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New Records of Ground Beetles (Coleoptera: Carabidae) from Jordan

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Abstract

Three species of ground beetles of the family Carabidae are recorded from Jordan for the first time: *Siagona jenissoni* (Dejean, 1826), *Dixus sphaerocephalus* (Olivier, 1795) and *Laemostenus complanatus* (Dejean, 1828). The occurrence of the following six species in Jordan is confirmed: *Grammognatha euphratica euphratica* (Latreille and Dejean, 1822), *Calosoma (Campalita) algiricum* (Géhin, 1885), *Paussus turcicus* (I. Frivaldszky von Frivald, 1835), *Clivina laevifrons* (Chaudoir, 1842), *Trechus quadristriatus* (Schrank, 1781), and *Sphodrus leucophthalmus* (Linné, 1758). *Taphoxenus* (*Lychnifugus*) *ziegleri* (Casale and Assmann 2017) is collected from a new locality. The collection sites and dates, all available biological or ecological data, and the digital images are given for all the recorded species, including the male genitalia for *Siagona jenissoni* Dejean.

Key words: Carabidae, Jordan, Cicindelinae, Carabinae, Paussinae, Siagoninae, Scaritinae, Trechinae, Harpalinae.

Introduction

The ground and tiger beetles belong to the Family Carabidae (Latreille, 1802), which is a large family of the order Coleoptera comprising more than 40,000 described species worldwide (Kesdek, 2012). They are mostly predators of small insects or other arthropods; some feed on carrion, while other species feed on plant materials. Ground beetles are an essential group for various studies, particularly in ecology (Ghahari *et al.*, 2010) and in biological control in forestry areas. Nasir and Katbeh-Bader (2017) published an annotated checklist of the ground beetles of Jordan, including 136 species, arranged in sixteen subfamilies, twenty-eight tribes, and sixty-nine genera. They also presented literature about the Carabidae from Jordan and the adjacent countries. However, after examining some newly collected specimens of the carabid beetles during 2017-2018, new records were added to the entomofauna of Jordan.

The objectives of this paper are to record ground beetle species from the family Carabidae from Jordan for the first time, in addition to confirming some earlier records, and presenting new collecting localities for some species. Since Lóbl, and Smetana (2003) mentioned in their "Catalogue of Palaearctic Coleoptera" that old records from "Arabia" may pertain to any of the states in the Arabian Peninsula and Jordan. Therefore, the present records confirm the occurrence of species mentioned from Jordan in the catalogue, which may have been recorded from Arabia without a specific locality.

Materials and Methods

The keys of Trautner and Geigenmüller (1987) and the website (http://coleo-net.de/coleo/index.htm) were used to identify the ground beetle specimens. Relevant taxonomic papers dealing with certain groups of the Carabidae of Jordan or adjacent areas were also used (Assmann *et al*., 2012; and Matalin and Chikatunov, 2016; Casale, and Assmann, 2017). The valid names followed by synonyms and world distribution are given for all the recorded species based mainly on the Catalogue of Palearctic Coleoptera (Lóbl and Smetana, 2003). Digital images were taken by Canon EOS 40D equipped with a 100mm Macro lens and ring LED illumination. The digital images of small specimens (less than 5 mm)

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and genitalia preparations were taken using the same camera mounted on a 65mm Macro lens. Many images were taken for each specimen and then stacked using Helicon Focus software and were processed using Adobe Photoshop 2020. Body length was measured from tip of the head to the tip of the abdomen. The male genitalia of *Siagona jenissoni* was dissected, boiled gently for one minute in 10% Koh, and was kept in an incubator at 50°C for one day. Images for paramere slide preparations were taken by a digital camera (CMEX 5.0 M pixel digital USB2 camera Euromex, Arnhem, The Netherlands) attached to the eye tube of a light microscope.

Results and discussion

The following ten species are recorded from Jordan; they are listed according to seven subfamilies of the Carabidae. Each valid species' name is followed by a synonymy list, world distribution, specimens examined, and some remarks.

