamam (Özdikmen et al., 2005); Çal Mountain (Özdikmen & Demir, 2006).
Records in Turkey: (AD-AF-AK-AM-AN-ANT-BI-BS-BT-BU-CO-ED-ER-ES-EZ-IC-IP-IZ-KA-KAR-KIR-KN-KO-KY-MN-NI-OS-SI-TO-VA-TRA-TUR)
Distribution: Europe (Spain, France, Italy, Albania, Croatia, Bosnia-Herzegovina, Serbia, Macedonia, Greece, Bulgaria, European Turkey, Romania, Hungary, Ukraine, Crimea, Moldavia, European Russia), Central Asia, Kazakhstan, Caucasus, Transcaucasia, Turkey, Iran, Syria, Israel.

Remarks: It has been reported from Western and Central Black Sea Parts as connected with covered geological area of the present work (*). New for Çorum province and it distributes widely in Turkey.
Chorotype: Turano-European.

***Agapanthia lateralis* Ganglbauer, 1884**
= ssp. *lateralis* Ganglbauer, 1884
= ssp. *bilateralis* Pic, 1927

Material examined: Ankara prov.: A.O.Ç., 13.06.2004, 870 m., 1 specimen, leg. S. Güzel; Bayındır dam env., 23.06.2004, 890 m., 1 specimen, leg. S. Güzel; Beytepe, 07.07.2004, 990 m., 1 specimen, 12.07.2004, 3 specimens, 15.07.2004, 1 specimen, 17.07.2004, 13 specimens, 16.06.2005, 14 specimens, leg. S. Güzel; Bağlum, 11.07.2005, 1170 m., 1 specimen, leg. S. Güzel; Şereflikoçhisar, Gülhöyük, 22.05.2006, 980 m., 1 specimen, leg. S. Güzel; İncek, 09.06.2006, 1070 m., 1 specimen, 28.06.2006, 2 specimens, leg. S. Güzel.
Records in Ankara prov.: Kızılcahamam (Adlbauer, 1988); Central, Gölbaşı, Dam, Ayaş Beli, Kızılcahamam (Kargasekmez), Azapderesi, Elmadağ, Beynam Forest (Önalp, 1989); Elmadağ, Kızılcahamam, Central, Eymir lake, Akyurt (Özdikmen et al., 2005); Çal Mountain, METU, Beştepe, Kızılcahamam (Soğuksu National Park), Kayaş (Bayındır dam env.), Beytepe (Özdikmen & Demir, 2006); Kızılcahamam (Işık Mountain, Güvem, Aköz village), Şereflikoçhisar, Çal Mountain, Şereflikoçhisar-Evren road (Özdikmen, 2006).
Records in Turkey: (AF-AG-AK-AM-AN-ANT-BI-BO-CA-CN-CO-ES-IC-IP-IS-IZ-KA-KIR-KM-KN-KR-KS-MG-MN-NE-NI-TE-TO-ZO-TRA-TUR)
Remarks: The species distributes widely in Turkey. The species is represented by the nominotypical subspecies in Turkey. Known other subspecies, *A. lateralis bilateralis* Pic, 1927 occurs in Syria.
Chorotype: E-Mediterranean.

***Agapanthia irrorata* (Fabricius, 1787)**

Records in Ankara prov.: Bala (Öymen, 1987).
Records in Turkey: (AN-IS-TUR)
Distribution: Europe (Spain, Portugal, ?France, Corsica, Italy, Sicily, Sardinia), North Africa (Morocco, Tunisia, Algeria).
Remarks: The species distributes in NW Turkey. Apparently, these records may be a different taxon (?new taxon), because *A. irrorata* occurs only in West Mediterranean area. However it is not impossible in Turkey. Since this species is very characteristic. Öymen (1987) gave a short definition of it. In addition to this, Taglianti et al. (1999) also mentioned that "this chorotype is very rarely represented in the Near East Fauna. I think that the best way for the solution of this problem is to see the specimens but I do not see the specimens and the occurrence in Turkey of this species is still doubtful for me.
Chorotype: W-Mediterranean.

***Agapanthia villosoviridescens* (De Geer, 1775)**

Records in Ankara prov.: near Eymir lake (Gül-Zümreoğlu, 1975).
Records in Turkey: (AF-AN-AY-BS-DE-ED-EZ-HA-IP-KA-SA-TRA-TUR)
Remarks: Probably the species distributes rather widely in Turkey.
Chorotype: Sibero-European.

LITERATURE CITED

Adlbauer, K. 1988. Neues zur Taxonomie und Faunistik der Bockkäferfauna der Türkei (Coleoptera, Cerambycidae). Entomofauna, 9 (12): 257-297.

Adlbauer, K. 1992. Zur Faunistik und Taxonomie der Bockkäferfauna der Türkei II (Coleoptera, Cerambycidae). Entomofauna, 13 (30): 485-509.

Alkan, B. 1946. Tarım Entomolojisi. T. C. Tarım Bakanlığı Ankara Yüksek Ziraat Enstitüsü Ders Kitabı 31, Ankara, 232 pp.

Bodemeyer, H. E. V. 1900. Quer durch Klein Asien, in den Bulghar Dagh; Eine Naturvissenschafliche studien-Reise. Coleopterologisches, 196 pp.

Bodenheimer, F. S. 1958. Türkiye'de ziraate ve ağaçlara zararlı olan böcekler ve bunlarla savaş hakkında bir etüt. Bayur Matbaası, Ankara, 347 pp.

Braun, W. 1978. Die Dorcadienausbeute der Forschungsreisen von W. Heinz 1963-1977, Faunistiche Aufstellung, Beschreibung einer neuen Unterart und Bemerkungen zur Systematik wenig bekannter Arten (Coleoptera, Cerambycidae). Nachrichtenblatt der Bayerischen Entomologen, 27 (6): 101-116.

Braun, W. 1979. Beitrag zur Kenntnis der Gattung *Dorcadion* Systematisch neu bewertete *Dorcadion*-Formen (Col., Cerambycidae). Nachrichtenblatt der Bayerischen Entomologen, 28 (5): 81-86.

Breuning, S. 1962. Revision der Dorcadionini. Entomologische abhandlungen und berichte aus dem staatliche museum für tierkunde in Dresden, 27: 665.

Breuning, S. 1966. Nouvelles formes de Lamiaires (dix-septieme partie). Bulletin de L'Institut royal des Sciences naturelles de Belgique, 42 (section 21) : 1-22.

Breuning, S. & Villiers, A. 1967. Cérambycides de Turquie (2. note). L' Entomologiste, 23 (3): 59-63.

Danilevsky, M. L. 2008a. A check-list of Longicorn Beetles (Coleoptera, Cerambycoidea) of Europe. Available from: http://www.cerambycidae.net/ (Updated 31.05.2008).

Danilevsky, M. L. 2008b. Systematic list of Longicorn Beetles (Cerambycoidea) of the territory of the former USSR. Available from: http://www.cerambycidae.net/ (Updated 31.05.2008).

Demelt, C. V. 1963. Beitrag zur Kenntnis der Cerambycidenfauna Kleinasiens und 13. Beitrag zur Biologie palaearkt. Cerambyciden, sowie Beschreibung einer neuen Oberea-Art. Entomologische Blatter, 59 (3) : 132-151.

Demelt, C. V. 1967. Nachtrag zur Kenntnis der Cerambyciden-Fauna Kleinasiens. Entomologische Blatter, 63 (2): 106-109.

Demelt, C. V. & Alkan, B. 1962. Short information of Cerambycidae Fauna of Turkey. Bitki Koruma Bülteni, 2 (10): 49-56.

Fuchs, E. & Breuning, S. 1971. Die Cerambycidenausbeute der Anatolienexpedition 1966-67 des Naturhistorischen Museums, Wien. Annalen Naturhistorischen Museum Wien, 75: 435-439.

Gfeller, W. 1972. Cerambycidae (Coleoptera) der Türkei-Persienexpedition 1970 der Herren Dr. H. c. W. Wittmer und U. v. Botmer. Mitteilungen der Entomologischen Geselschaft Basel, 22 (1): 1-8.

Gül-Zümreoğlu, S. 1975. Investigations on taxonomy, host plants and distribution of the Longhorned Beetles (Cerambycidae-Coleoptera) in Aegean Region. T. C. Ministry of Food, Agriculture and Stockbreeding, No : 28, , İstiklal Press, İzmir, 208 pp.

İren, Z. & Ahmed, M. K. 1973. Microlepidoptera and pests of fruit-trees in Turkey. Bitki Koruma Bülteni, Ankara, Turkey, 1: 41-42.

Lodos, N. 1998. Entomology of Turkey VI (General, Aplied and Faunistic). Ege Ü. Ziraat Fak. Yayınları No: 529, E. Ü. Faculty of Agriculture Press, İzmir, 300 pp.

Malmusi, M. & Saltini, L. 2005. Cerambycidae raccolti dai componenti del Gruppo Modenese Scienze Naturali durante escursioni in Turchia tra il 1987-2003 (Contributo alla Fauna dei Cerambycidae di Turchia). Quaderno di studi e notizie di storia naturale della Romagna, n. 21, 28 pp. (unpublished).

Önalp, B. 1988. Taxonomic researches on Agapanthia Serville, 1835 species (Coleoptera, Cerambycidae: Lamiinae) I. H. Ü. Eğitim Fakültesi Dergisi, 3: 257-295.

Önalp, B. 1989. Taxonomic researches on Agapanthia Serville, 1835 species (Coleoptera, Cerambycidae: Lamiinae) II. H. Ü. Eğitim Fakültesi Dergisi, 4: 197-234.

Önalp, B. 1990. Systematic researches on Dorcadion Dalman, 1817 species in Turkey (Coleoptera, Cerambycidae: Lamiinae) I. H. Ü. Eğitim Fakültesi Dergisi, 5: 57-102.

Önalp, B. 1991. Systematic researches on Dorcadion Dalman, 1817 species in Turkey (Coleoptera, Cerambycidae: Lamiinae) II. H. Ü. Eğitim Fakültesi Dergisi, 6: 191-227.

Öymen, T. 1987. The Forest Cerambycidae of Turkey. İ. Ü. Forest Faculty, İstanbul, 146 pp.

Özdikmen, H. 2003a. The Genus *Cortodera* Mulsant, 1863 (Cerambycidae: Coleoptera) in Turkey. *Phytoparasitica,* 31 (5): 433-441.

Özdikmen, H. 2003b. Check-list of the genus *Cortodera* Mulsant, 1863 (Coleoptera: Cerambycidae) in Turkey with two new records. *Acta Entomologica Slovenica,* 11 (2): 183-188.

Özdikmen, H. 2006. Contribution to the knowledge of Turkish longicorn beetles fauna (Coleoptera: Cerambycidae). *Munis Entomology & Zoology*, 1 (1): 71-90.

Özdikmen, H. 2007. The Longicorn Beetles of Turkey (Coleoptera: Cerambycidae) Part I - Black Sea Region. Munis Entomology & Zoology 2 (2): 179-422**.**

Özdikmen, H. 2008a. The Longicorn Beetles of Turkey (Coleoptera: Cerambycidae) Part II - Marmara Region. Munis Entomology & Zoology 3 (1): 7-152**.**

Özdikmen, H. 2008b. The Longicorn Beetles of Turkey (Coleoptera: Cerambycidae) Part III – Aegean Region. Munis Entomology & Zoology 3 (1): 355-436**.**

Özdikmen, H. & Çağlar, Ü. 2004. Contribution to the knowledge of longhorned bettles (Coleoptera, Cerambycidae) from Turkey, Subfamilies Prioninae, Lepturinae, Spondylidinae and Cerambycinae. *J. Ent. Res. Soc.,* 6 (1): 39-69.

Özdikmen, H. & Demir, H. 2006. Notes on longicorn beetles fauna of Turkey (Coleoptera: Cerambycidae). *Munis Entomology & Zoology*, 1 (1): 157-166.

Özdikmen, H. & Hasbenli, A. 2004. Contribution to the knowledge of longhorned bettles (Coleoptera, Cerambycidae) from Turkey, Subfamily Lamiinae. *J. Ent. Res. Soc.,* 6 (2): 25-49.

Özdikmen, H., Özdemir, Y. & Turgut, S. 2005. Longhorned Beetles Collection of the Nazife Tuatay Plant Protection Museum, Ankara, Turkey (Coleoptera, Cerambycidae). *J. Ent. Res. Soc.,* 7 (2): 1-33.

Özdikmen, H. & Şahin, Ö. 2006. İç Anadolu Ormancılık Araştırma Müdürlüğü, Entomoloji Müzesi (Türkiye, Ankara) Teke Böcekleri Koleksiyonu (Coleoptera, Cerambycidae). *G. U. Journal of Science*, 19 (1): 1-8.

Özdikmen, H. & Turgut, S. 2006. A zoogeographical review of Spondylidinae in Turkey (Coleoptera: Cerambycidae). *Munis Entomology & Zoology,* 1 (2): 279-288.

Özer, M. & Duran, M. 1968. Orta Anadolu'da yonca ve korungalara zarar yapan bazı böcek türleri üzerinde ilk çalışmalar. Ankara Üniversitesi Ziraat Fakültesi Yayınları, 316: 34-38.

Perissinotto, A. & Luchini, S. R. 1966. Coleotteri Raccolti Nel Vicino e Medio Oriente Nota I. *Dorcadion* Dalm. (Coleoptera, Cerambycidae). Bollettino della Societa Entomologica Italiana, 96 (9-10): 147-149.

Rapuzzi, P. & Sama, G. 1999. Descrizione di due nuovi *Chlorophorus* di Asia Minore (Coleoptera, Cerambycidae). Lambillionea, 96 (3) : 329-332.

Rejzek, M., Sama, G. & Alziar, G. 2001. Host Plants of Several Herb-Feeding Cerambycidae Mainly from East Mediterranean Region (Coleoptera : Cerambycidae). Biocosme Mésogéen, Nice, 17(4): 263-294.

Sama, G. 1982. Contributo allo studio dei coleotteri Cerambycidae di Grecia e Asia Minore. Fragmenta Entomologica, Roma, 16 (2): 205-227.

Sama, G. 1996a. Contribution a la connaissance des longicornes de Grece et d'Asie Mineure (Coleoptera, Cerambycidae). Biocosme Mésogéen, Nice, 12 (4): 101-116.

Sama, G. 1996b. Note preliminaire pour une revision du genre *Cortodera* Mulsant, 1863 (Coleoptera - Cerambycidae), avec la description de deux especes nouvelles. Biocosme Mésogéen, Nice, 13 (4): 107-114.

Sama, G. 2002. Atlas of the Cerambycidae of Europe and the Mediterranean Area, Volume I, Kabourek, Zlin, 173 pp.

Svacha, P. & Danilevsky, M. L. 1988. Cerambycoid Larvae of Europe and Soviet Union (Coleoptera, Cerambycoidea), Part III. Acta Universitatis Carolinae – Biologica, 32: 1-205.

Taglianti, A. V., Audisio, P. A., Biondi, M., Bologna, M. A., Carpaneto, G. M., De Biase, A., Fattorini, S., Piattella, E., Sindaco, R., Venchi, A. & Zapparoli, M. 1999. A proposal for a chorotype classification of the Near East fauna, in the framework of the Western Palaearctic Region. Biogeographia 20: 31-59.

Tozlu, G., Rejzek, M. & Özbek, H. 2002. A contribution to the knowledge of Cerambycidae (Coleoptera) fauna of Turkey. Part I: Subfamilies Prioninae to Cerambycinae. Biocosme Mèsogèen, Nice, 19 (1-2): 55-94.

Tuatay, N., Kalkandelen, A. & Aysev, N. 1972. Bitki Koruma Müzesi Böcek Kataloğu (1961-1971). T. C. Tarım Bakanlığı, Ankara, 53-55.

Villiers, A. 1967. Coléoptéres Cérambycides de Turquie (1. Partie) - L' Entomologiste, 23 (1): 18-22.

Winkler, A. 1924-1932. Catalogus Coleopterorum regionis palaearcticae. Verlag von Albert Winkler, 1135-1226.

APPENDIX

THE SIMPLE LIST OF LONGHORNED BEETLES IN ANKARA REGION

Subfamily PRIONINAE

1. *Ergates faber* (Linnaeus, 1761)
2. *Aegosoma scabricorne* (Scopoli, 1763) **(New for Ankara)**
3. *Prionus coriarius* (Linnaeus, 1758)
4. *Mesoprionus besicanus* (Fairmaire, 1855)

Subfamily LEPTURINAE

1. *Rhamnusium graecum* Schaufuss, 1862
2. *Rhamnusium testaceipenne* Pic, 1897
3. *Rhagium inquisitor* (Linnaeus, 1758)
4. *Stenocorus quercus* (Götz, 1783)
5. *Acmaeops marginatus* (Fabricius, 1781)
6. *Dinoptera collaris* (Linnaeus, 1758)
7. *Cortodera alpina* Hampe, 1870
8. *Cortodera colchica* Reitter, 1890
9. *Cortodera differens* (Pic, 1898)
10. *Cortodera femorata* (Fabricius, 1787)
11. *Cortodera flavimana* (Waltl, 1838)
12. *Cortodera humeralis* (Schaller, 1783)
13. *Cortodera syriaca* Pic, 1901
14. *Cortodera villosa* Heyden, 1876
15. *Grammoptera abdominalis* (Stephens, 1831)
16. *Grammoptera ustulata* (Schaller, 1783)
17. *Vadonia unipunctata* (Fabricius, 1787)
18. *Pseudovadonia livida* (Fabricius, 1776)
19. *Anoplodera rufipes* (Schaller, 1783)
20. *Stictoleptura cordigera* (Füsslins, 1775)
21. *Stictoleptura tesserula* (Charpentier, 1825)
22. *Anastrangalia sanguinolenta* (Linnaeus, 1761)
23. *Pachytodes erraticus* (Dalman, 1817)
24. *Leptura quadrifasciata* Linnaeus, 1758
25. *Stenurella bifasciata* (Müller, 1776)
26. *Stenurella septempunctata* (Fabricius, 1792)

Subfamily ASEMINAE

1. *Asemum tenuicorne* Kraatz, 1879
2. *Arhopalus rusticus* (Linnaeus, 1758)
3. *Arhopalus tristis* (Fabricius, 1787)

Subfamily SPONDYLIDINAE

1. *Spondylis buprestoides* (Linnaeus, 1758)

Subfamily CERAMBYCINAE

1. *Trichoferus fasciculatus* (Faldermann, 1837)
2. *Stromatium unicolor* (Olivier, 1795)
3. *Cerambyx carinatus* (Küster, 1846)
4. *Cerambyx cerdo* Linnaeus, 1758
5. *Cerambyx dux* (Faldermann, 1837)
6. *Cerambyx scopolii* Fusslins, 1775
7. *Purpuricenus budensis* (Götz, 1783)

8. *Aromia moschata* (Linnaeus, 1758)
9. *Penichroa fasciata* (Stephens, 1831)
10. *Molorchus kiesenwetteri* Mulsant et Rey, 1861
11. *Molorchus umbellatarum* (Schreber, 1759)
12. *Stenopterus rufus* (Linnaeus, 1767)
13. *Callimus femoratus* (Germar, 1824)
14. *Certallum ebulinum* (Linnaeus, 1767)
15. *Hylotrupes bajulus* (Linnaeus, 1758)
16. *Ropalopus clavipes* (Fabricius, 1775)
17. *Phymatodes testaceus* (Linnaeus, 1758)
18. *Echinocerus floralis* (Pallas, 1773)
19. *Chlorophorus aegyptiacus* (Fabricius, 1775)
20. *Chlorophorus cursor* Rapuzzi & Sama, 1999 **(New for Ankara)**
21. *Chlorophorus hungaricus* (Seidlitz, 1891)
22. *Chlorophorus sartor* (Müller, 1766)
23. *Chlorophorus trifasciatus* (Fabricius, 1781) **(New for Ankara)**
24. *Chlorophorus varius* (Müller, 1766)
25. *Xylotrechus rusticus* (Linnaeus, 1758)
26. *Clytus arietis* (Linnaeus, 1758)
27. *Clytus rhamni* Germar, 1817
28. *Clytus schurmanni* Sama, 1996

Subfamily LAMIINAE

1. *Morimus asper* (Sulzer, 1776)
2. *Morimus funereus* (Mulsant, 1863)
3. *Morimus orientalis* (Reitter, 1894)
4. *Dorcadion carinatum* (Pallas, 1771)
5. *Dorcadion arenarium* (Scopoli, 1763)
6. *Dorcadion bangi* Heyden, 1894
7. *Dorcadion bodemeyeri* Daniel, 1900
8. *Dorcadion boluense* Breuning, 1962
9. *Dorcadion cinerarium* (Fabricius, 1787)
10. *Dorcadion divisum* Germar, 1839
11. *Dorcadion escherichi* Ganglbauer, 1897
12. *Dorcadion haemorrhoidale* Hampe, 1852
13. *Dorcadion infernale* Mulsant et Rey, 1863
14. *Dorcadion kindermanni* Waltl, 1838
15. *Dorcadion olympicum* Kraatz, 1873
16. *Dorcadion parallelum* Küster, 1847
17. *Dorcadion pararufipenne* Braun, 1976
18. *Dorcadion rufipenne* Breuning, 1946
19. *Dorcadion scabricolle* Dalman, 1817
20. *Dorcadion septemlineatum* Waltl, 1838
21. *Dorcadion subsericatum* Pic, 1901
22. *Dorcadion subvestitum* Daniel, 1900
23. *Pogonocherus decoratus* Fairmaire, 1855
24. *Acanthocinus aedilis* (Linnaeus, 1758)
25. *Leiopus femoratus* Fairmaire, 1859
26. *Tetrops praeusta* (Linnaeus, 1758)
27. *Saperda carcharias* (Linnaeus, 1758)
28. *Oberea oculata* (Linnaeus, 1758) **(New for Ankara)**
29. *Oberea erythrocephala* (Schrank, 1776)
30. *Oberea ressli* Demelt, 1963
31. *Oxylia argentata* (Ménetries, 1832)
32. *Oxylia duponcheli* (Brullé, 1832)
33. *Coptosia albovittigera* (Heyden, 1863)
34. *Helladia humeralis* (Waltl, 1838)
35. *Helladia praetextata* (Steven, 1817)

36. *Neomusaria balcanica* (Frivaldsky, 1835)
37. *Neomusaria pauliraputii* Sama, 1993
38. *Phytoecia caerulea* (Scopoli, 1772)
39. *Phytoecia cylindrica* (Linnaeus, 1758)
40. *Phytoecia geniculata* Mulsant, 1863
41. *Phytoecia icterica* (Schaller, 1783)
42. *Phytoecia pubescens* Pic, 1895
43. *Phytoecia virgula* (Charpentier, 1825)
44. *Opsilia coerulescens* (Scopoli, 1763)
45. *Blepisanis vittipennis* (Reiche, 1877)
46. *Calamobius filum* (Rossi, 1790)
47. *Agapanthia cardui* (Linnaeus, 1767)
48. *Agapanthia fallax* Holzschuh, 1973
49. *Agapanthia frivaldszkyi* Ganglbauer, 1884
50. *Agapanthia violacea* (Fabricius, 1775)
51. *Agapanthia asphodeli* (Latreille, 1804)
52. *Agapanthia dahli* (Richter, 1821)
53. *Agapanthia detrita* Kraatz, 1882
54. *Agapanthia kirbyi* (Gyllenhal, 1817)
55. *Agapanthia lateralis* Ganglbauer, 1884
56. *Agapanthia irrorata* (Fabricius, 1787)
57. *Agapanthia villosoviridescens* (De Geer, 1775)

RESISTANCE MECHANISMS TO OXYDEMETON-METHYL IN *TETRANYCHUS URTICAE* KOCH (ACARI: TETRANYCHIDAE)

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ABSTRACT: The resistance mechanisms to oxydemeton-methyl were surveyed in two Iranian strains of the two spotted spider mite, *Tetranychus urticae* Koch. Bioassay was carried out on two strains, collected from Tehran and Rasht using a dipping method. The results of bioassay indicated that resistance ratio was 20.47 for resistant strain. The activity of esterase and glutathione S transferase in resistant and susceptible strains showed that one of resistance mechanisms to oxydemeton-methyl was esterase-based resistance and glutathione S-transferase. The esterase activity of the resistant strain was 2.5 and 2.14-fold higher than those of the susceptible strain for α-naphtyl acetate (α-NA) and β-naphtyl acetate (β-NA) respectively. The kinetic characteristics acetylcholinesterase (AChE) showed that the AChE of resistant strain had lower affinity to artificial substrates; acetylthiocholine and butyrylthiocholine than that of susceptible strain. I50 of oxydemeton-methyl for resistant and susceptible strains were 2.68×10 M and 7.79×10 M respectively. The results suggested that AChE of resistant is insensitive to oxydemeton-methyl and ratio of AChE insensitivity of resistant to susceptible strain were 3.49 and 7.8-fold to oxydemeton-methyl and paraoxon, respectively.

KEY WORDS: *Tetranychus urticae*, Oxydemeton-methyl, Esterase, Insensitive acetylcholinesterase, Glutathione S-transferase

The two-spotted spider mite, *Tetranychus urticae* Koch (Acari: Tetranychidae), is an important agricultural pest with a global distribution. Its phytophagous nature, high reproductive potential and short life cycle facilitate rapid resistance development to many acaricides often after a few applications (Cranham & Helle 1985; Keena & Granett, 1990; Devine et al., 2001; Stumpf & Nauen, 2001). So far resistance has been reported in several countries for compounds, such as organophosphates (OPs) (Sato et al., 1994; Anazawa et al., 2003), dicofol (Fergusson-Kolmes et al., 1991), organotins (Edge & James, 1986); hexythiazox (Herron & Rophail, 1993), clofentezine (Herron et al., 1993); fenpyroximate (Sato et al., 2004) and abamectin (Beers et al., 1998).

Insensitive AChE causing OP resistance is widespread and has been detected in *T. urticae* strains from Germany (Matsumura & Voss, 1964; Smissaert et al., 1970), Japan (Anazawa et al., 2003) and New Zealand (Ballantyne & Harrison, 1967) and in a few other tetranychid pest species, including *T. cinnabarinus* from Israel (Zahavi & tahori, 1970) and *T. kanzawai* from Japan (Kuwahara, 1982). Also the insensitivity of AChE to demeton-S-methyl, ethyl paraoxon, chlorpyrifos oxon and carbofuran was identified in a German laboratory strain of *T. urticae* and a field collected strain from Florida (Stumpf et al., 2001).

However, insensitive AChE was not the only mechanism of OP resistance in spider mites described, as some resistant strains of *T. urticae* showed an enhanced degradation of malathion, malaoxon, and ethyl parathion to nontoxic products (Herne and Brown, 1969; Matsumura and Voss, 1964). OP-resistant strains of *T. kanzawai* rapidly degraded malathion *in vitro* and the resistance was obviously attributed to high nonspecific esterase activity (Kuwahara, 1981 and 1982). Pilz et al. (1978) showed that a German dimethoate-selected laboratory strain of *T. urticae* possessed multiple mechanisms of OP resistance. In addition to an AChE insensitive to dimethoxon, the toxicity of dimethoate was enhanced by synergists, such as piperonyl butoxide indicating the involvement of cytochrome P-450-mediated oxidative detoxication.

Oxydemeton-methyl is currently used in Iran to control some pests, such as aphids and *T. urticae* in several crops. The intensive use of oxydemeton-methyl to control of *T. urticae* and aphids in greenhouse facilitates resistance development in some populations of *T. urticae* in Iran. There is no information about oxydemeton-methyl resistance in this pest in Iran. Resolution of the underlying biochemical mechanisms of resistance can play an important role in circumventing problems associated with pesticide resistance and assist in rational choices of chemicals for pesticide mixtures and rotations. The purpose of this study was to collect information about the presence of esterases, gluthathion s-transferase and insensitive acetylcholinesterases in the resistance of *T. urticae* by bioassays and biochemical assays.

MATERIAL AND METHODS

Two spotted spider mite strains

The resistant strain was collected from infected been plants grown in the research greenhouse in Plant Pests and Disease Research Institute of Iran, Tehran. A strain from Rasht was considered as a strain susceptible to oxydemeton-methyl which had no previous exposure to pesticides and was collected from *Convolvulus sp.* in University of Guilan. The mites were reared routinely on bean plants (*Phaseolus vulgaris*) grown under greenhouse conditions (25 ± 4° C, 60 ± 20 RH).

Pesticide

Oxydemeton-methyl was used as the commercial formulation in the bioassay (EC 25%) and was purchased from Bayer Crop Science, Germany

Chemicals

Acetylthiocholine iodide (ATC), S-butyrylthiocholine iodide (BTC), 5,5'-dithiobis-(2-nitrobenzoic acid, DTNB), triton X-100 were purchased from Sigma. Fast blue RR salt, α-naphtyl acetate (α-NA) and β-naphthyl acetate (β-NA) were obtained from Fluka, and oxydemeton-methyl from Accustandard. 1-chloro-2,4-dinitrobenzene (CDNB), 1,2-dichloro-4-nitrobenzene (DCNB) were purchased from Merck, Germany.

Bioassay

The toxicities of oxydemeton-methyl to the susceptible and resistant strains of two-spotted spider mite were assayed using the dipping method. The formulated oxydemeton-methyl was diluted with distilled water to generate five serial dilutions. The leaf disk (diameter 3.5cm) was immersed in the dilutions for 45s. After drying, adult mites were placed on each treated leaf disk on wet cotton in a petri dish. Up to 10 adults were placed on each leaf disk. Mortality was assessed after the treated mites were maintained at 25 ± 2° C, 70 ± 10 RH and 16:8 (L:D) for 48h. Mites that could walk at least one body length after a gentle probe with a fine brush were scored alive. Bioassay data were analyzed for LD50 values and their 95% confidence intervals (95% CL) using the POLO-PC computer program (LeOra Software 1987). Resistance factors (RF) were calculated by dividing the LD50 value of the resistant strain by the LD50 value of the susceptible strain.

Determination of esterase activity

Adults were homogenized in ice-cold 0.2 M phosphate buffer (pH 7.0) containing 0.05 % triton X-100. After the homogenates were centrifuged at 10000 g for 12 min at 4°C. The esterase activity was measured according to van Asperen's method (van Asperen, 1962). The substrate was α-NA and β-NA. Fifteen µl of supernatant was added to a microplate containing 35 µl 0.2 M, pH 7.0, phosphate buffer per well. The addition of 100 µl substrate per well (0.65 mM in buffer) initiated a reaction. After incubation for exactly 10 min at room temperature, 50 µl of fast blue RR salt was added and the microplate left in the dark for 30 min. Absorbance at 450 nm (OD450) was then measured in a microplate reader (Awareness stat fax® 3200).

Determination of glutathione S-transferase (GST)

GST activity was measured using 1-chloro-2,4-dinitrobenzene (CDNB), 1,2-dichloro-4-nitrobenzene (DCNB) and reduced GSH as substrates with slight modifications according to Habig et al. (1974) in 96-well microplates. The total reaction volume per well of a 96-well microplate was 300 µl, consisting of 100 µl, supernatant, CDNB (or DCNB) and GSH in buffer, giving final concentrations of 0.4 and 4mM of CDNB (or DCNB) and GSH, respectively. The non-enzymatic reaction of CDNB (or DCNB) with GSH measured without supernatant served as control. The change in absorbance was measured continuously for 10 min at 340nm in a Thermomax kinetic microplate reader (Awareness stat fax® 3200).

AChE kinetics

Mites were homogenized in ice-cold 0.2 M phosphate buffer (pH 7.0) containing 0.1% triton X 100. After the homogenates were centrifuged at 10000 g for 15 min at 4^{o}C. AChE activity was measured according to the methods of Stumpf et al. (2001) with some modifications. Fifty microliters of the enzyme source was added to each well of microplate containing 140 µl of 0.2 M phosphate buffer (pH 7.0) and 20 µl DTNB solution. Then 40 µl of ATC was added to each well. The concentrations of the substrate were changed from 0.01 mM to 10 mM to evaluate the Michaels's constant (*Km*). Optical density was measured at 415 nm with a Microplate Reader (Awareness Stat fax® 3200).

Inhibition assay

The enzyme was preincubated with inhibitor at 37°C for 15 min. After preincubation, the ATC substrate was added to the mixture (containing 0.2 M phosphate buffer (pH 7.0) and DTNB). The remaining activity was determined at 30 min following preparation of the reaction mixture. Optical density was measured at 415 nm with a Microplate Reader (Awareness stat fax® 3200). I50 values for the AChE of susceptible and resistant strains were estimated by probit analysis using the POLO-PC computer program.

RESULTS

Resistance levels in bioassay

Table 1 summaries the toxicological data for susceptible and resistant strains exposed to oxydemeton-methyl. The resistance ratio of the resistant strain was 20.47.

Activity of esterase

The measured esterase activity of the resistant strain was significantly higher than that of the susceptible strain (t-test $P < 0.001$). The esterase activity of the resistant strain was 2.5 and 2.14- fold higher than those of the susceptible strain for α-NA and β-NA respectively (Fig. 1).

Activity of GST

The measured glutathione S-transferase activity of the resistant strain was significantly higher than that of the susceptible strain (t-test $P < 0.001$). The glutathione s-transferase activity of the resistant strain was 1.75 and 1.27-fold higher than those of the susceptible strain for CDNB and DCNB, respectively (Fig. 2).

Kinetic analysis of AChE.

The effect of substrate concentrations on AChE activity were investigated using ATC and BTC. The different specificities of AChE in resistant and susceptible strains toward two substrates are summarized in Table 2. *Km* values suggest that AChE in resistant strain was kinetically different from that in susceptible strain, indicating qualitative differences among enzymes in two strains. The kinetic study indicated that AChE from the resistant strain had 1.55 and 2.16-fold lower affinities to substrates ATC and BTC than the susceptible strain, respectively. AChE of the susceptible strain showed significantly higher affinity toward BTC than AChE of the resistant strain, suggesting that a modification of the enzyme catalytic site might be present in the AChE from the resistant mite.

Inhibition of AChE by oxydemeton-methyl and paraoxon

A comparison of the I50 values of the susceptible and resistant strains showed

3.49 and 7.8-fold resistance to oxydemeton-methyl and ethyl paraoxon, respectively (Table 3, Fig. 3).

DISCUSSION

Metabolic resistance mechanisms seem to be most important in arthropod species exhibiting resistance to organophosphate and carbamate pesticides (Ghadamyari, et al., 2008 a & b; Devonshire et al., 1982; Moores et al., 1994; Kono and Tomita, 1992). Our results showed that probably glutathione S-transferase was related to oxydemeton-methyl resistance in *T. urticae*, and there is 1.75-and 1.27-fold increase in glutathione S-transferase activity in the resistant strain, when CDNB and DCNB were used as substrate respectively. GSTs are detoxification enzymes frequently associated with insecticides resistance, particularly OP resistance (Soderlund and Bloomquist, 1990; Yu, 1996). These enzymes may act as binding proteins increasing the activity of other pesticide detoxification enzymes such as esterases (Grant and Matsumura, 1994).

Also esterases have a main role in resistance of *T. urticae* to oxydemeton-methyl (fig.1). These enzymes probably sequester or degrade insecticide esters before they reach their target sites in the nervous system. This mechanism seems to be important in the insecticide resistance of *Culex* mosquitoes (Mouches et al., 1986; Kono and Tomita, 1992; Tomita et al., 1996) and *Aphis gossypii* (Suzuki et al., 1993). The relationship between the enzymes which catalyze hydrolysis of β-NA and degredation of malathion was studied in resistance and susceptible strains of *T. kanzawai* Kishida by Kuwahara (1981). Their results showed that resistance to malathion was associated with increased esterase activity at E3 and E4 bonds on which the main peak of malathion degradation was detected. Although metabolic detoxification mechanisms are implicated, insensitive AChE is considered the principal mechanism of resistance to oxydemeton-methyl in *T. urticae*. The occurrence of pesticide-insensitive AChE in spider mite was first demonstrated by Smissaert (1964). The present study indicates that the resistant strain possesses an altered AChE with decreased sensitivity to inhibition by oxydemetn-methyl and paraoxon and decreased affinity to ATC and BTC substrates. The *Km* values for ATC determined in our study were 95 and 61 μM for the insensitive and sensitive forms of AChE, respectively (Table 2). Our results agree well with those reported by Anazawa et al. (2003) with respect to the involvement of insensitive AChE in conferring OP resistance in *T. urticae*. Because AChE from the resistant strain had reduced affinity to ATC and BTC (i.e. increased *Km* values) and reduced sensitivity to inhibition by oxydemetn-methyl and paraoxon (i.e. increased $I50$ values) compared with AChE from susceptible strain, it is clear that the resistant strain possesses qualitatively altered AChE. Recent molecular investigations suggest that some amino acid substitutions in the AChE of *T. urticae* may result in different responses of the altered AChEs to different substrates and inhibitors (Anazawa et al., 2003). At present the only biochemical tests available for monitoring insensitive AChE in the field based on inhibition assays (Bourguet et al., 1996). It will be difficult to develop for mites due to their minute size (Stumpf et al., 2001). Therefore the amino acid sequences of AChE in Iranian strains need to be analyzed.

LITERATURE CITED

Anazawa, Y., Tomita, T., Aiki, Y., Kozaki, T. & Kono, Y. 2003. Sequence of a cDNA encoding acetylcholinesterase from susceptible and resistant two-spotted spider mite, *Tetranychus urticae*, Insect Biochemhstry & Molecular Biology, 33: 509–514.

Ballantyne, G.H., & Harrison, R.A. 1967. Genetic and biochemical comparisons of organophosphate resistance between strains of spider mites (*Tetranychus* species: Acari), Entomological Experimentalis et Applicata, 10: 231-239.

Beers, E.H., Riedl, H. & Dunley, J.E. 1998. Resistance to abamectin and reversion to susceptibility to fenbutatin oxide in spider mite (Acari: Tetranychidae) populations in the Pacific Northwest. Journal of Economic Entomology, 91: 352-360.

Bourguet, D., Pasteur, N., Bisset, J. & Raymond M. 1996. Determination of Ace1 genotypes in single mosquitoes: toward an ecumenical biochemical test. Pesticide Biochemistry & Physiology, 55: 122-128.

Cranham, J.E. & Helle, W. 1985. Pesticide resistance in Tetranychidae. In: Helle, W. & Sabelis, M.W. (eds.). Spider Mites: Their Biology, Natural Enemies, and Control. Vol. 1B, Amsterdam, Elsevier, pp 405-421.

Devine, G.J., Barber, M. & Denholm, I. 2001. Incidence and inheritance of resistance to METI-acaricides in European strains of the two-spotted spider mite (*Tetranychus urticae*) (Acari: Tetranychidae). Pest Management Science, 57: 443-448.

Devonshire, A.L. & Moores, G.D. 1982. A carboxylesterase with broad substrate specificity causes organophosphorus, carbamate, pyrethroid resistance in peach potato aphid (*Myzus persicae*). Pesticide Biochemistry & Physiology, 18**:** 235-246.

Edge, V.E. & James, D.G. 1986. Organotin resistance in *Tetranychus urticae* (Acari: Tetranychidae) in Australia. Journal of Economic Entomology, 79: 1477-1483.

Fergusson-Kolmes, L.A., Scott, J.G. & Dennehy, T.J. 1991. Dicofol resistance in *Tetranychus urticae* (Acari: Tetranychidae): Cross-resistance and pharmacokinetics. Journal of Economic Entomology, 84: 41-48.

Ghadamyari, M., Mizuno, H., Oh, S., Talebi, K. & Kono, Y. 2008a. Studies on pirimicarb resistance mechanisms in Iranian populations of the peach-potato aphid, *Myzus persicae*. Applied Entomology and Zoology, 43(1): 149-157.

Ghadamyari, M., Talebi, K., Mizuno, H. & Kono, Y. 2008b. Oxydemeton-methyl resistance, mechanisms and associated fitness cost in green peach potato aphids (Homopotera: Aphididae). Journal of Economic Entomology (In press).

Grant, D.F. & Matsumura, F. 1994. Glutathione S-transferase 1 and 2 in susceptible and insecticide resistant *Aedes aegypti*. Pesticide Biochemistry and Physiology, 33: 132-143.

Habig, W.H., Pabst, M.J. & Jakoby, W.B. 1974. Glutathione S-transferases, the first step in mercapturic acid formation. Journal of Biological Chemistry, 249: 7130–7139.

Herne, D.H.C. & Brown, A.W.A. 1969. Inheritance and biochemistry of OP-resistance in a New York strain of the two-spotted spider mite. Journal of Economic Entomology, 62:

205-209.

Herron, G.A., Edge, V. & Rophail, J. 1993. Clofentezine and hexythiazox resistance in *Tetranychus urticae* Koch in Australia. Experimental Applied Acarology, 17: 433-440.

Herron, G.A. & Rophail, J. 1993. Genetics of hexythiazox resistance in two spotted spider mite, *Tetranychus urticae* Koch. Experimental Applied Acarology, 17: 423-431.

Keena, M.A. & Granett J. 1990. Genetic analysis of propargite resistance in pacific spider mites and two spotted spider mites (Acari:Tetranychidae). Journal of Economic Entomology, 83: 655-661.

Kono, Y. & Tomita, T. 1992. Characteristics of highly active carboxylesterases in insecticide resistant *Culex pipiens quinquefasciatus*. Japanese Journal of Sanitary Zoology, 43: 297-305.

Kuwahara, M. 1982. Insensitivity of the acetylcholinesterase from the organophosphate resistant kanzawa spider mite, *Tetranychus kanzawai* Kishida (Acarina: Tetranychidae), to organophosphorus and carbamate insecticide. Applied Entomology & Zoology, 17: 486-493.

Kuwahara, M., Miyata, T., Saito, T. & Eto, M. 1981. Relationship between high esterase activity and in vitro degradation of ^{14}C-Malathion by organophosphate-resistant and susceptible strains of the Kanzawa spider mite, *Tetranychus kanzawai* Kishida (Acarina: Tetranychidae), and their inhibition with specific synergists. Applied Entomology & Zoology, 16: 297 -305.

LeOra Software. 1987. POLO-PC: A user guide to probit or logit analysis. LeOra Software, Berkeley, CA.

Matsumura, T. & Voss, G. 1964. Mechanism of malathion and ethyl parathion resistance in the two-spotted spider mite, *Tetranychus urticae*. Journal of Economic Entomology, 57: 911-916.

Moores, G. D., Devine, J. & Devonshire, A. L. 1994. Insecticide-acetylcholinesterase can enhance esterase-based resistance in *Myzus persicae* and *Myzus nicotianae*. Pesticide Biochemistry & Physiology, 49: 114-120.

Mouches, C., Pasteur, N., Berge, J. M., Hyrien, O., Raymond, M., De Saint Vincent, B. R., De Silvestri, M. & Georgihiou, G. P. 1986. Amplification of an esterase gene is responsible to insecticide resistance in a California *Culex* mosquito. Science, 233: 778-780.

Pilz, R., Pfeiffer, G. & Otto, D. 1978. Untersuchungen zum Resistenz mechanismus eines Dimethoat-resistenten Spinnmilbenstammes (*Tetranychus urticae* Koch). Archive Phytopathology, 14 (6): 383-391.

Sato, M. E., Miyata, T., da Silva, M., Raga, A. & de Souza Filho, M. F. 2004. Selections for fenpyroximate resistance and susceptibility, and inheritance, crossresistance and stability of fenpyroximate resistance in *Tetranychus urticae* Koch (Acari: Tetranychidae). Applied Entomology & Zoology, 39: 293-302.

Sato, M. E., Suplicy Filho, N., de Souza Filho, M. F. & Takematsu, A. P. 1994. Resistência do ácaro rajado *Tetranychus urticae* (Koch, 1836) (Acari: Tetranychidae) a diversos acaricidas em morangueiro (*Fragaria* sp.) nos municípios de Atibaia-SP e Piedade-

SP. Ecossistema, 19: 40-46.

Smissaert, H. R. 1964. Cholinesterase inhibition in spider mites susceptible and resistant to organophosphates, Science, 143: 129-131.

Smissaert, H. R., Voerman, S., Oostenbrugge, L. & Renooy, N. 1970. Acetylcholinesterase of organophosphate susceptible and resistant spider mites. Journal of Agriculture Food & Chemistry, 18: 65-75.

Soderlund, D. M. & Bloomquist, J. R. 1990. Molecular mechanisms of insecticide resistance. In: Roush, R.T. & Tabashnik, B.E. (eds.). Pesticide Resistance in Arthropods. Chapman & Hall, New York, pp. 58-96.

Stumpf, N. & Nauen R. 2001. Cross-resistance, inheritance, and biochemistry of mitochondrial electron transport inhibitor-acaricide resistance in *Tetranychus urticae* (Acari: Tetranychidae). Journal of Economic Entomology, 94: 1577-1583.

Stumpf, N., Zebitz, C. P. W., Kraus, W., Moores, G. D. & Nauen, R. 2001. Resistance to organophosphates and biochemical genotyping of acetylcholinesterases in *Tetranychus urticae* (Acari: Tetranychidae). Pesticide Biochemistry & Physiology, 69: 131-142.

Suzuki, K., Hama, H. & Konno, Y. 1993. Carboxylesterase of the cotton aphid, *Aphis gossypii* Glover (Homoptera: Aphididae), responsible for fenitrothion resistance as a sequestering protein. Applied Entomology & Zoology, 28: 439-450.

Tomita, T., Kono, Y. & Shimada, T. 1996. Chromosomal localization of amplified esterase genes in insecticide resistant *Culex* mosquitoes. Insect Biochemistry & Molecular Biology, 26: 853-857.

van Asperen, K. 1962. A study of housefly esterases by means of a sensitive colorimetric method. Journal of Insect Physiology, 8: 401–416.

Yu, S. J. 1996. Insect glutathione S-transferases. Zoological Studies, 35: 9-19.

Zahavi, M. & Tahori, A. S. 1970. Sensitivity of acetylcholinesterase in spider mites to organophosphorous compounds, Biochemical Pharmacology, 19: 219-225.

Table1. Log dose probit-mortality data for oxydemeton-methyl against susceptible and resistant strain of *T. urticae*

Strain	Insecticide	n	LD_{50} (95% CI)[a]	Slope ± SE	χ^2 [b]	RR[c]
Resistant	oxydemeton-methyl	245	4675.9 (4473- 4892)	10.79± 1.36	0.88	20.47
Susceptible	oxydemeton-methyl	250	228.6 (191-268)	2.5 ± 0.27	1.11	

[a]LD_{50} values and their CI are expressed in ppm formulated pesticide

[b]Values of χ^2 smaller than 7.81 ($p < 0.05$) considered to be represented satisfactory agreement between observed and expected results.

[c]Resistance ratio, LD_{50} of resistant strain/LD_{50} of susceptible strain

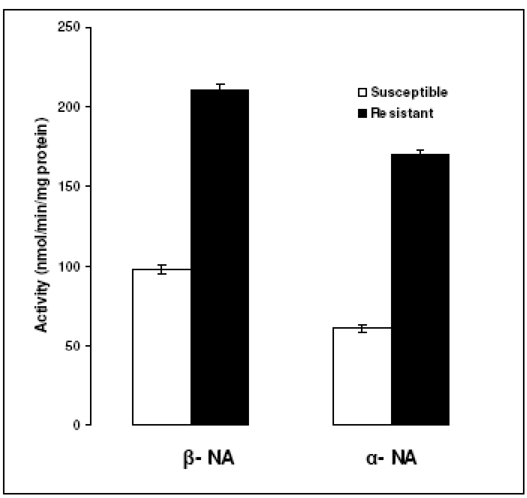

Fig.1. Esterase activity in resistant and susceptible strains of *T. urticae*

Table 2. ***Km*** **and** V_{max} **values of AChE in resistant and susceptible strains of** ***T. urticae.***

Substrate	Strain	K_m (µM) (±SD)	V_{max} (ΔOD/30min/mite) (±SD)
ATC	resistant	95± 5.2	5 ± 0.4
	susceptible	61± 4.1	4.33 ± 0.31
BTC	resistant	337±32	3.2±0.27
	susceptible	156±23	2.9±0.23

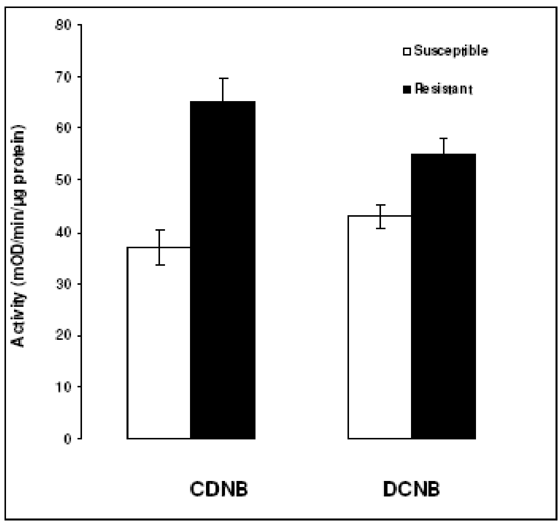

Fig.2. GST activity in resistant and susceptible strains of ***T. urticae***

Table 3. I_{50} values of oxydemeton-methyl and paraoxon on AChE from susceptible and resistant strains of *T. urticae*

Inhibitor	I_{50} (M) (95%CI)		IR (95%CI)[a]
	Resistant	Susceptible	
Oxydemeton-methyl	2.68×10^{-6}	7.79×10^{-7}	3.49 (2.82-4.37)
	$(2.3\times10^{-6}$- $3.15\times10^{-6})$	$(6.6\times10^{-7}$- $9\times10^{-7})$	
Paraoxon	6.5×10^{-6}	8×10^{-7}	7.8(5.2- 11.8)
	$(5.4\times10^{-6}$- $7.8\times10^{-6})$	$(5.2\times10^{-7}$- $12.2\times10^{-7})$	

[a] Insensitivity ratio= I_{50} for resistant strain/susceptible strain and confidence interval (CI)

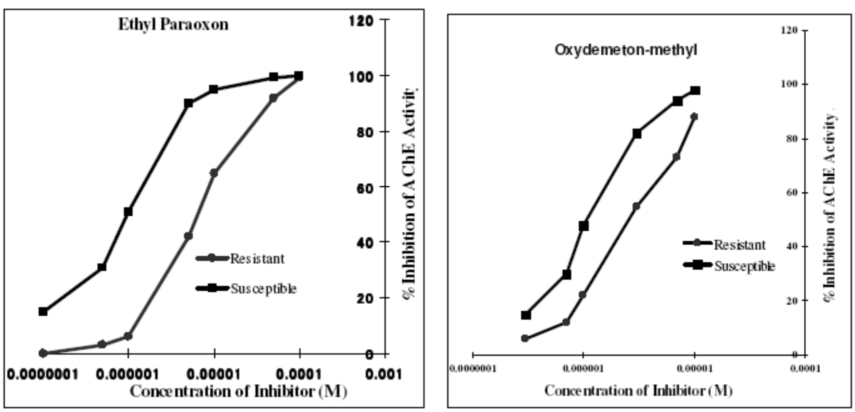

Fig. 3. Inhibition of AChE from *T. urticae* by oxydemeton-methyl and ethyl paraoxon

SUBSTITUTE NAMES FOR TWO PREOCCUPIED MOTH GENERA NAMES DESCRIBED BY J. F. G. CLARKE FROM CHILE (LEPIDOPTERA: OECOPHORIDAE)

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[Özdikmen, H. 2009. Substitute names for two preoccupied moth genera names described by J. F. G. Clarke from Chile (Lepidoptera: Oecophoridae). Munis Entomology & Zoology, 4 (1): 114-116**]**

ABSTRACT: Two junior homonym genus group names were detected among the moth genus group names. All names were described by J. F. G. Clarke from Chile. So, the following replacement names are herein proposed: *Nagehana* nom. nov. for *Retha* Clarke, 1978 and *Hozbeka* nom. nov. for *Talitha* Clarke, 1978. Accordingly, new combinations are herein proposed for the species currently included in these genus group names. *Nagehana rustica* (Clarke, 1978) comb. nov. and *Hozbeka anomala* (Clarke, 1978) comb. nov..

KEY WORDS: nomenclatural change, homonymy, replacement name, Lepidoptera, Gelechoidea, Oecophoridae.

Two previously proposed genus group names in the moth family Oecophoridae are nomenclaturally invalid, as the genus group names have already been used by a different authors in Mollusca and Thysanoptera. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these genus names.

Family OECOPHORIDAE
Subfamily OECOPHORINAE
Genus *NAGEHANA* nom. nov.

Retha Clarke, 1978. Smithsonian Contr. Zool. No. 273: 58. (Insecta: Lepidoptera: Gelechioidea: Oecophoridae: Oecophorinae). Preoccupied by *Retha* Cox, 1965. J. Paleont. 39: 731. (Mollusca: Bivallia: Hippuritacea: Caprinidae).

Remarks on nomenclatural change: The generic name *Retha* was initially introduced by Cox, 1965 for an objective replacement name for *Ethra* Matheron, 1878 that preoccupied by *Ethra* Laporte, 1833 (Coleoptera) in Bivalvia. Later Clarke, 1978 described a moth genus under the same generic name (with the type species *Retha rustica* Clarke, 1978 by original designation). *Retha* Clarke, 1978 is still used as a valid genus name in Lepidoptera (Oecophoridae). Recently Beeche (2003) described two new species from Central Chile for this genus. Thus, the genus name *Retha* Clarke, 1978 is a junior homonym of the genus *Retha* Cox, 1965. So I propose a new replacement name *Nagehana* nom. nov. for the genus name *Retha* Clarke, 1978.

Etymology: This genus name is dedicated to my student Nagehan Ramazanoğlu (Turkey).

Summary of nomenclatural changes:

Nagehana **nom. nov.**
pro *Retha* Clarke, 1978 (non Cox, 1965)

Nagehana rustica (Clarke, 1978) **comb. nov.**
from *Retha rustica* Clarke, 1978

Subfamily DEPRESSARIINAE
Genus *HOZBEKA* nom. nov.

Talitha Clarke, 1978. Smithsonian Contr. Zool. No. 273: 9. (Insecta: Lepidoptera: Gelechioidea: Oecophoridae: Depressariinae). Preoccupied by *Talitha* Faure, 1958. J. ent. Soc. sth. Afr. 21: 16. (Insecta: Thysanoptera: Phlaeothripidae: Phlaeothripinae).

Remarks on nomenclatural change: The moth genus *Talitha* Clarke, 1978 was established for a genus with the type species *Talitha anomala* Clarke, 1978 by original designation in the family Oecophoridae. It was placed in Depressariinae by Becker (1984). Nevertheless the name *Talitha* is already occupied. Faure (1958) described a thrips genus *Talitha* with the type species *Talitha fusca* Faure, 1958 in Thysanoptera. It has currently 3 species as *T. cincta* Faure, 1958*, T. fusca* Faure, 1958 *and T. grandifera* Faure, 1958. Thus the moth genus *Talitha* Clarke, 1978 is a junior homonym of *Talitha* Faure, 1958. So I suggest here that *Talitha* Clarke, 1978 should be replaced with new name *Hozbeka* as a replacement name.

Etymology: This genus name is dedicated to my student Hüseyin Özbek (Turkey).

Summary of nomenclatural changes:

Hozbeka **nom. nov.**
pro *Talitha* Clarke, 1978 (non Faure, 1958)

Hozbeka anomala (Clarke, 1978) **comb. nov.**
from *Talitha anomala* Clarke, 1978

LITERATURE CITED

Beeche, M. 2003. Dos especies nuevas del género "*Retha*" Clarke, 1978 (Lepidoptera: Oecophoridae). Acta entomológica chilena, 27: 37-44.

Clarke, J. F. G. 1978. Neotropical Microlepidoptera, XXI: new genera and species of Oecophoridae from Chile. Smithsonian Contributions to Zoology, 273: 1-80.

Cox, L. R. 1965. New names for Cretaceous rudists (Mollusca; Bivalvia). Journal of Paleontology, 39 (4): 731.

Faure, J. C. 1958. South African Thysanoptera - 8 . Journal of the Entomological Society of Southern Africa, 21: 16-35.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

THREE NEW RECORDS OF *ALEUROVIGGIANUS* IACCARINO (HEMIPTERA: STERNORRHYNCHA: ALEYRODIDAE) FROM IRAN WITH IDENTIFICATION KEY

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[Ghahari, H., Ko, C.-C. & Ostovan, H. 2009. Three new records of *Aleuroviggianus* Iaccarino (Hemiptera: Sternorrhyncha: Aleyrodidae) from Iran with identification key. Munis Entomology & Zoology, 4 (1): 117-120**]**

ABSTRACT: A total of three *Aleuroviggianus* species including, *A. adrianae* Iaccarino, *A. halperini* Bink-Moenen, and *A. zonalus* Bink-Moenen were identified for the first time from Iran. Identification key, host plants and distributional data are given in this paper.

KEYWORDS: Aleyrodidae, *Aleuroviggianus*, New record, *Quercus*, Iran

The plant genus *Quercus* (Fagales: Fagaceae), commonly known as oaks, comprises species which are deciduous or evergreen trees or shrubs. There is not any literature about the exact number of *Quercus* species, but probably 500 species exist in different regions of the world (Weeda et al, 1985). Oaks have a mainly Holarctic distribution but in the Old World they extend from Europe to the Atlas Mountains of North Africa, and in the mountains of Asia they can be found as high as 3000 m above sea level (Camus 1939). In a total of 14 oak tree species including, *Q. brandtii*, *Q. calliprinos*, *Q. cardochorum*, *Q. castanefolia*, *Q. coccifera*, *Q. iberica*, *Q. infectoria*, *Q. komarovii*, *Q. libani*, *Q. macranthera*, *Q. persica*, *Q. petraea* var. *iberica*, *Q. ithaburensis*, *Q. rotundifolia* (Kiabi *et al.* 1993; Modarres Awal 1997; Ghahari et al, 2008) were identified from different regions of Iran.

The family Aleyrodidae comprising 1556 accepted species names in 161 genera (Martin and Mound 2007). The most common species which attack to the oak trees are *Aleuroviggianus* spp. This genus is a pen-Mediterranean genus with six included species, and yet none of these six had been described in Bink-Moenen and Gerling (1990) and four more by Bink-Moenen (1992). However all these species feed only on evergreen oaks (Martin et al, 2000). Totally six *Aleuroviggianus* species were identified from all over the world so far which all of them are from West Palearctic especially Mediterranean region.

The whitefly fauna of Iran is very diverse but unknown. Although, there have been a number of publications of whiteflies in different regions (Kiriukhin 1947; Zarrabi 1991, 1998a, b; Ghahari & Hatami 2001; Manzari and Alemansoor, 2005), but there has been no account of the group across the whole region. The whiteflies species which recorded from the oak leaves are *Bemisia tabaci* Gennadius (Alemansoor 1992; Ghahari et al, 2007). In the present research the genus *Aleuroviggianus* Iaccarino 1982 as one of the oaks' pests in Mediterranean and Middle East regions is studied.

MATERIALS AND METHODS

The faunstic on which our work is based have been conducted by the collection of whitefly puparia and prepared in the method of Bink (1979). The illustration of each species show the dorsal half of a pupal case on the left and the ventral side on the right, also the margin, submargin around the tracheal pore area and the vasiform orifice, along with other necessary details. The characters were described as observed in mounted pupal cases, except for the coloration and wax cover that were described from intact specimens. The terminologies used were those of Bink-Moenen (1983) and Martin (1985). Distribution data and host plants were adapted from Bink-Moenen (1992), Martin et al, (2000) and Evans (2007). The aleyrodid specimens of this paper are preserved in HGCol (Hassan Ghahari Collection).

Acronyms Depositories of *Aleuroviggianus* Types

BMCol Bink-Moenen Collection, Netherlands
BMNH British Museum Natural History Museum, London, UK
UNP Universita degli Studi di Napoli, Portici, Italy

RESULTS

Totally three *Aleuroviggianus* species including, *A. adrianae* Iaccarino, *A. halperini* Bink-Moenen, and *A. zonalus* Bink-Moenen were collected and identified for the first time from Iran. All these species were collected from the leaves of oak trees including, *Quercus rotundifolia*, *Q. iberica* and *Q. coccifera*, respectively.

Genus *Aleuroviggianus* Iaccarino 1982

Aleuroviggianus Iaccarino 1982: 37. Type species. *Aleuroviggianus adrianae* Iaccarino 1982, by original designation.

Aleuroviggianus adrianae Iaccarino 1982

Aleuroviggianus adrianae Iaccarino 1982: 38. Holotype. Italy: Portici, on Quercus ilex, UNP

Distribution. Europe and Mediterranean countries including, Greece, Corfu, Corsica, Egypt, Italy, France, Morocco, Sardinia, Sicily, Spain (Bink-Moenen, 1992; Evans, 2007).

Host plant. *Quercus ilux*, *Q. rotundifolia*, *Q. suber* (Fagaceae) (Bink-Moenen, 1992; Evans, 2007).

Material examined. Mazandaran province: Savadkooh (780 m), 9.viii.1997 (H. Ghahari) on *Quercus rotundifolia*.

Natural enemies of the world: *Amitus vesuvianus* Viggiani & Mazzone 1982 (Platygastridae); *Encarsia aleuroilicis* Viggiani 1982 (Aphelinidae) (Evans, 2007).

Comment: The pupal case is distinguishable by its black colour, tuberculate dorsum, elongate shape and the obscured lingula tip, the adult by the elongate labial tip with its almost cylindrical distal end.

Aleuroviggianus halperini Bink-Moenen 1992

Aleuroviggianus halperini Bink-Moenen 1992, in Bink-Moenen and Gerling 1991: 14. Holotype. Israel: Mt. Meron, ix.1976, R. Neeman, on Quercus calliprinos, Bink-Moenen Col.

Distribution: Europe and Mediterranean countries including, Crete, Greece, Israel, Rhodes, Turkey (Bink-Moenen, 1992; Evans, 2007).

Host plants: *Quercus calliprinos*, *Q. coccifera*, *Q. ithaburensis* (Fagaceae) (Bink-Moenen, 1992; Evans, 2007).

Material examined: Kermanshah province, Kermanshah (1294 m), 6.ix.2002 (H. Ghahari) on *Quercus iberica*. Guilan province, Rasht (39 m), 14.vii.2003 (H. Ghahari) on *Q. calliprinos*.
Comment: The general outline of the pupal case of *A. halperini* is most similar to that of *A. adrianae*, but is distinguishable by its broader shape, presence of thoracic tracheal pores in the apparent margin and thoracic tracheal combs in the real margin, elongate shape of the vasiform orifice and large exposed lingula tip. A parasitoid, *Eretmocerus* sp. was reared from *A. halperini*.

Aleuroviggianus zonalus Bink-Moenen 1992

Aleuroviggianus zonalus Bink-Moenen 1992: 33. Holotype pupal case. Greece: on *Quercus coccifera*, BMNH.
Distribution: Europe and Mediterranean countries including, Albania, Greece, Corfu, Crete, Kos, Rhodes, Turkey (Bink-Moenen, 1992; Evans, 2007).
Host plant. *Quercus coccifera* (Fagaceae) (Bink-Moenen, 1992; Evans, 2007).
Material examined: Kordestan province, Sanandaj (1500 m), 11.vi.2001 (H. Ghahari) on *Quercus coccifera*.
Comment: The pupal case of this species is easily distinguishable by the typical colour pattern and the absence of the first abdominal setae.

Key to Iranian *Aleuroviggianus* species (Pupal cases)

1- Segment VII not visible medially 2
1'- Segment VII visible medially .... *A. zonalus*
2- Lingula tip not, or just, exposed .... *A. adrianae*
2'- Lingula tip exposed .... *A. halperini*

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LITERATURE CITED

Alemansoor, H. 1992. Distribution, host range, and natural enemies of the sweetpotato whitefly, Bemisia tabaci (Gennadius) (Homoptera: Aleyrodidae) in Fars province. M. Sc. thesis, Department of Entomology, Shiraz University, Iran (p. 70).

Bink, F. A. 1979. Methods for mounting Aleyrodidae specimens. Entomol. Ber. Amst., 39: 152-160.

Bink-Moenen, R. M. 1983. Revision of the African whiteflies (Aleyrodidae). Monografieen van de Nederlandse Entomologische Vercniging, Amsterdam, 10: 1-211.

Bink-Moenen, R. M. & Gerling, D. 1990. Aleyrodidae of Israel. Bollettino di Laboratorio de Entomologia Agraria 'Filippo Silvestri' 47 1990, 3-49.

Bink-Moenen, R. M. 1992. Whitefly from Mediterranean evergreen oaks (Homoptera: Aleyrodidae). Systematic Entomology, 17: 21-40.

Camus, A. 1939. Les Chenes: Monographie du genre Quercus. Vol. 2. Paul Lechevalier, Paris, 830 pp.

Evans, G. A. 2007. The whiteflies (Hemiptera: Aleyrodidae) of the world and their host plants and natural enemies. USDA/Animal Plant Health Inspection Service (APHIS), 715 pp. [http://www.sel.barc.usda.gov:591/ 1WF/whitefly_catalog.htm]

Ghahari, H. & Hatami, B. 2001. Faunistic and taxonomic surveys of whiteflies (Homoptera: Aleyrodidae) in Isfahan Province. Applied Entomology and Phytopathology, 69 (1): 141-170.

Ghahari, H., Mohebbi, H. R. & Parvanak, K. 2007. Host plants of whiteflies (Homoptera: Aleyrodidae) in Iran. Plant and Ecosystem, 9: 1-12.

Hassan-Zadeh Kiabi, B., Zehzad, B., Darreh-Shoori, B. F., Majnounian, H. & Meigouni, H. G. 1993. Golestan National Park. Department of Environment Publication, 203 pp.

Iaccarino, F. M. 1982. Descrizione di Aleitroviggvinus adrianae n. gen., n. sp. (Homoptera: Alevrodidae). Bollettino del laboratorio di Entoir.ologia Agraria 'Filippo Silvesfri', 39: 37-45.

Kiriukhin, G. 1947. Quelques Aleurododea de l'Iran. Entomologie Phytopath. Appl., 5: 8-10 (In Persian, 5: 22-28; French summary).

Manzari, S. & Alemansoor, H. 2005. A new species of Acaudaleyrodes Takahashi (Hemiptera: Aleyrodidae) from Iran, with a key to species of the genus. Zootaxa, 829: 1-6.

Martin, J. H. 1985. The whitefly of New Guinea (Homoptera: Aleyrodidae). Bulletin of the British Museum (Natural History) (Entomology), 50: 303-351.

Martin, J. H., Mifsud, D. & Rapisarda, C. 2000. The whiteflies (Hemiptera: Aleyrodidae) of Europe and the Mediterranean Basin. Bull. of Entomol. Research, 90 (5): 407-448.

Martin, J. H. & Mound, L. A. 2007. An annotated check list of the world's whiteflies (Insecta: Hemiptera: Aleyrodidae). Zootaxa, 1492: 1-84.

Modarres Awal, M. 1997. List of agricultural pests and their natural enemies in Iran. Ferdowsi University Press, 427 pp.

Weeda, E. J., Westra, R., Westra, Ch. & Westra, T. 1985. Nederlandse oecologische flora I. 364 pp. IVN, Vara, and Vewin, Amsterdam. (In Dutch).

Zarrabi, M. 1991. The aleyrodids fauna of Fars province. M.Sc thesis of Shiraz University, 74 pp.

Zarrabi, M. 1998a. Aleyrodid species of forest and pasturage plants of Fars province. Proceeding of the 13th Iranian Plant Protection Congress, 182.

Zarrabi, M. 1998b. Aleyrodid fauna of Hamedan and suburbs. Proceeding of the 13th Iranian Plant Protection Congress, 224.

NOMENCLATURAL CHANGES FOR THREE PREOCCUPIED AUSTRALIAN SPIDER GENERA DESCRIBED BY R. R. FORSTER (ARACHNIDA: ARANEAE)

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[Özdikmen, H. 2009. Nomenclatural changes for three preoccupied Australian spider genera described by R. R. Forster (Arachnida: Araneae). Munis Entomology & Zoology, 4 (1): 121-124**]**

ABSTRACT: Three junior homonyms were detected among the Australian spider genera and the following replacement names are proposed: *Novohaurokoa* nom. nov. for *Haurokoa* Forster & Wilton, 1973 (Tengellidae); *Zelanda* nom. nov. for *Taieria* Forster, 1979 (Gnaphosidae) and *Queenslandiana* nom. nov. for *Toddiana* Forster, 1988 (Cyatholipidae). Accordingly, new combinations are herein proposed for the species currently included in these genera: *Novohaurokoa filicicola* (Forster & Wilton, 1973) comb. nov.; *Zelanda elongata* (Forster, 1979) comb. nov.; *Zelanda erebus* (Koch, 1873) comb. nov.; *Zelanda kaituna* (Forster, 1979) comb. nov.; *Zelanda miranda* (Forster, 1979) comb. nov.; *Zelanda obtusa* (Forster, 1979) comb. nov.; *Zelanda titirangia* (Ovtsharenko, Fedoryak & Zakharov, 2006) comb. nov. and *Queenslandiana daviesae* (Forster, 1988) comb. nov..

KEY WORDS: nomenclatural changes, homonymy, replacement names, Australia, New Zealand, spider, Araneae.

Three previously proposed Australian genus group names in Araneae are nomenclaturally invalid, as the genus group names have already been used by a different authors in Mollusca and Lepidoptera. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these genus names.

TAXONOMY

Family TENGELLIDAE
Genus *NOVOHAUROKOA* nom. nov.

Haurokoa Forster & Wilton, 1973. Otago Mus.Bull.No.4: 299. (Arachinda: Araneae: Tengellidae). Preoccupied by *Haurokoa* Fleming, 1955. Trans. roy. Soc. N.Z., 82, 1055. (Mollusca: Gastropoda: Cymathidae: Cymathinae).

Remarks: The name *Haurokoa* was initially introduced by Fleming, 1955 for a genus of the gastropod family Cyathidae (with the type species *Agrobuccinum* (*Haorukoa*) *woodi* Fleming, 1955 from New Zealand). It is described firstly in the genus *Agrobuccinum* Hermannsen, 1846 as a subgenus. Subsequently, Forster & Wilton, 1973 erected a new spider genus of the family Psechridae (with the type species *Haurokoa filicicola* Forster & Wilton, 1973 from New Zealand) under the same generic name (Platnick, 2008a). It was transferred by Raven & Stumkat (2003) in the family Tengellidae. Thus, the genus *Haurokoa* Forster & Wilton, 1973 is a junior homonym of the genus *Haurokoa* Fleming, 1955. According to Article 60 of the International Code of Zoological Nomenclature, I propose for the genus *Haurokoa* Forster & Wilton, 1973 the new replacement name *Novohaurokoa* **nom. nov.**

Etymology: from the Latin name "nova" (meaning "new" in English) + preexisting genus name *Haurokoa*.

Summary of nomenclatural changes:

Novohaurokoa **nom. nov.**
= *Haurokoa* Forster & Wilton, 1973 (nec Fleming, 1955)

Novohaurokoa filicicola (Forster & Wilton, 1973) **comb. nov.**
from *Haurokoa filicicola* Forster & Wilton, 1973
Distr.: New Zealand

Family GNAPHOSIDAE
Genus *ZELANDA* nom. nov.

Taieria Forster, 1979. Otago Mus. Bull. No. 5: 48. (Arachnida: Araneae: Gnaphosidae). Preoccupied by *Taieria* Finlay & Marwick, 1937. Palaeont. Bull. N.Z., 15, 67. (Mollusca: Gastropoda: Cassidae).

Remarks: The generic name *Taieria* Finlay & Marwick, 1937 was proposed for a genus of Gastropoda with the type species *Taieria allani* Finlay & Marwick, 1937 from New Zealand. The genus is still used as a valid generic name as a subgenus of the genus *Galeodea* Link, 1807 in Gastropoda. Subsequently, the generic name *Taieria* Forster, 1979 was introduced for a new spider genus (with the type species *Megamyrmaekion erebum* (Koch, 1873) of the family Gnaphosidae (Platnick, 2008b). Thus, the genus *Taieria* Forster, 1979 is a junior homonym of the genus *Taieria* Finlay & Marwick, 1937. According to Article 60 of the International Code of Zoological Nomenclature, I propose for the genus *Taieria* Forster, 1979 the new replacement name *Zelanda* **nom. nov.**

Etymology: from the Turkish name "Zelanda" (meaning "Zealand" in English).

