

New Data on the Occurrence of Scarabaeoid Beetles (Coleoptera: Scarabaeoidea) in the Republic of Macedonia

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Abstract: The superfamily Scarabaeoidea (scarabaeoid beetles) in the Republic of Macedonia was studied between 2010 and 2013. We recorded 71 species, including six species new for the fauna of this country: *Lucanus cervus* (LINNAEUS, 1758), *Aphodius (Agrilinus) convexus* ERICHSON, 1848, *A. (Phalacrothorus) quadrimaculatus* (LINNAEUS, 1761), *A. (Plagiogonus) arenarius* (A.G. OLIVIER, 1789), *A. (Trichonotulus) scrofa* (FABRICIUS, 1787), and *Gnorimus variabilis* (LINNAEUS, 1758) were found. Up to date, 207 species of scarabaeoid beetles are known to occur in the Republic of Macedonia.

Key words: Coleoptera, Scarabaeoidea, occurrence, new records, Republic of Macedonia

Introduction

The current knowledge of the superfamily Scarabaeoidea (scarabaeoid beetles) occurring on the territory of the Republic of Macedonia is insufficient. The first list of scarabaeoid beetles of Macedonia was composed by MIKŠIĆ (1955) and included 129 species. Papers describing the fauna of scarabaeoid beetles of the Balkan Region, which were published two and four years later, mentioned respectively 137 (MIKŠIĆ 1957) and 144 species (MIKŠIĆ 1959) from the Republic of Macedonia. According to the „Katalog der Lamellicornia Jugoslaviens (Insecta-Coleoptera)”, which was published in 1970, the number of scarabaeoid beetle species known from the Republic of Macedonia was 143 (MIKŠIĆ 1970).

The Catalogue of Palaearctic Coleoptera (CPC) lists 171 species of scarabaeoid beetles occurring in the Republic of Macedonia: Lucanidae – two species, Trogidae – one, Bolboceridae – one, Geotrupidae – seven, Ochodaeidae – two, Hybosoridae – one, Glaphyridae – eight and Scarabaeidae – 149 (LÖBL & SMETANA 2006).

The purpose of this paper is to add new faunistic data and to complete the missing information on the occurrence of scarabaeoid beetles in the Republic of Macedonia.

Material and Methods

Study on beetles belonging to the superfamily Scarabaeoidea occurring in the Republic of Macedonia were performed in the years 2010-2013. It focused mostly on the western and southern part of the country (Fig. 1).

Given the fact that scarabaeoid beetles have various trophic preferences, i.e. folivores, root-feeders, dead wood-feeders, carrion-feeders and coprophages, specimens were sought also on flowers and leaves of herbaceous plants and trees, on dead tree trunks and in tree holes, in forest litter and surface layer of the soil, on dead animals and their remains. Since the most typical feeding specialisation of scarabaeoid beetles is coprophagy a high percentage of the inventarisation were performed on pastures. The faeces of farm animals (cattle, horses, sheep and goats), dogs as well as wild animals (wild boar, red deer, roe deer, hares, rabbits and foxes) were examined. Additionally, the insects were collected at night time with the use of a UV light source and white screen and on old tree trunks with the use of a LED light source.

In this paper, the following abbreviations of names of people who collected the scarabaeoid beetles and the owners of collections in which specimens are kept were used: Jerzy Borowski [JB], Adam Byk