1 Subfamily Cicindelinae (Latreille, 1802)
***Grammognatha euphratica euphratica* (Latreille and Dejean, 1822) (Figure 1)**
Megacephala euphratica euphratica (Latreille and Dejean, 1822)
Megacephala syriaca (GISTL, 1837)
Megacephala algeriana (Guérin-Méneville, 1846)
Megacephala algirica (Desmarest, 1849)
Megacephala nigra (W. Horn, 1899)
Megacephala nigripennis (Ferrante, 1908)
Megacephala aida (MandL, 1959)
Distribution: The United Arab Emirates, Algeria, Cyprus, Djibouti, Egypt, Greece, Iran, Iraq, Jordan, Kuwait, Libya, Lebanon, Morocco, Oman, Pakistan, Palestine, Saudi Arabia, Spain, Syria, Turkey, Tunisia, West Africa (Senegal), and Yemen.
Specimens examined: Fifa Reserve, 2018, RSCN researcher, no date.
Remarks: This record confirms the occurrence of this species in Jordan. It was recorded as *Megacephala* (*Grammognatha*) *euphratica euphratica* in the Catalogue of Palaearctic Coleoptera (Lóbl and Smetana, 2003), but according to Matalin and Chikatunov (2016), the subgenus *Grammognatha* was elevated to a genus level. Its distribution in Egypt, the Middle East, and Central Asia was studied. New localities were given for *M. e. euphratica* from Turkey, Syria, Saudi Arabia and Buraydah (Franzen, 2001). Franzen and Gigli (2003) confirmed its presence in Cyprus and described its habitat. Aydin (2011) studied some morphological and biological features of this species under laboratory conditions for the specimens collected from Turkey. He found that the duration of the pre-oviposition, oviposition, and post oviposition periods were 15.75, 6.41 and 9.15 days respectively. The shortest duration period for adult males was 14 days, while, it was 23 days for the female.

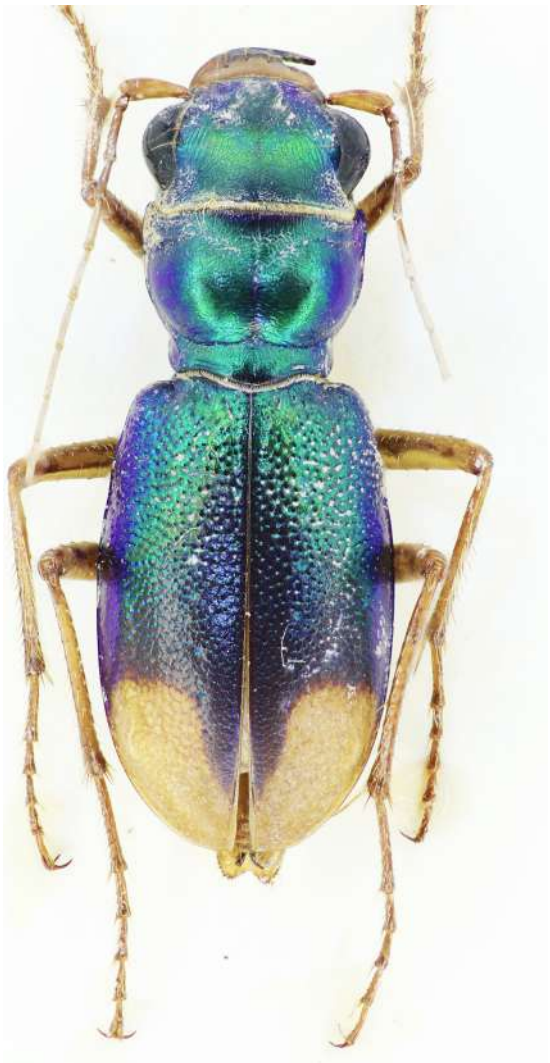

Figure1. *Grammognatha euphratica euphratica* (Latreille and Dejean, 1822)

2 Subfamily Carabinae (Latreille, 1802)
***Calosoma (Campalita) algiricum* (Géhin, 1885) (Figure 2)**
Calosoma petri (Semenov, 1902)
Distribution: Europe: Italy (Sicilia). **North Africa:** Algeria, Libya, Morocco, Tunisia. **Asia:** Iran, Palestine, Jordan, Saudi Arabia, Turkmenistan. Also, it was found in Lebanon (Tripolis) (Deuve 2004), and Syria (Bruschi 2013).
Specimen examined: One specimen. Al Mafraq Gov. III.2019, 32°21'N 36°12'E.
Remarks: This species was recorded previously from Wadi Rum in the south of Jordan by Borzatti von Löwenstern (1987). This is the second record of this species from Jordan since 1987. It is recorded for the first time from the north of Jordan. It prefers desert habitats, especially oases (Breuning 1927; Casale *et al.* 1982).