Summary of nomenclatural changes:

Zelanda **nom. nov.**
= *Taieria* Forster, 1979 (nec Finlay & Marwick, 1937)

Zelanda elongata (Forster, 1979) **comb. nov.**
from *Taieria elongata* Forster, 1979
Distr.: New Zealand

Zelanda erebus (Koch, 1873) **comb. nov.**
from *Taieria erebus* (Koch, 1873)
Megamyrmaekion erebum (Koch, 1873)
Distr.: New Zealand

Zelanda kaituna (Forster, 1979) **comb. nov.**
from *Taieria kaituna* Forster, 1979
Distr.: New Zealand

Zelanda miranda (Forster, 1979) **comb. nov.**
from *Taieria miranda* Forster, 1979
Distr.: New Zealand

Zelanda obtusa (Forster, 1979) **comb. nov.**
from *Taieria obtusa* Forster, 1979
Distr.: New Zealand

Zelanda titirangia (Ovtsharenko, Fedoryak & Zakharov, 2006) **comb. nov.**
from *Taieria titirangia* Ovtsharenko, Fedoryak & Zakharov, 2006
Distr.: New Zealand

Family CYATHOLIPIDAE
Genus *QUEENSLANDIANA* nom. nov.

Toddiana Forster, 1988. Otago Mus Bull 6: 31. (Arachnida: Araneae: Cyatholipidae). Preoccupied by *Toddiana* Kiriakoff, 1973. Bull. Annls. Soc. r. ent. Belg. 109: 42. (Insecta: Lepidoptera: Noctuoidea: Notodontidae).

Remarks: The genus *Toddiana* was proposed by Kiriakoff, 1973 as an objective replacement name for the genus *Toddia* Kiriakoff, 1967 that preoccupied by the genus *Toddia* Franca, 1911 (Protozoa) with the type species *Fentonia eingana* Schaus, 1928 by original designation from China in the moth family Notodontidae. Later, the genus *Toddiana* was described by Forster, 1988 with the type species *Toddiana daviesae* Forster, 1988 by monotypy from Queensland (Platnick, 2008c). However, the name *Toddiana* Forster, 1988 is invalid under the law of homonymy, being a junior homonym of *Toddiana* Kiriakoff, 1973. In accordance with article 60 of the International Code of Zoological Nomenclature, I propose to substitute the junior homonym name *Toddiana* Forster, 1988 for the nomen novum *Queenslandiana*.

Etymology: The name is dedicated to Queensland (Australia).

Summary of nomenclatural changes:

Queenslandiana **nom. nov.**
= *Toddiana* Forster, 1988 (nec Kiriakoff, 1973)

Queenslandiana daviesae (Forster, 1988) **comb. nov.**
from *Toddiana daviesae* Forster, 1988
Distr.: Australia (Queensland)

LITERATURE CITED

Finlay, H. J. & Marwick, J. 1937. The Wangaloan and associated molluscan faunas of Kaitanga-Green Island Subdivision. New Zealand Geological Survey. Paleontol. Bull. 15 (1937): 1–140.

Fleming, C. A. 1955. Kapitean (Upper Miocene) Mollusca from Te Waewae Bay, Southland, New Zealand. Ttansactions of the Royal Society of New Zealand, 82 (5): 1049-1059.

Forster, R. R. 1979. The spiders of New Zealand. Part V. Cycloctenidae, Gnaphosidae, Clubionidae. Otago Mus. Bull. 5: 1-95.

Forster, R. R. 1988. The spiders of New Zealand: Part VI. Family Cyatholipidae. Otago Mus. Bull. 6: 7-34.

Forster, R. R. & Wilton, C. L. 1973. The spiders of New Zealand. Part IV. Otago Mus. Bull. 4: 1-309.

ICZN. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Kiriakoff, S. G. 1967. Lepidoptera Familia Notodontidae 2. Genera Palaearctica. In: P. Wytsman (ed.) Genera Insectorum 217 B. 238 pp.

Platnick, N. I. 2008a. The world spider catalog, Version 9.0. Fam. Tengellidae. Last updated April 21, 2008. Available from: http://research.amnh.org/entomology/spiders/catalog/TENGELLIDAE.html

Platnick, N. I. 2008b. The world spider catalog, Version 9.0. Fam. Gnaphosidae. Last updated June 18, 2008. Available from: http://research.amnh.org/entomology/spiders/catalog/GNAPHOSIDAE.html

Platnick, N. I. 2008c. The world spider catalog, Version 9.0. Fam. Cyatholipidae. Last updated April 18, 2008. Available from: http://research.amnh.org/entomology/spiders/catalog/CYATHOLIPIDAE.html

Raven, R. J. & Stumkat, K. 2003. Problem solving in the spider families Miturgidae, Ctenidae and Psechridae (Araneae) in Australia and New Zealand. Journal of Arachnology 31: 105-121.

FAUNISTIC STUDY ON TWO SISTER PLAIN (BAFRA AND ÇARŞAMBA) AQUATIC COLEOPTERA FAUNA IN TURKEY: TWO SIMILAR GEOGRAPHY BUT RATHER DIFFERENT FAUNA, WITH A NEW RECORD

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[**İncekara, Ü., Darılmaz, M. C., Mart, A., Polat, A. & Karaca, H.** 2009. Faunistic study on two sister plain (Bafra and Çarşamba) aquatic Coleoptera fauna in Turkey: Two similar geography but rather different fauna, with a new record. Munis Entomology & Zoology, 4 (1): 125-138]

ABSTRACT: 50 species of aquatic Coleoptera belonging to five families and 24 genera, were collected from the Bafra and Çarşamba plain (Samsun province) in the North part of Turkey, between May 2007-June 2008 have been established and compared faunistically. Rather different fauna have been found in both plain respectively. *Helophorus strigifrons* Thomson, 1868 is recorded from Turkey for the first time. All species are newly recorded from the research area.

KEY WORDS: Aquatic Coleoptera, Faunistics, Samsun Province, Plains, Turkey.

In this study, we identified and compared the fauna of two big plains (lowlands; Bafra and Çarşamba) which are situated closely each other (100 kms) and which have similar climatic and geographic structure.

Kızılırmak river is the longest running water in Turkey which runs down to Bafra district, leaves behind wide and alluvial soil while falling down onto the sea from Bafra bay. This way, Bafra plains of 47727 hectares took shape. Northern parts of the plains are arid land.

The Lakes being basic habitat of water beetles in Bafra plains took shape after the hollows filled up. Among these Lakes are Karaboğaz Liman, Dutdibi, Uzungöl, Hayırlı, İncegöl, Çernek, Tombul and Balık Lakes are noteworthy. Most of these Lakes are quite rich in water products and are economically important.

Liman Lake is at a distance of 20 kms to Bafra. The Lake of 3 km size opens up to sea through several branches. Length of such branches is 2 km at some points. Liman Lake is neighboured by Balık Lake to the south and neighboured by Karaboğaz Lake to the north.

Yeşilırmak River runs down to Çarşamba district and falls down onto Black Sea from Civa Bay and, thus, gives birth to Çarşamba plains, while, at the same time, dividing up the plains in two parts. Surface area of Çarşamba plains is 89.500 hectares. 70% of the land has been rendered fit for agriculture. The remaining 30% is composed of forests, reed-beds and quicksands.

There are many Lakes in the plains, both small and large. Two large Lakes are Simenit and Akgöl. Both Lakes are used for commercial fishing.

Simenit Lake took shape after displacement of the bed of Terme brook. The Lake situated at a distance of 20 kms to Terme looks like two Lakes interconnected by means of a canal. The Lake is fed by rainfalls during winter and, from time to time, during stormy weather, is filled with overrunning sea water. Some of other Lakes of small surface area in the studied area get dry during summer and get water again during winter. Several Lakes combine at times of abundant rainfalls and, thus, turn into a single Lake. These are Dumanlı, Akmaz, Kocagöl, Sazlık, Çilme, Körırmak and Akarcık Lakes.

Both plains exhibit the characteristics of a Black Sea climate. Summer is hot and winter is warm and rainy. The number of days spent under snow is just 2 or 3. Altitude of both plains above the sea level is less than 1 meter at most of the spots. It is difficult to find permanent hydrophilous habitats beyond the Lakes. And most of the temporary habitats are rice fields. No faunistic study on the aquatic Coleoptera has been conducted in the studied area before.

MATERIALS AND METHODS

Specimens of aquatic Coleoptera were collected in various parts of two plain (Bafra ve Çarşamba) (Figs. 1a,b) in different surveys between May 2007-October 2007 and May 2008-June 2008). For collecting aquatic beetles, sweeping the water with a metal sieve or net was the main method; in some cases, a drag-type net was used. All captured samples were separated by forceps. Sorting was performed wet or dry in a flat white tray. The beetles preserved as dry or in 95% alcohol, which was replaced by 75% alcohol and 5% glycerin mix after 24 hours.

A list of species is given. For each species the detailed locality records contains sampling locations, date of sampling and total number of individuals are given. The Lakes placed in the research areas and their being main sampling stations, are indicated in figure I.

LIST OF SPECIES

BAFRA PLAIN

Family HELOPHORIDAE

Helophorus micans Falderman, 1835

Material examined: Ondokuzmayıs, Gernek Lake, 07.V.2008, 41° 38' 50K, 36° 04' 44D, 0m, 2 males. **Distribution in Turkey:** Aksaray, Antakya, Balıkesir, Burdur, Diyarbakır, Erzurum, İzmir, Rize, Trabzon and Tuz Lake (İncekara, 2001, 2004; Karaman et al. 2008).

Helophorus brevipalpis Bedel, 1881

Material examined: Kızılırmak, 30.V.2007, 41° 35' 14K, 35° 53' 66D, 14m, 17 males, 13 females; Arız, 35.VII.2007, 41° 36' 38K, 35° 50' 37D, 2m, 3 males, 7 females. **Distribution in Turkey:** Ankara, Antalya, Artvin, Bursa, Diyarbakır, Erzurum, Erzincan, İstanbul, İzmir, Kahramanmaraş, Kırklareli, Muğla, Niğde, Samsun, Sinop, Trabzon and Van (İncekara et al. 2005; Karaman et al. 2008).

Helophorus daedalus d' Orchymont, 1932

Material examined: Ondokuzmayıs, 26.VI.2007, 41° 35' 31K, 36° 06' 44D, 2m, 1 male. **Distribution in Turkey:** Diyarbakır, Erzurum, Erzincan, İzmir and Van (İncekara, 2001, 2004).

Helophorus griseus Herbst, 1793

Material examined: Ondokuzmayıs, 07.V.2008, 41° 29' 51K, 36° 04' 12D, 27 m, 1 male. **Distribution in Turkey:** Aydın, Bursa, Edirne, Erzincan Erzurum, Gümüşhane, İstanbul and Kayseri) (İncekara, 2004; Kıyak et al. 2006).

Helophorus strigifrons Thomson, 1868

Material examined: Bafra, Liman Lake, 07.V.2008, 41° 41' 09K, 36° 01' 12D, 0m, 2 males. **Remark:** *H. Strigifrons* is recorded from Turkey for the first time. Additional material also examined from another province (Sivas, Zara, Tödürge Lake, 05.VII.2003, 1 male).

Helophorus obscurus Mulsant, 1844

Material examined: Kızılırmak, 30.V.2007, 41° 35' 14K, 35° 53' 66D, 14m, 1 male. **Distribution in Turkey:** Artvin, Bolu, Bursa, Erzincan, Erzurum, İstanbul, Kırklareli, Sinop and Trabzon (İncekara et al. 2004; Karaman et al. 2008).

Helophorus aquaticus (Linnaeus, 1758)

Material examined: Kızılırmak, 30.V.2007, 41° 35' 14K, 35° 53' 66D, 14m, 2 females. **Distribution in Turkey:** Ankara, Bingöl, Bursa, Bolu, Diyarbakır, Erzurum, Erzincan, İstanbul, Kars, Kırklareli, Mardin, Muş, Rize, Sinop and Van (İncekara, 2001, 2004).

Helophorus syriacus Kuwert, 1885

Material examined: Ondokuzmayıs, 07.V.2008, 41° 29' 51K, 36° 04' 12D, 27 m, 3 males. **Distribution in Turkey:** Adana, Antakya, Amonos dağları, Denizli, Diyarbakır, Erzincan and Mardin (İncekara, 2004).

Helophorus terminassianae Angus, 1984

Material examined: Liman Lake, 07.V.2007, 41° 41' 09K, 36° 01' 12D, 0m, 1 male, 3 females, 07.V.2008, 41° 41' 09K, 36° 01' 12D, 0m, 2 males. **Distribution in Turkey:** Erzurum, Erzincan, İzmir and Konya (İncekara, 2004).

Family HYDROPHILIDAE

Hydrobius fuscipes (Linnaeus, 1758)

Material examined: Ondokuzmayıs, 07.V.2008, 41° 29' 51K, 36° 04' 12D, 27 m, 1 male. **Distribution in Turkey:** Erzincan (İncekara, 2004).

Coleostoma orbiculare (Fabricius, 1775)

Material examined: Ondokuzmayıs, Balık Lake, 41° 33' 08K, 36° 04' 52D, 0m, 3 males, 1 female, 41° 35' 16K, 36° 06' 41D, 0m, 2 males; Bafra, Gernek Lake, 07.V.2008, 41° 38' 50K, 36° 04' 44D, 0m, 2 males, 4 females, Liman Lake, 07.V.2008, 41° 41' 09K, 36° 01' 12D, 0m, 3 males, 3 females. **Distribution in Turkey:** Ankara, Erzurum, Trabzon (İncekara et al. 2003; Karaman et al. 2008).

Berosus signaticollis (Charpentier, 1825)

Material examined: Ondokuzmayıs, Balık Lake, 07.V.2008; 41° 29' 51K, 36° 04' 12D, 0m, 6 males, 11 females; Bafra, Gernek Lake, 07.V.2008, 41° 38' 50K, 36° 04' 44D, 0m, 1 male. **Distribution in Turkey:** Amasya, Antalya, Aydın, Erzincan, İzmir, Kastamonu, Kars and Ordu (İncekara et al. 2003; İncekara, 2004).

Berosus affinis Brulle, 1922

Material examined: Ondokuzmayıs, 26.VI.2007, 41° 35' 31K, 36° 06' 44D, 2m, 10 males, 8 females, Balık Lake, 41° 33' 08K, 36° 04' 52D, 0m, 4 males, 4 females, 41° 35 16K, 36° 06 41D, 0m, 16males, 21 females, Liman Lake, 29.VII.2007, 41°41 11K, 36° 01 09D, 2 males; Bafra, Gernek Lake, 29.VIII.2007, 41° 38' 53K, 36° 04' 42D, 0m, 18 males, 14 females, 26.VI.2007, 41° 38' 49K, 36° 04' 46D, 0m, 12 males, 17 females, Karaboğaz Lake, 29.VII.2007, 41° 20' 24K, 35° 48' 48D, 0m, 6 males, 8 females. **Distribution in Turkey:** Adana, Antalya, Burdur, Bursa, Çanakkale, Antakya (Hatay), Içel, Istanbul, Izmir, Kırklareli, Kocaeli, Kastamonu, Konya, Manisa, Mugla, Ordu, Samsun and Sakarya (İncekara et al. 2003).

Berosus sipinosus (Steven, 1808)

Material examined: Ondokuzmayıs, Liman Lake, 41° 41' 11K, 36° 01' 09D, 1♂, 07.V.2008, 41° 41' 09K, 36° 01' 12D, 0m, 1 male. **Distribution in Turkey:** Adana, Afyon, Ankara, Antalya, Aydın, Denizli, Edirne, Elazığ, Mersin (Erdemli), Içel, Kars, Malatya, Van (İncekara et al. 2003; Kıyak et al. 2006).

Berosus luridus (Linnaeus, 1761)

Material examined: Bafra, Gernek Lake, 07.V.2008, 41° 38' 50K, 36° 04' 44D, 0m, 2 males; Çarşamba, İhmal Lake, 07.V.2008, 41° 21' 01K, 36° 36' 47D, 0m, 1 male; Ondokuzmayıs, Balık Lake, 07.V.2008, 41° 35' 16K, 36° 06' 41D, 0m, 12 males,17 females. **Distribution in Turkey:** Erzincan, Hakkari, Ordu, Kars and Kastamonu (İncekara et al. 2003; İncekara, 2004).

Laccobius gracilis Motschulsky, 1855

Material examined: Bafra, derbent dam, 29.VII.2007, 41° 21' 43K, 35° 59' 04D, 70m, 1 male. **Distribution in Turkey:** Adana, Adıyaman, Ankara, Antakya, Antalya, Artvin, Aydın, Bayburt, Balıkesir, Bilecik, Bingöl, Bitlis, Bolu, Burdur, Bursa, Çanakkale, Çorum, Denizli, Diyarbakır, Edirne, Erzincan, Erzurum, Gaziantep, Giresun, Hakkari, Isparta, İstanbul, İzmir, Kars, Kastamonu, Kayseri, Manisa, Mardin, Mersin, Muğla, Muş, Niğde, Ordu, Rize, Sinop, Sivas, Tatvan, Trabzon and Van (İncekara et al. 2003; İncekara, 2004).

Laccobius obscuratus aegaeus Gentili, 1974

Material examined: Bafra, Derbent Dam, 29.VII.2007, 41° 21' 43K, 35° 49' 04D, 70m, 7 males, 12 females. **Distribution in Turkey:** Adana, Ankara, Antalya, Artvin, Aydın, Bitlis, Bolu Burdur, Bursa, Çanakkale, Çorum, Denizli, Erzurum, Erzincan, Gümüşhane, İstanbul, İzmir, İzmit, Kastamonu, Kırklareli, Konya, Manisa, Mersin, Muğla, Ordu, Osmaniye, Rize, Sinop, Trabzon and Van (İncekara et al. 2003, Karaman et al. 2008).

Laccobius syriacus Guillebeau, 1896

Material examined: Bafra, Derbent Dam, 29.VII.2007, 41° 21' 43K, 35° 49' 04D, 70m, 16 males, 19 females, 29.VII.2007, 40° 54' 19K, 35° 59' 00D, 868m, 4 males, 7 females; Doğanca, 29.VII.2007, 41° 35' 23K, 35° 56' 00D, 13m, 6 males, 3 females. **Distribution in Turkey:** Adana, Ankara, Antalya, Antakya, Artvin, Aydın, Bayburt, Bitlis, Burdur, Hakkari Çorum, Denizli, Diyarbakır, Edirne, Eğirdir, Gaziantep, Gümüşhane, Erzurum, Erzincan, Hakkari, Isparta, İzmir, Kars, Kayseri, Kahramanmaraş, Kastamonu, Konya, Mardin, Mersin, Muğla, Ordu, Osmaniye, Rize, Samsun, Sinop, Şanlıurfa, Trabzon and Van (İncekara et al. 2003; İncekara, 2004).

Laccobius striatulus (Fabricius, 1801)

Material examined: Bafra, Derbent Dam, 29.VII.2007, 41° 21' 43K, 35° 49' 04D, 70m, 3 males, 4 females; Liman Lake, 31.V.2007, 41° 41' 11K, 36° 05' 05D, 0m, 32 males, 13 females. **Distribution in Turkey:** Adapazarı, Ankara, Antakya, Antalya, Artvin, Bayburt, Bitlis, Bolu, Bursa, Çanakkale, Erzurum, Erzincan, Eskişehir, Gümüşhane, Isparta, İstanbul, İzmit, İzmir, Kütahya, Konya, Malatya, Manisa, Muğla, Rize, Sivas, Trabzon and Van (İncekara et al. 2003; İncekara, 2004; Karaman et al. 2008).

Hydrochara dichroma (Fairmaire, 1892)

Material examined: Ondokuzmayıs, Balık Lake, 41° 33' 08K, 36° 04' 52D, 0m, 1 male; Karaboğaz Lake, 29.VII.2007, 41° 20' 24K, 35° 48' 48D, 0m, 1 male; Bafra, Gernek Lake, 07.V.2008, 41° 38' 50K, 36° 04' 44D, 0m, 1 male; Liman Lake, 07.V.2008, 41° 41' 09K, 36° 01' 12D, 0m, 3 males, 2 females. **Distribution in Turkey:** Adana, Ankara, Erzincan, Erzurum and İstanbul) (İncekara *et al.* 2003; İncekara, 2001, 2004).

Paracymus sucutelleris Rosenhauer, 1856

Material examined: Ondokuzmayıs, Balık Lake, 41° 33' 08K, 36° 04' 52D, 0m, 1 male, 26.VI.2007, 41° 35' 31K, 36° 06' 44D, 2m, 3 males, 4 females, 07.V.2008, 41° 35' 16K, 36° 06' 41D, 0m, 8 males,17 females. **Distribution in Turkey:** Bingöl (Mart et al. 2006).

Limnoxenuıs niger (Gamelin, 1790)

Material examined: Ondokuzmayıs, Balık Lake, 07.V.2008, 41 35 10K, 36 0642D, 4 males, 6 females. **Remark:** Distribution of this species in Turkey was presented by İncekara et al. (2003) without detailed locality. After then, a record was reported from south-west Anatolia by Kıyak et al. (2006). This species was very abundant in the research area (especially in the Çarşamba plain).

Hydrophilus piceus (Linnaeus, 1758)

Material examined: Ondokuzmayıs, Balık Lake, 29.VIII.2007, 41° 35' 15K, 36° 06' 42D, 0m, 2 females; Karaboğaz Lake, 29.VII.2007, 41° 20' 24K, 35° 48' 48D, 0m, 1 male. **Distribution in Turkey:** Erzurum, Denizli (İncekara et al. 2003; Kıyak et al. 2006).

Helochares obscurus (Müller, 1776)

Material examined: Ondokuzmayıs, 26.VI.2006, 41° 35' 31K, 36° 06' 44D, 2m, 2 males, Balık Lake, 22.VI.2007, 41° 33' 08K, 36° 04' 52D, 0m, 3 males, 1 female; Bafra, Gernek Lake, 07.V.2008, 41° 38' 50K, 36° 04' 44D, 0m, 6 males, 14 females. **Distribution in Turkey:** Aydın (Kıyak et al. 2006). **Remark:** Besides the research area, we have also examined much additional material from Amasya, Artvin, Bayburt, Bingöl, Çorum, Giresun, Gümüşhane, Erzincan, Erzurum, Ordu, Rize, Tokat and Trabzon provinces.

Family DYTISCIDAE

Hydaticus leander (Rossi, 1790)

Material examined: Bafra, Karaboğaz Lake, 29.7.2007, 41° 40' 24K, 35° 48' 48D, 0 m. **Distribution in Turkey:** İzmir (Guéorguiev, 1981; Nilsson, 2003).

Hydaticus transversalis laevisculptus Zaitzev, 1910

Material examined: Bafra, Karaboğaz Lake, 29.7.2007, 41° 40' 24K, 35° 48' 48D, 0 m. **Distribution in Turkey:** Adana, Denizli, Kütahya (Guéorguiev, 1981; Nilsson, 2003; Kıyak et.al., 2007).

Bidessus nasutus (Sharp, 1887)

Material examined: Bafra, Liman Lake, 26.6.2007, 41° 41' 10K, 36° 01' 10D, 0 m. **Distribution in Turkey:** Afyon, Konya (Guéorguiev, 1981; Nilsson, 2003).

Hydroglyphus geminus (Fabricius, 1792)

Material examined: Bafra, Karaboğaz Lake, 29.7.2007, 41° 40' 24K, 35° 48' 48D, 0 m; Ondokuzmayıs, Balık Lake, 26.6.2007, 41° 33' 08K, 36° 04' 52D, 0 m, 29.7.2007, 41° 35' 16K, 36° 06' 41D, 0 m; Gernek Lake, 29.7.2007, 41° 38' 50K, 36° 04' 45D, 0 m, 26.6.2007, 41° 38' 49K, 36° 04' 46D, 0 m; Liman Lake, 29.7.2007, 41° 41' 11K, 36° 01' 09D, 0 m, 5.2007, 41° 41' 11K, 36° 01' 05D, 0 m. **Distribution in Turkey:** Adana, Afyon, Aksaray, Ankara, Antalya, Artvin, Aydın, Balıkesir, Bolu, Bursa, Edirne, Eskişehir, Gümüşhane, Isparta, İçel, İzmir, Kastamonu, Kayseri, Kilis, Konya, Manisa, Muğla, Rize, Toros Mountains, Trabzon (Guéorguiev,1981; Darılmaz & Kıyak, 2006; Kıyak et.al., 2007; Erman & Erman, 2008).

Hydroporus marginatus (Duftschmid, 1805)

Material examined: Ondokuzmayıs, Balık Lake, 30.5.2007, 41° 33' 07K, 36° 04' 52K, 0 m. **Distribution in Turkey:** Ankara, Erzurum, Gümüşhane, Kars, Konya, Muğla, Sivas, Trabzon (Guéorguiev, 1981; Kıyak et.al, 2007; Erman et.al., 2007).

Hydrovatus cuspidatus (Kunze, 1818)

Material examined: Ondokuzmayıs, Balık Lake, 30.5.2007, 41° 33' 07K, 36° 04' 52K, 0 m, 29.7.2007, 41° 35' 16K, 36° 06' 41D, 0 m; Bafra, Gernek Lake, 29.7.2007, 41° 38' 50K, 36° 04' 45D, 0 m; Liman Lake, 30.5.2007, 41° 41' 11K, 36° 01' 05D, 0 m. **Distribution in Turkey:** Afyon, Toros Mountains (Guéorguiev, 1981).

Hygrotus parallellogrammus (Ahrens, 1812)

Material examined: Bafra, Gernek Lake, 26.6.2007, 41° 38 49K, 36° 04 46D, 0 m. **Distribution in Turkey:** Afyon, Ankara, Erzurum, Konya, Kütahya, Toros Mountains, Tuzgölü (Guéorguiev, 1981; Erman et.al., 2007).

Hygrotus inaequalis (Fabricius, 1777)

Material examined: Ondokuzmayıs, Balık Lake, 30.5.2007, 41° 33' 07K, 36° 04' 52K, 0 m, 29.7.2007, 41° 35' 16K, 36° 06' 41D, 0 m; Bafra, Liman Lake, 29.7.2007, 41° 41' 11K, 36° 01' 09D, 0 m, 30.5.2007, 41° 41' 11K, 36° 01' 05D, 0 m; Doğanca, 29.7.2007, 41° 35' 23K, 35° 56' 00D, 10 m. **Distribution in Turkey:** Afyon, Artvin, Bolu, Erzurum, Isparta, Konya, Manisa (Guéorguiev, 1981; Balfour-Browne, 1963; Erman et.al., 2007; Erman & Erman, 2008).

Laccophilus minutus (Linnaeus, 1758)

Material examined: Bafra, Karaboğaz Lake, 29.7.2007, 41° 40' 24K, 35° 48' 48D, 0 m, Doğanca, 29.7.2007, 41° 35' 23K, 35° 56' 00D, 10 m; Ondokuzmayıs, Balık Lake, 30.5.2007, 41° 33' 07K, 36° 04' 52K, 0 m. **Distribution in Turkey:** Afyon, Aksaray, Ankara, Antalya, Artvin, Aydın, Balıkesir, Bolu, Burdur, Bursa, Denizli, Erzurum, Gümüşhane, Isparta, İzmir, Kayseri, Konya, Manisa, Rize, Sinop, Sivas, Toros Mountains, Trabzon (Guéorguiev,1981; Darılmaz & Kıyak, 2006; Kıyak et.al., 2007; Erman et.al., 2007; Erman & Erman, 2008).

Laccophilus poecilus (Klug, 1834)

Material examined: Bafra, Liman Lake, 29.7.2007, 41° 41' 11K, 36° 01' 09D, 0 m, 26.6.2007, 41° 41' 10K, 36° 01' 10D, 0 m, 30.5.2007, 41° 41' 11K, 36° 01' 05D, 0 m; Ondokuzmayıs, Balık Lake, 29.7.2007, 41° 35' 16K, 36° 06' 41D, 0 m. **Distribution in Turkey:** Adana, Afyon, Antalya, Aydın, Bolu, Erzurum, Isparta, İzmir, Konya, Manisa and Rize (Guéorguiev, 1981; Kıyak et.al., 2007; Erman et.al., 2007; Erman & Erman, 2008).

Family NOTERIDAE

Noterus clavicornis (De Geer, 1774)

Material examined: Ondokuzmayıs, Balık Lake, 30.5.2007, 41 33 07K, 36 04 52K, 0 m, 29.7.2007, 41 35 16K, 36 06 41D, 0 m; Bafra, Liman Lake, 26.6.2007, 41 41 10K, 36 01 10D, 0 m, 30.5.2007, 41 41 11K, 36 01 05D, 0 m, 29.7.2007, 41 41 11K, 36 01 09D, 0 m; Gernek Lake, 26.6.2007, 41 38 49K, 36 04 46D, 0 m, 29.7.2007, 41 38 50K, 36 04 45D, 0 m. **Distribution in Turkey:** Aksaray, Ankara, Antalya, Aydın, Balıkesir, Bilecik, Bolu, Isparta, İzmir, Kayseri, Konya, Manisa (Guéorguiev, 1968, 1981; Balfour-Browne, 1963; Nilsson, 2003; Kıyak et.al., 2007).

Noterus crassicornis (O.F. Müller, 1776)

Material examined: Ondokuzmayıs, Balık Lake, 30.5.2007, 41 33 07K, 36 04 52K, 0 m. **Distribution in Turkey:** Adana, Isparta (Guéorguiev, 1981; Nilsson, 2003).

ÇARŞAMBA PLAIN

Family HELOPHORIDAE

Helophorus griseus* Herbst, 1793

Material examined: Terme, Gölünyazı iskelesi, 29.V.2007, 41° 15' 14K, 36° 57' 55D, 0m, 3 males, 4 females; Çarşamba, Kaz Lake, 29.V.2007, 41° 21' 01K, 36° 36' 47D, 0m, 3 males, 1 female.

Helophorus brevipalpis* Bedel, 1881

Material examined: Terme, Gölünyazı iskelesi, 29.V.2007, 41° 15' 14K, 36° 57' 55D, 0m, 13 males, 8 females; Dörtyol, 29.V.2007, 41° 12' 43K, 36° 43' 13D, 4m, 8 males, 12 females; Çarşamba, İhmal Lake, 07.V.2008, 41° 21' 01K, 36° 36' 47D, 0m, 2 males, 4 females.

Helophorus minutus Fabricius, 1775
Material examined: Kaz Lake, 29.V.2007, 41° 21' 01K, 36° 36' 47D, 0m, 8 males, 7 females; Dörtyol, 29.V.2007, 41° 12' 43K, 36° 43' 13D, 4m, 3 males, 7 females. **Distribution in Turkey:** Antalya and İstanbul (İncekara et al. 2004).

* ***Helophorus obscurus*** Mulsant, 1844
Material examined: Terme, Gölünyazı iskelesi, 29.V.2007, 41° 15' 14K, 36° 57' 55D, 0m, 18 males, 21 females; Dörtyol, 29.V.2007, 41° 12' 43K, 36° 43' 13D, 4m, 7 males, 13 females.

****Helophorus strigifrons*** Thomson, 1868
Material examined: İhmal Lake, 07.V.2008, 41° 21' 01K, 36° 36' 47D, 0m, 3 males, 2 females.

****Helophorus aquaticus*** (Linnaeus, 1758)
Material examined: Terme, Gölünyazı iskelesi, 29.V.2007, 41° 15' 14K, 36° 57' 55D, 0m, 4 males, 2 females; Akgöl yanı, 06.V.2008, 41° 14' 18K, 36° 58' 29D, 0m, 5 male, 3 females.

Family HYDROPHILIDAE
****Hydrobius fuscipes*** (Linnaeus, 1758)
Material examined: Terme, Akgöl yanı, 06.V.2008, 41° 14' 18K, 36° 58' 29D, 0m, 1 males.

****Coleostoma orbiculare*** (Fabricius, 1775)
Material examined: Çarşamba, İhmal Lake, 26.VI.2007, 41° 21' 01K, 36° 36' 47D, 0m, 1 female; Terme, Simenit Lake, 26.VI.2007, 41° 17' 42K, 36° 54' 53D, 0m, 2 males, 1 females, 29.V.2007, 41° 17' 42K, 36° 54' 53D, 0m, 12 males, 17 females, 29.VIII.2007, 41° 17' 42K, 36° 54' 53D, 0m, 1 male, 1 female; Akgöl yanı, 06.V.2008, 41° 14' 18K, 36° 58' 29D, 0m, 1 male, 3 females.

****Berosus signaticollis*** (Charpentier, 1825)
Material examined: Terme, Akgöl, 26.VI.2007, 41° 16' 55K, 36° 56' 14D, 0m, 3 males, 3 females.

****Berosus affinis*** Brulle, 1922
Material examined: Çarşamba, İhmal Lake, 26.VI.2007, 41° 21' 01K, 36° 36' 47D, 0m, 26 males, 28 females, Kaz Lake, 08.VII.2007, 41° 23' 17K, 36° 54' 13D, 0m, 3 males; Terme, Akgöl, 26.VI.2007, 41° 16' 55K, 36° 56' 14D, 0m, 1 male; Simenit Lake, 26.VI.2007, 41° 17' 42K, 36° 54' 53D, 0m, 2 males, 3 females.

****Berosus sipinosus*** (Steven, 1808)
Material examined: Çarşamba, İhmal Lake, 26.VI.2007, 41° 21' 01K, 36° 36' 47D, 0m, 22 males, 30 females, 29.VIII.2007, 41° 21' 08K, 36° 36' 49D, 0m, 2 males, 5♀♀, 07.V.2008, 1 female .

****Berosus luridus*** (Linnaeus, 1761)
Material examined: Terme, Simenit Lake, 26.VI.2007, 41° 17' 42K, 36° 54' 53D, 0m, 1 male; Akgöl yanı, 06.V.2008, 41° 14' 18K, 36° 58' 29D, 0m, 2 females, 06.V.2008, 41° 16' 54K, 36° 56' 14D, 0m, 3 males.

****Laccobius gracilis*** Motschulsky, 1855
Material examined: Çarşamba, Dörtyol, 29.V.2007, 41° 12' 43K, 36° 43' 13 D, 4m, 2 males, 2 females.

****Laccobius syriacus*** Guillebeau, 1896
Material examined: Terme, Akgöl, 36.VI.2007, 41° 16' 55K, 36° 56' 14D, 0m, 2 males, 5 females; Gölyazı, Balkanlı, 28.VII.2007, 41° 14' 17K, 36° 58' 29D, 0m, 1 male.

Hydrochara dichroma (Fairmaire, 1892)
Material examined: Çarşamba, İhmal Lake, 26.VI.2007, 41° 21' 01K, 36° 36' 47D, 0m, 1 female.

Paracymus aeneus Germar, 1824
Material examined: Çarşamba, İhmal Lake, 26.VI.2007, 41° 21' 01K, 36° 36' 47D, 0m, 3 males, 4 females, Kaz Lake, 08.VII.2007, 41° 23' 17K, 36° 54' 13D, 0m, 3 males; Simenit Lake, 29.VII.2007, 41° 17' 42K, 36° 54' 53D, 0m, 1 male. **Distribution in Turkey:** without detailed locality (İncekara et al. 2003).

****Paracymus sucutelleris*** Rosenhauer, 1856
Material examined: Terme, Simenit Lake, 29.V.2007, 41° 17' 42K, 36° 54' 53D, 0m, 3 males, 1 female; 29.V.2007, 41° 21' 01K, 36° 36' 47D, 0m, 3 males, 4 females; Gölünyazı iskelesi, 29.V.2007, 41° 15' 14K, 36° 57' 55D, 0m, 38 males, 41 females, Çarşamba, İhmal Lake, 07.V.2008, 41° 21' 01K, 36° 36' 47D, 0m, 12 males, 3 females.

****Limnoxenus niger*** (Gamelin, 1790)
Material examined: Çarşamba, İhmal Lake, 26.VI.2007, 41° 21' 01K, 36° 36' 47D, 0m, 1 male, 07.V.2008, 13 males, 4 females; Terme, Simenit Lake, 26.VI.2007, 41° 17' 42K, 36° 54' 53D, 0m, 4 males, 2 females.

****Helochares obscurus*** (Müller, 1776)
Material examined: Terme, Akgöl, 26.VI.2007, 41° 16' 55K, 36° 56' 14D, 0m, 6 males, 12 females, 06.V.2008, 41° 16' 54K, 36° 56' 14D, 0m, 1 male; Gölünyazı iskelesi, 06.V.2008, 41° 15' 14K, 36° 57' 55D, 0m, 8 males, 12 females; Akgöl yanı, 06.V.2008, 41° 14' 18K, 36° 58' 29D, 0m, 1 male; Simenit Lake, 29.VII.2007, 41° 17' 42K, 36° 54' 53D, 0m, 2 males.

****Hydrophilus piceus*** (Linnaeus, 1758)
Material examined: Terme, Simenit Lake, 29.V.2007, 41° 17' 42K, 36° 54' 53D, 0m, 1 male, 29.VII.2007, 41° 17' 42K, 36° 54' 53D, 0m, 3 male, 2 females.

Hydrophilus atterimus Eschscoltz, 1822
Material examined: Terme, Akgöl, 06.V.2008, 41° 16' 54K, 36° 56' 14D, 0m, 1 female. **Distribution in Turkey:** Erzurum (İncekara et al. 2003). **Remark:** The first record of *H. atterimus was* given by İncekara et al. (2003). In this study, second record is given for Turkey.

Family DYTISCIDAE

Agabus dilatatus (Brullé, 1832)
Material examined: Çarşamba, Kaz Lake, 29.5.2007, 41° 21' 01K, 36° 36' 47D, 0 m. **Distribution in Turkey:** Adana, Ankara, Antalya, Bolu, Bursa, Gümüşhane, Isparta, İçel, İzmir, Kocaeli, Konya, Kütahya, Rize, Toros Mountains, Trabzon, Van (Balfour-Browne, 1963; Guéorguiev,1968; 1981; Nilsson, 2003).

Agabus nebulosus (Forster, 1771)
Material examined: Terme, Gölünyazı iskelesi, 29.5.2007, 41° 15' 14K, 36° 57' 55D, 0 m. **Distribution in Turkey:** Afyon, Antalya, Aydın, Burdur, Bursa, Denizli, İstanbul, İzmir, Muğla, Sinop, Toros Mountains, Trabzon (Guéorguiev, 1981; Nilsson, 2003; Kıyak et.al., 2007).

Colymbetes fuscus (Linnaeus, 1758)
Material examined: Terme, Simenit Lake, 29.8.2007, 41° 17' 42K, 36° 54' 53D, 0 m. **Distribution in Turkey:** Afyon, Aksaray, Aydın, Burdur, İzmir, Konya (Guéorguiev, 1981; Nilsson, 2003; Darılmaz & Kıyak, 2006; Kıyak et.al, 2007).

Graphoderus cinereus (Linnaeus, 1758)
Material examined: Terme, Simenit Lake, 29.8.2007, 41° 17' 42K, 36° 54' 53D, 0 m. **Distribution in Turkey:** Afyon, Ağrı (Guéorguiev, 1981; Nilsson, 2003; Kıyak et.al., 2007).

*****Bidessus nasutus*** (Sharp, 1887)
Material examined: Terme, Gölünyazı iskelesi, 29.5.2007, 41° 15' 14K, 36° 57' 55D, 0 m.

*****Hydroglyphus geminus*** (Fabricius, 1792)
Material examined: Terme, Gölünyazı iskelesi, 29.5.2007, 41° 15' 14K, 36° 57' 55D, 0 m; Simenit Lake, 26.6.2007, 41° 14' 19K, 36° 58' 29D, 0 m, 29.8.2007, 41° 17' 42K, 36° 54' 53K, 0 m; Çarşamba, İhmal Lake, 26.6.2007, 41° 21' 01K, 36° 36' 47D, 0 m.

*****Hydroporus marginatus*** (Duftschmid, 1805)
Material examined: Terme, Gölünyazı iskelesi, 29.5.2007, 41° 15' 14K, 36° 57' 55D, 0 m; Simenit Lake, 26.6.2007, 41° 14' 19K, 36° 58' 29D, 0m.

Hydroporus palustris (Linnaeus, 1761)
Material examined: Terme, Gölünyazı iskelesi, 29.5.2007, 41° 15' 14K, 36° 57' 55D, 0 m; Ladik, Gölünyazı Lake, 31.5.2007, 40° 54' 17K, 35° 59' 05D, 863 m; Simenit Lake, 29.8.2007, 41° 17' 42K, 36° 54' 53K, 0 m. **Distribution in Turkey:** Asie mineure, Erzurum (Guéorguiev, 1981; Erman et.al, 2007).

Hydroporus planus (Fabricius, 1781)
Material examined: Terme, Gölünyazı iskelesi, 29.5.2007, 41° 15' 14K, 36° 57' 55D, 0 m. **Distribution in Turkey:** Antalya, Balıkesir, Bursa, Erzurum, İstanbul, Kars, Toros Mountains, Trabzon (Guéorguiev, 1981; Kıyak et.al, 2007; Erman et.al., 2007).

Porhydrus lineatus (Fabricius, 1775)
Material examined: Terme, Gölünyazı iskelesi, 29.5.2007, 41° 15' 14K, 36° 57' 55D, 0 m; Simenit Lake, 29.8.2007, 41° 17' 42K, 36° 54' 53D, 0 m, 26.6.2007, 41° 14' 19K, 36° 58 29D, 0m; Gölyazı, Akgöl, 28.8.2007, 41° 16 54K, 36° 56' 15D, 0 m. **Distribution in Turkey:** Trabzon (Guéorguiev, 1981).

*****Hygrotus inaequalis*** (Fabricius, 1777)
Material examined: Terme, Simenit Lake, 29.8.2007, 41° 17' 42K, 36° 54' 53D, 0 m; Gölünyazı iskelesi, 29.5.2007, 41° 15' 14K, 36° 57' 55D, 0 m; Gölyazı, Akgöl, 28.8.2007, 41° 16' 54K, 36° 56' 15D, 0 m.

Hyphydrus ovatus (Linnaeus, 1761)
Material examined: Terme, Gölünyazı iskelesi, 29.5.2007, 41° 15' 14K, 36° 57' 55D, 0 m. **Distribution in Turkey:** Amasya, Bolu, Erzurum (Balfour-Browne, 1963; Guéorguiev,1981; Biström, 1982; Erman et. al., 2007).

*****Laccophilus minutus*** (Linnaeus, 1758)
Material examined: Terme, Simenit Lake, 29.8.2007, 41° 17' 42K, 36° 54' 53D, 0, 26.6.2007, 41° 17' 14K, 36° 54' 15D, 0 m; m; Terme, Gölyazı, Akgöl, 28.8.2007, 41° 16' 54K, 36° 56' 15D, 0 m.

*****Laccophilus poecilus*** (Klug, 1834)
Material examined: Terme, Gölünyazı iskelesi, 29.5.2007, 41° 15' 14K, 36° 57' 55D, 0 m; Simenit Lake, 29.8.2007, 41° 17' 42K, 36° 54' 53D, 0 m, 29.8.2007, 41° 17' 42K, 36° 54' 53K, 0 m; Gölyazı, Akgöl, 28.8.2007, 41° 16' 54K, 36° 56' 15D, 0 m.

Family NOTERIDAE

*****Noterus clavicornis*** (De Geer, 1774)
Material examined: Terme, Simenit Lake, 29.8.2007, 41 17 42K, 36 54 53K, 0 m, 26.6.2007, 41 17 14K, 36 54 15D, 0 m, 26.6.2007, 41 14 19K, 36 58 29D, 0m.

*__Noterus crassicornis__ (O.F. Müller, 1776)

Material examined: Ondokuzmayıs, Balık Lake, 30.5.2007, 41 33 07K, 36 04 52K, 0 m.

Family HALIPLIDAE

Peltodytes caesus (Duftschmid, 1805)

Material examined: Terme, Gölyazı, Akgöl, 28.8.2007, 41 16 54K, 36 56 18D, 0 m; Gölyazı, 28.8.2007, 41 15 16K, 365753D, 0 m; Simenit Lake, 29.8.2007, 41 17 42K, 36 54 53K, 0 m, 26.6.2007, 41 14 14K, 36 58 29D, 0m. **Distribution in Turkey:** Adana, Afyon, Aksaray, Aydın, Balıkesir, Bolu, Eskişehir, Isparta, İzmir, Konya, Toros Mountains (Guéorguiev, 1968, 1981; Vondel, 2003; Darılmaz & Kıyak, 2006).

Haliplus ruficollis (De Geer, 1774)

Material examined: Terme, Gölyazı, Akgöl, 28.8.2007, 41 16 54K, 36 56 18D, 0 m. **Distribution in Turkey:** Without detailed locality data (Guéorguiev, 1981; Vondel, 2003). **Remarks:** This species is confirmed for Turkey and the first detailed records are given.

*Locality information presented in detail before.

DISCUSSION

Totally, 50 species of aquatic Coleoptera belonging to 5 families and 25 genera were determined in the research area. Of these, 22 species are Adephaga and 28 are Polyphaga member. Besides the newly recorded for the Turkish fauna, *H. strigifrons*, all species are recorded from the research area for the first time.

12 genera of the family Dytiscidae were found in both plain. Of these, 7 genera placed in Bafra plain and of 9 in Çarşamba plain. Only 4 genara (*Bidessus*, *Hydroglyphus*, *Hydroporus* and *Laccophilus*) are common for both plains.

1 Noterid genus (*Noterus*) was determined in both plains. Two *Noterus* species (*N. clavicornis and N. crassicornis*) were common for both plains.

2 Haliplid genera (*Peltodytes and Haliplus*) were found in Çarşamba plain only. Naturally, the species *Peltodytes caesus* and *Haliplus* (*H.*) *ruficollis* belonging to these genera were not represented in the Bafra plain.

The Hydrophilidae family was represented with 9 genera and 17 species in the research area. All genera were found in both plain, but species were different. While the species *Laccobius (D.) obscuratus* and *L. striatulus* were not represented in Çarşamba plain, the species *Paracymus aeneus* and *Hydrophilus atterimus* were not represented in Bafra plain.

Although the Helophoridae are a large family consisting of a single subfamily only of a single genus, *Helophorus*, poorly represented in the research area. Totally, 10 species found in both plain. While the species *H. terminassianae*, *H. daedalus*, *H. syriacus*, *H. micans* and *H. griseus* were not represented in Çarşamba plain, the species *H. minutus* was not represented in Bafra plain.

Generally, it is thought that similar geographies and habitats are represented by the similar fauna, but this does not occur in every condition as is seen from this study.

LITERATURE CITED

Balfour – Browne, J. 1963. Professor E. Janssens Journeys to Greece, 1961, and Anatolia, 1962. Haliplidae, Noteridae and Dytiscidae, Bulletin de Institut Royal des Sciences Naturalles de Belgique Entomologie, 39 (17): 1–3.

Biström, O. 1982. A revision of the genus *Hyphydrus* Illiger (Coleoptera, Dytiscidae). Acta Zool. Fennica, 1-121

Darılmaz, M. & Kıyak, S. 2006. A Contribution to the Knowledge of the Turkish Water Beetles Fauna (Coleoptera), Munis Entomology & Zoology, 1 (1): 129–144.

Erman, Ö. K., Erman, O. & Kasapoğlu, A. 2007. Dytiscidae (Coleoptera) in the Erzurum province of Northeastern Turkey and notes on their distribution, Entomologische Zeitschrift, 117 (1): 27-36.

Erman, Ö. K. & Erman, O. 2008. Dytiscidae Species (Coleoptera) In Artvin and Rize Provinces of Northeastern Turkey. Munis Entomology & Zoology, 3 (2): 582-593.

Guéorguiev, V. B. 1968. Notes sur les Coleopteres hydrocanthares (Haliplidae et Dytiscidae) de Yougoslavie, de Grece et de Turquie asiatique, Izv. Zool. Inst. Sof., 27: 31-39.

Guéorguiev, V. B. 1981. Resultat de L'expedition Zoologique du musee national de parague en Turquie Coleoptera: Haliplidae, Dytiscidae, Gyrinidae, Acta Entomologica Musei Nationalis Pragae, 40: 399–424.

İncekara, Ü., Mart, A. & Erman, O. 2003. Check-list of the Hydrophilidae (Coleoptera) Species of Turkey and a New Record for the Turkish Fauna. Turkish Journal of Zoology, 27 (1): 47-53.

İncekara, Ü., Mart, A. & Erman, O. 2004. Distribution of Turkish *Helophorus* Fabricius, 1775 (Coleoptera, Helophoridae) I. Subgenus *Rhopalhelophorus*, with two new Records. Gazi Entomological Research Society, 6(2): 51-62.

İncekara, Ü., Mart, A. & Erman, O. 2005. Distribution of Turkish *Helophorus* Fabricius, 1775 (Coleoptera, Helophoridae) II. Subgenus *Atracthelophorus*, with two new Records and Some Ecological Notes. Turkish Journal of Zoology, 29(3): 237-242.

Kıyak, S., Darılmaz, M., Salur A. & Canbulat, S. 2007. Diving Beetles (Coleoptera: Dytiscidae, Noteridae) of the Soutwestern Anatolian Region of Turkey, Munis Entomology & Zoology, 2 (1): 103–114.

Karaman, B., Kıyak, S. & Darılmaz, M. C. 2008. Faunistic Study of the Aquatic Beetles (Coleoptera) of Trabzon Province (Turkey). Munis Entomology & Zoology, 3 (1): 437-446.

Mart, A., İncekara, Ü. & Erman, O. 2006. Studies on Turkish Hydrophilidae (Coleoptera) II. Genus *Paracymus* Thomson, 1867. Gazi Entomological Research Society, 8(3): 1-4.

Nilsson, A. N. 2003. Noteridae, Dytiscidae, pp. 33-78 - In I. Löbl & A. Smetana (editors): Catalogue of Palaearctic Coleoptera, Vol. 1. Stenstrup: Apollo Boks, 819 pp.

Vondel, B. J. van. 2003. Haliplidae, pp. 30-33.- In: Löbl, I.; Smetana, A. (eds): Catalogue of Palaearctic Coleoptera, Vol. 1. Stenstrup: Apollo Books, 819 pp.

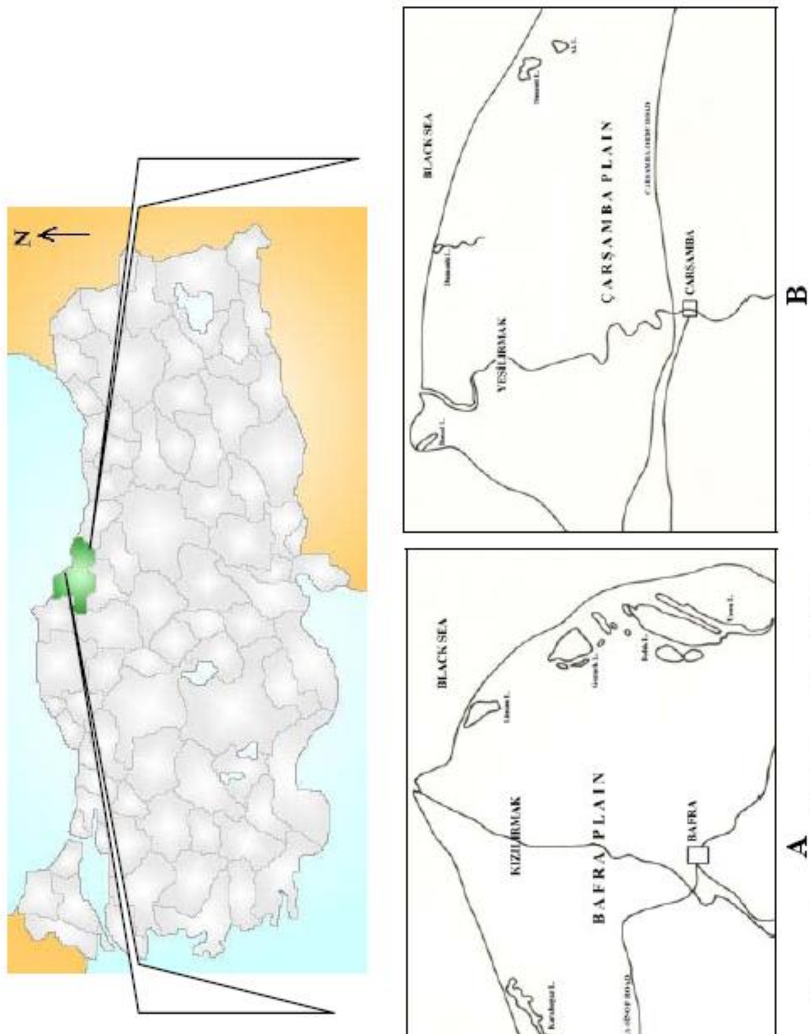

Figure 1. Research area. A) Bafra plain. B) Çarşamba plain.

Table I. Comparision of the species (Adephaga) number and variety of both plains.

DYTISCIDAE		NOTERIDAE		HALIPLIDAE	
BAFRA	**ÇARŞAMBA**	**BAFRA**	**ÇARŞAMBA**	**BAFRA**	**ÇARŞAMBA**
Hydaticus leander	*Agabus dilatatus*	*Noterus clavicornis*	*Noterus clavicornis*	-	*Peltodytes caesus*
H. transversalis laevisculptus	*Agabus nebulosus*	*N. crassicornis*	*N. crassicornis*	-	*Haliplus ruficollis*
Bidessus nasutus	*Colymbetes fuscus*	-	-	-	-
Hydroglyphus geminus	*Graphoderus cinereus*	-	-	-	-
Hydroporus marginatus	*Bidessus nasutus*	-	-	-	-
Hydrovatus cuspidatus	*Hydroglyphus geminus*	-	-	-	-
Hygrotus parallellogrammus	*Hydroporus marginatus*	-	-	-	-
H. inaequalis	*H. palustris*	-	-	-	-
Laccophilus minutus	*H. planus*	-	-	-	-
L. poecilus	*Porhydrus lineatus*	-	-	-	-
-	*H. inaequalis*	-	-	-	-
-	*Hyphydrus ovatus*	-	-	-	-
-	*Laccophilus minutus*	-	-	-	-
-	*L. poecilus*	-	-	-	-

Table II. Comparision of the species (Polyphaga) number and variety of both plains.

HYDROPHILIDAE		HELOPHORIDAE	
BAFRA	**ÇARŞAMBA**	**BAFRA**	**ÇARŞAMBA**
Hydrobius fuscipes	*Hydrobius fuscipes*	*Helophorus brevipalpis*	*Helophorus griseus*
Coleostoma orbculare	*Coleostoma orbicılare*	*H. strigifrons*	*H. minutus*
Berosus signaticolis	*Berosus signaticolis*	*H. obscurus*	*H. brevipalpis*
B. affinis	*B. affinis*	*H. aquaticus*	*H. obscurus*
B. sipinosus	*B. sipinosus*	*H. terminassianae*	*H. strigifrons*
B. luridus	*B. luridus*	*H. daedalus*	*H. aquaticus*
Laccobilis gracilis	*Laccobilis gracilis*	*H. syriacus*	-
L. syriacus	*L. syriacus*	*H. micans*	-
L. striatulus	*Hydrochara dichroma*	*H. griseus*	-
Laccobius obscuratus	*Paracymus aeneus*	-	-
Hydrochara dichroma	*P. sucutelleris*	-	-
Paracymus sucutelleris	*Limnoxenuıs niger*	-	-
Limnoxenuıs niger	*Helochares obscurus*	-	-
Hydrophilus piceus	*Hydrophilus piceus*	-	-
Helochares obscurus	*H. atterimus*	-	-

NOMENCLATURAL CHANGES FOR FIVE PREOCCUPIED SCARAB BEETLE GENUS GROUP NAMES (COLEOPTERA: SCARABAEIDAE)

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[Özdikmen, H. 2009. Nomenclatural changes for five preoccupied scarab beetle genus group names (Coleoptera: Scarabaeidae). Munis Entomology & Zoology, 4 (1): 139-147**]**

ABSTRACT: Five junior homonyms were detected among the scarab beetle genera and the following replacement names are proposed: in Dynastinae: *Carneoryctes* nom. nov. for *Cryptoryctes* Carne, 1957; *Carneodon* nom. nov. for *Neodon* Carne, 1957; in Scarabaeinae: *Amartinezus* nom. nov. for *Eurysternodes* Martinez, 1988; in Rutelinae: *Strigidia* Burmeister, 1844 substitute name for *Odontognathus* Laporte, 1840 and in Melolonthinae: *Lutfius* nom. nov. for *Colpomorpha* Szito, 1994. Accordingly, new combinations are herein proposed for the species currently included in these genera: *Carneoryctes ater* (Lea, 1917) comb. nov.; *Carneoryctes brittoni* (Carne, 1957) comb. nov.; *Carneoryctes griseopilosus* (Lea, 1917) comb. nov.; *Carneoryctes minchami* (Carne, 1981) comb. nov.; *Carneoryctes montrosus* (Blackburn, 1895) comb. nov.; *Carneoryctes nigripennis* (Lea, 1917) comb. nov.; *Carneoryctes peterseni* (Endrodi, 1967) comb. nov.; *Carneoryctes pimbus* (Carne, 1957) comb. nov.; *Carneoryctes psilus* (Carne, 1957) comb. nov.; *Carneoryctes semiclavus* (Lea, 1917) comb. nov.; *Carneoryctes sulcatus* (Arrow, 1914) comb. nov.; *Carneoryctes tectus* (Blackburn, 1892) comb. nov.; *Carneoryctes tricornutus* (Howden & Maly, 2005) comb. nov.; *Carneoryctes trifidus* (Blackburn, 1895) comb. nov.; *Carneoryctes truncatus* (Carne, 1957) comb. nov.; *Carneoryctes wingarus* (Carne, 1957) comb. nov.; *Carneodon bidens* (Blackburn, 1896) comb. nov.; *Carneodon glauerti* (Carne, 1957) comb. nov.; *Carneodon intermedius* (Blackburn, 1896) comb. nov.; *Carneodon laevicollis* (Macleay, 1873) comb. nov.; *Carneodon laevipennis* (Blackburn, 1896) comb. nov.; *Carneodon laevis* (Burmeister, 1847) comb. nov.; *Carneodon meyricki* (Blackburn, 1896) comb. nov.; *Carneodon occidentalis* (Macleay, 1888) comb. nov.; *Carneodon pecuarius* (Reiche, 1860) comb. nov.; *Carneodon simplex* (Carne, 1957) comb. nov., *Amartinezus velutinus* (Bates, 1887) comb. nov. and *Lutfius parvus* (Szito, 1994) comb. nov..

KEY WORDS: nomenclatural changes, homonymy, replacement names, Coleoptera, Scarabaeidae, Dynastinae, Scarabaeinae, Rutelinae, Melolonthinae.

Five previously proposed scarab beetle genus group names are nomenclaturally invalid, as the genus group names have already been used by a different authors in Mammalia, Pisces, Acari and Insecta. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these genus group names.

TAXONOMY
Family SCARABAEIDAE

Subfamily DYNASTINAE
Genus *CARNEORYCTES* nom. nov.

Cryptoryctes Carne, 1957. A systematic revision of the Australian Dynastinae. C.S.I.R.O. Melbourne: 154. (İnsecta: Coleoptera: Scarabaeoidea: Scarabaeidae: Dynastinae).

Preoccupied by *Cryptoryctes* Reed, 1954. J. Paleont., 28, 103. (Mammalia: Eutheria: Lipotyphla: Micropternodontidae).

Remarks: The name *Cryptoryctes* was initially introduced by Reed, 1954 for a genus of the mammals family Micropternodontinae (with the type species *Cryptoryctes kayi* Reed, 1954). This genus is not extant. It was assigned to Micropternodontidae by Reed (1954) and McKenna & Bell (1997). Subsequently, Carne, 1957 erected a new Australian scarab beetle genus of the family Scarabaeidae (with the type species *Pseudoryctes tectus* Blackburn, 1892 by original designation under the same generic name. Thus, the genus *Cryptoryctes* Carne, 1957 is a junior homonym of the genus *Cryptoryctes* Reed, 1954. According to Article 60 of the International Code of Zoological Nomenclature, I propose for the genus *Cryptoryctes* Carne, 1957 the new replacement name *Carneoryctes* **nom. nov.**

Etymology: The name is dedicated to P. B. Carne who is current author of the genus name *Cryptoryctes*.

Summary of nomenclatural changes:

Carneoryctes **nom. nov.**
pro *Cryptoryctes* Carne, 1957 (nec Reed, 1954)

Carneoryctes ater (Lea, 1917) **comb. nov.**
from *Cryptoryctes ater* (Lea, 1917)
Pseudoryctes ater Lea, 1917
Distr.: Australian (S Australia)

Carneoryctes brittoni (Carne, 1957) **comb. nov.**
from *Cryptoryctes brittoni* Carne, 1957
Distr.: Australian (W Australia)

Carneoryctes griseopilosus (Lea, 1917) **comb. nov.**
from *Cryptoryctes griseopilosus* (Lea, 1917)
Pseudoryctes griseopilosus Lea, 1917
= *Pseudoryctes friseopilosus* Lea, 1917
Distr.: Australian (S Australia)

Carneoryctes minchami (Carne, 1981) **comb. nov.**
from *Cryptoryctes minchami* Carne, 1981
Distr.: Australian (S Australia)

Carneoryctes montrosus (Blackburn, 1895) **comb. nov.**
from *Cryptoryctes montrosus* (Blackburn, 1895)
Pseudoryctes montrosus Blackburn, 1895
Distr.: Australian (W Australia)

Carneoryctes nigripennis (Lea, 1917) **comb. nov.**
from *Cryptoryctes nigripennis* (Lea, 1917)
Pseudoryctes nigripennis Lea, 1917
Distr.: Australian (Queensland)

Carneoryctes peterseni (Endrodi, 1967) **comb. nov.**
from *Cryptoryctes peterseni* Endrodi, 1967
Distr.: Australian (Bismarc Archipel)

Carneoryctes pimbus (Carne, 1957) **comb. nov.**
from *Cryptoryctes pimbus* Carne, 1957
Distr.: Australian (C Australia)

Carneoryctes psilus (Carne, 1957) **comb. nov.**
from *Cryptoryctes psilus* Carne, 1957
Distr.: Australian (W Australia)

Carneoryctes semiclavus (Lea, 1917) **comb. nov.**
from *Cryptoryctes semiclavus* (Lea, 1917)
Pseudoryctes semiclavus Lea, 1917
Distr.: Australian (S Australia)

Carneoryctes sulcatus (Arrow, 1914) **comb. nov.**
from *Cryptoryctes sulcatus* (Arrow, 1914)
Pseudoryctes sulcatus Arrow, 1914
Distr.: Australian (Queensland)

Carneoryctes tectus (Blackburn, 1892) **comb. nov.**
from *Cryptoryctes tectus* (Blackburn, 1892)
Pseudoryctes tectus Blackburn, 1892
Distr.: Australian (S Australia)

Carneoryctes tricornutus (Howden & Maly, 2005) **comb. nov.**
from *Cryptoryctes tricornutus* Howden & Maly, 2005
Distr.: Australian (S Australia)

Carneoryctes trifidus (Blackburn, 1895) **comb. nov.**
from *Cryptoryctes trifidus* (Blackburn, 1895)
Pseudoryctes trifidus Blackburn, 1895
Distr.: Australian (Queensland)

Carneoryctes truncatus (Carne, 1957) **comb. nov.**
from *Cryptoryctes truncatus* Carne, 1957
Distr.: Australian (Queensland)

Carneoryctes wingarus (Carne, 1957) **comb. nov.**
from *Cryptoryctes wingarus* Carne, 1957
Distr.: Australian (W Australia)

Genus *CARNEODON* nom. nov.

Neodon Carne, 1957. A systematic revision of the Australian Dynastinae. C.S.I.R.O. Melbourne: 41, 46. (İnsecta: Coleoptera: Scarabaeoidea: Scarabaeidae: Dynastinae). Preoccupied by *Neodon* Horsfield, 1841. J. Asiat. Soc. Bengal 10. (Mammalia: Rodentia: Muroidea: Cricetidae: Arvicolinae).

Remarks: The generic name *Neodon* was proposed by Horsfield, 1841 with the type species *Neodon sikimensis* Horsfield, 1841 in Mammalia. Wilson & Reeder (2005) gave it as a genus. They stated that "*it maintained as a genus by some specialists (Ellerman, 1941; Hinton, 1923, 1926a; Zagorodnyuk, 1990, 1992c), as a subgenus of Pitymys by others (Corbet, 1978c; Ellerman, 1941; Ellerman and Morrison-Scott,* *1951), or a subgenus of Microtus (G. M. Allen, 1940; Gromov and Erjabeva, 1995; Gromov and Polyakov, 1977; Musser and Carleton, 1993; Pavlinov et al., 1995a). Hinton (1923) included forresti, irene, oniscus (= irene), and carruthersi (= juldaschi) in Neodon*". Later, the scarab beetle genus *Neodon* was described by Carne, 1957 with the type species *Cheiroplatys pecuarius* Reiche, 1860 by original designation. However, the name *Neodon* Carne, 1957 is invalid under the law of homonymy, being a junior homonym of *Neodon* Horsfield, 1841. In accordance with article 60 of the International Code of Zoological Nomenclature, I propose to substitute the junior homonym name *Neodon* Carne, 1957 for the nomen novum *Carneodon*.

Etymology: The name is dedicated to P. B. Carne who is current author of the genus name *Neodon*.

Summary of nomenclatural changes:

Carneodon **nom. nov.**
pro *Neodon* Carne, 1957 (nec Horsfield, 1841)

Carneodon bidens (Blackburn, 1896) **comb. nov.**
from *Neodon bidens* (Blackburn, 1896)
Isodon bidens Blackburn, 1896
Distr.: Australian (Queensland, C Australia)

Carneodon glauerti (Carne, 1957) **comb. nov.**
from *Neodon glauerti* Carne, 1957
Distr.: Australian (NW and C Australia)

Carneodon intermedius (Blackburn, 1896) **comb. nov.**
from *Neodon intermedius* (Blackburn, 1896)
Isodon intermedius Blackburn, 1896
Distr.: Australian (NW Australia and New South Wales)

Carneodon laevicollis (Macleay, 1873) **comb. nov.**
from *Neodon laevicollis* (Macleay, 1873)
Isodon laevicollis Macleay, 1873
Distr.: Australian

Carneodon laevipennis (Blackburn, 1896) **comb. nov.**
from *Neodon laevipennis* (Blackburn, 1896)
Isodon laevipennis Blackburn, 1896
Distr.: Australian (NW Australia and Queensland)

Carneodon laevis (Burmeister, 1847) **comb. nov.**
from *Neodon laevis* (Burmeister, 1847)
Pimelopus laevis Burmeister, 1847
Isodon novitius Blackburn, 1897
Distr.: Australian (W Australia and Queensland)

Carneodon meyricki (Blackburn, 1896) **comb. nov.**
from *Neodon meyricki* (Blackburn, 1896)
Isodon meyricki Blackburn, 1896
Distr.: Australian (W Australia)

Carneodon occidentalis (Macleay, 1888) **comb. nov.**
from *Neodon occidentalis* (Macleay, 1888)
Cheiroplatys occidentalis Macleay, 1888
Distr.: Australian (NW Australia)

Carneodon pecuarius (Reiche, 1860) **comb. nov.**
from *Neodon pecuarius* (Reiche, 1860)
Cheiroplatys pecuarius Reiche, 1860
= *Isodon puncticollis* Macleay, 1871
= *Isodon subcornutus* Fairmaire, 1879
= *Heteronychus lucidus* Macleay, 1888
= *Isodon picipennis* Macleay, 1888
= *Trissodon denticeps* Arrow, 1941
Distr.: Australian (Australia)

Carneodon simplex (Carne, 1957) **comb. nov.**
from *Neodon simplex* Carne, 1957
Distr.: Australian (W Australia)

Subfamily SCARABAEINAE
Genus *AMARTINEZUS* nom. nov.

Eurysternodes Martinez, 1988. Entomol Basil 12: 281. (Insecta: Coleoptera: Scarabaeoidea: Scarabaeidae: Scarabaeinae). Preoccupied by *Eurysternodes* Schuster & Summer, 1978. International J. Acarol. 4: 303. (Acari: Parasitiformes: Mesostigmata: Diarthrophalloidea: Diarthrophallidae).

Remarks: The generic name *Eurysternodes* Schuster & Summer, 1978 was proposed for a genus of Acari with the type species *Brachytremella tragardhi* Womersley, 1961. The genus is still used as a valid generic name in the family Diarthrophallidae. Subsequently, the generic name *Eurysternodes* Martinez, 1988 was introduced for a new scarab beetle genus group (with the type species *Eurysternodes velutinus* Bates, 1887) of the family Scarabaeidae. *Eurysternodes* Martinez, 1988 was accepted by some authors (e.g. Vaz-De-Mello, 2000) as a subgenus of the genus *Eurysternus* Dalman, 1824. Thus, the generic name *Eurysternodes* Martinez, 1988 is a junior homonym of the genus *Eurysternodes* Schuster & Summer, 1978. According to Article 60 of the International Code of Zoological Nomenclature, I propose for the genus *Eurysternodes* Martinez, 1988 the new replacement name *Amartinezus* **nom. nov.**

Etymology: The name is dedicated to A. Martinez who is current author of the preexisting generic name *Eurysternodes*.

Summary of nomenclatural changes:

Amartinezus **nom. nov.**
pro *Eurysternodes* Martinez, 1988 (nec Schuster & Summer, 1978)

Amartinezus velutinus (Bates, 1887) **comb. nov.**
from *Eurysternodes velutinus* (Bates, 1887)
Eurysternus velutinus Bates, 1887
= *Eurysternus hypocrita* Balthasar, 1939

Distr.: Neotropical (Panama, Colombia, French Guiana, Suriname, Guyana, Ecuador, Peru, Brasil, Mexico, Venezuela, Bolivia)

Subfamily RUTELINAE
Genus *PELIDNOTA* Macleay, 1819
Subgenus *STRIGIDIA* Burmeister, 1844 new name

Odontognathus Laporte, 1840. H. N. Anim. artic. (Col.), 2, 137. (Insecta: Coleoptera: Scarabaeoidea: Scarabaeidae: Rutelinae). Preoccupied by *Odontognathus* Lacepède, 1800. Hist. Nat. Poiss., 2, 218. (Chordata: Actinopterygii: Clupeiformes: Clupeidae).

Remarks: The fish genus *Odontognathus* was erected by Lacepède, 1800 with the type species *Odontognathus mucronatum* Lacepède, 1800 by monotypy. It is still used as a valid generic name and it has three species currently. Later, the scarab beetle generic name *Odontognathus* was proposed by Laporte, 1840 with the type species *Odontognathus unicolor* Laporte, 1840 that is a synonym of the species *Pelidnota* (*Odontognathus*) *cuprea* (Germar, 1828). In 1975, this genus was placed by Hardy in the genus *Pelidnota* Macleay, 1819 as a subgenus. However, the name *Odontognathus* Laporte, 1840 is invalid under the law of homonymy, being a junior homonym of *Odontognathus* Lacepède, 1800.
The generic name *Odontognathus* Laporte, 1840 (type species: *O. unicolor* Laporte, 1840) has three subjective junior synonyms as *Strigidia* Burmeister, 1844 (type species: *Pelidnota cuprea* Germar, 1824); *Delipnia* Casey, 1915 (type species: *Pelidnota belti* Sharp, 1877) and *Ganonota* Ohaus, 1915 (type species: *Rutela cuprea* Germar, 1824). So, in accordance with the International Code of Zoological Nomenclature, I propose to substitute the junior homonym name *Odontognathus* Laporte, 1840 for the oldest name "senior subjective synonym name" *Strigidia* Burmeister, 1844 as a replacement name.

Summary of nomenclatural changes:

Genus *Pelidnota* Macleay, 1819
  syn. *Aglycoptera* Sharp, 1885 (type species: *A. lacerdae* Sharp, 1885)
  syn. *Pelidnota* (*Pelidnotidia*) Casey, 1915 (type species: *P. strigosa* Laporte, 1840)

This genus includes approximately 120 species (incl. two incertae sedis species).

Subgenus *Pelidnota* Macleay, 1819
  syn. *Aglycoptera* Sharp, 1885 (type species: *A. lacerdae* Sharp, 1885)
  syn. *Pelidnota* (*Pelidnotidia*) Casey, 1915 (type species: *P. strigosa* Laporte, 1840)

This subgenus includes 47 species.

Subgenus *Chalcoplethis* Burmeister, 1844 (type species: *Chrysophora kirbyi* Gray, 1832)
  syn. *Epichalcoplethis* F. Bates, 1904 (type species: *Pelidnota velutipes* Arrow, 1900)

This subgenus includes 23 species.

