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Contribution to the Chrysomelidae (Coleoptera) Fauna of Guilan Province (Northern Iran) with New Records

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ABSTRACT

Species diversity of chrysomelid beetles (Coleoptera) was studied in forest ecosystems of Guilan province, northern Iran. Sampling was conducted by sweep net, aspirator and Malaise trap during 2009-2012. A total of 15 species in five subfamilies- Bruchinae (2 species), Cassidinae (3), Criocerinae (2), Donacinae (3) and Galerucinae (5) were identified. Among the collected species 12 are new records for the Chrysomelidae fauna of Iran: *Bruchidius canescens* (Motschulsky, 1874), *B. fulvescens* (Baudi di Selve, 1886), *Cassida flaveola* Thunberg, 1794, *C. inquinata* Brullé, 1832, *C. stigmatica* Suffrian, 1844, *Crioceris quatuordecimpunctata* (Scopoli, 1763), *Oulema tristis* (Herbst, 1786), *Donacia clavipes clavipes* Fabricius, 1792, *D. simplex* Fabricius, 1775, *D. tomentosa* Ahrens, 1810, *Galerucella calmariensis* (Linnaeus, 1767) and *Exosoma flavipes* (Heyden, 1878). All the species are presented with data on their general distribution and the material examined.

Key words: Coleoptera, Chrysomelidae, fauna, new records, Guilan, Iran.

INTRODUCTION

Chrysomelidae, with 37.000-40.000 described species that are widespread in all the zoogeographical regions, comprises one of the most species rich families of phytophagous insects (Schmitt, 1996; Biondi and D'Alessandro, 2012). The family includes many species that show high levels of ecological and biological specialization, and a significant trend towards differentiation and endemization (Biondi *et al.*, 2013). The chrysomelids are closely related to the Cerambycidae and the Curculionidae which are regarded as phytophagous herbivore beetles due to their distinct feeding habit (Hsiao, 1994). Adults and larvae of almost all leaf beetles feed on leaves, flowers, stems or roots (Jolivet and Verma, 2002). Many species are economically important as pests of food crops, tree and shrub plantations, medical herbs and fodder crops, although several species are beneficial as biological control agents of weeds (Jolivet and Hawkeswood, 1995; Mirzoeva, 2001; Aslan *et al.*, 2009).

Though the family is economically important, in Iran they have not been studied adequately from the standpoint of taxonomy, biology or ecology. Many authors have published on the chrysomelid fauna of Iran- Medvedev (1957; 1962; 1983), Berti and

Rapilly (1973), Sobhian (1976), Barkhordari *et al.* (1981), Modarres Awal (1997), Lopatin (1977; 1979; 1980; 1981a; 1981b; 1981c; 1984a; 1984b; 1985; 1988; 1990; 2001), Borowiec (2000), Świętojańska (2001), Moridi *et al.* (2002), Warchałowski (2004), Alavi (2006), Alavi and Khalili (2006), Hagh-Ghadam and Padasht Dahkaii (2006), Serri and Naserzadeh (2007), Bezdek (2008; 2010), Mohaghegh and Abaii (2008), Moradian *et al.* (2009), Döberl (2010), Barari and Serri (2010), Keyhanian and Taghaddosi (2010), Schöller (2010), Ghahari and Hawkeswood (2011), Ghahari and Jędryczkowski (2012, 2016), Makhan (2012), Saeizad and Makhan (2013), Samin *et al.* (2014), Delobel and Sadeghi (2014), Mirzaei *et al.* (2015), Mirzaei and Nozari (2016), Ghahari and Borowiec (2017), Aslan and Ghahari (2017). The fauna of Chrysomelidae has not so far been studied in Guilan province except some scattered records in the papers cited above. The aim of this investigation is a faunistic survey of this family in some regions of Guilan province.

MATERIAL AND METHODS

Study area

The study is based on specimens collected from some forest ecosystems in Guilan province (37.2774°N 49.5890°E). The province covers an area of 14,042 km², and lies along the Caspian Sea, just west of the Mazandaran province, east of the Ardabil province, north of the Zanjan and Qazvin provinces. It has a humid temperate climate with a comparatively abundant annual rainfall. The Alborz mountain range provides further diversity to the land in addition to the Caspian coasts. The amount of humidity is quite high in the warm seasons of the year, and Guilan is known for its moderate, mild and Mediterranean-like climate (Fig. 1).