Figure 2. *Calosoma (Campalita) algiricum* (Géhin, 1885)

3 Subfamily Paussinae (Latreille, 1807)
***Paussus turcicus* (I. Frivaldszky von Frivald, 1835) (Figure 3)**
Paussus foreli (Wasmann, 1922)
Paussus innotatipennis (Pie, 1914)
Paussus mariae (Mulsant, 1855)
Distribution: Armenia, Bulgaria, Georgia, Greece, Iran, Jordan, Kyrgyzstan, Kazakhstan, Lebanon, Macedonia, Russia, Syria, Tadzhikistan, Turkmenistan, Turkey, and Uzbekistan.
Specimens examined: One specimen. Al Jubayhah, Amman. No date.
Remarks: The record confirms the occurrence of this species in Jordan. (Lapeva-Gjonova *et al*. 2011) mentioned that it is called ant nest beetle or the flanged bombardier beetle. Its typical host is the ant *Pheidole pallidula* (Nylander, 1849), but may be found with *Tetramorium semilaeve* (André, 1883) and *Messor barbarus* (Linnaeus, 1767), all of them belong to the subfamily Myrmicinae.

Figure 3. *Paussus turcicus* I. (Frivaldszky von Frivald, 1835)

4 Subfamily Siagoninae (Boftelli, 1813) *Siagona jenissoni* (Dejean, 1826) (Figures 4-9)
Specimens examined: One specimen. Sahab, 8.III.2019. Coll. Ahmad Gasan.
Distribution: **Europe**: Spain (incl. Gibraltar)
North Africa: Morocco (incl. Western Sahara)

Remarks: *Siagona jenissoni* (Dejean, 1826) is a new record to Jordan. It is also a new continental record in Asia. Future work may show its presence in other south European, north African, and Middle Eastern countries. Mediterranean *Siagonia* spp. are adapted to living in ground fissures in clayey soils formed during the dry season. They are nocturnal olfactory hunters, and prey on ants only. Their presence in such a specific habitat may explain why only one specimen was listed in the present collection. The male genitalia structures are displayed in (Figs. 4-9) showing the aedeagus, left and right parameres, and details of their distal part.

5 Subfamily Scaritinae (Bonelli, 1810)
***Clivina laevifrons* (Chaudoir, 1842a: 814) (Figure 10)**
Clivina lernaea (Schaum, 1857)
Clivina subcylindrica (Peyron, 1858)
Distribution: **Europe**: Azerbaijan, Albania, Bułgaria, Georgia, Greece (incl. Crete), Italy (Sicilia), Moldavia, Romania, Slovenia, Turkey, Yugoslavia (Serbia, Montenegro).

Figure 4. *Siagona jenissoni* (Dejean, 1826)