Subgenus *Strigidia* Burmeister, 1844 **substitute name**
syn. *Odontognathus* Laporte, 1840 (type species: *O. unicolor* Laporte, 1840)
syn. *Strigidia* Burmeister, 1844 (type species: *Pelidnota cuprea* Germar, 1824)
syn. *Delipnia* Casey, 1915 (type species: *Pelidnota belti* Sharp, 1877)
syn. *Ganonota* Ohaus, 1915 (type species: *Rutela cuprea* Germar, 1824)

This subgenus includes 46 species. The species list of this subgenus as follows:

Pelidnota acutipennis Bates, 1904
Pelidnota adrianae Martinez, 1982
Pelidnota assumpta Ohaus, 1928
Pelidnota belti Sharp, 1877
Pelidnota bivittata (Swederus, 1787)
Pelidnota boyi Ohaus, 1928
Pelidnota crassipes Ohaus, 1905
Pelidnota cuprea (Germar, 1824)
Pelidnota cupripes Perty, 1832
Pelidnota discicollis Ohaus, 1912
Pelidnota dubia Bates, 1904
Pelidnota ebenina (Blanchard, 1842)
Pelidnota flavovittata Perty, 1832
Pelidnota fusciventris Ohaus, 1905
Pelidnota gabrielae Martinez, 1979
Pelidnota glaberrima Blanchard, 1850
Pelidnota gounellei Ohaus, 1908
Pelidnota gracilis (Gory, 1834)
Pelidnota impressicollis Ohaus, 1925
Pelidnota labyrinthophallica Solis & Moron, 1994
Pelidnota liturella (Kirby, 1818)
Pelidnota matogrossensis Frey, 1976
Pelidnota nadiae Martinez, 1978
Pelidnota nitescens Vigors, 1825
Pelidnota ohausi Frey, 1976
Pelidnota plicipennis Ohaus, 1934
Pelidnota pubes Ohaus, 1913
Pelidnota pulchella (Kirby, 1818)
Pelidnota purpurea Burmeister, 1844
Pelidnota quadripunctata Bates, 1904
Pelidnota riedeli (Ohaus, 1905)
Pelidnota rubripennis (Burmeister, 1844)
Pelidnota santidomini Ohaus, 1905
Pelidnota sericeicollis Frey, 1976
Pelidnota similis Ohaus, 1908
Pelidnota soederstroemi Ohaus, 1908
Pelidnota striatopunctata (Kirsch, 1885)
Pelidnota testaceovirens Blanchard, 1850
Pelidnota tibialis Burmeister, 1844
Pelidnota uncinata Ohaus, 1930
Pelidnota vitalisi Ohaus, 1925
Pelidnota vitticollis Burmeister, 1844
Pelidnota xanthopyga Hardy, 1975
Pelidnota xanthospila Germar, 1824
Pelidnota yungana Ohaus, 1934
Pelidnota zikani Ohaus, 1922

Subfamily MELOLONTHINAE
Genus *LUTFIUS* nom. nov.

Colpomorpha Szito, 1994. Journal of the Australian Entomological Society 33(4), 30 November: 363. (Insecta: Coleoptera: Scarabaeoidea: Scarabaeidae: Melolonthinae). Preoccupied by *Colpomorpha* Meyrick, 1929. Exot. Microlep., 3, 528. (Insecta: Lepidoptera: Gelechoidea: Oecophoridae: Oecophorinae).

Remarks: The moth genus *Colpomorha* was established by Meyrick, 1929 with the type species *Colpomorpha orthomeris* Meyrick, 1929 by monotypy in Lepidoptera. It was described in the "Gelechiadae" and it was transferred to the Oecophoridae by Clarke (1955). It is still used as a valid generic name. Subsequently, the Australian scarab beetle generic name *Colpomorpha* was proposed by Szito, 1994 with the type species *Colpomorpha parva* Szito, 1994 by monotypy and original designation in Melolonthinae. However, the name *Colpomorpha* Szito, 1994 is invalid under the law of homonymy, being a junior homonym of *Colpomorpha* Meyrick, 1929. So, in accordance with the article 60 International Code of Zoological Nomenclature, I propose to substitute the junior homonym name *Colpomorpha* Szito, 1994 for the nomen novum *Lutfius* as a replacement name.

Etymology: The name is dedicated to my friend Lütfi Özden (Turkey). It is masculine in gender.

Summary of nomenclatural changes:

Lutfius **nom. nov.**
pro *Colpomorpha* Szito, 1994 (nec Meyrick, 1929)

Lutfius parvus (Szito, 1994) **comb. nov.**
from *Colpomorpha parva* Szito, 1994
Distr.: Australian (W Australia)

Note: I know that Dr. Andras Szito (Australia) is alive. This status on homonymy was informed by me to Dr. Andras Szito who is the current author of the genus name at least two years ago. Paper on this genus was prepared by me. Then it was sent to Dr. Szito. Finally we came to an agreement to publish it in the Australian Journal of Entomology. However, I have not been in communication with Dr. Szito since then, despite all my efforts. So I have decided to publish it here.

LITERATURE CITED

Carne, P. B. 1957. A systematic revision of the Australian Dynastinae (Coleoptera: Scarabaeidae). Melbourne: CSIRO, 284 pp.

Hardy, A. R. 1975. A revision of the genus Pelidnota of America North of Panama (Coleoptera: Scarabaeidae; Rutelinae). Univ. Calif. Publ. Ent. 78: 1-43.

Horsfield, T. 1841. List of the Mammalia in the Museum of the East India Company 16. Appendix to Despatch from the Court of Directors [of the Hon. East India Company] dated 16th September 1840. J. Asiat. Soc. Bengal 10: 38-63.

ICZN. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Lacepède, B. G. E. 1800. Histoire naturelle des poisons. Hist. Nat. Poiss., 2 : 1-602.

Laporte, F. L. de 1840. In Brullé, H. N. Anim. artic. (Col.), 2: 137.

Martinez, A. 1988. Notas sobre *Eurysternus* Dalman (Coleoptera, Scarabaeidae). Entomol. Basilensia, 12: 227-304.

McKenna, M. C. & Bell, S. K. 1997. Classification of Mammals above the species level, 1-640.

Meyrick, E. 1929. Exotic Microlepidoptera 3: 528.

Reed, C. A. 1954. Some fossorial mammals from the Tertiary of western North America. Journal of Paleontology, 28 (1): 102-111.

Schuster, R. & Summer, 1978. International Journal of Acarology, 4: 303.

Szito, A. 1994. *Colpomorpha parva*, a new genus and species of Liparetrini (Coleoptera: Scarabaeidae: Melolonthinae) from Western Australia. J. Aust. Entomol. Soc. 33 (4): 363-365.

Vaz-de-Mello, F. Z. 2000. Estado atual de conhecimento dos Scarabaeidae s. str. (Coleoptera: Scarabaeoidea) do Brasil. In Martín-Piera, F., Morrone, J. J. & Melic, A. (Eds.) Hacia un Proyecto CYTED para el Inventario y Estimación de la Diversidad Entomológica en Iberoamérica: PrIBES-2000. vol. 1, SEA, Zaragoza, 2000, pp.: 183-195.

Wilson, D. E. & Reeder, D. 2005. Mammal species of the world. A taxonomic and geographic reference (3rd ed.), Johns Hopkins University Press, 2, 142 pp.

ODONATA (INSECTA) FROM NORTHERN IRAN, WITH COMMENTS ON THEIR PRESENCE IN RICE FIELDS

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ABSTRACT: Odonata are considered effective predators to control pest organisms in rice fields. In the rice fields and other sites located in Northern Iran (Mazandaran Province) during 2003-2006, the 30 species from 19 genera and 8 families of Odonata (both suborders Zygoptera and Anisoptera) were collected and evaluated.

KEY WORDS: Odonata, Rice field, Northern Iran, Mazandaran province

Rice is the primary food for half the people in the world, providing more calories than any other single food. Several pests cause damage and yield loss on this crop (Datta and Khush, 2002). Pesticides can control many of the rice pests, but because of environmental risks, crop infection and killing of beneficial insects (natural enemies and pollinators) are not efficient and safe method (Khan et al., 1991). There are several natural predators in the rice fields that if conserved, can play an effective role in decreasing the pest population density (Mohyuddin, 1990; Bonhof et al., 1997). Larvae and adults of the Odonata are considered efficient predators in the rice fields (Heinrichs, 1994; Alonso Mejia and Marquez, 1994).

Rice fields, together with their contiguous aquatic habitats and dry land 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, 1996). The variety of organisms inhabiting the rice field ecosystems includes a rich composition of fauna and flora. These organisms colonize the rice fields by their 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. In addition, many species of amphibians, reptiles, birds and mammals visit the rice fields for feeding, from surrounding areas, and are generally considered as temporary or ephemeral inhabitants (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.

The arthropod natural enemies of rice insect pests include a wide range of predators and parasitoids that are important biological control agents. Predators include a variety of spiders, and insects such as carabid beetles, aquatic and terrestrial predatory bugs and dragon flies (Bambaradeniya and Amerasinghe, 2003).

Odonata Fabricius, 1793 are an order of aquatic palaeopterous insects. There are about 6,500 extant species in just over 600 genera. Adult odonates are medium to large in size, often conspicuous and/or brightly colored insects and are aerial predators hunting by sight. They generally are found at or near fresh water although some species roam widely and may be found far from their breeding sites (Norling and Sahlen, 1997). Odonate larvae are non-discriminate hunters which can eat any animal as large as or smaller than themselves, including their own species. Small vertebrates such as tadpoles and juvenile forms of fish are not immune from attack (Novelo et al., 2002). Prey may be stalked or ambushed. Captured prey is pulled back using powerful muscles in the labium and chewed by strong mandibles (Papazian, 1994).

The fauna of Iranian Odonata is quite poorly studied as only 95 species and subspecies have been recorded so far (Heidari and Dumont, 2002). Among the different crop fields, rice fields are the semi-aquatic ecosystems that are suitable for reproduction and survival of Odonata. The fauna of insects as potential prey of Odonata is very diverse in rice fields, which should make them optimal habitats for Odonata. The fauna of dragonflies and damselflies was studied in the rice fields of Northern Iran (Mazandaran Province), and additional specimens were collected from other habitats in this province.

MATERIALS AND METHODS

The materials were collected from the rice seedlings, and around hedges and grasses of Northern Iran through 2003-2006. The sampled regions in this study were Ghaemshahr, Sari, Amol, Savadkooh, Behshahr, Joibar, Mahmood-Abad, Fereydon-Kenar, Babol, Chalus, Noor and Nooshahr. After collecting the materials, they were killed by the cyanide, wings were spread, pinned and labeled (locality, date of collection) and identified preliminary by different scientific resources and identification keys (Spuris, 1967; Belshev, 1973; Hammond, 1983; Westfall, 1987; Askew, 1988; Kalkman, 2006). Then the materials were sent to the authorized taxonomists including, Dr. Geert De Knijf (Instituut voor Natuur- en Bosonderzoek, Research Institute for Nature and Forest, Belgium) and Dr. Marc Bernard (Société Linnéenne de Bordeaux, France) for identification or confirmation. All the materials were collected by the first, second and third authors, and also many obtained data from different collections were used in this paper. Also, the specimens are deposited in the collections of the mentioned specialists.

RESULTS

A total of 30 species of 19 genera and 8 families were recorded from Northern Iran (Mazandaran province; fig. 1). Of these, 22 species were collected in the rice fields surveyed. The list of Odonata species from rice fields of Northern Iran is given below.

LIST OF ODONATA FROM NORTHERN IRAN

SUBORDER ZYGOPTERA

CALOPTERYGIDAE

Calopteryx splendens orientalis Selys, 1887
Material examined: Ghaemshahr (2♂, 1♀), August 2004 and September 2005; Sari (2♀), July 2005.

COENAGRIONIDAE

Coenagrion vanbrinkae Lohmann, 1993
Material examined: Ghaemshahr (Rice field) (2♀), June 2004.

Ischnura elegans ebneri Schmidt, 1838
Material examined: Ghaemshahr (Rice field) (1♀), April 2003; Sari (Rice field) (1♂), August 2005.

Ischnura forcipata Morton, 1907
Material examined: Sari (Rice field) (1♂), July 2005; Amol (Rice field) (1♀, 1♂), June 2005.

Ischnura pumilio (Charpentier, 1825)
Material examined: Savadkooh (Rice field) (1♀), May 2003.

Pseudagrion decorum (Rambur, 1842)
Material examined: Ghaemshahr (Rice field) (1♂), July 2005; Behshahr (Rice field) (1♀), September 2004.

Pyrrhosoma nymphula (Sulzer, 1776)
Material examined: Ghaemshahr (1♀), August 2004; Amol (1♂), September 2005.

EUPHAEIDAE

Epallage fatime (Charpentier, 1840)
Material examined: Savadkooh (1♂), June 2005; Joibar (1♂), August 2005.

PLATYCNEMIDIDAE

Platycnemis dealbata Selys & Hagen, 1850
Material examined: Sari (Rice field) (1♀, 1♂), June 2004.

SUBORDER ANISOPTERA

AESHNIDAE

Aeshna affinis Vander Linden, 1820
Material examined: Savadkooh (Rice field) (1♀), Sept. 2005.

Aeshna mixta Latreille, 1805
Material examined: Amol (Rice field) (1♂, 1♀), September 2004, 2005; Ghaemshahr (Rice field) (1♀), October 2005.

Anax parthenope (Selys, 1839)
Material examined: Behshahr (Rice field) (1♀, 1♂), July and August 2005; Amol (Rice field) (2♀), September 2005.

Anax imperator Leach, 1815
Material examined: Savadkooh (Rice field) (1♂), August 2004.

Brachytron pratense (Müller, 1764)
Material examined: Joibar (1♀), May 2005; Ghaemshahr (1♂), August 2005.

CORDULIIDAE

Somatochlora flavomaculata (Vander Linden, 1825)
Material examined: Mahmood-Abad (Rice field) (1♂), August 2003; Fereydon-Kenar (Rice field) (1♂), September 2003.

GOMPHIDAE

Anormogomphus kiritshenkoi Bartenef, 1913
Material examined: Sari (1♀, 1♂), April 2003; Amol (2♂), July 2004.

Onychogomphus forcipatus albotibialis (Schmidt, 1954)
Material examined: Ghaemshahr (1♂), September 2005.

LIBELLULIDAE

Orthetrum albistylum (Selys, 1848)
Material examined: Savadkooh (Rice field) (1♀), July 2005.

Orthetrum luzonicum (Brauer, 1868)
Material examined: Ghaemshahr (Rice field) (1♀), August 2005.

Orthetrum sabina (Drury, 1773)
Material examined: Babol (1♂, 2♀), August, July and September 2005; Behshahr (2♀), June, 2004; November 2005; Ghaemshahr (2♂, 2♀) September 2002, July 2005, February 2005; Amol (Rice field) (3♂, 1♀), September 2004, September 2005, February 2005; Sari (2♂), July 2004.

Libellula depressa Linnaeus, 1758
Material examined: Amol (Rice field) (1♂), July 2005; Sari (1♂), August 2005; Savadkooh (Rice field) (1♂), August 2005.

Sympetrum sanguineum (Müller, 1764)
Material examined: Savadkooh (Rice field) (1♂), June 2004.

Sympetrum striolatum striolatum (Charpentier, 1840)
Material examined: Babol (2♂), Sept. 2005; Amol (2♂), August - July 2004; Amol (Rice field) (2♀) May and September 2005; Behshahr (2♀, 2♂), September 2005; Sari (3♀, 1♂), September 2005; Ghaemshahr (3♀, 5♂), April 2006. .

Sympetrum vulgatum decoloratum (Selys, 1884)
Material examined: Ghaemshahr (Rice field) (2♂), September 2005; Chalus (Rice field) (1♀), August 2005.

Crocothemis erythraea (Brullé, 1832)
Material examined: Ghaemshahr (1♂), June 2005; Amol (3♂), September 2005.

Crocothemis servilia (Drury, 1773)
Material examined: Ghaemshahr (2♂), July and Sept. 2005; Savadkooh (2♀), June 2004 and Dec. 2005; Ghaemshahr (1♀), May 2004; Babol (1♂), September 2005; Amol (Rice field) (2♀, 1♂), September 2005; Behshahr (2♂), September 2005.

Diplacodes lefebvrii (Rambur, 1842)
Material examined: Amol (Rice field) (1♀), November 2004; Savadkooh (Rice field) (1♀), August 2005.

Trithemis annulata (Palisot de Beauvois, 1807)
Material examined: Mahmood-Abad (Rice field) (2♀), September 2004; Amol (Rice field) (1♀), June 2005.

Trithemis arteriosa (Burmeister, 1839)
Material examined: Fereydon-Kenar (Rice field) (1♀), November 2005; Noor (Rice field) (1♂), July 2004.

Trithemis festiva (Rambur, 1842)
Material examined: Nooshahr (Rice field) (1♂), September 2004; Chalus (2♂), November 2003; Savadkooh (Rice field) (1♂), August 2005.

DISCUSSION

Among the 8 families reported in this paper, the two families including, Libellulidae and Coenagrionidae with 13 and 6 species, respectively are more diverse taxa in terms of the number of species in Northern Iran. Also, of the 30 collected species from rice fields and around grasslands of Northern Iran, three species included, *Sympetrum striolatum*, *Orthetrum sabina* and *Crocothemis servilia* are dominant species and probably have a more efficient role in the control of rice pests. *S. striolatum* is the most cosmopolitan and dominant species in Mazandaran province. About the importance of *Sympetrum* species in biological control, the predatory capacities and efficiencies of *S. frequens* dragonfly nymphs on *Anopheles sinensis* mosquito larvae were evaluated in the laboratory as part of a series of studies on their prey-predator relationship in rice fields (Urabe *et al.*, 1986). Urabe *et al.* (1986) showed that the 8th, 9th and 19th instar nymphs of *S. frequens* consumed 12, 19 and 28 individuals of the 4th instar larvae or more than 100 individuals of the 2nd instar larvae of *A. sinensis* per day, respectively, when the prey larvae were plentiful. During the 30-day period between the 8th and 10th nymphal instars (except for 3 or 4 days just before emergence), the nymph of *S. frequens* consumed an average of 524 individuals of 4th instar larvae of *A. sinensis*.

This research deals with the fauna of Odonata in a part of Iran; Iran is a large country incorporating various geographical regions and climates; consequently it would be expected that a large number of additional species and new records are to be expected to occur in country. For example in Turkey, a species frequently present in rice fields is *Sympetrum depressiusculum*. Since it was recorded from South Eastern Armenia, it is very probably also present in Iran. However, although the Odonata fauna of Turkey was studied rather well (Demirsoy, 1995; Kalkman, 2006; Salur and Kıyak, 2000, 2006; Salur and Özsarac, 2004; Miroğlu and Kartal, 2008), but there are a few faunistic papers on Iranian fauna (Blom, 1982; Heidari and Dumont, 2002). Therefore it is very necessary to work on this interesting and beneficial taxon in Iran.

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LITERATURE CITED

Alonso Mejia, A. & Marquez, M. 1994. Dragonfly predation on butterflies in a tropical dry forest. Biotropica 26: 341-344.

Askew, R. R. 1988. The Dragonflies of Europe. Harley Books, Colchester, England. 291 pp.

Bambaradeniya, C. N. B., Fonseka, K. T. & Ambagahawatte, C. L. 1998. A preliminary study of fauna and flora of a rice field in Kandy, Sri Lanka. Ceylon J. Sci. (Biol. Sci.) 25: 1-22.

Bambaradeniya, C. N. B. & Amerasinghe, F. P. 2003. Biodiversity associated with the rice field agro-ecosystem in Asian countries: a brief review. International Water Management Institute (IWMI), Working paper 63, 29 pp.

Belshev, B. F. 1973. The Dragonflies of Siberia. Volume 1. Part 1. Navka, Novosibirsk.

Blom, W. L. 1982. List of Odonata collected during various Lepidopterological trips in Iran. Notul. Odonatologica 1: 150-151.

Bonhof, M. L., Overholt, W. A., van Huis, A. & Polaszek, A. 1997. Natural enemies of cereal stemborers in East Africa: A review. Insect Sci. Applic. 17: 19 - 35.

Datta, S. K. & Khush, G. S. 2002. Improving rice to meet food and nutrient needs: Biotechnological approaches. Journal of Crop Production 6: 229 - 247.

Demirsoy, A. 1995. Türkiye Faunası, Odonata. TUBITAK, 4 (8), Ankara, (Basılmamış Proje Raporu), 446 pp.

Fernando, C. H. 1993. A bibliography of references to rice field aquatic fauna, their ecology and rice-fish culture. SUNY Geneseo - University of Waterloo, Geneseo N.Y.

Fernando, C. H. 1996. Ecology of rice fields and its bearing on fisheries and fish culture; pp. 217-237. In: S. S. de Silva (ed.). Perspectives in Asian fisheries.

Hammond, C. O. 1983. The Dragonflies of Great Britain and Ireland. Harley Books, Colchester. 115 pp.

Heidari, H. & Dumont, H. J. 2002. An annotated check-list of the Odonata of Iran. Zoology in the Middle East 26: 151-156.

Heinrichs, E. A. 1994. Biology and management of rice insects. Wiley Eastern Ltd., IRRI.

Kalkman, V. J. 2006. Key to the dragonflies of Turkey including species known from Greece, Bulgaria, Lebanon, Syria, The Trans-Caucasus and Iran, Brachytron 10 (1): 3-82.

Khan, Z. R., Litsinger, J. A., Barrion, A. T., Villanueva, F. F. D., Fernandez, N. J. & Taylor, L. D. 1991. World bibliography of rice stem borers 1974-1990. International Rice Research Institute and International Centre of Insect Physiology and Ecology.

Miroğlu, A. & Kartal, V. 2008. Additional Notes on the Odonata Fauna of Kurupelit (Samsun, Turkey). Turk. J. Zool. 32: 33-41.

Mohyuddin, A. I. 1990. Biological control of *Chilo* spp. in maize, sorghum and millet. Insect Sci. Applic. 11: 721 - 732.

Norling, U. & Sahlen, G. 1997. Odonata, dragonflies and damselflies, pp. 13-65. In: A.N. Nilsson (ed.), Aquatic insects of North Europe - A taxonomic handbook, Vol. 2, Apollo Books, Sterstrup, Denmark.

Novelo, G., Gómez-Anaya, R. J. A. & Arce-Pérez, R. 2002. Community structure of Odonata larvae in two streams in Zimapan, Hidalgo, Mexico. Odonatologica 31: 273-286.

Papazian, M. 1994. Predation and Odonata. Entomologiste 50: 297-303.

Salur, A. & Kıyak, S. 2000. On the Systematic and Faunistic Studies of Anisoptera Species (Insecta: Odonata) of Kizilirmak River Basin (Kayseri Province). Journal of the Institute of Science and Technology of Gazi University 13 (3): 829-841.

Salur, A. & Özsarac, O. 2004. Additional notes on the Odonata fauna of Çicekdagi (Kirsehir) Turkey. G.U. Journal of Science 17(1): 11-19.

Salur, A. & Kıyak, S. 2006. An interesting dragonfly record, *Pseudagrion syriacum* (Selys, 1887), from Turkey (Odonata: Coenagrionidae). Mun. Ent. Zool. 1 (1): 171-172.

Spuris, Z. D. 1967. Odonata pp. 157-189. In: Bei-Bienko, G. Ya. et al. (eds.). Keys to the insects of European USSR. Vol. 1. Apterygota, Paleoptera, Hemimetabola. The Israel Program for Scientific Translation, Jerusalem. 1214 pp.

Urabe, K., Ikemoto, T. & Aida, C. 1986. Studies on *Sympetrum frequens* (Odonata: Libellulidae) nymph as a natural enemy of the mosquito larvae, *Anopheles sinensis*, in rice fields. 2. Evaluation of predatory capacity and efficiency in the laboratory. Japanese Journal of Sanitary Zoology 37: 213-220.

Westfall, M. J., Jr. 1987. Order Odonata. pp. 95-117. In: Stehr, F.W. (ed.). Immature Insects Kendall/Hunt, Dubuque, Iowa. [Vol. 1]. xiv + 754 pp.

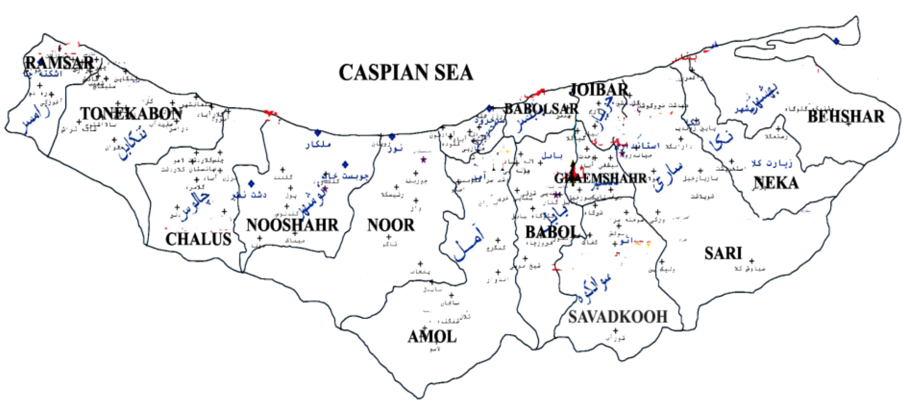

Fig. 1. The map of Mazandaran province (Northern Iran) included all the regions and cities.

NOMENCLATURAL CHANGES FOR TWENTY TRILOBITES GENERA

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ABSTRACT: Twenty junior homonyms were detected among the Trilobites genera and the following replacement names are proposed: Order Agnostida: *Yakutiana* nom. nov. for *Pseudophalacroma* Pokrovskaya, 1958 (Ptychagnostidae); *Morocconus* nom. nov. for *Cephalopyge* Geyer, 1988 (Weymouthiidae); Order Asaphida: *Russiana* nom. nov. for *Scintilla* Pegel, 1986 (Anomocaridae); *Sunocavia* nom. nov. for *Cavia* Sun, 1993 (Remopleurididae); Order Lichida: *Karslanus* nom. nov. for *Ariaspis* Wolfart, 1974 (Damesellidae); *Belenopyge* Pek & Vanek, 1991 subtitute name for *Lobopyge* Pribyl & Erben, 1952 (Lichidae); Order Phacopida: *Wuoaspis* nom. nov. for *Coronaspis* Wu, 1990 (Encrinuridae); Order Proetida: *Hahnus* nom. nov. for *Eometopus* Hahn & Hahn, 1996 (Brachymetopidae); *Engelomorrisia* nom. nov. for *Capricornia* Engel & Morris, 1996; *Yuanjia* nom. nov. for *Haasia* Yuan, 1988 and *Spatulata* nom. nov. for *Spatulina* Osmólska, 1962 (Proetidae); *Pseudobirmanites* Li, 1978 subtitute name for *Madygenia* Petrurina, 1975 (Rorringtoniidae); Order Ptychopariida: *Demuma* nom. nov. for *Pruvostina* Hupé, 1952 (Bigotinidae); *Novocatharia* nom. nov. for *Catharia* Alvaro & Vizcaino, 2003 (Conocoryphidae); *Geyerorodes* nom. nov. for *Orodes* Geyer, 1990 (Ellipsocephalidae); *Enixus* nom. nov. for *Schistocephalus* Chernysheva, 1956 (Palaeolenidae); *Palmerara* nom. nov. for *Nyella* Palmer, 1979 (Ptychopariidae); *Pinarella* nom. nov. for *Pensacola* Palmer & Gatehouse, 1972 (Yunnanocephalidae); Family uncertain: *Indiligens* nom. nov. for *Hospes* Stubblefield, 1927 and *Indigestus* nom. nov. for *Hybocephalus* Remelé, 1885. Accordingly, new combinations are herein proposed for the type species currently included in these genera respectively: *Yakutiana crebra* (Pokrovskaya, 1958) comb. nov.; *Morocconus notabilis* (Geyer, 1988) comb. nov.; *Russiana polita* (Pegel, 1986) comb. nov.; *Sunocavia dactyloides* (Guo & Duan, 1978) comb. nov.; *Karslanus parteaculeatus* (Wolfart, 1974) comb. nov.; *Belenopyge branikensis* (Barrande, 1872) comb. nov.; *Wuoaspis changningensis* (W. Zhang, 1974) comb. nov.; *Hahnus maximowae* (Hahn & Hahn, 1982) comb. nov.; *Engelomorrisia queenslandica* (Engel & Morris, 1996) comb. nov.; *Yuanjia wildungensis* (Richter, 1913) comb. nov.; *Spatulata spatulata* (Woodward, 1902) comb. nov.; *Pseudobirmanites suavis* (Petrurina, 1975) comb. nov.; *Demuma nicklesi* (Hupé, 1952) comb. nov.; *Novocatharia ferralsensis* (Courtessole, 1967) comb. nov.; *Geyerorodes schmitti* (Geyer, 1990) comb. nov.; *Enixus enigmaticus* (Chernysheva, 1956) comb. nov.; *Palmerara granosa* (Resser, 1939) comb. nov.; *Pinarella isolata* (Palmer & Gatehouse, 1972) comb. nov.; *Indiligens clonograpti* (Stubblefield, 1927) comb. nov. and *Indigestus hauchecornei* (Remelé, 1885) comb. nov.

KEY WORDS: nomenclatural changes, homonymy, replacement names, Trilobites.

In an effort to reduce the number of homonyms in Trilobites, I systematically checked the generic names published. I found twenty trilobites genera whose names had been previously published for other taxa, making them junior homonyms. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose replacement names for these genus group names.

TAXONOMY

Order AGNOSTIDA
Family PTYCHAGNOSTIDAE
Genus *YAKUTIANA* nom. nov.

Pseudophalacroma Pokrovskaya, 1958. Trudy geol. Inst., Leningr. 16: 79. (Trilobita: Agnostida: Agnostina: Agnostoidea: Ptychagnostidae). Preoccupied by *Pseudophalacroma* Jörgensen, 1923. Rep. Danish Ocean. Exped. 1908-10, 7, J. 2, 3. (Protozoa: Phytomastihophorea: Dinoflagellida: Dinophysidae).

Remarks: Pokrovskaya (1958) proposed the generic name *Pseudophalacroma* as a genus of trilobites with the type species *Pseudophalacroma crebra* Pokrovskaya, 1958 from Dzhakhtarsky Horizon, Yakutia, E Siberia, Russia. It is a valid genus name (Jell & Adrain, 2003). Unfortunately, the generic name was already preoccupied by Jörgensen (1923), who had proposed the genus name *Pseudophalacroma* as a protozoon genus with the type species *Phalacroma nasutum* von Stein, 1883. Thus, the genus group name *Pseudophalacroma* Pokrovskaya, 1958 is a junior homonym of the generic name *Pseudophalacroma* Jörgensen, 1883. I propose a new replacement name *Yakutiana* **nom. nov.** for *Pseudophalacroma* Pokrovskaya, 1958. The name is from the type locality Yakutia.

Summary of nomenclatural changes:

Yakutiana **nom. nov.**
pro *Pseudophalacroma* Pokrovskaya, 1958 (non Jörgensen, 1883)

Yakutiana crebra (Pokrovskaya, 1958) **comb. nov.**
from *Pseudophalacroma crebra* Pokrovskaya, 1958

Family WEYMOUTHIIDAE
Genus *MOROCCONUS* nom. nov.

Cephalopyge Geyer, 1988. Neues Jahrb. Geol. Palaeontol. Abh. B 177 (1): 123. (Trilobita: Agnostida: Eodiscina: Eodiscoidea: Weymouthiidae). Preoccupied by *Cephalopyge* Hanel, 1905. Zool. Jahrb., Syst., 21, 451. (Mollusca: Gastropoda: Opisthobranchia: Nudibranchia: Phylliroidae).

Remarks: The name *Cephalopyge* was initially introduced by Hanel, 1905 for a gastropod genus (with the type species *Phylliroe trematoides* Chun, 1889). It is still used as a valid genus name (Bouchet et al., 2001). Subsequently, Geyer, 1988 described a trilobite genus of the family Weymouthiidae (with the type species *Cephalopyge notabilis* Geyer, 1988 from Jbel Wawrmast Fm, Anti-Atlas, Morocco) under the same generic name. It is a valid genus name (Jell & Adrain, 2003). Thus, the genus *Cephalopyge* Geyer, 1988 is a junior homonym of the genus *Cephalopyge* Hanel, 1905. I propose a new replacement name *Morocconus* **nom. nov.** for *Cephalopyge* Geyer, 1988. The name is from the type locality Morocco.

Summary of nomenclatural changes:

Morocconus **nom. nov.**
pro *Cephalopyge* Geyer, 1988 (non Hanel, 1905)

Morocconus notabilis (Geyer, 1988) **comb. nov.**
from *Cephalopyge notabilis* Geyer, 1988

Order ASAPHIDA
Family ANOMOCARIDAE
Genus *RUSSIANA* nom. nov.

Scintilla Pegel, 1986. In Gintsinger, Fefelov, Vinkman, Tarnovsky, Zhuravleva & Pegel 1986, Akad Nauk SSSR Sib Otd Inst Geol Geofiz Tr 669: 106. ((Trilobita: Asaphida: Asaphina: Anomocaroidea: Anomocaridae). Preoccupied by *Scintilla* Deshayes, 1856. Proc. zool. Soc. London, 23, 1855, 171. (Mollusca: Bivalvia: Heterodonta: Veneroida: Galeommatoidea: Galeommatidae).

Remarks: The mollusk genus *Scintilla* was erected by Deshayes, 1856 with the type species *Scintilla philippinensis* Deshayes, 1856 by subsequent designation. Later, the genus *Scintilla* was described by Pegel, 1986 with the type species *Scintilla polita* Pegel, 1986 from Shangansk Fm, Tuva, Russia. It is a valid genus name (Jell & Adrain, 2003). However, the name *Scintilla* Pegel, 1986 is invalid under the law of homonymy, being a junior homonym of *Scintilla* Deshayes, 1856. I propose to substitute the junior homonym name *Scintilla* Pegel, 1986 for the nomen novum *Russiana*. The name is from the type locality Russia.

Summary of nomenclatural changes:

Russiana **nom. nov.**
pro *Scintilla* Pegel, 1986 (non Deshayes, 1856)

Russiana polita (Pegel, 1986) **comb. nov.**
from *Scintilla polita* Pegel, 1986

Family REMOPLEURIDIDAE
Genus *SUNOCAVIA* nom. nov.

Cavia Sun, 1993. Prof. Pap. Stratigr. Palaeontol. 24: 28. (Trilobita: Asaphida: Asaphina: Remopleurıdoidea: Remopleurididae). Preoccupied by *Cavia* Pallas, 1766. Misc. Zool., 30. (Mammalia: Theria: Rodentia: Caviidae: Caviinae).

Remarks: Firstly, the genus *Cavia* was established by Pallas, 1766 for a mammal genus with the type species *Cavia porcellus* Linnaeus, 1758. It is still used as a valid genus name. It is the type genus for the family group names Caviidae and Caviinae. Later, the name *Cavia* was proposed by Sun, 1993 for a trilobite genus with the type species *Haniwa dactyloides* Guo & Duan, 1978 from Fengshan Fm, Hebei, China. It is a valid genus name (Jell & Adrain, 2003). However, the name *Cavia* Sun, 1993 is invalid under the law of homonymy, being a junior homonym of *Cavia* Pallas, 1766. I propose to substitute the junior homonym name *Cavia* Sun, 1993 for the nomen novum *Sunocavia*. The name is dedicated to Hongbing Sun who is the current author of the preexisting genus name *Cavia*.

Summary of nomenclatural changes:

Sunocavia **nom. nov.**
pro *Cavia* Sun, 1993 (non Pallas, 1766)

Sunocavia dactyloides (Guo & Duan, 1978) **comb. nov.**
from *Cavia dactyloides* (Guo & Duan, 1978)
Haniwa dactyloides Guo & Duan, 1978

Order LICHIDA
Family DAMESELLIDAE
Genus *KARSLANUS* nom. nov.

Ariaspis Wolfart, 1974. Geol.Jb.(B) 8: 130. (Trilobita: Lichida: Lichina: Dameselloidea: Damesellidae). Preoccupied by *Ariaspis* Denison, 1963. Fieldiana, Geol. 14 (7): 120. (Chordata: Pteraspidomorphi: Pteraspidomorphes).

Remarks: The name *Ariaspis* was initially introduced by Denison, 1963 for a fossil fish genus (with the type species *Ariaspis ornata* Denison, 1963). It is not extant. It was assigned to Pteraspidomorphes by Sepkoski (2002). Subsequently, Wolfart, 1974 described a trilobite genus of the family Damesellidae (with the type species *Ariaspis parteaculeata* Wolfart, 1974 from Surkh Bum, Afghanistan) under the same generic name. It is a valid genus name in Damesellidae (Jell & Adrain, 2003). Thus, the genus *Ariaspis* Wolfart, 1974 is a junior homonym of the genus *Ariaspis* Denison, 1963. I propose a new replacement name *Karslanus* **nom. nov.** for *Ariaspis* Wolfart, 1974. The name is dedicated to my student Kemal Arslan (Turkey). The name is masculine in gender.

Summary of nomenclatural changes:

Karslanus **nom. nov.**
pro *Ariaspis* Wolfart, 1974 (non Denison, 1963)

Karslanus parteaculeatus (Wolfart, 1974) **comb. nov.**
from *Ariaspis parteaculeata* Wolfart, 1974

Family LICHIDAE
Genus *BELENOPYGE* Pek & Vanek, 1991 substitute name

Lobopyge Pribyl & Erben, 1952. Paläont. Z., 26, (3-4), 158. (Trilobita: Lichida: Lichina: Lichoidea: Lichidae). Preoccupied by *Lobopyge* Attems, 1951. Rev. Zool. Bot. afr., 44, 391. (Diplopoda: Polydesmida: Polydesmidea: Pyrgodesmidae).

Remarks: Firstly, the genus *Lobopyge* was established by Attems, 1951 for a millipede genus with the type species *Lobopyge papillata* Attems, 1951. It is still used as a valid genus name (Jeekel, 1971). Later, the generic name *Lobopyge* was proposed by Pribyl & Erben, 1952 for a trilobite with the type species *Lichas branikensis* Barrande, 1872 from Dvorce-Prokop Fm, Czech Republic. It is a valid genus name (Jell & Adrain, 2003). However, the name *Lobopyge* Pribyl & Erben, 1952 is invalid under the law of homonymy, being a junior homonym of *Lobopyge* Attems, 1951. *Lobopyge* Pribyl & Erben, 1952 has a junior subjective synonym as *Belenopyge* Pek & Vanek, 1991(with the type species *Lichas balliviani* Kozlowski, 1923 from Belén Fm, Bolivia). It was synonymized by Ebach & Ahyong (2001). So

I propose to substitute the junior homonym name *Lobopyge* Pribyl & Erben, 1952 for the name *Belenopyge* Pek & Van, 1991.

Summary of nomenclatural changes:

Belenopyge Pek & Vanek, 1991 **subtitute name**
pro *Lobopyge* Pribyl & Erben, 1952 (non Attems, 1951)

Belenopyge branikensis (Barrande, 1872) **comb. nov.**
from *Lobopyge branikensis* (Barrande, 1872)
Lichas branikensis Barrande, 1872
Lichas balliviani Kozlowski, 1923
Belenopyge balliviani (Kozlowski, 1923)

Order PHACOPIDA
Family ENCRINURIDAE
Genus *WUOASPIS* nom. nov.

Coronaspis Wu, 1990. Acta Palaeontol Sin 29 (5): 544. (Trilobita: Phacopida: Cheirurina: Cheiruroidea: Encrinuridae). Preoccupied by *Coronaspis* MacGillivray, 1921. The Coccidae, 312, 362. (Insecta: Hemiptera: Diaspididae).

Remarks: The generic name *Coronaspis* MacGillivray, 1921 was proposed for an hemipteran genus (with the type species *Chionaspis coronifera* Green, 1905). Subsequently, the generic name *Coronaspis* Wu, 1990 was introduced for a new trilobite genus (with the type species *Coronocephalus changningensis* W. Zhang, 1974 from Xiushan Fm, Sichuan, China. It is a valid genus name (Jell & Adrain, 2003). Thus, the genus *Coronaspis* Wu, 1990 is a junior homonym of the generic name *Coronaspis* MacGillivray, 1921. I propose for the genus *Coronaspis* Wu, 1990 the new replacement name *Wuoaspis* **nom. nov.** The name is dedicated to Hongji Wu who is current author of the preexisting generic name *Coronaspis*.

Summary of nomenclatural changes:

Wuoaspis **nom. nov.**
pro *Coronaspis* Wu, 1990 (non MacGillivray, 1921)

Wuoaspis changningensis (W. Zhang, 1974) **comb. nov.**
from *Coronaspis changningensis* (W. Zhang, 1974)
Coronocephalus changningensis W. Zhang, 1974

Order PROETIDA
Family BRACHYMETOPIDAE
Genus *HAHNUS* nom. nov.

Eometopus Hahn & Hahn, 1996. Cour Forschungsinst Senckenb 195, 26 November: 142. (Trilobita: Proetida: Proetina: Aulacopleuroidea: Brachymetopidae). Preoccupied by *Eometopus* Small & Lynn, 1985. In Lee & Bovee [Eds]. An illustrated guide to the Protozoa. Society of Protozoologists, Kansas: 430. (Protozoa: Ciliophora: Spirotrichea: Armophorida: Metopidae).

Remarks: Firstly, the genus *Eometopus* was established by Small & Lynn, 1985 for a protozoon genus with the type species *Eometopus simolex* Small & Lynn, 1985. It is still used as a valid genus name. Later, the generic name *Eometopus* was proposed by Hahn & Hahn, 1996 for a trilobite genus with the type taxon *Brachymetopus ouralicus maximowae* Hahn & Hahn, 1982 from Mugodshar Mts, Kazakhstan. It is a valid genus name (Jell & Adrain, 2003). However, the name *Eometopus* Hahn & Hahn, 1996 is invalid under the law of homonymy, being a junior homonym of *Eometopus* Small & Lynn, 1985. I propose to substitute the junior homonym name *Eometopus* Hahn & Hahn, 1996 for the nomen novum *Hahnus*. The name is dedicated to the surname of G. Hahn and R. Hahn who are current authors of the preexisting genus name *Eometopus*. It is masculine in gender.

Summary of nomenclatural changes:

Hahnus **nom. nov.**
pro *Eometopus* Hahn & Hahn, 1996 (non Small & Lynn, 1985)

Hahnus maximowae (Hahn & Hahn, 1982) **comb. nov.**
from *Eometopus maximowae* (Hahn & Hahn, 1982)
Brachymetopus ouralicus maximowae Hahn & Hahn, 1982

Family PROETIDAE
Genus *ENGELOMORRISIA* nom. nov.

Capricornia Engel & Morris, 1996. Geol. Palaeontol. 30, 31 Juli: 125. (Trilobita: Proetida: Proetina: Proetoidea: Proetidae). Preoccupied by *Capricornia* Obraztsov, 1960. Beitr. Ent. 10: 474. (Insecta: Lepidoptera: Tortricoidea: Tortricidae).

Remarks: Engel & Morris (1996) proposed the generic name *Capricornia* as a subgenus of *Bollandia* Reed, 1943 with the type species *Bollandia* (*Capricornia*) *queenslandica* Engel & Morris, 1996 from Neils Creek Clastics, Queensland, Australia. It is a valid genus name in Proteidae (Jell & Adrain, 2003). Unfortunately, the generic name was already preoccupied by Obraztsov (1960), who had proposed the genus name *Capricornia* as an objective replacement name of the preoccupied genus *Melodes* Guenée, 1845 with the type species *Carpocapsa boisduvaliana* Duponchel , 1836 in the moth family Tortricidae. Thus, the genus group name *Capricornia* Engel & Morris, 1996 is a junior homonym of the generic name *Capricornia* Obraztsov, 1960. I propose a new replacement name *Engelomorrisia* **nom. nov.** for *Capricornia* Engel & Morris, 1996. The name is dedicated to B. A. Engel and N. Morris who are the current authors of the preexisting generic name *Capricornia*.

Summary of nomenclatural changes:

Engelomorrisia **nom. nov.**
pro *Capricornia* Engel & Morris, 1996 (non Obraztsov, 1960)

Engelomorrisia queenslandica (Engel & Morris, 1996) **comb. nov.**
from *Capricornia queenslandica* Engel & Morris, 1996

Genus *YUANJIA* nom. nov.

Haasia Yuan, 1988. Palaeontogr Abt A Palaeozool-Stratigr 201 (1-3): 82. (Trilobita: Proetida: Proetina: Proetoidea: Proetidae). Preoccupied by *Haasia* Bollman, 1893. Bull. U.S. nat. Mus., No. 46, 158. (Diplopoda: Chordeumatida: Anthogonidae).

Remarks: The millipede genus *Haasia* was erected by Bollman, 1893 with the type species *Craspedosoma troglodytes* Latzel, 1884. It is a valid genus name (e. g. Jeekel, 1971). Later, the genus *Haasia* was described by Yuan, 1988 with the type species *Cyrtosymbole wildungensis* Richter, 1913 from *Wocklumeria*-Stufe, Rhenish Massif, Germany. It is a valid genus name (Jell & Adrain, 2003). However, the name *Haasia* Yuan, 1988 is invalid under the law of homonymy, being a junior homonym of *Haasia* Bollman, 1893. I propose to substitute the junior homonym name *Haasia* Yuan, 1988 for the nomen novum *Yuanjia*. The name is dedicated to Jinliang Yuan who is current author name of the preexisting genus *Haasia*.

Summary of nomenclatural changes:

Yuanjia **nom. nov.**
pro *Haasia* Yuan, 1988 (non Bollman, 1893)

Yuanjia wildungensis (Richter, 1913) **comb. nov.**
from *Haasia wildungensis* (Richter, 1913)
Cyrtosymbole wildungensis Richter, 1913

Genus *SPATULATA* nom. nov.

Spatulina Osmólska, 1962. Acta palaeont. pol. 7: 181. (Trilobita: Proetida: Proetina: Proetoidea: Proetidae). Preoccupied by *Spatulina* Szilády, 1942. Mitt. münchen. ent. Ges., 32, 625. (Insecta: Diptera: Brachycera: Rhagionidae).

Remarks: The name *Spatulina* was initially introduced by Szilády, 1942 for a fly genus (with the type species *Spatulina engeli* Szilády, 1942 by monotypy). It is stil used as a valid genus name in Diptera. Subsequently, Osmólska, 1962 described a new trilobite genus (with the type species *Phillipsia spatulata* Woodward, 1902 from Coddon Hill Chert Fm, England) under the same generic name. It is a valid genus name in Proetidae (Jell & Adrain, 2003). Thus, the genus *Spatulina* Osmólska, 1962 is a junior homonym of the genus *Spatulina* Szilády, 1942. I propose a new replacement name *Spatulata* **nom. nov.** for *Spatulina* Osmólska, 1962. The name is from the current species name for tautonymy.

Summary of nomenclatural changes:

Spatulata **nom. nov.**
pro *Spatulina* Osmólska, 1962 (non Szilády, 1942)

Spatulata spatulata (Woodward, 1902) **comb. nov.**
from *Spatulina spatulata* (Woodward, 1902)
Phillipsia spatulata Woodward, 1902

Family RORRINGTONIIDAE
Genus *PSEUDOBIRMANITES* Li, 1978

Madygenia Petrunina, 1975. In Repina et al., in Repina, Yaskovitch et al., Trudy Inst. Geol. Geofiz. sib. Otd. 278: 229. (Trilobita: Proetida: Proetina: Aulacopleuroidea: Rorringtoniidae). Preoccupied by *Madygenia* Sharov, 1968. Trudy paleont.Inst. 118: 171. (Insecta: Orthoptera: Ensifera: Oedischioidea: Proparagryllacrididae: Madygeniinae).

Remarks: Firstly, the genus *Madygenia* was established by Sharov, 1968 for fossil Orthoptera with the type species *Madygenia orientalis* Sharov, 1968 by monotypy and original designation. It is still used as a valid genus name. It is the type genus of the subfamily Madygeniinae Gorochov, 1987. Later, the generic name *Madygenia* was described by Petrurina, 1975 for a new trilobite genus with the type species *Madygenia suavis* Petrurina, 1975 from *Kielanella-Tretaspis* Zone, Turkestan. Also, it is stil used as a valid genus name (Jell & Adrain, 2003). However, the name *Madygenia* Petrurina, 1975 is invalid under the law of homonymy, being a junior homonym of *Madygenia* Sharov, 1968. On the other side, *Madygenia* Petrurina, 1975 has a junior subjective synonym as *Pseudobirmanites* Li, 1978 (with the type species *Pseudobirmanites leiboensis* Li, 1978 from Linxing Fm, S Sichuan, China). It was synonymized by Adrain in Jell & Adrain (2003). So I propose to substitute the junior homonym name *Madygenia* Petrurina, 1975 for the name *Pseudobirmanites* Li, 1978.

Summary of nomenclatural changes:

Pseudobirmanites Li, 1978 **subtitute name**
pro *Madygenia* Petrurina, 1975 (non Sharov, 1968)

Pseudobirmanites suavis (Petrurina, 1975) **comb. nov.**
from *Madygenia suavis* Petrurina, 1975
Pseudobirmanites leiboensis Li, 1978

Order PTYCHOPARIIDA
Family BIGOTINIDAE
Genus *DEMUMA* nom. nov.

Pruvostina Hupé, 1952. C.R. Acad. Sci., Paris, 235, 480. [n.n.]; 1953, Notes Serv. Min. Maroc, no. 103 (1952), 222. (Trilobita: Ptychopariida: Ptychopariina: Ellipsocephaloidea: Bigotinidae). Preoccupied by *Pruvostina* Scott & Summerson, 1943. Amer. J. Sci., 241, 670. (Crustacea: Ostracoda).

Remarks: The genus *Pruvostina* was erected by Scott & Summerson, 1943 with the type species *Pruvostina wanlassi* Scott & Summerson, 1943 in Crustacea. Later, the genus *Pruvostina* was described by Hupé, 1952 with the type species *Pruvostina nicklesi* Hupé, 1952 from Amouslek Fm, Morocco. It is a valid genus name in Bigotinidae (Jell & Adrain, 2003). However, the name *Pruvostina* Hupé, 1952 is invalid under the law of homonymy, being a junior homonym of *Pruvostina* Scott & Summerson, 1943. So I propose to substitute the junior homonym name *Pruvostina* Hupé, 1952 for the name *Demuma* **nom. nov.** The name is from the Latin word “demum” (meaning “complete, completely, exact, exactly, certain or certainly” in English).

Summary of nomenclatural changes:

Demuma **nom. nov.**
pro *Pruvostina* Hupé, 1952 (non Scott & Summerson, 1943)

Demuma nicklesi (Hupé, 1952) **comb. nov.**
from *Pruvostina nicklesi* Hupé, 1952

Family CONOCORYPHIDAE
Genus *NOVOCATHARIA* nom. nov.

Catharia Alvaro & Vizcaino, 2003. Spec. Pap. Palaeontol. 70, October: 129. (Trilobita: Ptychopariida: Ptychopariina: Ptychoparioidea: Conocoryphidae). Preoccupied by *Catharia* Lederer, 1863. Wien. ent. Monatschr., 7, 353. (Insecta: Lepidoptera: Pyraloidea: Crambidae: Cathariinae).

Remarks: The name *Catharia* was initially introduced by Lederer, 1863 for a moth genus (with the type species *Hercyna pyrenaealis* Duponchel, 1843 by monotypy). It is a valid genus name as the type genus of the subfamily Cathariinae Minet, 1981 in the family Crambidae. Subsequently, Alvaro & Vizcaino, 2003 described a trilobite genus of the family Conocoryphidae (with the type species *Conocoryphe ferralsensis* Courtessole, 1967 from Coulouma Formation, *Eccaparadoxides macrocercus* Zone (Upper Languedocian, Middle Cambrian), southern Mountagne Noire, France and Iberian Chains) under the same generic name. It is a valid genus name in Conocoryphidae. Thus, the genus *Catharia* Alvaro & Vizcaino, 2003 is a junior homonym of the genus *Catharia* Lederer, 1863. I propose a new replacement name *Novocatharia* **nom. nov.** for *Catharia* Alvaro & Vizcaino, 2003. The name is from the Latin word “nova” (meaning “new” in English) + the preexisting genus name *Catharia*.

Summary of nomenclatural changes:

Novocatharia **nom. nov.**
pro *Catharia* Alvaro & Vizcaino, 2003 (non Lederer, 1863)

Novocatharia ferralsensis (Courtessole, 1967) **comb. nov.**
from *Catharia ferralsensis* (Courtessole, 1967)
Conocoryphe ferralsensis Courtessole, 1967

Family ELLIPSOCEPHALIDAE
Genus *GEYERORODES* nom. nov.

Orodes Geyer, 1990. Beringeria 3: 199. (Trilobita: Ptychopariida: Ptychopariina: Ellipsocephaloidea: Ellipsocephalidae). Preoccupied by *Orodes* Jacoby, 1891. Biol. Centr. Amer., Zool., Col., 6 (1), Suppl., 276. (Insecta: Coleoptera: Chrysomeloidea: Chrysomelidae).

Remarks: Geyer (1990) proposed the genus name *Orodes* with the type species *Orodes schmitti* Geyer, 1990 from Asrir Fm, Morocco. It is a valid genus name in Ellipsocephalidae (Jell & Adrain, 2003). Unfortunately, the generic name was already preoccupied by Jacoby (1891), who had described the genus *Orodes* in the beetle family Chrysomelidae with the type species *Orodes nigropictus* Jacoby, 1891. Thus, the genus *Orodes* Geyer, 1990 is a junior homonym of the generic name *Orodes* Jacoby, 1891. I propose a new replacement name *Geyerorodes* **nom. nov.** for *Orodes* Geyer, 1990. The name is dedicated to the G. Geyer who is the current author of the preexisting generic name *Orodes*.

Summary of nomenclatural changes:

Geyerorodes **nom. nov.**
pro *Orodes* Geyer, 1990 (non Jacoby, 1891)

Geyerorodes schmitti (Geyer, 1990) **comb. nov.**
from *Orodes schmitti* Geyer, 1990

Family PALAEOLENIDAE
Genus *ENIXUS* nom. nov.

Schistocephalus Chernysheva, 1956. In Kiparisova, Markovski & Radchenko (Eds). Materials on paleontology. New families and genera. Ministr. Geol. Okran Nedr Moscow: Vses. nauchno-issled. Geol. Inst. (VSEGEI) 12: 147. (Trilobita: Ptychopariida: Ptychopariina: Ellipsocephaloidea: Palaeolenidae). Preoccupied by *Schistocephalus* Creplin, 1829. N. Obs. de Entozois, 90. (Platyhelminthes: Cestoda: Pseudophyllidea: Diphyllobothriidae: Ligulinae).

Remarks: Chernysheva (1956) established a trilobite genus *Schistocephalus* with the type species *Schistocephalus enigmaticus* Chernysheva, 1956 from Amga River, E Yakutia, Russia. It is a valid genus name in Palaeolenidae (Jell & Adrain, 2003). Unfortunately, the generic name was already preoccupied by Creplin (1829), who had described the genus *Schistocephalus* with the type species *Schistocephalus dimorphus* Creplin, 1829 in Cestoda. Thus, the genus *Schistocephalus* Chernysheva, 1956 is a junior homonym of the generic name *Schistocephalus* Creplin, 1829. I propose a new replacement name *Enixus* **nom. nov.** for *Schistocephalus* Chernysheva, 1956. The name is from the Latin word “enixus” (meaning “zealous” in English).

Summary of nomenclatural changes:

Enixus **nom. nov.**
pro *Schistocephalus* Chernysheva, 1956 (non Creplin, 1829)

Enixus enigmaticus (Chernysheva, 1956) **comb. nov.**
from *Schistocephalus enigmaticus* Chernysheva, 1956

Family PTYCHOPARIIDAE
Genus *PALMERARA* nom. nov.

Nyella Palmer, 1979. In Palmer & Halley, Professional Pap. U.S. geol. Surv. No. 1047: 110. (Trilobita: Ptychopariida: Ptychopariina: Ptychoparioidea: Ptychopariidae). Preoccupied by *Nyella* Oke, 1931. Proc. roy. Soc. Victoria, 43, 200. (Insecta: Coleoptera: Curculionoidea: Curculionidae).

Remarks: Palmer (1979) proposed the generic name *Nyella* as a genus of trilobites with the type species *Poulsenia granosa* Resser, 1939 from Langston Lst, Idaho, USA. It is a valid genus name in Ptychopariidae (Jell & Adrain, 2003). Unfortunately, the generic name was already preoccupied by Oke (1931), who had proposed the genus name *Nyella* as a genus of beetles with the type species *Nyella tuberculata* Oke, 1931 in the beetle family Curculionidae. Thus, the genus group name *Nyella* Palmer, 1979 is a junior homonym of the generic name *Nyella* Oke, 1931. I propose a new replacement name *Palmerara* **nom. nov.** for *Nyella* Palmer, 1979. The name is dedicated to the A. R. Palmer who is the current author of the preexisting generic name *Nyella*.

Summary of nomenclatural changes:

Palmerara **nom. nov.**
pro *Nyella* Palmer, 1979 (non Oke, 1931)

Palmerara granosa (Resser, 1939) **comb. nov.**
from *Nyella granosa* (Resser, 1939)
Poulsenia granosa Resser, 1939

Family YUNNANOCEPHALIDAE
Genus *PINARELLA* nom. nov.

Pensacola Palmer & Gatehouse, 1972. Prof.Pap.U.S.geol.Surv. 456-D: D28. (Trilobita: Ptychopariida: Ptychopariina: Ellipsocephaloidea: Yunnanocephalidae). Preoccupied by *Pensacola* Peckham & Peckham, 1885. Proc. nat. Hist. Soc. Wisconsin, 1885, 84. (Arachnida: Araneae: Salticidae).

Remarks: The generic name *Pensacola* Peckham & Peckham, 1885 was proposed for a genus of spider family Salticidae (with the type species *Pensacola signata* Peckham & Peckham, 1885). Subsequently, the generic name *Pensacola* Palmer & Gatehouse, 1972 was introduced for a new trilobite genus (with the type species *Pensacola isolata* Palmer & Gatehouse, 1972 from *Chorbusulina wilkesi* Faunule, Antarctica) of the family Yunnanocephalidae. It is a valid genus name (Jell & Adrain, 2003). Thus, the genus *Pensacola* Palmer & Gatehouse, 1972 is a junior homonym of the generic name *Pensacola* Peckham & Peckham, 1885. I propose for the genus *Pensacola* Palmer & Gatehouse, 1972 the new replacement name *Pinarella* **nom. nov.** The name is dedicated to my student Pınar Özbek (Turkey). The name is feminine in gender.

Summary of nomenclatural changes:

Pinarella **nom. nov.**
pro *Pensacola* Palmer & Gatehouse, 1972 (non Peckham & Peckham, 1885)

Pinarella isolata (Palmer & Gatehouse, 1972) **comb. nov.**
from *Pensacola isolata* Palmer & Gatehouse, 1972

Family UNCERTAIN
Genus *INDILIGENS* nom. nov.

Hospes Stubblefield, 1927. In Stubblefield & Bulman, 1927, Quart. J. geol. Soc., 83 (1), 128. (Trilobita). Preoccupied by *Hospes* Jordan, 1894. Novit. zool., 1, 182. (Insecta: Coleoptera: Cerambycoidea: Cerambycidae).

Remarks: The generic name *Hospes* Jordan, 1894 was proposed for a genus of longicorn beetle family Cerambycidae. The African genus name is still used as a valid name and, it has four species as *Hospes longitarsis* Aurivillius, 1907; *Hospes nitidicollis* Jordan, 1894; *Hospes punctatus* Jordan, 1894 and *Hospes tomentosus* Schmidt, 1922. Subsequently, the generic name *Hospes* Stubblefield, 1927 was introduced for a new trilobite genus (with the type species *Hospes clonograpti* Stubblefield, 1927 from Shineton Sh Fm, England. It is a valid genus name (Jell & Adrain, 2003). Thus, the genus *Hospes* Stubblefield, 1927 is a junior homonym of the generic name *Hospes* Jordan, 1894. I propose for the genus *Hospes*

Stubblefield, 1927 the new replacement name *Indiligens* **nom. nov.** The name is from the Latin word "indiligens" (meaning "neglected" in English).

Summary of nomenclatural changes:

Indiligens **nom. nov.**
pro *Hospes* Stubblefield, 1927 (non Jordan, 1894)

Indiligens clonograpti (Stubblefield, 1927) **comb. nov.**
from *Hospes clonograpti* Stubblefield, 1927

Family UNCERTAIN
Genus *INDIGESTUS* nom. nov.

Hybocephalus Remelé, 1885. Z. dtsch. geol. Ges., 37, 1032. (Trilobita). Preoccupied by *Hybocephalus* Motschulsky, 1851. Bull. Soc. imp. Nat. Moscou, 24 (2), 482; Schaufuss 1882, Ann. Mus. Stor. nat. Genova, 18, 353. (Crustacea: Ostracoda).

Remarks: The genus *Hybocephalus* was erected by Motschulsky, 1851 in Coleoptera. It is still used as a valid name (e. g. Tree of life web project, 2007) and, it is the type genus of *Hybocephalini* Raffray, 1890 (Pselaphinae). Later, the genus *Hybocephalus* was described by Remelé, 1885 with the type species *Hybocephalus hauchecornei* Remelé, 1885 from Upper Red Orthoceras Limestone, Eberswalde, E Germany. It is a valid genus name (Jell & Adrain, 2003). However, the name *Hybocephalus* Remelé, 1885 is invalid under the law of homonymy, being a junior homonym of *Hybocephalus* Motschulsky, 1851. So I propose to substitute the junior homonym name *Hybocephalus* Remelé, 1885 for the name *Indigestus* **nom. nov.** The name is from the Latin word "indigestus" (meaning "out of order" in English).

Summary of nomenclatural changes:

Indigestus **nom. nov.**
pro *Hybocephalus* Remelé, 1885 (non Motschulsky, 1851)

Indigestus hauchecornei (Remelé, 1885) **comb. nov.**
from *Hybocephalus hauchecornei* Remelé, 1885

LITERATURE CITED

Álvaro, J. J., Vizcaino, D. 2003. The conocoryphid biofacies. In Lane, P.D., Siveter, D.J. & Fortey, R.A. (eds.) Trilobites and their relatives. Special papers in Palaeontology, 70: 129-130.

Bouchet, P., Le Renard, J. & Gofas, S. (comp.) 2001. Mollusca. In Costello, M.J., Emblow, C.S. & White, R. (eds.), European Register of Marine Species. A check-list of the marine species in Europe and a bibliography of guides to their identification, Patrimoines naturels 50: 180-213.

Chernysheva, N. E., Egorova, L. I., Ogienko, L. V., Poletaeva, O. K. & Repina, L. N. 1956. [Materials on Palaeontology. New families and genera. Class Trilobita]. Trudy Vsesoyuznogo Nauchnogo-Issledovatel'skogo Geologicheskogo Instituta (VSEGEI) new series 12: 145-182.

Creplin, F. H. C. 1829. Novae observationes de entozois, Berolini, 134 pp.

Denison, R. H. 1963. New Silurian Heterostraci from southeastern Yukon. Fieldiana: Geology, 14 (7): 105-141.

Deshayes, G. P. 1856. Sur le genre Scintilla. Proceedings of the Zoological Society of London. 1855 : 171-181.

Ebach, M. & Ahyong, S. T. 2001. Phylogeny of the trilobite subgenus Acanthopyge (Lobopyge). Cladistics 17: 1-10.

Engel, B. A. & Morris, N. 1996. Trilobites from the Lower Carboniferous of eastern Australia. Geologica et Palaeontologica 30: 119-145.

Geyer, G. 1988. Agnostida aus dem höheren Unterkambrium und der Mittelkambrium von Marokko. Teil 2: Eodiscina: Neues Jahrbuch Geologie und Paläontologie Abhandlungen 177: 93-133.

Geyer, G. 1990. Die marokkanischen Ellipsocephalidae (Trilobita: Redlichiida). Beringeria, 3: 1-363.

Gintsinger, A. B., Fefelov, A. F., Vinkman, M. K., Tarnovsky, S. L., Zhuravleva, I. T. & Pegel, T. V. 1986. [The Lower Cambrian of Tuva (new interpretation of the section in the region of the Upper Yenisey River)]. Akademiya Nauk SSSR, Sibirskoe Otdelenie, Instituta Geologii i Geofiziki Trudy 669: 86-108.

Guenée, M. A. 1845. Essai sur une nouvelle classification des Microlépidopteres et catalogue des especes. européennes connues jusqu'a ce Jour. Annales de la Societe entomologique de France. 2 (3): 105-192.

Hahn, G. & Hahn, R. 1996. The trilobite taxa of the Carboniferous and Permian. 2. Brachymetopidae. Courier Forschungsinstitut Senckenberg 195: 1-242.

Hupé, P. 1952. Contribution a l'étude du Cambrien Inférieur et du Précambrien III de l'Anti-Atlas Marocain. Division des Mines et de la Géologie, Service Géologique, Notes et Memoires 103: 1-402.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Jacoby, M. 1891. Insecta. Coleoptera. Phytophaga (part). Biologia Centrali-Americana, 6 (1): 276-277.

Jeekel, C. A. W. 1971. Nomenclator generum et familiarum Diplopodorum: A list of the genus and family-group names in the Class Diplopoda from the 10th edition of Linnaeus, 1758, to the end of 1957. Monografieen van de Nederlandse Entomologische Vereniging 5, pp. 1-412.

Jell, P. A. & Adrain, J. M. 2003. Available generic names for trilobites. Memoirs of the Queensland Museum, 48 (2): 331-553.

Jordan, K. 1894. On African Longicornia. Novitates Zoologicae 1: 139-266.

Jörgensen, E. 1923. Mediterranean Dinophysiaceae. Report on the Danish Oceanographical Expeditions 1908-10 to the Mediterranean and adjacent Seas. II Biology J. 2: 1-48.

Lederer, J. 1863. Beitrag zur Kenntniss der Pyralidinen. Wien. Ent. Monatschrift, 7 (10): 331-378.

Li, J. & Hao S. 1978. [Trilobites]. Pp. 179-284, 568-583, pls 89-114. In Palaeontological atlas of SW China, Sichuan Volume 1. Sinian to Devonian. (Geological Publishing House: Beijing). 617 pp.

MacGillivray, A. D. 1921. The Coccidae. Scarab Co., Urbana, Illinois. 502 pp.

Oke, C. 1931. On some Australian Curculionoidea. Proc. Roy. Soc. Victoria, 43: 177-201.

Osmólska, H. 1962. Famennian and lower Carboniferous Cyrtosymbolinae (Trilobita) from the Holy Cross Mountains, Poland. Acta Palaeontologica Polonica 7: 53-222.

Pallas, P. S. 1766. Miscellanea Zoologida quibus novae imprimis atque obscurae animailum species describuntur et observationibus inconibusque illustrantur. P. van Clef, Hagae Comitum, 224 pp.

Palmer, A. R. & Gatehouse, C. G. 1972. Early and Middle Cambrian trilobites from Antarctica. United States Geological Survey, Professional Paper 456D: 1-37.

Palmer, A. R. & Halley, R. B. 1979. Physical stratigraphy and trilobite biostratigraphy of the Carrara Formation (Lower and Middle Cambrian) in the southern Great Basin. United States Geological Survey, Professional Paper 1047: 1-131.

Peckham, G. W. & Peckham, E. G. 1885. On some new genera and species of Attidae from the Eastern Part of Guatemala. Proc. Nat. Hist. Soc. Wisc., 1885: 62-86.

Pek, I. & Vanek, J. 1991. On some Silurian and Devonian trilobites of Bolivia. Acta Universitatis Palackianae Olomucensis Facultas rerum naturalium 103: 75-104.

Pokrovskaya, N. V. 1958. [Agnostida from the Middle Cambrian of Yakutia, part 1]. Akademiya Nauka SSSR, Trudy Geologicheskogo Instituta 16: 1-96.

Pribyl, A. & Erben, H. K. 1952. Über einige neue oder wenig bekannte Acanthopyginae (Tril.) des böhmischen und des deutschen Devons. Paläontologische Zeitschrift 26: 141-174.

Raffray, A. 1890. Étude sur le Psélaphides. V. Tableux synoptiques. Notes et synonymie. Rev. Entomol. (Caen) 9: 81-172 [135].

Remelé, A. 1885. Reported in 'Protokol'. Zeitschrift der Deutschen Geologischen Gesellschaft 37: 1032.

Repina, L. N., Petrunina, Z. E. & Hajrullina, T. I. 1975. [Trilobites]. In [Stratigraphy and fauna of the Lower Paleozoic of the northern submontane belt of Turkestan and Alai Ridges (southern Tyan-shan)]. Akademiya Nauk SSSR, Sibirskoe Otdelenie, Instituta Geologii i Geofiziki, Trudy 278: 100-248, pls 7- 48.

Scott, H. W. & Summerson, C. H. 1943. Non-marine Ostracoda from the Lower Pennsylvanian in the southern Appalachians, and their bearing on intercontinental correlation: American Journal of Science,v, 241: 654–675.

Sepkoski, J. J. 2002. A compendium of fossil marine animal genera. Bulletins of American Paleontology 363: 1-560.

Sharov, 1968. Filogniya orthopteroidnykh nasekomykh (in Russian) [1971 English translation, Phylogeny of the Orthopteroidea]. Trudy Paleontologicheskogo Instituta, Akademiia Nauk SSSR [= Transactions of the Institute of Paleontology, USSR Academy of Sciences]. 118: 1-216.

Small, E. B. & Lynn, D. H. 1985. Phylum Ciliophora Doflein, 1901. In Lee, J. J., Hutner, S. H., Bovee, E. D. (eds.). An Illustrated Guide to the Protozoa. Soc. Protozool. Special Publ., Allen Press, Lawrence, Kansas. pp. 393-575.

Stubblefield, C. J. & Bulman, O. M. B. 1927. The Shineton Shales of the Wrekin district. Quarterly Journal of the Geological Society of London 83: 96-146.

Sun, H. 1993. [New materials of Richardsonellidae from the Upper Cambrian-Lower Ordovician of Pingquan, Hebei]. Professional Papers in Stratigraphy and Palaeontology 24: 25-34.

Szilády, Z. 1942: Neue Dipteren aus Bayern, Tirol und Vorarlberg. - Mitt. Muenchner Ent. Ges. 32: 624-626.

Tree of Life Web Project. 2007. Hybocephalini. Version 25 April 2007. Available from: http://tolweb.org/Hybocephalini/63280/2007.04.25

Wolfart, R. 1974. Die Fauna (Brachiopoda, Mollusca, Trilobita) des älteren Ober-Kambriums (Ober-Kushanian) von Dorah Shah Dad, Südost-Iran, und Surkh Bum, Zentral-Afghanistan. Geologisches Jahrbuch, Reihe B, 8: 71-184.

Wu, H. 1990. [On genus Coronocephalus Grabau, 1924 (Silurian trilobite)]. Acta Palaeontologica Sinica, 29: 527-547.

Yuan, J. 1988. Proetiden aus dem jüngeren Oberdevon von Süd-China. Palaeontographica Abteilung A 201: 1-102.

