ACTA ZOOLOGICA BULGARICA

Acta Zool. Bulg., December 2024, 76 (4): 451-457

Published online 10 November 2024
DOI: https://doi.org/10.71424/azb76.4.002759

Zoogeography and Faunistics
Research Article

New Records of Beetles (Insecta: Coleoptera) for the Fauna of Greece

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Abstract: A list of 11 species of beetles of eight families is presented along with a discussion of their general distribution. The first record for Greece are those for *Laccobius minutus*, *Sphaeridium lunatum* (Hydrophilidae), *Nicrophorus investigator* (Silphidae), *Quedius dubius*, *Quedius fumatus* (Staphylinidae), *Pediacus dermestoides* (Cucujidae), *Cryptolestes duplicatus* (Laemophloeidae), *Sphaerosoma globosum* (Alexiidae) and *Bruchidius siliquastri* (Chrysomelidae). For two other species, *Lilioceris lilii* (Chrysomelidae) and *Cleopomiarus distinctus* (Curculionidae), which have been rarely recorded in this country, new localities are reported. All new records were from the Thessaly Region. For the majority of species, the newly reported places of occurrence were situated on the southern edge of their geographical ranges.

Key words: Coleoptera, distribution, new records, Greece

Introduction

The high environmental diversity of Greece results from the orographically diversified topography, the presence of various fresh and salt–water bodies, the partly island character of the country and the moderately warm climate. These natural conditions favour the species richness of plants, fungi and animals. The current number of animal species inhabiting Greece, including marine animals, is estimated at around 30,000. However, it is likely that there may even be over 50,000 animal species in this area. The fauna of Greece is studied relatively poorly and unevenly, and there are large gaps in knowledge of the invertebrate groups (Legakis et al. 2019). An important and most valuable part of the Greek fauna is represented by the endemic species, the occurrence of which is sometimes limited to one or few mountain ranges or one or few islands. Endemics often constitute a significant percentage of different groups: c. 20% of plants (over 1,200 species) and c. 17% of animals (Convention 2016, Kougioumoutzis et al. 2021). There is also a significant percentage of endemic insect species: from 8% (Lepidoptera) to 36% (Orthoptera), especially in the groups of species that cannot fly. There are no estimates referring to the level of endemism among beetles in Greece but it could be assumed that endemic species constitute a dozen or so percent (e. g., 23% in Carabidae) (Arndt et al. 2011).

The insufficient knowledge on the Greek coleopterans is confirmed by recent discoveries of species new to science as well as by the first records in this country of already described species (Liberti 2009, Giachino & Vailati 2012, Rapuzzi et al. 2013, Platia & Kakiopoulos 2014, Colonnelli 2016, Mertlik et al. 2018, Assing et al. 2019). The prevailing number of the new species descrip-

tions versus the smaller number of new records for Greece of known species is due to focussed search of undescribed taxa; in contrast, regional faunal inventories are practically lacking. The development of domestic entomology is inadequate to the needs and has so far been dependent mainly on the activity of foreign researchers, as illustrated by the monograph on Carabidae of Greece written by 21 authors, only one of them native to Greece and co–authoring the introduction) (Arndt et al. 2011). Another proof for existing gaps in the knowledge of the Greek Coleoptera may be a comparison of the number of species from some families recorded in this country with the number of species recorded from neighbouring countries with similar area and natural conditions. Examples of such families include Byrrhidae with 11 species (including two endemic) found in Greece; in contrast, in Bosnia and Herzegovina, Serbia and Croatia, there are 17, 15 and 14 species, respectively. The situation is similar in the case of Monotomidae, Erotylidae and Ciidae; the numbers of species recorded from Greece are 11, 10 and 19, respectively, i.e. slightly fewer when compared with Croatia and Bosnia and Herzegovina. The fauna of saproxylic Eucnemidae and Melandryidae, a significant part of which are relict species of primeval forests, is even less known – only six species of Eucnemidae are known from Greece (one endemic) compared to 17 known from Croatia, 13 from Bosnia and Herzegovina and ten from Bulgaria. Compared to the 28 species of Melandryidae recorded from Croatia, 24 from Bosnia and Herzegovina and 21 from Serbia, only 12 species (including three endemic) are known from Greece (Löbl & Smetana 2006, 2007, 2008).

