

1-1-2013

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Recommended Citation

ATAMEHR, AHMAD (2013) "Ground beetles (Coleoptera: Carabidae) of Azarbaijan, Iran," *Turkish Journal of Zoology*. Vol. 37: No. 2, Article 9. <https://doi.org/10.3906/zoo-1206-32>
Available at: <https://journals.tubitak.gov.tr/zoology/vol37/iss2/9>

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Ground beetles (Coleoptera: Carabidae) of Azarbaijan, Iran

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Received: 27.06.2012 • Accepted: 24.11.2012 • Published Online: 25.02.2013 • Printed: 25.03.2013

Abstract: The Carabidae family (Coleoptera) is among the dominant groups of terrestrial predators and includes more than 40,000 species worldwide, making it one of the largest families of beetles. The fauna of Carabidae in Azarbaijan, Iran, is very diverse and has not been studied thoroughly. In the following paper, this group of beneficial predators is studied, using samples taken through 2007–2010 across Azarbaijan. Species belonging to 12 subfamilies were collected from 24 different localities. Among this diverse fauna, 3 species, *Brosicus cephalotes* (Linnaeus, 1758), *Harpalus (Pseudooophonus) calceatus* (Duftschmid, 1812), and *Amara (Xenocelia) ingenua* Duftschmid, 1812 are new records for Iranian fauna.

Key words: Carabidae, ground beetle, new record, Azarbaijan, Iran

1. Introduction

Carabidae Latreille 1802, or ground beetles, belong to the suborder Adephaga and order Coleoptera, and they comprise more than 40,000 species worldwide. Carabids often are found on the ground and under stones or logs, or in leaf litter, but many of them, especially those in the tropics, are arboreal. They are usually small to moderate in size. Most are a dark color, but many of them exhibit brilliant metallic colors. Most ground beetles are predacious, feeding on soft-bodied insects, but some are specialized predators of snails and millipedes. Three of the recognized tribes are known to have parasitoid species: Brachinini, Peleciini, and Lebiini. All of these are ectoparasitic on pupae of other beetles. Beetles in most of the other families of Adephaga spend most of their lives in fresh water, and some carabids live on river shores (Capinera, 2008). The Carabidae are distinguished among other beetles by filiform antennae, 5-segmented tarsi, coalescent basal segments of the abdomen, pronounced backwards metacoxae, and slender legs that are used for running, or, in a few genera, the front pair of legs is used for digging (Lindroth, 1985).

Reviewing the literature, it seems that the faunal record of the Carabidae of Iran has not yet been completed and requires further detailed studies. Some important studies on Iranian Carabidae were conducted by Jaeger (1990, 1992), Hejkal (2000), Lassalle (2001), Heinz (2002), Löbl and Smetana 2003, Magrini and Pavesi (2003), Jaskuła

(2007), Toledano and Marggi (2007), and Muilwijk and Felix (2008).

Despite the importance of ground beetles as predators of insect pests in agroecosystems, few faunistic studies have been carried out in the study area (Afshar, 1944; Farahbakhsh, 1961; Zomorodi, 1990; Esmaili et al., 1991; Modarres Awal, 1997; Khajehzadeh, 1998). Recently, however, some faunistic studies (Alichi and Minaei, 2002a, 2002b; Homayoon et al., 2002; Mohammadzadeh Fard et al., 2004; Shafiei et al., 2004; Fallahzadeh et al., 2005; Modarres Awal, 2005, 2006; Mohammadzadeh Fard and Hodjat, 2005; Mohammadzadeh Fard, 2008; Ghahari et al., 2009a, 2009b, 2010; Namaghi et al., 2010; Namaghi, 2011; Sadeghi, 2011; Samin et al., 2011) have added more carabid species to the fauna of Iran. However, there have not been any studies conducted in many parts of Iran in regard to the field of species composition of this important family of insects. There is no preliminary checklist of this family in Iran. To improve the faunal record, regional field studies should be carried out throughout Iran. So far, some studies have been conducted in a few provinces of the country.

Azarbaijan is a large region of the country, with diverse geographical regions and climates. The carabid fauna of this part of the Palearctic is very diverse but not well known. Considering the importance of these beneficial insects in biological pest control, the fauna of Carabidae in Azarbaijan fields is studied in this paper.