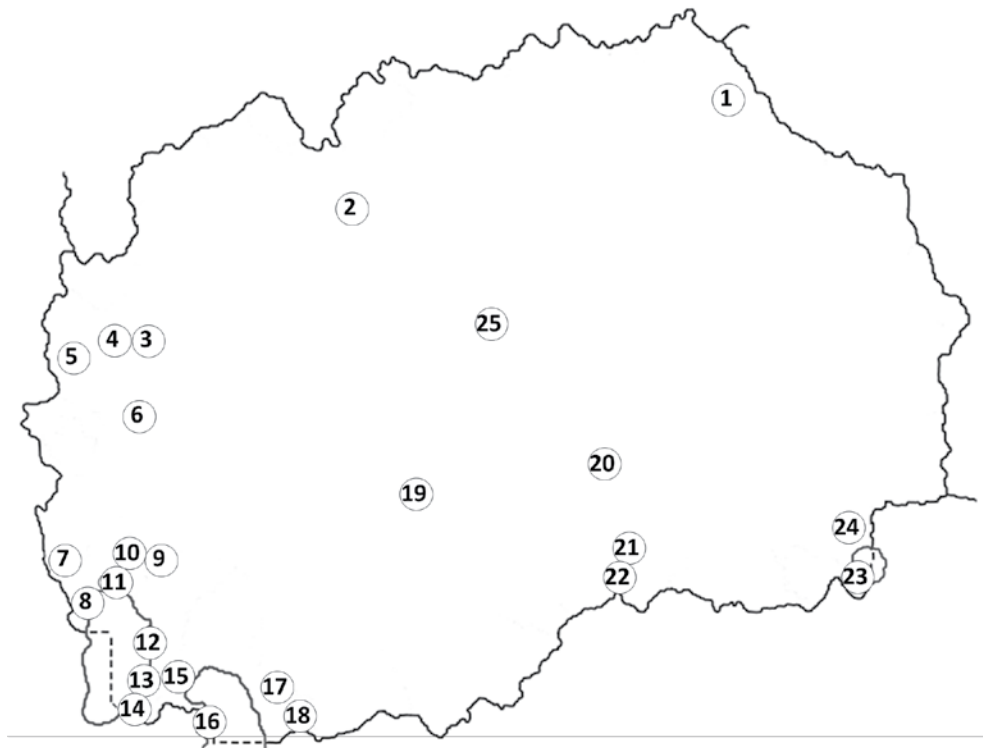


Fig. 1. Location of capture sites: 1 – Stanci, 2 – Šiševo, 3 – Nikiforovo, 4 – Mavrovo, 5 – Trebište, 6 – Tresonche, 7 – Vevčani, 8 – Kališta, 9 – Mešeišta, 10 – Korošišta, 11 – Struga, 12 – Gradište, 13 – Trpejca, 14 – Ljubaništa, 15 – Leskoec, 16 – Konjsko, 17 – Arvati, 18 – Brajčino, 19 – Markovi Kuli, 20 – Kavadarci, 21 – Konopište, 22 – Michajlovo, 23 – Star Dojran, 24 – Ćopčeli, 25 – Kožlar

[AB], Paweł Górski [PG], Dawid Marczak [DM], Tomasz Mokrzycki [TM], Danuta Pełowska-Marczak [DPM] and Jacek Piętko [JP].

The systematical order and species names were taken from the “Catalogue of Palearctic Coleoptera” (LÖBL & SMETANA 2006).

Results

We recorded 71 species of scarabaeoid beetles of from five families during the four years: Lucanidae (two species), Trogidae (one), Geotrupidae (two), Glaphyridae (three) and Scarabaeidae (65 species, including 20 species from the subfamily Aphodiinae, 23 species from Scarabaeinae, five species from Melolonthinae, two species from Sericinae, six species from Rutelinae, one species from Dynastinae and eight species from the family Cetoniinae). Among the collected material, six species were new to the fauna of the Republic of Macedonia.

Family Lucanidae

Dorcus parallelipedus (Linnaeus, 1758)

A western Palearctic species inhabiting areas from the Iberian Peninsula to the European part of the Republic of Kazakhstan; recorded also in Morocco. In the Republic of Macedonia known only from individual sites (ROZNER I. & ROZNER G. 2009, ZIANI *et al.* 2015). A female specimen was collected off an oak trunk.

Struga ad Ohrid, 9-14.V.2012 – 1 ex., leg. et coll. AB.