Materials and Methods

The studied material comes from beetle catches carried out during two entomological expeditions: one individual trip by the author in 2011 and one organised in 2014 by the Students' Scientific Club (Entomology Section) of the Agricultural University of Krakow, Poland. Imagines were caught in diverse habitats of the Kissavos Massif and Olympus Massif using various methods: catching with a scoop and entomological net, sifting litter and fragments of dead wood, using Barber traps (also with baits). Catches was also made through immediate searching for individuals in their life habitats. Specimens of discussed species were captured by the author and deposited in his collection.

Results

The species discussed below have been arranged in systematic order following Bouchard et al. (2011).

Hydrophilidae

Laccobius minutus (Linnaeus, 1758) – Thessaly: Larissa, Koutsoupia Village, 31 May 2011, 1 ex.

Sphaeridium lunatum Fabricius, 1792 – Central Macedonia: Mt. Olympus, near Lithochoro, 31 May 2014, ca. 1200 m a.s.l., 2 exx., in mule faeces.

Silphidae

Nicrophorus investigator Zetterstedt, 1824 – Thessaly: Larissa, Koutsoupia Village, 30 May 2014, 1 female, 2 June 2014, 1 male, 1 female, 20 m a.s.l; riparian forest, Barber traps with bait, which consisted of decaying chicken meat pieces.

Staphylinidae

Quedius (*Raphirus*) *dubius* (Heer, 1839) – Thessaly: Mt. Kissavos, near Koutsoupia, 1 June 2011, 1 male.

Quedius (*Raphirus*) *fumatus* (Stephens, 1833) – Thessaly: Mt. Kissavos, near Koutsoupia, 2 June 2014, 700 m a.s.l., 1 ex., beech forest, in leaf litter at the brook bank.

Cucujidae

Pediacus dermestoides (Fabricius, 1792) – Thessaly: Mt. Kissavos, near Koutsoupia, 2 June 2014, 700 m a.s.l., 1 ex., oak–beech forest, under the bark of oak (probably *Quercus pubescens* Willd.).

Laemophloeidae

Cryptolestes duplicatus (Waltl, 1839) – Thessaly: Larissa, Koutsoupia Village, 1 June 2011, 3 exx.

Alexiidae

Sphaerosoma globosum (Sturm, 1807) – Thessaly: Mt. Kissavos, near Stomio, 3 June 2014, 1 ex.

Chrysomelidae

Lilioceris lilii (Scopoli, 1763) – Central Macedonia: Mt. Olympus Massif at Prionia, 31 May 2014, 2 exx., ca. 1200 m a.s.l. in beech–fir forest on a *Polygonatum* sp.

Bruchidius siliquastri Delobel, 2007 – Thessaly: Larissa, Koutsoupia Village, 28 May 2011, 1 ex.; 4 June 2014, 1 ex.; in Mediterranean scrubland on *Cercis siliquastrum*.

Curculionidae

Cleopomiarus distinctus (Boheman, 1845) – Thessaly: Larissa, Koutsoupia Village, 3 June 2011, 6 exx., escarpment above the beach, in flowers of *Campanula* sp.

Discussion

The Palaearctic fauna of *Laccobius* Erichson contains almost 140 species, distributed mainly in Central and Eastern Asia; almost 40 species of this genus occur in Europe (Fikáček et al. 2015). Compared to other Balkan countries, *Laccobius* of Greece are quite well known – 13 species have been found here (including one endemic), while in other Balkan countries the number of species recorded falls in between 7 and 12. *Laccobius minutus* is an Euro–Siberian species with a wide range, whose southern border in Europe runs through the Pyrenees, Corsica, central Italy, Montenegro, the Republic of North Macedonia, Bulgaria and southern Ukraine;

the species has not yet been reported from Albania and Greece. Reports from the 19th century about the occurrence of this species in Greece were the result of incorrect identification (Gentili & Chiesa 1975). The newly discovered locality is the species' southernmost record in Europe. It is worth mentioning that it is highly probable to find another species of this genus in Greece, *L. colon* Steph., also known from the neighbouring Balkan countries (Fikáček et al. 2015).

