



New Data on the Scarabaeinae (Coleoptera: Scarabaeidae) Fauna of Bozdağ at Eskişehir in Central Anatolia Region

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ABSTRACT

Insects are generally dominant in terrestrial ecosystems and play a role in ecologically important functions and ecological processes. Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) are essential for the first decomposition, especially in forest/pasture ecosystems. This study aimed to determine the faunistic data of the subfamily Scarabaeinae (Coleoptera: Scarabaeidae) depending on three different altitudes in the Bozdağlar region of Eskişehir. In this study, the pitfall trap method collected totally of 40 species (34 species and 6 subspecies) belonging to 10 genera belonging to the Scarabaeinae subfamily of the Scarabaeidae family. *Cheironitis haroldi* Ballion, 1871, *Caccobius mundus* Ménériés, 1839, *Onthophagus (A.) falzonii* Goidanich, 1926, *Onthophagus (P.) carpanetoi* Pittino, 1982, *Onthophagus (P.) similis* Scriba, 1790, *Onthophagus (P.) t. truchmenus* Kolenati, 1846 and *Ateuchetus armeniacus* Ménériés, 1832, are the new data for Eskişehir province.

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Keywords

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İç Anadolu Bölgesi Eskişehir İli Bozdağ'ın Scarabaeinae (Coleoptera:Scarabaeidae) Faunasına Üzerine Yeni Veriler

ÖZET

Böcekler genellikle, karasal ekosistemlerde baskınlardır. Ekolojik olarak, önemli fonksiyonlarda ve önemli ekolojik süreçlerde rol oynarlar. Bokböcekleri, (Coleoptera: Scarabaeidae: Scarabaeinae) özellikle orman/mera ekosistemlerindeki ilk ayrıştırmanın önemli gruplarındandır. Bu çalışmada Eskişehir'in Bozdağlar bölgesinde 3 farklı yüksekliğe bağlı, Scarabaeinae (Scarabaeidae: Coleoptera) altfamilyasının faunistik verilerinin tespit edilmesini amaçlandı. Bu çalışmada, düşürme tuzak yöntemi ile toplanan Scarabaeidae familyasının Scarabaeinae altfamilyasına ait 10 cinse ait toplam 40 tür (34 tür ve 6 alttür) verilmiştir. *Cheironitis haroldi* Ballion, 1871, *Caccobius mundus* Ménériés, 1839, *Onthophagus (A.) falzonii* Goidanich, 1926, *Onthophagus (P.) carpanetoi* Pittino, 1982, *Onthophagus (P.) similis* Scriba, 1790, *Onthophagus (P.) t. truchmenus* Kolenati, 1846 ve *Ateuchetus armeniacus* Ménériés, 1832, Eskişehir ili için yeni kayıttır.

Entomoloji

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INTRODUCTION

Coleoptera (Arthropoda) is the most significant order of insects, with approximately 326.000 figspecies (Küçükaykay et al., 2013; Şenyüz et al., 2015; Bánki et al., 2023). Scarabaeinae subfamily (Coleoptera: Scarabaeidae) contains 817 species of 46 genera in 10

tribes in the Palearctic Region (Löbl & Löbl, 2016; Gülmez et al., 2019; Zeybek & Çıkman, 2019). In Turkey, there are also 92 species belonging to 14 genera in 7 tribes (Löbl & Löbl, 2016). Scarabaeidae is known as dung beetles. The dung beetles, a species-rich indicator group specialized in consuming mammal

feces, are unique elements of many terrestrial ecosystems worldwide and play an important role in ecological functions (Enari et al., 2013; Gülmez, 2014; Gómez & Kolokotronis, 2017; Cuesta & Lobo, 2019). Because of this reason, dung beetles (Scarabaeidae) provide beneficial ecological functions and ecosystem services in natural, subtropical, and tropical latitudes and elevations, especially also in the forest, by increasing rates of dung decomposition and nutrient cycling, dispersing seeds, and reducing levels of pests of humans and animals (Nichols et al. 2008; Sullivan et al., 2017; Latha & Sabu, 2018). Lobo et al., (2007) reported that data on the distribution of dung beetles with elevation in the Palaearctic are only for some western European regions (France and the Iberian Peninsula), but there is no safety data from the eastern European mountains. Therefore, this study aims to determine the species composition of each locality and species with particular altitudes and distribution preferences of species. Moreover, Şenyüz et al. (2019), similar research supported our study.

MATERIAL and METHOD

This study was carried out from October 2012 to

September 2013 in Bozdağ Mountains in Eskişehir Province. The specimens were collected at 3 different localities (Table 1, Figure 1) at altitudes varying between 207 to 1133 m. from October 2012 to September 2013, baited pitfall traps (Veiga et al., 1989) were placed at each locality, and fresh cattle dung (≈ 1000 g) was used as forage for each trap. All the pitfall traps remained in the field for 72 h. The collected samples were brought to the laboratory with jars with ethylalcohol. In the laboratory, the dung beetle specimens were identified by using Zeiss Stemi 2000 stereomicroscope following the character of Balthasar (1963a,b, 1964) and Pehlivan (1988, 1989). Distributional data for Turkey were taken from Tuatay et al. (1967, 1972), Carpaneto (1973), Lodos (1978), Lodos et al. (1999), Carpaneto et al., (2000), Pittino (1982, 2004), Pehlivan (1988, 1989), Tezcan and Pehlivan (2001), Şenyüz (2004), Bellmann (2007), Rozner & Rozner (2009), Anlaş et al., (2011a, b), Küçükaykay et al., (2013), Şenyüz & Şahin (2013), Özgen et al., (2014), Şenyüz et al., (2013a,b, 2015, 2016, 2017, 2019), Löbl & Löbl, (2016), Polat et al., (2017); Gülmez et al., (2019) and Ersoy & Hasbenli, (2022).