Lucanus cervus cervus (Linnaeus, 1758)

A subspecies widely distributed in Europe from Portugal to the European part of Russia. Recorded also in Georgia, the Republic of Kazakhstan, Turkey, Syria, Israel and Iran (LÖBL & SMETANA 2006). There is no confirmation of its occurrence in the Republic of Macedonia (see MIKŠIĆ 1970, LÖBL & SMETANA 2006, HARVEY *et al.* 2011). Swarming individuals as well as copulating specimens were observed in an oak forest located in Galičica National Park. These are the first records of this species in the Republic of Macedonia.

Gradište ad Ohrid (Galičica National Park), 17.VII.2010 – 10 ex., leg. DM et DPM, coll. DM;

Leskoec ad Resen (Galičica National Park), 21.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Kavadarci, 21.VII.2013 – 1 ex., leg. DM et DPM, coll. DM.

Family Trogidae

Trox niger P. Rossi, 1792

A species widely distributed in Europe from the Pyrenean Peninsula to the European part of Russia. Recorded also in Georgia, Armenia, Kazakhstan, Turkey, Kyrgyzstan and Siberia (LÖBL & SMETANA 2006, PITTINO 1991, ZÍDEK 2013). All specimens of this species were found under decaying sheep hides.

Kališta ad Struga, 9-14.V.2012 – 12 exx., leg. AB et JB et JP, coll. AB;

Family Geotrupidae

Trypocopris (Trypocopris) vernalis vernalis (Linnaeus, 1758)

Mavrovo ad Gostivar (Bistra Mts., Mavrovo National Park), 14.VII.2011 – 3 exx., leg. DM et DPM, coll. DM;

Vevčani ad Struga, 11.V.2012 – 2 exx., leg. et coll. AB;

Family Glaphyridae

Eulasia pareyssei (Brullé, 1832)

Mešeišta ad Struga, 13.V.2012 – 3 exx., leg. et coll. AB;

Kožlar ad Veles, 27.V.2012 – 1 ex., leg. PG, coll. AB;

Pygopleurus diffusus (Petrovitz, 1958)

Mešeišta ad Struga, 13.V.2012 – 3 exx., leg. et coll. AB;

Family Scarabaeidae

Subfamily Aphodiinae

Aphodius (Acrossus) depressus (Kugelann, 1792)

Vevčani ad Struga, 11.V.2012 – 4 exx., leg. et coll. AB;

Aphodius (Acrossus) luridus (Fabricius, 1775)

Korošhišta ad Struga, 12.V.2012 – 4 exx., leg. et coll. AB;

Aphodius (Agrilinus) convexus Erichson, 1848

A species widely distributed in Europe from the Iberian Peninsula to the European part of Russia. However, its occurrence in many countries, especially northern (including Scandinavia) has not yet been confirmed. Recorded also in Georgia, Armenia, Turkey, Siberia and Morocco, Algeria and Tunisia (DELLACASA G. & DELLACASA M. 2006, LÖBL & SMETANA 2006, PITTINO & MARIANI 1993). Recently found in the Czech Republic and Slovakia (JUŘENA *et al.* 2008), Bulgaria and Iran (ZIANI *et al.* 2015). Collected from a forest meadow surrounded by a beech stand at 900 m a.s.l. This is the first record of this species from the Republic of Macedonia.

Vevčani ad Struga, 11.V.2012 – 4 exx., leg. et coll. AB;

Aphodius (Aphodius) fimetarius (Linnaeus, 1758)

The identification of the species (distinguishing from *Aphodius (Aphodius) cardinalis* Reitter, 1892) was based on diagnostic features presented by FERY & RÖSSNER (2015).