Unlike most representatives of the water scavenger beetles associated with aquatic environments, the genus *Sphaeridium* Fabr. includes coprophilous terrestrial species that inhabit fresh dung of large mammals (Koch 1989). The genus *Sphaeridium* comprises not many species; 42 species have been described worldwide (Archangelsky et al. 2016), six of which occur in Europe (Fikáček et al. 2015). *Sphaeridium lunatum* is widely distributed: its range covers almost the entire Palearctic and it has also been found in North America (probably introduced). Recorded in Bulgaria, former Yugoslavia and western Türkiye, but not recorded from Albania, Greece and the Republic of North Macedonia (Fikáček et al. 2015, Şenyüz et al. 2017). So far, only one species of *Sphaeridium* has been observed in Greece: *S. substriatum* Fald. (Fikáček et al. 2015). However, we can expect that more species of this genus will be found here, because in neighbouring countries (Bulgaria, the Republic of North Macedonia, Türkiye) from four to five species have been recorded, with *S. lunatum* only recently being found in western Türkiye as new to the country (Fikáček et al. 2015, Şenyüz et al. 2017).

Most of the 43 European species of carrion beetles have an extensive range, extending beyond Europe to the eastern reaches of Asia and even to North America. A few species with limited ranges are either montane or Western Mediterranean elements (Sikes et al. 2002, Růžička 2015). The distribution of species of this family in Europe is quite well known but there are no data on common species known from neighbouring regions. Countries with poorly known fauna of Silphidae include some lands of the Balkan Peninsula, such as Albania, the Republic of North Macedonia and Serbia, where 11, 13 and 19 species of this family have been found, respectively. Greece (together with the islands) is also one of the countries with a relatively poorly known Silphidae: 17 species have been recorded so far, while in Bulgaria (a neighbouring country with a similar territory size) 23 species have been found (Guéorguiev & Růžička 2002, Růžička 2015). Thirteen species of the genus *Nicrophorus* Fabr. occur in Europe, three of which reach the western limit of their range in Ukraine and Russia. So far, five species of the genus are known from Greece: *N. humator* (Gled.), *N. interruptus* Steph., *N. sepulchralis* Heer, *N. vespilloides* Herbst and *N. vestigator* Hersch. In addition to the discussed *N. investigator*, it is possible to find three more species: *N. antennatus* (Reitt.), *N. germanicus* (L.) and *N. vespillo* (L.), known from Bulgaria, Republic of North Macedonia and the Asian part of Türkiye (Růžička 2015). Apart from the common *N. vespillo*, there is no information about the occurrence in Greece for other widely distributed species of Silphidae such as *Aclypea opaca* (L.), *Silpha carinata* Herbst and *Thanatophilus dispar* (Herbst), known, among others, from Bulgaria, what indicates an insufficient degree of knowledge about Greek Silphidae.

Nicrophorus investigator Zetterstedt is one of the widely distributed species of this genus with a Holarctic type of distribution: it occurs in the temperate and cool climate zones of Europe, Asia and North America (Sikes et al. 2002). It is found throughout Europe except some southern countries; it has not been recorded from Portugal, Spain, Corsica, Sardinia, Sicily, Albania, Macedonia and Greece (Piloña et al. 2002, Růžička 2015). The southern limit of its range in the Palaearctic runs through the Pyrenees, northern Italy, Croatia, Serbia, Bulgaria, northern Türkiye, the Caucasus, northern Iran, Turkmenistan, northern Afghanistan, northern Pakistan, Kashmir, Tajikistan and Kyrgyzstan, northern and central China as well as South Korea and Japan (Hava et al. 1998, Bertin & Lebboroni 1999, Piloña et al. 2002, Růžička & Schneider 2002, Růžička et al. 2002, Sikes et al. 2002, Růžička 2015, Ghahari & Hava 2015). Regarding the occurrence of *N. investigator* in the countries neighbouring Greece, the closest locality was reported from Bulgaria, the Kozhuh Hills in the Struma River Valley that is very close to the border with Greece (Guéorguiev & Růžička 2002). The currently discovered locality is not only the first record of *N. investigator* in Greece, but it is also the southernmost one in Europe.

Among extremely diverse and abundant in species rove beetle family (Staphylinidae – ca. 63 000 species), genus *Quedius* Stephens is one of the largest with more than 700 species worldwide. Species of *Quedius* are common inhabitants of the various debris in forests and open landscapes. Some of them occur in mammal and bird burrows and nests, in the anthills, others are even highly adapted to hypogean microhabitats (Salnitska & Solodovnikov 2019). Over 160 species of this genus are known in Europe, while 35 have been found in Greece so far, including

four endemic species described from the islands of Crete, Lesbos and Rhodes. Compared to neighbouring countries, the state of knowledge of this genus in Greece seems to be rather good: 18, 18 and 31 species have been recorded from Albania, the Republic of North Macedonia and Bulgaria, respectively (Schülke & Smetana 2015).

