Original article (Orijinal araştırma)

Descriptions of Geostiba dindymosensis sp. n. and Geostiba yagmuri sp. n. (Coleoptera: Staphylinidae: Aleocharinae), and additional records for Geostiba Thomson, 1858 from Turkey

Geostiba dindymosensis sp. n. ve Geostiba yagmuri sp. n. (Coleoptera: Staphylinidae: Aleocharinae) türlerinin deskripsiyonları ve Türkiye'den Geostiba Thomson, 1858 için ek kayıtlar

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Abstract

As a result of field survey in the western Anatolia, Turkey (Aydın, Balıkesir, Denizli, İzmir, Kütahya, Manisa, Muğla) between 2014 and 2016, two new species of the subgenus Tropogastrosipalia Scheerpeltz, 1951 belonging to the genus Geostiba Thomson, 1858 are described and illustrated: Geostiba dindymosensis sp. n. from Kütahya and Geostiba yagmuri sp. n. from Balıkesir and Manisa. These two new species are compared with morphologically similar and geographically close species. Also, a map illustrating the distributions of these species is provided. Additional records of Geostiba aydinica Assing, 2006, Geostiba biformis Assing, 2006 and Geostiba nifica Assing, 2006 are presented. These three species are recorded for the first time since their descriptions.

Keywords: Aleocharinae, Geostiba, new species, Staphylinidae, Turkey

Öz

Batı Anadolu (Türkiye)’da (Aydın, Balıkesir, Denizli, İzmir, Kütahya, Manisa, Muğla) 2014-2016 yılları arasında yapılan arazi çalışmaları sonucunda, Geostiba Thomson,1958 cinsinden Tropogastrosipalia Scheerpeltz,1951 alt cinsinin iki yeni türü, Kütahya’dan Geostiba dindymosensis sp. n. ile Balıkesir ve Manisa’dan Geostiba yagmuri sp. n. bilim dünyasına tanıtılmıştır. Bu yeni türler, morfolojik olarak benzer ve coğrafi olarak yakın yayılışa sahip türlerle karşılaştırmıştır. Ayrıca, bu türlerin ilişkilerini gösteren bir harita da verilmiştir. Geostiba aydinica Assing, 2006, Geostiba biformis Assing, 2006 ve Geostiba nifica Assing, 2006 türleri için ek kayıtlar verilmiştir. Bu üç tür, tanımlandıklarından bu yana ilk kez kaydedilmiştir.

Anahtar sözcükler: Aleocharinae, Geostiba, yeni türler, Staphylinidae, Türkiye

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Introduction

The genus *Geostiba* Thomson, 1858 (Coleoptera: Staphylinidae: Aleocharinae) is one of the most studied taxa of the subfamily Aleocharinae with 443 species in the Palearctic Region (Schülke & Smetana, 2015; Assing, 2018; 2019; Örgel, 2018; Assing et al., 2019; Örgel & Anlaş, 2020). These species are classified into 13 subgenera. Twenty-seven species are not included in any subgenus.

In Turkey, the genus *Geostiba* contains 86 species, with 81 species known only from Turkey. (Anlaş, 2009; Örgel & Anlaş, 2020) and these species belong to the subgenera *Sibiota* Casey, 1906, *Sipalotricha* Scheerpeltz, 1931, *Tropogastrosipalia* Scheerpeltz, 1951 and the nominal subgenus, with one species without subgeneric assignment (Schülke & Smetana, 2015). *Tropogastrosipalia* spp. are distinguished from those of other subgenera of *Geostiba* by the male primary and secondary sexual characters (presence of a process of abdominal tergite VII, an unmodified abdominal sternite VIII, and a crystal process of the aedeagus), have very restricted distributions and are represented a high diversity. In general, *Tropogastrosipalia* spp. inhabit the alpine and subalpine zones (Assing, 2016a, b; 2017a, b). The Anatolian mountain ranges provide appropriate habitats for the species belonging to the subgenus. Until 2000, only seven *Tropogastrosipalia* spp. had been known in Anatolia (Anlaş, 2009). Thirty-nine species were described in the studies carried out by Volker Assing between 2000-2011 (Assing, 2000; 2001; 2003; 2004; 2005; 2006; 2007; 2009; 2010; 2011). In addition, Assing’s studies, four species were described from western Anatolia by Örgel (2018) and Örgel & Anlaş (2020). In all, 50 species are known from Anatolia and all of them are endemic to the certain mountains and their environs (Pace, 1983; Assing, 2000; 2001; 2003; 2004; 2009; 2011; 2016a, b; 2017a, b; Örgel, 2018; Örgel & Anlaş, 2020).