Order	Family	Junior homonym	Senior homonym	Replacement name
AGNOSTIDA	PTYCHAGNOSTIDAE	*Pseudophalacroma* Pokrovskaya, 1958	*Pseudophalacroma* Jörgensen, 1923 (Protozoa)	*Yakutiana* **nom. nov.**
AGNOSTIDA	WEYMOUTHIIDAE	*Cephalopyge* Geyer, 1988	*Cephalopyge* Hanel, 1905 (Mollusca)	*Morocconus* **nom. nov.**
ASAPHIDA	ANOMOCARIDAE	*Scintilla* Pegel, 1986	*Scintilla* Deshayes, 1856 (Mollusca)	*Russiana* **nom. nov.**
ASAPHIDA	REMOPLEURIDIDAE	*Cavia* Sun, 1993	*Cavia* Pallas, 1766 (Mammalia)	*Sunocavia* **nom. nov.**
LICHIDA	DAMESELLIDAE	*Ariaspis* Wolfart, 1974	*Ariaspis* Denison, 1963 (Chordata)	*Karslanus* **nom. nov.**
LICHIDA	LICHIDAE	*Lobopyge* Pribyl & Erben, 1952	*Lobopyge* Attems, 1951 (Diplopoda)	*Belenopyge* Pek & Vanek, 1991 **subtitute name**
PHACOPIDA	ENCRINURIDAE	*Coronaspis* Wu, 1990	*Coronaspis* MacGillivray, 1921 (Hemiptera)	*Wuoaspis* **nom. nov.**
PROETIDA	BRACHYMETOPIDAE	*Eometopus* Hahn & Hahn, 1996	*Eometopus* Small & Lynn, 1985 (Protozoa)	*Hahnus* **nom. nov.**
PROETIDA	PROETIDAE	*Capricornia* Engel & Morris, 1996	*Capricornia* Obraztsov, 1960 (Lepidoptera)	*Engelomorrisia* **nom. nov.**
PROETIDA	PROETIDAE	*Haasia* Yuan, 1988	*Haasia* Bollman, 1893 (Diplopoda)	*Yuanjia* **nom. nov.**

Order	Family	Junior homonym	Senior homonym	Replacement name
PROETIDA	PROETIDAE	*Spatulina* Osmólska, 1962	*Spatulina* Szilády, 1942 (Diptera)	*Spatulata* **nom. nov.**
PROETIDA	RORRINGTONIIDAE	*Madygenia* Petrurina, 1975	*Madygenia* Sharov, 1968 (Orthoptera)	*Pseudobirmanites* Li, 1978 **subtitute name**
PTYCHOPARIIDA	BIGOTINIDAE	*Pruvostina* Hupé, 1952	*Pruvostina* Scott & Summerson, 1943 (Crustacea)	*Demuma* **nom. nov.**
PTYCHOPARIIDA	CONOCORYPHIDAE	*Catharia* Alvaro & Vizcaino, 2003	*Catharia* Lederer, 1863 (Lepidoptera)	*Novocatharia* **nom. nov.**
PTYCHOPARIIDA	ELLIPSOCEPHALIDAE	*Orodes* Geyer, 1990	*Orodes* Jacoby, 1891 (Coleoptera)	*Geyerorodes* **nom. nov.**
PTYCHOPARIIDA	PALAEOLENIDAE	*Schistocephalus* Chernysheva, 1956	*Schistocephalus* Creplin, 1829 (Cestoda)	*Enixus* **nom. nov.**
PTYCHOPARIIDA	PTYCHOPARIIDAE	*Nyella* Palmer, 1979	*Nyella* Oke, 1931 (Coleoptera)	*Palmerara* **nom. nov.**
PTYCHOPARIIDA	YUNNANOCEPHALIDAE	*Pensacola* Palmer & Gatehouse, 1972	*Pensacola* Peckham & Peckham, 1885 (Araneae)	*Pinarella* **nom. nov.**
	UNCERTAIN	*Hospes* Stubblefield, 1927	*Hospes* Jordan, 1894 (Coleoptera)	*Indiligens* **nom. nov.**
	UNCERTAIN	*Hybocephalus* Remelé, 1885	*Hybocephalus* Motschulsky, 1851 (Crustacea)	*Indigestus* **nom. nov.**

THE EFFECTS OF FEEDING ON DIFFERENT POPLAR CLONES ON SOME BIOCHEMICAL PROPERTIES OF GYPSY MOTH LARVAE

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[Daryaei, M. G., Darvishi, S. & Etebari, K. 2009. The effects of feeding on different Poplar Clones on some biochemical properties of Gypsy moth larvae. Munis Entomology & Zoology, 4 (1): 172-179**]**

ABSTRACT: Gypsy moth (*Lymantria dispar* L.) is one of the most important pests in northern forests of Iran. For better understanding of the interaction between the pest and plant, the biochemical traits of larval body including glucose, cholesterol, protein, urea and also activity levels of alanin and aspartate amino transferase (ALT & AST) were measured in the 4^{th} instar larvae fed by different clones of *Populus deltoiedes, P. euramerican* and *P. caspica*. Larval feeding on different clones of poplar caused considerable biochemical changes in their body. The results showed that glucose fluctuated in the body of these larvae from 35 to 93.3 mg/dl and its highest amount was observed in the larvae fed by *P. e. triplo*. Feeding on the leaves of *P. deltoiedes* caused cholesterol enhancement and in all the treatments ALT and AST activity levels followed the same pattern and AST was always higher than ALT. A considerable correlation was shown between these two enzymes while their activity levels were lower in the larvae fed on *P. euramerican* and *P. caspica*. Data outlined a negative correlation between glucose and other compounds in a way that if the metabolism was in the favor of carbohydrates, proteins and sterols decreased.

KEYWORDS: Gypsy moth, *Lymantria dispar, Populus,* Biochemical traits

Short-rotation woody crops are being developed as a sustainable system that simultaneously produces a renewable feedback for bioproducts and a suite of environmental and rural development benefits (Nordman et al., 2005). Poplars with high rate of biomass production are appealing as short-rotation woody crops and also they can be used for phytoremediation, carbon sequestration and erosion control (Coyle et al., 2006). Poplars like any other plant are not excluded from the damages of pests and pathogens and are invaded with many pests through the year which some of defoliating insects like gypsy moth (*Lymantria dispar*) can significantly reduce the yield of biomass production and negatively impact their sustainability (Daryaei et al., 2008).

Utilizing pest-resistant cultivars or a mixture of clones in integrated pest management is one of the best approaches for pest damage suppression. Because plants alter feeding efficiency of the insects with different methods and they use this system as a defending mechanism. Therefore analyzing the changes in the amount and type of larval feeding could be used as a tool for recognizing resistance mechanisms within plants.

Feeding of an organism supplies the energy for growth, development, reproduction and many of its other needs (Chapman, 1998). Most of the insect species have similar nutritional needs because of the similarities in the main chemical compounds and also metabolic pathways of their body. Amino acids, proteins, lipids, carbohydrates, nucleic acid, minerals, vitamins and water are the most important nutritional needs of the insects which they are able to make some of these nutrients by themselves and some of their needs has to be provided by eating foods or by symbiotic organisms which they harbour (Etebari et al., 2004).

Biochemical compounds of larval body change after feeding on different diets and these changes could be used as a marker to study biological reactions. Feeding from plants with different chemical characteristics changes the biochemistry of larval body in different ways. It has been reported that gypsy moth larvae which are reared on diet with low nitrogen had higher carbohydrates compared to the larvae fed by high nitrogenous diets (Stockhoff, 1991).

Intraspecific variation in insect performance on aspen has been linked to variation in foliar chemistry. It was reported that esterase and glutathione transferase activities in insect body were induced by leaf phenolic glycosides and also performance of gypsy moth larvae is strongly influenced by variation in level of these compounds (Hemming and Lindroth, 2000). Therefore the interaction of feeding on different poplar varieties and biochemical characteristics of gypsy moth larvae were studied to gain a better understanding of the factors and reasons for its host preference.

MATERIALS AND METHODS

Gypsy moth eggs were collected at mid April 2007 from Guisom region, in north of Iran, from poplar, alder and ironwood with a smooth stalk and then were transferred to the lab. The eggs were hatched in 25 ± 5 ^{o}C by the end of spring. The caterpillar was reared on different poplar clones included 5 from *P. deltoiedes* (*P. d.* 72/51, *P. d.* 77/51, *P. d.* 73/51, *P. d.* 79/51 and *P. d.* 69/55) and 4 clones from *P. euramerican* Dode (*P. e. triplo, P. e. castanzo*, *P. e.* 92/40 and *P. e.* 45/51) with the single local species of Iran, *P. caspica*.

Larvae were reared on each clone from the beginning and the larval growth rate was measured based on the manipulated method of (Waldbauer, 1968).

After the 3rd molting, in the first day of forth instar, 10 larvae were collected randomly and were homogenized. 300 mg of the samples were diluted with 1ml of phosphate buffer and after 10 min the samples were centrifuged with 14000 rpm. Supernatant were transferred to new tubes and were kept in -20 ^{o}C for biochemical analysis.

Biochemical Analysis

The method of Lowry et al. (1951) was used for the total protein estimation. Haemolymph was diluted with distilled water and was added to alkaline copper reagent in microtubes. After 10 minutes 0.5 ml of Folin Ciocalteu's reagent was added to the mixture and microtubes were shaken thoroughly. The tubes were kept 20 minutes in room temperature for color development. The readings were taken on the spectrophotometer at 650 nm. For the reference, standard Bovine Serum Albumen (BSA) (Fatty acid free) was used. The concentration of urea was determined by measuring ammonia produced from urea, using a commercial urea assay kit (Chemenzyme Co., Iran). To measure the total cholesterol of haemolymph, Richmond (1973) method was conducted. The principles of this method are based on hydrolysis of cholesterol esters by cholesterol oxidase, cholesterol esterase and peroxidase. Glucose was analyzed as described by Sigert (1987). Alanine aminotransferase (ALT) (EC 2.6.1.2) and aspartate aminotransferase (AST) (EC 2.6.1.1) were measured utilizing Thomas (1998) procedure.

Statistical Analysis

Collected data were subjected to statistical analysis of variance test for significant differences in the measured parameters. For all analysis of variance the Tukey-Kramer test at 5% significant level was used in randomized complete blocks designed by SAS statistical program (SAS, 1997).

RESULTS AND DISCUSSION

Glucose was much higher in the larvae fed on *P. e. triplo* and it fluctuated from 35 to 93.3 mg/dl. Its amount in the larvae fed on *P. d.* 79/51 and *P. d.* 72/51 was lower than other groups. Therefore feeding from *P. deltoids* caused relative decrease of glucose in larval body (Fig 1). Generally glucose enhancement in lepidopteran larvae has a direct correlation by carbohydrates quantity. Larvae with better nutrition have usually higher amount of this compound.

The amount of glucose can be a representative aspect of carbohydrate metabolism. Satake et al., (2000) showed that the quality of the food taken by lepidopteran larvae would have considerable effect on the haemolymph glucose. Daryaei et al, (2008) demonstrated that the larval performance and nutritional indices were improved when larva were fed by clones with *P. euramerican* parentage. As it has been indicated in the current data, glucose was higher in this group of larvae and this outlines that larvae with optimum diet and higher absorption of carbohydrates could increase the level of nutrient for their growth.

Feeding on the leaves of *P. deltoids* caused cholesterol increase in the larval body (Fig 2). The highest amount of this compound was measured in the larvae fed by *P. d.* 79/51. The analysis of correlation coefficient among biochemical compounds showed that cholesterol and glucose have a negative correlation (0.446) in a way that with the decrease of cholesterol in gypsy moth larvae its glucose content increases (Table 1). This indicates that lipid and carbohydrate metabolic pathways are activated in completely different conditions. This is while there are positive correlation between cholesterol and other compounds particularly protein and urea. Cholesterol reduction has an inverse relation with larval growth rate. It could be assumed that with the increase of growth and other biological indices, sterols absorbed from food, enter metabolic cycles because of their involvement in many biological reactions as substrates. Shekari et al. (2008) showed that the cholesterol content in the body of elm leaf beetle was related to the amount of food consumption and absorption. The beetles with better nutrition had a higher amount of this compound in their body.

Feeding on different poplar clones has a significant effect on protein and urea of gypsy moth larvae (Fig 3). Protein in different groups fluctuated between 10.1-16.6 mg/dl but there were no logical relation between the growth rate of larvae and this compound in their body (Fig 5). Urea differed between 4.5-10.6 in this group. Protein and urea indicated significant correlation with cholesterol which their coefficients were 0.911 and 0.598 but there were no considerable correlation between protein and urea. It has been reported that protein content in the larval body of gypsy moth has a direct relation with the amount of nitrogen in diet (Stockhoff, 1991). Insects that use low level nitrogenous diets eat more to compensate N deficiency and this causes the insects to be affected by allelochemicals and hence many of their biological performances reduce.

Hemming and Lindorth (2000) demonstrated that gypsy moths are very susceptible to phenolic glycosides. And these compounds have negative effect on insect performance because insects need to use much more energy to compensate their effects. Daryaei et al. (2008) showed that food consumption in the gypsy moth larvae fed on *P. e. triplo* was higher than other groups but as current results indicate although their food consumption is high, many biochemical compounds of their body is lower than other treatments and that is because of usage of energy for detoxification.

Proteins, being the key organic constituents, could be expected to play a role in the compensatory mechanisms of insects during different stress conditions. Also it has been shown that different stresses can decrease the amount of total protein in lepidopteran larva (Etebari et al., 2007; Shekari et al., 2008). This could be due to the break down of protein into amino acids, so with the entrance of these amino acids as a keto acid to TCA cycle, they will help to supply energy for the insect. So, protein depletion in tissues may constitute a physiological mechanism and might play a role in compensatory mechanisms under oxidative stress, to provide intermediates to the Krebs cycle, by retaining free amino acid content in haemolymph (Nath et al., 1997).

Aminotransferases activity was higher in the larvae fed by different clones of *P. deltoids* (Fig 4) while AST was always higher than ALT in all the larvae. The transaminases are the important components of amino acid catabolism, which is mainly involved in transferring an amino group from one amino acid to another keto acid. The AST and ALT serve as a strategic link between the carbohydrate and protein metabolism and are known to be altered during various physiological conditions (Etebari et al., 2007).

Comparison of the results of this research with other studies demonstrated that gypsy moth larvae need to utilize a high amount of energy to overcome the low oxidative pressure of different compounds in the poplar leaves and reach maximum performance. It could be concluded that high growth rate does not cause the enhancement of many nutrients in the larval body. Generally, in lepidopteran larvae with improvement of feeding condition and absorption, biochemical compounds increase in the larval body, however in this species such results were not obtained. Therefore the pattern of changes of these compounds could not change according to the specific type of the host plant (*P. deltoides* and *P. euroamricana*) and usually the changes were independent of each other.

LITERATURE CITED

Chapman, R. F. 1998. The Insects-Structure and Function, 4th edition, Cambridge: Cambridge University Press.

Coyle, D. R., Coleman, M. D., Durant, J. A. & Newman, L. A. 2006. Multiple factors affect pest and pathogen damage on *Populus* clones in South Carolina, Biomass and Bioenergy 30: 759–768.

Etebari, K., Ebadi, R. & Matindoost, L. 2004. Effect of feeding mulberry's enriched leaves with ascorbic acid on some biological, biochemical and economical characteristics of silkworm *Bombyx mori* L., Int. J. Indust. Entomol., 8 (1): 81-87.

Etebari, K. & Matindoost, L. 2004. Effects of hypervitaminosis of vitamin B3 on silkworm biology. Journal of Biosciences, 29 (4): 417-422.

Etebari, K., Bizhannia, A. R., Sorati, R. and Matindoost, L. 2007. Biochemical Changes in Hemolymph of Silkworm Larva Due to Pyriproxyfen Residue. Pesticide Biochem. Physiol., 88 (1): 14-19.

Hemming, J. D. C. & Lindroth, R. L. 2000. Effects of phenolic glycosides and protein on Gypsy Moth (Lepidoptera: Lymantriidae) and forest tent caterpillar (Lepidoptera: Lasiocampidae) performance and detoxication activities. Environ. Entomol., 29 (6): 1108-1115.

Lowry, H., Rosebrough, N. L., Far, A. L. & Randal, R. J. 1951. Protein measurement with folin phenol reagent. J. Biol. Chem. 193: 265–275.

Nath, B. S., Suresh, A., Mahendra Varma, B. & Kumar, R. P. 2007. Changes in Protein Metabolism in Haemolymph and Fat Body of the Silkworm, *Bombyx mori* L., in responce to Organophosphorus Insecticides toxicity. Ecotoxicol. Envirn. Safe. 36: 169-173.

Nordman, E. E., Robison, D. J., Abrahamson, L. P. & Volk, T. A. 2005. Relative resistance of willow and poplar biomass production clones across a continuum of herbivorous insect specialization: Univariate and multivariate approaches. For. Ecol. Manag. 217: 307–318.

Richmond, W. 1973. Preparation and properties of cholesterol oxidase from *Nocardia* sp. and its application to enzymatic assay of total cholesterol in serum. Clin. Chem. 19: 1350-1356.

SAS Institute 1997. SAS/STAT User's Guide for personal computers, Cary, NC: SAS institute.

Satake, S., Kawabe, Y. & Mizoguchi, A. 2000. Carbohydrate metebolism during starvation in the silkworm *Bombyx mori* L.. Arch. Insect Biochem. Physiol., 44: 90-98.

Shekari, M., Jalali Sendi, J., Etebari, K., Zibaee, A. & Shadparvar, A. 2008. Effects of *Artemisia annua* L. (Asteracea) on nutritional physiology and enzyme activities of elm leaf beetle, *Xanthogaleruca luteola* Mull. (Coleoptera: Chrysomelidae). Pesticide Biochem. Physiol.

Siegert, K. J. 1987. Carbohydrate metabolism in *Manduca sexta* during late larval development. J. Insect Physiol. 33: 421-427.

Stockhoff, B. A. 1991. Starvation resistance of gypsy moth, *Lymantria dispar* (Lepidoptera: Lymantriidae): tradeoffs among growth, body size, and survival. Oecologia, 88 (3): 422-429.

Thomas, L. 1998. Clinical Laboratory Diagnostics. 1st ed. TH Books Verlasgesell-schaft, Frankfurt, pp. 89-94.

Waldbauer, G. P. 1968. The consumption and utilization of food by insects. Adv. Insect Physiol., 5: 229-288.

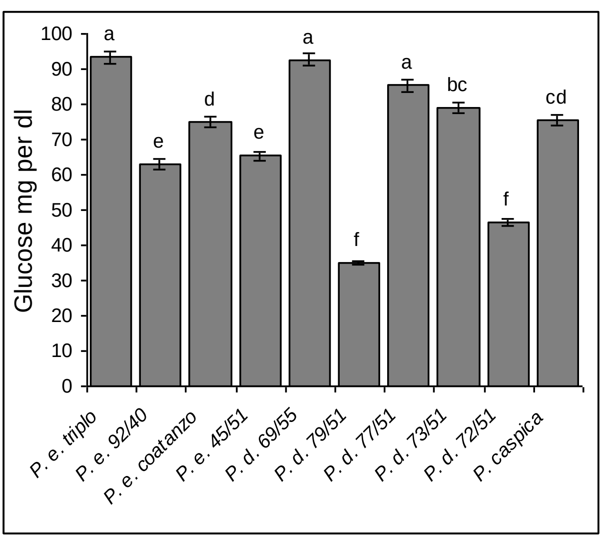

Figure 1. The amount of glucose in gypsy moth caterpillar feed by different poplar clones.

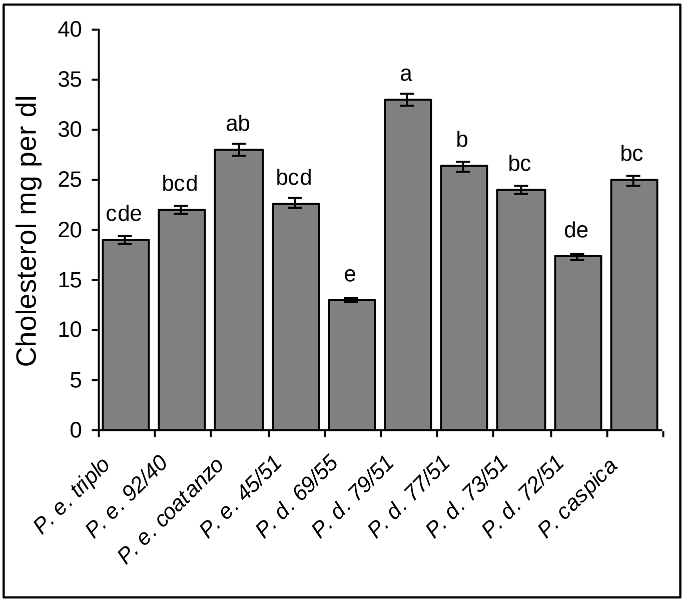

Figure 2. The amount of cholesterol in gypsy moth caterpillar feed by different poplar clones.

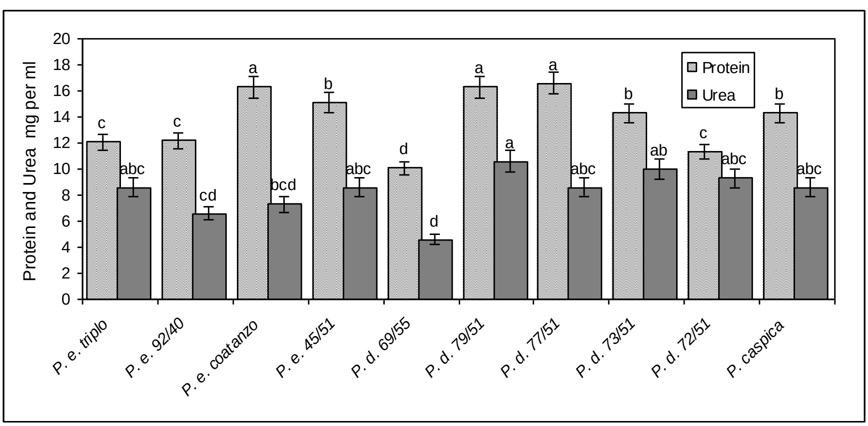

Figure 3. The amount of protein and urea in gypsy moth caterpillar feed by different poplar clones.

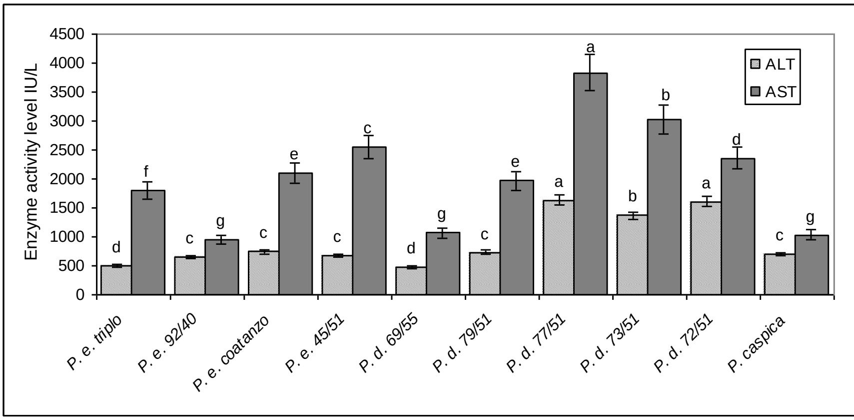

Figure 4. The activity level of ALT and AST in gypsy moth caterpillar feed by different poplar clones.

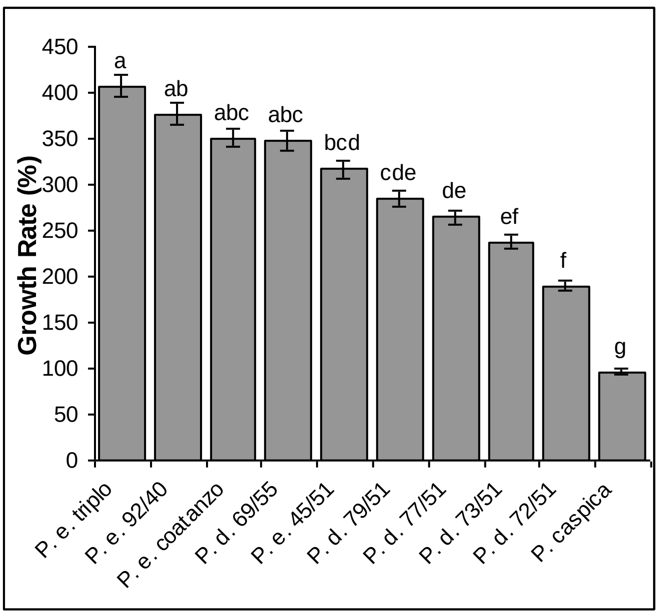

Figure 5. the growth rate of 4th instar larvae of Gypsy moth on different poplar clones.

Table 1- The correlation matrix among biochemical parameters of gypsy moth larva

	Glucose	Cholesterol	Protein	urea	ALT	AST
Glucose	1					
Cholesterol	- 0.446	1				
Protein	- 0.217	0.911 **	1			
Urea	- 0.516	0.598 *	0.524	1		
ALT	- 0.175	0.097	0.211	0.470	1	
AST	0.023	0.302	0.548	0.521	0.770 **	1

SUBSTITUTE NAMES FOR FOUR PREOCCUPIED MILLIPEDE GENERA (DIPLOPODA)

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[Özdikmen, H. 2009. Substitute names for four preoccupied millipede genera (Diplopoda). Munis Entomology & Zoology, 4 (1): 180-183**]**

ABSTRACT: Four junior homonyms were detected among the millipedes genera and the following replacement names are proposed: Order Polydesmida: *Vigilia* nom. nov. pro *Curimagua* Hoffman, 1982; *Delirus* nom. nov. pro *Cylindromus* Loomis, 1977 and *Lippus* nom. nov. pro *Paratylopus* Korsos & Golovatch, 1989; Order Spirostreptida : *Umbraticus* nom. nov. pro *Tomogonus* Demange, 1971. Accordingly, new combinations are herein proposed for the species currently included in these genera respectively: *Vigilia granulata* (Hoffman, 1982) comb. nov.; *Delirus uniporus* (Loomis, 1977) comb. nov.; *Lippus strongylosomoides* (Korsos & Golovatch, 1989) comb. nov.; *Umbraticus implicatus* (Demange, 1978) comb. nov.; *Umbraticus intortus* (Demange, 1971) comb. nov.; *Umbraticus involutus* (Demange & Mauries, 1975) comb. nov.; *Umbraticus lamottei* (Demange & Mauries, 1975) comb. nov.; *Umbraticus schuberti* (Demange & Mauries, 1975) comb. nov. and *Umbraticus subgrundus* (Demange, 1971) comb. nov.

KEY WORDS: nomenclatural changes, homonymy, replacement names, Diplopoda.

Four proposed genus names in Diplopoda are nomenclaturally invalid, as the genus group names has already been used by a different authors in Araneae, Coleoptera and Mammalia. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these generic names.

TAXONOMY

Class DIPLOPODA

Order POLYDESMIDA

Family CHELODESMIDAE
Genus *VIGILIA* nom. nov.

Curimagua Hoffman, 1982. Journal nat. Hist. 16 (5): 645. (Diplopoda: Polydesmida: Leptodesmidea: Chelodesmoidea: Chelodesmidae: Chelodesminae: Batodesmini). Preoccupied by *Curimagua* Forster & Platnick, 1977. Am. Mus. Novit. No.2619: 24. (Arachnida: Araneae: Symphytognathidae).

Remarks: Hoffman (1982) proposed the generic name *Curimagua* as a genus of millipedes with the type species *Curimagua granulata* Hoffman, 1982 by original designation from Venezuela (Edo. Falcon, Serrania de San Luis, Curimagua valley) in Diplopoda. It is a valid genus name (Shelley et al., 2000). Unfortunately, the generic name was already preoccupied by Forster & Platnick (1977), who had proposed the genus name *Curimagua* as a spider genus with the type species *Curimagua chapmani* Forster & Platnick, 1977 in Araneae. Thus, the genus group name *Curimagua* Hoffman, 1982 is a junior homonym of the generic name *Curimagua* Forster & Platnick, 1977. So I propose a new replacement name *Vigilia* **nom. nov.** for *Curimagua* Hoffman, 1982. The name is from the Latin word "vigilia" (meaning "watch, watchfulness" in English).

Summary of nomenclatural changes:

Vigilia **nom. nov.**
pro *Curimagua* Hoffman, 1982 (non Forster & Platnick, 1977)

Vigilia granulata (Hoffman, 1982) **comb. nov.**
from *Curimagua granulata* Hoffman, 1982

Genus *DELIRUS* nom. nov.

Cylindromus Loomis, 1977. Flo. Ent. 60: 21. (Diplopoda: Polydesmida: Leptodesmidea: Chelodesmoidea: Chelodesmidae: Chelodesminae: tribe uncertain). Preoccupied by *Cylindromus* Aurivillius, 1891. Nouv. Arch. Mus. Paris, (3) 7, 213. (Insecta: Coleoptera: Curculionoidea: Curculionidae).

Remarks: The name *Cylindromus* was initially introduced by Aurivillius, 1891 for a beetle genus (with the type species *Cylindromus plumbeus* Aurivillius, 1891 in Coleoptera. It is still used as a valid genus name (Alonso-Zarazaga & Lyal, 1999). Subsequently, Loomis, 1977 described a new millipede genus (with the type species *Cylindromus uniporus* Loomis, 1977 by original designation from Puerto Rico) under the same generic name. It is a valid genus name. Thus, the genus *Cylindromus* Loomis, 1977 is a junior homonym of the genus *Cylindromus* Aurivillius, 1891. So I propose a new replacement name *Delirus* **nom. nov.** for *Cylindromus* Loomis, 1977. The name is from the Latin word "delirus" (meaning "crazy" in English).

Summary of nomenclatural changes:

Delirus **nom. nov.**
pro *Cylindromus* Loomis, 1977 (non Aurivillius, 1891)

Delirus uniporus (Loomis, 1977) **comb. nov.**
from *Cylindromus uniporus* Loomis, 1977

Family PARADOXOSOMATIDAE
Genus *LIPPUS* nom. nov.

Paratylopus Korsos & Golovatch, 1989. Acta Zool. Hung. 35 (3-4): 215. (Diplopoda: Polydesmida: Strongylosomatidea: Strongylosomatoidea: Paradoxosomatidae: Paradoxosomatinae: Sulciferini). Preoccupied by *Paratylopus* Matthew, 1904. Bull. Amer. Mus. nat. Hist., 20, 211. (Mammalia: Artiodactyla: Ruminantia: Tylopoda: Camelidae: Poebrotheriinae).

Remarks: The fossil mammal generic name *Paratylopus* was proposed by Matthew, 1904 with the type species *Miolabis primaevus* Matthew, 1904 in Mammalia. Later, the genus *Paratylopus* was described by Korsos & Golovatch, 1989 for millipedes with the type species *Paratylopus strongylosomoides* Korsos & Golovatch, 1989 by original designation from Vietnam (Prov. Vinh phu, Tam dao, north of the village). It is a valid genus name. However, the name *Paratylopus* Korsos & Golovatch, 1989 is invalid under the law of homonymy, being a junior homonym of *Paratylopus* Matthew, 1904. So I propose to substitute the junior homonym name *Paratylopus* Korsos & Golovatch, 1989 for the nomen novum *Lippus*. The name is from the Latin word "lippus" (meaning "sleepy" in English).

Summary of nomenclatural changes:

Lippus **nom. nov.**
pro *Paratylopus* Korsos & Golovatch, 1989 (non Matthew, 1904)

Lippus strongylosomoides (Korsos & Golovatch, 1989) **comb. nov.**
from *Paratylopus strongylosomoides* Korsos & Golovatch, 1989

Order SPIROSTREPTIDA

Family SPIROSTREPTIDAE
Genus *UMBRATICUS* nom. nov.

Tomogonus Demange, 1971. Mem. Inst. fond. Afr. noire No.86: 208. (Diplopoda: Spirostreptida: Spirostreptidea: Spirostreptoidea: Spirostreptidae: Spirostreptinae: Spirostreptini). Preoccupied by *Tomogonus* d'Orbigny, 1904. Ann. Mus. Stor. nat. Genova, 41, 254. (Insecta: Coleoptera: Scarabaeoidea: Scarabaeidae: Coprinae: Onthophagini).

Remarks: Firstly, the African beetle genus *Tomogonus* was established by d'Orbigny, 1904 with the type species *Tomogonus crassus* d'Orbigny, 1904 in Coleoptera. It is still used as a valid genus name (Mathison et al., 2008). Subsequently, the generic name *Tomogonus* was proposed by Demange, 1971 for a millipede genus with the type species *Tomogonus intortus* Demange, 1971 by original designation from Sierra Leone (Loma Mountains). It is a valid genus name (Shelley et al., 2000). However, the name *Tomogonus* Demange, 1971 is invalid under the law of homonymy, being a junior homonym of *Tomogonus* d'Orbigny, 1904. So I propose to substitute the junior homonym name *Tomogonus* Demange, 1971 for the new name *Umbraticus* **nom. nov.**. The name is from the Latin word "umbraticus" (meaning "like shadow or like umbra" in English).

Summary of nomenclatural changes:

Umbraticus **nom. nov.**
pro *Tomogonus* Demange, 1971 (non Orbigny, 1904)

Umbraticus implicatus (Demange, 1978) **comb. nov.**
from *Tomogonus implicatus* (Demange, 1978)

Umbraticus intortus (Demange, 1971) **comb. nov.**
from *Tomogonus intortus* Demange, 1971

Umbraticus involutus (Demange & Mauries, 1975) **comb. nov.**
from *Tomogonus involutus* (Demange & Mauries, 1975)

Umbraticus lamottei (Demange & Mauries, 1975) **comb. nov.**
from *Tomogonus lamottei* Demange & Mauries, 1975

Umbraticus schuberti (Demange & Mauries, 1975) **comb. nov.**
from *Tomogonus schuberti* (Demange & Mauries, 1975)

Umbraticus subgrundus (Demange, 1971) **comb. nov.**
from *Tomogonus subgrundus* Demange, 1971

LITERATURE CITED

Alonso-Zarazaga, M. A. & Lyal, C. H. C. 1999. A World Catalogue of Families and Genera of Curculionoidea (excepting Scolytidae and Platypodidae). Entomopraxis S. C., Barcelona, 316 pp.

Demange, J.-M. 1971. Myriapodes Diplopodes récoltés au Togo, au Dahomey et en Côte d'Ivoire par M. A. Aouti. Bulletin de l'Institut Fondamental d'Afrique Noire, Série A 33: 76-86.

D'Orbigny, H. 1904. Annali del Museo Civico di Storia Naturale "Giacomo Doria" 41: 253-331.

Forster, R. R. & Platnick, N. I. 1977. A review of the spider family Symphytognathidae (Arachnida, Araneae). Am. Mus. Novit. 2619: 1-29.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Korsos, **Z. & Golovatch, S. I.** 1989. Addenda to the millipede fauna of Vietnam (Diplopoda). Acta zoologica hungarica, 35: 211-220.

Loomis, H. F. 1977. Three new millipeds from West Indian caves. The Florida Entomologist, 60: 21-25.

Mathison, B. A., Hardy, M., Bezdek, A. & Schoolmeesters, P. 2008. A worldwide checklist of the tribes and genera of Aegialiinae, Aphodiinae, Termitotroginae, Aulonocneminae, Scarabaeinae and Coprinae (Coleoptera: Scarabaeoidea: Scarabaeidae). Last modified on Friday, 13 June 2008. Available from: http://www.coleoptera.org/p735.htm

Matthew, W. D. 1904. Notice of two new Oligocene camels. Bull. Amer. Mus. Nat. Hist., 20: 211-215.

Shelley, R. M., Sierwald, P., Kiser, S. B., Golovatch, S. I. 2000. Nomenclator generum et familiarum Diplopodorum II, pp. 1-167.

FAUNISTIC NOTES ON FORMICIDAE (INSECTA: HYMENOPTERA) OF RICE FIELDS AND SURROUNDING GRASSLANDS IN NORTHERN IRAN

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ABSTRACT: The fauna of ants (Hymenoptera: Formicidae) was studied in rice fields of Northern Iran, Mazandaran province through 2000 until 2006. In a total of 39 species from 17 genera and 3 subfamilies were identified. Of these 34 species and subspecies are new records for the Iranian fauna.

KEY WORDS: Formicidae, Fauna, Rice field, Northern Iran

Rice field is one of the rare agroecosystems which included both arid and aquatic ecosystems; in this case the fauna of insects is more diverse than the other agroecosystems (Bambaradeniya and Amerasinghe, 2003). There are several pests in the rice fields that in absence of management programs damage the crop severely (Heinrichs, 1994). Besides, there are several natural enemies (especially predators and parasitoids) in the rice fields of the world that decrease the population density of the pests significantly (Mohyuddin, 1990). One of these powerful predators is ants (Hymenoptera: Formicidae) (Bonhof et al., 1997). Ants, with an estimated world population of 10^{15} adults, are most abundant in most climates especially the tropics where in rain forests they may represent between one third and half of the insect biomass (Fittkau and Klinge, 1973). In view of their abundance, their stability as populations, and their feeding habits, ants have a major influence in many habitats. As predators of pests, they may be useful in pest management, but such positive attributes must be weighed against possible disadvantages (Way and Khoo, 1992).

Important attributes of useful ant species are listed by Risch & Caroll (1982) as follows: *a.* they are very responsive to prey density; *b.* they can remain abundant even when prey is scarce because they can cannibalize their brood and, most importantly, use honey dew-producing Homoptera as a stable source of energy; *c.* they can store food and hence continue to capture prey even if it is not immediately needed; *d.* besides killing pests, they can deter many others including some too large to be successfully captured; *e.* they can be managed to enhance their abundance, distribution, and contacts with prey. Other useful criteria for ants as biological control agents include broad habitat range and choice of species that are unlikely to be out-competed by other ants (Majer, 1986). Finnegan (1974) lists desirable characteristics of certain *Formica* spp., some of which are relevant to other ants, including the ability to hunt at different levels and to concentrate increasingly on a particular prey species as its population increases. Polygyny is a useful attribute because colony fragments can easily be transferred to establish new colonies (Way and Khoo, 1992). All the literatures on beneficial and potentially beneficial ants especially the ants' role in biological control and pest management were reviewed by Way and Khoo (1992).

Iran is a large country incorporating various geographical regions and climates; therefore it would be expected that there are a diverse fauna of ants in this region. But the fauna of this important and large family was studied very poorly in Iran (Modarres Awal, 1997; Ghasemi et al., 2000; Alipanah and Dejakam, 2000; Alipanah et al., 2000; Tahmasebi et al., 2000; Tahmasebi and Alipanah, 2002; Alipanah, 2004; Askarzadeh et al., 2004). The goal of this paper which is a part of large project as "Iranian Formicidae" is introducing the ants' fauna in different Iranian agroecosystems.

METHODS

Totally 20 plastic pitfall traps, 8.5×10 cm (diameter × depth), were installed at 10 m intervals in different rice fields and were part-filled with ethanol 75%. The traps were emptied weekly for three crop seasons and the fallen beetles were collected and identified. In addition to the pit fall traps, sweepings were conducted randomly in different rice fields of Northern Iran. Also several samplings were conducted after harvesting the crops in autumns and winters by the mentioned methods.

SPECIES LIST

Totally 39 species of the 17 genera (*Camponotus*, *Cataglyphis*, *Formica*, *Lasius*, *Lepisiota*, *Plagiolepis*, *Polyrhachis*, *Aphaenogaster*, *Cardiocondyla*, *Crematogaster*, *Messor*, *Monomorium*, *Pheidole*, *Solenopsis*, *Tetramorium*, *Linepithema*, *Tapinoma*) and three subfamilies (Formicinae, Myrmicinae and Dolichoderinae) were collected and identified from Mazandaran Province. Almost the materials were collected by the senior author and are deposited in the collection of the second author.

Family Formicidae
Subfamily Formicinae

Camponotus oasium Forel, 1890
Ghaemshahr (Ahangarkola), November 2001; Joibar (Divkola); August 2002.
****Camponotus xerxes*** Forel, 1904
Amol, June 2005; Ghaemshahr (Sarokola), April 2006.
****Cataglyphis auratus*** Menozzi, 1992
Amol, September 2005.
****Cataglyphis albicans*** var. ***auratus*** Menozzi, 1932
Amol, August 2005; Babol (Amirkola), July 2006.
****Cataglyphis lividus*** Andre, 1881
Savadkooh (Zirab), June 2003.
****Cataglyphis nodus*** var. ***drusa*** Santschi, 1929
Amol, April 2005; Fereydonkenar, November 2005.
****Cataglyphis semitonsus*** Santschi, 1929
Savadkooh (Polsephid), July 2000.
****Formica glauca*** Ruzsky, 1896
Amol, Aug. 2005; Babol (Bandpey), May 2006.

****Lasius alienus*** Foerster, 1850
Galoogah, August 2002.
****Lasius neglectus*** Van Loon, Boomsma & Andrasfaldvy, 1990
Amol, November 2005.
Lasius turcicus Santschi, 1921
Savadkooh, July 2003; Ghaemshahr, June 2005.
****Lepisiota frauenfeldi*** subsp. ***Karavievi*** Ugamsky, 1929
Amol, April 2006.
****Lepisiota karavievi*** Pisarski, 1967
Amol, June 2005.
****Plagiolepis maura*** Santschi, 1920
Amol, November 2004; Ghaemshahr, October 2005.
****Polyrhachis lacteipennis*** Smith, 1858
Amol, September 2005.

Subfamily Myrmicinae

****Aphaenogaster obsidiana*** Mayr, 1861
Babol, June 2002.
****Cardiocondyla stambouloffi*** Forel, 1892
Amol and Sari; September 2003.
****Crematogaster antaris*** Forel, 1849
Joibar, July 2000.
****Crematogaster subdentata*** Mayr, 1877
Neka, August 2004; Sari, August 2005.
****Crematogaster warburgi*** Menozzi, 1933
Behshahr, June 2001; Sari, April 2003.
****Messor alexandri*** Thome & Thome, 1981
Amol, September 2006.
****Messor darianus*** Pisarski, 1967
Amol and Ghaemshahr, October 2005.
****Messor denticulatus*** Santschi, 1927
Savadkooh, July 2003.
****Messor medioruber*** Santschi, 1910
Amol, June 2006.
Messor caducus Victor, 1839
Sari and Neka, June 2002.
****Messor sultanus*** Santschi, 1917
Babol, August 2003.
****Monomorium areniphilum*** Santschi, 1911
Ghaemshahr and Joibar, September 2004.
****Monomorium pharaonis*** Linnaeus, 1758
Savadkooh, July 2003.
****Monomorium venustum*** Smith, 1858
Babol, Aug. 2003.
****Pheidole megacephala*** Fabricius, 1793
Amol, August 2005.
Pheidole pallidula Nylander, 1849
Savadkooh (Shirgah), October 2000.
****Solenopsis wolfi*** Emery, 1915
Ramsar, July 2003.
****Tetramorium caespitum*** Linnaeus, 1758
Savadkooh (Shirgah), October 2000.
Tetramorium punctatum Santschi, 1927
Noor, July 2005.
****Tetramorium taurocaucasicum*** Arnoldi, 1977
Amol, June 2005, Ghaemshahr, April 2006.

Subfamily Dolichoderinae

*__Linepithema humile__ Meyr, 1868
Nooshahr and Noor, September 2005.
*__*Tapinoma festae*__ Emery, 1925
Fereydonkenar and Chalus, November 2001.
*__*Tapinoma karavievi*__ Emery, 1925
Chalus and Tonekabon, June 2004.
Tapinoma simrothi subsp. ***Karavievi*** Emery, 1925
Behshahr and Neka, August 2001.

DISCUSSION

The results of this survey indicated that the subfamily Myrmicinae is more diverse than the two other subfamilies with 20 species. Majer (1986) classified ants into status categories of dominant; subdominant, which can attain dominant status in the absence of dominant ants; and nondominant, which live within or between the territories of dominant ants. Dominant ants include species that are most conspicuously useful for biological control.

Good evidence shows that ants prey on the egg of pest species in many different countries and habitats. For example, in Sri Lanka virtually 100% of eggs of *Opisina arenosella* were removed within 24 h by *Monomorium floricola*. *Solenopsis invicta* was part of a complex killing of over 70% of eggs of *Heliothis virescens* in 24 h on cotton where ratios of predators to prey ranging from 2: 1 to 200: 1 seem able to prevent significant pest damage. On sugar cane, over 90% of eggs and small larvae of *Castnia licus* and 92% of eggs of *Eldana saccharina* were killed by ants. *Pheidole* spp. are major predators in complexes that can kill over 95% of eggs of *Alabama argillacea* and some 80% of *Diabrotica* spp. eggs in the soil (Way & Khoo, 1992). Therefore, ants alone or as an important part of predator complex can cause very large mortalities of eggs and so can contribute importantly to natural control (Jaffe et al., 1990). More specific case studies are needed to assess the importance of such mortality, especially because increased egg mortality can sometimes be compensated for by decreased larval mortality (van Hamburg & Hassell, 1984).

The stability, social organization, and foraging behavior of some predatory ants enable them to react quickly to increasing prey density, and also make them uniquely able to protect crops from low-density pests. Such qualities require dependence on honeydew-producing Homoptera that may sometimes be made harmful by ant attendance. Cost-benefit judgments are therefore needed when such ants are to be used.

Predacious ants also affect other natural enemies, but less than might be expected, and may indeed benefit some. Ants tend to overlap the food niches of other predators and may force them into one competitive system. Whether overall biological control is benefited by such interactions is unknown. Work on the role of ants as part of overall natural-enemy complexes is needed. In addition, inadequate attention has been given to understanding ant-prey interactions. Research such as that carried out in some natural habitats needs to be undertaken in agroecosystems.

Behavioral attributes that enable one species, for example, a very small and apparently inoffensive species, to dominate over larger more aggressive species are not understood and need detailed investigation. Studies of this type should provide valuable clues to manipulating systems in favor of some beneficial species.

Biological-control attributes of many relatively inconspicuous nondominant ants have been inadequately studied. Some species may he valuable in their own right, but many also make a significant contribution to overall natural mortality, which needs to be understood much better than it is at present.

The results are promising from some ecological approaches to manipulating beneficial ants by cultural practices and habitat modification. More emphasis is needed on practical application, especially since some ants have sharply contrasting pest and beneficial attributes. Since eradication is impossible, the emphasis should be on enhancing their role in habitats where they are beneficial while controlling them elsewhere. Such approaches need not be incompatible.

Although the introduction of exotic predatory ants for biological control is potentially hazardous, it should not be discounted. In this context, work is needed on some accidentally introduced species that have important biological-control attributes.

Finally, in some circumstances, ants are uniquely useful, as when they are the only alternative to intensive insecticide treatment, or where alternative practices are uneconomic or impracticable.

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LITERATURE CITED

Alipanah, H. 2004. The first record of one family and six species of ants (Hym.: Formicidae) from Iran. 16th Iranian Plant Protection Congress 2004: p. 190.

Alipanah, H. & Dejakam, G. 2000. Introduction of seven new species of ants (Hymenoptera, Formicidae) from Iran. 14th Iranian Plant Protection Congress 2000: 349.

Alipanah, H., Khazagi, A. & Moghadassi, P. 2000. Taxonomical Study of Formicinae Ants in Tehran. 14th Plant Protection Congress 2000: p. 350.

Askarzadeh, K., Tirgari, S. & Nateyhpirir, M. 2004. The first report of biting ants Pachycondyla sennaarensis (Formicidae, Hymenoptera) in Sistan & Baluchestan Province. 16th Plant Protection Congress 2004: p. 190.

Bambaradeniya, C. N. B. & Amerasinghe, F. P. 2003. Biodiversity associated with the rice field agro-ecosystem in Asian countries: a brief review. DRAFT of 16 Jan 2003. (www.iwmi.cgiar.org/Assessment/FILES/word/publications/WorkingPapers/RiceBioRevII.do)

Bonhof, M. L., Overholt, W. A., van Huis, A. & Polaszek, A. 1997. Natural enemies of cereal stemborers in East Africa: A review. Insect Sci. Applic. 17 (1): 19 - 35.

Finnegan, R. J. 1974. Ants as predators of forest pests. Entomophaga Mem. Hors Ser. 7: 53-59.

Fittkau, E. J. & Klinge, H. 1973. On biomass and trophic structure of the central Amazonian rain forest ecosystem. Biotropica 5: 2-14.

Ghasemi, M., Haji-Zadeh, J. & Alipanah, H. 2000. Study of the ants (Hymenoptera: Formicidae) of pome fruit orchards in Mashad. 14th Iranian Plant Protection Congress, p. 260.

van Hamburg, H. & Hassell, M. P. 1984. Density dependent and the augmentative release of egg parasitoids against graminaceous stalkborers. Ecol. Entomol. 9: 101-108.

Heinrichs, E. A. 1994. Biology and management of rice insects. Wiley Eastern Ltd., IRRI 779 pp.

Jaffe, K., Mauleon, H. & Kermarree, A. 1990. Predatory ants of Diaprepes abbreviatus (Coleoptera: Curculionidae) in citrus groves in Martinique and Guadeloupe, F.W.I. Fla. Entomol. 73: 684-687.

Majer, J. D. 1986. Utilizing economically beneficial ants; pp. 314-331. In: Vinson, S.B. (ed.), Economic impact and control of social insects. New York, Praeger. 421 pp.

Modarres Awal, M. 1997. List of agricultural pests and their natural enemies in Iran. Ferdowsi University Press No. 147: p. 274.

Mohyuddin, A. I. 1990. Biological control of Chilo spp. in maize, sorghum and millet. Insect Sci. Applic. 11 (4/5): 721-732.

Risch, S. J. & Caroll, C. R. 1982. The ecological roles of ants in two Mexican agroecosystems. Oecologia 55: 114-119.

Tahmasebi, G., Alipanah, H. & Bahreini, R. 2000. Introducing of carpenter ant Camponotus cruentatus Latreille (Hym.: Formicidae) as a pest in honey bee colonies. 14th Iranian Plant Protection Congress 2000: p. 368.

Tahmasebi, G. & Alipanah, H. 2002. New report of Lepisiota semenovi (Hym.: Formicidae) in Iran. Journal of Entomological Society of Iran 22(1).

Way, M. J. & Khoo, K. C. 1992. Role of ants in pest management. Annu. Rev. Entomol. 37: 479-503.

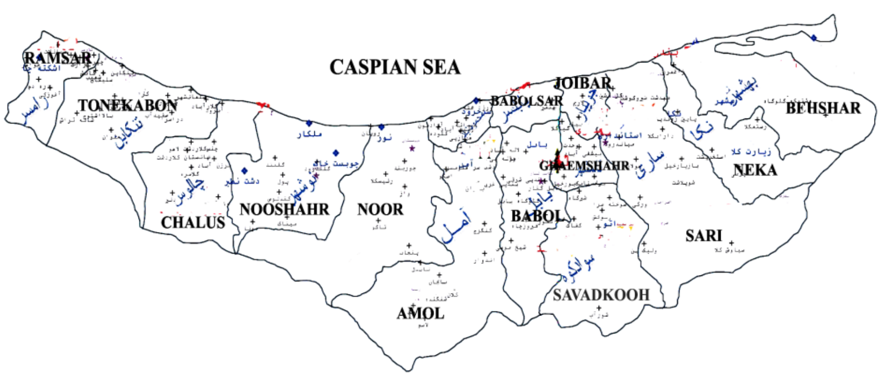

Fig. 1. The map of Mazandaran province, Northern Iran.

NEW FAMILY AND GENUS NAMES, FAHRIYEIDAE NOM. NOV. AND *FAHRIYEA* NOM. NOV., FOR SPICIDAE AND THE TYPE GENUS *SPICA* TERMIER & TERMIER, 1977 (PORIFERA: DEMOSPONGIAE: AGELASIDA)

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[Özdikmen, H. 2009. New family and genus names, Fahriyeidae nom. nov. and *Fahriyea* nom. nov., for Spicidae and the type genus *Spica* Termier & Termier, 1977 (Demospongiae: Agelasida). Munis Entomology & Zoology, 4 (1): 190-192**]**

ABSTRACT: A junior homonym was detected among the sponge genus group names and the following replacement name is proposed: *Fahriyea* nom. nov. for *Spica* Termier & Termier, 1977. Accordingly, new combinations are herein proposed for the species currently included in this genus. *Fahriyea spica* (Termier & Termier, 1977) comb. nov. and *Fahriyea texana* (Rigby & Bell, 2006) comb. nov.. In addition, I propose the replacement name Fahriyeidae new name for the family name Spicidae.

KEY WORDS: nomenclatural change, homonymy, replacement name, Spicidae, *Spica,* sponges.

Remarks on nomenclatural change

Firstly, the moth genus name *Spica* was erected by Swinhoe (1889) with the type species *Spica luteola* Swinhoe, 1889 by monotypy from Sikkim (India) in Lepidoptera (Drepanoidea: Drepanidae: Thyatrinae). It is still used as a valid genus name (e. g. Smetacek, 2002).

Subsequently, the fossil genus *Spica* was described by Termier & Termier (1977) with the type species *Spica spica* Termier & Termier, 1977 by original designation in Agelasida (Demospongiae). The name is currently used as a valid generic name among sponges as the type genus of the family Spicidae Termier & Termier, 1977. It was synonymized subjectively with *Fistulosponginina* by Finks et al. (2004). Then, it was revalidated by Rigby & Bell (2006). So it is still used as a valid genus (Senowbari-Daryan & Rigby, 1988; Weidlich & Senowbari-Daryan, 1996; Rigby & Bell, 2006).

However, the name *Spica* Termier & Termier, 1977 is invalid under the rule of homonymy, being a junior homonym of *Spica* Swinhoe, 1889. 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 *Spica* Termier & Termier, 1977 for the nomen novum *Fahriyea*. As a result of this, *Spica* Termier & Termier, 1977 is replaced with *Fahriyea* new name. The following new combination is established: *Fahriyea spica* (Termier & Termier, 1977) new combination, along with two another new combination for all two valid species currently included in *Spica* Termier & Termier, 1977.

In addition to this, I herein propose the replacement name Fahriyeidae new name for the family name Spicidae Termier & Termier, 1977 because its type genus *Spica* Termier & Termier, 1977 is invalid and the type genus of a family-group name must be valid.

SYSTEMATICS

Order Agelasida
Family **Fahriyeidae** new name

Spicidae Termier & Termier, 1977
Type genus.— *Fahriyea* **new name**.
Remarks.—The name *Spica* has been used in Agelasida as a stem for a family-group name, and should be automatically replaced with the new name.

Genus ***Fahriyea*** new name

Spica Termier & Termier, 1977, junior homonym of *Spica* Swinhoe, 1889.

Spica Termier & Termier, 1977. In Termier, Termier & Vachard, Palaeontographica (A) 156: 41. (Demospongiae: Ceractinomorpha: Agelasida: Fahriyeidae nom. nov.). Preoccupied by *Spica* Swinhoe, 1889. Proc. zool. Soc. London, 1889, 424. (Insecta: Lepidoptera: Drepanoidea: Drepanidae: Thyatrinae).

Type species.— *Spica spica* Termier & Termier, 1977 by original designation.

Etymology.— The new genus name is dedicated to my elder sister Fahriye Özdikmen (Demirer) from Turkey. It is feminine in gender.

Species account. — Two species.

The following new combinations are proposed and the species is removed from *Spica*:

Fahriyea spica (Termier & Termier, 1977) **new combination**
from *Spica spica* Termier & Termier, 1977

Fahriyea texana (Rigby & Bell, 2006) **new combination**
from *Spica texana* Rigby & Bell, 2006

LITERATURE CITED

Finks, R. M., Reid, R. E. H. & Rigby, J. K. 2004. Porifera (Demospongea, Hexactinellida, Heteractinida, Calcarea). Treatise on Invertebrate Paleontology Part E, Revised E (3): 1-872.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Rigby, J. K. & Bell, G. L. Jr. 2006. Sponges from the Reef Trail Member of the Upper Guadalupian (Permian) Bell Canyon Formation, Guadalupe Mountains National Park, Texas. Journal of Paleontology, 80 (5): 1-42.

Senowbari-Daryan, B. & Rigby, J. K. 1988. Upper Permian segmented sponges from Djebel Tebaga, Tunisia. Facies, 19: 171-250.

Smetacek, P. 2002. Notes on new records of hooktip moths, Lepidoptera,: Drepanidae, from the Kumaon and Garhwal Himalaya. Journal, Bombay Natural History Society, 99 (3): 446-454.

Swinhoe, C. 1889. On new Indian Lepidoptera, chiefly Heterocera. Proc. zool. Soc. Lond. 1889 (4): 396-431.

Termier, H. & Termier, G. 1977. Paléontologie des Invertébrés, in Monographie paléontologique des affleurements permiens du Djebel Tebaga (Sud Tunisien). Palaeontographica Abteilung A, 156 (1-3): 25-99.

Weidlich, O. & Senowbari-Daryan, B. 1996. Late Permian 'Sphinctozoans' from reefal blocks of the Ba'id area, Oman Mountains. Journal of Paleontology, 70 (1): 27-46.

SOME BIOLOGICAL PARAMETERS OF *LYSIPHLEBUS FABARUM* (HYMENOPTERA: APHIDIIDAE) A PARASITOID OF *APHIS FABAE* (HOMOPTERA: APHIDIIDAE) UNDER LABORATORY CONDITIONS

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[**Matin, S. B., Sahragard, A. & Rasoolian, G.** 2009. Some biological parameters of *Lysiphlebus fabarum* (Hymenoptera: Aphidiidae) a parasitoid of *Aphis fabae* (Homoptera: Aphidiidae) under labaratory conditions. Munis Entomology & Zoology, 4 (1): 193-200]

ABSTRACT: Some biological traits of *Lysiphlebus fabarum* (Marshal) an important parasitoid of *Aphis fabae* were studied under laboratory conditions (21 ±1° C, a relative humidity of 70± 5 % and 14:10 L:D h. of photoperiod). Different stages of *Aphis fabae* and its host plant were used. Average preadult period of male and female adult parasitoids were 13.18 ± 0.28 and 13.68 ± 0.27 days, respectively. There were no significant differences between male and female wasps longevity (P>0.05). There was a significant difference between preadult period of female and male parasitoids on different life stages of *Aphis fabae* (P < 0.05). Diet affected significantly the female parasitoid longevity (P<0.05). Longevity was longer when the females were fed on 30% honey solution and the shortest when they had no access to host plant, host, water and honey solution. Sex ratio changed towards males as temperature increased. Data analysis revealed that female parasitoids prefer *Aphis fabae* over *Aphis craccivora* Koch and *Aphis nerri* for oviposition (P< 0.05). The lowest oviposition preference was shown for *Aphis nerri*. Mean lifetime fertility of *Lysiphlebus fabarum* was 122 ± 27.28 offsprings/ female on *Aphis fabae*. The intrinsic rate of increase(r_m), mean generation time, doubling time and rate of increase per week (R_W) were 0.28, 16.31 days, 2.47 days, and 7.11, respectively.

KEY WORDS: Diet, Host preference, Population growth, Preadult period, Sex ratio

Aphidiids as endoparasitoids of aphids oviposit in the host body in a way that is specific in these wasps. The larvae hatch into their hosts bodies after incubation. They develop as solitary endoparasitoids. After aphid mummification, they spin cocoons beneath the emptied bodies of their hosts. Prepupal, pupal and adult stages are completed inside the cocoon and the mummified body of the aphid. Mature adults emerge from their mummified aphid host by cutting a circular hole in the host tegument (Stary, 1970).

The lifespan of adult aphidiids is influenced by many factors, such as temperature, humidity, food, presence or absence of hosts, etc. (Stary, 1988). This period generally takes 13-16 days from oviposition to adult emergence in *Lysiphlebus testaceipes* (Weeden & Haffman, 1995) and 10 ± 0.26 days in *L. fabarum* (Baghery-Matin et al., 2005). Development time in *L. testaceipes* ranges between 53.53 ± 0.48 at 10° C to 8.86 ± 0.06 days at 26° C (Welling et al., 1986). This period has been reported as 33.7 days at 15 °C, 21.1 days at 21.6 °C and 19.9 days at 24 °C for *Ephedrus cerasicola* (Hofsvang & Hagvar, 1977). Adult females of *Aphidius sonchi* Marshal, a parasitoid of the sowthistle aphid, *Hyperomyzus lactucae* (L.) lived longer in the absence of hosts than in their presence and also longer than males. Those supplied with water and honey lived longer than those without honey (Liu & Carver, 1985).

The aphidiid wasps vary in their preference for different stages of their aphid hosts. Although the female wasps prefer the second and the third instar nymphs for oviposition, they all attack four instar nymphs (Stary, 1988). The females of *Aphidius sonchi* Marshal, oviposited in all nymphal instars and both apterous and alate adults of the host, *Hyperomyzus lactucae* (L.) (Liu & Carver, 1985). The females of *Ephedrus cerasicola* oviposited in four nymphal stages and newly emerged adults of *Myzus persicae*, but they preferred the third instar nymphs to others (Tremblay, 1964). It has been found that female *Lysiphlebus fabarum* prefers the second and the third instar nymphs of *Aphis fabae* to other ones and the rate of parasitism is related to the movement of the aphid host and the parasitoid itself (Tremblay, 1964). According to Rakhshani et al. (2004), *Trioxys pallidus* also showed a greater preference for the third and forth instar nymphs of the walnut aphid, *Chromaphis juglandicola* (Kalt.) than the others. Studies on the biology of *Aphidius sonchi* revealed that it was a specific parasitoid of species of *Hyperomyzus* (Mackauer & Stary, 1967). However, observations showed that the parasitoid also laid eggs in *Macrosiphum euphorbiae* (Thomas), an aphid occurring commonly on *Sonchus* with *H. lactucae* (L.) but the development of parasitoid larvae were never found in *M. euphorbia*, indicating that development of the parasitoid in *Macrosiphum euphorbiae* ceased during the egg stage (Liu & Carver, 1985).

The sex ratio in aphidiids is in favor of females in the field conditions , but it is variably influenced by environmental and genetical factors (Stary, 1988). Host size as an environmental factor affects parasitoid sex ratio, as smaller aphid hosts result in male parasitoids and the larger ones in females. Wellings et al. (1986) also found that smaller hosts produced male parasitoids in *Aphidius ervi*. Age in adult females is another important factor that influences sex allocation and progeny production in *Lysiphlebus delhiensis* (Kouame & Mackauer, 1991; Serivastava & Singh, 1995). The sex ratio (male/female) in *Ephedrus cerasicola* and *L. fabarum* has been reported 1: 1 and 1 :1.8, respectively (Stary, 1988).

The intrinsic rate of increase (r_m) for *Trioxys pallidus* reared on *Chromaphis juglandicola* has been studied by Rakhshani (2001) and for *Ephedrus cerasicola* by Hagvar and Hofsvang (1990).

In this research some biological parameters of *L. fabarum* reared on *A. fabae* were studied.

MATERIALS AND METHODS

Preadult period of the parasitoid

In order to determine preadult period of the wasp, colonies of different stages of *A. fabae* were separately established in clip cages (60 x10 mm). Each colony was then transferred to broad bean*, Vicia faba*e, which were inserted into a glass vial (90 x 50 mm) filled with water. The plant was fixed with nonabsorbent cotton into test tube. This tube then was placed in a transparent plastic dish (300 x 180 mm) on sides of which four circle holes (each 2 cm in diameter) were made for aeration and adult parasitoid releases. Three of them were covered with muslin and the fourth one was pluged with a cork. On the top of the dish cover, a hole (80 mm in diameter) was also made to feed wasps. Dishes were kept in growth chambers (21±1°C, a relative humidity of 70 ± 5 % and 14: 10 L: D). Five pairs of female and male parasitoids were introduced to each dish for 24 hrs. The different stages of aphid in dishes were observed daily. After mummification, mummified aphids from each dish with a plant part were placed in a Petri-dish (80 x 15 mm) and they were kept until adult parasitoid emergence. The number of adult parasitoid emerged each day was recorded and the observation was continued until all adults that emerged.

Effect of different diets on parasitoid longevity

Mated females were fed on (i) 30% of honey solution (sprayed as tiny droplets on the cover of the plastic dish), (ii) 30 % of honey solution with aphids and host plants, (iii) aphids and host plants without honey solution, and (iv) without food in the absence of aphids and host plants. Thirty five mated females (as replications) were released into a plastic dish (80x120 mm) for each treatment and by daily observation, number of dead female was recorded till the last wasp died.

Effect of temperature on sex ratio

Twenty mummified aphids at the same age (third instar nymphs of *A.fabae*) were placed in a Petri-dish (15 x 80 mm) and were reared to adult stage at four levels of temperatures (15, 20, 25, and 35° C and a relative humidity of 70 ± 5%). Each experiment was replicated five times at each temperature level. Petri-dishes were observed daily and the number of adult parasitoids emerged was recorded and they were sexed under a stereomicroscope (the abdomen tip in female is sharper than male).

Host species preference

In order to determine host species preference of the parasitoid, 20 third instar nymphs of *Aphis fabae*, *A. craccivora* and *A. nerri* were established on a part of *Vicia fabae*, *Robinia pseudoacacia*, and *Nerium oleander* plants. These were then transferred to a transparant plastic box as above. A pair of 1 day-old male and female parasitoid already fed on 30 % of honey solution, was introduced into each box. This experiment was replicated 6 times. After 24 hrs. wasps were removed from the cages using a pooter, and the infested host plant parts were transferred to transparent plastic dishes (120 x 80 mm). They were then kept in a growth chamber (25 ± 1° C, 65 ± 5% RH.) for 72 hrs. Aphids were then transferred in a deep freezer and were then dissected to determine the number of parasitoid eggs laid.

Analysis of variance was used for data analysis and means were compared with Duncan's multiple range test using SAS (1995) software. All experiment were performed in a completely randomized design.

Population growth parameters

In order to determine fertility lifetable of the parasitoid, adults emerging from mummified aphids were used. For this, 15 pairs of 1 day-old female and male parasitoids were introduced into transparent plastic boxes (70 x 110 x 200 mm) containing 50 third instar nymphs of *A. fabae* established already on apical parts of host plant (*Vicia fabae*). After 24 hrs, plant parts bearing parasitized hosts inserted in a glass vial (as above) filled with water were removed and transferred to transparent plastic dishes (80 x 120 mm) and were kept in a growth chamber (21±1°C and 70 ± 5 of RH, 10D: 14L) until adult parasitoids emerged. Fifty third instar nymphs were presented separately to each female parasitoid until they died. At the end of each experiment, the sex ratio of offsprings was determined and used to obtain female percentage at each age class. Population growth rates were calculated according to Andrewartha and Birch (1954) and Carey (1993):

Intrinsic rate of increase ($1 = \Sigma e^{-rx} l_x m_x$),
where, x= age in days, r = intrinsic rate of increase, l_x =age-specific survival, m_x = age-specific number of female offspring.

RESULTS

Preadult period

Average preadult period of male and female adult parasitoids reared on third instar nymphs of the aphid hosts were 13.18 ± 0.28 and 13.68 ± 0.27 days, respectively. There was no significant differences between this period for male and female wasps ($P>0.05$). Preadult periods of adult parasitoids on different life stages of *A. fabae* are presented in Table 1. There was a significant difference between preadult period of female parasitoids on different life stages of the host ($P<0.05$). The same results were found for male parasitoids ($P<0.05$). This period was shorter than female parasitoids.

Effect of different diets on parasitoid longevity

Data analysis showed that diet had a significant effect on female adult parasitoid longevity ($P<0.05$). The longevity was longer when the females were fed on 30% honey solution (12.83 ± 0.77 days) and the shortest (1.57 ± 0.15 days) when they had no access to host plant, host, water and honey solution. The female longevity on host plant, aphid, honey solution and on host plant & aphid was 8.86 ± 0.38 and 4.28 ± 0.256 day, respectively.

Effect of temperature on sex ratio

The sex ratio of *L. fabarum* at different levels of temperatures are shown in Table 2. The percentage of females decreased as the temperature increased.

Host species preference

Data analysis on the mean percentages of parasitism revealed that female parasitoids prefer *A. fabae* (52.33 ± 3.53%), over *A. craccivora* (34.63 ± 2.61 %) and *A. nerri* (10.56 ± 3.33 %) for oviposition ($P< 0.05$). As it is clear the lowest oviposition preference was shown for *A. nerri.*

Population growth parameters

Fertility life table parameters are shown in Table 3. Mean lifetime fertility of *L. fabarum* was 122 ± 27.28 offsprings/female (with a range of 62-141) on *A. fabae*. Age-specific survival (l_x) and age-specific fecundity of the parasitoid population (m_x) are illustrated in Fig.1.

DISCUSSIONS

Average preadult period of *L. fabarum* decreased as the host stages grew older. Similar results were found by Stary (1986). According to Hofsvang and Hagvar (1986) preadult period of *Ephedrus cerasicola* was influenced by species and age of the host and the temperature. Similar results were also found on *Aphidius matricarie* Hal. parasitizing *Myzus persicae* Sulz. (Rabasse & Shalaby, 1980).

Successful biological control is partly dependent on the longevity and reproductive success of beneficial insects. Availability of carbohydrates can improve the nutrition of parasitic insects, and thereby increase their longevity and realized fecundity. Evidence suggests that individual fitness benefits afforded by food sources are important for a time-limited parasitoid (Williams & Roane, 2007). In this study, food provision of female parasitoids affected their longevity significantly. Providing parasitoids with food will result in increased longevity and subsequent parasitism rates (Wäckers, 2001; Azzouz et al., 2004; Irvin et al., 2007). Similar results were found by Hofsvang and Hagvar (1986) on *Ephedrus cerasicola*. Longevity is generally influenced by searching activity, body size, mating, oviposition, temperature, humidity, photoperiod and diet (Jervis & Copland, 1996). The adult parasitoid of *Trioxys palidius* lived shorter when fed only on water and honey solution compared to those kept with hosts and fed upon honeydew and first instar nymphs of *Chromaphis juglandicola*. It was even shorter when they were kept without hosts and food (Rakhshani, 2001). In this research, the longevity of adult females of *Lysiphlebus fabarum* with hosts was shorter than *E. cerasicola* with *M. persicae* and *E. californicus* with *Acyrthosiphon pisum* (Hofsvang & Hagvar, 1975a).

The sex ratio changed towards males as temperature increased. According to Tremblay (1964) at higher temperatures, most activities of the parasitoid including mating, oviposition, flight and searching declined and that in turn resulted in the reduction of offspring number and an increase in the number of males in the population. This result is similar to those found by Tremblay (1964). As females grow older, daily oviposition rate decreases leading to an increase in male offsprings (Hofsvang & Hagvar, 1975b, Hagvar & Hofsvang, 1990). Parasitized nymphs of *Aphis fabae* start to mummifiy prior to maturity and reproduction. Therefore, by eliminating reproduction in younger instars and parasitization of fourth instar nymphs and adult stages by the parasitoid will eventually decrease aphid reproduction and its population considerably (Tremblay, 1964; Hofsvang & Hagvar, 1986; Hagvar & Hofsvang, 1991).

Data analysis on host species selection showed that *A. fabae* was the most preferred host for the parasitoid. This has been shown to be related to the colour of the aphid host, as this parasitoid prefers aphids with darker colours to others (Tregubenko, 1980). Carver (1984) in a study on the host ranges of *L. fabarum* and *L. testacipes* found that the percentage of adult parasitoids emergence on *A. nerii* was very low as compared with those on *A. craccivora* and *A. citricidus*. The toxic substances in *Nerium oleander* leaf tissues affect the growth of parasitoid inside the body of the aphid host (P. Stary, unpubl. data, 2002).

The intrinsic rate of increase (r_m) obtained for *L. fabarum* was similar to those obtained for *Ephedrus cerasicola* (Hagvar & Hofsvang, 1990) and *Trioxys pallidus* (Rakhshani, 2001). The r_m values in these insects were 0.38 and 0.28, respectively. Hagvar and Hofsvang (1990) state the intrinsic rate of increase in Aphidiid wasps generally ranges between 0.29 and 0.38. Net reproductive rate obtained here was less than the reproductive rate for *Ephedrus cerasicola* on *M. persicae* and more than that calculated for *T. pallidus* on *Chromaphis juglandicola*. The generation time of *L. fabarum* was greater than those obtained for two above mentioned was species, but the doubling time was lower than *T. pallidus* and higher than *Ephedrus cerasicola*.

LITERATURE CITED

Andrewartha, H. G. & Birch, L. C. 1954. The distribution and abundance of animals. University of Chicago press, Chicago.

Azzouz, H., Giordanengo, P., Wäckers, F. L. & Kaiser, L. 2004. Effects of feeding frequency and sugar concentration on behavior and longevity of the adult aphid parasitoid: *Aphidius ervi* (Haliday) (Hymenoptera: Braconidae). Biological Control, 31: 445-452.

Baghery-Matin, Sh., Sahragard A. & Rasoolian, Gh. 2005. Some behavioural characteristics of Lysiphlebus fabarum (Hym: Aphidiidae) parasitizing Aphis fabae (Hom: Aphididae) under laboratory conditions. Journal of Entomology, 2 (1): 64-68.

Carey, J. R. 1993. Applied demography for biologists. Oxford University Press.

Hofsvang, T. & Hagvar, E. B. 1975a. Development rate, longevity, fecundity and oviposition period of Ephedrus cerasicola parasitizing Myzus persicae on paprika. Norwagian Journal of Entomology, 22: 15–22.

Hofsvang, T. & Hagvar, E. B. 1975b. Fecundity and oviposition period of Aphidius platensis (Hym.: Aphidiidae) on paprika. Norwagian Journal of Entomology, 22: 113-116.