Table 1. Locations data of study area

Çizelge 1. Çalışma alanının lokalite bilgileri

Location	Latitude	Longitude	Elevation (m)
Karaoğlan-Mihalgazi	40° 01'.334"	30° 32'.019"	207 m.
Kalekaya Top- Erenler Site	39° 59'.569"	30° 31'.186"	612 m.
Sulukaraağaç Site	39° 56'.159"	30° 29'.590"	1133 m.



Figure1. Location data and map of study area

Şekil 1. Çalışma alanının konum bilgileri

RESULTS

Family Scarabaeidae Latreille, 1802

Subfamily Scarabaeinae Latreille, 1802

Genus *Copris* Geoffroy, 1762

Copris hispanus cavolinii V. Petagna, 1792

Material examined: Karaoğlan-Mihalgazi, 207 m., 17-20.IV.2013, 1♀.

Distribution in Türkiye: It is spread in all geographical regions, except Eastern Anatolia Region (Tuatay et al., 1967, 1972; Lodos, 1978; Lodos et al., 1999; Bellmann, 2007; Rozner & Rozner, 2009, Şenyüz et al., 2016; Ersoy & Hasbenli, 2022).

Copris lunaris Linnaeus, 1758

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.V.2013, Gülmez M. leg. and det., 2♀♀; Kalekaya Top-Erenler Site 612 m., 16-19.V.2013, Gülmez M. leg. and det., 1♂.

Distribution in Türkiye: It is spread in all geographical regions, except Southeastern Anatolia Region (Tuatay et al., 1967, 1972; Lodos et al., 1999; Şenyüz, 2004; Rozner & Rozner, 2009; Anlaş et al., 2011a,b; Şenyüz et al., 2013a, 2015, 2016; Şenyüz & Şahin, 2013; Ersoy & Hasbenli, 2022).

Genus *Gymnopleurus* Illiger, 1803

Gymnopleurus geoffroyi Fuessly, 1775

Material examined: Karaoğlan-Mihalgazi, 207 m., 17-20.IV.2013, Gülmez M. leg. and det., 60 exx.; 16-19.V.2013, Gülmez M. leg. and det., 1435 exx.; 17-20.VI.2013, Gülmez M. leg. and det., 51 exx.; 18-21.VII.2013, Gülmez M. leg. and det., 9 exx.; 17-20.VIII.2013, Gülmez M. leg. and det., 1 ex.; Kalekaya Top-Erenler Site 612 m., 17-20.IV.2013, Gülmez M. leg. and det., 18 exx.; 16-19.V.2013, Gülmez M. leg. and det., 2470 exx.; 17-20.VI.2013, Gülmez M. leg. and det., 275 exx.; 18-21.VII.2013, Gülmez M. leg. and det., 19 exx.; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 4 exx.; 17-20.VI.2013, Gülmez M. leg. and det., 86 exx.; 18-21.VII.2013, Gülmez M. leg. and det., 19 exx.; 17-20.VIII.2013, Gülmez M. leg. and det., 14 exx.

Distribution in Türkiye: It is spread in all geographical regions (Tuatay et al., 1967, 1972; Pehlivan, 1988; Lodos et al., 1999; Bellmann, 2007; Rozner & Rozner, 2009; Anlaş et al., 2011b; Şenyüz et al., 2013a, b, 2015, 2016, Gülmez et al., 2019; Ersoy & Hasbenli, 2022).

Genus *Euoniticellus* A. Janssens, 1953

Euoniticellus fulvus Goeze, 1777

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.V.2013, Gülmez M. leg. and det., 5♂♂, 2♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 1♂, 3♀♀; 18-21.VII.2013, Gülmez M. leg. and det., 2♀♀; Kalekaya Top-Erenler Site 612 m., 16-19.V.2013, Gülmez M. leg. and det., 3♂♂, 2♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 1♂, 1♀; 17-20.VIII.2013, Gülmez M. leg. and det., 7♀♀; 13-16.IX.2013, Gülmez M. leg. and det. 1♂; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 4♂♂, 2♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 11♂♂, 12♀♀; 18-21.VII.2013, Gülmez M. leg. and det., 25♂♂, 22♀♀; 17-20.VIII.2013, Gülmez M. leg. and det., 16♂♂, 1♀.

Distribution in Türkiye: It is widespread in all geographical regions (Tuatay et al., 1967; Lodos et al., 1999; Şenyüz, 2004; Bellmann, 2007; Rozner & Rozner, 2009; Anlaş et al., 2011b; Şenyüz et al., 2013a,b; Şenyüz & Şahin, 2013; Özgen et al., 2014; Şenyüz et

al., 2015; Gülmez et al., 2019; Ersoy & Hasbenli, 2022).

Genus *Cheironitis* van Lansberge, 1875b

Cheironitis haroldi Ballion, 1871

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.V.2013, Gülmez M. leg. and det., 1 ex.; Kalekaya Top-Erenler Site 612 m., 17-20.VI.2013, Gülmez M. leg. and det., 1 ex.; 18-21.VII.2013, Gülmez M. leg. and det., 1 ex.

Distribution in Türkiye: It is widespread in all geographical regions except Marmara and Aegean (Lodos et al., 1999; Rozner & Rozner, 2009).

Cheironitis ungaricus Herbst, 1789

Material examined: Kalekaya Top-Erenler Site 612 m., 18-21.VII.2013, Gülmez M. leg. and det., 1 ex.

Distribution in Türkiye: It is distributed in the Aegean and Central Anatolia Region (Anlaş et al., 2011b; Şenyüz et al., 2015).