The main aims of this study were to contribute to Anatolian biodiversity studies and determine the Turkish *Geostiba* fauna.

Materials and Methods

The material studied was collected using aspirators in Aydın, Balıkesir, Denizli, İzmir, Kütahya, Manisa, Muğla Provinces of western Anatolia between 2014 and 2016. Dissection techniques followed that of Hanley & Ashe (2003). The morphological studies were carried out by a Stemi 508 (Zeiss Oberkochen, Germany) stereomicroscope. Photographs were taken with a Zeiss AxioCam ERC5s digital camera. Adobe Photoshop 2020 was used for focus stacking. CorelDRAW Graphics Suite X7 was used for editing photographs. Google Earth Pro was used to create the map. Primary and secondary sexual characters of the species are described following the terminology of Assing (2006; 2010). Head length was measured from the anterior margin of the frons to the posterior margin of the head, length of the pronotum was measured along the median line; elytral length was measured along suture from the apex of the scutellum to the posterior margin; the length of the median lobe of the aedeagus was measured from the apex of the ventral process to the base of the capsule. The material is deposited in Alaşehir Zoological Museum, Manisa, Turkey (AZMM).

RESULTS

Additional faunistic records for three species are given and two new species are described of the subgenus *Tropogastrosipalia* from western Anatolia. The subgenus *Tropogastrosipalia* is now represented by 52 species in Turkey.
Descriptions of new species

**Geostiba (Tropogastrosipalia) dindymosensis** sp. n. (Figures 1a-I and 3)

Type material. Holotype: Turkey, ♂, “TR- Kütahya Province, Gediz district, 5 km SE of Uğurluca, Murat Mountain, 2082 m, 38°56’38” N, 29°38’22” E, 05.IV.2014, leg. Yağmur & Örgel / Holotypus ♂ Geostiba (Tropogastrosipalia) dindymosensis sp. n. det. S. Örgel 2021” (AZMM).

Paratypes (22 exs.). Turkey, 8♂♂, 8♀♀, same locality and date as holotype; ♂, Kütahya Province, Gediz district, 3 km E of Karaağaç, Murat Mountain, 1754 m, 38°56’15” N, 29°35’45” E, 03.V.2015, leg. Örgel; ♂, 2♀♀, Kütahya Province, Gediz district, 7 km SE of Uğurluca, Murat Mountain, 2191 m, 38°56’58” N, 29°40’18” E, 24.V.2015, leg. Örgel; ♂, Kütahya Province, Gediz district, 8 km E of Karaağaç, Murat Mountain, 1764 m, 38°56’11” N, 29°38’34” E, 24.V.2015, leg. Örgel; ♀, Kütahya Province, Gediz district, 3 km S of Uğurluca, Murat Mountain, 2073 m, 38°57’04” N, 29°36’26” E, 19.VI.2016, leg. Örgel (AZMM).

Etymology. Murat Mountain, where this new species was discovered, was called Dindymos in ancient times. The specific epithet is derived from this name.