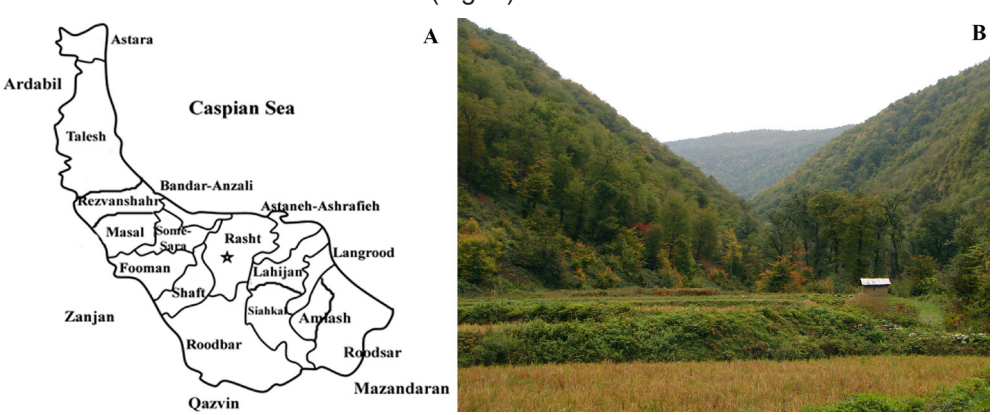

Fig. 1. A. Map of Guilan province and its cities, B. landscape of Guilan province with vast forests and rice fields.

Sampling

Beetles were collected from July to September during the years 2009-2012 from various plants, shrubs and trees by using mainly sweep net, aspirator and in a few

instances by Malaise trap. Collected beetles were killed by ethyl acetate and taken to the laboratory for further analysis and dissection. Preparation of male genitalia was conducted; external morphological features and male genitalia characters were studied. The identification keys in Mohr (1966), Lopatin (1984c), Bieńkowski (2004), and Warchałowski (1998; 1999; 2010) were used for identification of specimens to the species level. Data about classification, nomenclature and distribution are according to Löbl and Smetana (2010). Voucher specimens are deposited in the collections of Dr. B. Gruev (Bulgaria) and A. Warchałowski (Poland).

RESULTS

As a result of field studies carried out in some forest ecosystems of Guilan province, a total of 15 species belonging to 5 subfamilies and 9 genera of Chrysomelidae were found: Bruchinae (2 species, one genus), Cassidinae (3 species, one genus), Criocerinae (2 species, 2 genera), Donacinae (3 species, one genus) and Galerucinae (5 species, 4 genera). Twelve species of those are newly recorded from Iran. The list of species is given below alphabetically by subfamily with distributional data.

Family: Chrysomeliae Latreille, 1802

Subfamily: Bruchinae Latreille, 1802

Genus: *Bruchidius* Schilsky, 1905

***Bruchidius canescens* (Motschulsky, 1874)**

General distribution: Bulgaria**,** Cyprus, Greece, Iraq, Israel, Jordan, Lebanon, Macedonia, Serbia and Montenegro, Syria, Turkey.

Material examined: Guilan province, Siahkal, 36°56′N 49°54′E, 25 m, 2♂♂, July 2010. New record for Iran.

***Bruchidius fulvescens* (Baudi di Selve, 1886)**

General distribution: Egypt, Greece, Cyprus, Iraq, Israel, Jordan, Lebanon, Syria, Turkey.

Material examined: Guilan province, Roodbar, 36°49′N 49°35′E, 213 m, 1♀, 1♂, July 2011. New record for Iran.

Subfamily: Cassidinae Gyllenhal, 1813

Tribe: Cassidini Gyllenhal, 1813

Genus: *Cassida* Linnaeus, 1758

***Cassida flaveola* Thunberg, 1794**

General distribution: Albania, Algeria, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Belarus, China, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Macedonia, Moldavia, The Netherlands, Norway, Poland, Romania, Russia (Far East), Serbia and Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Ukraine.

Material examined: Guilan province, Roodsar, 36°42′N 50°18′E, 2 m, 2♂♂, July 2009. New record for Iran.