Genus *Caccobius* C.G. Thomson, 1859: 80

Caccobius histeroides Ménétériés, 1832

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.V.2013, Gülmez M. leg. and det., 27 exx.; 17-20.VI.2013, Gülmez M. leg. and det., 6 exx.; 18-21.VII.2013, Gülmez M. leg. and det., 4 exx.; Kalekaya Top-Erenler Site 612 m., 16-19.V.2013, Gülmez M. leg. and det., 103 exx.; 17-20.VI.2013, Gülmez M. leg. and det., 6 exx.; 18-21.VII.2013, Gülmez M. leg. and det., 6 exx.; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 3 exx.; 17-20.VI.2013, Gülmez M. leg. and det., 11 exx.; 18-21.VII.2013, Gülmez M. leg. and det., 8 exx.; 17-20.VIII.2013, Gülmez M. leg. and det., 24 exx.

Distribution in Türkiye: It is spread in all geographical regions (Tuatay et al., 1967; Lodos et al., 1999; Tezcan and Pehlivan, 2001; Şenyüz, 2004; Rozner & Rozner, 2009; Anlaş et al., 2011a, 2011b; Şenyüz & Şahin, 2013; Şenyüz et al., 2013a, 2015; Ersoy & Hasbenli, 2022).

Caccobius mundus Ménétériés, 1839

Material examined: Karaoğlan-Mihalgazi, 207 m., 18-21.VII.2013, Gülmez M. leg. and det., 1 ex.; Sulukaraağaç Site, 1133 m., 17-20.VIII.2013, Gülmez M. leg. and det., 3 exx.

Distribution in Türkiye: It is distributed only in the Mediterranean Region (Bellmann, 2007).

Caccobius schreberi Linnaeus, 1767:

Material examined: Karaoğlan-Mihalgazi, 207 m., 17-20.VI.2013, Gülmez M. leg. and det., 1 ex.; 18-21.VII.2013, Gülmez M. leg. and det., 1 ex.; Kalekaya Top-Erenler Site 612 m., 16-19.V.2013, Gülmez M. leg. and det., 1 ex.; 18-21.VII.2013, Gülmez M. leg. and det., 1 ex.; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 4 exx.; 17-20.VI.2013, Gülmez M. leg. and det., 5 exx.; 18-21.VII.2013, Gülmez M. leg. and det., 5 exx.; 17-20.VIII.2013, Gülmez M. leg. and det., 18 exx.; 13-16.IX.2013, Gülmez M. leg. and det., 1 ex.

Distribution in Türkiye: It is spread in all geographical regions (Tuatay et al., 1967, 1972; Lodos, 1978; Lodos

et al., 1999; Şenyüz, 2004; Bellmann, 2007; Rozner & Rozner, 2009; Anlaş et al., 2011b; Şenyüz & Şahin, 2013; Şenyüz et al., 2013a, b, 2015, 2016; Ersoy & Hasbenli, 2022).

Genus *Euonthophagus* Balthasar, 1959b

Euonthophagus amyntas alces Fabricius, 1792

Material examined: Karaoğlan-Mihalgazi, 207 m., 17-20.IV.2013, Gülmez FFM. leg. and det., 4♂♂, 5♀♀; 16-19.V.2013, Gülmez M. leg. and det., 12♂♂, 4♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 3 ♂♂; 18-21.VII.2013, Gülmez M. leg. and det., 2♂♂; 17-20.VIII.2013, Gülmez M. leg. and det., 1♂, 1♀; Kalekaya Top-Erenler Site 612 m., 16-19.V.2013, Gülmez M. leg. and det., 8♂♂, 17♀♀; 18-21.VII.2013, Gülmez M. leg. and det., 1♀; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 1♂, 13♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 2♂♂, 7♀♀.

Distribution in Türkiye: It is spread in all geographical regions (Tuatay, 1967, 1972; Lodos, 1978; Lodos et al., 1999; Bellmann, 2007; Anlaş et al., 2011b; Rozner & Rozner, 2009; Şenyüz et al., 2013b, 2015, 2016, 2017; Ersoy & Hasbenli, 2022).

Euonthophagus atramentarius Ménétrés, 1832

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.III.2013, Gülmez M. leg. and det., 4♂♂, 3♀♀, 16-19.V.2013, Gülmez M. leg. and det., 5♀♀, 17-20.VI.2013, Gülmez M. leg. and det., 1♂; 18-21.VII.2013, Gülmez M. leg. and det., 6♂♂, 2♀♀; Kalekaya Top-Erenler Site 612 m., 16-19.V.2013, Gülmez M. leg. and det., 4♂♂, 7♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 2♂♂; 18-21.VII.2013, Gülmez M. leg. and det., 2♂♂, 1♀; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 11♂♂, 6♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 2♂♂, 1♀; 18-21.VII.2013, Gülmez M. leg. and det., 2♂♂.

Distribution in Türkiye: It is distributed in all geographical regions except Southeastern Anatolia Region (Tuatay et al., 1967; Pehlivan, 1989; Lodos et al., 1999; Şenyüz, 2004; Bellmann, 2007; Rozner & Rozner, 2009; Anlaş et al., 2011b; Şenyüz & Şahin, 2013; Şenyüz et al., 2015, 2017; Gülmez et al., 2019; Ersoy & Hasbenli, 2022).

Euonthophagus gibbosus Scriba, 1790

Material examined: Karaoğlan-Mihalgazi, 207m., 16-19.V.2013, Gülmez M. leg. and det., 3♂♂, 3♀♀; Kalekaya Top-Erenler Site 612 m., 16-19.V.2013, Gülmez M. leg. and det., 3♂♂, 1♀; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 1♂, 3♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 5♂♂, 2♀♀.