Hofsvang, T. & Hagvar, E. B. 1977. Cold storage tolerance and supercooling points of mummies of Ephedrus cerasicola and Aphidius colemami. Norwagian Journal of Entomology, 24: 1-6.

Hofsvang, T. & Hagvar, E. B. 1986. Oviposition behaviour of Ephedrus cerasicola parasitizing different instars of its aphid host. Entomophaga, 31 (3): 261-267.

Irvin, N. A., Hoddle, M. S. & Castle, S. J. 2007. The effect of resource provisioning and sugar composition of foods on longevity of three Gonatocerus spp., egg parasitoids of Homalodisca vitripennis. Biological Control, 40: 69-79.

Jervis, M. A. & Copland, M. J. W. 1996. The life cycle. In: Jervis, M.A. and Kidd, N. (eds) Insect natural enemies, Practical approaches to their study and evaluation, Pp, 63-162. Chapman & Hall.

Hagvar, E. B. & Hofsvang, T. 1990. Fecundity and intrinsic rate of increase of the aphid parasitoid, Ephedrus cerasicola (Aphidiidae). Journal of Applied Entomology, 109: 262-267.

Hagvar, E. B & Hofsvang, T. 1991. Aphid parasitoid (Aphidiidae) biology, host selection and use in biological control. Biocontrol News and information, 12 (1): 13-42.

Kouame, K. L. & Mackauer, M. 1991. Influence of aphid size, age and behaviour on host choice by the parasitoid wasp, Ephedrus californicus, a test of host size models. Oecologia, 88 (2): 197-203.

Liu, S. S. & Carver, M. 1985. Studies on the biology of Aphidius sonchi Marshal (Hym.: Aphidiidae), a parasite of the sowthistle aphid, Hyperomyzus lactucae (L.) (Hem.: Aphididae). Bulletin of Entomolgical Research, 75: 199-208.

Mackauer, M. & Stary, P. 1967. Hym. Ichneumonoidea, World Aphidiidae. In: Delucchi, V, Remaudiere G (eds) Index of entomophagous insects. Paris, Le Francois.

Rabasse, J. M. & Shalaby, F. F. 1980. Laboratory studies on the development of Myzus persicae Sulz. (Hom .: Aphididae) and its primary parasite, Aphidius matricariae Hal (Hym .: Aphidiidae) at constant temperatures. Acta Oecologia Applicata, 1: 21–28 .

Rakhshani, E. 2001. Identification of natural enemies of Chromaphis juglandicola (Hom.: Aphididae) and biology of its parasitoid wasp, Trioxys pallidus (Hym: Aphidiidae). Msc. thesis, College of Agriculture, Univ. of Tarbiat Modares, Tehran, Iran.

Rakhshani, E., Talebi, A. A., Kavallieratos, N. & Fathipour, Y. 2004. Host stage preference, juvenile mortality and functional response of Trioxys pallidus (Hymentoptera: Braconidae, Aphidiinae). Biologica, Bratislava, 59 (2): 197-203.

SAS Institute. Inc. 1995. Cary, NC. 27513, USA.

Srivastava, M. & Singh, R. 1995. Influence of age of parents Lysiphlebus delhiensis during copulation on progeny production and offspring sex ratio. Journal of Applied. Entomology, 119: 73–77.

Stary, P. 1970. Biology of aphid parasites (Hym.: Aphidiidae) with respect to integrated control. Series Entomologica, Dr. W Junk, Publishers. The Hague.

Stary, P. 1986. Specificity of parasitoids (Aphidiidae) to the black bean aphid, Aphis fabae complex, in agroecosystems. Acta. Ento–Bohemoslovac, 83 (1): 24–29.

Stary, P. 1988. Aphidiidae, In : Minks AK, Harewijn P (eds), Aphids , their biology, natural enemies and control, Vol. B, pp. 171–184. Elsevier Publisher. Amesterdam.

Tregubenko, E. S. 1980. On the ethology of aphids and aphidophagous insects. Zashchita–Rastinii, 4: 38-39.

Tremblay, E. 1964. Research on parasitic Hymenoptera. Bollettino del Laboratorio di Entomologia. Agraria ‘' Flippo Silvestri" Portici: 22: 1-122.

Wäckers, F. L. 2001. A comparison of nectar- and honeydew sugars with respect to their utilization by the hymenopteran parasitoid Cotesia glomerata. Journal of Insect Physiology, 47: 1077-1084.

Weeden, Sh. & Haffman, Li 1995. Lysiphlebus testaceipes (Hym.:Aphidiinae). Cornell University, Biological Control. Availablefrom: http://www.nysac. Cornell.

Wellings, P. W., Morton, W. & Hart, W. P. T. 1986. Primary sex ratio and differential progeny survivorship in solitary haplo–diploid parasitoids. Ecological Entomology, 11: 341–348.

Williams, L. & Roane, T. M. 2007. Nutritional ecology of a para-sitic wasp: Food source affects gustatory response, metabolic utilization, and survivorship. Journal of Insect Physiology doi:10.1016/j.jinsphys.2007.06.017

Table 1. Average (± Se) preadult periods (in days) of *L.fabarum* reared on different life stages of *A. fabae* at 21±1°C

Host stages:	*1st instar*	*2nd instar*	*3rd instar*	4th instar nymph	*adults*
Females:	17.38± 0.33 a (n 17)	15.76± 0.19b (n 20)	14.21± 0.27bc (n 32)	11.3± 0.4 cd (n 25)	9.73± 0.14d (n 9)
Males :	17.06± 0.17 a (n 35)	14.37± 0.04b (n 35)	13.92±0.17bc (n 48)	11.25 ± 0.82cd (n 34)	9.3± 0.19d (n 12)

Data with the same letter are not significantly different at 0.05

Table 2. Sex ratio of *L.fabarum* reared on *A. fabae* at different temperatures.

Temperature (oC)	No. of males	No. of females	Female
15	53	147	73.5
20	57	160	73.7
25	56	123	68.7
30	38	58	60.4

Table 3. Population growth parameters of *L. fabarum* reared on *A. fabae* under laboratory condition

Parameters	Values
Net reproductive rate ($R_o = \sum l_x m_x$)	94.34
Intrinsic rate of increase (r_m)	0.28
Mean generation time ($T = \ln R_o / r_m$)	16.31
Doubling time ($Dt = \ln 2/r_m$)	2.47
Rate of increase per week ($R_W = e^{rm})^7$	7.11

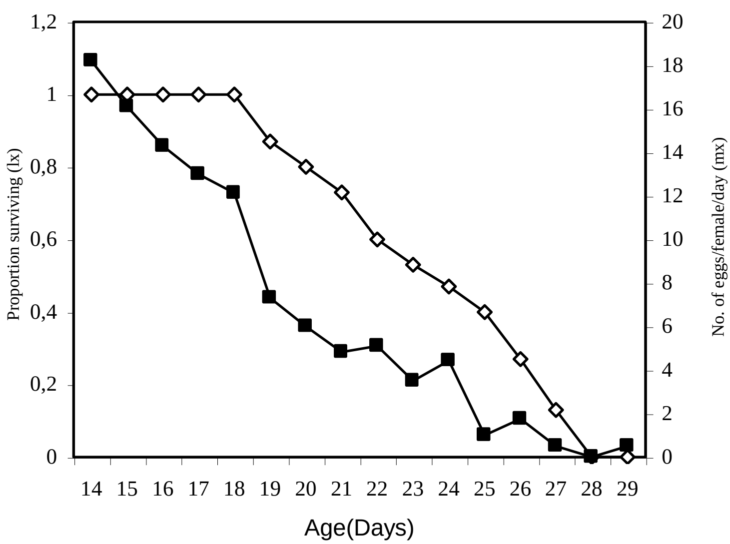

Fig. 1. Age-specific survival rate (l_x) and age-specific fecundity (m_x) of *L. fabarum* reared on *A.fabae*.

NEW NAMES FOR TWO GALL MIDGES GENERA (DIPTERA: CECIDOMYIIDAE)

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[Özdikmen, H. 2009. New names for two gall midges genera (Diptera: Cecidomyiidae). Munis Entomology & Zoology, 4 (1): 201-203**]**

ABSTRACT: Two genus group names in Cecidomyiidae were detected as nomenclaturally invalid and the following replacement names are proposed: *Novocalmonia* nom. nov. for *Calmonia* Tavares, 1917 and *Pritchardaea* nom. nov. for *Pararete* Pritchard, 1951. Accordingly, new combinations are herein proposed for the species currently included in these genus group names.*Novocalmonia fici* (Gagne, 1994); *Novocalmonia urostigmata* (Tavares, 1917) and *Pritchardaea elongata* (Felt, 1908).

KEY WORDS: nomenclatural changes, Diptera, Cecidomyiidae, gall midges.

Two proposed genus names in Cecidomyiidae are nomenclaturally invalid, as the genus group names have already been used by different authors in Trilobita and Porifera. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these genus names.

TAXONOMY

Order DIPTERA
Family CECIDOMYIIDAE

Genus *NOVOCALMONIA* nom. nov.

Calmonia Tavares, 1917. Brotéria, Sér. Zool., 15, 173. (Insecta: Diptera: Nematocera: Cecidomyiidae: Cecidomyiinae: Oligotrophini). Preoccupied by *Calmonia* Clarke, 1913. Monogr. Serv. geol. Brasil, 1, 119. (Trilobita: Phacopida: Phacopina: Acastoidea: Calmoniidae).

Remarks on nomenclatural change: Firstly, the neotropical trilobite genus *Calmonia* was described by Clarke (1913) with the type species *Calmonia signifer* Clarke, 1913 from Ponta Grossa Sh, Paraná Basin, Brazil. It is still used as a valid genus name in Trilobita (e. g. Jell & Adrain, 2003). It is the type genus of the trilobite family Calmoniidae Delo, 1935.

Subsequently, the neotropical gall midge genus *Calmonia* was erected by Tavares (1917) with the type species *Calmonia urostigmata* Tavares, 1917 by original designation from Nova Friburgo, Rio de Jenairo, Brasil. Also, it is still used as a valid genus name (e. g. Maia, 2005 and 2007).

Thus the gall midge genus *Calmonia* Tavares, 1917 is a junior homonym of the valid genus name *Calmonia* Clarke, 1913. So I propose here that *Calmonia* Tavares, 1917 should be replaced with the new name *Novocalmonia*, as a replacement name.

Etymology: from the latin word “nova” (meaning “new” in English) + the preexisting genus name *Calmonia*.

Summary of nomenclatural changes:

Novocalmonia **nom. nov.**
pro *Calmonia* Tavares, 1917 (non Clarke, 1913)

Novocalmonia fici (Gagne, 1994) **comb. nov.**
from *Calmonia fici* Gagne, 1994

Novocalmonia urostigmata (Tavares, 1917) **comb. nov.**
from *Calmonia urostigmata* Tavares, 1917

Genus *PRITCHARDAEA* nom. nov.

Pararete Pritchard, 1951. Univ. Calif. Publ. Ent., 8, 253. (Insecta: Diptera: Nematocera: Cecidomyiidae: Lestremiinae: Lestremiini). Preoccupied by *Pararete* Ijima, 1927. Siboga Exped., 6, 165. (Porifera: Hexactinellida: Hexasterophora: Hexactinosida: Euretidae: Euretinae).

The name *Pararete* was initially introduced by Ijima, 1927 for a sponge genus (with the type species *Eurete farreopsis* Carter, 1877 from Philippines. It is still used as a valid genus name (e. g. Hooper & Van Soest, 2002).

Later Pritchard, 1951 described a new nearctic gall midge genus under the same generic name (with the type species *Lestremia elongata* Felt, 1908 by monotypy from Argus Mountains, California, USA). Also, it is still used as a valid genus name (Thompson & Evenhuis, 1998).

Thus, the genus group name *Pararete* Pritchard, 1951 is nomenclaturally invalid as a junior homonym of the genus *Pararete* Ijima, 1927. So I propose a new replacement name *Pritchardaea* nom. nov. for the genus name *Pararete* Pritchard, 1951.

Etymology: This genus name is dedicated to A. E. Pritchard who is the current author of the preexisting genus *Pararete*.

Summary of nomenclatural changes:

Pritchardaea **nom. nov.**
pro *Pararete* Pritchard, 1951 (non Ijima, 1927)

Pritchardaea elongata (Felt, 1908) **comb. nov.**
from *Pararete elongata* (Felt, 1908)
Lestremia elongata Felt, 1908

LITERATURE CITED

Clarke, J. M. 1913. Fosseis Devonianos do Paraná. Monografias. Servico Geologico e Mineralogico do Brasil, 1: 1-353.

Hooper, J. N. A. & Van Soest, R. W. M. 2002. Systema Porifera: a guide to the classification of Sponges. Kluwer Academic/Plenum Publishers: New York, NY (USA). ISBN 0-306-47260-0. xix, 1-1101, 1103-1706 pp. (2 volumes).

Ijima, I. 1927. The Hexactinellida of the Siboga Expedition: Siboga-Expeditie VI, Leiden. 383 pp.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Jell, P. A. & Adrain, J. M. 2003. Available generic names for trilobites. Memoirs of the Queensland Museum, 48 (2): 331-553.

Maia, V. C. 2005. Catálogo dos Cecidomyiidae (Díptera) do Estado do Rio de Janeiro. Biota Neotropica, 5 (2): 189-203.

Maia, V. C. 2007. New genera and species of gall midges (Diptera: Cecidomyiidae) associated with Guarea macrophylla (Meliaceae). Revista Brasileira de Zoologia, 24 (2): 449-456.

Pritchard, A. E. 1951. Ihe North American gall midges of the tribe Lestremiini; Ittmididae (Cecidomyiidae); Diptera. Univ. Calif, Publ. Ent., 8(6): 239-275.

Tavares, J. S. 1917. Cecidias brazileiras que se criam em plantas das Compositae, Rubiaceae, Tiliaceae, Lythraceae e Artocarpaceae. Broteria, Série Zoológica, Braga, 15: 113-181.

Thompson, C. F. & Evenhuis, N. L. 1998. Biosystematic Database of World Diptera. Diptera Data Dissemination Disk, vol. 1. North American Dipterists Society c/o SEL, USDA. Washington, D.C., USA.

LIFE HISTORY TRAITS OF *TETRANYCHUS URTICAE* KOCH ON THREE LEGUMES (ACARI: TETRANYCHIDAE)

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[Razmjou, J., Tavakkoli, H. & Nemati, M. 2009. Life history traits of *Tetranychus urticae* Koch on three legumes (Acari: Tetranychidae). Munis Entomology & Zoology, 4 (1): 204-211**]**

ABSTRACT: The two-spotted spider mite, *Tetranychus urticae* Koch, is very polyphagous and considered a serious pest world-wide. The divers host plant species may have been the different effects of this pest; we therefore compared population growth parameters of *T. urticae* reared on three commonly grown and important legumes in Iran (soybean, cowpea and bean). The life table parameters were estimated at 25 ± 1°C, 60 ± 10% RH, and a photoperiod of 18:6 h (L: D). Egg hatchability, development time and survival to adult stage were similar among cultivars, but we detected significant variation in fecundity and longevity, resulting in large differences for population growth parameters such as the intrinsic rate of natural increase (r_m), net reproductive rate (R_o), finite rate of increase (λ) and doubling time (DT). Soybean was the most favorable host for two-spotted spider mites with r_m = 0.296 (offsprings/female/day), followed by cowpea (0.242) and bean (0.230). The slowest population growth was observed on the bean species with r_m = 0.214. These findings indicate that the choice of host plant species will affect how fast spider mite populations reach damaging levels in a culture.

KEY WORDS: host plant, legumes, life table, *Tetranychus urticae*

The two-spotted spider mite, *Tetranychus urticae* Koch (Acari, Tetranychidae) is one of the most serious agricultural pests in the world. This mite is polyphagous and attacks the broad range of crops, including soybean, cowpea, and common bean and etc. (van de Vrie et al., 1972; Khanjani, 2005). These latter three plants are economic important crops, commercially produced in some regions of Iran. Based on reports by the Iranian Ministry of Agriculture in 2005, overall, these crops are grown on more than 180000 ha annually in Iran. Therefore, outbreaks of several pests especially *T. urticae* limits yield of these high cash leguminous plants. The importance of this mite pest is not only due to direct damage to plants including defoliation, leaf burning, and even in excessive outbreaks plant death but also indirect damage to plants which decreases in photosynthesis and transpiration (Brandenburg and Kennedy, 1987).

Host plants of spider mites differ in the degree of food quality, which either depend on the level of primary plant metabolites, or on the quantity and nature of secondary metabolites (Rosenthal and Berenbaum, 1991). Many secondary metabolites found in plants have a responsibility in defense against herbivores, pests and pathogens. These compounds can perform as toxins, deterrents, digestibility reducers or act as precursors to physical defense systems (Bennett and Wallsgrove, 1994; Balkema-Boomstra, 2003).

The rapid developmental rate and high reproductive potential of *T. urticae* allows them to achieve damaging population levels very quickly when growth conditions are good, resulting in an equally rapid decline of host plant quality. The population growth parameters of *T. urticae* such as developmental rate, survival, reproduction and longevity may vary in response to changes in temperature, host plant species, host plant nutrition, cultivar kind, phenological stage, exposure to pesticides, relative humidity, etc. (Sabelis, 1981; Brandenburg and Kennedy, 1987; Wermelinger et al., 1991; Wilson, 1994; Dicke, 2000; James, 2002; Marcic, 2003; Skorupska, 2004).

Biological knowledge, in particular life table attributes is a significant step to an improved reorganization of the population dynamics of pests. This information may be used as an important means in planning pest management program. On the other hand, host plants have main effects on development, mortality and fecundity rates in spider mite population dynamics; therefore, in order to expand a successful integrated pest management (IPM) program for this spider mite, it is vital to comprehend its life-history parameters on diverse host plans. However, despite its economic importance and word-wide distribution, relatively little is known about its population growth parameters especially on some host plants and the relevance of these results in different conditions of Iran is unknown. Hence, the goal of this study was to evaluate the population growth characteristics of two-spotted spider mite and the suitability of three economically important legumes: common bean, *Phaseolus vulgaris* L., cowpea, *vigna unguiculata*, and soybean, *Glycine max* Merrill, as host plants of *T. urticae*.

MATERIALS AND METHODS

This study was conducted in a laboratory of the plant protection department at the faculty of agriculture, Mohaghegh Ardabili University, Iran in 2007. All experiments were carried out at 25 ± 1 °C, 60 ± 10 humidity and a photoperiod of 16:8 (L: D) in a growth chamber.

Mite colony

Samples of two-spotted spider mites were collected from soybean fields of the Moghan region, Iran in June 2007. These mites were then cultured on potted related plants in a growth chamber for at least three months before conducting the experiments.

Plant material

The development and fecundity of *T. urticae* was estimated on three leguminous host plant including common bean, *Phaseolus vulgaris* L., cowpea, *Vigna unguiculata*, and soybean. Seeds of these bean plants were supplied by the seeds institute of Karaj, and agricultural and resources research center of Moghan, Iran. Plants were grown from seeds in plastic pots of 12 cm in diameter filled with suitable field soil and maintained in a greenhouse. Two or four weeks after planting, clean leaves were collected and used to cut the leaf discs used in the experiments.

Experiment 1. To evaluate the hatchability of eggs, the sex ratio of the offspring and survivorship of immature mites, one female and one adult male from the stock culture were transferred to a fresh leaf disc (30 mm in diameter) placed on a water-saturated cotton in a Petri dish (90 mm in diameter). The females were allowed to deposit eggs for five days after the preoviposition period. All eggs laid by each female were reared through all stages to adulthood. From these data we calculated the hatchability of mite eggs, the immature mite's survivorship and the sex ratio of the appearing mites (Gotoh and Nagata, 2001). Non-mated females, i.e. producing only males, were not taken into account.

Experiment 2. To assess development and life table parameters of *T. urticae* on each host plant, one female and one male (for mating) were randomly selected from the stock culture and transferred to a fresh leaf disc. Female mites were allowed to lay eggs for 24 hours, after which the mites and all but two eggs were removed from the Petri dish. Development times and survivorship of these eggs and other immature stages (larva and nymphs) were monitored and recorded daily until reaching adulthood. These assays were replicated twenty times for each host plant.

To evaluate mite fecundity, one newly emerged female from the development experiment and one male collected from the stock culture (for mating) were introduced to a 90 mm Petri dish with a fresh leaf disc on water-saturated cotton. Eggs were counted and removed daily until all experimental females died. In this way, we evaluated the fecundity of 20 two-spotted mite females per host plant (see Table 2 and 3) (Gotoh and Gomi, 2003).

Data analysis. Developmental time, the proportion of immature mites surviving, longevity and fecundity of *T. urticae* were analysed with analyses of variance (ANOVA) using the MINITAB-13.1 statistical software (Minitab lnc. 1994 Philadelphia, PA). When the overall variation among cultivars was significant, post-hoc comparisons among means were carried out using Tukey tests at $\alpha <$ 0.05.

Life table parameters including intrinsic rate of natural increase (r_m), net reproductive rate (R_o), doubling time (DT), finite rate of increase (λ) and the generation time (T) as well as their standard errors were estimated by the jackknife method (Southwood, 1978; Meyer et al., 1986; Carey, 1993) using the SAS System Software V6.12 (SAS Institute, 1989). Significance of differences between mean values of life table parameters was determined using Student's t test (Maia et al 2000). The r_m for two-spotted spider mites on different cultivars was estimated using the following equation (Birch, 1948):

$$\sum e^{-rx} l_x m_x = 1 \quad [1]$$

Where x is the age in days, r is the intrinsic rate of natural increase, l_x is the age-specific survival, and m_x is the age-specific number of female offspring. After r was computed for the original data (r_{all}), the jackknife technique was applied to appraise the differences in r_m values by estimating the variances (Meyer et al., 1986). The jackknife pseudo-value r_j was calculated for the n samples by using the following formula:

$$r_j = n \times r_{all} - (n - 1) \times r_i \quad [2]$$

The jackknife pseudo-values for each treatment were subjected to an analysis of variance (ANOVA). Also, Jackknife techniques were used to calculate the other parameters of life tables (Maia et al., 2000).

RESULTS

Hatchability, Sex ratio and survivorship. Percentage of egg hatchability ranged from 89 to 92.5 and sex ratio (proportion of females) from 77.7 to 86 percent on different host plants. The survivorship of immature stages (from egg to adult) was from 72.5 to 87.5 percent as well (see Table 1).

Developmental time of immature stages. No significant variation among three host plant was observed for the development period of two-spotted spider mite eggs (F =2.77; df= 2, 68; P = 0.070), of mite nymphs (F = 0.26; df = 2, 68; P = 0.769). While the development period of mite larvae showed significantly differences among host species (F = 8.21; df = 2, 68; P = 0.001). Also, when the total development time, i.e. the sum of the three periods above, is compared among host plants, the variation is not significant (F = 1.93; df = 2, 68; P = 0.153). The means of these periods are listed in Table 2.

Female longevity and lifespan. The adult longevity of two-spotted spider mite as well as the total lifespan (from egg to death) varied significantly among three host plants (adult longevity: F = 10.08; df = 2, 53; P = 0.000; total lifespan: F = 10.68; df = 2, 53; P = 0.000). The mites survived and oviposited clearly longer on the soybean plants than on all other host plants (Table 2).

Fecundity. The number of eggs laid by each female mite (F = 7.77; df = 2, 53; P = 0.001) exhibited significant differences among three host plants. While no significant variation among host plants was observed for the number of eggs laid by each female per day (F = 2.75; df = 2, 53; P = 0.073). Due to much longer adult survival, mites laid about more than twice as many eggs on soybean compared to the bean plants (Table 1).

Life table parameters. The analysis of the net reproductive rate (R_o) of the two spotted spider mite indicated significant differences among three host plants (P < 0.05). The cohorts reared on Soybean had the largest R_o value, followed by cowpea, those on bean had the smallest R_o value (Table 3).

The intrinsic rate of natural increase (r_m) of *T. urticae* was also found to be significantly different among the three host plant species (P < 0.05), ranging from 0.296 on Soybean to 0.230 on bean (Table 3). The finite rate of increase (λ) and the doubling time (DT) varied in a similar fashion and exhibited the same hierarchy of performance: best on soybean, followed by cowpea, worst on bean. Only the generation time (T) followed a different pattern, being shortest on bean and highest on cowpea (Table 3).

DISCUSSION

Plant species vary seriously on the basis of their suitability as hosts for specific insects and mites when measured in terms of insect survival, reproductive rates and acceptance by the pest population (van den Boom et al., 2003; Musa and Ren, 2005; Greco et al., 2006). Host plant species often differ in chemical profiles, thereby affecting host (i.e., herbivore) quality (Ode, 2006). So, host plant quality is a key determinant of the fecundity of herbivorous insects (Awmack and Leather, 2002). Our results showed that there are seriously differences in the spider mite performance among on three leguminous plants tested in this study. Therefore, obtained results from these experiments showed a better performance of *T. urticae* on soybean leaf discs than on any other two plants. This was shown not only in the fecundity (mean number of eggs laid on leaf discs), adult longevity but in the lifetime of the two-spotted spider mite, as well (Table 2). So, the mean number of eggs laid by *T. urticae* on soybean plant (83.16, eggs/female) was more than two times higher than those on bean (34.50 eggs/female). In addition, the means for the lifetime of *T. urticae* were 21.63 days on soybean whereas this value was 21.53 and 14.10 days on cowpea and bean plants, respectively (Table 2). Therefore, the better r_m of mite female found on soybean and by followed cowpea compared with mites on bean was mainly the result of the greater overall fecundity and longer adult oviposition period and lifetime of this pest. The poor performance of mites on bean was the result of poor fecundity, lower survivorship immature stages and shorter life time and adult oviposition period (Tables 1, 2 and 3). The r_m value of *T. urticae* estimated in the current study ranged from 0.230 to 0.296 individuals per female per day (Table 2). These values are close to those estimated for the spider mites reared on other host plants (Sabelis, 1985; Gotoh and Gomi, 2003; Kasap, 2003; Kafil et al., 2007).

Musa and Ren (2005) demonstrated that life history traits of *Bemisia tabaci* differ greatly between three leguminous species including soybean, garden bean (*P. vulgaris*) and cowpea. Based on their results, the r_m value of *B. tabaci* was 0.1097 (d^{-1}) on garden bean and 0.1857 (d^{-1}) on soybean. In particular, some studies have documented that amount of performance and acceptance of the spider mite differs between plant species. For instance, van den Boom et al (2003) found that the plant species vary in their degree of acceptance by the *T. urticae* population. Their results indicated that the plants including soybean, hop, golden chain and tobacco are highly acceptable to the spider mite, because almost 100% of the spider mites stayed on the plant while eggplant, cowpea and thorn apple had a lower percentage of spider mite acceptance where this value was 65% for cowpea. Besides the findings of Greco et al (2006) showed a high preference and a better performance of *T. urticae* on strawberry leaves than on onion, leek and parsley leaves. This was shown not only in the fecundity but in the maximum number of offspring settled, as well. Several potential mechanisms could be responsible for this phenomenon including plant nutritional quality of the host plant and morphological or allelochemical features (Sabelis, 1985; Krips et al., 1998; Dike et al., 1999; Agrawal, 2000; Pietrosiuk et al., 2003; Balkema-Boomstra et al., 2003). Our findings show that soybean plant is a more suitable host plant than cowpea and bean plants for two-spotted spider mite. Therefore, this pest may be able to create quickly a large and damaging population on soybean plants, and this feature must be considered by growers in order to implement IPM programs for this spider mite.

LITERATURE CITED

Agrawal, A. A. 2000. Host-range evolution: adaptation and trade-offs in fitness of mites on alternative hosts. Ecology, 81: 500–508.

Ansaloni, T., Aucejo, S. & Jacas, J. A. 2007. Estimating the intrinsic rate of increase of Tetranychus urticae: which is the minimum number of immature individuals to consider? Experimental and Applied Acarology, 41: 55–59.

Awmack, C. S. & Leather, S. R. 2002. Host plant quality and fecundity in herbivorous insects. Annual Review of Entomology, 47: 817-844.

Balkema-Boomstra, A. G., Zijlstra, S., Verstappen, F. W. A., Inggamer, H., Mercke, P. E., Jongsma, M. A., Bouwmeester, H. J. 2003. Role of cucurbitacin C in resistance to spider mite (Tetranychus urticae) in cucumber (Cucumis sativus L.). Journal of Chemical Ecology, 29: 225-235.

Bennett, R. N. & Wallsgrove, R. M. 1994. Secondary metabolites in plant defense mechanisms. New Phytologist, 127: 617-633.

Birch, L. C. 1948. The intrinsic rate of natural increase of an insect population. Journal of Animal Ecology, 17: 15-26.

Brandenburg, R. L. & Kennedy, G. G. 1987. Ecological and agricultural considerations in the management of twospotted spider mite (Tetranychus urticae Koch). Agricul. Zool. Reviews, 2: 185-236.

Carey, J. R. 1993. Applied demography for biologists, with special emphasis on insects. Oxford University Press, United Kingdom.

Dicke, M. 2000. Chemical ecology of host-plant selection by herbivorous arthropods: a multitrophic perspective. Biochemistry and Systematic Ecology, 28: 601–617.

Gotoh, T. & Gomi, K. 2003 Life-history traits of the kanzawa spider mite Tetranychus kanzawai (Acari: Tetranychidae). Applied Entomology and Zoology, 38 (1): 7–14.

Gotoh, T. & Nagata, T. 2001. Development and reproduction of Oligonychus coffeae (Acari: Tetranychidae) on tea. International Journal of Acarology, 27 (4): 293-298.

Greco, N. M., Pereyra P. C. & Guillade, A. 2006. Host-plant acceptance and performance of Tetranychus urticae (Acari, Tetranychidae). Journal of Applied Entomology, 130 (1): 32–36.

James, D. G. & Price, T. S. 2002. Fecundity in twospotted spider mite (Acari: Tetranychidae) is increased by direct and systemic exposure to imidacloprid. Journal of Economic Entomology, 95 (4): 729-732.

Kafil, M., Allahyari , H. & Saboori, A. 2007. Effect of host plants on developmental time and life table parameters of Amphitetranychus viennensis (Acari: Tetranychidae). Experimental and Applied Acarology, 42 (4): 273-81.

Kasap, I. 2003. Life history of hawthorn spider mite Amphitetranychus viennensis (Acarina: Tetranychidae) on various apple cultivars and at different temperatures. Experimental and Applied Acarology, 31: 79–91.

Khanjani, M. 2005. Field crop pests (insects and mites) in Iran. Abu-Ali Sina University Press, Hamadan, Iran. (In Persian).

Maia, A. H. N., Luiz A. J. B. & Campanhola, C. 2000. Statistical inference on associated fertility life parameters using jackknife technique: Computational aspects. Journal of Economic Entomology, 93: 511-518.

Marcic, D. 2003. The effects of clofentezine on life-table parameters in two-spotted spider mite Tetranychus urticae. Experimental and Applied Acarology, 30 (4): 249-63.

Meyer, J. S., Ingersoll, C. G., McDonald L. L. & Boyce, M. S. 1986. Estimating uncertainly in population growth rates: jackknife vs. bootstrap techniques. Ecology, 67: 1156-1166.

Musa, P. D. & Ren, S.-X. 2005. Development and reproduction of Bemisia tabaci (Homoptera: Aleyrodidae) on three bean species. Insect Science, 12 (1): 25–30.

Pietrosiuk, A., Furmanowa, M., Kropczynska, D., Kawka, B., Wiedenfeld, H. 2003. Life history parameters of the two-spotted spider mite (Tetranychus urticae Koch) feeding on bean leaves treated with pyrrolizidine alkaloids. Journal of Applied Toxicology, 23 (3): 187–190.

Rosenthal, G. A. & Berenbaum, M. R. 1991. Herbivores: Their Interaction with Secondary Plant Metabolites. vol. 2, Ecological and Evolutionary Processes. London: Academic Press.

Sabelis, M. W. 1981. Biological control of two-spotted spider mites using phytoseiid predators. Part 1. Modelling the predator-prey interaction at the individual level. Pudoc, Wageningen, Agric. Res. Rep., 910, 248 pp.

Sabelis, M. W. 1985. Reproductive strategies. In: Helle W, Sabelis MV (eds) Spider mites. Their biology, natural enemies and control. Elsevier, Amsterdam.

Skorupska, A. 2004. Resistance of apple cultivars to spotted spider mite, Tetranychus urticae Koch (Acarina, Tetranychidae) Part II. Infeluence of leafe pubescence of selected apple cultivars on fecundity of two-spotted spider mite. Journal of Plant Protection Research, 44 (1): 69-74.

Southwood, T. R. E. 1978. Ecological methods, with particular reference to the study of insect populations. Chapman & Hall, New York.

Suzanne, J. W. & Hutchison W. D. 2003. Varietal Resistance to Tetranychus urticae Koch (Acari: Tetranychidae) in Minnesota strawberries and control with bifenthrin'. Journal of Entomological Science, 38 (4): 692-695.

van de Rive, J. A. C., Murtry, J. A., Huffaker, C. B. 1972. Ecology of mites and their natural enemies. A review. III Biology, ecology, and pest status, and host plant relations of Tetranychids. Hilgardia, 41: 354-432.

van den Boom, C. E. M., van Beek, T. A. & Dicke, M. 2003. Differences among plant species in acceptance by the spider mite Tetranychus urticae Koch. Journal of Applied Entomology, 127: 177–183.

Wermelinger, B., Oertli J. J. & Baumgärtner, J. 1991. Environmental factors affecting the life-tables of Tetranychus urticae (Acari: Tetranychidae) III. Host-plant nutrition. Experimental and Applied Acarology, 12: 259-274.

Wilson, L. J. 1994. Plant-quality effect on life-history parameters of the twospotted spider mite (Acari: Tetarnychidae) on cotton. Journal of Economic Entomology, 87: 1665-1673.

Table 1. Number of eggs per female, egg hatchability, immature survivorship and sex ratio of *T. urticae* reared on three legumes at 25°C.

	Parameter (mean ± SE)				
Host	Number of Eggs/female[a]	Number of Eggs/ female/day	Egg hatchability (%)	Immature survivorship (%)	**Sex ratio (% female)**
Soybean	83.16 ± 10.71a (19)	6.59 ± 0.43a (19)	92.5 (153)	87.5 (153)	**81.2 (125)**
Cowpea	65.53 ± 10.26ab(17)	5.05 ± 0.38a (17)	90.0 (129)	72.5 (129)	**86.0 (68)**
Bean	**34.50 ± 5.60bc (20)**	**6.17 ± 0.54a (20)**	**89.0 (54)**	**72.5 (54)**	**81.0 (24)**

[a]For this parameter, differences among species host plant were determined by Tukey tests. Within columns, means followed by different letters are significantly different ($P<0.05$). Sample size of all parameters is in the parenthesis.

Table 2. Development period of immature stages and adult female of *T. urticae* reared on three legumes at 25°C.

	Development period in days (Mean ± SE)					
Host	Eggs	Larva	Nymphs	Total (Immature stage)	Oviposition	Female lifespan
Soybean	4.50 ± 0.14a (22)	1.05 ± 0.05a (22)	3.68 ± 0.14a (22)	9.23 ± 0.11a (22)	12.47 ± 1.51a (19)	21.63 ± 1.53a (19)
Cowpea	4.17 ± 0.99a (24)	1.50 ± 0.12b (24)	3.71± 0.14a (24)	9.38 ± 0.10a (24)	12.06 ± 1.82a (17)	21.53 ± 1.78a (17)
Bean	*4.20 ± 0.08a (25)*	*1.12 ± 0.07a (25)*	*3.80± 0.08a (25)*	*9.12 ± 0.07a (25)*	*5.00 ± 0.53b (20)*	*14.10 ± 0.56b (20)*

For each parameter, differences among bean cultivars were determined by Tukey tests. Within columns, means followed by different letters are significantly different (P<0.05).
The *n* value in the parentheses shows the number of the tested individuals.

Table 3. Life table parameters of *T. urticae* reared on three legumes at 25°C.

	Parameter (Mean ± SD)				
Host	R_o	r_m	DT (d)	λ (d)	**T (d)**
Soybean	53.84 ± 6.64a	0.296 ± 0.012a	2.34 ± 0.09a	1.345 ± 0.016a	**13.45 ± 0.67a**
Cowpea	29.13 ± 4.66b	0.242 ± 0.013b	2.86 ± 0.15b	1.274 ± 0.016b	**13.96 ± 0.89a**
Bean	**11.25 ± 1.85c**	**0.230 ± 0.013b**	**3.00 ± 0.15b**	**1.259 ± 0.016b**	**10.59 ± 0.31a**

[a] Differences among bean cultivars were determined by t-test pairwise comparison, based on jackknife estimates of variance for each parameter (Maia et al 2000). Within columns, means followed by different letters are significantly different (P<0.05).
[b] Each parameter value is mean of 20 replications.

SUBSTITUTE NAMES FOR EIGHT SPONGE GENUS GROUP NAMES (PORIFERA)

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ABSTRACT: Eight junior homonyms were detected among the sponges genera and the following replacement names are proposed: Class Demospongiae: *Spongonewellia* nom. nov. pro *Newellia* Wood, Reitner & West, 1989 and *Exsuperantia* nom. nov. pro *Rimella* Schmidt, 1879; Class Hexactinellida: *Novocarbonella* nom. nov. pro *Carbonella* Hurcewicz and Czarniecki, 1986; *Maestitia* nom. nov. pro *Napaea* Schrammen, 1912; *Hyalonema* (*Ijimaonema*) nom. nov. pro *Hyalonema* (*Pteronema*) Ijima, 1927 and *Rigbykia* nom. nov. pro *Rigbyella* Mostler & Mosleh-Yazdi, 1976; Class Regulares: *Yukonensis* nom. nov. pro *Acanthopyrgus* Handfield, 1967; Class Uncertain: *Mostlerhella* nom. nov. pro *Bengtsonella* Mostler, 1996. Accordingly, new combinations are herein proposed for the type species currently included in these genera respectively: *Spongonewellia mira* (Wood, Reitner & West, 1989) comb. nov.; *Exsuperantia clava* (Schmidt, 1879) comb. nov.; *Novocarbonella rotunda* Hurcewicz and Czarniecki, 1986) comb. nov. ; *Maestitia striata* (Schrammen, 1912) comb. nov.; *Hyalonema (Ijimaonema) aculeatum* Schulze, 1894 comb. nov.; *Hyalonema (Ijimaonema) cebuense* Higgin, 1875 comb. nov.; *Hyalonema (Ijimaonema) clavigerum* Schulze, 1886 comb. nov.; *Hyalonema (Ijimaonema) globus* (Schulze, 1886) comb. nov.; *Hyalonema (Ijimaonema) heideri* Schulze, 1894 comb. nov.; *Hyalonema (Ijimaonema) topsenti* Ijima, 1927 comb. nov.; *Rigbykia ruttneri* (Mostler & Mosleh-Yazdi, 1976) comb. nov.; *Yukonensis yukonensis* Handfield, 1967) comb. nov. and *Mostlerhella australiensis* (Mostler, 1996) comb. nov.

KEY WORDS: nomenclatural changes, homonymy, replacement names, sponges, Porifera.

In an effort to reduce the number of homonyms in Porifera, I systematically checked the generic names published. I found eight sponges genera whose names had been previously published for other taxa, making them junior homonyms. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose replacement names for these genus group names.

TAXONOMY

Phylum PORIFERA

Class DEMOSPONGIAE

Genus *SPONGONEWELLIA* nom. nov.

Newellia Wood, Reitner & West, 1989. Lethaia 22 (1): 86. (Porifera: Demospongiae: Haplosclerida). Preoccupied by *Newellia* André, 1962. Publ. cult. Comp. Diam. Angola No. 60: 69. (Arachnida: Acari: Acariformes: Actinedida: Parasitengona: Trombidioidea: Johnstonianidae).

Remarks: The genus *Newellia* was erected by André, 1962 with the type species *Newellia glandulosa* André, 1962 in Acari. It is still used as a valid genus name in the family Johnstonianidae. Later, the sponge genus *Newellia* was described by Wood, Reitner & West, 1989 with the type species *Newellia mira* Wood, Reitner & West, 1989 by original designation. It is still used as a valid genus name (e. g. Boury-Esnault, 2006). However, the name *Newellia* Wood, Reitner & West, 1989 is invalid under the law of homonymy, being a junior homonym of *Newellia* André, 1962. I propose to substitute the junior homonym name *Newellia* Wood, Reitner & West, 1989 for the nomen novum *Spongonewellia*. The name is from the word "sponge" + preexisting genus name *Newellia*.

Summary of nomenclatural changes:

Spongonewellia **nom. nov.**
pro *Newellia* Wood, Reitner & West, 1989 (non André, 1962)

Spongonewellia mira (Wood, Reitner & West, 1989) **comb. nov.**
from *Newellia mira* Wood, Reitner & West, 1989

Genus *EXSUPERANTIA* nom. nov.

Rimella Schmidt, 1879. Spong. Mex., 21. (Porifera: Demispongiae: Lithistida: Phymaraphiniidae). Preoccupied by *Rimella* Agassiz, 1840. Conch. Min., 137. (Mollusca: Gastropoda: Stromboidea: Strombidae).

Remarks: Firstly, the genus *Rimella* was established by Agassiz, 1840 for a gastropod genus with the type species *Rostellaria fissurella* Lamarck, 1799 by subsequent designation. It is still used as a valid genus name. Subsequently, the name *Rimella* was proposed by Schmidt, 1879 for a sponge genus with the type species *Rimella clava* Schmidt, 1879 from gulf of Mexico. Also, it is still used as a valid genus name (Pisera & Lévi, 2002). However, the name *Rimella* Schmidt, 1879 is invalid under the law of homonymy, being a junior homonym of *Rimella* Agassiz, 1840. I propose to substitute the junior homonym name *Rimella* Schmidt, 1879 for the nomen novum *Exsuperantia*. The name is from the Latin word "exsuperantia" (meaning "superiority" in English).

Summary of nomenclatural changes:

Exsuperantia **nom. nov.**
pro *Rimella* Schmidt, 1879 (non Agassiz, 1840)

Exsuperantia clava (Schmidt, 1879) **comb. nov.**
from *Rimella clava* Schmidt, 1879

Class HEXACTINELLIDA

Genus *NOVOCARBONELLA* nom. nov.

Carbonella Hurcewicz & Czarniecki, 1986. Annales Soc. geol. Pol. 55 (3-4): 341. (Porifera: Hexactinellida). Preoccupied by *Carbonella* Dain, 1953. Trudy vses. neft. nauchno-issled. geol.-razv. Inst. 74: 36. (Protozoa: Rhizopoda: Foraminifera: Fusulinidia: Fusulinida: Tournayellidae).

Remarks: The protozoon genus *Carbonella* was erected by Dain, 1953 with the type species *Carbonella spectabilis* Dain, 1953. It is not extant. It was assigned to Foraminiferida by Sepkoski (2002). It is still used as a valid genus name. Later, the genus *Carbonella* was described by Hurcewicz & Czarniecki, 1986 with the type species *Carbonella rotunda* Hurcewicz and Czarniecki, 1986 from the Carboniferous of Poland. It is still used as a valid genus name (e. g. Rigby & Bell, 2006). However, the name *Carbonella* Hurcewicz and Czarniecki, 1986 is invalid under the law of homonymy, being a junior homonym of *Carbonella* Dain, 1953. I propose to substitute the junior homonym name *Carbonella* Hurcewicz and Czarniecki, 1986 for the nomen novum *Novocarbonella*. The name is from the Latin word "nova" (meaning "new" in English) + the preexisting genus *Carbonella*.

Summary of nomenclatural changes:

Novocarbonella **nom. nov.**
pro *Carbonella* Hurcewicz and Czarniecki, 1986 (non Dain, 1953)

Novocarbonella rotunda Hurcewicz and Czarniecki, 1986) **comb. nov.**
from *Carbonella rotunda* Hurcewicz and Czarniecki, 1986

Genus *MAESTITIA* nom. nov.

Napaea Schrammen, 1912. Palaeontogr., Suppl. 5, no. 3, 273. (Porifera: Hexactinellida: Lychniscosida: Ventriculitidae: Ventriculitinae). Preoccupied by *Napaea* Hübner, [1819]. Samml. Exot. Schmett., 1 pl. (34). (Insecta: Lepidoptera: Papilionoidea: Riodinidae: Riodininae: Mesosemiini: Napaeina).

Remarks: The name *Napaea* was initially introduced by Hübner, [1819] for a butterfly genus (with the type species *Cremna eucharila* Bates , 1867 by subsequent designation) in Lepidoptera. *Cremna eucharila* Bates, 1967 was designated as the type-species of *Napaea* Hübner, [1819] under the plenary powers of the Commission and was placed on the Official List of Specific Names in Zoology, (Opinion 820), The Bulletin of Zoological Nomenclature, 24: 212. *Napaea* was placed on the Official List of Generic Names in Zoology after the designation of *Cremna eucharila*, (Opinion 820). It is still used as a valid genus name. The genus is the type genus of the family group name Napaeina. Subsequently, Schrammen, 1912 described a new sponge genus (with the type species *Napaea striata* Schrammen, 1912) under the same generic name. It is a valid genus name (e. g. Jahnke & Gasse, 1993). Thus, the genus *Napaea* Schrammen, 1912 is a junior homonym of the genus *Napaea* Hübner, [1819]. So I propose a new replacement name *Maestitia* **nom. nov.** for *Napaea* Schrammen, 1912. The name is from the Latin word "maestitia" (meaning "melancholy, sorrow" in English).

Summary of nomenclatural changes:

Maestitia **nom. nov.**
pro *Napaea* Schrammen, 1912 (non Hübner, [1819])

Maestitia striata (Schrammen, 1912) **comb. nov.**
from *Napaea striata* Schrammen, 1912

Genus *HYALONEMA* Gray, 1832
Subgenus *IJIMAONEMA* nom. nov.

Pteronema Ijima, 1927. Siboga Exped. Rep., 6, 61. (Porifera: Hexactinellida: Amphidiscophora: Amphidiscosida: Hyalonematidae: *Hyalonema*). Preoccupied by *Pteronema* Haeckel, 1879. Syst. der Medusen, 1, 101. (Cnidaria: Hydrozoa: Hydroidomedusa: Anthomedusae: Capitata).

Remarks: Firstly, the generic name *Pteronema* was established by Haeckel, 1879 as an hydrozoon genus with the type species *Pteronema darwini* Haeckel, 1879 from Australia. It is still used as a valid genus name. Later, the generic name *Pteronema* was described by Ijima, 1927 for a new sponge genus group with the type species *Hyalonema* (*Pteronema*) *topsenti* Ijima, 1927. It is stil used as a valid genus name (e. g. Hooper & Van Soest, 2002). However, the generic name *Pteronema* Ijima, 1927 is invalid under the law of homonymy, being a junior homonym of *Pteronema* Haeckel, 1879. So I propose a new replacement name *Ijimaonema* **nom. nov.** for *Pteronema* Ijima, 1927. The name is dedicated to Ijima who is current author of the preexisting subgenus *Pteronema*.

Summary of nomenclatural changes:

Genus *Hyalonema* Gray, 1832

Subgenus *Ijimaonema* **nom. nov.**
pro *Pteronema* Ijima, 1927 (non Haeckel, 1879)

Hyalonema (Ijimaonema) aculeatum Schulze, 1894 **comb. nov.**
from *Hyalonema (Pteronema) aculeatum* Schulze, 1894

Hyalonema (Ijimaonema) cebuense Higgin, 1875 **comb. nov.**
from *Hyalonema (Pteronema) cebuense* Higgin, 1875

Hyalonema (Ijimaonema) clavigerum Schulze, 1886 **comb. nov.**
from *Hyalonema (Pteronema) clavigerum* Schulze, 1886

Hyalonema (Ijimaonema) globus (Schulze, 1886) **comb. nov.**
from *Hyalonema (Pteronema) globus* (Schulze, 1886)

Hyalonema (Ijimaonema) heideri Schulze, 1894 **comb. nov.**
from *Hyalonema (Pteronema) heideri* Schulze, 1894

Hyalonema (Ijimaonema) topsenti Ijima, 1927 **comb. nov.**
from *Hyalonema (Pteronema) topsenti* Ijima, 1927

Genus *RIGBYKIA* nom. nov.

Rigbyella Mostler & Mosleh-Yazdi, 1976. Geol.-Palaont. Mitt. 5 (1): 19. (Porifera: Hexactinellida). Preoccupied by *Rigbyella* Stehli, 1956. J. Paleont. 30: 310. (Brachiopoda: Strophomenata: Productida: Lyttoniidina: Lyttonioidea: Rigbyellidae).

Remarks: Mostler & Mosleh-Yazdi (1976) established a cambrian spiculate sponge genus *Rigbyella* with the type species *Rigbyella ruttneri* Mostler & Mosleh-Yazdi, 1976 from Iran. It is still used as a valid genus name (e. g. Carrera & Botting, 2008). Unfortunately, the generic name was already preoccupied by Stehli (1956), who had described the genus *Rigbyella* with the type species *Paralyttonia girtyi* Wanner & Sieverts, 1935 in Brachiopoda. It is still used as a valid genus name. It is the type genus of the family Rigbyellidae Williams et al., 2000. Thus, the genus *Rigbyella* Mostler & Mosleh-Yazdi, 1976 is a junior homonym of the generic name *Rigbyella* Stehli, 1956. So I propose a new replacement name *Rigbykia* **nom. nov.** for *Rigbyella* Mostler & Mosleh-Yazdi, 1976. The name is dedicated to J. K. Rigby.

Summary of nomenclatural changes:

Rigbykia **nom. nov.**
pro *Rigbyella* Mostler & Mosleh-Yazdi, 1976 (non Stehli, 1956)

Rigbykia ruttneri (Mostler & Mosleh-Yazdi, 1976) **comb. nov.**
from *Rigbyella ruttneri* Mostler & Mosleh-Yazdi, 1976

Class REGULARES

Genus *YUKONENSIS* nom. nov.

Acanthoppyrgus Handfield, 1967. J. Paleont. 41: 209. (Porifera: Regulares: Capsulocyathida). Preoccupied by *Acanthopyrgus* Descamps & Wintrebert, 1966. Bull.Soc.ent.Fr. 71: 28. (Insecta: Orthoptera: Caelifera: Acrididea: Pyrgomorphoidea: Pyrgomorphidae: Orthacridinae: Sagittacridini).

Remarks: Handfield (1967) proposed the generic name *Acanthopyrgus* as a fossil genus of sponges with the type species *Acanthopyrgus yukonensis* Handfield, 1967 from Mackenzie Mountains, Yukon territory (Yukon, Canada, North America). It is a valid genus name. It is not extant. It was assigned to Capsulocyathida by Sepkoski (2002). Unfortunately, the generic name was already preoccupied by Descamps & Wintrebert (1966), who had proposed the genus name *Acanthopyrgus* as a orthopteran genus with the type species *Geloius finoti* Bolivar, 1905 in Caelifera. Thus, the genus group name *Acanthopyrgus* Handfield, 1967 is a junior homonym of the generic name *Acanthopyrgus* Descamps & Wintrebert, 1966. I propose a new replacement name *Yukonensis* **nom. nov.** for *Acanthopyrgus* Handfield, 1967. The name is from the type locality Yukon for tautonymy.

Summary of nomenclatural changes:

Yukonensis **nom. nov.**
pro *Acanthopyrgus* Handfield, 1967 (non Descamps & Wintrebert, 1966)

Yukonensis yukonensis Handfield, 1967) **comb. nov.**
from *Acanthopyrgus yukonensis* Handfield, 1967

Class UNCERTAIN

Genus *MOSTLERHELLA* nom. nov.

Bengtsonella Mostler, 1996. Geol.-Palaeontol. Mitt. 21: 228. (Porifera: Uncertain). Preoccupied by *Bengtsonella* Müller & Hinz, 1991. Fossils Strata No. 28: 15. (Chordata: Vertebrata: Conodonta).

Remarks: The name *Bengtsonella* was initially introduced by Müller & Hinz, 1991 for a fossil conodont genus (with the type species *Bengtsonella triangularis* Müller & Hinz, 1991 from Sweden) in Conoconta. It is still used as a valid genus name. Subsequently, Mostler, 1996 described a new Cambrian spiculate sponge genus with the type species *Bengtsonella australiensis* Mostler, 1996 from Australia under the same generic name. It is a valid genus name and it is endemic to Australia (e. g. Carrera & Botting, 2008). Thus, the genus *Bengtsonella* Mostler, 1996 is a junior homonym of the genus *Bengtsonella* Müller & Hinz, 1991. I propose a new replacement name *Mostlerhella* **nom. nov.** for *Bengtsonella* Mostler, 1996. The name is dedicated to H. Mostler who is the current author of the preexisting genus *Bengtsonella*.

Summary of nomenclatural changes:

Mostlerhella **nom. nov.**
pro *Bengtsonella* Mostler, 1996 (non Müller & Hinz, 1991)

Mostlerhella australiensis (Mostler, 1996) **comb. nov.**
from *Bengtsonella australiensis* Mostler, 1996

LITERATURE CITED

Agassiz, L. 1840. Conchyliologie mineralogique de la Grande Bretagne. pp. 125-286.

André, M. 1962. Acariens Thrombidions (adultes) de l.Angola (2éme note). Publ. cult. Comp. Diam. Angola (Diamang) 60: 57-112.

Boury-Esnault, N. 2006. Systematics and evolution of Demospongiae. Can. J. Zool., 84 (2): 205–224.

Carrera, M. G. & Botting, J. P. 2008. Evolutionary history of cambrian spiculate sponges: Implications for the cambrian evolutionary fauna. Palaios, 23 (3): 124-138.

Dain, L. G. & Grozdilova, L. P. 1953 Fossil foraminifera of the U. S. S. R., Tournayellidae and Archaediscidae. Vses. Neft. Nauchno-Issled. Geol..- Razved. Inst., Trudy, 74: 36.

Descamps, M. & Wintrebert, D. 1966. Revue et diagnose preliminaire de quelques Pyrgomorphidae et Acrididae de madagascar (Orth. Acridoidea). Bulletin de la Société Entomologique de France, 71: 24-34.

Haeckel, E. 1879. Das System der Medusen. Erster Teil einer Monographie der Medusen. Denkschriften der Medicinisch-Naturwissenschaftlichen Gesellschaft zu Jena, 1: 1–360.

Handfield, R. C. 1967. A new Lower Cambrian Archaeocyatha. Journal of Paleontology, 41: 209-212.

Hooper, J. N. A. & Van Soest, R. W. M. (Ed.) 2002. Systema Porifera: a guide to the classification of Sponges. Kluwer Academic/Plenum Publishers: New York, NY (USA). xix, 1-1101, 1103-1706 pp. (2 volumes).

Hurcewicz, H. & Czarniecki, S. 1986. Lyssakidae sponges from the Carboniferous limestone and the Culm of southern Poland and their environmental differentiation. Annales Societatis Geologorum Poloniae, 55: 333-354.

Hübner, J. [1819]. Sammlung exotischer Schmetterlinge. 1 pl. (34).

Ijima, I. 1927. The Hexactinellida of the Siboga Expedition. Siboga Expedition Reports 6: 383 pp.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Jahnke, H. & Gasse, W. 1993. Bestandskatalog der Kreideschwamm-Originale im Institut und Museum für Geologie und Paläontologie, Göttingen, und im Roemer Museum, Hildesheim. Mitteilungen des Roemer Museums, Neue Folge, Heft 4: p. 62.

Mostler, H. & Mosleh-Yazdi, A. 1976. Neue Poriferen aus oberkambrischen Gesteinen der Milaformation im Elburzgebirge (Iran). Geol.-Paläont. Mitt. Innsbruck, 5 (1): 1-36.

Müller, K. J. & Hinz, I. 1991. Upper Cambrian conodonts from Sweden. Fossils and Strata, 28: 1-153.

Pisera, A. & Lévi, C. 2002. Family Phymaraphiniidae Schrammen, 1910. In Hooper, J. N. A. & Van Soest, R. W. M. (ed.) Systema Porifera. A guide to the classification of sponges. 1. Pp. 380-383.

Rigby, J. K. & Bell, G. L. Jr. 2006. Sponges from the Reef Trail Member of the Upper Guadalupian (Permian) Bell Canyon Formation, Guadalupe Mountains National Park, Texas. Journal of Paleontology, 80 (5): 1-42.

Schmidt, O. 1879. Die Spongien des Meerbusen von Mexico (Und des caraibischen Meeres). Abtheilung I. Heft I. Pp. 1-32.

Schrammen, A. 1910-1912. Die Kieselspongien der oberen Kreide von Nordwestdeutschland. I.Teil: Tetraxonia, Monaxonia und Silicea incert. sedis. II.Teil: Triaxonia (Hexactinellida). Palaeontographica Supplementband V, 1-175; 176-385, Stuttgart (Schweizerbart).

Sepkoski, J. J. 2002. A compendium of fossil marine animal genera. Bulletins of American Paleontology, 363: 1-560.

Stehli, F. G. 1956. Notes on oldhaminid brachiopods. Journal of Paleontology, 30 (2): 305-313.

Sepkoski, J. J. 2002. A compendium of fossil marine animal genera. Bulletins of American Paleontology, 363: 1-560.

Williams, A., Carlson, S. J., Brunton, C. H. C., Holmer, L. E., Popov, L. E., Mergl, M., Laurie, J. R., Bassett, M. G., Cocks, L. R. M., Rong, J.-Y., Lazarev, S. S., Grant, R. E., Racheboeuf, P. R., Jin, Y.-G., Wardlaw, B. R., Harper, D. A. T. & Wright, A. D. M. 2000. Part H Brachiopoda (revised): Volumes 2 & 3, Linguliformea, Craniiformea, Rhynchonelliformea (part). Treatise on Invertebrate Paleontology, 1-919.

Wood, R., Reitner, J. & West, R. 1989. Systematics and phylogenetic implications of the haplosclerid stromatoporoid Newellia mira nov. gen. Lethaia, 22: 85-93.

EXPRESSING OF DIGESTIVE AMYLASE IN VARIOUS DEVELOPMENTAL STAGES OF *EURYGASTER MAURA*, AN ENZYMATIC APPROACH

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[**Mehrabadi, M. & Bandani, A. R.** 2009. Expressing of digestive amylase in various developmental stages of *Eurygaster maura,* an enzymatic approach. Munis Entomology & Zoology, 4 (1): 219-226]

ABSTRACT: In order to identify and determine of α-amylase expressing in various developmental stages of *Eurygaster maura,* a series of biochemical and enzymatic experiments was carried out. For this goal midgut α-amylase was isolated and characterized. Enzyme samples from midguts of adults were prepared by the method of Cohen with slight modifications. The α-amylase activity was assayed by the dinitrosalicylic acid (DNS) procedure, using 1% soluble starch as substrate. Then absorbance was read at 540 nm by spectrophotometer. Amylase activity was detected in the midgut of the insects which were collected from wheat fields during spring. Amylase activity in the midgut of feeding insects was 0.083 U/insect. α-amylase activity was detected in the various nymphal stage. The results show that α-amylase activity in the immature stages increase constantly up to the third-instar. There were no significant differences of enzyme activity between third, fourth, fifth nymphal stages and adults (0.0071 - 0.0083 (U/insect)). α-amylase activity in first-nymphal stage was 0.0046 U/insect. Optimum temperature for the enzyme activity was determined to be between 30 to 40 °C. Optimum pH value for amylase was 6.5-7.

KEY WORDS: *Eurygaster maura*, nymphal stages, amylase assay.

Wheat is one of the main crops planted over a wide area in Iran. Several biotic factors influence the yield of this economic crop; among mentioned biotic factors the most important factors are insects which in recent years decrease wheat yield dramatically. Wheat bugs have an important role in the decrease of wheat products. Among hemipteran insects in wheat farms, genera of *Eurygaster* sp. is more important than others and have several species such as E. *integriceps, E. maura* etc. As wheat bugs are piercing- sucking insects, they must introduce theirs salivary enzymes into the seed and after partial digestion, sucking digested material (e.g. flush-feeding insects). The entrance of mentioned bugs salivary enzymes into the feeding seeds, in addition of its direct injury to wheat seeds, it causes the decrease of feeding seeds quality, and has harmful medical effects on consumers including humans. *Eurygaster maura* is the dominant wheat bug in north Iran particularly in the Gorgan area, Golestan province. The insect is mainly found in wheat farm which causes severe damage to the vegetative growth stage of wheat in the early season. It also feeds on wheat grains in the late growth stage, thus damaged grains lose their bakery properties. In addition to the direct damage to wheat grain it also injects salivary enzymes into the feeding seeds causing damage to seed quality, too. Injection of salivary enzymes into the wheat also produces hygienic problem for consumers. The most important periods in the life cycle of *E. maura* are the period of late nymphal development and the intense feeding of the newly emerged adults. Nymphs in the early instars do not feed intensively. After the third instar, feeding is intensified and the damage to crops becomes obvious. The emerged adults start intense feeding on wheat grains. During feeding, this pest with its piercing-sucking mouthparts injects saliva from the salivary gland complexes into the grains to liquefy food. Then the liquefied food is ingested and further digestion is made inside the gut. Because of injecting enzymes into the grain during feeding, the enzymes degrade gluten proteins and cause rapid relaxation of dough which results in the production of bread with poor volume and texture (Kazzazi et al., 2005).

α-Amylases (α-1,4-glucan-4-glucanohydrolases; EC 3.2.1.1) are hydrolytic enzymes that are widespread in nature, being found in microorganisms, plants, and animals. These enzymes catalyze the hydrolysis of α-D-(1,4)-glucan linkage in starch components, glycogen and various other related carbohydrates (Franco et al., 2000; Strobl et al., 1998).

E. maura like other insect pests of wheat lives on a polysaccharide-rich diet and depends to a large extent on the effectiveness of its α-amylases for survival (Mendiola-Olaya et al., 2000). It converts starch to maltose, which is then hydrolyzed to glucose by an α-glucosidase. In insects only α-amylases has been found to hydrolyze long α-1,4-glucan chains such as starch or glycogen. Amylase activity has been described from several insect orders including Coleoptera, Hymenoptera, Diptra, Lepidoptera and Hemiptera (Terra et al., 1988; Mendiola-Olaya et al., 2000; Zeng, and Cohen 2000; Oliveira-Neto et al., 2003).

An understanding of how digestive enzymes function is essential when developing methods of insect control, such as the use of enzyme inhibitors and transgenic plants to control phytophagous insects (Bandani et al., 2001; Maqbool et al., 2001). For nearly all these strategies, having a strong understanding of the target pest's feeding is important. Also, an understanding of the biochemistry and physiology of feeding adaptation is important.

Nothing is currently known about the properties of α-amylase of *E. maura*. The purpose of the present study is to identify and characterize the α-amylase activity of *E. maura* in order to gain a better understanding of the digestive physiology of wheat bug. This understanding will hopefully lead to new management strategies for this pest.

MATERIALS AND METHODS

Insects

The insects were collected from the Gorgan wheat farm of Golestan Province, Iran and maintained on wheat plants in the laboratory at 27 ± 2°C with 14 h light : 10 h dark cycle. Voucher specimens are kept in the Entomological Laboratory, Plant Protection Department, Tehran University.

Sample Preparation

Enzyme samples from midguts and salivary glands of adults were prepared by the method of Cohen (1993) with slight modifications. Briefly, adults were randomly selected and midgut from these individuals were removed by dissection under a light microscope in ice-cold saline buffer (0.006 M NaCl).

The midgut was separated from the insect body, rinsed in ice-cold saline buffer, placed in a pre-cooled homogenizer and ground in one ml of universal buffer. The homogenates from both preparations were separately transferred to 1.5 ml centrifuge tubes and centrifuged at 15000 ×g for 20 min at 4˚C. The supernatants were pooled and stored at -20˚C for subsequent analyses.

Nymphs' α-amylase was prepared by the method of Mendiola-Olaya (2000) with slight modifications. The nymphs' weight was determined. Whole *E. maura* nymphs were homogenized in the above mentioned universal buffer and centrifugation carried out as before. The supernatants were pooled and stored at -20˚C for later use.

Amylase Activity Assay

The α- amylase activity was assayed by the dinitrosalicylic acid (DNS) procedure (Bernfeld 1995), using 1% soluble starch (Merck, product number 1257, Darmstadt, Germany) as substrate. Ten microliters of the enzyme was incubated for 30 min at 35˚C with 500 µl universal buffer and 40µl soluble starch. The reaction was stopped by addition of 100 µl DNS and heated in boiling water for 10 min. 3,5-Dinitrosalicylic acid is a color reagent that the reducing groups released from starch by α- amylase action are measured by the reduction of 3,5-dinitrosalicylic acid. The boiling water is for stopping the α-amylase activity and catalyzing the reaction between DNS and reducing groups of starch.

Then absorbance was read at 540 nm after cooling in ice for 5 min. One unit of α-amylase activity was defined as the amount of enzyme required to produce 1 mg maltose in 30 min at 35˚C. A standard curve of absorbance against the amount of maltose released was constructed to enable calculation of the amount of maltose released during α-amylase assays. Serial dilutions of maltose (Merck, Product Number 105911, Mr 360.32 mg mol-1) in the universal buffer at pH 6.5 were made to give following range of concentrations of 2, 1, 0.5, 0.25, 0.125 mg ml-1 (Fig. 1).

A blank without substrate but with α-amylase extract and a control containing no α-amylase extract but with substrate were run simultaneously with the reaction mixture. All assays were performed in duplicate and each assay repeated at least three times.

Effect of Temperature on Enzyme Activity

The effect of temperature on α-amylase activity was determined by incubating the reaction mixture at different temperatures including 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, and 70 ˚C for 30 min. Also thermo-stability of enzyme over 10 days at specified temperature was determined. Samples were maintained at 4, 24, 34, and 44˚C for 10 days followed by determination of residual activity by enzyme assay as described before.

Effect of pH on Enzyme Activity

The pH optima of amylase was determined using universal buffer (Hosseinkhani and Nemat-Gorgani, 2003). The pH was tested were 2, 3, 4, 5, 5.5, 6, 6.5, 7, 7.5, 8, 9, and 10.

Protein Determination

Protein concentration was measured according to the method of Bradford (1976), using bovine serum albumin (Bio-Rad, Munchen, Germany) as a standard (Fig. 1).

Statistical Analysis

Data were compared by one-way analysis of variance (ANOVA) followed by Duncan multiple range test when significant differences were found at P = 0.05.

RESULTS

α- amylase Activity

Studies showed that α- amylase activity is present in midgut of adult *E. maura* and in whole body of nymphs (Table 1). the activity of midgut enzyme was 0.0507 U/insect.

Only trace amounts of enzyme activity were detected in the first-nymphal stage (0.0046 U/insect), whereas α- amylase activity reached its highest value (0.083 U/insect) in the fifth-nymphal stage (Table 1).

These results show that α-amylase expression and activity in the immature stages increase constantly up to third-instar nymph. There was significant differences in amylase activity between first, second and third instars (d.f. =4, F

=57.41, P =0.0001). The amounts of α-amylase activity did not change significantly in the last nymphal stages (third, fourth and fifth instars) (Table 1). Enzyme activities in these stages were 0.071, 0.078 and 0.083 U/insect, respectively (Fig.2)

Effect of Temperature on Amylase Activity

Optimum temperature for the enzyme activity was determined to be between 30 to 40 ˚C (Fig. 3). The rapid decrease in amylase activity observed above 40˚C and amylase activity reached zero at 70˚C. α-amylase thermal stability was monitored by measuring residual activity after incubation of enzyme at 4, 24, 34, and 44˚C over 10 days. The amylolytic activity decreased at high temperature. For instance at 4 and 44˚C loss of enzyme activity over 10 days were 2 and 50%, respectively (Fig 3).

Effect of pH on Amylase Activity

Optimum pH value for amylase was 6.5-7 (Fig. 4). Activity dropped rapidly below pH 4.0 and mildly above pH 7.0. However, there was considerable activity over a broad range of pH.

DISCUSSIONS

The results from this study demonstrate that midget of adults and nymphal hole body of *E. maura* have α- amylase activity, then expressing of amylase was demonstrated. The presence of the amylase activity in the gut of other phytophagous heteropterans has been reported. The insects can digest polysaccharides partially by salivary secretions, which would be ingested along with partially digested starches to be used in the midgut (Boyd 2003). The complete breakdown of starch should take place in the midgut where large amounts of amylase exist.

Amylases in insects are generally most active in neutral to slightly acid pH conditions. Optimal pH values for amylases in larvae of several coleopterans were 4-5.8 and in Lygus spp. (Heteroptera) was 6.5 (Zheng and Cohen 2000). Optimum pH generally corresponds to the pH prevailing in the midguts from which the amylases are isolated.

The first nymphal stage of the wheat bug does not feed, which may be one reason why they have very low expression of amylase and activity (0.0046 U/insect). In the field, feeding is usually intensified at the third instar where damage to crops is obvious. The present study found the maximum α-amylase activity present in the third to fifth nymphal stages.

The Wheat bug α-amylase has an optimum temperature activity of 30-40oC, which is consistent with the other reports (Ishaaya et al. 1971; Mendiola-Olaya et al. 2000).

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LITERATURE CITED

Agblor, A., Henerson, H.M. & Madrid, F. J. 1994. Characterization of alpha-amylase & polygalacturonase from Lygus spp. (Heteroptera: Miridae). Food Research International, 27: 321-326.

Bandani, A. R., Amiri, B., Butt, T. M. & Gordon-Weeks, R. 2001. Effects of efrapeptin and destruxin, metabolites of entomogenous fungi, on the hydrolytic activity of a vacuolar type ATPase identified on the brush border memebrane vesicles of Galleria mellonella midgut and on plant membrane bound hydrolytic enzymes. Biochemica et Biophysica Acta, 1510: 367-377.

Bernfeld, P. 1955. Amylases, α and β. Methods in enzymology 1: 149-158.

Boyd, D. W. 2003. Digestive enzymes and stylet morphology of Deraeocoris nigritulus (Uhler) (Hemiptera: Miridae) reflect adaptation for predatory habits. Annals of Entomological Society of America, 96: 667-671.

Boyd, D. W., Cohen, A. C. & Alverson, D. R. 2002. Digestive enzymes and stylet morphology of Deraeocoris nebulosus (Hemiptera: Miridae), a predacious plant bug. Annals of Entomological Society of America, 95: 395-401.

Bradford, M. 1976. A rapid and sensitive method for quantitation of microgram quantities of protein utilizing the principle of protein-dye binding. Analytical Biochemistry, 72: 248-254.

Campos, F. A., Xavier-Filho, J., Silva, C. P & Ary, M. B. 1989. Resolution and partial characterization of proteinases and α-amylases from midgut of larvae of the bruchid beetle Callosobruchus maculates (F). Comparative Biochemistry and Physiology Part B, 92: 51-57.

Chen, M. S., Feng, G., Zeng, K. C., Richardson, M., Valdes-Rodriguez, S., Reeck, G. R. & Kramer, K. J. 1992. α-Amylase from three species of stored grain coleopteran & their inhibition by wheat & corn proteinaceous inhibitors. Insect Biochemistry & Molecular Biology, 22: 261-268.

Cohen, A. C. & Hendrix, D. L. 1994. Demonstration & preliminary characterization of α-amylase in the sweet potato whitefly Bemisia tabaci (Aleyrodidae: Homoptera). Comparative Biochemistry & Physiology Part B, 109: 593-601.

Cohen, A. C. 1993. Organization of digestion & preliminary characterization of salivary trypsin like enzymes in a predaceous heteropteran, zelus renadii. Journal of insect physiology, 39: 823 829.

Doani, W. W. 1967. Quantification of amylases in Drosophila separated by acrylamide gel electrophoresis. Journal of Experimental Zoology, 164: 363-378.

Franco, O. L., Rigden, D. G., Melo, F. R. & Grossi-de-sa, M. 2000. Plant α-amylase inhibitors & their interaction with insect α-amylases: structure, function & potential for crop protection. European journal of biochemistry, 269: 397-412.

Hosseinkhani, S. & Nemat-Gorgani, M. 2003. Partial unfolding of carbonic anhydrase provides a method for its immobilization on hydrophobic adsorbents & protects it against irreversible thermoinactivation. Enzyme and Microbial Technology, 33: 179-184.

Ishaaya, I., Moore, I. & Joseph, D. 1971. Protease and amylase activity in larvae of the Egyptian cotton worm, Spodoptera littoralis. Journal of Insect Physiology, 17: 945-953.

Kazzazi, M., Bandani, A. R. & Hosseinkhani, S. 2005. Biochemical characterization of alpha-amylase of the Sunn pest, Eurygaster integriceps, Entomological Science, 8 (4): 371-377.