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2. Materials and methods

2.1. Study area

The materials for this investigation were collected from various habitats such as agricultural fields, mountains, and deserts between the years 2007 and 2010. The study areas were 3 provinces, East Azarbaijan, West Azarbaijan, and Ardabil, located in the northwest of Iran. Details of collected samples areas are as follows.

Ardabil Province (Almas Kandi: 38°34'N, 48°06'E; Anzab: 38°19'N, 48°18'E; Aq Qaleh: 38°31'N, 48°09'E; Arallu: 38°08'N, 48°25'E; Ardabil: 38°15'N, 48°17'E; Ayuriq: 38°10'N, 48°31'E; Gilan Deh: 38°18'N, 48°21'E; Gorjan: 38°18'N, 48°12'E; Kalkhuran: 38°08'N, 48°30'E; Khalilabad: 38°09'N, 48°28'E; Namin: 38°25'N, 48°29'E; Nir: 38°2' N, 47°59'E; Pars Abad Moghan: 39°93'N, 48°47'E; Qasem Qeshlaqi: 38°10'N, 48°11'E; Samarin: 38°21'N, 48°08'E; Samarin: 38°21'N, 48°8' E; Samian: 38°22'N, 48°14'E; Shahrivar: 38°19'N, 48°11'E; Sham Asbi: 38°11'N, 48°14'E; Sharif Beyglu: 38°35'N, 48°11'E; Shiran: 38°15'N, 47°15'E; Tupraqlu: 38°12'N, 48°27'E), **East Azarbaijan Province** (Basmenj: 37°59'N, 46°29'E), **West Azarbaijan Province** (Naghadeh: 36°57'N, 45°23'E).

Geographical areas have been coded as follows:

E – Europe: AB – Azerbaijan; AL – Albania; AN – Andorra; AR – Armenia; AU – Austria; AZ – Azores; BE – Belgium; BH – Bosnia and Herzegovina; BU – Bulgaria; BY – Belarus; CR – Croatia; CZ – Czech Republic; DE – Denmark; EN – Estonia; FA – Faroe Islands; FI – Finland; FR – France; GB – Great Britain; GE – Germany; GG – Georgia; GR – Greece; HU – Hungary; IC – Iceland; IR – Ireland; IT – Italy; KZ – Kazakhstan; LA – Latvia; LS – Liechtenstein; LT – Lithuania; LU – Luxembourg; MC – Macedonia; MD – Moldova; ME – Montenegro; MR – Madeira; MT – Malta; NL – the Netherlands; NR – Norway; PL – Poland; PO – Portugal; RO – Romania; RU – Russia (CT – central European territory; FE – Far East; NT – northern European territory; ST – southern European territory); SE – Serbia; SK – Slovakia; SL – Slovenia; SP – Spain; SV – Sweden; SZ – Switzerland; TC – Transcaucasia; TR – Turkey; UK – Ukraine; YU – Serbia and Montenegro.

N – North Africa: AG – Algeria; CI – Canary Islands; EG – Egypt (except Sinai); GH – Ghana; LB – Libya; MO – Morocco; TU – Tunisia.

A – Asia: AF – Afghanistan; AP – India (Arunachal Pradesh); CH – China [CE – central territory (ANH – Anhui; HUB – Hubei; HUN – Hunan; JIA – Jiangsu; JIX – Jiangxi; SHG – Shanghai; ZHE – Zhejiang); NE – northeastern territory (HEI – Heilongjiang; JIL – Jilin; LIA – Liaoning); NO – northern territory (BEI – Beijing; GAN – Gansu; HEB – Hebei; HEN – Henan; NIN – Ningxia; NMO – Nei Mongol; SHA – Shaanxi; SHN – Shandong; SHX – Shanxi; TIA – Tianjin); NW – northwestern