Quedius dubius is an Alpine–Balkan montane species with a not very extensive range, covering the Alps, the central Apennines, Bosnia and Herzegovina and the mountains of Bulgaria, where the subspecies *Q. d. ermischi* Korge occurs. Apart from Bulgaria, it has not been reported from other countries on the Balkan Peninsula (Schülke & Smetana 2015). However, it is not certain to which subspecies the captured individual belongs and it is possible that it is a subspecies or even a species new to science (paramere of aedeagus slightly longer than median lobe). The range of *Q. fumatus* covers most of the European continent, but on the Balkan Peninsula it has been recorded only in Croatia and Bosnia and Herzegovina; it has not been recorded from Albania, Bulgaria, the Republic of North Macedonia and Serbia (Schülke & Smetana 2015). The locality in Greece is located at the southern limit of this species' range.

European flat bark beetles (Cucujidae) inhabit mainly Central and Northern Europe, in the southern part of the continent they have been recorded in a few countries. With the exception of Italy, where six species have been recorded, in the remaining countries of the Mediterranean region, Cucujidae are poorly represented. One species is known from Portugal, three from Spain, three from Serbia, two from the Republic of North Macedonia and Bulgaria, while in Croatia, Bosnia and Herzegovina, Albania and Greece, no representatives of this family have been recorded (Grosso–Silva 2002, Węgrzynowicz 2007a, Guéorguiev et al. 2008, 2010, Iberfauna 2017, Cvetkovska–Gjorgjievska et al. 2020, Gradinarov et al. 2021). Most of the 31 known species of the genus *Pediacus* Shuck. are distributed in Holarctic and Oriental Regions. They inhabit the subcortical habitats of dead coniferous and deciduous trees, being predators of small invertebrates (Marris & Ślipiński 2014). Three European species are distributed mainly in the central and northern part of the continent. The range of *P. dermestoides* extends from the Iberian Peninsula through Central and Northern Europe to the Caucasus and the north–eastern part of Türkiye (Burakowski et al. 1986, Ünal 2010). Quite recently, it has been recorded for the first time from the Republic of North Macedonia and mountainous areas of western Bulgaria (Guéorguiev et al. 2010, Gradinarov et al. 2021). The Greek locality is also, as in the case of the previous species, one of the southernmost records of *P. dermestoides*.

The family Laemophloeidae, formerly placed within Cucujidae, is not very abundant in species: 37 species are found in Europe with about 30% of species being introduced from other regions. Species of the family are mostly associated with dying woody plants, where they lead a subcortical life, hunting other small insects or feeding on sac fungi. Some representatives of the genus *Cryptolestes* Ganglb. are important pests of stored grain and grain products (Węgrzynowicz 2007b , Thomas & Leschen 2010). Of the 13 species of the genus found in Europe (including four introduced ones), four were found in Greece (*C. abietis*, *C. corticinus*, *C. ferrugineus*, *C. turcicus*). *Cryptolestes duplicatus* is new to Greece and here is report it for the first time. From the remaining Balkan countries, except Bulgaria where eight species of Laemophloeidae have been recorded, there is no information about the occurrence of not only species of this genus but even any representatives of this family (Tschorbadjiev 1930, Buresch & Lazarov 1956, Węgrzynowicz 2007b, Guéorguiev & Ljubomirov 2009).

The only genus *Sphaerosoma* Sam. in the family Alexiidae contains 48 species distributed in mountainous areas of Central and Southern Europe and Northern Africa (Tomaszewska 2007, Courtin et al. 2017). The mountainous distribution pattern is associated with a significant degree of endemism – almost half of them are endemic species inhabiting separate mountain ranges (Apfelbeck 1916, Audisio 2023). Considering that almost all systematic and taxonomic works on this genus were published over 100 years ago, it requires an urgent revision, especially based on genetic–molecular studies, because to date both the systematic position of the family and the phylogenetic relationships remain largely unresolved. (Ślipiński & Tomaszewska 2010). Both larvae and adults are found in various substrates attacked by fungi, often in wood decomposed by white–rot fungi (Courtin et al. 2017). *Sphaerosoma globosum* is one of the few species of the genus with a fairly wide range: it is known from areas stretching from eastern France to Romania and Bulgaria, reaching in the south to Croatia, Bosnia and Herzegovina and Serbia; unknown from Albania, the Republic of North Macedonia and Greece (Tomaszewska 2007). Four species of *Sphaerosoma* have been known so far from Greece, including two endemic ones: *S. leonhardi* Apfelb. and *S. scymnoides* Reitt. Other species of this genus can