Stanci ad Kriva Palanka, 1.VIII.2013 – 2 exx., leg. DM et DPM, coll. DM;

Korošhišta ad Struga, 12.V.2012 – 2 exx., leg. et coll. AB;

Aphodius (Calamasternus) granarius (Linnaeus, 1767)

Korošhišta ad Struga, 12.V.2012 – 1 ex., leg. et coll. AB;

Aphodius (Colobopterus) erraticus (Linnaeus, 1758)

Trpejca ad Ohrid (Galičica National Park), 23-24.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Korošhišta ad Struga, 12.V.2012 – 3 exx., leg. et coll. AB;

Aphodius (Copriformus) scrutator (Herbst, 1789)

Stanci ad Kriva Palanka, 1.VIII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Aphodius (Esymus) pusillus pusillus (Herbst, 1789)

Korošhišta ad Struga, 12.V.2012 – 4 exx., leg. et coll. AB;

Aphodius (Eudolus) quadriguttatus (Herbst, 1783)

Korošhišta ad Struga, 12.V.2012 – 3 exx., leg. et coll. AB;

Aphodius (Euorodalus) coenosus (Panzer, 1798)

Korošhišta ad Struga, 12.V.2012 – 23 exx., leg. et coll. AB;

Aphodius (Melinopterus) consputus Creutzer, 1799

Korošhišta ad Struga, 12.V.2012 – 1 ex., leg. et coll. AB;

Aphodius (Melinopterus) prodromus (Brahm, 1790)

Korošhišta ad Struga, 12.V.2012 – 4 exx., leg. et coll. AB;

Aphodius (Otophorus) haemorrhoidalis (Linnaeus, 1758)

Konopište ad Kavadarci (Kožuf Mts.), 28.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Aphodius (Phalacronothus) biguttatus Germar, 1824

Korošhišta ad Struga, 12.V.2012 – 11 exx., leg. et coll. AB;

Aphodius (Phalacronothus) quadrimaculatus (Linnaeus, 1761)

A species widely distributed in Europe from Portugal to the European part of Russia. Recorded also in Armenia, Kazakhstan, Siberia, Turkey, Syria, Lebanon, Morocco, Algeria and Tunisia (LÖBL & SMETANA 2006). A specimen was collected from sheep faeces. First record from the Republic of Macedonia.

Korošhišta ad Struga, 12.V.2012 – 1 ex., leg. et coll. AB;

Aphodius (Plagiogonus) arenarius (A.G. Olivier, 1789)

A species widely distributed in Europe (from the Iberian Peninsula to the European part of Russia) and Asia (Cyprus, Turkey, Armenia, Kazakhstan, Turkmenistan, Russia) to the Krasnoyarsk Territory (AKHMETOVA 2009, LÖBL & SMETANA 2006). Collected from sheep feces. First record from the Republic of Macedonia.

Korošhišta ad Struga, 12.V.2012 – 1 ex., leg. et coll. AB;

Aphodius (Trichonotulus) scrofa (Fabricius, 1787)

A species widely distributed in Europe (from Portugal to the European part of Russia) Caucasus, Central and Eastern Asia. Recorded also in Morocco. Accidentally introduced to Canada and the USA (DELLACASA G. & DELLACASA M. 2006, LÖBL & SMETANA 2006). Collected from under sheep feces. First record from the Republic of Macedonia.

Korošhišta ad Struga, 12.V.2012 – 5 exx., leg. et coll. AB;

Aphodius (Volinus) sticticus (Panzer, 1798)

Vevčani ad Struga, 11.V.2012 – 10 exx., leg. et coll. AB;

Korošhišta ad Struga, 12.V.2012 – 7 exx., leg. et coll. AB;

Aphodius (Nialus) varians Duftschmidt, 1805

Korošhišta ad Struga, 12.V.2012 – 6 exx., leg. et coll. AB;

Euheptaulacus carinatus carinatus (Germar, 1824)

Trebište ad Gostivar (Mavrovo National Park), 31.VII.2013 – 10 exx., leg. DM et DPM, coll. DM;

Subfamily Scarabaeinae

Caccobius histeroideus (Ménétrières, 1832)

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 2 exx., leg. DM et DPM, coll. DM;

Caccobius schreberi (Linnaeus, 1767)

Korošhišta ad Struga, 12.V.2012 – 6 exx., leg. et coll. AB;

Chironitis furcifer (P. Rossi, 1792)

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 3 exx., leg. DM et DPM, coll. DM;

Chironitis ungaricus ungaricus (Herbst, 1789)

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 10 exx., leg. DM et DPM, coll. DM;