Description. Body 2.5-3.2 mm. Head dark brown; pronotum and elytra reddish-brown, but pronotum darker than elytra; abdomen with segments I-III reddish-brown, IV-VII black VIII-IX dark brown, anterior portion of all abdominal segments darker than posterior; legs yellowish-brown; antennae with segments I, II yellowish-brown, III-XI reddish-brown.

Head 0.98 times as wide as long (Figure 1a), with fine microreticulation; eyes 1/3 as long as postocular region.

Pronotum distinctly oblong (Figure 1a), 1.23 times as long as wide; 1.28 times as wide as head; covering scutellum; posterior margin truncate in the middle; microreticulation more pronounced than that on the head.

Elytra 0.58 times as long as and 1.13 times as wide as pronotum (Figure 1a); lateral margins slightly elevated; sutural carina strongly elevated, extending about half length of elytral suture (Figure 1c); microreticulation less pronounced than that on the pronotum; punctuation distinctly granulose; hind wings absent.

Abdomen 0.95 times as wide as elytra; only tergites VII modified, process of tergite VII short and stout in lateral view (Figure 1d), wide and acute apically in dorsal view (Figure 1g); posterior margin of sternite VIII convex, setae unmodified (Figure 1e).

Median lobe of aedeagus 0.28 mm; crystal process wide, tall, acute apically and slightly closer to ventral process in lateral view (Figure 1h).

Spermatheca as in Figure 1i.

Sexual dimorphism. Pronotum, elytra, and abdomen with sexual dimorphism. Female pronotum distinctly shorter than male pronotum and posterior margin truncate in the middle. Female elytra without sutural carinae and female abdominal tergite VII unmodified.
Descriptions of Geostiba dindymosensis sp. n. and Geostiba yagmuri sp. n. (Coleoptera: Staphylinidae: Aleocharinae), and additional records for Geostiba Thomson, 1858 from Turkey

Differential diagnosis. Regarding similar external and sexual characters, the new species is similar to Geostiba ahirensis Örgel & Anlaş, 2020 and Geostiba sandiklica Örgel & Anlaş, 2020, but distinguished by the different shapes of the posterior margin of the male pronotum, elevations of the sutural carinae on the male elytra, modifications of the male abdominal tergites III and IV, widths of the process of the male abdominal tergite VII and different shapes of the crystal process of the median lobe of aedeagus. In G. dindymosensis sp. n. the posterior margin of the pronotum is truncate in the middle, whereas in G. ahirensis and G. sandiklica the posterior margin of the pronotum is convex in the middle. The sutural carinae on the elytra in G. dindymosensis sp. n. are more elevated than that in G. ahirensis and G. sandiklica. In G. dindymosensis sp. n. tergites III and IV are unmodified, whereas in G. ahirensis tergites III and IV have a tubercle. The process of the male abdominal tergite VII in G. dindymosensis sp. n. is wider than that of G.

Figure 1. Geostiba (Tropogastrosipalia) dindymosensis sp. n.: a) male forebody; b) female forebody; c) male elytra in lateral view; d) posterior portion of abdominal segments of male in lateral view; e) male abdominal sternite VIII in dorsal view; f) female abdominal sternite VIII in dorsal view; g) male abdominal tergite VII in dorsal view; h) median lobe of aedeagus in lateral view; and i) spermatheca. Scale bars: 0.5 mm (a, b); 0.2 mm (c, d); 0.1 mm (e-i).
*ahirensis* and *G. sandiklica*. The crystal process of the median lobe of aedeagus is similar to that of *G. sandiklica*. However, in *G. sandiklica* it is distinctly narrowed towards the apex, while in *G. dindymosensis* sp. n. it is narrowed only apically. In *G. ahirensis* the crystal process is wider than that of *G. dindymosensis* sp. n. and *G. sandiklica*. Morphologically (especially regarding the shape of the posterior margin of the male pronotum), this new species is the most similar to *Geostiba kazika* Assing, 2010 and *Geostiba extensicollis* Assing, 2010 (the posterior margin of the male pronotum truncate to indistinctly concave in both species). The new species is distinguished from these species by different shapes of the sutural carinae on the male elytra and crystal process of the median lobe. In *G. dindymosensis* sp. n. the sutural carinae (extending from apex of scutellum along approximately 1/2 of suture) are wide and highly elevated, whereas in *G. kazika* they extend from the apex of the scutellum along 2/3 of the suture and in *G. extensicollis* they extend from the apex of the scutellum almost to posterior margin of the elytra, and the sutural carinae are narrow and moderately elevated in both species. The crystal process in *G. dindymosensis* sp. n. is longer and wider than that in *G. kazika* and *G. extensicollis* (Table 1).