Distribution in Türkiye: It is spread in all geographical regions (Tuatay et al., 1967, 1972; Pehlivan, 1989; Lodos et al., 1999; Şenyüz, 2004; Rozner & Rozner, 2009; Şenyüz et al., 2013a, 2015, 2016; Şenyüz & Şahin, 2013; Ersoy & Hasbenli, 2022).

Genus *Onthophagus* Latreille, 1802a

Onthophagus (Amphionthophagus) falzonii Goidanich, 1926

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.V.2013, Gülmez M. leg. and det., 2♀♀; Kalekaya Top-Erenler Site 612 m., 17-20.IV.2013, Gülmez M. leg. and det., 1♂, 1♀; 16-19.V.2013, Gülmez M. leg. and det., 2♂♂, 2♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 1♂, 1♀; 18-21.VII.2013, Gülmez M. leg. and det., 1♂, 1♀; Sulukaraağaç Site, 1133 m., 18-21.VII.2013, Gülmez M. leg. and det., 1♂, 3♀♀; 17-20.VIII.2013, Gülmez M. leg. and det., 1♂.

Distribution in Türkiye: It is distributed only in the Mediterranean Region (Lodos et al., 1999; Pehlivan, 1989; Bellmann, 2007).

Onthophagus (Furconthophagus) furcatus Fabricius, 1781

Material examined: Karaoğlan-Mihalgazi, 207 m., 19-22.X.2012, Gülmez M. leg. and det., 2♂♂, 3♀♀; 17-20.IV.2013, Gülmez M. leg. and det., 1♂, 2♀♀; 16-19.V.2013, Gülmez M. leg. and det., 3♂♂, 15♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 56♂♂, 68♀♀; 18-21.VII.2013, Gülmez M. leg. and det., 125♂♂, 113♀♀; 17-20.VIII.2013, Gülmez M. leg. and det., 81♂♂, 68♀♀; 13-16.IX.2013, Gülmez M. leg. and det., 22♂♂, 18♀♀; Kalekaya Top-Erenler Site 612 m., 19-22.X.2012, Gülmez M. leg. and det., 2♂♂, 1♀; 17-20.IV.2013, Gülmez M. leg. and det., 11♂♂, 4♀♀; 16-19.V.2013, Gülmez M. leg. and det., 28♂♂, 21♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 23♂♂, 27♀♀; 18-21.VII.2013, Gülmez M. leg. and det., 20♂♂, 28♀♀; 17-20.VIII.2013, Gülmez M. leg. and det., 22♂♂, 13♀♀; 13-16.IX.2013, Gülmez M. leg. and det., 11♂♂, 8♀♀; Sulukaraağaç Site, 1133 m., 19-22.X.2012, Gülmez M. leg. and det., 2♂♂; 16-19.V.2013, Gülmez M. leg. and det., 15♂♂, 9♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 34♂♂, 29♀♀; 18-21.VII.2013, Gülmez M. leg. and det., 16♂♂, 16♀♀; 17-20.VIII.2013, Gülmez M. leg. and det., 236♂♂, 204♀♀; 13-16.IX.2013, Gülmez M. leg. and det., 48♂♂, 43♀♀.

Distribution in Türkiye: It is spread in all geographical regions (Tuatay et al., 1967, 1972; Lodos et al., 1999; Pehlivan, 1989; Bellmann, 2007; Rozner & Rozner, 2009; Anlaş et al., 2011a,b; Şenyüz et al., 2015, 2016, 2017; Ersoy & Hasbenli, 2022).

Onthophagus (Onthophagus) illyricus Scopoli, 1763

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.V.2013, Gülmez M. leg. and det., 1♀; Kalekaya Top-Erenler Site 612 m., 17-20.VI.2013, Gülmez M. leg. and det., 1♂; Sulukaraağaç Site, 1133 m., 17-20.VI.2013, Gülmez M. leg. and det., 1♀; 18-21.VII.2013, Gülmez M. leg. and det., 1♂; 17-20.VIII.2013, Gülmez M. leg. and det., 6♂♂, 3♀♀.

Distribution in Türkiye: It is spread in all geographical regions, except Marmara Region (Pehlivan, 1989; Lodos et al., 1999; Şenyüz, 2004; Bellmann, 2007; Rozner & Rozner, 2009; Anlaş et al., 2011b; Küçükaykay et al., 2013).

Onthophagus (Onthophagus) taurus Schreber, 1759

Material examined: Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 1♂; 17-20.VI.2013,

Gülmez M. leg. and det., 1♂,1♀; 18-21.VII.2013, Gülmez M. leg. and det., 2♂♂; 17-20.VIII.2013, Gülmez M. leg. and det., 17♂♂,20♀♀; 13-16.IX.2013, Gülmez M. leg. and det., 1♂,1♀.

Distribution in Türkiye: It is spread in all geographical regions (Tuatay et al., 1967, 1972; Lodos, 1978; Pehlivan, 1989; Lodos et al., 1999; Rozner & Rozner, 2009; Anlaş et al., 2011a,b; Şenyüz et al., 2013a; Şenyüz & Şahin, 2013; Özgen et al., 2014; Şenyüz et al., 2015; Ersoy & Hasbenli, 2022).

Onthophagus (Palaeonthophagus) aleppensis L. Redtenbacher, 1843

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.III.2013, Gülmez M. leg. and det., 4♀♀; 16-19.V.2013, Gülmez M. leg. and det., 1♂,1♀; Kalekaya Top-Erenler Site 612 m., 16-19.V.2013, Gülmez M. leg. and det., 3♂♂,4♀♀.

Distribution in Türkiye: It is distributed in the Aegean, Central Anatolia, and Southeastern Anatolia (Pehlivan, 1989; Dindar, 2013; Şenyüz et al., 2016, 2017).