territory (GAN – Gansu; NMO – Nei Mongol; XIN – Xinjiang); SE – southeastern territory (FUJ – Fujian; GUA – Guangdong; GUX – Guangxi; HAI – Hainan; HKG – Hong Kong; MAC – Macao; TAI – Taiwan); SW – southwestern territory (GUI – Guizhou; SCH – Sichuan; YUN – Yunnan); WP – western plateau (QIN – Qinghai; XIZ – Xizang)]; CY – Cyprus; DG – Dagestan; HP – India (Himachal Pradesh); IN – Iran; IQ – Iraq; IS – Israel; JA – Japan; JO – Jordan; KA – India (Kashmir); KI – Kyrgyzstan; KU – Kuwait; KZ – Kazakhstan; LE – Lebanon; MC – Manchuria; MG – Mongolia; NC – North Korea; ON – Oman; PA – Pakistan; SA – Saudi Arabia; WS – West Siberia; SC – South Korea; SD – India (Sikim; Darjeeling District); SI – Sinai (Egyptian part); SY – Syria; TAI – Taiwan; TD – Tajikistan; TM – Turkmenistan; UP – India (Uttarakhand; Uttar Pradesh); UZ – Uzbekistan; YE – Yemen.

AFR – Afrotropical region.

NAR – Nearctic region.

2.2. Sampling procedure

Several plastic pitfall traps (6.8 × 11 cm [diameter × depth]) were installed in different fields and were partly filled with 70% ethanol plus Bitrex and a few drops of glycerin. The traps were emptied weekly, and the beetles were collected, separated, and identified. Additional specimens were collected directly by hand while walking through the area. Light traps were applied for sampling, too. Dates, locations, and number of carabids were recorded. The materials were identified using literature and comparing identified materials, and were confirmed by Dr J. Muilwijk in the Netherlands. Some specimens are deposited in the personal collection of Dr J. Muilwijk; some paratypes are held in the Department of Agriculture, Islamic Azad University, Ardabil Branch, Ardabil, Iran.

Based on several samplings in localities containing fields and also their surrounding grasslands, more than 200 carabid specimens were collected and determined.

3. Results and discussion

A total of 47 carabid species belonging to 12 subfamilies were collected from different fields and surrounding grasslands of Azarbaijan. Three species are newly recorded from Iran. The species and subspecies that belonged to subfamilies and tribes are presented in alphabetical order in the following list.

3.1. Subfamily Brachininae Bonelli, 1810

Tribe Brachinini Bonelli, 1810

Brachinus (Brachinus) cf. crepitans (Linnaeus, 1758)

Material: Ardabil Province: Samian, 3♂♂, 2♀♀; July 2008; Kalkhuran, 2♂♂, 2♀♀; May 2009.

Geographical distribution: E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA

LT LU MC MD ME NL NR PL PT RO RU SE SK SL SP ST SV SZ TR UK YU; A: CY IN IQ KI KZ SY TD TM UZ WS.

***Brachinus (Brachynolomus) explodens* Duftschmid, 1812**

Material: Ardabil province: Kalkhuran, 2♂♂, May 2009; Sham Asbi, 2♀♀, August 2010.

Geographical distribution: E: AB AL AR AU BE BH BU BY CR CZ EN FR GE GG GR HU IS IT LA LT LU MD NL PL PT RO RU (CT NT) SK SL SP ST TR UK YU; A: IN IQ KI KZ SY TD TM UZ WS.

3.2. Subfamily Broscinae Hope, 1838

Tribe Broscini Hope, 1838

***Broscus cephalotes* (Linnaeus, 1758)**

Material: Ardabil Province: Aq Qaleh, 2♂♂, 1♀♀, June 2008. New record for Iranian fauna.

Geographical distribution: E: AR AF AU AZ BE BH BU CZ DE EN FI FR GB GE GG GR HU IR IT LA LS LU MC MD MO NL NR PL RO RU SK SL SP ST SV SZ TR UK; N: AG EG LB; A: IN IQ KI KZ PA SA SY TM TU UZ.

3.3. Subfamily Carabinae Latreille, 1802

Tribe Carabini Latreille, 1802

***Calosoma (Callisthenes) pumicatus* Lapouge, 1907**

Material: Ardabil Province: Namin, 2♀♀, June 2007.

Geographical distribution: A: IN.

3.4. Subfamily Cicindelinae Latreille, 1802

Tribe Cicindelini Latreille, 1802

***Cicindela (Cicindela) talychensis* Chaudoir, 1846**

Material: Ardabil Province: Ardabil, 3♂♂, 6♀♀, September 2009.