Distribution and bionomics. The new species was collected from Murat Mountain (Figure 3). This mountain is located in the eastern central division of western Anatolia. Murat Mountain has been an important area for endemism. For example, *Astenus kumlutası* Anlaş, 2015, an endemic staphylinid species, is known from this mountain (Anlaş, 2015), and also this mountain has some other endemic insect species, e.g., *Camponotus ruseni* Karaman, 2012 (Karaman, 2012). Additionally, Murat Mountain is isolated by some valleys and rivers. Therefore, the new species is most probably endemic to Murat Mountain. As a result of more careful investigation of such isolated mountain systems, especially in terms of species with limited mobility and special habitat preferences, it is predicted that many new species will be detected in many different groups for the scientific world. In addition, the importance of detecting the insect fauna of Turkey is again revealed.

**Geostiba (Tropogastrosipalia) yagmuri** sp. n. (Figures 2a-l and 3)

Type material. Holotype: Turkey, ♂, "TR- Balikesir Province, Bigadiç district, 7 km N of Bozbük, Alaçam Mountains, 1548 m, 39°24’03” N, 28°33’15” E, 01.IV.2016, leg. Örgel & Yaman / Holotypus ♂ *Geostiba (Tropogastrosipalia) yagmuri* sp. n. det. S. Örgel 2021" (AZMM).

Paratypes (21 exs.). Turkey, 7♂♂, 11♀♀, same locality and date as holotype; 3♂♂, Manisa Province, Akhisar district, 20 km SW of Sindirgli, 408 m, 39°07’59” N, 28°00’33” E, 13.IV.2015, leg. Anlaş & Örgel (AZMM).

Etymology. The species is dedicated to Dr. Erser Aydin Yağmur (Manisa), a specialist on scorpions, who have helped in the collection of some of the material used in this study.

Description. Body 2.7-3.3 mm. Head black; pronotum and elytra reddish-brown, but anterior portion of elytra darker than posterior portion; abdomen with segments I-III reddish-brown, IV-VII black, VIII-IX dark brown; legs and antennae reddish-brown.

Head approximately as wide as long, with fine microreticulation (Figure 2a); eyes half as long as postocular region in lateral view.

Pronotum weakly oblong; 1.09 times as long as wide (Figure 2a); 1.17 times as wide as head; not covering scutellum; posterior margin weakly convex; microreticulation more pronounced than that on the head.

Elytra 0.54 times as long as and 1.15 times as wide as pronotum (Figure 2a); lateral margins slightly elevated; sutural carina slightly elevated, extending about 1/3 length of elytral suture (Figure 2c); microreticulation less pronounced than that on the pronotum; punctuation distinctly granulose; hind wings absent.
Descriptions of Geostiba dindymosensis sp. n. and Geostiba yagmuri sp. n. (Coleoptera: Staphylinidae: Aleocharinae), and additional records for Geostiba Thomson, 1858 from Turkey

Abdomen 0.98 times as wide as elytra; only tergites VII modified, process of tergite VII short and stout in lateral view (Figure 2d), narrow and acute apically in dorsal view (Figure 2g); posterior margin of sternite VIII convex, setae unmodified (Figure 2e).