Markovi Kuli ad Prilep, 26.VII.2013 – 3 exx., leg. DM et DPM, coll. DM;

Copris lunaris (Linnaeus, 1758)

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Korošhišta ad Struga, 12.V.2012 – 2 exx., leg. et coll. AB;

Euonthophagus amyntas alces (Fabricius, 1792)

Korošhišta ad Struga, 12.V.2012 – 4 exx., leg. et coll. AB;

Euoniticellus fulvus (Goeze, 1777)

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 6 exx., leg. DM et DPM, coll. DM;

Trpejca ad Ohrid (Galičica National Park), 23-24.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Markovi Kuli ad Prilep, 26.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Konopište ad Kavadarci (Kožuf Mts.), 28.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Stanci ad Kriva Palanka, 1.VIII.2013 – 2 exx., leg. DM et DPM, coll. DM;

Korošhišta ad Struga, 12.V.2012 – 3 exx., leg. et coll. AB;

Gymnopleurus geoffroyi geoffroyi (Fuessly, 1775)

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 14 exx., leg. DM et DPM, coll. DM;

Onthophagus andalusicus andalusicus Waltl, 1835

A subspecies widely distributed in Southern Europe from Portugal to the European part of Russia. Found in Georgia, Armenia, Kazakhstan, Turkey, Syria, Israel, Lebanon, Morocco, Algeria and Tunisia (KABAKOV 2006). The range of occurrence

of *Onthophagus marginalis* (Gebler, 1817) and *O. andalusicus* presented by KABAKOV (2006) show that all information on the presence of *O. marginalis* in the Republic of Macedonia actually refers to *O. andalusicus*. Found in fresh cattle feces among hills overgrown with dwarf oak trees.

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 11 exx., leg. DM et DPM, coll. DM;

Konopište ad Kavadarci (Kožuf Mts.), 28.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Onthophagus coenobita (Herbst, 1783)

Korošišta ad Struga, 12.V.2012 – 3 exx., leg. et coll. AB;

Onthophagus dellacasai Pittino et Mariani, 1981

A species known from the Balkan Peninsula: Albania, Bulgaria, Greece, Republic of Macedonia and the European part of Turkey (LÖBL & SMETANA 2006, PITTINO 2004). Collected from fresh sheep feces on the southern slope of a very isolated pasture.

Korošišta ad Struga, 12.V.2012 – 8 exx., leg. et coll. AB;

Onthophagus fissicornis Steven, 1809

Korošišta ad Struga, 12.V.2012 – 14 exx., leg. et coll. AB;

Onthophagus fracticornis (Preyssl, 1790)

Michajlovo ad Kavadarci (Kožuf Mts.), 29.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Korošišta ad Struga, 12.V.2012 – 3 exx., leg. et coll. AB;

Onthophagus furcatus (Fabricius, 1781)

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 33 exx., leg. DM et DPM, coll. DM;

Markovi Kuli ad Prilep, 26.VII.2013 – 6 exx., leg. DM et DPM, coll. DM;

Korošišta ad Struga, 12.V.2012 – 6 exx., leg. et coll. AB;

Onthophagus grossepunctatus Reitter, 1905

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 14 exx., leg. DM et DPM, coll. DM; leg. DM et DPM, coll. DM;

Korošišta ad Struga, 12.V.2012 – 1 ex., leg. et coll. AB;

Onthophagus illyricus (Scopoli, 1763)

Konopište ad Kavadarci (Kožuf Mts.), 28.VII.2013 – 2 exx., leg. DM et DPM, coll. DM;

Onthophagus lemur (Fabricius, 1781)

Korošišta ad Struga, 12.V.2012 – 26 exx., leg. et coll. AB;

Onthophagus opacicollis Reitter, 1892

Konopište ad Kavadarci (Kožuf Mts.), 28.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Onthophagus taurus (Schreber, 1759)

Markovi Kuli ad Prilep, 26.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Konopište ad Kavadarci (Kožuf Mts.), 28.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Stanci ad Kriva Palanka, 1.VIII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Onthophagus vacca (Linnaeus, 1767)