Geographical distribution: E: AB; A: IN.

3.5. Subfamily Harpalinae Bonelli, 1810

Tribe Harpalini Bonelli, 1810

***Acinopus laevigatus* Menetries, 1832**

Material: Ardabil Province: Nir, 2♀♀, 2♂♂, September 2007; Shahrivar, 3♂♂, July 2008; 2♀♀, 1♂ June 2008; 1♀, June 2009.

Geographical distribution: E: AF AB AR BU CR GG GR IS MD RO RU ST TR; N: EG; A: CH (GAN XIN) DG IN IQ KA KI KZ SI TD TM UZ.

***Carterus (Carterus) rufipes* (Chaudoir, 1843)**

Material: Ardabil Province: Samarin, 2♀♀, May 2007.

Geographical distribution: E: AR BU GG GR IS TR; N: CY; A: IN LE SY.

***Dixus eremita* Dejean, 1825**

Material: East Azarbaijan Province: Basmenj, 1♂; August 2007.

Geographical distribution: E: AB AL AR BU CY GR IS MC MD RO RU TR UK; A: IN IQ JO KI KZ SY TD TM UZ.

***Dixus obscurus* Dejean 1825**

Material: East Azarbaijan Province: Basmenj, 1♀; August 2007.

Geographical distribution: E: AB AL AR BU IS GG GR IT MC MD RO ST TR UK; A: CY IN IQ LE SD SY.

***Eucartermus sparsutus* (Reitter, 1898)**

Material: Ardabil Province: Almas Kandi, 1♂, June 2009.

Geographical distribution: E: AR BU GR IS TR UK; A: IN JO SY.

***Harpalus (Cryptophonus) tenebrosus* Dejean, 1829**

Material: East Azarbaijan Province: Basmenj, 2♀♀; August 2007.

Geographical distribution: E: AB AL AR AU BE BH BU CR FR GB GE GG GR HU IT MC MD PL PT RO SL SP ST SZ TR UK YU; N: AG CI EG MO MR TU; A: CY IN IS IQ JO KI NW PA SY TD TM UZ YE.

***Harpalus (Harpalus) distinguendus* (Duftschmid, 1812)**

Material: Ardabil Province: Gorjan, 2♂♂, 5♀♀, May 2007; Samian: 3♂♂, 2♀♀ July 2007; Tupraqlu: 4♂♂, 2♀♀, May 2008; Aq Qaleh: 3♂♂, 2♀♀, June 2009.

Geographical distribution: E: AB AL AR AU AZ BE BH BU BY CI CR CY CZ DE EN ES FI FR GE GG GR HU IR IS IT LA LT LU MC MD MR NL NR PL PT RO SK SL SP ST SV SY SZ RU (CT NT) TR UK YU; N: AG; A: AF CH (HEI QIN XIN) IN KI KZ MG MO NC TD TM UZ WS.

***Harpalus (Harpalus) cf. flavicornis* Dejean, 1829**

Material: Ardabil Province: Ayuriq, 2♀♀, May 2008.

Geographical distribution: E: AB AL AR AU BH BU CR CZ GE GG GR HU IT MC MD ME PL RO RU SK SE SL ST SZ TR UK YU; A: IN MG TR.

***Harpalus (Harpalus) serripes* (Quensel, 1806)**

Material: Ardabil Province: Shahrivar, 2♀♀, May 2007.

Geographical distribution: E: AB AL AR AU BE BH BU BY CR CT CZ DE FR GB GE GG GR HU IT KZ LT LU MC MD NL PL PT RO RU SK SL SP ST SV SZ TR UK YU; N: AG MO TU; A: IN IS KI KZ SY WS.

***Harpalus (Pseudoophonus) calceatus* (Duftschmid, 1812)**

Material: Ardabil Province: Namin, 1♀, July 2008; Ayuriq, 1♂, July 2009. New record for Iranian fauna.

Geographical distribution: E: AB AL AN AR AU BE BH BU BY CR CZ DE EN FI FR GG GE GB GR HU IT LA LT LU MC MD NR PO PT RO RU YU SK SL SP SV SZ TR UK; A: AF CH JA KZ KI MG NC TD TM UZ.