Median lobe of aedeagus 0.31 mm; crystal process very thin, tall and acute apically, slightly closer to ventral process in lateral view (Figure 2h).

Spermatheca as in Figure 2i.

Sexual dimorphism. Pronotum (weakly), elytra, and abdomen with sexual dimorphism. Female pronotum weakly shorter than that in male. Female elytra without sutural carinae and female abdominal tergite VII unmodified.

Figure 2. Geostiba (Tropogastrosipalia) yagmuri sp. n.: a) male forebody; b) female forebody; c) male elytra in lateral view; d) posterior abdominal segments of male in lateral view; e) male abdominal sternite VIII in dorsal view; f) female abdominal sternite VIII in dorsal view; g) male abdominal tergite VII in dorsal view; h) median lobe of aedeagus in lateral view; and i) spermatheca. Scale bars: 0.5 mm (a, b); 0.2 mm (c, d); 0.1 mm (e-i).
Differential diagnosis. Based on the shape of the posterior margin of the male pronotum, the new species is similar to *Geostiba atromontis* Assing, 2006. The posterior margin of the male pronotum is convex in the both species. But these species distinguished by the different shape of process of male abdominal tergite VII. In *G. yagmuri* sp. n. it is much shorter than that in *G. atromontis*. Additionally, the carinae in the posterior angles of the elytra of *G. yagmuri* sp. n. are narrower than those in *G. atromontis*. *G. yagmuri* sp. n. From these species *G. dindymosensis* sp. n. can be distinguished by the shape of the posterior margin in the male pronotum. In *G. yagmuri* sp. n. the posterior margin of the male pronotum is convex, whereas in *G. dindymosensis* sp. n. this part is truncate in the middle. In addition, the male pronotum in *G. yagmuri* sp. n. is shorter than that in *G. dindymosensis* sp. n. The sutural carinae on the male elytra and the crystal process of the median lobe of these two species are also different. In *G. yagmuri* sp. n. the sutural carinae on the male elytra are weakly elevated, whereas in *G. dindymosensis* sp. n. they are strongly elevated and the crystal process of the median lobe is thinner and shorter in *G. yagmuri* sp. n. than that in *G. dindymosensis* sp. n. (Table 1).

Distribution and Bionomics. The specimens were collected under stones in meadows between 408 and 1548 m. The new species is probably endemic of the Alaçam Mountains, Balikesir and Manisa Provinces (Figure 3). Alaçam Mountains has been an important area for endemism. For example, *Sunius ciceki* Anlaş, 2016, an endemic staphylinid species, is known from this mountain (Anlaş, 2016, 2018).

![Figure 3. Distribution of *Geostiba dindymosensis* sp. n. (squares); *Geostiba yagmuri* sp. n. (circles); *Geostiba ahirensis* (inverted triangles); *Geostiba sandiklica* (diamonds); *Geostiba atromontis* (pentagons); *Geostiba kazika* (triangles); *Geostiba extensicollis* (stars).](image)

Additional records

*Geostiba (Tropogastrosipalia) aydinica* Assing, 2006

Material. Aydın: 4 km N of Karaköy, İmambaba Hill, 37°57'06" N, 27°53'56" E, 1644 m, 24.III.2014, 6♂♂, 3♀♀, leg. Anlaş & Örgel (AZMM).

Distribution. *Geostiba aydinica* is only known from Aydın Mountains (Aydın Province) (Assing, 2006) and recorded for the first time since its description.
Descriptions of Geostiba dindymosensis sp. n. and Geostiba yagmuri sp. n. (Coleoptera: Staphylinidae: Aleocharinae), and additional records for Geostiba Thomson, 1858 from Turkey