Cassida inquinata Brullé, 1832

General distribution: Albania, Algeria, Armenia, Austria, Azerbaijan, Bosnia Herzegovina, Bulgaria, Croatia, Czech Republic, France, Georgia, Greece, Hungary, Israel, Italy, Lebanon, Macedonia, Morocco, Portugal, Romania, Russia (South European Territory), Serbia and Montenegro, Slovakia, Slovenia, Spain, Syria, Tunisia, Turkey, Turkmenistan.

Material examined: Guilan province, Siahkal, 36°56′N 49°54′E, 25 m, 1♀, 1♂, July 2010. New record for Iran.

Cassida stigmatica Suffrian, 1844

General distribution: Afghanistan, Austria, Belgium, Bosnia Herzegovina, China, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Kazakhstan, Kyrgyzstan, Latvia, Macedonia, The Netherlands, Poland, Romania, Russia (East Siberia, West Siberia), Slovakia, Spain, Switzerland, Tunisia, Turkey, Ukraine.

Material examined: Guilan province, Talesh, 37°80'N 48°91'E, 145 m, 1♂, July 2009. New record for Iran.

Subfamily: Criocerinae Latreille, 1804

Genus: *Crioceris* Geoffroy, 1762

Crioceris quatuordecimpunctata (Scopoli, 1763)

General distribution: Albania, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Belarus, China, Croatia, Czech Republic, France, Germany, Hungary, Japan, Kazakhstan, Korea, Moldavia, Poland, Romania, Slovakia, Slovenia, Russia (Central European Territory, East Siberia, Far East, South European Territory, West Siberia), Taiwan, Ukraine.

Material examined: Guilan province, Lahijan, 37°14′N 50°02′E, 16 m, 2♂♂, September 2011. New record for Iran.

Genus: *Oulema* Des Gozis, 1886

Oulema tristis (Herbst, 1786)

General distribution: Austria**,** Belgium, Bosnia Herzegovina, Bulgaria, China, Croatia, Czech Republic, France, Germany, Hungary, Italy, Japan, Kazakhstan, Korea, Latvia, Moldavia, Mongolia, Poland, Romania, Russia (Central European Territory, East Siberia, Far East, South European Territory, West Siberia), Slovakia, Slovenia, Spain, Switzerland, Ukraine, Uzbekistan.

Material examined: Guilan province, Masal, 37°23′N 49°00′E, 9 m, 2♀♀, 1♂, September 2011. New record for Iran.

Subfamily: Donaciinae Kirby, 1837

Tribe: Donaciini Kirby, 1837

Genus *Donacia* Fabricius, 1775

***Donacia clavipes clavipes* Fabricius, 1792**

General distribution: Austria, Belgium, Bulgaria, Belarus, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Moldavia, The Netherlands, Norway, Poland, Portugal, Romania, Russia (Central European Territory, North European Territory, West Siberia), Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, Ukraine.

Material examined: Guilan province, Rasht, 37°16′N 49°42′E, 39 m, 1♂, 25-26 August 2012. New record for Iran.

***Donacia simplex* Fabricius, 1775**

General distribution: Algeria, Austria, Belgium, Bulgaria, Belarus, China, Croatia, Czech Republic, Denmark, Finland, France, Georgia, Germany, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Moldavia, Mongolia, Morocco, The Netherlands, Norway, Russia (Central European Territory, East Siberia, North European Territory, West Siberia), Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom.

Material examined: Guilan province, Talesh, 37°80'N 48°91'E, 145 m, 1♂, July 2009. New record for Iran.

***Donacia tomentosa* Ahrens, 1810**

General distribution: Azerbaijan, Belgium, Bosnia Herzegovina, Bulgaria, Belarus, Czech Republic, Finland, France, Germany, Hungary, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, The Netherlands, Poland, Romania, Russia (Central European Territory, North European Territory, South European Territory, West Siberia), Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Turkmenistan, United Kingdom, Ukraine, Uzbekistan.

Material examined: Guilan province, Fooman, 37°13′N 49°19′E, 34 m, 1♂, 1♀, September 2012. New record for Iran.

Subfamily: Galerucinae Latreille, 1802

Tribe: Galerucini Latreille, 1802

Genus: *Diorhabda* Weise, 1883

***Diorhabda carinulata* (Desbrochers des Loges, 1870)**

General distribution: Azerbaijan, China, Iran, Kazakhstan, Kyrgyzstan, Mongolia, Russia (South European Territory), Tajikistan, Turkmenistan, Uzbekistan.