Markovi Kuli ad Prilep, 26.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Konopište ad Kavadarci (Kožuf Mts.), 28.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Onthophagus verticornis (Laicharting, 1781)

Korošišta ad Struga, 12.V.2012 – 30 exx., leg. et coll. AB;

Scarabaeus pius (Illiger, 1803)

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Sisyphus schaefferi schaefferi (Linnaeus, 1758)

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 9 exx., leg. DM et DPM, coll. DM;

Korošišta ad Struga, 12.V.2012 – 2 exx., leg. et coll. AB;

Subfamily Melolonthinae

Amphimallon solstitiale solstitiale (Linnaeus, 1758)

Nikiforovo ad Gostivar (Mavrovo National Park),

16.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Mavrovo ad Gostivar (Bistra Mts., Mavrovo National Park), 24.VII.2010 – 1 ex., 10.VII.2013 – 2 exx., leg. DM et DPM, coll. DM;

Anoxia orientalis (Krynicky, 1832)

Ljubaništa ad Ohrid (Galičica National Park), 17-19.VII.2011 – 3 exx., leg. DM et DPM, coll. DM;

Aplidia transversa transversa (Fabricius, 1801)

Ljubaništa ad Ohrid (Galičica National Park), 17-19.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Šiševo ad Skopje (Matka Canyon), 27-28.VII.2010 – 1 ex., leg. DM et DPM, coll. DM;

Trpejca ad Ohrid (Galičica National Park), 23-24.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Holochelus vernus (Germar, 1824)

Kališta ad Struga, 9-14.V.2012 – 36 exx., leg. JB et AB et TM et JP, coll. AB;

Hoplia argentea (Poda von Neuhaus, 1761)

Korošišta ad Struga, 12.V.2012 – 33 exx., leg. JB et AB et TM et JP, coll. AB;

Subfamily Sericinae

Omaloplia illyrica (Baraud, 1965)

Korošišta ad Struga, 12.V.2012 – 33 exx., leg. JB et AB et TM et JP, coll. AB;

Triodontella dalmatica (Baraud, 1962)

A species found in South-eastern Europe (Romania, Serbia, Bulgaria, Bosnia and Herzegovina, Croatia, Montenegro, Albania, Republic of Macedonia) and the European part of Turkey. Throughout its range it is rarely found, in the Republic of Macedonia known only from individual sites (AHRENS *et al.* 2004). One male was captured with using a UV light source.

Kališta ad Struga, 9-14.V.2012 – 1 ex., leg. et coll. AB;

Subfamily Rutelinae

Anisoplia agricola (Poda von Neuhaus, 1761)

Arvati ad Resen (Pelister National Park), 15.VII.2010 – 1 ex., leg. DM et DPM, coll. DM;

Anomala solida solida Erichson, 1847

Arvati ad Resen (Pelister National Park), 15.VII.2010 – 3 exx., leg. DM et DPM, coll. DM;

Ljubaništa ad Ohrid (Galičica National Park), 17-19.VII.2011 – 2 exx., leg. DM et DPM, coll. DM;

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 2 exx., leg. DM et DPM, coll. DM;

Bliptopertha lineolata (Fischer von Waldheim, 1824)

Korošišta ad Struga, 12.V.2012 – 3 exx., leg. et coll. AB;

Chaetopteropia segetum segetum (Herbst, 1783)

Kožlar ad Veles, 27.V.2012 – 3 exx., leg. PG, coll. AB;

Exomala hirtella (Brullé, 1832)

A species inhabiting the southern parts of the Balkan Peninsula (Albania, Bulgaria, Greece, Republic of Macedonia, Montenegro), the European and Asian part of Turkey. Found from individual sites in Bosnia and Herzegovina, Serbia, Croatia, Romania, and recently from Austria (KRÁL *et al.* 2014). An imago was collected from a *Fraxinus ornus* L. inflorescence.