***Harpalus (Pseudoophonus) rufipes* (Degeer, 1774)**

Material: Ardabil Province: Pars Abad Moghan, 3♀♀, 3♂♂, May 2009; Qasem Qeshlaqi, 3♀♀, 2♂♂ June 2009; Ardabil, 2♀♀, September 2010.

Geographical distribution: E: AB AL AR AU AZ BE BH BU BY CR CZ DE EN ES FI FR GB GE GG GR HU IR IT KZ LA LS LT LU MA MC MD NL NR MT PL PT RO RU (CT) SK SL SP ST SV SZ TR UK YU; A: AF AG CH (XIN) CY IN IQ KI KZ MO TD TM TU UZ WS; NAR.

***Oedesis caucasicus* (Dejean, 1831)**

Material: East Azarbaijan Province: Basmenj, 1♂; August 2007.

Geographical distribution: E: AB AR BU GG GR IS IT RU (ST) ST UK; A: CY IN JO TD TM.

***Ophonus (Hesperophonus) cf. rebellus* (Schauberger, 1926)**

Material: Ardabil Province: Ayuriq, 1♀, July 2009.

Geographical distribution: A: IN TM.

***Stenolophus (Stenolophus) discophorus* (Fischer, 1823)**

Material: Ardabil Province: Pars Abad Moghan, 2♀♀, June 2010.

Geographical distribution: E: AB AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GR HU IR IT LA LS LT LU MC MD NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU; N: AG MO ES; A: IN KI KZ UZ WS.

***Stenolophus (Stenolophus) steveni* Krynicki, 1832**

Material: East Azarbaijan Province: Basmenj, 1♀; August 2007.

Geographical distribution: E: AB AR BH BU CR GG HU MD RO SK ST TR UK; A: IN SY TM.

3.6. Subfamily Lebiinae Bonelli, 1810**Tribe Lebinini Bonelli, 1810*****Cymindis (Cymindis) axillaris* (Fabricius, 1794)**

Material: East Azarbaijan Province: Basmenj, 2♀♀, August 2007.

Geographical distribution: E: AB AR AU BH BU CZ GG GE GB GR HU IS IT MC MD NL PO PT RO RU SK SP TR UK; N: AG; A: CY LB IR LE SY TM.

***Cymindis (Cymindis) cf. andreae* Menetries, 1832**

Material: East Azarbaijan Province: Basmenj, 2♂♂, August 2007.

Geographical distribution: E: AB AR GG ST TR; N: EG; A: AF CY IN IQ KI KZ LE PA SA TD TM YE.

***Cymindis (Cymindis) picta* (Pallas, 1771)**

Material: Ardabil Province: Sham Asbi, 5♀♀, 2♂♂, June 2008.

Geographical distribution: E: AB AR RU ST TR UK; A: AF CH (XIN) IN KI KZ TD TM UZ WS.

***Lebia (Lamprias) cyanocephala* (Linne, 1758)**

Material: Ardabil Province: Gilan Deh, 2♀♀, July 2007.

Geographical distribution: E: AL AR AB BU BH BU BY CZ DE EN FI FR GB GE GG GR HU IS IT LA LS LT MC MD NL NR PL PT RU (CT) SK SP ST SV TR UK YU; N: AG MO TU; A: AF CH (XIN) CY IN IQ KZ PA SY UZ WS.

3.7. Subfamily Liciniinae Bonelli, 1810**Tribe Chlaeniini Brulle, 1834*****Chlaenius (Chlaeniellus) intermedius* Chaudoir, 1856**

Material: East Azarbaijan Province: Basmenj, 1♂, August 2007.

Geographical distribution: A: IN.

***Chlaenius (Chlaeniellus) vestitus* (Paykull, 1790)**

Material: Ardabil Province: Shiran, 2♂♂, 2♀♀, June 2008; Sham Asbi, 2♂♂, 2♀♀, June 2009.

Geographical distribution: E: AB AL AN AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG HU IR IT LA LS LT LU MA MC MD MR MT NL NR PL RO RU (CT FA NT) SK SL SP ST SV SZ TR UK YU; A: IN IQ KZ WS.

***Chlaenius (Chlaenius) festivus* Panzer, 1796**

Material: East Azarbaijan Province: Basmenj, 2♀♀, August 2007.