be expected here, as more of them are known from some neighbouring countries: five from Albania, six from Serbia and eight from Bulgaria and Bosnia and Herzegovina each (Tomaszewska 2007).

Among the seven species of the genus *Lilioceris* Reitt. occurring in Europe, only two – *L. faldermannii* (Guér.–Menev.) and *L. lilii* have been reported from Greece (Berti & Rapilly 1976, Warchałowski 1985). The Greek records of *L. lilii* are not mentioned in the Catalogue of Palaearctic Coleoptera (Schmitt 2010). Presumably, this was the reason for publishing information about discovering this species for the first time in the territory of Greece (western Thessaly: Fylakti near Karditsa, on *Lilium chalcedonicum* L. and *L. martagon* L.) in 2007 (Papadoulis & Tsagkarakis 2012). The authors of this report did not take into account information about three known localities of this species (around Thessaloniki, Kefalonia and Crete), where it had been recorded before World War II (Berti & Rapilly 1976). Moreover, they did not provide either the number of individuals or the biotope in which *L. lilii* was observed (Papadoulis & Tsagkarakis 2012). Although the locality presented here is the fifth in Greece, it seems advisable to provide this information about the occurrence of *L. lilii* in Greece, especially since it is located in a natural environment, within a national park. Greek localities mark the southern limit of the range of *L. lilii*. In addition to those mentioned, it is possible to find a third species of this genus in Greece, *L. merdigera* (L.), known (among others) from Bosnia and Herzegovina, Bulgaria and Croatia (Schmitt 2010).

The genus *Bruchidius* Schil. comprises a large number of species with about 80 species inhabiting Europe (including five introduced), most of them concentrated in the southern part of the continent. Forty– five species have been recorded from Greece, which indicates a relatively good knowledge of the occurrence of representatives of the genus here, better than in neighbouring countries, where the following numbers of species have been reported: 26 in Albania, 33 in the Republic of North Macedonia, 40 in Bulgaria (Anton 2010). *Bruchidius siliquastri* is likely an invasive species: although described from France, it is assumed that to be brought to Europe from Central or Eastern Asia (Kergoat et al. 2007). Later on this species was recorded from Hungary, Czech Republic, Slovakia, Spain, Bulgaria, Serbia, Türkiye, Ukraine (Crimea), Germany, Great Britain, Italy and Romania (Stojanova et al. 2011, Martynov & Nikulina 2015, Yus Ramos & Bocci 2017, Pintilioaie et al. 2018). *Bruchidius siliquastri* is trophically connected to various species of the genus *Cercis* L. (Fabaceae); the larvae develop in the pods of these trees (Stojanova et al. 2011). Given that this species has recently been recorded from several neighbouring countries, finding it in Greece is not surprising.

The genus *Cleopomiarus* Pierce includes 21 species; most of them are Palaearctic. Of the 11 European species, six have been reported from Greece and apart from *C. meridionalis* (Bris.), the remaining species of this genus have been recorded from single localities (Caldara & Legalov 2016, Germann et al. 2023). Weevils of this genus develop on various species of plants of Campanulaceae (Caldara & Legalov 2016). *Cleopomiarus distinctus* is a species with a wide range, covering the area from the Iberian Peninsula to the Far East, with the southern border of the European part of the range running through southern France, southern Italy, Greece, Bulgaria and the Crimea (Caldara 2013). In Greece, previously known only from the Peloponnese (Germann et al. 2023), thus, the current locality is the second one in Greece.

Acknowledgements: The author is grateful to his son, Jacek, as well as to Jakub Goczał, Aniela Początek, Magdalena Ranocha and Wojciech Witek, members of the Scientific Students' Club, for some help in collecting the material.

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Received: 09.11.2023
Accepted: 02.08.2024