Lammli, U. K. 1970. Cleavage of structural proteins during the assembly of bacteriophage T4. Nature, 227: 680-685.

Maqbool, S. B., Riazuddin, S., Loc, N. T., Gatehouse, A. M. R., Gatehouse, J. A. & Christou, P. 2001. Expression of multiple insecticidal genes confers broad resistance against a range of different rice pests. Molecular Breeding, 7: 85-93.

Mendiola-Olaya, E., Valencia-Jimenez, A., Valdes-Rodriguez, S., Delano-Frier J. & Blanco-Labra. A. 2000. Digestive amylase from the larger grain borer, Prostephanus truncates Horn. Comparative Biochemistry & Physiology Part B, 126: 425-433.

Mohamed, M. A. 2004. Purification & characterization of α-amylase from the infective juveniles of the nematode Heterorhbditis bacteriophaga. Comparative Biochemistry & Physiology Part B, 139: 1-9.

Oliveira-Neto, O., Batista, J. A. N., Rigden, D. J., Franco, O. L., Falcao, R., Fragoso, R. R., Mello, L. V., Santos, R. C. D. & Grossi-de-sa, M. F. 2003. Molecular cloning of α-amylase from cotton boll weevil, Anthonomus gr&is & structural relations to plant inhibitors: An approach to insect resistance. Journal of Protein Chemistry, 22: 77-87.

Shaw, J. F., Lin, F. P. & Chen, S. C. 1995. Purification & properties of an extracellular α-amylase from Thermus sp. Botanical Bulletin of Academia Sinica, 36: 165-200.

Strobl, S., Maskos, K., Wiegand, G., Huber, R., Gomis-Ruth, F. & Glockshuber, R. 1998. A novel strategy for inhibition of α-amylases: yellow meal worm α-amylase in complex with Ragi bifunctional inhibitor at 2.5 Å resolution. Structure, 6: 911-921.

Terra, W. R., Espinoza-Fuentes, E. P. & Ferreira, C. 1988. Midgut amylase lysozyme, aminopeptidase, & trehalase from larvae & adults of Musca domestica. Archives of Biochemistry & Pysiology, 9: 283-297.

Terra, W. R. Ferreira, C. & De-Bianchi, A. G. 1977. Action pattern, kinetical properties & electrophoretical studies on an alpha-amylase present in midgut homogenates from Rynchosciara americana (Diptera) larvae. Comparative Biochemistry & Physiology Part B, 56: 201-209.

Zeng, F. & Cohen, A. C. 2000. Partial characterization of α- amylase in the salivary gl&s of lygus Hesperus & L. lineolaris. Comparative Biochemistry & Physiology Part B, 126: 9-16.

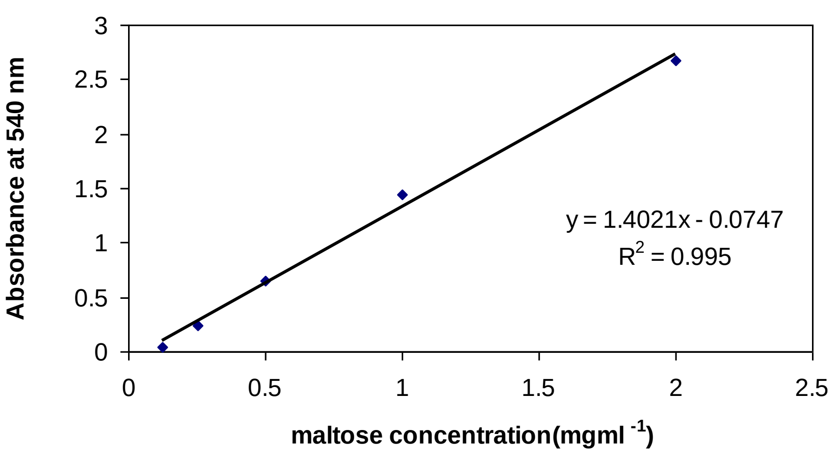

Fig. 1. Standart calibration curve for the determination of maltose released in the α-amylase assay.

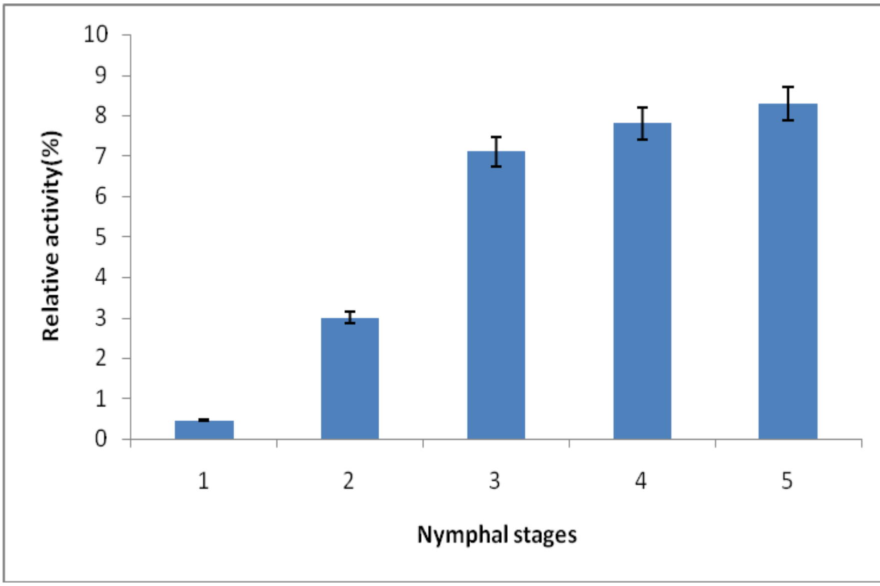

Fig. 2. Histogram of the activity of α-amylase in different nymphal stages of *E.maura*.

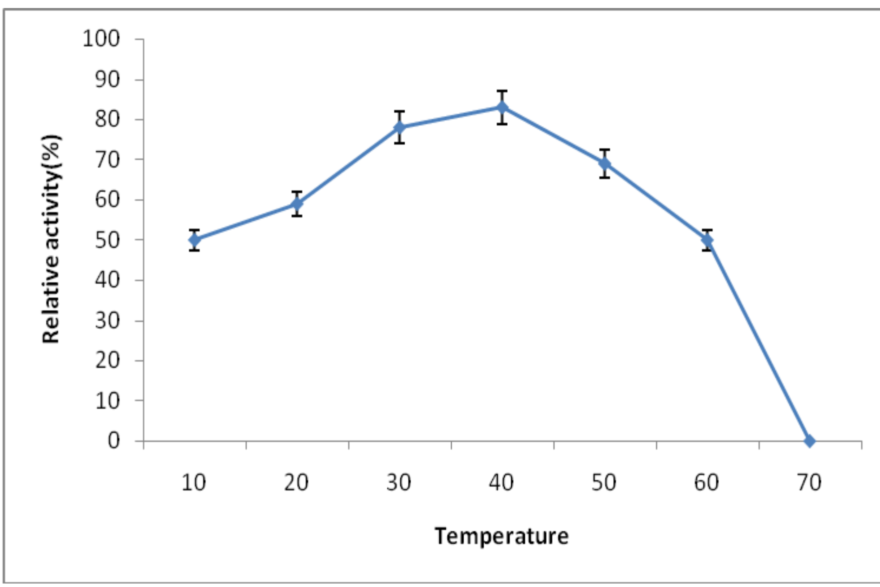

Fig 3. Effect of temperature on α-amylase activity of *E. maura*.

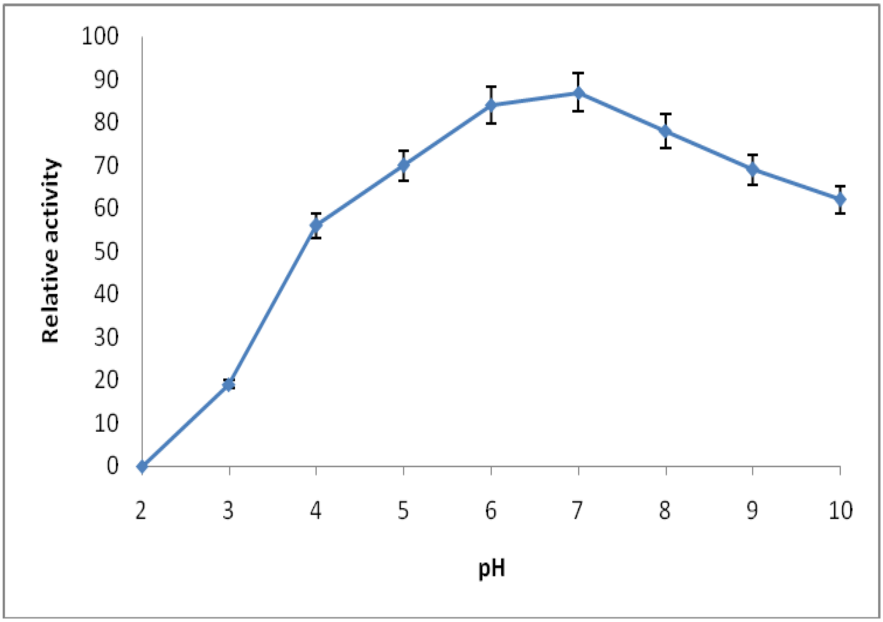

Fig 4. Effect of pH on α-amylase activity of *E. maura*.

Table 1. Comparison of the activity of α-amylase in different nymphal stages of *E. maura*.

Nymphal stage	Activity per ml enzyme (µmol/min/ml; Mean ± SE)	Unit Activity (µmol/min/u, Mean± SE)
1	0.00046 ± 0.020b	0.0046 ± 0.023b
2	0.0030 ± 0.025c	0.030 ± 0.034c
3	0.0071 ± 0.020a	0.071±0.05a
4	0.0078 ± 0.030a	0.078 ± 0.042a
5	0.0083 ± 0.026a	0. 083 ± 0.011a

Sample size for each nymphal stage, n = 3. Values with the same letter did not significantly differ.

NEW NAMES FOR TWO PREOCCUPIED CENTIPEDE GENERA (CHILOPODA)

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[Özdikmen, H. 2009. New names for two preoccupied centipede genera (Chilopoda). Munis Entomology & Zoology, 4 (1): 227-229**]**

ABSTRACT: Two junior homonyms were detected among the centipede genera and the following replacement names are proposed: *Chileana* nom. nov. pro *Araucania* Chamberlin, 1956 (non Pate, 1947) and *Paralamyctes* (*Edgecombegdus*) nom. nov. pro *Paralamyctes* (*Nothofagobius*) Edgecombe, 2001 (non Kuschel, 1952). Accordingly, new combinations are herein proposed for the species currently included in these genera respectively: *Chileana araucanensis* (Sylvestri, 1899) comb. nov.; *Paralamyctes* (*Edgecombegdus*) *cassisi* Edgecombe, 2001 comb. nov. and *Paralamyctes* (*Edgecombegdus*) *mesibovi* Edgecombe, 2001 comb. nov..

KEY WORDS: nomenclatural changes, homonymy, replacement names, sponges, Porifera.

Two proposed genus group names in Chilopoda are nomenclaturally invalid, as the genus group names have already been used by different authors in Hymenoptera and Coleoptera. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these genus group names.

Order GEOPHILIDA
Family LINOTAENIIDAE
Genus *CHILEANA* nom. nov.

Araucania Chamberlin, 1956. Acta Univ. lund., Avd. 2 (N.S.) 51 (5): 32. (Chilopoda: Geophilida: Linotaeniidae). Preoccupied by *Araucania* Pate, 1947. Ent. News, 57, 219. (Insecta: Hymenoptera: Sapygidae: Sapyginae).

Remarks on nomenclatural change:

Firstly, the neotropical hymenopteran genus name *Araucania* was proposed by Pate (1947) as an objective replacement name for the preoccupied genus *Laura* Reed, 1930 (non *Laura* Lacaze-Duthiers, 1883 as the type genus of Lauridae in Crustacea) in Hymenoptera. It is still used as a valid genus name.

Subsequently, the neotropical centipede genus *Araucania* was described by Chamberlin (1956) with the type species *Linotaenia araucanensis* Sylvestri, 1899 by original designation from Chile in Chilopoda. Also, it is still used as a valid genus name.

Thus, the centipede genus *Araucania* Chamberlin, 1956 is a junior homonym of the valid genus name *Araucania* Pate, 1947. So I propose here that *Araucania* Chamberlin, 1956 should be replaced with the new name *Chileana*, as a replacement name.

Etymology: from the type locality Chile.

Summary of nomenclatural changes:

Chileana **nom. nov.**
pro *Araucania* Chamberlin, 1956 (non Pate, 1947)

Chileana araucanensis (Sylvestri, 1899) **comb. nov.**
from *Araucania araucanensis* (Sylvestri, 1899)
Linotaenia araucanensis Sylvestri, 1899

Order LITHOBIOMORPHA
Family HENICOPIDAE
Genus *PARALAMYCTES* Pocock, 1901
Subgenus *EDGECOMBEGDUS* nom. nov.

Nothofagobius Edgecombe, 2001. Rec. Aust. Mus. 53 (2), 228. (Chilopoda: Lithobiomorpha: Henicopidae: Henicopinae). Preoccupied by *Nothofagobius* Kuschel, 1952. Rev. chil. Ent., 2, 254. (Insecta: Coleoptera: Curculionoidea: Curculionidae: Curculioninae).

Remarks on nomenclatural change:

Edgecombe (2001) proposed the generic name *Nothofagobius* as a subgenus of the genus *Paralamyctes* Pocock, 1901 of centipedes with the type species *Paralamyctes* (*Nothofagobius*) *cassisi* Edgecombe, 2001 from Australia. It is still used as a valid genus group name.

Unfortunately, the generic name was already preoccupied by Kuschel (1952), who had proposed the genus name *Nothofagobius* as a beetle genus with the type species *Nothofagobius brevirostris* Kuschel, 1952 from Chile in the family Curculionidae. It is still used as a valid genus name.

Thus, the genus group name *Nothofagobius* Edgecombe, 2001 is a junior homonym of the generic name *Nothofagobius* Kuschel, 1952. So I propose a new replacement name *Edgecombegdus* **nom. nov.** for *Nothofagobius* Edgecombe, 2001. The name is dedicated to G. D. Edgecombe who is the current author of the preexisting genus group name *Nothofagobius*. It is masculine in gender.

Summary of nomenclatural changes:

Genus *Paralamyctes* Pocock, 1901

Subgenus *Edgecombegdus* **nom. nov.**
pro *Nothofagobius* Edgecombe, 2001 (non Kuschel, 1952)

Paralamyctes (*Edgecombegdus*) *cassisi* Edgecombe, 2001 **comb. nov.**
from *Paralamyctes* (*Nothofagobius*) *cassisi* Edgecombe, 2001

Paralamyctes (*Edgecombegdus*) *mesibovi* Edgecombe, 2001 **comb. nov.**
from *Paralamyctes* (*Nothofagobius*) *mesibovi* Edgecombe, 2001

LITERATURE CITED

Chamberlin, R. V. 1955. Reports of the Lund University Chile Expedition 1948-49. 18. The Chilopoda of the Lund University and California Academy of Science Expeditions. Acta Universitatis Lundensis N.S. Avd. 2 51(5): 1-61.

Edgecombe, G. D. 2001. Revision of Paralamyctes (Chilopoda: Lithobiomorpha: Henicopidae), with six new species from Eastern Australia. Record of the Australian Museum, 53: 201-241.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Kuschel, G. 1952. Los Curculionidae de la cordillera chileno-Argentina (1ª parte) (Aporte 13 de Coleoptera Curculionidae). Revista Chilena de Entomología, 2: 229-279.

Pate, V. S. L. 1947. Two new wasps from southern Arizona (Hymenoptera: Sphecidae). Entomological News 57: 219.

Silvestri, F. 1899. Contribucion al estudio de los quilopodos chilenos. Revista Chilena de Historia Natural, 3: 141-152.

A NEW SPECIES FOR THE ARANEOFAUNA OF TURKEY, *EVARCHA MICHAILOVI* LOGUNOV, 1992 (ARANEAE: SALTICIDAE)

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[**Yağmur, E. A., Kunt, K. B. & Ulupınar, E.** 2009. A new species for the areneofauna of Turkey, *Evarcha michailovi* Logunov, 1992 (Araneae: Salticidae). Munis Entomology & Zoology, 4 (1): 230-232]

ABSTRACT: *Evarcha michailovi* Logunov, 1992 is recorded for the first time for areneofauna of Turkey.

KEY WORDS: *Evarcha michailovi* Logunov, 1992, Araneae, Salticidae, Turkey.

Family Salticidae, is one of the important groups of the order Araneae. To date, members of this family represents 13 % of the world's araneofauna with a total of 5188 described species in 560 genus (Platnick, 2008). According to the latest checklist by Bayram et al. (2008), the family Salticidae is represented by a total of 74 species of 31 genus in Turkey.

The aim of this study is to investigate the morphological and genital characteristics of *Evarcha michailovi*, a new record for Turkish araneofauna. Specimens were collected using a sweeping net from the study area. They were preserved in 70 % ethanol. The identification and drawings were made by means of a SMZ10A Nikon stereomicroscope attached a camera lucida. Species identification was based on genital characters defined by Logunov (1992). The specimens were deposited in the Arachnology Museum of Turkish Arachnological Society (MTAS). All measurements are in millimeters (mm) in the present text.

Family Salticidae Blackwall, 1841

Evarcha michailovi Logunov, 1992 (fig. 1)

Material Examined:
1 male, 2 females (MTAS/Sal: 0745-47), Kavalcık village, (36°13'48.13"N, 36°36'36.83"E, Hatay province, Reyhanlı district), 26.IV.2007, collected over annual plants by using sweeping net; 1 male (MTAS/Sal: 0751), İslahiye district, (37° 1'6.19"N, 36°38'44"E, Gaziantep province), 15.XII.2007, collected over annual plants by using sweeping net.

Description of Male:

Total length, 5.32 (n=1). Prosoma is blackish brown. On both sides of the prosoma, there is a grayish-white band that becomes narrower towards the pedicel. It is dark brown, black around the eyes. There is grayish white hair above the anterior eyes. Dorsal of the prosoma has shorter hair when compared to other parts. Chelicers are yellowish-brown. Opistosoma is grayish-brown. There are whitish-grey and blackish-brown random and vague spots on the surface of the dorsal. Legs are blackish brown. There is also, yellowish, grayish and whitish hair seldom seen. Leg measurements are given in Table 1.

Description of Female:

Total length, 6.01 (n=3). Body coloration is almost same with the males, only legs are a little lighter in color. Leg measurements are given in Table 2.

Conclusion:

E. michailovi which, according to Logunov (1992) showed "Siberian subboreal" distribution when it was defined, with a notice by the same researcher that this distribution can expand, currently is known from France, Russia, Mongolia, Kazakhstan and China (Platnick, 2008). Our records are the first locality records from the wide geographical area without any previous record, between the populations of Europe and Asia.

LITERATURE CITED

Bayram, A., Kunt, K. B. & Danışman, T. 2008. The Checklist of the Spiders of Turkey. Version 08.1.0. Turkish Arachnological Society. Available from: http://www.araknolojidernegi.org.tr/turkishspiders (01.VIII.2008).

Logunov, D. V. 1992. The spider family Salticidae (Araneae) from Tuva. II. An annotated check list of species. Arthropoda Selecta, 1 (2): 47-71.

Karol, S. 1967. Türkiye Örümcekleri. I. Ön Liste pp. 1-37. Ankara Üniversitesi Basımevi. Ankara.

Platnick, N. I. 2008. The World Spider Catalog. Version 8.5. The American Museum of Natural History. Available from: http://research.amnh.org/entomology/spiders/catalog (01.VIII.2008).

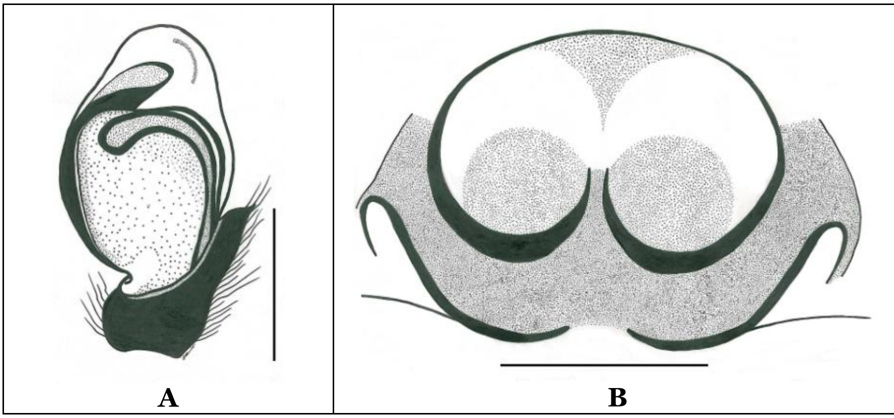

Fig. 1. *Evarcha michailovi* Logunov, 1992 (A) Male palp, ventral view (B) Epigynum, ventral view. Scale lines=0.25 mm.

Table 1. Leg measurements of the male.

Leg (n=1)	Femur	Patella + Tibia	Metatarsus	Tarsus	Total
I	1.78	2.37	0.85	0.93	5.93
II	1.50	1.83	0.71	0.50	4.54
III	1.78	2.37	0.85	0.93	5.93
IV	1.64	1.22	1.18	0.55	4.59

Table 2. Leg measurements of the female.

Leg (n=3)	Femur	Patella + Tibia	Metatarsus	Tarsus	Total
I	1.58	2.09	0.79	0.56	5.02
II	1.41	1.73	0.71	0.54	4.39
III	1.83	1.86	1.02	0.61	5.32
IV	1.78	1.92	1.30	0.61	5.61

SUBSTITUTE NAMES FOR SOME UNICELLULAR ANIMAL TAXA (PROTOZOA)

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[Özdikmen, H. 2009. Substitute names for some unicellular animal taxa (Protozoa). Munis Entomology & Zoology, 4 (1): 233-256**]**

ABSTRACT: Fourty-eight junior homonyms were detected among the protozoon genus group names and the following replacement names are proposed: *Baileyella* nom. nov. pro *Durotrigia* Bailey, 1987; *Novedwardsiella* nom. nov. pro *Edwardsiella* Versteegh & Zevenboom, 1995; *Neofentonia* nom. nov. pro *Fentonia* Bailey & Hogg, 1995; *Neogippslandia* nom. nov. pro *Gippslandia* Stover & Williams, 1987; *Yesevius* nom. nov. pro *Goniodoma* Stein, 1883; *Akbuluta* nom. nov. pro *Hannaites* Mandra, 1969; *Phia* nom. nov. pro *Hanusia* Deane, Hill, Brett & McFadden, 1998; *Dodgeia* nom. nov. pro *Herdmania* Dodge, 1981; *Yildizia* nom. nov. pro *Lundiella* Sarma & Shyam, 1974; *Zugelia* nom. nov. pro *Normandia* Zügel, 1994; *Baserus* nom. nov. pro *Suessia* Morbey, 1975; *Belowius* nom. nov. pro *Wanneria* Below, 1987; *Volkanus* nom. nov. pro *Diplotheca* Valkanov, 1970; *Hollandeia* nom. nov. pro *Perkinsiella* Hollande, 1981; *Thomsenella* nom. nov. pro *Platypleura* Thomsen, 1983; *Elifa* nom. nov. pro *Dinema* Perty, 1852; *Semihia* nom. nov. pro *Metanema* Klebs, 1892; *Aneza* nom. nov. pro *Tejeraia* Anez, 1982; *Neopileolus* nom. nov. pro *Pileolus* Couteaux & Chardez, 1981; *Altineria* nom. nov. pro *Angelina* Altıner, 1988; *Neocatena* nom. nov. pro *Catena* Schröder, Medioli & Scott, 1989; *Turgutia* nom. nov. pro *Chenia* Sheng, 1963; *Neogallitellia* nom. nov. pro *Gallitellia* Loeblich & Tapan, 1986; *Mccullochia* nom. nov. pro *Krebsia* McCulloch, 1977; *Mccullochella* nom. nov. pro *Milesia* McCulloch, 1977; *Ugurus* nom. nov. pro *Mirifica* Shlykova, 1969; *Novonanlingella* nom. nov. pro *Nanlingella* Rui & Sheng, 1981; *Doyrana* nom. nov. pro *Natlandia* McCulloch, 1977; *Akcaya* nom. nov. pro *Sabaudia* Charollais & Brönnimann, 1966; *Novosetia* nom. nov. pro *Setia* Ferrandez & Canadell, 2002; *Novosigmella* nom. nov. pro *Sigmella* Azbel & Mikhalevich, 1983; *Kuremsia* nom. nov. pro *Sphaeridia* Heron-Allen & Earland, 1928; *Palmierina* nom. nov. pro *Teichertina* Palmieri, 1994; *Novamuria* nom. nov. pro *Amuria* Whalen & Carter, 1998; *Enjumetia* nom. nov. pro *Bathysphaera* Hollande & Enjumet, 1960; *Haeckelocyphanta* nom. nov. pro *Cyphanta* Haeckel, 1887; *Blomeus* nom. nov. pro *Milax* Blome, 1984; *Novormistonia* nom. nov. pro *Ormistonia* Li Hong-sheng, 1994; *Deweverus* nom. nov. pro *Riedelius* De Wever, 1982; *Wonia* nom. nov. pro *Scharfenbergia* Won Moon-Zoo, 1983; *Neosophia* nom. nov. pro *Sophia* Whalen & Carter, 1998; *Neozanola* nom. nov. pro *Zanola* Pessagno & Yang, 1989; *Ozdikmenella* nom. nov. pro *Clathrella* Penard, 1903; *Obvallatus* nom. nov. pro *Adelina* Hesse, 1911; *Neogarnia* nom. nov. pro *Garnia* Lainson, Landau & Shaw, 1971; *Hoshidella* nom. nov. pro *Loxomorpha* Hoshide, 1988; *Manastirlia* nom. nov. pro *Rayella* Dasgupta, 1967 and *Aliona* nom. nov. pro *Schizocystis* Léger, 1900. Accordingly, new combinations are herein proposed for the type species currently included in these genus groups. As a result of these nomenclatural changes, four new family group names Yeseviidae nom. nov., Baseridae nom. nov., Akcayinae nom. nov. and Ozdikmenellidae nom.nov. are also proposed for Goniodomidae, Suessiidae, Sabaudiinae and Clathrellidae.

KEY WORDS: nomenclatural changes, homonymy, replacement names, Protozoa.

Fourty-eight proposed genus group names in Protozoa are nomenclaturally invalid, as the genus group names have already been used by different authors in various animal groups. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these genus group names.

TAXONOMY

PHYTOMASTIGOPHOREA

Genus *Baileyella* nom. nov.

Durotrigia Bailey, 1987. J. Micropalaeontol. 6 (2): 89. (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Dinoflagellida: Diniferina: Gonyaulacidae). Type species: *Durotrigia daveyi* Bailey, 1987.

Preoccupied by *Durotrigia* Hoffstetter, 1967. In Lehman (Ed.). Problemes actuels de paleontologie. (Evolution des vertebres). Colloques int.Cent.natn.Rech.scient., Paris No.163: 362. (Reptilia: Diapsida: Lepidosauria: Squamata: Sauria). Type species: *Durotrigia triconidens* Hoffstetter, 1967

Etymology: The name is dedicated to D. A. Bailey who is the author of the preexisting genus *Durotrigia*.

Summary of nomenclatural changes:
Genus *Baileyella* **nom. nov.**
pro *Durotrigia* Bailey, 1987 (non Hoffstetter, 1967)
Type species *Baileyella daveyi* (Bailey, 1987) **comb. nov.**
from *Durotrigia daveyi* Bailey, 1987

Genus *Novedwardsiella* nom. nov.

Edwardsiella Versteegh & Zevenboom, 1995. Rev. Palaeobot. Palynol. 85 (3-4), 217 (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Dinoflagellida: Gonyaulacidae). Type species: *Edwardsiella sexispinosum* Versteegh & Zevenboom, 1995.

Preoccupied by *Edwardsiella* Andres, 1883. Atti Accad. Lincei, Mem., (3) 14, 301, 305. (Cnidaria: Anthozoa: Hexacorallia: Actiniaria). Type species: *Edwardsia carnea* Gosse, 1856.

Etymology: from the Latin world “nova” (meaning “new” in English) + the preexisting genus name *Edwardsiella*.

Summary of nomenclatural changes:
Genus *Novedwardsiella* **nom. nov.**
pro *Edwardsiella* Versteegh & Zevenboom, 1995 (non Andres, 1883; nec Rukhkin, 1937)
Type species *Novedwardsiella sexispinosum* (Versteegh & Zevenboom, 1995) **comb. nov.**
from *Edwardsiella sexispinosum* Versteegh & Zevenboom, 1995

Genus *Noefentonia* nom. nov.

Fentonia Bailey & Hogg, 1995. J. Micropalaeontol. 14 (1), April: 58. (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Dinoflagellida). Type species: *Parvocysta bjaerkei* Smelror, 1987.

Preoccupied by *Fentonia* Butler, 1881. Trans. ent. Soc. London, 1881, 20. (Insecta: Lepidoptera: Noctuoidea: Notodontidae). Type species: *Fentonia laevis* Butler, 1881.

Etymology: from the Latin prefix “neo-” (meaning “new” in English) + the preexisting genus name *Fentonia*.

Summary of nomenclatural changes:
Genus *Neofentonia* **nom. nov.**
pro *Fentonia* Bailey & Hogg, 1995 (non Butler, 1881)

Type species *Neofentonia bjaerkei* (Smelror, 1987) **comb. nov.**
from *Fentonia bjaerkei* (Smelror, 1987)
Parvocysta bjaerkei Smelror, 1987

Genus *Neogippslandia* nom. nov.

Gippslandia Stover & Williams, 1987. AASP (Am. Assoc. Stratigr. Palynol.) Contrib. Ser. No. 18: 107. (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Dinoflagellida: Peridiniidae). Type species: *Gippslandia extensa* Stover & Williams, 1987.

Preoccupied by *Gippslandia* Bayly & Arnott, 1969. Aust. J. mar. Freshwat. Res. 20: 191. (Crustacea: Copepoda: Calanoida: Centropagidae). Type species: *Gippslandia estuarina* Bayly & Arnott, 1969.

Etymology: from the Latin prefix "neo-" (meaning "new" in English) + the preexisting genus name *Gippslandia*.

Summary of nomenclatural changes:
Genus *Neogippslandia* **nom. nov.**
pro *Gippslandia* Stover & Williams, 1987 (non Bayly & Arnott, 1969)
Type species *Neogippslandia extensa* (Stover & Williams, 1987) **comb. nov.**
from *Gippslandia extensa* Stover & Williams, 1987

Family Yeseviidae nom. nov.
Genus *Yesevius* nom. nov.

Goniodoma Stein, 1883. Org. Infus., 3 (2) 12. (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Dinoflagellida: Goniodomataceae=Goniodomidae). Type species: *Peridinium acuminatum* Ehrenberg, 1838.

Preoccupied by *Goniodoma* Zeller, 1849. Linnaea Entom., 4, 195. (Insecta: Lepidoptera: Gelechioidea: Coleophoridae). Type species: *Goniodoma auroguttella* Zeller, 1849.

Etymology: The name is dedicated to the famous Turkish philosopher Hoca Ahmet Yesevi.

In addition to this, I herein propose the replacement name Gomezellidae new name for the family name Goniodomidae because its type genus *Goniodoma* Stein, 1883 is invalid and the type genus of a family-group name must be valid.

Summary of nomenclatural changes:
Family Yeseviidae **nom. nov.**
pro Goniodomidae
Genus *Yesevius* **nom. nov.**
pro *Goniodoma* Stein, 1883 (non Zeller, 1849)
syn. *Triadinium* Dodge, 1981 (preoccupied by ciliate genus *Triadinium* Fiorentini, 1890)
Type species *Yesevius acuminatus* (Ehrenberg, 1838) **comb. nov.**
from *Goniodoma acuminatum* (Ehrenberg, 1838)
Peridinium acuminatum Ehrenberg, 1838

Genus *Akbuluta* nom. nov.

Hannaites Mandra, 1969. Occ. Pap. Calif. Acad. Sci. 77: 2. (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Silicoflagellida: Silicoflagellidae). Type species: *Hannaites quadria* Mandra, 1969.

Preoccupied by *Hannaites* Imlay, 1957. J. Wash. Acad. Sci. 47: 275. (Mollusca: Cephalopoda: Ammonidea). Type species: *Hannaites riddlensis* Imlay, 1957.

Etymology: The name is dedicated to Associate Prof. Dr. Aydın Akbulut (Turkey).

Summary of nomenclatural changes:
Genus *Akbuluta* **nom. nov.**
pro *Hannaites* Mandra, 1969 (non Imlay, 1957)
Type species *Akbuluta quadria* (Mandra, 1969) **comb. nov.**
from *Hannaites quadria* Mandra, 1969

Genus *Phia* nom. nov.

Hanusia Deane, Hill, Brett & McFadden, 1998. Eur. J. Phycol. 33 (2), May: 153. (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Cryptomonadida). Type species: *Hanusia phi* Deane, Hill, Brett & McFadden, 1998.

Preoccupied by *Hanusia* Cripps, 1989. Geobios (Lyon) 22 (2): 219. (Echinodermata: Homalozoa: Stylophora: Cornuta). Type species: *Hanusia prilepensis* Cripps, 1989.

Etymology: from the species epiteth "*phi*".

Summary of nomenclatural changes:
Genus *Phia* **nom. nov.**
pro *Hanusia* Deane, Hill, Brett & McFadden, 1998 (non Cripps, 1989)
Type species *Phia phi* (Deane, Hill, Brett & McFadden, 1998) **comb. nov.**
from *Hanusia phi* Deane, Hill, Brett & McFadden, 1998

Genus *Dodgeia* nom. nov.

Herdmania Dodge, 1981. British phycol. J. 16 (3): 274. (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Dinoflagellida: Lophodiniidae). Type species: *Herdmania litoralis* Dodge, 1981.

Preoccupied by *Herdmania* Lahille, 1888. C. R. Ass. Franç., 16, 1887, 677. (Chordata: Tunicata: Ascidiacea: Stolidobranchia: Pyuridae). Type species: *Cynthia momus* Savigny, 1816.

Etymology: The name is dedicated to J. D. Dodge who is the author name of the preexisting genus *Herdmannia*.

Summary of nomenclatural changes:
Genus *Dodgeia* **nom. nov.**
pro *Herdmania* Dodge, 1981 (non Lahille, 1888; non Thompson, 1893; non Hartmeyer, 1900; non Metcalf, 1900; nec Ritter, 1903)
Type species *Dodgeia litoralis* (Dodge, 1981) **comb. nov.**
from *Herdmania litoralis* Dodge, 1981

Genus *Yildizia* nom. nov.

Lundiella Sarma & Shyam, 1974. Br. phycol. J. 9: 307. (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Volvocida: Volvocina: Volvocidae). Type species: *Lundiella indica* Sarma & Shyam, 1974.

Preoccupied by *Lundiella* Carvalho, 1951. Ent. Medd., 26, 132. (Insecta: Hemiptera: Heteroptera: Miridae). Type species: *Cimatlan pertingens* Distant, 1893.

Etymology: The name is dedicated to Prof. Dr. Kazım Yıldız (Turkey).

Summary of nomenclatural changes:
Genus *Yildizia* **nom. nov.**
pro *Lundiella* Sarma & Shyam, 1974 (non Carvalho, 1951)

Type species *Yildizia indica* (Sarma & Shyam, 1974) **comb. nov.**
from *Lundiella indica* Sarma & Shyam, 1974

Genus *Zugelia* nom. nov.

Normandia Zügel, 1994. Cour. Forschungsinst. Senckenb. 176, 5 Dezember: 30. (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Dinoflagellida: Pithonelloidea). Type species: *Normandia circumperforata* Zügel, 1994

Preoccupied by *Normandia* Pic, 1900. Bull. Soc. ent. France, 1900, 267. (Insecta: Coleoptera: Dryopoidea: Elmidae). Type species: *Normandia nitens* (Müller, 1817).

Etymology: The name is dedicated to P. Zügel who is the author name of the preexisting genus *Normandia*.

Summary of nomenclatural changes:
Genus *Zugelia* **nom. nov.**
pro *Normandia* Zügel, 1994 (non Pic, 1900)
Type species *Zugelia circumperforata* (Zügel, 1994) **comb. nov.**
from *Normandia circumperforata* Zügel, 1994

Family Baseridae nom. nov.
Genus *Baserus* nom. nov.

Suessia Morbey, 1975. Palaeontographica 152B: 39. (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Dinoflagellida: Suessiales: Suessiidae=Suessiaceae). Type species: *Suessia swabiana* Morbey, 1975.

Preoccupied by *Suessia* Deslongchamps, 1855. Annuaire Inst. Prov., 1855, 535. (Brachiopoda: Rhynchonelliformea: Rhynchonellata: Spiriferinida: Cyrtinidina: Suessioidea: Suessiidae). Type species: *Suessia costata* Deslongchamps, 1855.

Etymology: The name is dedicated to Dr. Birol Başer (Turkey).

In addition to this, I herein propose the replacement name Baseridae new name for the family name Suessiidae because its type genus *Suessia* Morbey, 1975 is invalid and the type genus of a family group name must be valid.

Summary of nomenclatural changes:
Family Baseridae **nom. nov.**
pro Suessiidae=Suessiaceae
Genus *Baserus* **nom. nov.**
pro *Suessia* Morbey, 1975 (non Deslongchamps, 1855)
Type species *Baserus swabiana* (Morbey, 1975) **comb. nov.**
from *Suessia swabiana* Morbey, 1975

Genus *Belowius* nom. nov.

Wanneria Below, 1987. Palaeontogr. Abt. B. Palaeophytol. 205 (1-6): 72. (Protozoa: Sarcomastigophora: Mastigophora: Phytomastigophorea: Dinoflagellida: Suessiidae). Type species: *Wanneria misolensis* Below, 1987.

Preoccupied by *Wanneria* Walcott, 1908. Smithson. misc. Coll., 53, 296. (Trilobita: Redlichiida: Olenellina: Olenelloidea: Olenellidae). Type species: *Olenellus* (*Holmia*) *walcottanus* Wanner, 1901.

Etymology: The name is dedicated to R. Below who is the author name of the preexisting genus *Wanneria*.

Summary of nomenclatural changes:
Genus *Belowius* **nom. nov.**
pro *Wanneria* Below, 1987 (non Walcott, 1908)
Type species *Belowius misolensis* (Below, 1987) **comb. nov.**
from *Wanneria misolensis* Below, 1987

ZOOMASTIGOPHOREA

Genus *Volkanus* nom. nov.

Diplotheca Valkanov, 1970. Zool. Anz. 184: 272. (Protozoa: Sarcomastigophora: Mastigophora: Zoomastigophorea: Choanoflagellida: Acanthoecida: Acanthoecidae). Type species: *Diplotheca costata* Valkanov, 1970.

Preoccupied by *Diplotheca* Matthew, 1885. Canad. Record. Sci., 1, no. 3, 149; 1885, Amer. J. Sci., (3) 30, 293. (Mollusca: Hyolitha: Hyolithida). Type species: *Diplotheca acadica* Matthew, 1885.

Etymology: The name is dedicated to Volkan Yanmaz (Turkey).

Summary of nomenclatural changes:
Genus *Volkanus* **nom. nov.**
pro *Diplotheca* Valkanov, 1970 (non Matthew, 1885)
Type species *Volkanus costatus* (Valkanov, 1970) **comb. nov.**
from *Diplotheca costata* Valkanov, 1970

Genus *Hollandeia* nom. nov.

Perkinsiella Hollande, 1981. Protistologica 26 (4): 622. (Protozoa: Sarcomastigophora: Mastigophora: Zoomastigophorea: Kinetoplastida). Type species: *Perkinsiella amoebae* Hollande, 1981.

Preoccupied by *Perkinsiella* Kirkaldy, 1903. Entomologist, 36, 179. (Insecta: Hemiptera: Fulgoromorpha: Delphacidae: Delphacinae: Delphacini). Type species: *Perkinsiella saccharicida* Kirkaldy, 1903.

Etymology: The name is dedicated to A. Hollande who is the author of the preexisting genus *Perkinsiella*.

Summary of nomenclatural changes:
Genus *Hollandeia* **nom. nov.**
pro *Perkinsiella* Hollande, 1981 (non Kirkaldy, 1903)
Type species *Hollandeia amoebae* (Hollande, 1981) **comb. nov.**
from *Perkinsiella amoebae* Hollande, 1981

Genus *Thomsenella* nom. nov.

Platypleura Thomsen, 1983. In Thomsen & Boonruang, 1983. Protistologica, 19 (2): 204. (Protozoa: Sarcomastigophora: Mastigophora: Zoomastigophorea: Choanoflagellida: Acanthoecidae). Type species: *Parvicorbicula infundibuliformis* Leadbeater, 1974.

Preoccupied by *Platypleura* Amyot & Serville, 1843. (Roret's Suite à Buffon) Hémiptères, 465. (Insecta: Hemiptera: Cicadidae: Cicadinae: Platypleurini). Type species: *Platypleura clara* Amyot & Serville, 1843.

Etymology: The name is dedicated to H. A. Thomsen who is the author of the preexisting genus *Platypleura*.

Summary of nomenclatural changes:
Genus *Thomsenella* **nom. nov.**
pro *Platypleura* Thomsen, 1983 (non Amyot & Serville, 1843; nec Pomel, 1887)
Type species *Thomsenella infundibuliformis* (Leadbeater, 1974) **comb. nov.**
from *Platypleura infundibuliformis* (Leadbeater, 1974)
Parvicorbicula infundibuliformis Leadbeater, 1974

EUGLENOZOA

Genus *Elifa* nom. nov.

Dinema Perty, 1852. Kennt. Lebensform., 169. (Protozoa: Euglenozoa: Plicostoma: Euglenoidea). Type species: *Dinema griseola* Perty, 1852.

Preoccupied by *Dinema* Fairmaire, 1849. Rev. Mag. Zool., (2) 1, 457. (Insecta: Coleoptera: Curculionoidea: Anthribidae: Anthribinae: Jordanthribini). Type species: *Dinema filicorne* Fairmaire, 1849.

Etymology: The new name is dedicated to my daughter Elif Gül Özdikmen (Turkey). It is feminine in gender.

Summary of nomenclatural changes:
Genus *Elifa* **nom. nov.**
pro *Dinema* Perty, 1852 (non Fairmaire, 1849; nec Beneden, 1867)
Type species *Elifa griseola* (Perty, 1852) **comb. nov.**
from *Dinema griseola* Perty, 1852

Genus *Semihia* nom. nov.

Metanema Klebs, 1892. Z. wiss. Zool., 55, 385. (Protozoa: Euglenozoa: Euglenida: Sphenomonadina: Sphenomonadidae). Type species: *Metanema variabile* Klebs, 1892.

Preoccupied by *Metanema* Guenée, 1857. In Boisduval & Guenée, Hist. nat. Ins., Spec. gén. Lép., 9, 171. (Insecta: Lepidoptera: Geonetroidea: Geometridae: Ennominae). Type species: *Metanema inatomaria* Guenée, 1857.

Etymology: The name is dedicated to Semih Çalamak (Turkey).

Summary of nomenclatural changes:
Genus *Semihia* **nom. nov.**
pro *Metanema* Klebs, 1892 (non Guenée, 1857)
Type species *Semihia variabile* (Klebs, 1892) **comb. nov.**
from *Metanema variabile* Klebs, 1892

Genus *Tripanosoma* Stiles & Hassall, 1925
Subgenus *Aneza* nom. nov.

Tejeraia Anez, 1982. Memorias Inst. Oswaldo Cruz 77 (4): 411. (Protozoa: Euglenozoa: Kinetoplastea: Tripanosomatida: Tripanosomatidae: *Tripanosoma*). Type species: *Tripanosoma rangeli* Tejera, 1920.

Preoccupied by *Tejeraia* Diaz-Ungria, 1964. Annls. Parasit. hum. comp. 38: 904. (Nematoda: Spirurida: Spiruroidea). Type species: *Tejeraia mediospirallis* Diaz-Ungria, 1964.

Etymology: The name is dedicated to N. Anez who is the author of the preexisting subgenus *Tejeraia*.

Summary of nomenclatural changes:
Genus *Tripanosoma* Stiles & Hassall, 1925
Subgenus *Aneza* **nom. nov.**
pro *Tejeraia* Anez, 1982 (non Diaz-Ungria, 1964)
Type species *Tripanosoma* (*Aneza*) *rangeli* Tejera, 1920 **comb. nov.**
from *Tripanosoma* (Tejeraia) *rangeli* Tejera, 1920

ACTINOPODA

TESTACEA

Genus *Neopileolus* nom. nov.

Pileolus Couteaux & Chardez, 1981. Revue Ecol. Biol. Sol 18 (2): 202. (Protozoa: Rhizopoda: Testacea: Euglyphida: Trinematidae). Type species: *Pileolus tuberosus* Couteaux & Chardez, 1981.

Preoccupied by *Pileolus* Sowerby, 1823. Gen. Shells, pt. 19, pl. 187. (Mollusca: Gastropoda: Orthogastropoda: Neritopsina: Neritoidea: Pileolidae). Type species: *Pileolus plicatus* Sowerby, 1823.

Etymology: from the Latin prefix “neo-” (meaning “new” in English) + the preexisting genus name *Pileolus*.

Summary of nomenclatural changes:
Genus *Neopileolus* **nom. nov.**
pro *Pileolus* Couteaux & Chardez, 1981 (non Sowerby, 1823; non Lesson, 1831; non Ehrenberg, 1843; nec Spriestersbach, 1919)
Type species *Neopileolus tuberosus* (Couteaux & Chardez, 1981) **comb. nov.**
from *Pileolus tuberosus* Couteaux & Chardez, 1981

FORAMINIFERA

Genus *Altineria* nom. nov.

Angelina Altıner, 1988. Rev. Paleobiol. Volume special No. 2 (1): 28. (Protozoa: Foraminifera).

Preoccupied by *Angelina* Salter, 1859. In Murchison, Siluria, ed. 3, 53. (Trilobita: Ptychopariida: Olenina: Olenidae). Type species: *Angelina sedwickii* Salter, 1859.

Etymology: The name is dedicated to D. Altıner who is the author of the preexisting genus *Angelina*.

Summary of nomenclatural changes:
Genus *Altineria* **nom. nov.**
pro *Angelina* Altıner, 1988 (non Salter, 1859)

Genus *Neocatena* nom. nov.

Catena Schröder, Medioli & Scott, 1989. Micropaleontology (N Y) 35 (1): 40. (Protozoa: Foraminifera: Baculellidae). Type species: *Catena piriformis* Schröder, Medioli & Scott, 1989.

Preoccupied by *Catena* Richter, 1975. Nasekom. Mongol. 3: 635. (Insecta: Diptera: Tachinidae) (see O’Hara, 2007). Type species: *Catena serena* Richter, 1975.

Etymology: from the Latin prefix "neo-" (meaning "new" in English) + the preexisting genus name *Catena*.

Summary of nomenclatural changes:
Genus *Neocatena* **nom. nov.**
pro *Catena* Schröder, Medioli & Scott, 1989 (non Richter, 1975)
Type species *Neocatena piriformis* (Schröder, Medioli & Scott, 1989) **comb. nov.**
from *Catena piriformis* Schröder, Medioli & Scott, 1989

Genus *Turgutia* nom. nov.

Chenia Sheng, 1963. Palaeont. sin. 149 (N.S.) (B) No. 10: 213. (Protozoa: Foraminifera: Fusulinina: Fusulinacea: Staffellidae). Type species: *Chenia kwangsiensis* Sheng, 1963.

Preoccupied by *Chenia* Hsu, 1954. Acta Zool. Sinica 6, 33, 36. (Trematoda: Derogenidae). Type species: *Chenia cheni* Hsu, 1954.

Etymology: The name is dedicated to Semra Turgut (Haliloğlu) (Turkey).

Summary of nomenclatural changes:
Genus *Turgutia* **nom. nov.**
pro *Chenia* Sheng, 1963 (non Hsu, 1954)
Type species *Turgutia kwangsiensis* (Sheng, 1963) **comb. nov.**
from *Chenia kwangsiensis* Sheng, 1963

Genus *Neogallitellia* nom. nov.

Gallitellia Loeblich & Tapan, 1986. Transactions Am. microsc. Soc. 105 (3): 249. (Protozoa: Foraminifera: Heterohelicacea: Guembelitriidae). Type species: *Guembelitria vivans* Cushman, 1934.

Preoccupied by *Gallitellia* Cuif, 1977. Memoires Bur. Rech. geol. minier. No. 89: 260. (Cnidaria: Anthozoa: Scleractinia). Type species: *Gallitellia seelandalpi* Cuif, 1977.

Etymology: from the Latin prefix "neo-" (meaning "new" in English) + the preexisting genus name *Gallitellia*.

Summary of nomenclatural changes:
Genus *Neogallitellia* **nom. nov.**
pro *Gallitellia* Loeblich & Tapan, 1986 (non Cuif, 1977)
Type species *Neogallitellia vivans* (Cushman, 1934) **comb. nov.**
from *Gallitellia vivans* (Cushman, 1934)
Guembelitria vivans Cushman, 1934

Genus *Mccullochia* nom. nov.

Krebsia McCulloch, 1977. Qualitative observations on recent foraminiferal tests with emphasis on the eastern Pacific. University of Southern California, Los Angeles, California: 19. (Protozoa: Foraminifera: Lagenida: Glandulinidae).

Preoccupied by *Krebsia* Mörch, 1877. Malak. Bl., 24, 97. (Mollusca: Gastropoda: Hypsogastropoda: Littorinimorpha: Capuloidea: Capulidae). Type species: *Capulus* (*Krebsia*) *intornus* Lamarc, 1822.

Etymology: The name is dedicated to I. McCulloch who is the author of the preexisting genus *Krebsia*.

Summary of nomenclatural changes:
Genus *Mccullochia* **nom. nov.**

pro *Krebsia* McCulloch, 1977 (non Moerch, 1877; nec Guppy, 1895)

Genus *Mccullochella* nom. nov.

Milesia McCulloch, 1977. Qualitative observations on recent foraminiferal tests with emphasis on the eastern Pacific. University of Southern California, Los Angeles, California: 307. (Protozoa: Foraminifera: Rotaliida: Rotaliacea: Discorbidae)

Preoccupied by *Milesia* Latreille, 1804. Nouv. Dict. H. N., 24 (Tab.), 194. (Insecta: Diptera: Syrphidae: Eristalinae: Milesiini). Type species: *Syrphus crabroniformis* Fabricius, 1775.

Etymology: The name is dedicated to I. McCulloch who is the author of the preexisting genus *Milesia*.

Summary of nomenclatural changes:
Genus *Mccullochella* **nom. nov.**
pro *Milesia* McCulloch, 1977 (non Latreille, 1804; nec Chapman, 1929)

Genus *Ugurus* nom. nov.

Mirifica Shlykova, 1969. Vop. Mikropaleont. 12: 49. (Protozoa: Foraminifera: Fusulinidia: Fusulinida: Endothyridae: Endothyrinae). Type species: *Endothyra mirifica* Rauzer-Chernousova, 1948.

Preoccupied by *Mirifica* Fletcher, 1956. Proc. R. ent. Soc. Lond. (B) 25: 33. (Insecta: Lepidoptera: Geometroidea: Geometridae: Geometrinae). Type species: *Mirifica variata* Fletcher, 1956.

Etymology: The name is dedicated to Uğur Akçay (Turkey).

Summary of nomenclatural changes:
Genus *Ugurus* **nom. nov.**
pro *Mirifica* Shlykova, 1969 (non Fletcher, 1956)
Type species *Ugurus mirificus* (Rauzer-Chernousova, 1948) **comb. nov.**
from *Mirifica mirifica* (Rauzer-Chernousova, 1948)
Endothyra mirifica Rauzer-Chernousova, 1948

Genus *Novonanlingella* nom. nov.

Nanlingella Rui & Sheng, 1981. Special Pap. geol. Soc. Am. No. 187: 35. (Protozoa: Foraminifera: Fusulinidia: Fusulinida: Fusulinina: Fusinacea: Schubertellidae: Boultoniinae). Type species: *Nanlingella meridionalis* Rui & Sheng, 1981.

Preoccupied by *Nanlingella* Xiong & Wang, 1980. In Meitan, Kexue, Yanjiuyuan, Dizhi, Kantan, Yanjiusuo 1980. [Mesozoic fossils of coal-bearing strata in Hunan Hubei & Jiangxi Provinces.] Di 2 fence. Shuangqiao gang huashi. (Mollusca: Bivalvia: Autolamellibranchiata: Pteriomorphia: Pterioida).

Etymology: from the Latin world “nova” (meaning “new” in English) + the preexisting genus name *Nanlingella*.

Summary of nomenclatural changes:
Genus *Novonanlingella* **nom. nov.**
pro *Nanlingella* Rui & Sheng, 1981 (non Xiong & Wang, 1980)
Type species *Novonanlingella meridionalis* (Rui & Sheng, 1981) **comb. nov.**
from *Nanlingella meridionalis* Rui & Sheng, 1981

Genus *Doyrana* nom. nov.

Natlandia McCulloch, 1977. Qualitative observations on recent foraminiferal tests with emphasis on the eastern Pacific. University of Southern California, Los Angeles, California: 346. (Protozoa: Foraminifera: Rotaliina: Discorbacea: Bagginidae: Bagininae). Type species: *Natlandia secasensis* McCulloch, 1977.

Preoccupied by *Natlandia* David, 1946. Contrib. Paleont., Carnegie Inst. Wash., 551, 97. (Chordata: Osteichthyes: Actinopterygii: Neopterygii: Teleostei: Salmoniformes). Type species: *Natlandia ornata* David, 1946.

Etymology: The name is dedicated to Associate Prof. Dr. Emine Yıldız Doyran (Turkey).

Summary of nomenclatural changes:
Genus *Doyrana* **nom. nov.**
 pro *Natlandia* McCulloch, 1977 (non David, 1946)
Type species *Doyrana secasensis* (McCulloch, 1977) **comb. nov.**
 from *Natlandia secasensis* McCulloch, 1977

Subfamily Akcayinae nom. nov.
Genus *Akcaya* nom. nov.

Sabaudia Charollais & Brönnimann, 1966. Archs. Sci. Geneve 18: 616. (Protozoa: Foraminifera: Textularidia: Textulariida: Cuneolinidae: Sabaudiinae). Type species: *Textulariella minuta* Hofker, 1965.

Preoccupied by *Sabaudia* Ghigi, 1909. Racc. plancton., 2, no. 1, 19. (Ctenophora: Tentaculata: Typhlocoela: Cydippida: Pleurobrachiidae). Type species: *Sabaudia liguriae* Ghigi, 1909.

Etymology: The name is dedicated to the family Akçay (Turgut, Günay, Meltem and Uğur Akçay)(Turkey).

In addition to this, I herein propose the replacement name Akcayinae new name for the subfamily name Sabaudiinae because its type genus *Sabaudia* Charollais & Brönnimann, 1966 is invalid and the type genus of a family-group name must be valid.

Summary of nomenclatural changes:
Subfamily Akcayinae **nom. nov.**
 pro Sabaudiinae
Genus *Akcaya* **nom. nov.**
 pro *Sabaudia* Charollais & Brönnimann, 1966 (non Ghigi, 1909)
Type species *Akcaya minuta* (Hofker, 1965) **comb. nov.**
 from *Sabaudia minuta* (Hofker, 1965)
 Textulariella minuta Hofker, 1965

Genus *Novosetia* nom. nov.

Setia Ferrandez & Canadell, 2002. J. Foraminiferal Res. 32 (1), January: 7. (Protozoa: Foraminifera: Orbitoidae). Type species: *Lepidorbitoides tibetica* Douvillé, 1916.

Preoccupied by *Setia* Adams & Adams, 1852. Ann. Mag. nat. Hist., (2) 10, 359. (Mollusca: Gastropoda: Orthogastropoda: Caenogastropoda: Hypsogastropoda: Littorinimorpha: Rissoidea: Rissoidae: Rissoinae). Type species: *Setia pulcherrima* (Jeffreys, 1848).

Etymology: from the Latin world “nova” (meaning “new” in English) + the preexisting genus name *Setia*.

Summary of nomenclatural changes:
Genus *Novosetia* **nom. nov.**
pro *Setia* Ferrandez & Canadell, 2002 (non Adams & Adams, 1852)
Type species *Novosetia tibetica* (Douvillé, 1916) **comb. nov.**
from *Setia tibetica* (Douvillé, 1916)
Lepidorbitoides tibetica Douvillé, 1916

Genus *Novosigmella* nom. nov.

Sigmella Azbel & Mikhalevich, 1983. In Mikhalevich, 1983. The bottom Foraminifera from the shelves of the tropical Atlantik. Akademiya Nauk SSSR, Leningrad: 121. (Protozoa: Foraminifera: Miliolina: Miliolacea: Hauerinidae: Sigmoilinitinae). Type species: *Planispirina edwarsi* Schlumberger, 1887.

Preoccupied by *Sigmella* Hebard, 1940. Ent. News, 51, 236. (Insecta: Dictyoptera: Blattodea: Blaberoidea: Blattellidae: Blattellinae). Type species: Type species information not available.

Etymology: from the Latin world "nova" (meaning "new" in English) + the preexisting genus name *Sigmella*.

Summary of nomenclatural changes:
Genus *Novosigmella* **nom. nov.**
pro *Sigmella* Azbel & Mikhalevich, 1983 (non Hebard, 1940)
Type species *Novosigmella edwarsi* (Schlumberger, 1887) **comb. nov.**
from *Sigmella edwarsi* (Schlumberger, 1887)
Planispirina edwarsi Schlumberger, 1887

Genus *Kuremsia* nom. nov.

Sphaeridia Heron-Allen & Earland, 1928. J. R. micr. Soc., (3) 48, 286, 294. (Protozoa: Foraminifera: Rotaliina: Discorbacea: Pegidiidae). Type species: *Sphaeridia papillata* Heron-Allen & Earland, 1928.

Preoccupied by *Sphaeridia* Linnaniemi, 1912. Acta Soc. Sci. Fenn., 40, 248. (Insecta: Collembola: Symphypleona: Sminthurididae). Type species: *Sminthurus pumilis* Krausbauer, 1898.

Etymology: from the Turkish "küremsi" (meaning "like sphere" in English).

Summary of nomenclatural changes:
Genus *Kuremsia* **nom. nov.**
pro *Sphaeridia* Heron-Allen & Earland, 1928 (non Linnaniemi, 1912)
Type species *Kuremsia papillata* (Heron-Allen & Earland, 1928) **comb. nov.**
from *Sphaeridia papillata* Heron-Allen & Earland, 1928

Genus *Palmierina* nom. nov.

Teichertina Palmieri, 1994. Qld Geol. 6: 8. (Protozoa: Foraminifera: Textulariina: Astrorhizoidea: Psammosphaeridae: Psammosphaerinae). Type species: *Crithionina teicherti* Parr, 1942.

Preoccupied by *Teichertina* Veevers, 1959. Bull. Bur. Miner. Resour. Geol. Geophys. Aust. 45: 37. (Brachiopoda: Enteletacea: Dalmanellidae). Type species: *Teichertina fitzroyensis* Veevers, 1959.

Etymology: The name is dedicated to V. Palmieri who is the author of the preexisting genus *Teichertina*.

Summary of nomenclatural changes:
Genus *Palmierina* **nom. nov.**
pro *Teichertina* Palmieri, 1994 (non Veevers, 1959)
Type species *Palmierina teicherti* (Parr, 1942) **comb. nov.**
from *Teichertina teicherti* (Parr, 1942)
Crithionina teicherti Parr, 1942

RADIOLARIA

Genus *Novamuria* nom. nov.

Amuria Whalen & Carter, 1998. Geol. Surv. Can. Bull. 496: 56. (Protozoa: Actinopoda: Radiolaria: Polycystina: Spumellaria: Xiphostylidae). Type species: *Amuria impensa* Whalen & Carter, 1998.

Preoccupied by *Amuria* Staudinger, 1887. In Romanoff, Mém. Lép., 3, 172. (Insecta: Lepidoptera: Zygaenoidea: Zygaenidae: Procridinae). Type species: *Amuria cyclops* Staudinger, 1887.

Etymology: from the Latin world "nova" (meaning "new" in English) + the preexisting genus name *Amuria*.

Summary of nomenclatural changes:
Genus *Novamuria* **nom. nov.**
pro *Amuria* Whalen & Carter, 1998 (non Staudinger, 1887; non Brunner, 1893; nec Aurivillius, 1894)
Type species *Novamuria impensa* (Whalen & Carter, 1998) **comb. nov.**
from *Amuria impensa* Whalen & Carter, 1998

Genus *Enjumetia* nom. nov.

Bathysphaera Hollande & Enjumet, 1960. Archs. Mus. natn. Hist. nat. Paris (7) 7: 127. (Protozoa: Actinopoda: Radiaolaria: Polycystina: Spumellaria). Type species: *Bathysphaera pelagica* Hollande & Enjumet, 1960.

Preoccupied by *Bathysphaera* Beebe, 1932. Bull. New York zool. Soc., 35, 175. (Actinopterygii: Stomiiformes: Stomiidae: Melanostomiinae). Type species: *Bathysphaera intacta* Beebe, 1932.

Etymology: The name is dedicated to M. Enjumet who is the second author of the preexisting genus name *Bathysphaera*.

Summary of nomenclatural changes:
Genus *Enjumetia* **nom. nov.**
pro *Bathysphaera* Hollande & Enjumet, 1960 (non Beebe, 1932)
Type species *Enjumetia pelagica* (Hollande & Enjumet, 1960) **comb. nov.**
from *Bathysphaera pelagica* Hollande & Enjumet, 1960

Genus *Haeckelocyphanta* nom. nov.

Cyphanta Haeckel, 1887. Rep. Voy. Challenger, Zool., 18 (1), 360. (Protozoa: Actinopoda: Radiolaria: Polycystina: Spumellaria). Type species: *Cyphanta leavis* Haeckel, 1887.

Preoccupied by *Cyphanta* Walker, 1865. List Specimens Lep. Ins. Brit. Mus., 33, 855. (Insecta: Lepidoptera: Noctuoidea: Notodontidae: Platychasmatinae). Type species: *Cyphanta xanthochlora* Walker, 1865.

Etymology: The name is dedicated to E. Haeckel who is the author of the preexisting genus *Cyphanta*.

Summary of nomenclatural changes:
Genus *Haeckelocyphanta* **nom. nov.**
pro *Cyphanta* Haeckel, 1887 (non Walker, 1865)
Type species *Haeckelocyphanta leavis* (Haeckel, 1887) **comb. nov.**
from *Cyphanta leavis* Haeckel, 1887

Genus *Blomeus* nom. nov.

Milax Blome, 1984. Micropaleontology, 30 (4): 372. (Protozoa: Actinopoda: Radiolaria: Polycystina: Nassellaria: Eucyrtidiacea: Eucyrtidiidae). Type species: *Milax alienus* Blome, 1984.

Preoccupied by *Milax* Gray, 1855. Cat. Pulmonata Brit. Mus., 1, 174. (Mollusca: Gastropoda: Pulmonata: Milacidae). Type species: *Limax gagates* Dreparnaud, 1801.

Etymology: The name is dedicated to C. D. Blome who is the author of the preexisting genus *Milax*.

Summary of nomenclatural changes:
Genus *Blomeus* **nom. nov.**
pro *Milax* Blome, 1984 (non Gray, 1855)
Type species *Blomeus alienus* (Blome, 1984) **comb. nov.**
from *Milax alienus* Blome, 1984

Genus *Novormistonia* nom. nov.

Ormistonia Li Hong-sheng, 1994. Acta Micropalaeontol. Sin. 11 (2), Jun: 265. (Protozoa: Actinopoda: Radiolaria). Type species: *Ormistonia pteracaena* Li Hong-sheng, 1994.

Preoccupied by *Ormistonia* Maksimova, 1978. Ezhegodnik Vses. paleont. Obshch. 21: 98. (Trilobita: Proetida: Proetoidea: Proetidae). Type species: *Dechenella* (*Dechenella*) *teska* Ormiston, 1967.

Etymology: from the Latin world “nova” (meaning “new” in English) + the preexisting genus name *Ormistonia*.

Summary of nomenclatural changes:
Genus *Novormistonia* **nom. nov.**
pro *Ormistonia* Li Hong-sheng, 1994 (non Maksimova, 1978)
Type species *Novormistonia pteracaena* (Li Hong-sheng, 1994) **comb. nov.**
from *Ormistonia pteracaena* Li Hong-sheng, 1994

Genus *Deweverus* nom. nov.

Riedelius De Wever, 1982. Revue Micropaleont. 24 (4): 200. (Protozoa: Actinopoda: Radiolaria: Polycystina: Nassellaria: Foremanellinidae). Type species: *Riedelius williami* De Weyer, 1982.

Preoccupied by *Riedelius* Hudec, 1961. Sb. nar. mus. Praze (B) 17: 110. (Mollusca: Gastropoda: Pulmonata: Oxychilidae: *Oxychilus*). Type species: *Oxychilus inopinatus* (Uličný, 1887).

Etymology: The name is dedicated to P. De Wever who is the author of the preexisting genus *Riedelius*.

Summary of nomenclatural changes:
Genus *Deweverus* **nom. nov.**
pro *Riedelius* De Wever, 1982 (non Hudec, 1961)

Type species *Deweverus williami* (De Wever, 1982) **comb. nov.**
from *Riedelius williami* De Wever, 1982

Genus *Wonia* nom. nov.

Scharfenbergia Won Moon-Zoo, 1983. Palaeontographica (A) 182 (4-6): 158. (Protozoa: Actinopoda: Radiolaria: Polycystina: Latentifistularia: Latentifistulidae). Type species: *Spongotripus concentricus* Rust, 1892.

Preoccupied by *Scharfenbergia* Oudemans, 1936. Arch. Naturgesch., (N.F.) 5, 412. (Arachnida: Acari: Prostigmata: Anystina: Anystoidea: Anystidae: Anystinae). Type species: *Actineda hilaris* Koch, 1836.

Etymology: The name is dedicated to M.-Z. Won who is the author of the preexisting genus *Scharfenbergia*.

Summary of nomenclatural changes:
Genus *Wonia* **nom. nov.**
pro *Scharfenbergia* Won Moon-Zoo, 1983 (non Oudemans, 1936)
Type species *Wonia concentricus* (Rust, 1892) **comb. nov.**
from *Scharfenbergia concentrica* (Rust, 1892)
Spongotripus concentricus Rust, 1892

Genus *Neosophia* nom. nov.

Sophia Whalen & Carter, 1998. In Carter, Whalen and Guex, 1998. Geol. Surv. Can. Bull. 496: 41. (Protozoa: Actinopoda: Radiolaria: Polycystina: Spumellaria: Hagiastridae). Type species: *Sophia tuberis* Whalen & Carter, 1998.

Preoccupied by *Sophia* Robineau-Desvoidy, 1830. Mém. présentés Acad. Roy. Sci. Inst. France, 2, 317. (Insecta: Diptera: Tachinidae). Type species: *Sophia filipes* Robineau-Desvoidy, 1830.

Etymology: from the Latin prefix "neo-" (meaning "new" in English) + the preexisting genus name *Sophia*.

Summary of nomenclatural changes:
Genus *Neosophia* **nom. nov.**
pro *Sophia* Whalen & Carter, 1998 (non Robineau-Desvoidy, 1830; nec Lamarck, 1816)
Type species *Neosophia tuberis* (Whalen & Carter, 1998) **comb. nov.**
from *Sophia tuberis* Whalen & Carter, 1998

Genus *Neozanola* nom. nov.

Zanola Pessagno & Yang, 1989. In Pessagno, Six & Yang, 1989. Micropaleontology (N Y) 35 (3): 241. (Protozoa: Actinopoda: Radiolaria: Polycystina: Spumellaria: Xiphostylidae). Type species: *Triactoma cornuta* Baumgartner, 1980.

Preoccupied by *Zanola* Walker, 1855. List Specimens Lep. Ins. Brit. Mus., 5, 1173. (Insecta: Lepildoptera: Bombycoidea: Bombycidae: Apatelodinae). Type species: *Zanola difficilis* Walker, 1855.

Etymology: from the Latin prefix "neo-" (meaning "new" in English) + the preexisting genus name *Zanola*.

Summary of nomenclatural changes:
Genus *Neozanola* **nom. nov.**
pro *Zanola* Pessagno & Yang, 1989 (non Walker, 1855)

Type species *Neozanola cornuta* (Baumgartner, 1980) **comb. nov.**
from *Zanola cornuta* (Baumgartner, 1980)
Triactoma cornuta Baumgartner, 1980

HELIOZOA

Family Ozdikmenellidae nom. nov.
Genus *Ozdikmenella* nom. nov.

Clathrella Penard, 1903. Arch. Protistenk., 2, 293. (Protozoa: Heliozoa: Desmothoracida: Clathrellidae). Type species: *Clathrella foreli* Penard, 1903.

Preoccupied by *Clathrella* Récluz, 1864. J. Conchyliol., 12, 251. (Mollusca: Gastropoda: Heterobranchia: Heterostropha: Pyramidelloidea: Amathinidae). Type species: *Fossarus clathrata* Philippi, 1844.

Etymology: The name is dedicated to the my family Özdikmen (Nurettin, Redife, Fahriye, Fehmi, Tülay, Zehra Gülşen, Çağrı, Hüseyin, Meltem, Elif Gül) (Turkey) .

In addition to this, I herein propose the replacement name Ozdikmenella new name for the family name Clathrellidae because its type genus *Clathrella* Penard, 1903 is invalid and the type genus of a family-group name must be valid.

Summary of nomenclatural changes:
Family Ozdikmenellidae **nom. nov.**
pro Clathrellidae
Genus *Ozdikmenella* **nom. nov.**
pro *Clathrella* Penard, 1903 (non Récluz, 1864)
Type species *Ozdikmenella foreli* Penard, 1903) **comb. nov.**
from *Clathrella foreli* Penard, 1903

APICOMPLEXA

Genus *Obvallatus* nom. nov.

Adelina Hesse, 1911. Arch. Zool. exp. gén. Paris, (5) 7 (Notes et Revue, xv-xix). (Protozoa: Myzozoa: Apicomplexa: Conoidasida: Coccidiasina: Eucoccidiorida: Adeleorina: Adeleidae). Type species: *Adelina octospora* Hesse, 1911.

Preoccupied by *Adelina* Dejean, 1835. Catal. Coléopt., 3, 315. (Insecta: Coleoptera: Tenebrionoidea: Tenebrionidae: Diaperinae: Diaperini: Adelinina). Type species: *Cucujus planus* Fabricius, 1801.

Etymology: from the Latin word "obvallatus" (meaning "irrefutable, consolidated or strengthen" in English).

Summary of nomenclatural changes:
Genus *Obvallatus* **nom. nov.**
pro *Adelina* Hesse, 1911 (non Dejean, 1835; nec Catraine, 1841)
Type species *Obvallatus octosporus* (Hesse, 1911) **comb. nov.**
from *Adelina octospora* Hesse, 1911

Genus *Plasmodium* Marchiafava & Celli, 1885
Subgenus *Neogarnia* nom. nov.

Garnia Lainson, Landau & Shaw, 1971. Int. J. Parasit. 1: 247. (Protozoa: Apicomplexa: Eucoccidiida: Haemosporina: Plasmodiidae: *Plasmodium*). Type species: *Garnia gonadoti* Lainson, Landau & Shaw, 1971.

Preoccupied by *Garnia* Casey, 1922. Mem. Col., 10, 151. (Insecta: Coleoptera: Curculionoidea: Curculionidae). Type species: *Garnia militaris* Casey, 1922.

Etymology: from the Latin prefix "neo-" (meaning "new" in English) + the preexisting subgenus name *Garnia*.

Summary of nomenclatural changes:
Genus *Plasmodium* Marchiafava & Celli, 1885
Subgenus *Neogarnia* **nom. nov.**
pro *Garnia* Lainson, Landau & Shaw, 1971 (non Casey, 1922)
Type species *Plasmodium* (*Neogarnia*) *gonadoti* (Lainson, Landau & Shaw, 1971) **comb. nov.**
from *Plasmodium* (*Garnia*) *gonadoti* (Lainson, Landau & Shaw, 1971)
Garnia gonadoti Lainson, Landau & Shaw, 1971

Genus *Hoshidella* nom. nov.