Geographical distribution: E: AB AL AR AU BH BU BY CR CZ FR GG HU IT KZ LT MC MD RO RU (CT) SK SL ST TR UK YU; N: EG LB TU; A: AF IN IQ SY TD UZ WS.

***Chlaenius (Dinodes) cruralis* Fischer von Waldheim, 1829**

Material: East Azarbaijan Province: Basmenj, 1♂, August 2007.

Geographical distribution: E: AB AL AR BH BU GG GR IS JO MC MD RO RU (CT) ST TR UK YU; A: IN IQ KZ SY TD TM UZ.

3.8. Subfamily Paussinae Latreille, 1807**Tribe Paussini Latreille, 1807*****Paussus (Cochliopaussus) turcicus* Frivaldszky von Frivald, 1835**

Material: East Azarbaijan Province: Naghadeh, 1♂, August 2010.

Geographical distribution: E: AB AR BU GG GR IS MC RU TR; A: IN JO KI KZ LE SY TD TM UZ.

3.9. Subfamily Platyninae Bonelli, 1810**Tribe Platynini Bonelli, 1810*****Anchomenus (Anchomenus) dorsalis* (Pontoppidan, 1763)**

Material: Semnan Province: Nir, 1♂, 1♀, June 2007.

Geographical distribution: E: AB AU BE BH BU CR CZ DE EN FI FR GB GE GR HU IR IT LA LS LT MC MD NL PO PT RU TR UK YU; N: MO; A: AF IN IQ JO KZ TM UZ.

Tribe Sphodrini Laporte, 1834***Calathus (Calathus) fuscipes* Goeze, 1777**

Material: Ardabil Province: Namin, 3♀♀, July 2007; Ardabil, 2♂♂, 2♀♀, June 2008; Ardabil, 1♂, 2♀♀, September 2008; Sharif Beyglu, 3♀♀, September 2008; Tupraqlu, 4♀♀, July 2009.

Geographical distribution: E: AL AU BE BH BU BY CZ DE EN FI FR GB GE GR HU IR IT LA LS LT LU MC NL NR PL RO SK SB SP SV SZ TR UK; N: AG LB MO TU; A: IN IQ.

***Calathus (Calathus) syriacus* Chaudoir, 1863**

Material: Ardabil Province: Arallu, 1♀, May 2008; Ardabil, 1♂, June 2008; Tupraqlu, 2♀♀, July 2009.

Geographical distribution: E: AB AR GG GR IS ST TR UK; N: EG; A: IN JO KZ LE MG SI SY TM UZ.

***Calathus (Neocalathus) peltatus* Kolenati, 1845**

Material: East Azarbaijan Province: Basmenj, 1♂, August 2007.

Geographical distribution: E: AB AR ST; A: IN TD TM UZ.

***Laemostenus (Laemostenus) caspius* Meneiries, 1832**

Material: Ardabil Province: Ardabil, 1♀, June 2008; Shiran, 1♀, June 2009.

Geographical distribution: E: AB RU; A: IN.

***Laemostenus (Pristonychus) sp. near morvani* Casale, 1988**

Material: Ardabil Province: Almas Kandi, 1♀, June 2008; Samarín, 1♀, July 2008.

Geographical distribution: A: IN.

3.10. Subfamily Pterostichinae Bonelli, 1810**Tribe Pterostichini Bonelli, 1810*****Poecilus (Poecilus) cupreus* Linne, 1758**

Material: Ardabil Province: Gorjan, 1♂, 3♀, July 2008.

Geographical distribution: E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA LS LT MD NL NR PL RO RU (CT ES NT) SK SP ST SV SZ TR UK YU; A: KI KZ SY TD TM UZ WS.

***Pterostichus (Lyrothorax) caspius* (Menetries, 1832)**

Material: East Azarbaijan Province: Basmenj, 1♀, August 2007.

Geographical distribution: E: AB CZ; A: IN.

Tribe Zabrinini Bonelli, 1810***Amara (Amara) aenea* (De Geer, 1774)**

Material: Ardabil Province: Ayuriq, 1♂, July 2009.