Onthophagus (Palaeonthophagus) carpanetoi Pittino, 1982

Material examined: Karaoğlan-Mihalgazi, 207 m., 17-20.VIII.2013, Gülmez M. leg. and det., 1♂; Kalekaya Top-Erenler Site 612 m., 17-20.VI.2013, Gülmez M. leg. and det., 4♀♀; 17-20.VIII.2013, Gülmez M. leg. and det., 2♂♂,2♀♀.

Distribution in Türkiye: It is spread in all geographical regions (Pittino, 1982; Keith, 1998; Pittino, 2004; Bellmann, 2007; Ziani & Sama, 2013).

Onthophagus (Palaeonthophagus) coenobita Herbst, 1783

Material examined: Karaoğlan-Mihalgazi, 207 m., 17-20.IV.2013, Gülmez M. leg. and det., 2♂♂,3♀♀; 16-19.V.2013, Gülmez M. leg. and det., 9♂♂,12♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 4♂♂,2♀♀; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 11♂♂,13♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 31♂♂,14♀♀; 18-21.VII.2013, Gülmez M. leg. and det., 9♂♂,5♀♀; 13-16.IX.2013, Gülmez M. leg. and det., 1♂,1♀.

Distribution in Türkiye: It is widespread in all geographical regions, except Aegean, Mediterranean, and Southeastern Anatolia Region (Rozner & Rozner, 2009; Şenyüz et al., 2013a, b, 2015; Ersoy & Hasbenli, 2022).

Onthophagus (Palaeonthophagus) fissicornis Steven, 1809

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.III.2013, Gülmez M. leg. and det., 2♂♂; 17-20.IV.2013, Gülmez M. leg. and det., 2♂♂,4♀♀; 16-19.V.2013, Gülmez M. leg. and det., 6♂♂,6♀♀; Kalekaya Top-Erenler Site 612 m., 17-20.IV.2013, Gülmez M. leg. and det., 1♀; 16-19.V.2013, Gülmez M. leg. and det., 7♂♂,13♀♀; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 3♂♂,6♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 6♀♀.

Distribution in Türkiye: It is spread in all geographical regions (Tuatay et al., 1967, 1972; Lodos, 1978; Pehlivan, 1989; Lodos et al., 1999; Şenyüz, 2004; Bellmann, 2007; Rozner & Rozner, 2009; Şenyüz & Şahin, 2013; Şenyüz et al., 2013a, b, 2015, 2016; Ersoy & Hasbenli, 2022).

Onthophagus (Palaeonthophagus) fracticornis Preyssl, 1790

Material examined: Karaoğlan-Mihalgazi, 207 m., 19-22.X.2012, Gülmez M. leg. and det., 1♂,2♀♀; 16-19.V.2013, Gülmez M. leg. and det., 7♂♂,2♀♀; Kalekaya Top-Erenler Site 612 m., 16-19.III.2013, Gülmez M. leg. and det., 1♂,1♀; 17-20.IV.2013, Gülmez M. leg. and det., 2♂♂; 16-19.V.2013, Gülmez M. leg. and det., 8♂♂,4♀♀; Sulukaraağaç Site, 1133 m., 19-22.X.2012, Gülmez M. leg. and det., 5♂♂,6♀♀; 16-19.III.2013, Gülmez M. leg. and det., 15♂♂,11♀♀; 17-20.IV.2013, Gülmez M. leg. and det., 4♂♂,2♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 4♂♂,2♀♀.

Distribution in Türkiye: It is distributed in all geographical regions (Tuatay et al., 1967, 1972; Pehlivan, 1989; Lodos et al., 1999; Bellmann, 2007; Rozner & Rozner, 2009; Anlaş et al., 2011b; Şenyüz & Şahin, 2013; Şenyüz et al., 2013a, 2015, 2016; Ersoy & Hasbenli, 2022).

Onthophagus (Palaeonthophagus) lemur Fabricius, 1781

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.III.2013, Gülmez M. leg. and det., 2♂♂,3♀♀; 16-19.V.2013, Gülmez M. leg. and det., 2♀♀; Kalekaya Top-Erenler Site 612 m., 16-19.III.2013, Gülmez M. leg. and det., 3♂♂,1♀; 17-20.IV.2013, Gülmez M. leg. and det., 2♂♂, 7♀♀; 16-19.V.2013, Gülmez M. leg. and det., 38♂♂,52♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 3♂♂, 6♀♀; Sulukaraağaç Site, 1133 m., 17-20.VI.2013, Gülmez M. leg. and det., 1♀.

Distribution in Türkiye: It is distributed in all geographical regions except Marmara Region (Pehlivan, 1989; Bellmann, 2007; Rozner & Rozner, 2009; Dindar, 2013; Şenyüz et al., 2015; Ersoy & Hasbenli, 2022)

Onthophagus (Palaeonthophagus) lucidus Illiger, 1800

Material examined: Karaoğlan-Mihalgazi, 207 m., 22-25.I.2013, Gülmez M. leg. and det., 2♂♂,2♀♀; 15-18.II.2013, Gülmez M. leg. and det., 6♂♂; 16-19.III.2013, Gülmez M. leg. and det., 2♂♂,2♀♀; 17-20.IV.2013, Gülmez M. leg. and det., 8♂♂, 4♀♀; 16-19.V.2013, Gülmez M. leg. and det., 2♂♂,4♀♀; Kalekaya Top-Erenler Site 612 m., 17-20.IV.2013, Gülmez M. leg. and det., 1♂, 1♀.

Distribution in Türkiye: It is spread in all geographical regions (Tuatay et al., 1967, 1972; Pehlivan, 1989; Lodos et al., 1999; Bellmann, 2007; Rozner & Rozner, 2009; Şenyüz et al., 2013b, 2015, 2016, 2017).