Korošišta ad Struga, 12.V.2012 – 1 ex., leg. et coll. AB;

Mimela aurata (Fabricius, 1801)

Michajlovo ad Kavadarci (Kožuf Mts.) 29.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Subfamily Dynastinae

Oryctes nasicornis kuntzeni Minck, 1914

Ljubaništa ad Ohrid (Galičica National Park), 17-19.VII.2011 – 3 exx., leg. DM et DPM, coll. DM;

Star Dojran ad Nov Dojran, 25.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Subfamily Cetoniinae

Cetonia aurata aurata (Linnaeus, 1758)

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Konjsko ad Resen (Galičica National Park), 20.VII.2011 – 3 exx., leg. DM et DPM, coll. DM;

Leskoec ad Resen (Galičica National Park), 21.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Leskoec ad Resen (Galičica National Park), 25.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Korošhišta ad Struga, 12.V.2012 – 2 exx., leg. et coll. AB; *Gnorimus variabilis* (Linnaeus, 1758)

A species widely distributed in Europe (from Portugal to Ukraine) and in Turkey (LÖBL & SMETANA 2006). A female individual was collected from the inflorescence of *Sambucus ebulus* L. First record from the Republic of Macedonia.

Leskoec ad Resen (Galičica National Park), 21.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Gnorimus nobilis macedonicus Baraud, 1992

Nikišorovo ad Gostivar (Mavrovo National Park), 16.VII.2011 – 5 exx., leg. DM et DPM, coll. DM;

Leskoec ad Resen (Galičica National Park), 21.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Oxythyrea funesta (Poda von Neuhaus, 1761)

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Mavrovo ad Gostivar (Mavrovo National Park), 22.VII.2010 – 2 exx., 31.VII.2013 – 4 exx., leg. DM et DPM, coll. DM;

Konjsko ad Resen (Galičica National Park), 20.VII.2011 – 2 exx., leg. DM et DPM, coll. DM;

Tresonche ad Gostivar (Mavrovo National Park), 21.VII.2013 – 2 exx., leg. DM et DPM, coll. DM;

Konopište ad Kavadarci (Kožuf Mts.), 28.VII.2013 – 1 ex., leg. DM et DPM, coll. DM;

Gradište ad Ohrid (Galičica National Park), 17.VII.2010 – 2 exx., leg. DM et DPM, coll. DM;

Protaetia cuprea obscura (Andersch, 1797)

Trpejca ad Ohrid (Galičica National Park), 18.VII.2010 – 1 ex., leg. DM et DPM, coll. DM;

Konjsko ad Resen (Galičica National Park), 20.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Korošhišta ad Struga, 12.V.2012 – 4 exx., leg. et coll. AB;

Trichius fasciatus (Linnaeus, 1758)

Mavrovo ad Gostivar (Bistra Mts., Mavrovo National Park), 24.VII.2010 – 2 exx., leg. DM et DPM, coll. DM;

Trichius sexualis Bedel, 1906

Ġopčeli ad Nov Dojran (Popovniak Mts.), 25.VII.2011 – 4 exx., leg. DM et DPM, coll. DM;

Mavrovo ad Gostivar (Mavrovo National Park), 22.VII.2010 – 1 ex., leg. DM et DPM, coll. DM;

Mavrovo ad Gostivar (Bistra Mts., Mavrovo National Park), 24.VII.2010 – 1 ex., leg. DM et DPM, coll. DM;

Kožlar ad Veles, 27.V.2012 – 2 exx., leg. PG, coll. AB;

Tropinota hirta hirta (Poda von Neuhaus, 1761)

Brajčino ad Resen (Pelister National Park), 23.VII.2011 – 2 exx., leg. DM et DPM, coll. DM;

Star Dojran ad Nov Dojran, 25.VII.2011 – 1 ex., leg. DM et DPM, coll. DM;

Vevčani ad Struga, 11.V.2012 – 1 ex., leg. et coll. TM;

Korošhišta ad Struga, 12.V.2012 – 2 exx., leg. et coll. AB

Discussion

In the „Catalogue of Palearctic Coleoptera” (LÖBL & SMETANA 2006), the following seven species were not included among the fauna of the Republic of Macedonia: *Geotrupes spiniger* (Marsham, 1802), *Aphodius (Liothorax) plagiatus* (Linnaeus, 1767), *Hoplia hungarica* Burmeister, 1844, *Anoxia villosa* (Fabricius, 1781), *Anisoplia hebes* Reitter, 1903, *Trichius sexualis* and *Valgus haemipterus* (Linnaeus, 1758), all of which were previously mentioned by MIKŠIĆ (1955, 1957, 1970).