Geographical distribution: E: AB AL AN AR AU AZ BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IS IT LA LS LT LU MA MC MD MT NL NR PL PT RO RU (CT NT) SK SL SP ST SV SZ TR UK YU; N: AG CI EG LB MO MR TU; A: AF CH CY ES HP IN IQ JO KA KI KZ LE MG NP PA SY TD TM UP UZ.

***Amara (Amara) littorea* Thomson, 1857**

Material: Ardabil Province: Ardabil, 1♂, 2♀, May 2009.

Geographical distribution: E: AB AR AU BH BU BY CR CZ DE EN ES FI FR GE GG HU IT LA LT MD NR PL RU (CT NT) SK SL ST SV SZ TR UK YU; A: IN KI KZ TD UZ WS.

***Amara (Bradytus) apricaria* (Paykull, 1790)**

Material: Ardabil Province: Khalkhal, 1♂, 3♀, September 2010.

Geographical distribution: E: AB AL AN AR AU BE BH BU BY CR CZ DE EN ES FI FR GB GE GG GR HU IC IR IT LA LT LU MC MD NL NR PL PT RO RU (CT NT FE) SK SL SP ST SV SZ TR UK YU; A: AF CH (GAN HEI NMO QIN XIN XIZ) IN JA KA KI KZ MG NC PA TD TM UZ.

***Amara (Paracelia) saxicola* C. Zimmermann, 1832**

Material: Ardabil Province: Gilan Deh, 1♂, July 2008.

Geographical distribution: E: AB AR GG RO ST UK RU TR UZ; A: AF CH (XIN) IN IQ KZ PA TD TM WS.

***Amara (Xenocelia) elevata* (Motschulsky, 1844)**

Material: Ardabil Province: Khalilabad, 1♀, July 2009.

Geographical distribution: A: IN.

***Amara (Xenocelia) ingenua* Duftschmid, 1812**

Material: Ardabil Province: Namin, 1♂, August 2008.

New record for Iranian fauna.

Geographical distribution: E: AR AU BE BH BU BY CR CZ DE EN FI FR GG GE GR HU IT LA LT MC MD NL NR PO RO RU SK SL SP SV SZ TR UK; N: AG; A: CH (XIN) KZ KI TD TM UZ.

***Amara (Xenocelia) municipalis* Duftschmid, 1812**

Material: Ardabil Province: Sharif Beyglu, 1♀, May 2010.

Geographical distribution: E: AL AN AR AU BE BU BY CR CZ DE EN FI FR GE GG GR HU IT LA LT MD MC NR PO RO RU (ST) SK SP SV SZ TR UK; A: IN CH (XIN) KZ KI TD TM UZ.

***Zabrus (Pelor) rotundicollis* Menetries, 1836**

Material: Ardabil Province: Anzab, 1♂, May 2009; Ardabil, 1♀, June 2009.

Geographical distribution: E: AR TR; A: IN.

***Zabrus (Zabrus) morio* Mandrias, 1832**

Material: East Azarbaijan Province: Basmenj, 1♀, August 2007.

Geographical distribution: E: AB AR GG TR; A: IN PA SY TD UZ.

***Zabrus (Zabrus) tenebrioides* Goeze, 1777**

Material: Ardabil Province: Pars Abad Moghan, 5♂, 8♀, June 2007.

Geographical distribution: E: AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LT LU MC MD NL NR NT PL RO RU (CT) SK SL SP ST SV SZ TR UK YU; A: CY IN KZ.

3.11. Subfamily Siagoninae Bonelli, 1813**Tribe Siagonini Bonelli, 1813*****Siagona europaea* Dejean, 1826**

Material: East Azarbaijan Province: Basmenj, 1♀, August 2007.

Geographical distribution: E: AB AL AR RU BU CR GG GR IS IT MC PT SP ST TR; N: AG CI EG LB MO TU; A: AF CY HP IN IQ JO KA LE PA SA SY TD TM UP YE.

3.12. Subfamily Trechinae Bonelli, 1810**Tribe Bembidiini Stephens, 1827*****Bembidion (Emphanes) latiplaga* Chaudoir, 1850**

Material: East Azarbaijan Province: Basmenj, 1♀; August 2007.

Geographical distribution: E: AB AR AU BH BU FR GG GR HU IT MD RO RU SK SP ST RU (ST) UK YU; A: IN KZ TM UZ.