Loxomorpha Hoshide, 1988. Proc. Jpn. Soc. Syst. Zool. No. 37: 48. (Protozoa: Apicomplexa: Eugregarinida: Lecudinidae). Type species: *Loxomorpha harmothoe* Hoshide, 1988.

Preoccupied by *Loxomorpha* Amsel, 1956. Boln. Ent. venez. 10: 254. (Insecta: Lepidoptera: Pyraloidea: Crambidae: Spilomelinae). Type species: *Loxomorpha citrinalis* Amsel, 1956.

Etymology: The name is dedicated to K. Hoshide who is the author of the preexisting genus *Loxomorpha*.

Summary of nomenclatural changes:
Genus *Hoshidella* **nom. nov.**
pro *Loxomorpha* Hoshide, 1988 (non Amsel, 1956; nec Nielsen, 1964)
Type species *Hoshidella harmothoe* (Hoshide, 1988) **comb. nov.**
from *Loxomorpha harmothoe* Hoshide, 1988

Genus *Manastirlia* nom. nov.

Rayella Dasgupta, 1967. Parasitology 57: 471. (Protozoa: Apicomplexa: Coccidia: Eucoccida: Haemosporina: Haemoproteidae). Type species: *Rayella rayi* Dasgupta, 1967.

Preoccupied by *Rayella* Teichert, 1939. J. Paleont., 13, 622. (Crustacea: Ostracoda). Type species: *Basslerites hanseni* Teichert, 1937.

Etymology: The name is dedicated to my student Sergey Manastırlı (Moldova, Gagauziya) .

Summary of nomenclatural changes:
Genus *Manastirlia* **nom. nov.**
pro *Rayella rayi* Dasgupta, 1967 (non Teichert, 1939)
Type species *Manastirlia rayi* (Dasgupta, 1967) **comb. nov.**
from *Rayella rayi* Dasgupta, 1967

Genus *Aliona* nom. nov.

Schizocystis Léger, 1900. C. R. Acad. Sci. Paris, 131, 722. (Protozoa: Apicomplexa: Conoidasida: Gregarinasina: Neogregarinorida: Schizocystidae). Type species: *Schizocystis gregarinoides* Léger, 1900.

Preoccupied by *Schizocystis* Jaekel, 1895. Verh. dtsch. zool. Ges., 1895, 113. (Echinodermata: Cystoidea: Rhombifera: Callocystitidae: Scoliocystinae). Type species: *Schizocystis armata* (Forbes, 1848).

Etymology: The name is dedicated to Aliona Orlioglo (Moldova, Gagauziya) .

Summary of nomenclatural changes:
Genus *Aliona* **nom. nov.**
pro *Schizocystis* Léger, 1900 (non Jaekel, 1895)
Type species *Aliona gregarinoides* (Léger, 1900) **comb. nov.**
from *Schizocystis gregarinoides* Léger, 1900

LITERATURE CITED

Altıner, D. 1988. Pseudovidalinidae n. fam. and Angelina n. gen. from the Upper Permien of Southeast Turkey: Revue de Paléobiologie, v. Vol. Spec. No 2, Benthos'86, p. 25-36.

Amsel, H. G. 1956. Microlepidoptera Venezolana. Boletin de Entomologia Venezolana, 10 (1/2): 1-336.

Amyot, C. J. B. & Serville, A. 1843. Hemiptères. Deuxime partie. Homopteres. Homoptera Latr. Hist. Nat. Insectes. Hemipteres 1843, 1–676.

Andres, A. 1883. Le Attinie (Monografia). Coi Tipi der Salviucci, Roma, 460.

Añez, N. 1982. Studies on Trypansoma rangeli Tejera, 1920. IV. A reconsideration of its systematic position. Mem. Inst. Oswaldo Cruz, 77: 405-415.

Bailey, D. A. 1987. Durotrigia daveyi gen. et sp. nov., an Early Bajocian dinocyst with a variable precingular archaeopyle. J. Micropalaeontol. 6: 89-96.

Bailey, D. A. & Hogg, N. M. 1995. Fentonia bjaerkei gen. et comb. nov.; transfer from Parvocysta Bjaerke 1980. Journal of Micropalaeontology, 14: 58 pp.

Bayly, I. A. E. & Arnott, G. H. 1969. A new centropagid genus (Copepoda: Calanoida) from Australian estuarine waters. Australian Journal of Marine and Freshwater Research, 20: 189-198.

Beebe, W. 1932. A new deep-sea fish. Bulletin or the New York Zoological Society, 35 (5): 175-177.

Below, R. 1987. Evolution und Systematik von Dinoflagellaten-Zysten aus der Ordnung Peridiniales. I. Allgemeine Grundlagen und Subfamilie Rhaetogonyaulacoideae (Familie Peridiniaceae). Palaeontographica, Abteilung B, 205(1-6): 1-164.

Blome, C. D. 1984. Middle Jurassic (Callovian) radiolarians from carbonate concretions, Alaska and Oregon. Micropaleontology, 30: 343-389.

Butler, A. G. 1881. Descriptions of new genera and species of Heterocerous Lepidoptera from Japan. Trans. Entomol. Soc. Lond., 1881: 1-23.

Carter, E. S., Whalen, P. A. & Guex, J. 1998. Biochronology and paleontology of Lower Jurassic (Hettangian and Sinemurian) radiolarians, Queen Charlotte Islands, British Columbia. Geological Survey of Canada Bulletin 496: 1-162.

Carvalho, J. C. M. 1951. Neotropical Miridae, 44: On a historical collection made by P. W. Lund and J. T. Reinhardt in Brazil (Hemiptera). Entomologiske meddelelser, 26: 130-136.

Casey, T. L. 1922. Memoirs on the Coleoptera. X. Lancaster: New Era Printing Company. 520 pp.

Charollais, J. & Brönnimann, P. 1966. Première note sur les foraminifères du Crétacé inférieur de la région genevoise. Sabaudia Charollais et Brönnimann, n. gen. Archs. Sci., Genève, 18 (3): 615-624.

Couteaux, M.-M. & Chardez, D. 1981. Thécamoebiens édaphiques et muscicoles de Guyane Française. Revue d'Ecologie et de Biologie du Sol, 18: 193-208.

Cripps, A. P. 1989. A new genus of stem chordate (Cornuta) from the Lower and Middle Ordovician of Czechoslovakia and the origin of bilateral symmetry in the chordates. Geobios, 22: 215-245.

Cuif, J. P. 1977. Caracteres et affinites de Gallitellia, nouveau genre de madreporaires du ladino-carnien des Dolomites. 2eme Congr. int. sur les Cnidaires fossiles, Paris. Mem. B.R.G.M., 89: 256-263.

Dasgupta, B. 1967. A new malarial parasite of the flying squirrel. Parasitology, 57 (3): 467-474.

David, L. R. 1946. Upper Cretaceous fish remains from the western border of the San Joaquin Valley, California. Carnegie Inst. Washington Pub. 551 (5): 82-112.

Deane, J. A., Hill, D. R., Brett, S. J. & McFadden, G. I. 1998. Hanusia phi gen. et sp. nov. (Cryptophyceae): characterization of 'Cryptomonas sp'. Eur. J. Phycol., 33: 149–154.

Dejean, P. F. M. A. 1835. Catalogue des coléoptères de la collection de M. le comte Dejean. livr. 3: 257-360.

De Wever, P. 1982: Nassellaria (Radiolaires Polycystines) du Lias de. Turquie. Revue de Micropaléontologie, 24(4): 189-232.

Diaz-Ungria, C. 1964. Nematodes parasites, nouveaux ou interessants, du Venezuela. Ann. Parasitol. Hum. Comp., 38: 893-914.

Dodge, J. D. 1981. Three new generic names in the Dinophyceae: Heteraulacus, Sclerodinium, and Triadinium to replace Heteraulacus and Goniodoma. Brit. Phycol. J., 16: 273-280.

Fairmaire, L. 1849. Essai sur les coléoptéres de la Polynesie. Suite des Taxicornes. Rev. Mag. Zool., (2) 1: 445-460.

Ferrandez-Canadell, C. 2002. New Paleocene orbitoidiform foraminifera from the Punjab Salt Range, Pakistan. Journal of Foraminiferal Research, 32 (1): 1-21.

Fletcher, D. S. 1956. New species of African Geometridas. Proc. Roy. Ent. Soc. London (B), 25: 29-34.

Ghigi, A. 1909. New Zealand Ctenophores. Raccolte planctoniche, fatte dalla R. nave Liguria: vol II, Ctenofori, p. 19.

Gray, J. E. 1855. Catalogue of Pulmonate or Air-breathing Mollusca in the Collection of the British Museum. British Museum, London. 192 pp.

Guenée, A. 1857. Uranides et Phalenites II. In: J. B. A. Boisduval & A. Gueée. Histoire naturelle des Insectes: species général des Lépidoptères. Paris. 584 pp.

Haeckel, E. 1887. Report on the Radiolaria collect- ed by H.M.S. Challenger during the years 1873- 1876. Rep. Voy. Challenger, Zool., 18: 1-1803.

Hebard, M. 1940. A new generic name to replace *Sigmoidella* Hebard, not of Cushman and Ozana (Orthoptera: Blattidae). Entomological News, 51: 236.

Heron-Allen, E. & Earland, A. 1928. On the Pegididae, a new family of Foraminifera. Jour. Roy. Micr. Soc., London, ser. 3, 48: 283-299.

Hesse, E. 1911. Sur le genre Adelea á propos d'une nouvelle coccidie des oligochètes. Arc. Zool. Exp. et Gén. 47: (Notes et Rev. 71: 1) 15-20.

Hollande, A. 1980. Identification du parasome (Nebenkern) de Janickina pigmentifera a un symbionte (Perkinsiella amoebae nov. gen. – nov. sp.) apparenté aux flagellés Kinetoplastidiés. Protistologica, 16: 613–625.

Hollande, A. & Enjumet, M. 1960. Cytologie, évolution et systématique des Sphaeroidés (Radiolaires). Archs Mus. natn Hist. nat. Paris, 7 (7): 1–134.

Hoshide, K. 1988. Two gregarines found in Polychaetes from the Hokkaido Coast of Japan. Proc. Japan. Soc. syst. Zool., N 37: 45-53.

Hsu, Y. C. 1954. A new trematode, Chenia cheni gen. & sp. nov. (Hemiuridae) from gobiid fish. Acta Zoologica Sinica, 6 (1): 33-36.

Hudec, V. 1961. Zur Diskussion über die Schnecke Oxychilus (Riedelius) inopinatus (Uličný, 1887). Sbornik Národniho Musea v Praze (B), 16: 97-128.

Imlay, R. W. 1957. New Genera of Early Cretaceous Ammonites from California and Oregon. Journal of the Washington Academy of Sciences 47 (8): 275–277.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Jaekel, O. 1895. Beiträge zur Kenntniss der palaeozoischen Crinoiden Deutschlands: Paläontologisches Abhandlungen v. 7, (n.f. 3), p. 1-116.

Kirkaldy, G. W. 1903. Miscellanea Rhynchotalia. No.7, The Entomologist. An illustrated Journal of Entomology. London, 36: 179-181.

Klebs, G. 1892. "Flagellatenstudien," Zeitschrift fur wissenschaftliche Zoologie (Leipzig). Z. wiss. Zool., 55: 265-445.

Lahille, F. 1888. Etude systématique des tuniciers. Comptes Rendus Ass. Fr. Avanc. Sci., 1887 (2): 667–677.

Lainson, R., Landau, I. & Shaw, J. J. 1971. On a new family of non-pigmented parasites in the blood of reptiles: Garniidae fam.nov., (Coccidiida:Haemosporidiidea). Some species of the new genus Garnia. Int. J. Parasitol., 1: 241–250.

Latreille, P. A. 1804. VIII. Insecta. In: Nouveau Dictionnaire d'histoire naturelle, 24: 128–200.

Léger, L. 1900. Sur un nouveau sporozoaire des larves de diptères. C. R. Acad. Sci. Paris, 131: 722-772.

Lehman, J.-P. (organizer) 1967. Problèmes actuels de Paléontologie. Évolution des Vertébrés. Colloques Internationaux du Centre National de la Recherche Scientifique No. 163: p. 662. Paris, CNRS.

Li, H.-S. 1994. Middle Silurian radiolarians from Kccrhada, Xinjiang. Acta Micropalaeontologica Sinica, 11:259-272.

Linnaniemi (Axelson), W. M. 1912. Die Apterygotenfauna Finlands. II. Spezieller Teil. Helsingfors. Acta Soc. Sci. Fennicae, 40: 1-361.

Loeblich, A. R. & Tappan, H. 1986. Some new and revised genera and families of hyaline calcareous Foraminiferida (Protozoa). Transactions of the American Microscopical Society, 105: 239-265.

Maksimova, Z. A. 1978. [Some new Devonian trilobites]. Ezhegodnik Vsesoyuznogo Paleontologicheskogo Obshchestva
21: 94-109.

Mandra, Y. T. 1969. A new genus of Silicoflagellata from an Eocene South Atlantic deep-sea core (Protozoa: Mastigophora). Occasional Papers of the California Academy of Sciences, no. 77, 7 p.

Matthew, G. F. 1885a. Recent discoveries in the St. John group," and "A *new genus of Cambrian Pteropods.* Canadian Rec. Sci., Vol. I, pp. 136 and 152.

Matthew, G. F. 1885b. Notice of a *new genus* of pteropods from the Saint John Group (*Cambrian*). Amer. Joirr. Sci. 30: 293-294.

McCulloch, I. 1977. Qualitative Observations on Recent Foraminiferal Tests with Emphasis on the Eastern Pacific. University of Southern California, Los Angeles, 3 vols.

Mikhalevich, V. I. 1983. The bottom foraminifera from the shelves of the Tropical Atlantic. ZoologicalInstitute of USSR Academy of Sciences, Leningrad, 247 pp.

Morbey, S. J. 1975. The palynostratigraphy of the. Rhaetian Stage, Upper Triassic in the. Kendelbachgraben, Austria. Palaeontographica, 152B: 1-75.

Mörch, O. A. L. 1877. Synopsis molluscorum marinorum Indiarum occidentalium imprimis insularum danicarum. Malakozoologische Blätter, 24: 93-123.

Murchison, R. I. 1859. Siluria. 3rd Edition. (London). 592 pp.

O'Hara, J. E. 2007. World genera of the Tachinidae (Diptera) and their regional occurrence. Version 3.0. Available from: http://www.nadsdiptera.org/Tach/Genera/Gentach%20ver3.pdf

Oudemans, A. C. 1936. Neues über Anystidae (Acari). Archiv für Naturgeschichte [new series] 5: 364–446.

Palmieri, V. 1994. Permian foraminifera in the Bowen Basin, Queensland. Queensland Geology, 6: 1-126.

Penard, E. 1903. Sur quelques protistes voisins des Héliozoaires ou des Flagellates: Archiv für Protistenkunde, 2: 283-304.

Perty, M. 1852. Zur Kenntniss Kleinster Lebensformen nach Bau, Funktionen, Systematik, mit Spezialverzeichniss der in der Schweiz bebachteten n: pp. I-VIII, 1-228.

Pessagno, E. A., Six, W. M. & Yang, Q. 1989. The Xiphostylidae Haeckel and Parvivaccidae, n. fam., (Radiolaria) from the North American Jurassic. Micropaleontology, 35 (3): 193-255.

Pic, M. 1900. Description d' un nouveau genre d' Elmides de. Tunisie. Bulletin de la Société Entomologique de France,. 1900: 266-267.

Recluz, C. A. 1864. Observations sur le genre Fossar (Fossarus). Journal de Conchyliologie, 12: 247-251.

Robineau-Desvoidy, J. B. 1830. Essai sur les myodaires. Mem. Pres. Div. Sav. Acad. R. Sci. Inst. Fr., 2 (2): 813 pp.

Rui, L. & Sheng, J. Z. 1981. On the genus Palaeofusulina. Special Papers of the Geological Society of America, 187: 33-37.

Sarma, Y. S. R. K. & Shyam, R. 1974. Lundiella indica gen. et sp. nov., a new member of colonial volvocales (Chlorophyceae) from India. British Phycological Journal, 9: 307-311.

Schröder, C. J., Medioli, F. S. & Scott, D. B. 1989. Fragile abyssal foraminifera (including new Komokiacea) from the Nares abyssal plain. Micropaleontology, 35:10-48.

Sheng, J. 1963. Permian fusulinids of Kwangsi, Kueichow and. Szechuan: Palaeontologica Sinica, N. S. B, no. 10, 247 pp.

Sowerby, J. &. Sowerby, G. B. 1820-5. The Genera of Recent and Fossil Shells, for use of the Students in Conchology and geology, London. 2 Volumes.

Staudinger, O. 1887. Neue Arten und Varietäten von Lepidopteren aus dem Amur-Gebiete. In: Romanoff, N. M. Mémoires sur les Lépidoptères. St. Petersb., 3: 126-232.

Stein, F. 1883. Der Organismus der Infusionsthiere nach eigenen Forschungen in systematischer Reihenfolge bearbeitet. III. Die Naturgeschichte der arthrodelen Flagellaten. Wilhelm Engelmann, Leipzig, pp. 1–30.

Stover, L. E. & Williams, G. L. 1987. Analyses of Mesozoic and Cenozoic organic-walled dinoflagellates. Am. Assoc. Strat. Palynol. Contrib. Ser., 18: 1-243.

Teichert, C. 1939. New Names for Ostracode Homonyms. *Journal of Paleontology*, 13 (6): 622.

Thomsen, H. A. & Boonruang, P. 1983. A microscopical study of marine collared flagellates (Choanoflagellida) from the Andaman Sea, SW Thailand: species of Stephanacantha gen.nov. and Platypleura gen.nov. Protistologica, 19: 193–214.

Valkanov, A. 1970. Beitrag zur Kenntnis der Protozoen des Schwarzen. Meeres. Zool. Anz., 184: 241-290.

Veevers, J. J. 1959. Devonian brachiopods from the Fitzroy Basin, western Australia. Bureau of Mineral Resources, Geology and Geophysics Bulletin, 45: 220 pp.

Versteegh, G. J. M. & Zevenboom, D. 1995. New genera and species of dinoflagellate cysts from the Mediterranean Neogene. Rev. Palaeobot. Palynol., 85: 213-229.

Walcott, C. D. 1910. Olenellus and other genera of the Mesonacidae. Smithsonian Miscellaneous Collections, 53 (6): 231-422.

Walker, F. 1855. List of the Specimens of Lepidopterous Insects in the Collection of the British Museum, 5: 977-1258.

Walker, F. [1865]. List of the Specimens of Lepidopterous Insects in the Collection of the British Museu, 33: 707-1120.

Won, M.-Z. 1983. Radiolarien aus dem Unterkarbon des Rheinischen Schiefergebirges (Deutschland). Palaeontographica, Abt. A, 182: 116-175.

Zeller, P. C. 1849. Beitrag zur Kenntniss der Coleophoren. Linnaea Entomologica, 4: 191-416.

Zügel, P. 1994. Verbreitung kalkiger Dinoflagellaten-Zysten im Cenoman/Turon von Westfrankreich und Norddeutschland. Courier Forschungsinstitut Senckenberg 176: 159 pp.

APPENDIX

Summary of the nomenclatural changes in the present paper.

Junior Homonym	Senior Homonym	New Names
Durotrigia Bailey, 1987	*Durotrigia* Hoffstetter, 1967	*Baileyella* nom. nov.
Edwardsiella Versteegh & Zevenboom, 1995	*Edwardsiella* Andres, 1883	*Novedwardsiella* nom. nov.
Fentonia Bailey & Hogg, 1995	*Fentonia* Butler, 1881	*Neofentonia* nom. nov.
Gippslandia Stover & Williams, 1987	*Gippslandia* Bayly & Arnott, 1969	*Neogippslandia* nom. nov.
Goniodoma Stein, 1883	*Goniodoma* Zeller, 1849	Family *Yeseviidae* nom. nov. Genus *Yesevius* nom. nov.
Hannaites Mandra, 1969	*Hannaites* Imlay, 1957	*Akbuluta* nom. nov.
Hanusia Deane, Hill, Brett & McFadden, 1998	*Hanusia* Cripps, 1989	*Phia* nom. nov.
Herdmania Dodge, 1981	*Herdmania* Lahille, 1888	*Dodgeia* nom. nov.
Lundiella Sarma & Shyam, 1974	*Lundiella* Carvalho, 1951	*Yildizia* nom. nov.
Normandia Zügel, 1994	*Normandia* Pic, 1900	*Zugelia* nom. nov.
Suessia Morbey, 1975	*Suessia* Deslongchamps, 1855	Family *Baseridae* nom. nov. Genus *Baserus* nom. nov.
Wanneria Below, 1987	*Wanneria* Walcott, 1908	*Belowius* nom. nov.
Diplotheca Valkanov, 1970	*Diplotheca* Matthew, 1885	*Volkanus* nom. nov.
Perkinsiella Hollande, 1981	*Perkinsiella* Kirkaldy, 1903	*Hollandeia* nom. nov.
Platypleura Thomsen, 1983	*Platypleura* Amyot & Serville, 1843	*Thomsenella* nom. nov.
Dinema Perty, 1852	*Dinema* Fairmaire, 1849	*Elifa* nom. nov.
Metanema Klebs, 1892	*Metanema* Guenée, 1857	*Semihia* nom. nov.
Tejeraia Anez, 1982	*Tejeraia* Diaz-Ungria, 1964	*Aneza* nom. nov.
Pileolus Couteaux & Chardez, 1981	*Pileolus* Sowerby, 1823	*Neopileolus* nom. nov.
Angelina Altıner, 1988	*Angelina* Salter, 1859	*Altineria* nom. nov.
Catena Schröder, Medioli & Scott, 1989	*Catena* Richter, 1975	*Neocatena* nom. nov.
Chenia Sheng, 1963	*Chenia* Hsu, 1954	*Turgutia* nom. nov.
Gallitellia Loeblich & Tapan, 1986	*Gallitellia* Cuif, 1977	*Neogallitellia* nom. nov.
Krebsia McCulloch, 1977	*Krebsia* Mörch, 1877	*Mccullochia* nom. nov.
Milesia McCulloch, 1977	*Milesia* Latreille, 1804	*Mccullochella* nom. nov.
Mirifica Shlykova, 1969	*Mirifica* Fletcher, 1956	*Ugurus* nom. nov.

Junior Homonym	Senior Homonym	New Names
Nanlingella Rui & Sheng, 1981	*Nanlingella* Xiong & Wang, 1980	*Novonanlingella* nom. nov.
Natlandia McCulloch, 1977	*Natlandia* David, 1946	*Doyrana* nom. nov.
Sabaudia Charollais & Brönnimann, 1966	*Sabaudia* Ghigi, 1909	Subfamily *Akcayinae* nom. nov. Genus *Akcaya* nom. nov.
Setia Ferrandez & Canadell, 2002	*Setia* Adams & Adams, 1852	*Novosetia* nom. nov.
Sigmella Azbel & Mikhalevich, 1983	*Sigmella* Hebard, 1940	*Novosigmella* nom. nov.
Sphaeridia Heron-Allen & Earland, 1928	*Sphaeridia* Linnaniemi, 1912	*Kuremsia* nom. nov.
Teichertina Palmieri, 1994	*Teichertina* Veevers, 1959	*Palmierina* nom. nov.
Amuria Whalen & Carter, 1998	*Amuria* Staudinger, 1887	*Novamuria* nom. nov.
Bathysphaera Hollande & Enjumet, 1960	*Bathysphaera* Beebe, 1932	*Enjumetia* nom. nov.
Cyphanta Haeckel, 1887	*Cyphanta* Walker, 1865	*Haeckelocyphanta* nom. nov.
Milax Blome, 1984	*Milax* Gray, 1855	*Blomeus* nom. nov.
Ormistonia Li Hong-sheng, 1994	*Ormistonia* Maksimova, 1978	*Novormistonia* nom. nov.
Riedelius De Wever, 1982	*Riedelius* Hudec, 1961	*Deweverus* nom. nov.
Scharfenbergia Won Moon-Zoo, 1983	*Scharfenbergia* Oudemans, 1936	*Wonia* nom. nov.
Sophia Whalen & Carter, 1998	*Sophia* Robineau-Desvoidy, 1830	*Neosophia* nom. nov.
Zanola Pessagno & Yang, 1989	*Zanola* Walker, 1855	*Neozanola* nom. nov.
Clathrella Penard, 1903	*Clathrella* Récluz, 1864	Family *Ozdikmenellidae* nom. nov. Genus *Ozdikmenella* nom. nov.
Adelina Hesse, 1911	*Adelina* Dejean, 1835	*Obvallatus* nom. nov.
Garnia Lainson, Landau & Shaw, 1971	*Garnia* Casey, 1922	*Neogarnia* nom. nov.
Loxomorpha Hoshide, 1988	*Loxomorpha* Amsel, 1956	*Hoshidella* nom. nov.
Rayella Dasgupta, 1967	*Rayella* Teichert, 1939	*Manastirlia* nom. nov.
Schizocystis Léger, 1900	*Schizocystis* Jaekel, 1895	*Aliona* nom. nov.

EVALUATION OF FLUBENDIAMIDE AS AN IPM COMPONENT FOR THE MANAGEMENT OF BRINJAL SHOOT AND FRUIT BORER, *LEUCINODES ORBONALIS* GUENEE

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ABSTRACT: A field experiment was conducted to evaluate the efficacy of flubendiamide as an IPM component for the management of brinjal shoot and fruit borer and eight IPM packages were evaluated. Among the different IPM packages, package 6 (mechanical control + potash @100 kg/ha + field sanitation in combination with flubendiamide 24WG applied at 5% level of shoot and fruit infestation) showed the better performance by reducing 80.63% fruit infestation over control and produced the highest number of healthy and total fruits/plant (25.0 and 27.20, respectively). The same package also increased 108.83% healthy fruit yield and decreased 74.13% infested fruit yield over control. The highest benefit cost ratio (5.53) was recorded in IPM package 2 (Potash @100 kg/ha + flubendiamide 24WG applied at 5% level of fruit infestation), where 9 sprays were required. The BCR of 4.12 and 4.00 was obtained in IPM package 6 and package 5 with 8 and 5 sprays, respectively. The results of this study suggested that application of flubendiamide at 5% level of fruit infestation in combination with mechanical control + potash @ 100 kg/ha + field sanitation may be used for the management of brinjal shoot and fruit borer.

KEY WORDS: Benefit cost ratio, Field sanitation, Infestation, Mechanical control, Potash.

Brinjal shoot and fruit borer is the most destructive pest of brinjal, which caused 31-86% fruit damage in Bangladesh (Alam et al., 2003) reaching up to 90% (Raman, 1997), 37-63% in India (Dhankar, 1988) and 50-70% in Pakistan (Saeed & Khan, 1997). Farmers of Bangladesh as well as of other Asian countries in most cases solely depend on insecticides for the management of the pest. Such reliance on insecticides has created many problems such as very frequent application of insecticides (up to 140 times in a season), excessive residues on market vegetables that concerns general consumer health and the environment, pesticide resistance, trade implications, poisoning, hazards to non-target organisms, increased production costs etc. (Alam et al., 2003; Pedigo, 2002; Debach & Rosen, 1991). In the context of damage for ensuring food safety and minimization of severity, environmental hazards, appropriate management practice for BSFB incorporating different methods as needed and ought to be devised consistent with modern pest management. The researchers have been trying combination of various components of the IPM package such as cultural, mechanical, pheromone, chemical etc. for the control of brinjal shoot and fruit borer (FAO, 2003; Sasikala et al., 1999; Islam et al., 1999; Maleque et al., 1998).

Mechanical control such as collection and destruction of infested shoots and fruits in combination with insecticide treatments reduced BSFB infestation, increased yield of fruit and ensured the highest benefit cost ratio (Alam et al., 2003; FAO, 2003; Rahman et al., 2002). Use of balanced fertilizer and application of insecticides decreased fruit damage both in quantity and quality (Patnaik et al. 1998). Combination of higher dose of potash along with insecticides treatment also reduced the percentage of fruit infestation (Sudhakar et al., 1998). Mechanical control in combination with insecticides spraying at 5% fruit infestation provided the best protection against brinjal shoot and fruit borer (Islam et al., 1999). Field sanitation, through the removal of plant debris and refuges and cleaning reduced the BSFB infestation significantly (Sasikala et al., 1999). However, none of the individual method alone provides satisfactory protection of the crop against this obnoxious pest. Nevertheless, their combination in a best compatible manner is expected to render desirable protection of the crop.

Flubendiamide, having a new biochemical mode of action, showed excellent effectiveness against a broad spectrum of lepidopterous insect pests including resistance strains (Tohnishi et al., 2005). Thus flubendiamide is expected to provide the necessary protection against brinjal shoot and fruit borer, if needed to supplement the actions of other control components such as cultural, mechanical and field sanitation. Accordingly, the present experiment was undertaken to evaluate the effectiveness of flubendiamide as an IPM component for the management of the brinjal shoot and fruit borer in the field.

MATERIALS AND METHODS

The experiment was conducted in the field at Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU) during October 2006 to May 2007 (winter season). The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. The unit plot size was 3 m × 3 m having 2 m space between the blocks and 1.5 m between the plots. The distance between rows was 1 m and that between plants was 60 cm. The crop was grown following the recommended practices as described by Rashid (1993). Weeding, mulching and irrigation were done as and when necessary. The experiment comprised 8 combinations of IPM components each such combination termed as an IPM package and an untreated control.

Package 1: Mechanical control + application of flubendiamide 24WG at 5% level of fruit infestation: Twenty days after transplanting, clipping of infested shoots by scissors was carried out and destroyed them by burring at a 7 days interval. At fruiting stage, removal and destruction of both infested shoots and fruits were carried out at 7 days interval and continued till the last harvest. Field application of flubendiamide 24WG (0.012%) was made at 5% level of fruit infestation at 7 days interval and continued till the last harvest.

Package 2: Use of potash @ 100 kg/ha + application flubendiamide 24WG at 5% level of fruit infestation: Application of 100 kg potash per hectare as muriate of potash (MP) fertilizer. One third of the MP was applied in the pit one week before transplanting and the rest of MP was applied in two equal installments as top dressing at 20 days after transplanting and at the flower initiation stage and flubendiamide 24WG was applied as IPM package 1.

Package 3: Field sanitation and application of flubendiamide 24WG at 5% level of fruit infestation: Dead and fallen leaves were collected from the field and destroyed by burring in soil to remove the pupae from soil at 7 days interval and flubendiamide 24WG was applied as IPM package 1.

Package 4: Use of potash @ 100 kg/ha + mechanical control + application of flubendiamide 24WG at 5% level of fruit infestation: Potash was applied as IPM package 2. Mechanical control and application of flubendiamide were done as IPM package 1.

Package 5: Use of potash @ 100 kg/ha + mechanical control + field sanitation + application of flubendiamide 24WG at 5% level of fruit infestation: Potash was applied as IPM package 2 and field sanitation was done according to IPM package 3. Mechanical control and application of flubendiamide were done as IPM package 1.

Package 6: Use of potash @ 100 kg/ha + mechanical control + field sanitation + flubendiamide 24WG applied at 5% level of shoot and fruit infestation: Potash was applied as IPM package 2 and field sanitation was done as IPM package 3. Mechanical control was also made as IPM package 1 but flubendiamide 24WG (0.012%) was applied at 5% level of both shoots and fruits infestation.

Package 7: Use of potash @ 100 kg/ha + mechanical control + field sanitation: Potash was applied as IPM package 2 and field sanitation was done as IPM package 3. Mechanical control was also made as IPM package 1.

Package 8: Schedule spray of flubendiamide 24WG at 7 days interval: After 20 days of transplanting, field application of flubendiamide 24WG (0.012%) was made at 7 days interval and continued till the last harvest.

Untreated control: No pest control technique was applied in control plots. However, an equal volume of water, which was used for other plots, was sprayed at 7 days intervals.

Insecticide application: Brinjal fields were visited regularly and the number of total and infested shoots was counted to determine the level of shoot infestation. The level of fruit infestation was determined by random observation and selection of 50 fruits/ plot everyday. Flubendiamide 24WG was applied by mixing 2.5 g of insecticide with 5 liter of water (0.5 g of flubendiamide 24WG per liter of water i.e., 0.012% flubendiamide) and sprayed covering the whole plants. Five liters of spray material was required to spray three plots. The spraying was done in the afternoon to avoid bright sunlight and drift caused by strong wind and adverse effect on pollinating bees and other pollinators.

Data collection: The total number of shoots as well as the number of infested shoots was recorded from 10 plants of each plot at weekly intervals and the percent shoot infestation was calculated. Fruits were harvested at 7 days interval and the number of healthy and infested fruits was recorded for calculating the percent fruit infestation. The weight of healthy and infested fruits was noted separately per plot per treatment. The cumulative plot yield of healthy and infested fruits of 10 harvests were transformed into healthy, infested and total yield per hectare in tons respectively.

Benefit Cost Ratio (BCR): For benefit cost analysis, records of the costs incurred for labour, fertilizer, insecticide, application in each IPM package were maintained. It is to be noted here that expenses incurred referred to those only on pest control. The price of the harvested marketable healthy fruits of each treatment and that of control were calculated at market rate. The result of Benefit-Cost analysis was expressed in terms of Benefit Cost Ratio.

Data analysis: Data were analyzed by using MSTAT software for analysis of variance after square root transformation. ANOVA was made by F variance test and the pair comparisons were performed by Duncan's Multiple Range Test (DMRT) (Gomez & Gomez, 1984).

RESULTS

Effect of different IPM packages on shoot infestation

Shoot infestation of brinjal was significantly influenced by the different IPM packages. The lowest percent of shoot infestation was observed in schedule spray plot (package 8), which was significantly lower than that of all packages (Figure 1). However, the highest percent of shoot infestation was observed in untreated control, which was statistically identical with IPM package 3 (field sanitation + flubendiamide applied at 5% level of fruit infestation) and package 2 (potash @ 100k/ha + flubendiamide at 5% level of fruit infestation). Accordingly, Figure 2 illustrated that IPM package 8 (schedule spray plot) provided maximum reduction of shoot infestation over control, which was significantly higher than that of all other IPM packages. No significant difference was observed among the percent reduction of shoot infestation over control in IPM package 1 (mechanical control + flubendiamide 24WG applied at 5% level of fruit infestation), package 4 (mechanical control + potash @100 kg/ha + flubendiamide 24WG at 5% level of fruit infestation), package 5 (mechanical control + potash @100 kg/ha + field sanitation + flubendiamide 24WG applied at 5% level of fruit infestation), package 6 (mechanical control + potash @100 kg/ha + field sanitation + flubendiamide 24WG applied at 5% level of infestation) and package 7 (mechanical control + potash @100 kg/ha +field sanitation).

Effect of different IPM packages on fruit infestation

IPM packages significantly reduced the borer infestation on brinjal, increased the number of healthy and total fruits/plant, and decreased the number infested fruits/plant of brinjal. Data (Table 1) revealed that IPM package 6 (mechanical control + potash @ 100 kg/ha + field sanitation + flubendiamide 24WG applied at 5% level of infestation) produced the highest number of healthy fruits/plant (25.00) and statistically similar results were obtained in package 8 (schedule spray of flubendiamide 24WG at 7 days interval) regarding this parameter. However, the number of healthy fruits/plant was statistically identical in IPM package 5 (mechanical control + potash @100 kg/ha + field sanitation + flubendiamide 24WG applied at 5% level of fruit infestation), package 4 (mechanical control + potash @100 kg /ha + flubendiamide 24WG applied at 5% level of fruit infestation) and package 1 (mechanical control + flubendiamide 24WG applied at 5% level of fruit infestation). In contrast, the lowest number of healthy fruits/plant (11.98) was obtained from the untreated control, which was significantly lower than all other IPM packages except package 7 (mechanical control + fertilizer +field sanitation). Moreover, the data regarding the number of infested fruits/plant (Table 1) showed that the highest value (8.53) was obtained from untreated control as against the lowest (2.20) in IPM package 6 (mechanical control + potash @100 kg /ha + field sanitation + flubendiamide 24WG applied at 5% level of infestation). However, the number of total fruits/plant was statistically identical in IPM package 1, 2, 4, 5, 6 and 8 (Table 1).

Table 1 further revealed that the lowest level of fruit infestation (8.04%) was found in IPM package 6 and statistically no significant difference was observed between IPM package 8 (8.85%), package 5 (10.23%). IPM package 7 (mechanical control + potash @100 kg /ha + field sanitation) had comparatively higher level of fruit infestation (34.94%) than all other IPM packages. The rest of the packages (package 1, package 2 and package 3) had intermediate levels of fruit infestation having no significant difference among them. Significantly the highest percent fruit infestation (41.60%) was obtained in untreated control.

The data (Table 2) showed that IPM package 6 (mechanical control + potash @ 100 kg/ha + field sanitation + flubendiamide 24WG applied at 5% level of fruit infestation) provided the highest reduction of fruit infestation (80.63%) over the control having no significant difference with package 8, package 5 and package 4. Therefore, the results indicated that none of the package was able to exceed the standard level of 80% reduction in fruit infestation over control except the package 6. Mechanical control in combination with potash @100 kg/ha and field sanitation (package 7) showed very low effectiveness and flubendiamide alone and in combination with mechanical control or potash fertilizer showed significantly higher level of effectiveness against the brinjal shoot and fruit borer.

Effect of different IPM packages on yield performance of brinjal

The effect of different IPM packages on yield of brinjal was evaluated in terms of healthy fruit yield, infested fruit yield and total fruit yield. IPM package 6 (mechanical control + potash @100 kg/ha + field sanitation + flubendiamide 24WG applied at 5% level of infestation) produced the highest healthy fruit yield (17.71 t/ha). Although statistically no significant difference was observed in IPM package 8 (schedule spray of flubendiamide 24WG at 7 days interval) and package 5 (mechanical control + potash @100 kg/ha + field sanitation + flubendiamide 24WG applied at 5% level of fruit infestation) regarding healthy fruit yield (Table 3). In contrast, healthy fruit yield was the lowest (8.48 t/ha) in untreated control plots, which was identical with that of the IPM package 7 (mechanical control + potash @100 kg/ha + field sanitation). Accordingly, infested fruit yield was the highest in untreated control plots (4.33 t/ha) having no statistical significant with IPM package 7 (mechanical control + potash @100 kg/ha + field sanitation). Thus, the highest total fruit yield was obtained in IPM package 6 with no significant difference among the IPM packages 1, 2, 4, 5, 6 and 8 treated plots. A further analysis of the yield to assess the impact of each treatment on yield over control as shown in the same Table, suggested that IPM package 6 ensured maximum increase (108.84%) of healthy fruit yield over control. However, maximum reduction (74.13%) of infested fruit yield was found in that package and as a cumulative impact, maximum increase of total fruit yield (46.99%) was obtained in the same package (mechanical control + potash @100 kg/ha + field sanitation + flubendiamide 24WG applied at 5% level of infestation).

Economic analysis of different IPM packages

The benefit-cost ratio (BCR) as worked out based on the expenses incurred and value of crops obtained against the treatment used in the present study for the control of brinjal shoot and fruit borer has been presented in Table 4. It is revealed from Table that the highest BCR (5.53) was found in IPM package 2 (potash @100 kg/ha + flubendiamide 24WG applied at 5% level of fruit infestation) where 9 applications were required. Although almost equal BCR (5.48) was obtained in package 4 (mechanical control + potash @ 100 kg/ha + flubendiamide 24WG applied at 5% level of fruit infestation) with only 5 sprays of flubendiamide. In contrast, the lowest BCR (0.53) was obtained from IPM package 7 (mechanical control + potash @100 kg/ha + field sanitation) with no application of insecticide. In the schedule spray plots, the BCR was 4.03 but the number of spray was 16. Although the IPM package 6 (mechanical control + potash @100 kg/ha + field sanitation + flubendiamide 24WG applied at 5% level of infestation) had the higher BCR (4.12) than IPM package 5 (mechanical control + potash @100 kg/ha + field sanitation + flubendiamide 24WG applied at 5% level of fruit infestation) however, the number of spray was lower in package 5 (5) compared to package 6 (8). IPM package 3 (field sanitation + flubendiamide 24WG applied at 5% level of fruit infestation) required 7 sprays but the BCR was only 1.70.

DISCUSSION

The results demonstrated that the scheduled spray of flubendiamide at weekly intervals was found to be the most effective in reducing shoot infestation of brinjal by shoot and fruit borer. There is no information on the efficacy of flubendiamide against the pest in the field or laboratory; however, findings of other researchers with different insecticides supported these results. Raman et al. (2002) stated that schedule spray of cypermethrin at weekly interval showed the best efficacy in reducing shoot infestation of brinjal. Moreover, Kabir et al. (2003) found the similar efficacy against this pest by spraying of carbosulfan at weekly intervals.

The performance of the different IPM packages against brinjal shoot and fruit borer in different aspects such as percent fruit infestation, reduction of infestation over control, healthy fruit yield and total yield as found in the present study was more or less in conformity with the findings of several other similar studies. Mannan & Begum (1999) found that hand picking damaged shoots and fruit and spraying of cypermethrin at 15 days interval caused 25.78% fruit infestation and 63.93% fruit infestation reduction over control. Gapud et al. (1999) reported that the removal of damaged shoots and fruit at every week produced higher yield than plants sprayed every three weeks. Moreover, mechanical control in combination with spraying of cypermethrin and monocrotophos alternatively at 5% fruit infestation provided effective control of the brinjal shoot and fruit borer (Islam & Karim, 1994). Combination of 4 cultural practices such as irrigation, pruning of older leaves and use of wide spacing, sanitation and proper disposal of BSFB-infested plant material and fertilizer use as per recommended rate controlled 70% of BSFB population in brinjal (FAO, 2003). These findings also agree with that of the Sudhakar et al. (1998), who reported that a higher dose of potash along with insecticide treatment reduced the percentage of fruit infestation.

The findings regarding BCR and number of spray agree with Alam et al. (2006), who obtained the benefit cost ratio (BCR) 3.4 in IPM treated field during winter trial. However, the findings also coincide with those of Maleque et al. (1998), who found a benefit cost ratio (BCR) of 3.4 and 3.3 by using mechanical control + application of cypermethrin at 5% level of fruit infestation and schedule spray of cypermethrin at 7 days intervals, respectively where the weekly spray involved applying 8 times more insecticides. These results contradict the findings of Islam et al. (1999), who observed the BCR of 37.77 in plots treated with shobicron (mixture of cypermethrin and profenofos) at 10% fruit with only 3 applications. The difference in results might be due to the cost of insecticides, the price of product and socio-economic conditions.

The overall results suggested that use of IPM package 5 (mechanical control + potash @100 kg/ha + field sanitation + flubendiamide 24WG applied at 5% level of fruit infestation) against the brinjal shoot and fruit borer reduced fruit infestation, increased marketable yield and benefits cost ratio. This had ultimately reduced the number of insecticide applications. This would have a positive impact on the environment, reduce toxic residue load on brinjal fruits and finally the cost of control measure would be minimized significantly.

ACKNOWLEDGEMENTS

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LITERATURE CITED

Alam, S. N., Rashid, M. A., Rouf, F. M. A., Jhala, R. C., Patel, J. R., Satpathy, S., Shivalingaswamy, T. M., Rai, S., Wahundeniya, I., Cork, A., Ammaranan, C., & Talekar, N. S. 2003. Development of an integrated pest management strategy for eggplant fruit and shoot borer in South Asia. Technical Bulletin 28, AVRDC–The World Vegetable Center, Shanhua, Taiwan. 66 pp.

Alam, S. N., Hossain, M. I., Rouf, F. M. A., Jhala, R. C., Patel, M. G., Nath, L. K., Sengupta, A., Baral, K., Shylesha, A. N., Satpathy, S., Shivalingaswamy, T. M., Cork, A., & Talekar, N. S. 2006. Control of eggplant fruit and shoot and fruit borer in South Asia. Technical Bulletin 36, AVRDC – The World Vegetable Center, Shanhua, Taiwan. 88 pp.

Debach, P. & Rosen, D. 1991. Biological control by natural enemies. Cambridge University Press, Cambridge, United Kingdom. 537 pp.

Dhankar, D. S. 1988. Progress in resistance studies in eggplant (Solanum melongena L.) against shoot and fruit borer of brinjal (Leucinodes orbonalis Guenee) infestation. Tropical Pest Management. 34: 343-345.

FAO (Food and Agricultural organization). 2003. Inter country programme for integrated pest management in vegetables in South and South-East Asia. Eggplant integrated pest management: An ecological guide. Rome, Italy. 177 pp.

Gapud, V. P., Pile, C. V., Arida, G. S., Santiago, B., Balagot, G., & Rajotte, E. G. 1999. Field evaluation of damaged fruit removal as an alternative to insecticide sprays for control of eggplant shoot and fruit borer (Leucinodes orbonalis Guen.). IPM CRSP, Annual Report. 6: 366-369.

Gomez, K. A. & Gomez, A. A. 1984. Statistical procedures for agricultural research. 2nd edition. International Rice Research Institute, John Willey and Sons, Singapore. 490 pp.

Islam, M. N. & Karim, M. A. 1994. Integrated management of the brinjal shoot and fruit borer, Leucinodes orbonalis Guenee (Lepidoptera: Pyralidae) at Joydebpur. Annual Report. 1993-1994. Entomology Division. Bangladesh Agricultural Research Institute, Joydebpur, Gazipur, Bangladesh. pp. 41-44.

Islam, M. N., Karim, M. A., Mannan, M. A., Chowdhury, J. C. S., & Islam, M. 1999. Integrated management of the brinjal shoot and fruit borer, Leucinodes orbonalis Guenee (Lepidoptera: Pyralidae) based on insecticide. Bangladesh Journal of Entomology. 9: 75-85.

Kabir, K. H., Rahman, M. A. & Ahmed, M. S. 2003. Field evaluation of some chemical insecticides for the management of brinjal shoot and fruit borer attacking brinjal at Gazipur. Annual Report 2002-2003. Division of Enomology. Bangladesh Agricultural Research Institute, Joydebpur, Gazipur, Bangladesh. pp. 36-39.

Maleque, M. A., Islam, M. N., Kundu, R. & Islam, M. S. 1998. Judicious use of insecticides for the management of the brinjal shoot and fruit borer. Bangladesh Journal of Entomology. 8: 97-107.

Mannan, M. A. & Begum, A. 1999. Development of management package against brinjal shoot and fruit borer. Annual Report. 1999-2000. Entomology Division. Bangladesh Agricultural Research Institute, Jodebpur, Gazipur, Bangladesh. pp. 22-23.

Patnaik, H. P., Singh, D. N. & Mohapatra, S. 1998. Effect of NPK fertilizers on the incidence of shoot and fruit borer, (Leucinodes orbonalis Gueen.) in brinjal under insecticidal protection. Orissa Journal of Horticulture. 26: 56-60.

Pedigo, L. P. 2002. Entomology and Pest Management. 4th Edition. Prentice Hall, Upper Saddle River, New Jersey, USA. 633 pp.

Rahman, A. K. M. Z. 1997. Screening of 28 brinjal line for resistance/tolerance against the brinjal shoot and fruit borer. Annual Report. Entomology Division, Bangladesh Agricultural Research Institute, Joydebpur, Gazipur, Bangladesh. pp. 32-35.

Rahman, M. S., Alam, M. Z., Huq, M., Sultana, N. & Islam, K. S. 2002. Effect of some integrated pest management (IPM) packages against brinjal shoot and fruit borer and its consequence on yield. Journal of Biological Science. 2: 489-491.

Rashid, M. M. 1993 Begun Paribarer Shabji. In: Shabji Biggan. First Edn. Bangla Academy, Dhaka, Bangladesh. 526 pp.

Saeed, M. Q. & Khan, I. A. 1997. Population abundance and chemical control of brinjal fruit borer Leucinodes orbonalis Guen. (Lepidoptera: Pyralidae). Sarhad Journal of Agriculture. 13: 399-402.

Sasikala, K., Rao, P. A. & Krishnayya, P. V. 1999. Comparative efficacy of eco-friendly methods involving egg parasitoid, Trichogramma japonicum, mechanical control and safe chemicals against Leucinodes orbonalis Guenee infesting brinjal. Journal of Entomological Research. 23: 369-372.

Sudhakar, K. Punnaiah, K. C. & Krishnayya, P. V. 1998. Influence of organic and inorganic fertilizers and certain insecticides on the incidence of shoot and fruit and borer, Leucinodes orbonalis Guen. infesting brinjal. Journal of Entomological Research. 22: 283-286.

Tohnishi, M., Nakao, H., Furuya, T., Seo, A., Kodama, H., Tsubata, K., Fujioka, S., Hirooka, T. & Nishimatsu, T. 2005. Flubendiamide, a novel insecticide highly active against Lepidopterous insect pests. Journal of Pesticide Science. 30: 354-360.

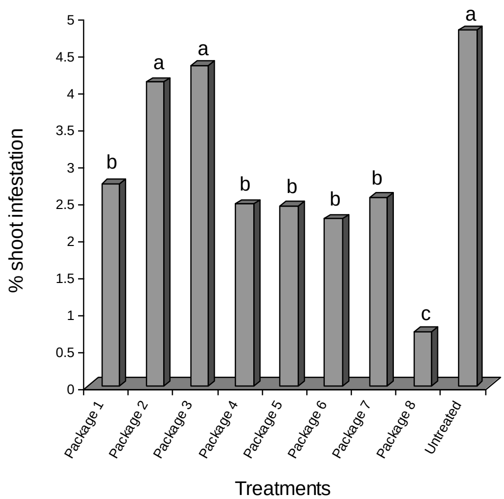

Fig. 1 Percent shoot infestation under different treatments caused by brinjal shoot and fruit borer. Bars having the same letter are not significantly different according to DMRT at $P\leq 0.05$

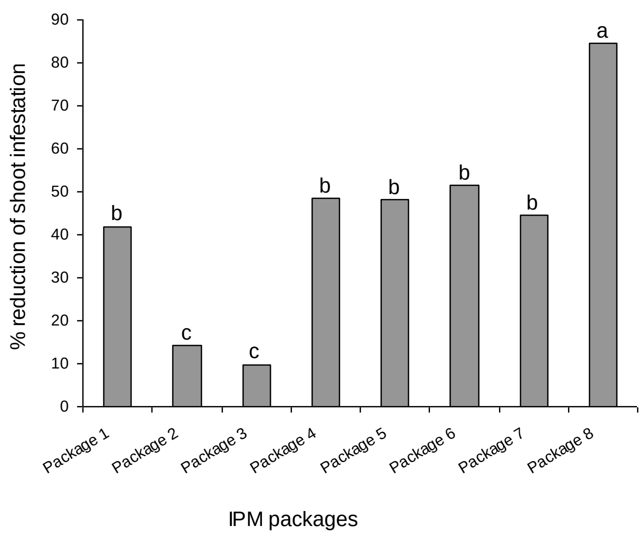

Fig. 2 Effect of different IPM packages on percent reduction of shoot infestation over control against brinjal shoot and fruit borer. Bars having the same letter are not significantly different according to DMRT at $P\leq 0.05$

Table 1. Effect of different IPM packages on number of fruits per plant and percent fruit infestation caused by brinjal shoot and fruit borer

IPM packages	Healthy fruits/ plant	Infested fruits/ plant	Total fruits/ plant	Percent fruit infestation by number	Percent reduction of fruit infestation over control
Package 1	20.09 bc	4.76b	24.85 abc	19.15 cd	53.86 bc
Package 2	19.42 cd	4.24 bc	23.66 abc	17.95 cd	56.85 bc
Package 3	16.38 de	4.80 b	21.18 bc	22.83 c	45.15 c
Package 4	21.47 bc	3.56 bcd	25.03 ab	14.16 de	65.99 ab
Package 5	21.67 bc	2.49 cd	24.16 abc	10.23 e	75.34 a
Package 6	25.00 a	2.20 d	27.20 a	8.04 e	80.63 a
Package 7	14.18 ef	7.69 a	21.87 bc	34.94b	16.32 d
Package 8	23.11 ab	2.27 cd	25.38 ab	8.85 e	78.70 a
Untreated	11.98 f	8.53 a	20.51 c	41.60 a	-
df	8,16	8,16	8,16	8,16	7,14
F	33.60	25.56	5.26	56.07	31.56
P	0.000	0.000	0.002	0.000	0.000

Means followed by the same letter in a column are not significantly different according to DMRT at $P \leq 0.05$.

Table 2. Effect of different IPM packages on fruit yield of brinjal against brinjal shoot and fruit borer infestation

IPM Packages	Healthy fruit yield		Infested fruit yield		Total fruit yield	
	t/ha	Increase over control (%)	t/ha	Decrease over control (%)	t/ha	Increase over control (%)
Package 1	14.60 b	72.17	2.41 b	44.34	17.01 a	32.79
Package 2	14.76 b	74.06	2.31 b	46.65	17.07 a	33.26
Package 3	11.60 c	36.79	2.43 b	43.88	14.03 b	9.52
Package 4	15.21 b	79.36	1.80 bc	58.43	17.01 a	32.79
Package 5	16.02 ab	88.92	1.32 c	69.52	17.34 a	35.36
Package 6	17.71 a	108.84	1.12 c	74.13	18.83 a	46.99
Package 7	10.04 cd	18.40	3.91 a	9.70	13.95 b	8.90
Package 8	16.37 ab	93.04	1.15 c	73.44	17.52 a	36.77
Untreated	8.48 d	-	4.33 a	-	12.81 b	-
df	8,16		8,16		8,16	
F	48.68		26.93		15.24	
P	0.000		0.000		0.000	

Means followed by the same letter in a column are not significantly different according to DMRT at $P \leq 0.05$.

Table 3. Benefit cost ratio of different IPM packages for the management of brinjal shoot and fruit borer

IPM Packages	No. of sprays	Variable cost of pest management (Tk/ha)				Healthy fruit yield (t/ha)	Gross return (Tk./ha)	Net return (Tk./ha)	Adjusted net return (Tk./ha)	Benefit cost ratio (BCR)
		Insecticide	Fertilizer	Labour	Total					
Package 1	6	7500	0	8360	15860	14.60	219000	203140	75940	4.79
Package 2	9	11250	1200	1980	14430	14.76	221400	206970	79770	5.53
Package 3	7	8750	0	8580	17330	11.60	174000	156670	29470	1.70
Package 4	5	6250	1200	8140	15590	15.21	228150	212560	85360	5.48
Package 5	5	6250	1200	15180	22630	16.02	240300	217670	90470	4.00
Package 6	8	10000	1200	15840	27040	17.71	265650	238610	111410	4.12
Package 7	0	0	1200	14080	15280	10.04	150600	135320	8120	0.53
Package 8	16	20000	0	3520	23520	16.37	245550	222030	94830	4.03
Untreated	0	0	0	0	0	8.48	127200	127200	-	-

Cost of insecticides : Flubendiamide 24WG @ Tk 5000.00/kg
Cost of spray : Two labourers/spray/ha @ Tk 110.00/day. Spray volume required: 500 l/ha
Cost of mechanical control : One labour/ha/week before fruiting stage for weeks; four labourers/ha/week starting from fruiting stage for 15 weeks (Islam et al., 1999)
Cost of field sanitation : Four labourers/ha/week starting from fruiting stage for 15 weeks.
Cost of muriate of potash : Tk 16.00/kg
Market price of brinjal : Healthy fruit Tk 15.00/ kg. (1U$= 69.00TK.)

THE DESCRIPTION OF A NATURAL INTERSPECIFIC HYBRID BETWEEN *CARABUS (ARCHIPLECTES) JUENTHNERI AVADCHARENSIS* KURNAKOV, 1972 AND *CARABUS (SPHODRISTOCARABUS) JANTHINUS RUGATUS* BREUNING, 1934 (COLEOPTERA, CARABIDAE).

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[Obydov, D. 2009. The description of a natural interspecific hybrid between *Carabus (Archiplectes) juenthneri avadcharensis* Kurnakov, 1972 and *Carabus (Sphodristocarabus) janthinus rugatus* Breuning, 1934 (Coleoptera, Carabidae). Munis Entomology & Zoology, 4 (1): 268-270**]**

ABSTRACT: A natural hybrid between *Carabus (Archiplectes) juenthneri avadcharensis* Kurnakov, 1972 and *Carabus (Sphodristocarabus) janthinus rugatus* Breuning, 1934 is described and figured.

KEY WORDS: Coleoptera, Carabidae, *Carabus*, *Archiplectes*, *Sphodristocarabus*, natural hybrid, Caucasus, Abkhazia.

Natural hybrids between species of the subgenera *Archiplectes* and *Sphodristocarabus* were not known till now. The description of a natural hybrid between *Carabus (Archiplectes) juenthneri avadcharensis* Kurnakov, 1972 and *Carabus (Sphodristocarabus) janthinus rugatus* Breuning, 1934 (Fig.2) is given below.

MATERIAL

Male: Caucasus, Abkhazia, 7,4 km from Ritza Lake to the north-east, 1,5 km from Kutykukh Village to the north, 1635 m, 19-25.VII.2008, A. Vlasenko leg.
Specimen is preserved in the collection of Mr. A.S Vlasenko (Moscow, Russia).

DESCRIPTION

***Carabus* (*Archiplectes*) *juenthneri avadcharensis* Kurnakov, 1972 (Fig.1)**

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***Carabus* (*Sphodristocarabus*) *janthinus rugatus* Breuning, 1934 (Fig.3)**

Body length is 25.4 mm (including mandibles), body width is 9.0 mm.

Body more convex than in *C. juenthneri avadcharensis* but less convex than in *C. janthinus rugatus*.

Head thickened; ratio width of pronotum/width of head 1.32; eyes prominent. Mandibles broader than in *C. janthinus rugatus* but narrower than in *C. juenthneri avadcharensis*; terebral tooth of the right and left mandibles bi-dentate, strongly prominent; retinaculum of the right mandible bigger, strongly prominent, retinaculum of the left mandible smaller, slightly prominent; surface of mandibles smooth. Frontal furrows broad and deep as in *C. juenthneri avadcharensis*, inside with few coarse wrinkles; frons and vertex nearly smooth as in *C. juenthneri avadcharensis*; neck with coarse punctures and wrinkles as in *C. janthinus rugatus*. Labrum wider than clypeus, slightly notched, with two lateral setae. Antenna long, protruding beyond the base of pronotum by five apical segments as in *C. juenthneri avadcharensis*, longer than in *C. janthinus rugatus*; palpi as in *C. juenthneri avadcharensis,* more dilated than in *C. janthinus rugatus*; penultimate segment of the maxillary palpi slightly longer than the last segment; penultimate segment of the labial palpi with two setae. Mentum tooth triangular broad as in *C. juenthneri avadcharensis,* slightly shorter than lateral lobes; submentum with two setiferous pores.

Prothorax broader than in *C. juenthneri avadcharensis* and *C. janthinus rugatus*; ratio width/length 1.96. Pronotum with more rough sculpture than in *C. juenthneri avadcharensis* but less rough than in *C. janthinus rugatus*; median longitudinal line distinct; basal foveae not deep as in *C. janthinus rugatus*, inside with dense coarse wrinkles as in *C. juenthneri avadcharensis*. Lobes of hind angles triangular, long, bent upwards as in *C. juenthneri avadcharensis*. Sides of pronotum narrowly margined and bent upward posteriorly, lateral margin with three setae.

Elytrae oval as in *C. janthinus rugatus* (in *C. juenthneri avadcharensis* elytrae oblong-oval), more convex than in *C. juenthneri avadcharensis* but less convex than in *C. janthinus rugatus*; widest at about middle; shoulders prominent as in *C. janthinus rugatus*, not so rounded as in *C. juenthneri avadcharensis*; sides of elytrae narrowly margined. Ratio length/width 1.50; ratio width of elytrae/width of pronotum 1.53. Elytral sculpture exactly intermediate between elytral sculpture of *C. juenthneri avadcharensis* and *C. janthinus rugatus*; primary elytral foveoles indistinct.

Abdominal sternites slightly wrinkled as in *C. juenthneri avadcharensis*, metepisternum with sparse fine wrinkles, not longer than its width; sternal sulci absent as in *C. juenthneri avadcharensis*. Legs longer than in *C. janthinus rugatus*; anterior tarsi with four dilated segments bearing hairy pads.

Shape of aedeagus and endophallic structure are conspecific with the genital structure of *C. juenthneri avadcharensis*.

Coloration black.

Distribution. Caucasus, Abkhazia, Ritza Lake environs.

Habitat. The specimen was collected in the brushwood near beech-fir forest.

LITERATURE CITED

Breuning, S. 1934. Über Carabini. Folia Zoologica et Hydrobiologica, 6: 29-40.

Kurnakov, V.N. 1972. Contribution à la Faune des Carabiques du Caucase. VI. Nouveaux Carabes du Caucase. Nouvelle Revue d'entomologie, II (2): 111-115.

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Figs 1-3. *Carabus* (general view): 1. *Carabus (Archiplectes) juenthneri avadcharensis*; 2. *Carabus (Archiplectes) juenthneri avadcharensis* X *Carabus (Sphodristocarabus) janthinus rugatus* interspecific hybrid; 3. *Carabus (Sphodristocarabus) janthinus rugatus*. All specimens from Caucasus, Abkhazia, Ritza Lake environs.

RICANIA GERMAR, 1818 SPECIES OF WESTERN PALAEARCTIC REGION (HEMIPTERA: FULGOROMORPHA: RICANIIDAE)

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[**Demir, E.** 2009. *Ricania* Germar, 1818 species of Western Palaearctic Region (Hemiptera: Fulgoromorpha: Ricaniidae). Munis Entomology & Zoology, 4 (1): 271-275]

ABSTRACT: In this study, *Ricania* species in western Palaearctic region are examined. Four species belonging to this genus are determined. These are; *Ricania aylae* Dlabola, 1983; *R. hedenborgi* Stal, 1865; *R. japonica* Melichar, 1898 and *R. soraya* Dlabola, 1983. *R. japonica* Melichar, 1898 is the first record for Turkish fauna.

KEY WORDS: *Ricania*, Fulgoromorpha, Hemiptera, Western Palaearctic region.

The family Ricaniidae is mostly distributed in Tropical regions. The family is represented only by the genus *Ricania* in the Palaearctic region. Melichar (1898) gave 48 species of the genus in his Ricanidae monograph. Nast (1972) reported 6 species in the check list in the Palaearctic region. At present, in Fulgoromorpha Lists on the Web, 93 species have been listed for the whole world except *R. aylae* Dlabola, 1983 and *R. soraya* Dlabola, 1983. Four species are known from the western Palaearctic region in the genus. These are *R. aylae* Dlabola, 1983; *Ricania hedenborgi* Stål, 1865; *R. japonica* Melichar, 1898 and *R. soraya* Dlabola, 1983. *Ricania hedenborgi* Stål, 1865 is the most widely distributed species in the region. In the western Palaearctic region, *R. japonica* Melichar, 1898 from Ukraine, *R. aylae* Dlabola, 1983 from Turkey and *R. soraya* Dlabola, 1983 from Iran are known. Also, *R. aylae* Dlabola, 1983 is endemic to Turkey and *R. soraya* Dlabola, 1983 is endemic to Iran.

The genus *Ricania* is one of the genera that include the most considerable species for Turkish fauna.

In this study, for the purpose of determining the status of *Ricania* species in Turkey, my own sent specimens of *R. japonica* and *Ricania* specimens in the Museum of Agricultural Struggle Institute are examined. *Ricania* specimens in the Museum are determined as two species, *R. aylae* and *R. hedenborgi*. In the museum, *R. aylae* and *R. hedenborgi* was identified by Dr. J. Dlabola. I checked them. So I confirmed their identification. Anyway, the specimens of *R. aylae* are paratypes.

On the other hand, some *Ricania* specimens were sent from Rize province (Eastern Black Sea Region) for identification to Ankara Agricultural Struggle Central Research Institute. The specimens were given by a member of staff (Dr. Işıl Özdemir) of the Institute to the author for identification. Some of the specimens are deposited in the museum of the Institute and some of them are in the personal collection of the author. The specimens were identified by the author as *R. japonica*. It is the first record to Turkey. This record is very important. Since the record of Turkey of this Far East distributed species (which occurs in Japan, China, Korea and Oriental region) also confirm the record for Ukraine and doubtful Georgian record.

Consequently, the western Palaearctic *Ricania* fauna now consists of four species.

Family: Ricaniidae Amyot et Serville, 1843
Genus: *Ricania* Germar, 1818

Type-species: *Cicada hyalina* Fabricius, 1775

***Ricania aylae* Dlabola, 1983**

Dlabola, J. 1983. Ergebnisse der Tschechoslovakisch-Iranischen entomologischen Expeditionen 1970 und 1973 nach dem Iran. Acta entomologica Musei Nationalis Pragae 41: 91-97.

Distribution: Turkey (Dlabola, 1983). **Distribution in Turkey:** Elazığ prov., İzmir prov.: Selçuk, Muğla prov.: Marmaris, Muş prov. (Dlabola, 1983).

***Ricania hedenborgi* Stål, 1865**

Stål, C. 1865. Homoptera nova vel minus cognita, Ofversigt af Kongliga Svenska Vetenskaps-Akademiens Förhandlingar. Stockholm 22: 145-165.

Distribution: Armenia, Afro-tropical region, Crete, Dodecanese Is., Greece, North Aegean Is., Near East, North Africa, Turkey (Nast, 1972, 1987; www.faunaeur.org). **Distribution in Turkey:** Diyarbakır prov.: Ergani, Mardin prov.: Nusaybin (Lodos & Kalkandelen, 1981).

***Ricania japonica* Melichar, 1898**

Melichar, L. 1898. Vorlaufige Beschreibungen neuer Ricanideen, Verhandlungen der Kaiserlich-Königlichen Zoologisch-botanischen Gesellschaft in Wien. Wien 48: 384-400.

Distribution: Japan (Honshu, Kyushu, Shikoku), N China, Georgia?, Korea, Oriental region, Ukraine (Nast, 1972, 1987; www.faunaeur.org). **Distribution in Turkey:** This species is the first record to Turkey. **Materials:** Rize: Center, 26.08.2007, 45♂♂, 44♀♀ (Resul Yıldırım leg.) on *Vitis vinifera*, *Rubus* sp., *Camelia sinensis*, *Ficus carica*, *Phaseolus vulgaris*, *Cucumis sativus*, *Lycopersicum esculentum* and weeds. On the other side, this species was observed by agricultural engineers on the cultural plants in Rize province and numerous specimens were collected (Plate 1).

***Ricania soraya* Dlabola, 1983**

Dlabola, J. 1983. Ergebnisse der Tschechoslovakisch-Iranischen entomologischen Expeditionen 1970 und 1973 nach dem Iran. Acta entomologica Musei Nationalis Pragae 41: 91-97.

Distribution: Iran (Dlabola, 1983).

DISCUSSION

As a result of examining all the specimens, diagnostic characters between *R. aylae* and *R. hedenborgi* given in the key by Dlabola (1983) could not be determined. Dlabola's key (1983) is given as follows. In the examined specimens, diagnostic characters between two species have not been observed in terms of mentioned characters, namely size, colour and apical spots on the wings in the key (Plate 2). Besides, genital structures of paratypes of *R. aylae* and male specimens of *R. hedenborgi* are examined.

As a result of the examination, it is seen that apophysis in apex of aedeagus is longer than that of *R. hedenborgi*. Any difference could not be seen between two species except this. Also, *R. japonica* specimens and wing patterns and genital structures of *R. soraya* described from İran by Dlabola are compared with them. Wings patterns are important to separate *Ricania* species such as given in monograph of Melichar.

I compared genital structures of *R. soraya, R. japonica, R. aylae* and *R. hedenborgi*. The species *R. soraya* and *R. japonica* are easily distinguished from other species by both wing patterns and genital structures are easily distinguished from the above two species. However, *R. aylae* and *R. hedenborgi* can not be separated to each other. Their genital structures are rather similar, but only, the length of apophysis in apex of aedeagus is different. It is possible that the difference is in populational variations. So, *R. aylae* may be a synonym of *R. hedenborgi*. More specimens should be examined for a certain decision of this approach.

LITERATURE CITED

Dlabola, J. 1983. Ergebnisse der Tschechoslovakisch-Iranischen entomologischen Expeditionen 1970 und 1973 nach dem Iran. Acta entomologica Musei Nationalis Pragae 41: 91-97.

Lodos, N. & Kalkandelen, A. 1981. Preliminary list of Auchenorrhyncha with notes on distribution and importance of species in Turkey V. Families Flatidae, Ricaniidae and Cicadidae. Türkiye Bitki koruma Dergisi 5(2): 67-82.

Melichar, L. 1898. Vorläufige Beschreibung neuer Ricaniiden. Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien 48: 384-400.

Nast, J. 1972. Palaearctic Auchenorrhyncha (Homoptera). An annotated check list Polish Scientific Publishers, Warszawa. 550 pp.

Nast, J. 1987. The Auchenorrhyncha (Homoptera) of Europe. Annales Zoologici Warszawa 40: 535-661.

Fulgoromorpha Lists on the Web (FLOW). http://flow.snv.jussieu.fr/cgi-bin/entomosite.pl

Fauna Europaea. http://www.faunaeur.org/

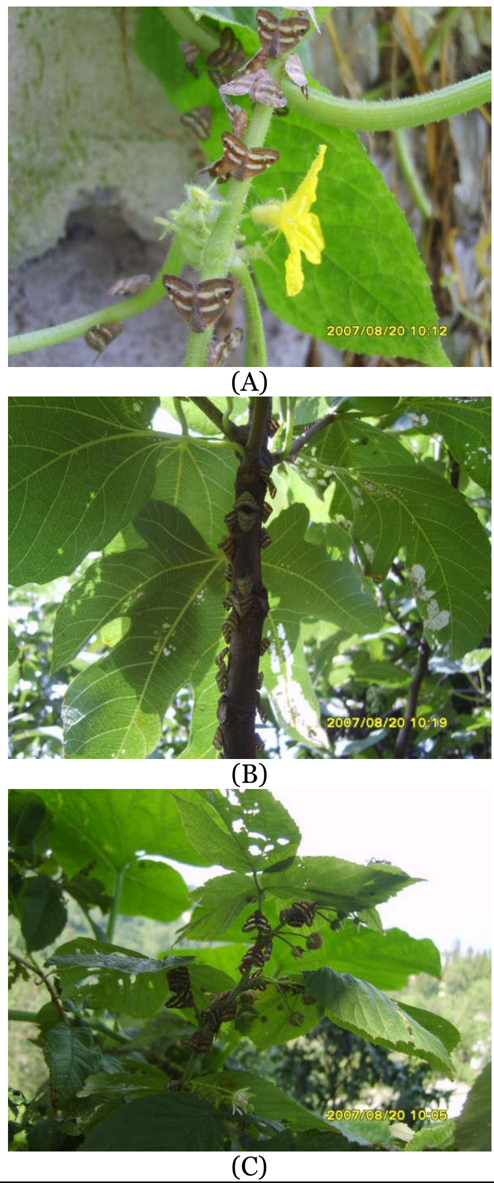

Plate 1: *Ricania japonica* specimens. A: on *Cucumis sativa*, B: on *Ficus carica* C: on *Rubus* sp.

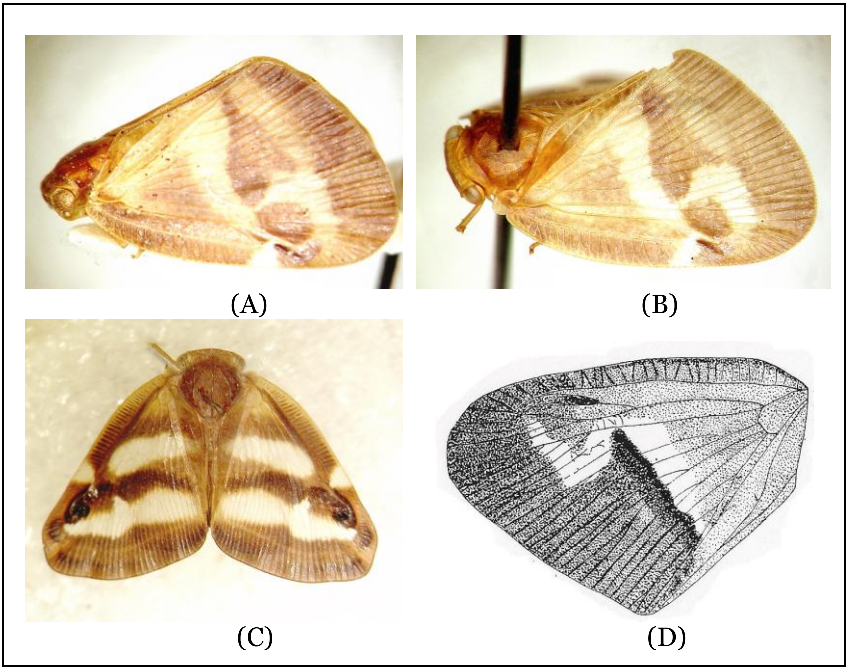

Plate 2: A: *Ricania aylae* (Paratypus male: İzmir prov: Selçuk), B: *R. hedenborgi* (Male: Mardin prov: Nusaybin), C: *R.japonica* (Male: Rize prov.), D: *R. soraya* from Dlabola (1983).