Onthophagus (Palaeonthophagus) marginalis Gebler, 1817

Material examined: Kalekaya Top-Erenler Site 612 m., 16-19.V.2013, Gülmez M. leg. and det., 15♂♂,19♀♀;

Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 1♂.

Distribution in Türkiye: It is distributed in all geographical regions (Tuatay et al., 1967, 1972; Pehlivan, 1989; Lodos et al., 1999; Şenyüz, 2004; Rozner & Rozner, 2009; Şenyüz & Şahin, 2013; Şenyüz et al., 2016; Ersoy & Hasbenli, 2022)

Onthophagus (Palaeonthophagus) medius Kugelann, 1792

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.III.2013, Gülmez M. leg. and det., 1♀.

Distribution in Türkiye: It is spread in all geographical regions, except the Mediterranean, Eastern Anatolia, and Southeastern Anatolia Region (Anlaş et al., 2011b; Şenyüz et al., 2013a, b, 2016).

Onthophagus (Palaeonthophagus) muelleri P. Novak, 1921

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.III.2013, Gülmez M. leg. and det., 22♂♂, 29♀♀; 17-20.IV.2013, Gülmez M. leg. and det., 9♂♂, 7♀♀; 16-19.V.2013, Gülmez M. leg. and det., 16♂♂, 7♀♀; Kalekaya Top-Erenler Site 612 m., 16-19.III.2013, Gülmez M. leg. and det., 3♂♂, 2♀♀; 17-20.IV.2013, Gülmez M. leg. and det., 1♂, 2♀♀; 16-19.V.2013, Gülmez M. leg. and det., 5♂♂, 4♀♀; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 4♂♂, 2♀♀; 18-21.VII.2013, Gülmez M. leg. and det., 4♂♂.

Distribution in Türkiye: It is distributed in the Central Anatolia and Mediterranean Region (Pittino, 1982; Pehlivan, 1989; Şenyüz et al., 2015)

Onthophagus (Palaeonthophagus) opacicollis Reitter, 1892

Material examined: Karaoğlan-Mihalgazi, 207 m., 19-22.X.2012, Gülmez M. leg. and det., 1♂, 2♀♀; 22-25.I.2013, Gülmez M. leg. and det., 1♂, 1♀; 16-19.V.2013, Gülmez M. leg. and det., 3♂♂, 5♀♀; Kalekaya Top-Erenler Site 612 m., 19-22.X.2012, Gülmez M. leg. and det., 1♂; 16-19.V.2013, Gülmez M. leg. and det., 1♂, 1♀; Sulukaraağaç Site, 1133 m., 19-22.X.2012, Gülmez M. leg. and det., 1♀; 22-25.I.2013, Gülmez M. leg. and det., 3♂♂; 16-19.III.2013, Gülmez M. leg. and det., 1♂, 2♀♀.

Distribution in Türkiye: It is spread in all geographical regions, except Eastern Anatolia Region (Pehlivan, 1989; Lodos et al., 1999; Şenyüz, 2004; Bellmann, 2007; Rozner & Rozner, 2009; Anlaş et al., 2011b; Şenyüz & Şahin, 2013; Şenyüz et al., 2013a, 2015, 2016).

Onthophagus (Palaeonthophagus) osellai Pittino, 1982

Material examined: Kalekaya Top-Erenler Site 612 m., 16-19.V.2013, Gülmez M. leg. and det., 1♂; Sulukaraağaç Site, 1133 m., 17-20.VI.2013, Gülmez M. leg. and det., 2♂♂.

Distribution in Türkiye: It is distributed in all geographical regions (Pittino, 1982, 2004; Rozner & Rozner, 2009; Şenyüz et al., 2013b, 2015, 2016).

Onthophagus (Palaeonthophagus) ovatus Linnaeus,

1767

Material examined: Karaoğlan-Mihalgazi, 207 m., 19-22.X.2012, Gülmez M. leg. and det., 3♂♂, 3♀♀; 16-19.III.2013, Gülmez M. leg. and det., 3♂♂; 17-20.IV.2013, Gülmez M. leg. and det., 14♂♂, 1♀; 16-19.V.2013, Gülmez M. leg. and det., 4♂♂, 7♀♀; 17-20.VIII.2013, Gülmez M. leg. and det., 4♂♂, 5♀♀; Kalekaya Top-Erenler Site 612 m., 16-19.III.2013, Gülmez M. leg. and det., 1♂, 2♂♂; 17-20.IV.2013, Gülmez M. leg. and det., 17♂♂, 8♀♀; 16-19.V.2013, Gülmez M. leg. and det., 19♂♂, 25♀♀; 17-20.VIII.2013, Gülmez M. leg. and det., 3♀♀; Sulukaraağaç Site, 1133 m., 19-22.X.2012, Gülmez M. leg. and det., 6♂♂, 4♀♀; 17-20.IV.2013, Gülmez M. leg. and det., 5♂♂, 2♀♀; 16-19.V.2013, Gülmez M. leg. and det., 27♂♂, 17♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 117♂♂, 97♀♀; 18-21.VII.2013, Gülmez M. leg. and det., 73♂♂, 53♀♀; 17-20.VIII.2013, Gülmez M. leg. and det., 186♂♂, 168♀♀; 13-16.IX.2013, Gülmez M. leg. and det., 1♂, 1♀.

Distribution in Türkiye: It is spread in all geographical regions except Eastern Anatolia Region (Pehlivan, 1989; Lodos et al., 1999; Şenyüz, 2004; Anlaş et al., 2011a; Şenyüz & Şahin, 2013; Şenyüz et al., 2013a, b, 2015).