***Bembidion (Emphanes) minimum* (Fabricius, 1792)**

Material: East Azarbaijan Province: Basmenj, 1♂, 2♀; August 2007.

Geographical distribution: E: AR AU BE BH BU BY CZ DE ES EN FI FR GB GE GR HU IR IT LA LT LU MD MO NL NR PT RO RU (CT FE NT) SK SP ST SV UK YU; N: AG TU; A: IN KZ WS.

***Bembidion (Notaphus) varium* (Olivier, 1795)**

Material: East Azarbaijan Province: Basmenj, 1♂, 3♀; August 2007.

Geographical distribution: E: AB AL AR AU BE BH BU BY CR CZ DE ES FI FR GB GE GR HU IR IS IT LA LT LU MC MD MO NL NR PL PT RO RU (CT FE NT) SK SL SP ST SV SZ TR UK YU; N: AG CI EG TU; A: AF CH (SHG TAI) CY IN KI KZ SC TM UZ WS.

***Bembidion (Ocydromus) atlanticum* Wollaston, 1854**

Material: East Azarbaijan Province: Basmenj, 1♂; August 2007.

Geographical distribution: E: AR AZ BU EG GG GR IS MA MD MO MR PO RU TR UK; N: AG CI TU; A: CY IN IQ KI KZ SA TD TM UZ YE.

***Elaphropus (Tachyura) diabrachys* Kolenati, 1845**

Material: East Azarbaijan Province: Basmenj, 2♀, 1♂; August 2007.

Geographical distribution: E: AB AR BE CZ FR GG GR HU IS IT MD PL PT RO SK SP ST TR UK; A: CY IN KZ LE SY TD TM UZ.

4. Conclusions

The results of this research indicate that there is a diverse fauna of Carabidae in Iran. Among the 12 studied subfamilies in this paper, Harpalinae and Pterostichinae contained the highest number of species (15 and 12, respectively). The subfamily Harpalinae is the largest group of carabid beetles and includes about 19,000 species (Lorenz, 2005), the bulk of the family's species level diversity. In this survey, a total of 47 species belonging to 12 subfamilies were collected from 24 different localities. Of these diverse fauna, 3 species,

Broscus cephalotes (Linnaeus, 1758) in Ardabil Province (Aq Qaleh: 38°31'N, 48°09'E), *Harpalus (Pseudoophonus) calceatus* (Duftschmid, 1812) in Ardabil Province (Namin: 38°25'N, 48°29'E; Ayuriq: 38°10'N, 48°31'E), and *Amara (Xenocelia) ingenua* Duftschmid 1812 in Ardabil Province (Namin 38°25'N, 48°29'E), are new records for Iranian fauna. Many collected species such as *Dyschirius* sp. and *Laemostenus (Pristonychus)* sp. were not completely identified, as there were only a few specimens and no male specimens. Most collected species from West Azarbaijan (Naghadeh: 36°57'N, 45°23'E) were not identified due to time limitations; only one species is listed in this paper. Some species such as *Brachinus (Brachinus)* cf. *crepitans* (Linnaeus, 1758), *Harpalus (Harpalus)* cf. *flavicornis* Dejean, 1829, *Ophonus (Hesperophonus)* cf. *rebellus* (Schauberger, 1926), *Cymindis (Cymindis)* cf. *andreae* Menetries, 1832, and *Laemostenus (Pristonychus)* sp. near *morvani* Casale, 1988 were very similar to holotype or paratype species, and so they were not completely identified, either. They are expected to be identified in future studies.

Iran is a large country with diverse geographical regions and climate, and Azarbaijan is a large region in the northwest of Iran; hence, it would be expected that a large number of additional species remain to be discovered.

Acknowledgments

The author is indebted to Dr J. Muilwijk of the Netherlands and Dr Prof Peter Nagel, University of Basel, Switzerland, for valuable help in identification in the progress of the project, and to Dr H. Ghahari of the Department of Agriculture, Islamic Azad University, Shahre Rey Branch, Tehran, Iran, for his kind assistance in sending related papers and M. Alaei for office assistance. The research was supported by the Department of Agriculture, Islamic Azad University, Ardabil Branch, Ardabil, Iran.

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