Iranian distribution: Sistan and Baluchestan, Esfahan, Razavi Khorasan, Kerman, Golestan (Mirzaei and Nozari, 2016).

Comment: *Tamarix kotschyi* Bunge was mentioned as possible host plant from Iran (Tracy and Robbins, 2009).

Material examined: Guilan province, Siahkal, 36°56′N 49°54′E, 25 m, 3♀♀, 1♂, July 2010; Guilan province, Rasht, 37°16′N 49°42′E, 44 m, 2♂♂, August 2012.

Genus: *Galeruca* Geoffroy, 1762

***Galeruca* (*Galeruca*) *jucunda* (Faldermann, 1837)**

General distribution: Afghanistan, Austria, Azerbaijan, Bosnia Herzegovina, Bulgaria, China, Croatia, Czech Republic, Denmark, France, Germany, Greece, Hungary, Iran, Lithuania, Mongolia, Poland, Romania, Russia (East Siberia, West Siberia), Serbia and Montenegro, Slovakia, Sweden, Switzerland, Syria, Turkey, Ukraine.

Iranian distribution: Alborz, Qazvin (Mirzaei and Nozari, 2016).

Comment: Reported also from Zanjan as *Galeruca circumdata* (Duftschmid) by Keyhanian and Taghaddosi (2010).

Material examined: Guilan province, Langrood, 37°09′N 50°08′E, 1753 m, 2♂♂, September 2009.

Genus: *Galerucella* Crotch, 1873

***Galerucella* (*Neogalerucella*) *calmariensis* (Linnaeus, 1767)**

General distribution: Albania, Algeria, Austria, Azerbaijan, Belgium, Bosnia Herzegovina, Bulgaria, Belarus, China, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Hungary, Italy, Japan, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Mongolia, Morocco, The Netherlands, Norway, Poland, Slovakia, Spain, Russia (Far East, South European Territory), Serbia and Montenegro, Sweden, Switzerland, Turkey, Turkmenistan, United Kingdom, Ukraine.

Material examined: Guilan province, Roodsar, 36°42′N 50°18′E, 2 m, 2♀♀, 1♂, July 2009. New record for Iran.

***Galerucella* (*Neogalerucella*) *tenella* (Linnaeus, 1761)**

General distribution: Austria, Azerbaijan, Belgium, Bosnia Herzegovina, Bulgaria, Belarus, China, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iran, Italy, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Mongolia, The Netherlands, Norway, Poland, Russia (Far East, South European Territory), Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom, Ukraine.

Iranian distribution: Golestan, Gorgan (Samin *et al*., 2014).

Material examined: Guilan province, Roodbar, 36°49′N 49°35′E, 213 m, 2♀♀, July 2011.

Tribe: Luperini Gistel, 1848

Subtribe: Luperina Gistel, 1848

Genus: *Exosoma* Jacoby, 1903

***Exosoma flavipes* (Heyden, 1878)**

General distribution: Armenia, Azerbaijan, Turkey.

Material examined: Guilan province, Lahijan, 37°14′N 50°02′E, 26 m, 2♂♂, September 2011; Guilan province, Roodbar, 36°49′N 49°35′E, 213 m, 2♀♀, July 2011. New record for Iran.

CONCLUSIONS AND DISCUSSION

The results of this research indicate that there is diverse fauna of Chrysomelidae in Guilan province. Finding 12 new country records proves that the fauna of Iranian Chrysomelidae is still largely unknown because sampling has not been done systematically in most regions. Among the different taxa of Iranian Chrysomelidae, only three, Alticini, Bruchinae and Galerucinae s.str. with 180, 117 and 44 species respectively, have been catalogued and published (Mirzaei and Nozari, 2016; Ghahari and Borowiec, 2017; Aslan and Ghahari, 2017). Guilan province, which is located in south of Caspian Sea, has a climate similar to the Mediterranean, and the flora and fauna of this area is extremely diverse. The presence of vast and diverse forests and agricultural ecosystems as well as several rivers, results in a high diversity of insects. So we expect that continuing of faunistic surveys on Chrysomelidae will result in new findings. There are probably more than 500 species reported in Iran, but a comprehensive Chrysomelidae checklist is actually needed. Additionally chrysomelids have various host plants (Jolivet and Hawkeswood, 1995) which are unknown in Iran, and determining the host plants of these plant feeders should be another research topic.

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