FIRST RECORDS OF SOME LEAFBEETLES FOR MEDITERRANEAN REGION IN TURKEY AND SOUTH TURKEY (COLEOPTERA: CHRYSOMELIDAE)

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[Özdikmen, H. 2009. First records of some leafbeetles for Mediterranean region in Turkey and south Turkey (Coleoptera: Chrysomelidae). Munis Entomology & Zoology, 4 (1): 276-279**]**

ABSTRACT: In this work, specimens of the family Chrysomelidae that were collected from various parts of the Amanos Mountains in 2006-2007 were evaluated faunistically and zoogeographically. As a result of this, a total of 10 species were determined as the first records for Mediterranean region in Turkey and 6 of them were also determined as the first records for the whole South Turkey.

KEY WORDS: Chrysomelidae, Turkey

The members of Chrysomelidae feed on plant materials (e.g., leaves, flowers etc.). For this reason, some of Chrysomelidae are regarded as pests in terms of agriculture and forestry. So Chrysomelidae data are very important for all countries.

Following from this aim, new Chrysomelidae data for Turkey are presented in this work. The examined specimens were collected from various parts of the Amanos Mountains (in Mediterranean region in Turkey) in 2006-2007. As a result of this, ten species were determined as the first records for Mediterranean region in Turkey such as *Crioceris asparagi* (Linnaeus, 1758), *Tituboea macropus* (Illiger, 1800), *Smaragdina concolor* (Fabricius, 1792), *Chrysolina chalcites* (Germar, 1824), *Chrysolina orientalis* (Olivier, 1807), *Prasocuris junci* (Brahm, 1790), *Galeruca pomonae* (Scopoli, 1763), *Calomicrus lividus* (Joannis, 1866), *Altica quercetorum* Foudras, 1860 and *Psylliodes hyoscyami* (Linnaeus, 1758). Six species among these were also determined as the first records for whole South Turkey such as *Crioceris asparagi* (Linnaeus, 1758), *Smaragdina concolor* (Fabricius, 1792), *Galeruca pomonae* (Scopoli, 1763), *Calomicrus lividus* (Joannis, 1866), *Altica quercetorum* Foudras, 1860 and *Psylliodes hyoscyami* (Linnaeus, 1758).

Subfamily CRIOCERINAE

Crioceris asparagi (Linnaeus, 1758)

Material examined: Osmaniye: Zorkun road, Çiftmazı place, 223 m, N 37 01 E 36 17, 20.05.2006, 1 specimen. **Distribution in Turkey:** İzmir (Gül-Zümreoğlu, 1972); Amasya (Tomov & Gruev, 1975); Kars (Aslan, 2000); Aksaray, Kayseri, Karabük (Özdikmen & Turgut, 2008). **Range:** From Iberian Peninsula to Central Asia, introduced also to N America, Argentina and Tanzania (Warchalowski, 2003). **Chorotype:** Mainly Holarctic. **Remarks:** The species has three subspecies (incl. nominative subspecies) in the world. It is represented only by the subspecies *C. asparagi maculipes* (Gebler, 1834) in Turkey. Until now, it has been reported only from N, W and C Turkey. It is reported for the first time both for Mediterranean region in Turkey and whole S Turkey.

Subfamily CLYTRINAE

Tituboea macropus (Illiger, 1800)

Material examined: Osmaniye: Küllü village, 1707 m, N 36 57 E 36 24, 25.06.2006, 3 specimens, Hasanbeyli, Kalecikli village, 587 m, N 37 09 E 36 27, 19.05.2006, 7 specimens, Zorkun-Karıncalı-Hassa road, Küllü plateau, 1603 m, N 36 57 E 36 21, 25.06.2006, 1 specimen, Bahçe, 551 m, N 37 11 E 36 33, 18.05.2006, 1 specimen, Hınzırlı plateau, Kalaycıbatıran place, 1465 m, N 36 58 E 36 27, 25.06.2006, 1 specimen; **Hatay**: Entry of Belen, Çakallı, 652 m, N 36 28 E 36 13, 19.05.2006, 1 specimen, Erzin, Gökgöl, N 36 57 E 36 17, 600 m, 04.06.2007, 5 specimens; **Kilis**: Hassa–Kilis road, Hisar village, 16.05.2006, 2 specimens. **Distribution in Turkey:** Konya, Ankara, Sivas, Kars (Kasap, 1987); Aegean region (Aydın, 1988); Konya, Aydın, Çanakkale, İzmir, Muğla (Aydın & Kısmalı, 1990); Artvin, Erzurum, Konya, Aydın, Çanakkale, İzmir, Muğla (Aslan & Özbek, 1998). **Range:** European Russia, Caucasus, Turkmenia, Ozbekistan, S and C Europe, Asia Minor, Syria, W Iran (Lopatin, 1977); Distributed in SE Europe and Asia Minor, from Austria and Albania to basin of Volga and Caucasian countries (Warchalowski, 2003). **Chorotype:** Turano-Mediterranean. **Remarks:** Until now, it has been reported only from N, W, NE and C Turkey. It is reported for the first time for the Mediterranean region in Turkey.

Smaragdina concolor (Fabricius, 1792)

Material examined: Hatay: Antakya, Saint Pierre church env., N 16 12 E 36 10, 210 m, 30.03.2007, 5 specimens, Harbiye-Yayladağı road, N 36 07 E 36 08, 275 m, 30.03.2007, 5 specimens, Harbiye, N 36 07 E 36 08, 273 m, 30.03.2007, 1 specimen, Alahan castle, N 36 19 E 36 11, 147 m, 30.03.2007, 3 specimens, Yayladağı, N 35 55 E 36 06, 787 m, 20.04.2007, 1 specimen, Aktepe, N 36 39 E 36 27, 207 m, 18.05.2007, 1 specimen, Akbez, N 36 50 E 36 32, 464 m, 22.04.2007, 1 specimen; **Gaziantep**: Nurdağı, N 37 10 E 36 42, 814 m, 17.05.2007, 2 specimens, Fevzipaşa, Türkbahçe village, N 37 04 E 36 37, 521 m, 18.05.2007, 2 specimens, Nurdağı, Gökçedere village, N 37 09 E 36 43, 496 m, 17.05.2007, 1 specimen; **Osmaniye**: Hasanbeyli, N 37 07 E 36 32, 711 m, 21.04.2007, 1 specimen, 31.03.2007, 2 specimens. **Distribution in Turkey:** İstanbul (Lefevre, 1872); Bursa, Ankara, Samsun, Tokat (Medvedev, 1970); İstanbul, Samsun (Tomov & Gruev, 1975); Gümüşhane, Bursa (Gruev & Tomov, 1979); İstanbul, Bursa, Samsun, Tokat, Gümüşhane, Ankara, Trabzon, Kastamonu (Kasap,1987); Asia Minor (Medvedev, 1990). **Range:** Spain, France, Italy, Bulgaria, Romania and Asia Minor (Warchalowski, 2003). **Chorotype:** S-European. **Remarks:** The species has three subspecies (incl. nominative subspecies) in the world. It is represented only by the subspecies *S. concolor hypocrita* (Lacordaire, 1848) in Turkey. Until now, it has been reported only from N, NW and North of C Turkey. It is reported for the first time both for the Mediterranean region in Turkey and the whole S Turkey.

Subfamily CHRYSOMELINAE

Chrysolina chalcites (Germar, 1824)

Material examined: Osmaniye: Zorkun road, Çiftmazı place, 223 m, N 37 01 E 36 17, 20.05.2006, 1 specimen, Fakıuşağı village, 655 m, N 36 01 E 36 12, 19.05.2006, 1 specimen, 145 m, N 37 02 E 36 13, 09.04.2006, 1 specimen, Boğaz plateau, 713 m, N 37 04 E 36 22, 18.05.2006, 1 specimen; **Gaziantep**: Kilis-Gaziantep road, turn of Oğuzeli, 16.05.2006, 3 specimens. **Distribution in Turkey:** Sakarya, Konya (Bodemeyer, 1900); Denizli, Bursa (Bechyne, 1952); Anadolu (Gruev, 1973); Amasya, Samsun (Tomov & Gruev, 1975); Asia Minor (Warchalowski, 1976); Amasya, Samsun, İzmir, İstanbul, Diyarbakır (ex Aslan & Özbek, 1999); Artvin, Erzurum (Aslan & Özbek, 1999). **Range:** SE Europe, Caucasus, Asia Minor, Near East and Central Asia (Warchalowski, 2003). **Chorotype:** Turano-Mediterranean. **Remarks:** Until now, it has been reported only from N, W, C and SE Turkey. It is reported for the first time for the Mediterranean region in Turkey.

Chrysolina orientalis (Olivier, 1807)

Material examined: Hatay: Dörtyol, Kuzuculu, 119 m, N 36 54 E 36 13, 07.04.2006, 2 specimens, Entry of Belen, Çakallı, 652 m, N 36 28 E 36 13, 19.05.2006, 1 specimen; **Osmaniye**: Kalecik-Hasanbeyli road, 679 m, N 37 09 E 36 28, 19.05.2006, 2 specimens. **Distribution in Turkey:** Amasya (Weise, 1884); Konya (Bodemeyer, 1900); İstanbul, Bilecik, Bursa, Afyon (Bechyne, 1952); Asia Minor, S Turkey (Warchalowski, 1976, 2003). **Range:** Greece, Turkey, Lebanon, Israel (Warchalowski, 2003). **Chorotype:** Turano-Mediterranean. **Remarks:** The species has three subspecies (incl. nominative subspecies) in the world. It is represented by two subspecies, the nominative subspecies and *C. orientalis thraeissa* Bechyne, 1950 in Turkey. The examined materials in this work belong to the subspecies *C. orientalis thraeissa* Bechyne, 1950. Until now, it has been reported only from N, NW and C Turkey. It is reported for the first time for the Mediterranean region in Turkey.

Prasocuris junci (Brahm, 1790)

Material examined: Gaziantep: Nurdağı, Gökçedere village, 496 m, N 37 09 55 E 36 43 10, 17.05.2007, 1 specimen; **Osmaniye**: Bahçe, Kabacalı village, 722m, N 37 11 57 E 36 36 05, 02.06.2007, 1 specimen. **Distribution in Turkey:** Gümüşhane, Samsun (Tomov & Gruev, 1975); Asia Minor (Warchalowski, 1976); Afyon, Ankara, Eskişehir, Kayseri, Kırşehir, Konya, Muğla, Nevşehir, Sivas, Yozgat, Samsun, Erzurum (Aslan & Özbek, 1999). **Range:** W, C and S Europe, S Turkey, Azerbaijan (Warchalowski, 2003). **Chorotype:** W-Palaearctic. **Remarks:** Until now, it has been reported only from N, W and C Turkey. It is reported for the first time both for the Mediterranean region in Turkey.

Subfamily GALERUCINAE

Galeruca pomonae (Scopoli, 1763)

Material examined: Osmaniye: Entry of Yarpuz, 930 m, N 37 03 E 36 25, 18.05.2006, 17 specimens, Zorkun, Karıncalı-Hassa road, Küllü plateau, 1603 m, N 36 57 E 36 21, 25.06.2006, 8 specimens, Zorkun road, Karacalar village, 381 m, N 37 02 E 36 16, 24.06.2006, 1 specimen, Küllü-Islahiye road, Hınzırlı plateau, 1620 m, N 36 57 E 36 25, 25.06.2006, 1 specimen. **Distribution in Turkey:** Konya (Bodemeyer, 1900); Çankırı (Tomov & Gruev, 1975); Asia Minor (Warchalowski, 1976); Erzurum (Aslan, 1998); Rize (Aslan et al., 2000). **Range:** From portugal and Ireland to Central Asia, intruduced also in N America (Warchalowski, 2003). **Chorotype:** W-Palaearctic + Nearctic. **Remarks:** Until now, it has been reported only from N and C Turkey. It is reported for the first time both for the Mediterranean region in Turkey and the whole S Turkey.

Calomicrus lividus (Joannis, 1866)

Material examined: Osmaniye: Kuşcubeli pass, 1134 m, N 37 06 675 E 36 36 525, 19.05.2006, 19 specimens. **Distribution in Turkey:** Asia Minor (Laboissière, 1912; Warchalowski, 1976); Erzurum (Aslan, 1998); Erzincan, Kars (Aslan et al., 2000). **Range:** E Turkey, Syria and Lebanon (Warchalowski, 2003). **Chorotype:** E-Mediterranean (Palaestino-Taurian). **Remarks:** Until now, it has been reported only from NE Turkey. It is reported for the first time both for the Mediterranean region in Turkey and the whole S Turkey.

Subfamily ALTICINAE

Altica quercetorum Foudras, 1860

Material examined: Osmaniye: Bıçakçı village, 293 m, N 37 09 35 E 36 17 22, 21.04.2007, 1 specimen. **Distribution in Turkey:** Turkey (Acatay, 1963); İstanbul (Tomov & Gruev, 1975); Asia Minor (Warchalowski, 1976). **Range:** In Europe from N Spain, Netherlands and S Norway to basin of Volga, also in Asia Minor, Caucasus (Warchalowski, 2003). **Chorotype:** European. **Remarks:** Until now, it has been reported only from N Turkey. It is reported for the first time both for the Mediterranean region in Turkey and the whole S Turkey.

Psylliodes hyoscyami (Linnaeus, 1758)

Material examined: Hatay: Akbez, 527 m, N 36 51 10 E 36 32 13, 18.05.2007, 1 specimen. **Osmaniye**: Düziçi, Yarbaş, 376 m, N 37 11 01 E 36 25 04, 02.06.2007, 1 specimen. **Distribution in Turkey:** Asia Minor (Warchalowski, 1976); Bayburt, Erzurum (Aslan et at., 1999). **Range:** Transpalaearctic species, from British Isles to Russian Far East and in European part of Mediterranean area (Warchalowski, 2003). **Chorotype:** Sibero-European. **Remarks:** Until now, it has been reported only from N Turkey. It is reported for the first time both for the Mediterranean region in Turkey and the whole S Turkey.

LITERATURE CITED

Acatay, 1963. Tatbiki orman entomolojisi. İstanbul Üniversitesi yay., İstanbul, 1068: 169 pp.

Aslan, İ. 1998. Faunistic and systematic studies on the subfamily Galerucinae (Coleoptera: Chrysomelidae) in Erzurum provinces. Türk. Entomol. Derg., 22 (4): 285-298.

Aslan, İ. 2000. Doğu Anadolu'da Criocerinae (Coleoptera : Chrysomelidae) altfamilyası üzerinde faunistik ve sistematik çalışma. Türkiye 4. Entomoloji Kongresi, 12-15 Eylül 2000, Aydın, 511-522.

Aslan, İ., Gruev, B. & Özbek, H. 1999. A preliminary review of the subfamily Alticinae (Coleoptera, Chrysomelidae) in Turkey. Turkish Journal of Zoology, 23 (1999): 373-414.

Aslan, İ. & Özbek, H. 1998. Erzurum, Erzincan ve Artvin illeri Clytrinae (Coleoptera, Chrysomelidae) altfamilyası üzerinde faunistik ve sistematik bir araştırma. Ata. Üniv. Zir. Fak. Derg., 20 (1): 57-76.

Aslan, İ. & Özbek, H. 1999. Faunistic and systematic studies on the subfamily Chrysomelinae (Coleoptera, Chrysomelidae) in Artvin, Erzincan and Erzurum Provinces of Turkey. Turkish Journal of Zoology, 23 (3): 751-767.

Aslan, İ., Warchalowski, A. & Özbek, H. 2000. A Preliminary Review of the Subfamily Galerucinae (Coleoptera, Chrysomelidae) in Turkey. J. Ent. Res. Soc. 2(2): 27-42.

Aydın, E. 1988. Ege Bölgesi Clytrinae (Coleoptera, Chrysomelidae) altfamilyasi türleri üzerinde sistematik çalismalar. Yüksek Lisans Tezi, Bornova, İzmir.

Aydın, E. & Kısmalı, S. 1990. Ege Bölgesi Clytrinae (Coleoptera, Chrysomelidae) altfamilyasi türleri üzerinde faunistik çalismalar. Türk. Entomol. Derg. 14(1):23–35.

Bechyne, J. 1952. Achter Beitrag zur Kenntnis der Gattung Chrysolina Motsch. (Col. Phytoph. Chrysomelidae). Entom. Arkeiton aus den Museum G. Frey, 3 (2): 351-385.

Bodemeyer, H. E. V. 1900. Quer durch Klein Asien, in den Bulghar Dagh; Eine Naturvissenschafliche studien-Reise. Coleopterologisches, 196 pp.

Gruev, B. 1973. Neue Angaben uber die Systematik und Verbreitung einiger palaarktischen Arten der Gattung Longitarsus Latr. mit Beschreibung einer neuen Art aus Bulgarien (Coleoptera, Chrysomelidae). Trav. Sci. Univ. Plovdiv, Biol. 11(5):105–123.

Gruev. B. & Tomov, V. 1979. Zur Kenntnis einiger in der Türkei, Jugoslawien und Griechenland vorkommender Arten der Familie Chrysomelidae (Coleoplera) aus der Zoologischen Staatssammlung München. Spixiana, 2 (3): 259-267.

Gül-Zümreoğlu, S. 1972. İzmir Bölge Zirai Mücadele Araştırma Enstitüsü Böcek ve Genel Zararlılar Kataloğu. Zirai Mücadele ve Zirai Karantina Genel Müdürlüğü yayınları, İzmir, 119 s.

Kasap, H. 1987. A list of some Clytrinae (Col.: Chrysomelidae) from Turkey. Labidostomis, Lachnaea, Antipa, Coptocehala* (Part I). Turk. entomol. derg. 11(1):41-52, 2 figs.

Laboissiere, V. 1912. Revision des Galeruocini d'Europe et pays limitrophes. Ann. I' Association des Naturelles, 1912:13–55.

Lefevre, E. 1872. Manographie des Clytrides d'Europe et du basin de la Mediterrance I. Annales de la societe entomologique de France(s), 1872 (II): 59-168; 313-396.

Lopatin, I. 1977. Leaf beetles (Chrysomelidae) of Middle Asia and Kazakhistan. Nauka, Leningrad, 268p.

Medvedev, L. N. 1970. A list of Chrysomelidae collected by Dr. W. Wittmer in Turkey (Coleoptera). Rev. Suisse de Zool., 77: 309-3 19.

Medvedev, L. N. 1990. Zhuki-Listoedy podsemeistva *Clytrinae* (Coleoptera ,Chrysomelidae) Kavkaza (Leaf-Beetles of subgenus *Clytrina*e (Coleoptera, Chrysomelidae) in the Caucas fauna of Terrestrial arthropods in the Caucaus, colleccted papers. Moscow: nauka, 1990).

Özdikmen, H. & Turgut, S. 2008. The subfamily Criocerinae of Turkey (Coleoptera: Chrysomelidae) with two new records and zoogeographical remarks. Munis Entomology & Zoology, 3 (1): 239-250.

Tomov, V. & Gruev, B. 1975. Chrysomelidae (Coleoptera) collected by K. M. Guichard in Turkey, Greece and Yugoslavia. Trav. Sci., 13 (4): 134–151.

Warchalowski, A. 1976. Biogeographische Studien uber die Blattkafer der Pontischen Provinz (Coleoptera: Chrysomelidae). Pol. Pismo Entomol., 46: 29–94.

Warchalowski, A. 2003. Chrysomelidae, The leaf-beetles of Europe and the Mediterranean area. Natura optima dux Foundation, Warszawa, 600 pp.

Weise, J. 1884. Beitrag zur Chrysomelden-fauna von Amasia. Deutsche Entomologische Zeitschrift, 28 heft I, 1884.

PRELIMINARY REPORT ON THE FULGOROMORPHA (HEMIPTERA) FAUNA OF KEMALİYE (ERZİNCAN) WITH A NEW RECORD FOR TURKEY

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[Demir, E. 2009. Preliminary report on the Fulgoromorpha (Hemiptera) fauna of Kemaliye (Erzincan) with a new record for Turkey. Munis Entomology & Zoology, 4 (1): 280-286**]**

ABSTRACT: In this study, 227 samples of Fulgoromorpha species collected from Kemaliye (Erzincan) region in east Turkey during field studies in the years 2006-2007 are examined 29 species belonging to 9 families are found to be distributed in the region. Among these, 12 species belong to the Family Cixiidae, 5 species to Delphacidae, 1 species to Meenoplidae, 1 species to Derbidae, 1 species to Dictyopharidae, 5 species to Tettigometridae, 1 species to Caliscelidae, 2 species to Issidae and 1 species to Ricaniidae. Distribution of these species in Turkey and their host plants are given along with their locality records. 27 of these examined species are new records for Kemaliye, 20 are new records for Erzincan, 7 are new records for East Anatolien and *Tettigometra laeta* Herrich-Schäffer, 1835 is a new record for Turkey's fauna.

KEY WORDS: Hemiptera, Fulgoromorpha, fauna, new record, Turkey.

Kemaliye is a district where the Fırat River passes through the middle of it placed in South Erzincan in East Anatolia. It is between 38° 15' - 39° 0' east longitude and 39° 30' – 39° 0' north latitude. It has different properties than the general structure of the East Anatolian Region in terms of flora and fauna because of having local climatical regions.

In the study of Lodos and Kalkandelen (1980-1988) in Turkey Auchenorrhyncha list 14 Fulgoromorph records from Erzincan and 2 records from Kemaliye were given. In the result of scanning present literature it is seen that there is not any record from related region except Lodos and Kalkandelen.

With this study the determination of fauna of the Kemaliye region is given by analysing collected specimens.

MATERIAL AND METHODS

Field studies were carried out in the years 2006 and 2007. 227 adult Fulgoromorpha specimens were collected and analyzed. Samples were collected by sweeping the herbaceous plants with a wood shaft net. The host plants of samples collected from only one species of herbaceous plant, tree or bush by wood shaft net were determined. Hemipterans, which were found in the wood shaft net after sweeping the plants, were vacuumed with an aspirator. The samples in the aspirator were then killed in ethyl acetate in a jar and put in standard envelopes. These samples were brought to the lab in envelopes and prepared according to standard methods to produce museum material.

RESULTS

It was found that there were 29 species of Fulgoromorpha suborder in the study area. Along with their distribution in Turkey and the plants found to be their host, the examined materials of these species are given as a list, below.

Suborder: Fulgoromorpha Evans, 1946
Family: Cixiidae Spinola, 1839
Subfamily: Cixiinae Spinola, 1839
Tribe: Cixiini Spinola, 1839

Cixius* (*Ceratocixius*) *pallipes Fieber, 1876
Distribution in Turkey: Adıyaman, Afyon, Ankara, Antalya, Artvin, Aydın, Balıkesir, Çanakkale, Diyarbakır, Erzincan (BahçeliVillage), Erzurum, Gaziantep, Giresun, Gümüşhane, Hakkari, Yüksekova, İzmir, Konya, Kütahya, Malatya, Mardin, Muğla, Ordu, Urfa (Lodos & Kalkandelen, 1980a; Dlabola, 1981; Demir, 2007a). **Materials:** Kemaliye: Yuva Village, 03.06.2007, 1♂, 970 m, Yeşilyayla Village (Subaşı), 04.06.2007, 2♂♂, 1350 m, Kekikpınarı Village (Köprü), 06.07.2006, 1♀, 1320 m.

Cixius* (*Ceratocixius*) *remotus Edwards, 1888
Distribution in Turkey: Adana, Ankara, Antalya, Erzurum, Konya (Kalkandelen, 1988; Demir, 2007a, 2007b). **Materials:** Kemaliye: Sarıçiçek (Subatan), 11.06.2006, 1♂, 8♀♀, 1890 m, Salihli Village (Opposite of Dump), 09.07.2006, 1♀, 1500 m, Sarıçiçek (Subatan), 02.06.2007, 5♂♂, 5♀♀, 1890 m.

Tachycixius bidentifer Dlabola, 1971
Distribution in Turkey: Adana, Gaziantep, Hakkari, İçel, Kahramanmaraş, Mardin (Dlabola, 1971; Kalkandelen, 1988). **Materials:** Kemaliye: Yeşilyayla Village (Subaşı), 04.06.2007, 1♀, 1350 m.

Tribe: Duiliini
Duilius fasciata (Horvath, 1894)
Distribution in Turkey: Çankırı, Erzincan (Kalkandelen, 1989). **Materials:** Kemaliye: Yeşilyamaç Village (Geşo Pass), 08.07.2006, 1♂, 1670 m.

Duilius seticulosus (Lethierry, 1874)
Distribution in Turkey: Antalya, Erzincan (Ilıç), Kahramanmaraş, Nevşehir (Kalkandelen, 1989; Lodos & Kalkandelen, 1988; Demir, 2007a). **Materials:** Kemaliye: Rabat River (Tunceli border), 03.07.2007, 3♂♂, 1♀ on *Tamarix*.

Tribe: Pentastirini Emeljanov, 1971

Pentastiridius* (*s. str.*) *leporinus (Linnaeus, 1761)
= *latifrons* Walker, 1851 = *pallens* Germar, 1818 = *pallida* Herrich-Schäffer, 1835.
Distribution in Turkey: Adana, Ağrı, Ankara, Antalya, Aydın, Bitlis, Çankırı, Diyarbakır, Erzurum, Hatya, İçel, Kars, Konya, Kahramanmaraş, Mardin, Nevşehir, Niğde (Fahringer, 1922; Lodos & Kalkandelen, 1980; Kalkandelen, 1990; Demir, 2007a). **Materials:** Kemaliye: Yuva Village, 03.06.2007, 3♂♂, 3♀♀, 970 m.

Setapius barajus (Dlabola, 1957)
Distribution in Turkey: Adana, Ağrı, Ankara, Bursa, Denizli, Diyarbakır, Elazığ, Erzincan (BahçeliVillage), Erzurum, Gümüşhane, İçel, İzmir, Iğdır, Malatya, Mardin, Muş, Nevşehir, Samsun, Sinop, Siirt, Sivas, Uşak (Linnavuori, 1965; Lodos & Kalkandelen, 1980a; Dlabola, 1981; Kalkandelen, 1990). **Materials:** Kemaliye: Rabat River (Tunceli border), 03.07.2007, 1♂, Salihli Village (Opposite of Dump), 09.07.2006, 1♂, 2♀♀, 1500 m.

Reptalus (s. str.) horridus (Linnavuori, 1962)
= *zercanus* Dlabola, 1965.
Distribution in Turkey: Adana, Ankara, Antalya, İzmir (Kalkandelen, 1994; Demir, 2007a, 2007b). **Materials:** Kemaliye: Sarıçiçek (Mazman Well), 07.07.2006, 2♂♂, 1♀, 1690 m, Yeşilyamaç Village (Geşo Pass), 08.07.2006, 1♂, 1670 m, Yuva Village, 08.07.2006, 1♂, 930 m.

Reptalus (s. str.) melanochaetus (Fieber, 1876)
Distribution in Turkey: Ankara, Artvin, Aydın, Bilecik, Diyarbakır, Edirne, Erzurum, Giresun, Hatay, Isparta, İzmir, İstanbul, Kırklareli, Kırşehir, Muğla, Tekirdağ (Linnvuori, 1965; Lodos & Kalkandelen, 1980a; Kalkandelen, 1994). **Materials:** Kemaliye: Sarıçiçek (Mazman Well), 07.07.2006, 5♂♂, 1690 m, Kabataş Village (İkisu Place), 03.06.2007, 1♀, 1550 m.

Hyalesthes luteipes Fieber, 1879
Distribution in Turkey: Ankara, Antalya, Aydın, Çorum, Diyarbakır, İçel, İstanbul, Kayseri, Kırşehir, Konya, Kahramanmaraş, Karaman, Nevşehir, Yozgat, Zonguldak (Linnvuori, 1965; Lodos & Kalkandelen, 1980a; Dlabola, 1981; Hoch & Remane, 1985; Kalkandelen, 2000; Demir, 2007a). **Materials:** Kemaliye: Yeşilyamaç Village (Geşo Pass), 08.07.2006, 1♂, 2♀♀,1670 m.

Hyalesthes mlokosiewiczi Signoret, 1879
Distribution in Turkey: Adana, Adıyaman, Afyon, Ankara, Antalya, Aydın, Bilecik, Burdur, Çankırı, Diyarbakır, Gaziantep, Isparta, İzmir, Kahramanmaraş, Kilis, Malatya, Mardin, Muğla, Siirt, Şırnak, Tokat, Urfa (Lodos & Kalkandelen, 1980a; Dlabola, 1981; Kalkandelen, 2000; Demir, 2007a). **Materials:** Kemaliye: Yuva Village, 03.06.2007, 1♂, 970 m, Kekikpınar Village, 06.07.2006, 1♂, 1070 m, Kırkgöz, 08.07.2006, 1♀, 1300 m on *Salix*, Yuva Village, 08.07.2006, 1♀, 930 m.

Hyalesthes obsoletus Signoret, 1865
= *albolimbatus* Kirschbaum, 1868.
Distribution in Turkey: Adıyaman, Afyon, Ağrı, Ankara, Antalya, Aydın, Balıkesir, Bolu, Burdur, Çanakkale, Çankırı, Çorum, Diyarbakır, Düzce, Elazığ, Erzincan (BahçelikVillage, Demirpınar), Erzurum, Eskişehir, Gaziantep, Giresun, Hakkari, Iğdır, Isparta, İçel, İstanbul, Kahramanmaraş, Kars, Konya, Malatya, Manisa, Mardin, Muğla, Nevşehir, Ordu, Rize, Sakarya, Sinop, Sivas, Tokat, Trabzon, Urfa, Van (Fahringer, 1922; Lodos & Kalkandelen, 1980a; Dlabola, 1981; Hoch & Remane, 1985; Kalkandelen, 2000; Demir, 2007a). **Materials:** Sarıçiçek (Subatan), 07.07.2006, 4♂♂, 1♀, 1890 m.

Family: Delphacidae Leach, 1815
Subfamily: Kelisiinae
Kelisia ribauti Wagner, 1938
= *guttula* auct.
Distribution in Turkey: Ankara, Antalya, Bitlis, Diyarbakır, Erzurum, Hakkari, Sinop, Van (Lodos & Kalkandelen, 1980b; Güçlü, 1996; Demir, 2007a). **Materials:** Kemaliye: Kabataş Village (İkisu Place), 03.06.2007, 3♂♂, 1♀, 1550 m.

Subfamily: Delphacinae Leach, 1815
Tribe: Delphacini Leach, 1815
Dicranotropis (Leimonodite) beckeri Fieber 1866
Distribution in Turkey: Ankara (Asche, 1982; Demir, 2007a). **Materials:** Kemaliye: Yeşilyayla Village (Hınsoy), 04.06.2007, 13♂♂, 18♀♀, 1500 m, Yeşilyayla Village (Subaşı),

04.06.2007, 1♀, 1350 m, Sarıçiçek (Mazman Well), 02.06.2007, 1♂, 2♀♀, 1650 m, Çanakçı Village, 02.06.2007, 2♂♂, 3♀♀, 1400 m.

Chloriana unicolor (Herrich-Schaffaer, 1835)

= *canariensis* Lindberg, 1954 = *edwardsi* Le Quesne, 1960 = *oranensis* Matsumura, 1910
Distribution in Turkey: Ankara, Erzurum (Lodos & Kalkandelen, 1980b; Güçlü, 1996).
Materials: Kemaliye: Rabat River (Tunceli border), 03.07.2007, 4♂♂, 1♀.

Laodelphax striatellus (Fallen, 1826)

= *akashiensis* Matsumura, 1900 = *devastans* Matsumura, 1900 = *fimbriata* Rey, 1894 = *giffuensis* Matsumura, 1900 = *haupti* Lindberg, 1936 = *lateralis* Fieber, 1879 = *maikoensis* Matsumura, 1900 = *minonensis* Matsumura, 1900 = *nipponica* Matsumura, 1900 = *niveopicta* Haupt, 1927 = *reyana* Metcalf, 1943.
Distribution in Turkey: Adıyaman, Ankara, Antalya, Diyarbakır, Erzincan, Erzurum, Iğdır, İçel, İzmir, Kahramanmaraş, Malatya, Muğla, Nevşehir, Niğde, Ordu, Rize, Şırnak (Lodos & Kalkandelen, 1980b; Dlabola, 1981; Güçlü, 1996; Demir, 2007a). **Materials:** Kemaliye: Sarıçiçek (Subatan), 02.06.2007, 2♀♀, 1890 m, Yeşilyamaç Village (Geşo Pass), 11.06.2006, 1♂, 1689 m.

Toya propinqua (Fieber, 1866)

= *cataniae* Matsumura, 1910 = *hamatula* Kirschbaum, 1868 = *marshalli* Scott, 1873 = *shirozui* Ishihara, 1949 = *subfusca* Muir, 1919 = *terminalis* Van Duzee, 1907 = *tuckeri* Van Duzee, 1912.
Distribution in Turkey: Adana, Afyon, Amasya, Ankara, Antalya, Aydın, Çanakkale, Denizli, Diyarbakır, Erzurum, Gaziantep, Hatay, Kastamonu, Mardin, Mersin, Muğla, Ordu, Samsun, Siirt, Sinop (Linnavuori, 1965; Lodos & Kalkandelen, 1980b; Güçlü, 1996; Demir, 2007a). **Materials:** Kemaliye: Kabataş Village (Pınarbaşı Well), 25.09.2006, 1♀, 1640 m, Munzur Mountain (Doymuş Top), 04.06.2007, 1♂, 2350 m.

Family: Meenoplidae Fieber, 1872
Subfamily: Meenoplinae Fieber, 1872
Meenoplus albosignatus Fieber, 1866

Distribution in Turkey: Adıyaman, Ankara, Antalya, Bolu, Hakkari, Malatya, Mardin, Muş (Linnavuori, 1965; Lodos & Kalkandelen, 1980c; Demir, 2007a). **Materials:** Kemaliye: Kocaçimen Village (Silk Road), 04.07.2007, 3 ♂♀, 1300 m on *Quercus*, Ocak Village, 06.07.2006, 6♂♀, 1480 m, Ocak Village-Kuşak Village, 10.06.2006, 2♂♀, 1025 m on *Quercus*, Yeşilyamaç Village (Geşo Park), 11.06.2006, 1♂♀, 1320 m on *Salix*.

Family: Derbidae Spinola, 1839
Subfamily: Derbinae Spinola, 1839
Tribe: Cenchreini
Malenia bosnica (Horvath, 1907)

Distribution in Turkey: Mardin (Lodos & Kalkandelen, 1980c). **Materials:** Kemaliye: Yuva Village, 03.06.2007, 1♀, 970 m, Başpınar (Konsar Village), 04.06.2007, 1♂, 1468 m, Kuşak Village (Dere), 06.07.2006, 1♂, 1070 m on *Salix*.

Family: Dictyopharidae Spinola, 1839
Subfamily: Dictyopharinae Spinola, 1839
Dictyophara* (*Euthremma*) *multireticulata Mulsant et Rey, 1855

= *heydenii* Kirschbaum, 1868 = *curvata* Matsumura, 1910 = *nemourensis* Matsumura, 1910 = *oertzeni* Matsumura, 1910.
Distribution in Turkey: Ankara, Antalya, Denizli, Van (Lodos & Kalkandelen, 1980c; Demir, 2006, 2007a). **Materials:** Kemaliye: Ocak Village, 06.07.2006, 2♂♂, 1480 m, Kırkgöz, 08.07.2006, 1♂, 1300 m.

Family: Tettigometridae Germar, 1821
Tettigometra* (*Hystrigonia*) *hexaspina Kolenati, 1857

= *callosa* Signoret, 1866 = *hispidula* Fieber, 1865

Distribution in Turkey: Ağrı, Ankara, Antalya, Gaziantep, Giresun, Isparta, Tekirdağ, Urfa (Lodos & Kalkandelen, 1980c; Demir, 2007a). **Materials:** Kemaliye: Ocak Village-Kuşak Village, 10.06.2006, 3♂♀, 1025 m.

Tettigometra (Mitricephalus) leucophaea (Preyssler 1792)

= *obliqua* Panzer, 1799

Distribution in Turkey: Adıyaman, Ağrı, Ankara, Antalya, Bilecik, Bolu, Burdur, Çanakkale, Çankırı, Çorum, Diyarbakır, Elazığ, İstanbul, İzmir, Mardin, Nevşehir, Sivas, Tekirdağ, Urfa (Linnavuori, 1965; Lodos & Kalkandelen, 1980c; Demir, 2007a). **Materials:** Kemaliye: Sarıçiçek (Subatan), 04.07.2007, 3♂♀, 1890 m, Karanlık Canyon (Venkağ Top), 09.07.2006, 1♂♀, 1400-1680 m.

***Tettigometra laeta* Herrich-Schäffer, 1835**

= *lepida* Fieber, 1876

Distribution in Turkey: This species is the first record in Turkey. **Materials:** Kemaliye: Sarıçiçek (Subatan), 11.06.2006, 1♂♀, 1890 m, Karanlık Canyon (Venkağ Top), 09.07.2006, 1♂♀, 1400-1680 m, Sarıçiçek (Subatan), 07.07.2006, 1♂♀, 1890 m, Salihli Village (Opposite of Dump), 09.07.2006, 2♂♀, 1500 m, Başpınar (Konsar Village), 04.06.2007, 1♂♀, 1468 m.

Tettigometra* (*s. str.*) *sulphurea Mulsant et Rey, 1855

Distribution in Turkey: Antalya, Artvin, Aydın, Bilecik, Bursa, Diyarbakır, Elazığ, İzmir, Kütahya, Nevşehir, Sakarya, Urfa, Uşak, Van (Lodos & Kalkandelen, 1980c; Demir, 2007a). **Materials:** Kemaliye: Rabat River (Tunceli border), 03.07.2007, 1♀ on *Fraxinus*, Salihli Village (Opposite of Dump), 09.07.2006, 1♂, 1500 m.

Tettigometra* (*s. str.*) *virescens (Panzer, 1799)

= *dorsalis* Latreille, 1804

Distribution in Turkey: Adana, Adıyaman, Ankara, Antalya, Diyarbakır, Elazığ, Erzincan (Kemaliye), Gaziantep, Hatay, Iğdır, Mardin, Tunceli, Urfa, Van (Lodos & Kalkandelen, 1980c; Demir, 2007a). **Materials:** Salihli Village (Opposite of Dump), 09.07.2006, 1♂, 1500 m.

Family: Caliscelidae
Subfamily: Caliscelinae
Tribe: Caliscelini

Peltonotellus punctifrons Horváth 1895

= *melichari* Horvath, 1897

Distribution in Turkey: Ankara, Kırşehir, Yozgat (Dlabola, 1957; Kartal, 1985; Demir, 2007b). **Materials:** Kemaliye: Sarıçiçek (Subatan), 04.07.2007, 1♂, 1890 m, Karanlık Canyon (Venkağ Top), 09.07.2006, 1♀, 1400-1680 m.

Family: Issidae Spinola, 1839
Subfamily: Issinae Spinola, 1839
Tribe: Issini

Scorlupella discolor (Germar, 1821)

Distribution in Turkey: Ankara, Yozgat (Dlabola., 1957; Kartal, 1985; Demir, 2006). **Materials:** Kemaliye: Sarıçiçek (Mazman Well), 02.06.2007, 2♂♂, 3♀♀, 1650 m, Kabataş Village (İkisu Place), 03.06.2007, 1♀, 1550 m.

Scorlupella montana (Becker, 1865)

= *arundinis* Becker, 1865

Distribution in Turkey: Ankara, Erzincan, Kars, Yozgat (Lodos & Kalkandelen, 1981a; Kartal, 1985; Demir, 2006). **Materials:** Kemaliye: Yeşilyayla Village (Hınsoy), 04.06.2007, 21♀♀, 1500 m, Sarıçiçek (Subatan), 02.06.2007, 1♀, 1890 m, Sarıçiçek (Mazman Well), 02.06.2007, 18♀♀, 1650 m, Sarıçiçek (Subatan), 11.06.2006, 8♀♀, 1890 m, Sarıçiçek (Subatan), 11.06.2006, 13♀♀, 1890 m, Sarıçiçek (Mazman Well), 04.07.2007, 3♀♀, 1650 m, Sarıçiçek (Mazman Well), 07.07.2006, 1♀, 1690 m, Karanlık Canyon (Venkağ Top), 09.07.2006, 1♀, 1400-1680 m, Sarıçiçek (Subatan), 07.07.2006, 2♀♀, 1890 m.

Family: Ricaniidae Amyot et Serville, 1843

Ricania aylae Dlabola, 1983

Distribution in Turkey: Elazığ, Muğla, Muş (Dlabola, 1983). **Materials:** Kemaliye: Yuva Village, 23.09.2006, 1♀, 970 m on *Ficus carica*.

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LITERATURE CITED

Asche, M. 1982. Beiträge zur Delphaciden-Fauna der Türkei (Anatolien) (Homoptera Cicadina Delphacidae). Marburger Entomologische Publikationen 1(7): 71-98.

Demir, E. 2006. Contributions to the knowledge of Turkish Auchenorrhyncha (Homoptera) with a new record, *Pentastiridius nanus* (Ivanov, 1885). Munis entomology and zoology 1(1): 97-122.

Demir, E. 2007a. Contributions to the Knowledge of Turkish Auchenorrhyncha (Homoptera, Fulgoromorpha and Cicadomorpha , excl. Cicadellidae) with a new record, *Setapius klapperichianus* Dlabola, 1988. Munis entomology and zoology, 2(1), 39-58.

Demir, E. 2007b. Auchenorrhyncha (Homoptera) data from Ankara with two new records to Turkey, Munis entomology and zoology, 2(2), 481-492.

Dlabola, J. 1957. Results of the Zoological Expedition of the National Museum in Prague to Turkey 20. Homoptera, Auchenorrhyncha. Acta Entomologica Musei Nationalis Pragae 31(469): 19-68.

Dlabola, J. 1971. Taxonomische und chorologische Erzangungen zur türkischen und iranischen Zikadenfauna (Homoptera, Auchenorrhyncha). Acta faunistica entomologica Musei Nationalis Pragae 14(163): 115-138.

Dlabola, J. 1981. Ergebnisse der Tschechoslowakisch-Iranischen Entomologischen Expeditionen nach dem Iran (1970 und 1973). Acta Entomologica Musei Nationalis Pragae 40: 127-311.

Dlabola, J. 1983. Ergebnisse der Tschechoslovakisch-Iranischen Entomologischen Expeditionen 1970 und 1973 nach dem Iran. Acta Entomologica Musei Nationalis Pragae 41: 91-97.

Fahringer, J. 1922. Eine Rhynchotenausbeute aus der Türkei, Kleinasien und den benachbarten Gebieten. Konowia 1: 296-307.

Güçlü, Ş. 1996. Studies on Delphacidae (Hom., Auchenorrhyncha) from Turkey. Turkish Journal of Zoology 20: 407-411.

Hoch, H. & Remane, R. 1985. Evolution und Speziation der Zikaden-Gattung *Hyalesthes* Signoret, 1865 (Homoptera, Auchenorrhyncha, Fulgoroidea, Cixiidae). Marburger Entomologische Publikationen 2(2): 1-427.

Kalkandelen, A. 1988. Türyiye Cixiidae (Homoptera) türleri üzerinde taksonomik çalışmalar-II, *Bitki Koruma Bült.*, 28(3-4), 113-140.

Kalkandelen, A. 1989. Türkiye Cixiidae (Homoptera) türleri üzerinde çalışmalar-III, *Bitki Koruma Bült.*, 29(1-2), 1-17.

Kalkandelen, A. 1990. Türkiye Cixiidae (Homoptera) türleri üzerinde taksonomik çalışmalar-V, *Bitki Koruma Bült.*, 30(1-4), 3-27.

Kalkandelen, A. 1994. Türkiye Cixiidae (Homoptera) türleri üzerindeki taksonomik çalışmalar-VII, *Bitki Koruma Bült.*, 34(1-2), 1-21.

Kalkandelen, A. 2000. Türkiye Cixiidae (Homoptera) türleri üzerindeki taksonomik çalışmalar-VIII, *Bitki Koruma Bült.*, 40(3-4), 91-123.

Kartal, V. 1985. Türkiye Yukarı Kızılırmak Havzasındaki Issidae (Homoptera, Auchenorrhyncha) Familyası Türlerinin Taksonomik Yönden İncelenmesi. Doğa A2: 64-77.

Linnavuori, R. 1965. Studies on the South and East-Mediterranean Hemipterous fauna. Acta Entomolojica Fennica, Helsinki 21: 1-70.

Lodos, N. & Kalkandelen, A. 1980a. Preliminary list of Auchenorrhyncha with notes on distribution and importance of species in Turkey I. Family Cixiidae Spinola. Türkiye Bitki Koruma Dergisi 4(1): 15-27.

Lodos, N. & Kalkandelen, A. 1980b. Preliminary list of Auchenorrhyncha with notes on distribution and importance of species in Turkey II. Family Delpacidae Leach. Türkiye Bitki Koruma Dergisi 4(2): 103-117.

Lodos, N. & Kalkandelen, A. 1980c. Preliminary list of Auchenorrhyncha with notes on distribution and importance of species in Turkey III. Families Meenoplidae, Derbidae, Achilidae, Dictyopharidae and Tettigometridae. Türkiye Bitki Koruma Dergisi 4(3): 161-178.

Lodos, N. & Kalkandelen, A. 1981a. Preliminary list of Auchenorrhyncha with notes on distribution and importance of species in Turkey IV. Family Issidae Spinola. Türkiye Bitki Koruma Dergisi 5(1): 5-21.

Lodos, N. & Kalkandelen, A. 1981b. Preliminary list of Auchenorrhyncha with notes on distribution and importance of species in Turkey V. Families Flatidae, Ricaniidae and Cicadidae. Türkiye Bitki Koruma Dergisi 5(2): 67-82.

Lodos, N. & Kalkandelen, A. 1988. Preliminary list of Auchenorrhyncha with notes on distribution and importance of Turkey XXVII. (Addenda and Corrigenda). Türkiye Entomoloji Dergisi 12(1): 11-22.

SCIENTIFIC NOTE

A NEW NAME, *ASLIHANA* FOR THE PREOCCUPIED MOTH GENUS *ECPHYSIS* FLETCHER, 1979 (LEPIDOPTERA: GEOMETRIDAE)

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[**Özdikmen, H.** 2009. A new name, *Aslıhana* for the preoccupied moth genus *Ecphysis* Fletcher, 1979 (Lepidoptera: Geometridae). Munis Entomology & Zoology 4 (1): 287-288]

One proposed genus name in the order Lepidoptera is nomenclaturally invalid, as the genus group name has already been used by a different author in Hymenoptera. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose a substitute name for this genus name.

Order LEPIDOPTERA

Family GEOMETRIDAE
Genus *ASLIHANA* nom. nov.

Ecphysis Fletcher, 1979. In Nye [Ed.] The generic names of moths of the world. Vol. 3. Geometroidea. Publications Br. Mus. nat. Hist. No. 812: 69. (Insecta: Lepidoptera: Geometroidea: Geometridae: Larentiinae). Preoccupied by *Ecphysis* Townes, 1969. Mem.Am.ent.Inst. No.11: 202. (Insecta: Hymenoptera: Ichneumonoidea : Ichneumonidae: Cryptinae: Claseini).

Remarks on nomenclatural change: The neotropical genus *Ecphysis* was erected by Townes (1969) with the type species *Ecphysis cyanea* Townes, 1969 from Chile in Hymenoptera. It is still used as a valid genus name. Subsequently, the Australian moth genus name *Ecphysis* was proposed by Fletcher (1979) as an objective replacement name for *Probolaea* Turner, 1943 that was preoccupied by *Probolaea* Meyrick, 1886 (Lepidoptera) with the type species *Probolaea roboginosa* Turner, 1943 by monotypy in Geometridae. Thus the moth genus name *Ecphysis* Fletcher, 1979 is a junior homonym of the valid genus name *Ecphysis* Townes, 1969. So I propose here that *Ecphysis* Fletcher, 1979 should be replaced with the new name *Aslihana*, as a replacement name.

Etymology: The name is dedicated to my student Aslıhan Begüm Gökçınar (Turkey).

Summary of nomenclatural changes:

Aslihana **nom. nov.**
pro *Ecphysis* Fletcher, 1979 (non Townes, 1969)

Aslihana roboginosa (Turner, 1943) **comb. nov.**
from *Ecphysis roboginosa* (Turner, 1943)
Probolaea roboginosa Turner, 1943

LITERATURE CITED

Fletcher, D. S. 1979. In Nye, IWB [ed.]. The generic names of moths of the world. Vol. 3. Geometroidea. Publications British Museum of Natural History, No. 812: 69.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Townes, H. 1969. The genera of Ichneumonidae, part 1. Memoirs of the American Entomological Institute 11: 1-300.

SCIENTIFIC NOTE

A SUBSTITUTE NAME FOR A GENUS OF FOSSIL NEUROPTERA

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[Özdikmen, H. 2009. A substitute name for a genus of fossil Neuroptera. Munis Entomology & Zoology 4 (1): 289-290**]**

One proposed genus name in fossil Neuroptera is nomenclaturally invalid, as the genus group name has already been used by a different author in Trilobita. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose a substitute name for this genus name.

Order NEUROPTERA
Family POLYSTOECHOTIDAE
Genus *PANFILOVDVIA* nom. nov.

Kasachstania Panfilov in Dolin & Pritikina, 1980. [Fossil insects of the Mesozoic.] Inst. Zool., Akad. Nauk ukrain. SSR, Naukova Dumka, Kiev: 94. (Insecta: Neuroptera: Hemerobioidea: Polystoechotidae). Preoccupied by *Kasachstania* Maksimova, 1971. In Nalivkin (Ed.). The boundary between the Silurian and the Devonian etc. Trans.III Internat.Symp. 1: 147. Vses. nauch.-issled. geol. Inst., Akad.Nauk SSSR, Minist.goel.SSSR, Leningrad. (Trilobita: Phacopida: Phacopina: Dalmanitoidea: Dalmanitidae).

Remarks on nomenclatural change: Firstly, the trilobite genus *Kasachstania* was described by Maksimova (1971) with the type species *Dalmanites saryarkensis* Maksimova, 1960 from Kokbaytel Stage, Kazakhstan. It is still used as a available valid genus name in the family Dalmanitidae (e. g. Jell & Adrain, 2003).

Subsequently, the fossil neuropteran genus *Kasachstania* was established by Panfilov (1980) with the type species *Kasachstania fasciata* Panfilov, 1980 by original designation from the Late Jurassic of Kazakhstan. Also, it is still used as a valid generic name in the family Polystoechotidae (e. g. Makarkin & Archibald, 2005; Archibald & Makarkin, 2006).

Thus the genus *Kasachstania* Panfilov, 1980 is a junior homonym of the valid genus name *Kasachstania* Maksimova, 1971. So I propose here that *Kasachstania* Panfilov, 1980 should be replaced with the new name *Panfilovdvia*, as a replacement name.

Etymology: The name is dedicated to D. V. Panfilov who is the current author of the preexisting genus *Kasachstania*.

Summary of nomenclatural changes:

Panfilovdvia **nom. nov.**
pro *Kasachstania* Panfilov, 1980 (non Maksimova, 1971)

Panfilovdvia fasciata (Panfilov, 1980) **comb. nov.**
from *Kasachstania fasciata* Panfilov, 1980

LITERATURE CITED

Archibald, S. B. & Makarkin,V. N. 2006. Tertiary giant lacewings (Neuroptera: Polystoechotidae): Revision and description of new taxa from western north America and Denmark. Journal of Systematic Palaeontology, 4: 119-155.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Jell, P. A. & Adrain, J. M. 2003. Available generic names for trilobites. Memoirs of the Queensland Museum, 48 (2): 331-553.

Makarkin, V. N. & Archibald, S. B. 2005. Substitute names for three genera of fossil Neuroptera, with taxonomic notes. Zootaxa, 1054: 15–23.

Maksimova, Z. A. 1972. [New Devonian trilobites of the Phacopoidea]. Paleontologicheskij Zhurnal, 1: 88-94.

Panfilov, D. V. 1980. New representatives of lacewings (Neuroptera) from the Jurassic of Karatau. In: Dolin, V. G., Panfilov, D. V., Ponomarenko, A. G. & Pritykina, L. N. Fossil insects of the Mesozoic. Naukova Dumka, Kiev, 82–111.

SCIENTIFIC NOTE

A NEW NAME, *PICOMICROLYCUS* FOR THE PREOCCUPIED BEETLE GENUS *MICROLYCUS* PIC, 1922 (COLEOPTERA: LYCIDAE)

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[**Özdikmen, H.** 2009. A new name, *Picomicrolycus* for the preoccupied beetle genus *Microlycus* Pic, 1922 (Coleoptera: Lycidae). Munis Entomology & Zoology 4 (1): 291-292]

One proposed genus name in the family Lycidae is nomenclaturally invalid, as the genus group name has already been used by a different author in Hymenoptera. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose a substitute name for this genus name.

Order COLEOPTERA

Family LYCIDAE
Genus *PICOMICROLYCUS* nom. nov.

Microlycus Pic, 1922. Échange, 38, no. 409, 22. (Insecta: Coleoptera: Lycidae). Preoccupied by *Microlycus* Thomson, 1878. Hym. Scandin., 5, 253. (Insecta: Hymenoptera: Chalcidoidea: Eulophidae: Eulophinae).

Remarks on nomenclatural change: The genus *Microlycus* was established by Thomson (1878) with the type species *Microlycus heterocerus* Thomson, 1878 in Hymenoptera. It has currently 9 species as *Microlycus biroi* Erdös, 1951; *Microlycus collaris* Szelényi, 1980; *Microlycus erdoesi* Boucek, 1959; *Microlycus gyorfii* (Erdös, 1954); *Microlycus harcalo* (Walker, 1852); *Microlycus heterocerus* Thomson, 1878; *Microlycus pulcherrimus* Kerrich, 1969; *Microlycus scaurus* Askew, 2001 and *Microlycus virens* Erdös, 1951. Subsequently, the beetle genus *Microlycus* was described by Pic (1922) with the type species *Microlycus minutus* Pic, 1922 in Lycidae. Thus the beetle genus name *Microlycus* Pic, 1922 is a junior homonym of the valid genus name *Microlycus* Thomson, 1878. So I propose here that *Microlycus* Pic, 1922 should be replaced with the new name *Picomicrolycus*, as a replacement name.

Etymology: The name is dedicated in honor of the famous coleopterist M. Pic (France).

Summary of nomenclatural changes:

Picomicrolycus **nom. nov.**
pro *Microlycus* Pic, 1922 (non Thomson, 1878)

Picomicrolycus minutus (Pic, 1922) **comb. nov.**
from *Microlycus minutus* Pic, 1922

Picomicrolycus mexicanus (Bacakova, 2001) **comb. nov.**
from *Microlycus mexicanus* Bacakova, 2001

LITERATURE CITED

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Kazantsev, S. V. 2006. A review of the genera *Microlycus* Pic, 1922 and *Teroplas* Gorham, 1884 (Coleoptera: Lycidae). Russian Entomological Journal, 14 (4): 275–280.

Pic, M. **1922**. L'**Echange**. Vol.**38**. No.409. p. 22.

Thomson, C. G. 1878. Hymenoptera Scandinaviae 5. Pteromalus (Svederus) continuatio: 307 pp.

SCIENTIFIC NOTE

A SUBSTITUTE NAME FOR A PREOCCUPIED GENUS OF SPRINGTAILS (COLLEMBOLA)

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[Özdikmen, H. 2009. A substitute name for a preoccupied genus of springtails (Collembola). Munis Entomology & Zoology 4 (1): 293-294**]**

One proposed genus name in springtails is nomenclaturally invalid, as the genus group name has already been used by a different author in Echinodermata. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose a substitute name for this genus name.

TAXONOMY

Family NEANURIDAE
Genus *CASSAGNAUA* nom. nov.

Pectinura Cassagnau, 1983. Nouvelle Revue Ent. 13 (1): 18. (Insecta: Collembola: Poduromorpha: Neanuroidea: Neanuridae: Neanurinae: Lobellini). Preoccupied by *Pectinura* Forbes, 1843. Proc. Linn. Soc. London, 1 (17), 167. (Echinodermata: Asterozoa: Stelleroidea: Ophiuroidea: Ophiurida: Ophiurina: Ophiodermatidae).

Remarks on nomenclatural change:

Cassagnau (1983) proposed the generic name *Pectinura* as a genus of springtails with the type species *Womersleya hongkongensis* Yosii, 1976 from Victoria peak, Hongkong. It is still used as a valid genus name.

Unfortunately, the generic name was already preoccupied by Forbes (1843), who had proposed the genus name *Pectinura* as a echinoderm genus with the type species *Pectinura vestita* Forbes, 1843. It is still used as a valid genus name (e. g. Hansson, 2001, Stöhr & O'Hara, 2008). In this genus, many species has been described by various authors until now. However, most of the species was transfered by different authors in the other valid genera. So, according to Stöhr & O'hara (2008), the genus *Pectinura* Forbes, 1843 has four species currently as *Pectinura angulata* Lyman, 1883; *Pectinura honorata* Koehler, 1904; *Pectinura verrucosa* Studer, 1876 and *Pectinura vestita* Forbes, 1843.

Thus, the genus group name *Pectinura* Cassagnau, 1983 is a junior homonym of the generic name *Pectinura* Forbes, 1843. So I propose a new replacement name *Cassagnaua* **nom. nov.** for *Pectinura*

Cassagnau, 1983. The name is dedicated to P. Cassagnau who is current author of the preexisting genus *Pectinura*.

Summary of nomenclatural changes:

Cassagnaua **nom. nov.**
pro *Pectinura* Cassagnau, 1983 (non Forbes, 1843)

Cassagnaua hongkongensis (Yosii, 1976) **comb. nov.**
from *Pectinura hongkongensis* (Yosii, 1976)
Womersleya hongkongensis Yosii, 1976

LITERATURE CITED

Cassagnau, P. 1983. Un nouveau modèle phylogénétique chez les Collemboles Neanurinae. Nouv. Rev. Ent., 13 (1): 3-27.

Forbes, E. 1843. Report on the molluscs and radiata of the Aegean Sea and on their distribution considered as bearing on geology. Rept. Brit. Acad. Adv. Sci., 13: 130-93.

Hansson, H. G. 2001. Echinodermata, In: Costello, M. J. et al. (Ed.) (2001). European register of marine species: a check-list of the marine species in Europe and a bibliography of guides to their identification. Collection Patrimoines Naturels, 50: 336-351.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Stöhr, S. & O'Hara, T. 2007. World Ophiuroidea database. Available online at http://www.marinespecies.org/ophiuroidea. Consulted on 2008-08-06.

SCIENTIFIC NOTE

A NEW NAME, *ISOYVESIA* FOR THE PREOCCUPIED ISOPOD GENUS *YVESIA* COINEAU & BOTOSANEANU, 1973 (CRUSTACEA: ISOPODA)

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[**Özdikmen, H.** 2009. A new name, *Isoyvesia* for the preoccupied Isopod genus *Yvesia* Coineau & Botosaneanu, 1973 (Crustacea: Isopoda). Munis Entomology & Zoology 4 (1): 295-296]

One proposed genus name in the order Isopoda is nomenclaturally invalid, as the genus group name has already been used by a different author in Porifera. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose a substitute name for this genus name.

Order ISOPODA

Family MICROCERBERIDAE
Genus *ISOYVESIA* nom. nov.

Yvesia Coineau & Botosaneanu, 1973. In Orghidan, Nunez Jimenez, et al. (Eds). Resultats Exped. biospeleol. Cubano Roum. Cuba 1: 209. (Crustacea: Malacostraca: Eumalacostraca: Peracarida: Isopoda: Microcerberoidea: Microcerberidae). Preoccupied by *Yvesia* Topsent, 1890. Bull. Soc. zool. France, 15, 29. (Porifera: Demospongiae: Poecilosclerida: Myxillina: Crellidae: *Crella*).

Remarks on nomenclatural change: The genus group name *Yvesia* was proposed by Topsent (1890) with the type species *Halichondria albula* Bowerbank, 1866 in porifera. *Yvesia* Topsent, 1890 is a subgenus of the genus *Crella* Gray, 1867 in the family Crellidae. It has currently 15 species as *Crella (Yvesia) albula* (Bowerbank, 1866); *Crella (Yvesia) dispar* (Topsent, 1927); *Crella (Yvesia) fallax* (Topsent, 1890); *Crella (Yvesia) gracilis* (Alander, 1942); *Crella (Yvesia) guernei* (Topsent, 1890); *Crella (Yvesia) hanseni* (Topsent, 1890); *Crella (Yvesia) linguifera* (Topsent, 1890); *Crella (Yvesia) mamillata* (Arnesen, 1903); *Crella (Yvesia) nodulosa* Sarà, 1959; *Crella (Yvesia) pertusa* (Topsent, 1890); *Crella (Yvesia) pyrula* (Carter, 1876); *Crella (Yvesia) richardi* (Topsent, 1890); *Crella (Yvesia) ridleyi* (Topsent, 1890); *Crella (Yvesia) rosea* (Topsent, 1890) and *Crella (Yvesia) topsenti* (Babiç, 1922).

Subsequently, the monotypic isopod genus *Yvesia* was described by Coineau & Botosaneanu (1973) with the type species *Yvesia striata* Coineau & Botoseneanu, 1973 in Crustacea. Thus the genus name *Yvesia*

Coineau & Botosaneanu, 1973 is a junior homonym of the valid genus group name *Yvesia* Topsent, 1890. So I propose here that *Yvesia* Coineau & Botosaneanu, 1973 should be replaced with the new name *Isoyvesia*, as a replacement name.

Etymology: from the Latin prefix "iso-" (meaning "equal" in English) + the preexisting genus name *Yvesia*.

Summary of nomenclatural changes:

Isoyvesia **nom. nov.**
pro *Yvesia* Coineau & Botosaneanu, 1973 (non Topsent, 1890)

Isoyvesia striata (Coineau & Botosaneanu, 1973) **comb. nov.**
from *Yvesia striata* Coineau & Botosaneanu, 1973

LITERATURE CITED

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Ooghidan, T., Nunez-Jimenez, A., Botosaneanu, L., Decou, V., Negrea, S. & Vina-Bayes, N. (Eds). 1973. Résultats des expéditions biospéologiques cubano-roumaines à Cuba. Volume 1. Academiei Republicii Socialiste România, Bucarest, 424 pp.

Topsent, E. 1890. Notice préliminaire sue les spongiaires recueillis durant les campagnes de l'Hirondelle (1886-1887-1888), Golfe de Gascogne, Acores, Terre-Neuve. Bulletin de la SociétéZoologique de France, 15: 26-32.

SCIENTIFIC NOTE

SUBSTITUTE NAMES FOR TWO GENERA OF HARPACTICOIDA (CRUSTACEA: COPEPODA)

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[**Özdikmen, H.** 2009. Substitute names for two genera of Harpacticoida (Crustacea: Copepoda). Munis Entomology & Zoology 4 (1): 297-298]

Two proposed genus names in Copepoda is nomenclaturally invalid, as the genus group names have already been used by different authors in Phoronida and Trilobita. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these genus names.

Order HARPACTICOIDA
Family HUNTEMANNIIDAE
Genus *DAHMSOPOTTEKINA* nom. nov.

Talpina Dahms & Pottek, 1992. Microfauna Mar 7: 28. (Crustacea: Copepoda: Neocopepoda: Podoplea: Harpacticoida: Huntemanniidae). Preoccupied by *Talpina* Hagenow, 1840. N. Jahrb. f. Min., 1840, 670. (Phoronida: Phoronidae).

Remarks on nomenclatural change: Firstly, the phoronid ichnogenus *Talpina* was erected by Hagenow (1840). It is still used as an available valid genus name in the family Phoronidae. Subsequently, the copepod genus *Talpina* was established by Dahms & Pottek (1992) with the type species *Talpina curticauda* (Becker, Noodt & Schriever, 1979 by original designation in the family Cletodidae. Also, it is still used as a valid generic name in the family Huntemanniidae. Thus the genus *Talpina* Dahms & Pottek, 1992 is a junior homonym of the valid genus name *Talpina* Hagenow, 1840. So I propose here that *Talpina* Dahms & Pottek, 1992 should be replaced with the new name *Dahmsopottekina*, as a replacement name.

Etymology: The name is dedicated to H. U. Dahms and M. Pottek who are current authors of the preexisting genus *Talpina*.

Summary of nomenclatural changes:

Dahmsopottekina **nom. nov.**
  pro *Talpina* Dahms & Pottek, 1992 (non Hagenow, 1840)
Dahmsopottekina bathyalis (Dahms & Pottek, 1992) **comb. nov.**
  from *Talpina bathyalis* Dahms & Pottek, 1992
Dahmsopottekina bifida (Schriever, 1984) **comb. nov.**
  from *Talpina bifida* (Schriever, 1984)
Dahmsopottekina curticauda (Becker, Noodt & Schriever, 1979) **comb. nov.**
  from *Talpina curticauda* (Becker, Noodt & Schriever, 1979)
Dahmsopottekina fodens (Dahms & Pottek, 1992) **comb. nov.**
  from *Talpina fodens* Dahms & Pottek, 1992
Dahmsopottekina furcispina (Dahms & Pottek, 1992) **comb. nov.**
  from *Talpina furcispina* Dahms & Pottek, 1992
Dahmsopottekina micracantha (Gamo, 1981) **comb. nov.**
  from *Talpina micracantha* (Gamo, 1981)

Dahmsopottekina noodti (Dahms & Pottek, 1992) **comb. nov.**
from *Talpina noodti* Dahms & Pottek, 1992
Dahmsopottekina pacifica (Becker, Noodt & Schriever, 1979) **comb. nov.**
from *Talpina pacifica* (Becker, Noodt & Schriever, 1979)
Dahmsopottekina pectinata (Dahms & Pottek, 1992) **comb. nov.**
from *Talpina pectinata* Dahms & Pottek, 1992
Dahmsopottekina peruana (Becker, Noodt & Schriever, 1979) **comb. nov.**
from *Talpina peruana* (Becker, Noodt & Schriever, 1979)
Dahmsopottekina talpa (Becker, Noodt & Schriever, 1979) **comb. nov.**
from *Talpina talpa* (Becker, Noodt & Schriever, 1979)

Family MIRACIIDAE
Genus *MUOHUYSIA* nom. nov.

Hicksia Mu & Huys, 2002. Cah. Biol. Mar. 43 (2): 204. (Crustacea: Copepoda: Neocopepoda: Podoplea: Harpacticoida: Miraciidae). Preoccupied by *Hicksia* Delgado, 1904. Commiss. Serv. geol. Portugal, Commun., 5 (2), 327. (Trilobita: Corynexochida: Corynexochina: Dorypygidae).

Remarks on nomenclatural change: The genus *Hicksia* was described by Delgado (1904) with the type species *Hicksia elvensis* Delgado, 1904 in Trilobita from Haut Alemtejo, Portugal. Subsequently, the monotypic copepod genus *Hicksia* was erected by Mu & Huys (2002) with the type species *Hicksia xylophila* (Hicks, 1988) in Crustacea. Thus the genus name *Hicksia* Mu & Huys, 2002 is a junior homonym of the valid genus name *Hicksia* Delgado, 1904. So I propose here that *Hicksia* Mu & Huys, 2002 should be replaced with the new name *Muohuysia*, as a replacement name.

Etymology: The name is dedicated to F. H. Mu and R. Huys who are the current authors of the preexisting genus *Hicksia*.

Summary of nomenclatural changes:
Muohuysia **nom. nov.**
pro *Hicksia* Mu & Huys, 2002 (non Delgado, 1904)
Muohuysia xylophila (Hicks, 1988) **comb. nov.**
from *Hicksia xylophila* (Hicks, 1988)

LITERATURE CITED

Dahms, H. U. & Pottek, M. 1992. Metahuntemannia Smirnov, 1946 and Talpina gen. nov. (Copepoda, Harpacticoida) from the deep-sea of the high Antarctic Weddell Sea with a description of eight new species. Microfauna Marina, 7: 7-78.

Delgado, J. F. N. 1904. Faune Cambrienne du Haut-Alemtejo (Portugal). Comunicacoes da Commissao dos Trabalhos Servico Geologico de Portugal, 5: 307-374.

von Hagenow, F. 1840. Monographie der Rügen'schen Kreideversteinerungen. Abtheilung 2. Radiarien und Annulaten nbest Nachträge zur I. Abtheilung. Neues Jahrbuch für Mineralogie, Geognosie Geologie und Petrefactenkunde, 1840:631-672.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Mu, F.-H. & Huys, R. 2002. New species of Stenhelia (Copepoda, Harpacticoida, Diosaccidae) from the Bohai Sea (China) with notes on subgeneric division and phylogenetic relationships. Cah. Biol. Mar., 43 (2): 179-206.

SCIENTIFIC NOTE

PLATNICKNIA NOM. NOV., A NEW NAME FOR THE PREOCCUPIED SPIDER GENUS *BRYANTINA* BRIGNOLI, 1985 (ARANEAE: PHOLCIDAE)

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[**Özdikmen, H. & Demir, H.** 2009. *Platnicknia* nom. nov., a new name for the preoccupied spider genus *Bryantina* Brignoli, 1985 (Araneae: Pholcidae). Munis Entomology & Zoology 4 (1): 299-300]

One proposed genus name in the spider family Pholcidae is nomenclaturally invalid, as the genus group name has already been used by a different author in Diptera. In accordance with Article 60 of the International Code of Zoological Nomenclature, we propose a substitute name for this genus name.

Family PHOLCIDAE
Genus *PLATNICKNIA* nom. nov.

Bryantina Brignoli, 1985. Bulletin Br. arachnol. Soc. 6 (9): 380. (Arachnida: Araneae: Pholcidae). Preoccupied by *Bryantina* Malloch, 1926. Philippine J. Sci., 31, 506. (Insecta: Diptera: Muscidae).

Remarks on nomenclatural change: The monotypic orientalic genus *Bryantina* was firstly introduced by Malloch (1926) with the type species *Bryantina javensis* Malloch, 1926 from Java (Indonesia) in Diptera. It is still used as a valid genus name.

Subsequently, the neotropical spider genus name *Bryantina* was proposed by Brignoli (1985) as an objective replacement name for *Bryantia* Mello-Leitão, 1946 that preoccupied by *Bryantia* Schaus, 1922 (Lepidoptera) with the type species *Systenita coxana* Bryant, 1940 in Pholcidae. Also, it is still used as a valid generic name in Pholcidae (Platnick, 2008).

Thus the spider genus name *Bryantina* Brignoli, 1985 is a junior homonym of the valid genus name *Bryantina* Malloch, 1926. So we propose here that *Bryantina* Brignoli, 1985 should be replaced with the new name *Platnicknia*, as a replacement name.

Etymology: The name is dedicated to the well known arachnologist Norman I. Platnick (USA).

Summary of nomenclatural changes:

Platnicknia **nom. nov.**
pro *Bryantina* Brignoli, 1985 (non Malloch, 1926)

Platnicknia coxana (Bryant, 1940) **comb. nov.**
from *Bryantina coxana* (Bryant, 1940)
Bryantia coxana (Bryant, 1940)
Systenita coxana Bryant, 1940

Platnicknia incerta (Bryant, 1940) **comb. nov.**
from *Bryantina incerta* (Bryant, 1940)
Bryantia incerta (Bryant, 1940)
Systenita incerta Bryant, 1940

LITERATURE CITED

Brignoli, P. M. 1985. On some generic homonymies in spiders (Araneae). Bull. Br. arachnol. Soc. 6: 380.

International Comission of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

Malloch, J. R. 1926. Notes on Oriental Diptera, with descriptions of new species. Philipp. J. Sci. 31: 491-512.

Mello-Leitão, C. F. de. 1946. Notas sobre os Filistatidae e Pholcidae. Anais Acad. bras. Cienc. 18: 39-83.

Platnick, N. I. 2008a. The world spider catalog, Version 9.0. Fam. Pholcidae. Last updated May 6, 2008. Available from: http://research.amnh.org/entomology/spiders/catalog/PHOLCIDAE.html