ROZNER I. & ROZNER G. (2006) in their study focusing on scarabaeoid beetles of the Republic of Macedonia, completed this list adding 18 species: *Dorcus parallelipedus*, *Platycerus caraboides* (Linnaeus, 1758), *Trypocopris fulgidus* (Motschulsky, 1845), *Lethrus apterus* (Laxmann, 1770), *Ochodaeus chrysomeloides* (Schrank, 1781), *Eulasia bombyli-formis athenae* (Petrovitz, 1980), *Aphodius (Bodiloides) ictericus* (Laicharting, 1781), *A. (Esymus) pusillus*, *A. (Eudolus) quadriguttatus*, *A. (Euorodalus) coenosus*, *A. sphacelatus* (Panzer, 1798), *A. (Otophorus) haemorrhoidalis*, *A. (Phalacronothus) biguttatus*, *Onthophagus ovatus* (Linnaeus, 1758), *Onthophagus similis* (Scriba, 1790), *Amphimallon assimile* (HERBST, 1790), *Amphimallon ochraceum* (Knoch, 1801), and *Omaloplia graeca* (Reitter, 1887). The discovered sites of *Trypocopris fulgidus*, *Lethrus apterus*, *Eulasia bombyli-formis athenae* and *Omaloplia graeca* were located very far away from previously known sites of these species. In the case of *O. graeca* this fact was also noted by RÖSSNER & AHRENS (2015).

In recent years, additional five species of scarabaeoid beetles new to the Republic of Macedonia were discovered: *Dorcus peyronis* Reiche et Saulcy, 1856, *Propomacrus bimucronatus* (Pallas, 1781) (KOVÁCS & MERKL 2013), *Aphodius (Phalacronothus) fumigatulus* (Reitter, 1892), *Onitis damoetas* Steven, 1806 and *Maladera apfelbecki* Petrovitz, 1969 (ZIANI *et al.* 2015). As a result of previous studies, the total number of species of Scarabaeoidea found in the Republic of Macedonia is 201.

During the four year period of faunistic research conducted from the first days of May till the beginning of August in the Republic of Macedonia the occurrence of 35,3% of the Scarabaeoidea subfamily of this country was recorded. The discovery of six new species for the country in our study increases the total number of scarabaeoid beetles known to occur in the Republic of Macedonia to 207. The following species are considered new to the fauna of the Republic of Macedonia: *Lucanus cervus*, *Aphodius (Agrilinus) convexus*, *A. (Phalacronothus) quadrimaculatus*, *A.*

(*Plagiogonus*) *arenarius*, *A. (Trichonotulus) scrofa*, and *Gnorimus variabilis*.

The richness of the Scarabaeoidea fauna of the Balkan Peninsula strongly suggests the possibility of discovering other new species for the Republic of Macedonia. It is estimated that Croatia alone is inhabited by over 400 species of scarabaeoid beetles (KULUNDŽIĆ *et al.* 2014), while approximately 360 species are known from Greece, 235 from Bulgaria, approx. 115 from Albania and approx. 220 from Serbia and Montenegro (LÖBL & SMETANA 2006). Within five years of the latter study, GUÉORGUIEV *et al.* (2011) published data on the occurrence of 316 species of scarabaeoid beetles in Bulgaria and estimated the number of species at approx. 335-345. From the family Scarabaeidae alone 178 species are known from Serbia (GAVRILOVIĆ & ČURČIĆ 2010).

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