Onthophagus (Palaeonthophagus) ruficapillus Brullé, 1832

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.III.2013, Gülmez M. leg. and det., 2♀♀; 17-20.IV.2013, Gülmez M. leg. and det., 1♂; 16-19.V.2013, Gülmez M. leg. and det., 3♂♂, 2♀♀; Kalekaya Top-Erenler Site 612 m., 17-20.IV.2013, Gülmez M. leg. and det., 1♀; 16-19.V.2013, Gülmez M. leg. and det., 1♀; 17-20.VIII.2013, Gülmez M. leg. and det., 15♂♂, 39♀♀; Sulukaraağaç Site, 1133 m., 17-20.IV.2013, Gülmez M. leg. and det., 2♂♂, 4♀♀; 16-19.V.2013, Gülmez M. leg. and det., 1♀; 17-20.VI.2013, Gülmez M. leg. and det., 3♂♂, 2♀♀; 18-21.VII.2013, Gülmez M. leg. and det., 70♂♂, 65♀♀; 17-20.VIII.2013, Gülmez M. leg. and det., 16♂♂, 38♀♀.

Distribution in Türkiye: It is widespread in all geographical regions (Pehlivan, 1989; Lodos et al., 1999; Şenyüz, 2004; Bellmann, 2007; Rozner & Rozner, 2009; Anlaş et al., 2011b, Şenyüz et al., 2015, 2017; Gülmez et al., 2019; Ersoy & Hasbenli, 2022).

Onthophagus (Palaeonthophagus) sericatus Reitter, 1892

Material examined: Sulukaraağaç Site, 1133 m., 17-20.VI.2013, Gülmez M. leg. and det., 1♂.

Distribution in Türkiye: It is distributed in all geographical regions, except the Aegean and Eastern Anatolia Region (Pehlivan, 1989; Lodos et al., 1999; Bellmann, 2007; Rozner & Rozner, 2009, Şenyüz et al., 2017).

Onthophagus (Palaeonthophagus) similis Scriba, 1790

Material examined: Karaoğlan-Mihalgazi, 207 m., 19-22.X.2012, Gülmez M. leg. and det., 1♂; 15-18.II.2013, Gülmez M. leg. and det., 1♂; Kalekaya Top-Erenler Site 612 m., 19-22.X.2012, Gülmez M. leg. and det., 1♀;

Sulukaraağaç Site, 1133 m., 19-22.X.2012, Gülmez M. leg. and det., 8♂♂,9♀♀; 15-18.II.2013, Gülmez M. leg. and det., 1♀; 16-19.III.2013, Gülmez M. leg. and det., 5♂♂,15♀♀; 17-20.IV.2013, Gülmez M. leg. and det., 5♂♂,1♀.

Distribution in Türkiye: It is distributed in Marmara, Aegean, Mediterranean, and Southeastern Anatolia Region (Pehlivan,1989; Rozner & Rozner, 2009; Dindar, 2013).

Onthophagus (Palaeonthophagus) suturellus Brullé, 1832

Material examined: Kalekaya Top-Erenler Site 612 m., 17-20.IV.2013, Gülmez M. leg. and det., 1♂; Sulukaraağaç Site, 1133 m., 16-19.III.2013, Gülmez M. leg. and det., 1♀; 17-20.VI.2013, Gülmez M. leg. and det., 1♂.

Distribution in Türkiye: It is spread in all geographical regions, except Marmara, Black Sea, and Southeastern Anatolia Region (Tuatay et al., 1967, 1972; Pehlivan, 1989; Lodos et al., 1999; Rozner & Rozner, 2009, Şenyüz et al., 2016).

Onthophagus (Palaeonthophagus) truchmenus truchmenus Kolenati, 1846

Material examined: Karaoğlan-Mihalgazi, 207 m., 17-20.IV.2013, Gülmez M. leg. and det., 1♀; Kalekaya Top-Erenler Site 612 m., 17-20.VI.2013, Gülmez M. leg. and det., 1♂; Sulukaraağaç Site, 1133 m., 17-20.IV.2013, Gülmez M. leg. and det., 1♀.

Distribution in Türkiye: It is widespread in all geographical regions, except Marmara, the Black Sea, and Southeastern Anatolia Region (Tuatay et al., 1967; Lodos et al., 1999; Şenyüz, 2004).

Onthophagus (Palaeonthophagus) vacca Linnaeus, 1767

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.V.2013, Gülmez M. leg. and det., 1♂; Sulukaraağaç Site, 1133 m., 17-20.VI.2013, Gülmez M. leg. and det., 1♀.

Distribution in Türkiye: It is distributed in all geographical regions except Southeastern Anatolia Region (Tuatay et al., 1967, 1972; Pehlivan, 1989; Lodos et al., 1999; Şenyüz 2004; Bellmann, 2007; Rozner & Rozner, 2009; Anlaş et al., 2011b; Şenyüz & Şahin, 2013; Şenyüz et al., 2013a, b, 2015; Ersoy & Hasbenli, 2022).

Onthophagus (Palaeonthophagus) verticicornis Laicharting, 1781

Material examined: Karaoğlan-Mihalgazi, 207 m., 16-19.V.2013, Gülmez M. leg. and det., 1♂,2♀♀; 18-21.VII.2013, Gülmez M. leg. and det., 1♀; Kalekaya Top-Erenler Site 612 m., 17-20.IV.2013, Gülmez M. leg. and det., 1♀; 16-19.V.2013, Gülmez M. leg. and det., 23♂♂,29♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 3♂♂,1♀; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 2♂♂,3♀♀; 17-20.VI.2013, Gülmez M. leg. and det., 3♂♂,3♀♀.