Figure 5. Male Aedeagus and paramesres

Figure 6. Left paramere

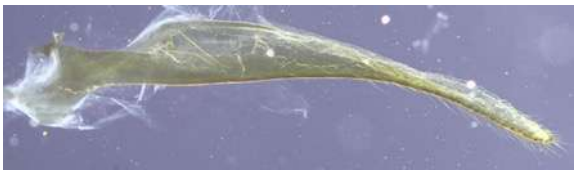

Figure 7. Right paramere

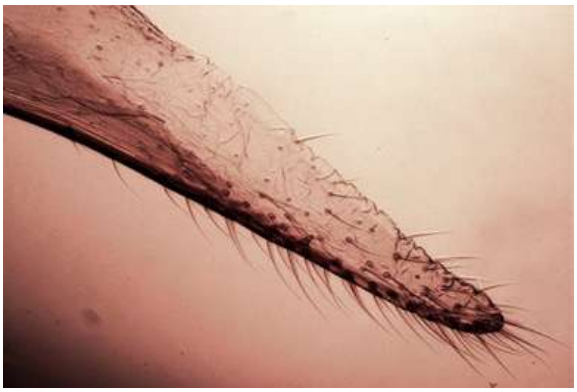

Figure 8. Left paramere distal end enlarged

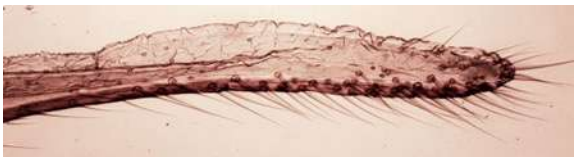

Figure 9. Right paramere distal end enlarged

North Africa: Egypt. **Asia**: Cyprus, Iran, Palestine, Iraq, Jordan, Kazakhstan, Lebanon, Oman, Syria, Turkmenistan, Turkey, Ukrainę, and Yemen. Slavčo and Borislav (2015) recorded the species from Macedonia.
Specimens Examined: One specimen. Al Moujib Reserve. 2.V.2016, Coll. Katbeh and Nasir.
Remarks: This record confirms the presence

Figure 10. *Clivina laevifrons* (Chaudoir, 1842)

Figure 11. *Trechus (Trechus) quadristriatus* (Schrank, 1781)

of *Clivina laevifrons* Chaudoir in Jordan. This is a common species widespread in the Mediterranean area to Middle Asia (Bulirsch and Stachowiak 2017).

6 Subfamily Trechinae (Bonelli, 1810)
***Trechus (Trechus) quadristriatus* (Schrank, 1781) (Figure 11)**

Trechus (Trechus) amaurocephalus (Kolenati, 1845)
Buprestis capitatus (Geoffroy, 1785)
Trechus (Trechus) fascipennis (Stephens, 1828)
Trechus (Trechus) humeralis (Dejean, 1831)
Carabus minutus (Fabricius, 1792)
Trechus (Trechus) piciventris (Graells, 1858)
Trechus (Trechus) politus (Faldermann, 1836)
Trechus (Trechus) syriacus (Putzeys, 1870)
Carabus tempestivus (Panzer, 1799)
Distribution: Afghanistan, Algeria, Albania, Armenia, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Byelorussia, Croatia, Cyprus, Denmark, Egypt, Estonia, Finland, France, Great Britain, Germany, Georgia, Greece, Hungary, Iran, Iraq, Ireland, Palestine, Italy, Jordan, Kyrgyzstan, Kazakhstan, Latvia, Lebanon, Lithuania, Luxembourg, Malta, Macedonia, Moldavia, Morocco, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Syria, Switzerland, Tadzhikistan, Turkmenistan, Turkey, Ukraine, and Uzbekistan.
Specimens examined: one specimen. University of Jordan Farm, Jordan Valley, Light trap 29/4/-3/5 1994.
Remarks: This record confirms the presence of this species in Jordan. Hind wings dimorphic, (in the Middle East predominantly winged specimens). Eurytopic species in meadows (Assmann *et al*., 2012).

7 Subfamily Harpalinae (Bonelli, 1810)
***Dixus sphaerocephalus* (Olivier, 1795) (Figure 12)**
Aristus trogossitoides (L. Dufour, 1820)
Ditomus sphaerocephalus (Olivier, 1795)
Dixus trogossitoides (L. Dufour, 1820)
Scarites sphaerocephalus (Olivier, 1795)
Distribution: **Europę**: Faeroe Islands, Italy (incl. Sardinia, Sicily, San Marino) Portugal, Spain (incl. Gibraltar); **North Africa**: Algeria, Libya, Morocco (incl. Western Sahara), and Tunisia.
Material examined: One specimen. Al Jubayhah, 18.III.2018.
Remarks: *Dixus sphaerocephalus* **(**Olivier, 1795) is a new record to Jordan. It is also a new continental record in Asia. Additional collecting in other countries may reveal its presence in other south European, north African, and Middle Eastern countries.
***Laemostenus* (*Laemostenus) complanatus* (Dejean, 1828) (Figure 13)**
Pristonychus alatus (Wollaston, 1854)
Pristonychus australis (Blackburn, 1888)
Pristonychus australianus (Casale, 1988)
Pristonychus beloni (Raffray, 1870)
Pristonychus chilensis (Gory, 1833)
Pristonychus crassicornis (Fainnaire, 1877)
Pristonychus nanniscus (Péringuey, 1896)
Pristonychus rufitarsis (Curtis, 1839)
Specimens examined: One specimen. Amman, Tabarbour 17.XII.2017.
Distribution: **Europe**: Azores, Croatia, France (incl. Corsica, Monaco), Great Britain (incl. Channel Islands), Greece (incl. Crete), Italy (incl. Sardinia, Sicily, San Marino), Portugal, Spain (incl. Gibraltar), Slovenia, Yugoslavia (Serbia, Montenegro). **North Africa**: Algeria, Canary Islands, Morocco (incl. Western Sahara), Madeira Archipelago, Tunisia. **Asia**: Cyprus, and Lebanon.
Remarks: *Laemostenus* (*Laemostenus) complanatus* (Dejean, 1828) is recorded for the first time from Jordan. It is a cosmopolitan species (Lóbl and Smetana, 2003). Originating from North Africa, it has been dispersed by trade to ports in most continents (Lindroth, 1974).

Figure 12. *Dixus sphaerocephalus* (Olivier, 1795)

Figure 13. *Laemostenus (Laemostenus) complanatus* (Dejean, 1828)

***Sphodrus leucophthalmus* (Linné, 1758) (Figure 14)**

Sphodrus armeniacus (Osculati, 1844)
Sphodrus findus (Chaudoir, 1852)
Carabus obsoletus (P. Rossi, 1790)
Carabus planus (Fabricius, 1792)
Sphodrus siculus (Motschulsky, 1865)
Carabus spiniger (Puykuîl, 1790)

Distribution: **Europe**: Armenia, Austria, Belgium, Bułgaria, Croatia, Czech Republic, Denmark, Finland, Franc, Great Britain, Germany, Georgia, Greece (incl. Crete) Hungary, Italy, The Netherlands Poland Portugal Slovakia Slovenia, Spain (incl. Gibraltar), Russia, Sweden Switzerland, Romania, Ukrainę, Yugoslayia.

North Africa: Algeria, Canary Islands, Egypt, Libya, Morocco, Tunisia. **Asia**: Afghanistan, Cyprus, Himachal, Pradesh, Iraq, Kashmir (India), Saudi Arabia, Syria, Turkey, Uttar Pradesh (India), and Yemen.

Specimens examined: One specimen. Dibeen Reserve.

Remarks: Casale and Assmann (2017) recorded this species from the south of Jordan in Wadi Rum and Dhana Camp syntopically with *Taphoxenus* (*Lychnifugus*) *ziegleri* (Casale and Assmann, 2017). *Sphodrus leucophthalmus* Linné is steppic, eremic and anthropophilic species, rare and disappearing in several European countries. It lives in mammal nests and other damp areas with clay floors. It preys on adults and the larvae of the darkling beetle family Tenebrionidae. *Sphodrus leucophthalmus* is the only species of *Sphorus* present in the southern Levant. Another species of the genus, *S. trochanteribus* (Mateu, 1990), is found in Yemen (Casale and Assmann, 2017).

Figure 14. *Sphodrus leucophthalmus* (Linné, 1758)

***Taphoxenus* (*Lychnifugus*) *ziegleri* (Casale and Assmann, 2017) (Figure 15)**

Distribution: Iraq, Jordan, Syria, and Turkey.

Specimens examined: Two specimens Dibbeen Reserve.

Remarks: The type locality of this species is Madaba, Jordan. Other specimens were collected from Petra, Dhana and Tafila. The record from Dibben Reserve shows the most northern distribution of the species so far. Further investigations are needed to determine the presence of this species

Figure 15. *Taphoxenus (Lychnifugus) ziegleri* (Casale and Assmann, 2017)

in east Mediterranean countries. Casale and Assmann (2017) provided a detailed description of the species, diagnosis, and genitalia drawings.

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