Distribution in Türkiye: It is widespread in Marmara, Central Anatolia, and Aegean Region (Rozner &

Rozner, 2009; Şenyüz et al., 2013b, 2016; Ersoy & Hasbenli, 2022).

Genus *Ateuchetus* Bedel, 1892

Ateuchetus armeniacus Ménériés, 1832:

Material examined: Kalekaya Top-Erenler Site 612 m., 16-19.V.2013, Gülmez M. leg. and det., 1♂; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 1♂.

Distribution in Türkiye: It is distributed in all geographical regions, except the Black Sea, Eastern Anatolia, and Southeastern Anatolia Region (Pehlivan, 1988; Anlaş et al., 2011b; Dindar, 2013; Ersoy & Hasbenli, 2022).

Genus *Scarabaeus* Linnaeus, 1758

Scarabaeus pius Illiger, 1803

Material examined: Karaoğlan-Mihalgazi, 207 m., 17-20.IV.2013, Gülmez M. leg. and det., 3 exx.; 16-19.V.2013, Gülmez M. leg. and det., 60 exx.; 17-20.VI.2013, Gülmez M. leg. and det., 8 exx.; 18-21.VII.2013, Gülmez M. leg. and det., 2 exx.; Kalekaya Top-Erenler Site 612 m., 17-20.IV.2013, Gülmez M. leg. and det., 2 exx.; 16-19.V.2013, Gülmez M. leg. and det., 6 exx.; 17-20.VI.2013, Gülmez M. leg. and det., 1 ex.; 18-21.VII.2013, Gülmez M. leg. and det., 4 exx.; 13-16.IX.2013, Gülmez M. leg. and det., 1 ex.; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M. leg. and det., 1 ex.; 17-20.VI.2013, Gülmez M. leg. and det., 6 exx.; 18-21.VII.2013, Gülmez M. leg. and det., 4 exx.

Distribution in Türkiye: It is spread in all geographical regions (Tuatay et al., 1967, 1972; Pehlivan, 1988; Lodos et al., 1999; Rozner & Rozner, 2009; Özgen et al., 2014, Şenyüz et al., 2016; Ersoy & Hasbenli, 2022).

Scarabaeus typhon Fischer von Waldheim, 1823

Material examined: Karaoğlan-Mihalgazi, 207 m., 17-20.IV.2013, Gülmez M. leg. and det., 1 ex.; 16-19.V.2013, Gülmez M. leg. and det., 50 exx.; 17-20.VI.2013, Gülmez M. leg. and det., 5 exx.; 18-21.VII.2013, Gülmez M. leg. and det., 5 exx.; Kalekaya Top-Erenler Site 612 m., 18-21.VII.2013, Gülmez M. leg. and det., 1 ex.; Sulukaraağaç Site, 1133 m., 17-20.VI.2013, Gülmez M. leg. and det., 4 exx.

Distribution in Türkiye: It is distributed in all geographical regions, except the Black Sea, Mediterranean, and Southeastern Anatolia Region (Rozner & Rozner, 2009; Sürgüt et al., 2014; Şenyüz et al., 2016; Ersoy & Hasbenli, 2022).

Tribe Sisyphini Mulsant, 1842

Genus *Sisyphus* Latreille, 1806

Sisyphus schaefferi schaefferi Linnaeus, 1758

Material examined: Karaoğlan-Mihalgazi, 207 m., 17-20.IV.2013, Gülmez M. leg. and det., 2 exx.; Kalekaya Top-Erenler Site 612 m., 19-22.X.2012, Gülmez M. leg. and det., 1 ex.; 16-19.V.2013, Gülmez M. leg. and det., 16 exx.; 17-20.VI.2013, Gülmez M. leg. and det., 9 exx.; 18-21.VII.2013, Gülmez M. leg. and det., 1 ex.; 13-16.IX.2013, Gülmez M. leg. and det., 2 exx.; Sulukaraağaç Site, 1133 m., 16-19.V.2013, Gülmez M.

leg. and det., 3 exx.

Distribution in Türkiye: It is spread in all geographical regions (Tuatay et al., 1967, 1972; Lodos, 1978; Lodos et al., 1999; Şenyüz, 2004; Bellmann, 2007; Rozner & Rozner, 2009; Anlaş et al. 2011a, b; Şenyüz & Şahin, 2013; Şenyüz et al., 2013a, b, 2015, 2016; Ersoy & Hasbenli, 2022)

DISCUSSION AND CONCLUSION

This study was completed at 3 different altitudes, with fieldwork carried out regularly every month for a year. Thirty-four species and six subspecies total of 40 species of 10 genera belonging to the Scarabaeinae subfamily of Scarabaeidae, were collected. Despite *Copris hispanus cavolinii* were preferred just in 207 m. elevation, *Copris lunaris* were preferred only at May in different altitudes. *Onthophagus (Palaeonthophagus) medius* 207m. and March, *Cheironitis ungaricus* 612 m. and July, *Onthophagus (Palaeonthophagus) sericatus* 1133 m. and June preferred both only altitude and only month. Moreover, 23 species and subspecies were found every three altitudes at different months. The *Onthophagus* genus has the most founding species, with 13 species in these altitudes.

C. haroldi, *C. mundus*, *O. (A.) falzonii*, *O. (P.) carpanetoi*, *O. (P.) similis*, *O. (P.) t. truchmenus* and *S. armeniacus* are the new data for Eskişehir province. Also, these three species, *C. mundus*, *O. (A.) falzonii*, and *O. (P.) similis*, are the new data Central Anatolia Region.

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Researcher's Contribution Rate Declaration Summary

The authors declare that they have contributed equally to the article.

Conflicts of Interest Statement

None of the authors had financial or personal relationships with other individuals or organizations that might inappropriately influence their work during submission.

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