**Geostiba (Tropogastrosipalia) biformis Assing, 2006**

Material. Denizli: Çameli, 2 km SE of Kalınkız, DeğirmenTaşı Hill, 37°07’21” N, 29°20’35” E, 1497 m, 04.V.2014, 3♂♀, leg. Yağmur & Örgel, same data but 18.IV.2015, 16♂♂, 46♂♀, 5 km SE of Kale, 37°25’37” N, 28°53’30” E, 1335 m, 11.IV.2015, 2♂♀, leg. Yağmur & Örgel, Tavas, 8 km SE of Nikfer, Bozdağ ski center road, 37°19’57” N, 29°10’47” E, 2033 m, 03.V.2014, 9♂♀, 26♂♀, leg. Yağmur & Örgel, Tavas, 3 km NE of Alpa, Gölgeli Mountains, 37°14’16” N, 29°04’07” E, 1900 m, 26.IV.2014, 2♂♀, 8♂♀, leg. Yağmur & Örgel; Muğla: 7 km SE of Özluce, 37°15’56” N, 28°26’57” E, 1605 m, 22.III.2014, 7♂♀, 17♂♀, leg. Anlaş & Örgel (AZMM).

Distribution. Distribution of *G. biformis* is confined to Eastern Menteşe Mountains (Muğla Province) and Gölgeli Mountains (Denizli Province) (Assing, 2006) and is recorded for the first time since its description.

**Geostiba (Tropogastrosipalia) nifica Assing, 2006**

Material. İzmir: Kemalpaşa, 7 km SW of Çiniliköy, Nif Mountain, 38°23’03” N, 27°21’56” E, 1274 m, 16.III.2014, 4♂♀, ♀, leg. Yağmur & Örgel (AZMM).

Distribution. *Geostiba nifica* was only known from Nif Mountain (İzmir Province) (Assing, 2006) and recorded for the first time since its description.

| ♂ | Posterior margin of pronotum | Lateral margins of elytra | Sutural carinae | Abdominal tergite VII (lateral view) | Crystal process of aedeagus |
|---|---|---|---|---|---|
| *G. dindymosensis* sp. n. | truncate | weakly elevated | extending about half length of elytral suture | short and stout | strong, wide and tall |
| *G. yagmuri* sp. n. | weakly convex | weakly elevated | extending about 1/3 length of elytral suture | short and stout | narrow and short |
| *G. extensicollis* | truncate to indistinctly concave | not elevated | extending along elytral suture | short, stout, suberect | somewhat variable shape |
| *G. kazika* | truncate to indistinctly concave | not elevated | extending about 2/3 length of elytral suture | short and stout | short and slender |
| *G. ahirensis* | weakly convex | distinctly elevated | extending about half length of elytral suture | short and stout | very wide and tall |
| *G. atromontis* | broadly convex | weakly elevated | extending about half length of elytral suture | long, acute, and erect | thin |
| *G. sandiklica* | weakly convex | not elevated | extending about 1/3 length of elytral suture | short and stout | moderately broad |

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References

Anlaş, S., 2000. The Turkish species of Geostiba s. str. Thomson, 1858 (Coleoptera: Staphylinidae, Aleocharinae). Linzer Biologische Beiträge, 32 (2): 1033-1042.

Anlaş, S., 2001. A revision of the Turkish species of Geostiba Thomson, 1858 and Tropimenleytron Pace, 1983 (Coleoptera: Staphylinidae, Aleocharinae). Linzer Biologische Beiträge, 33 (1): 137-185.

Anlaş, V., 2004. A revision of the Turkish species of Geostiba Thomson. V. New species and additional records (Coleoptera: Staphylinidae, Aleocharinae). Linzer Biologische Beiträge, 36 (2): 615-638.

Ashing, V., 2005. New species and new records of Eastern Mediterranean Geostiba Thomson (Coleoptera: Staphylinidae, Aleocharinae). Linzer Biologische Beiträge, 37 (2): 1047-1070.

Ashing, V., 2006. Thirteen new species and additional records of Eastern Mediterranean Geostiba Thomson (Coleoptera: Staphylinidae, Aleocharinae). Linzer Biologische Beiträge, 38 (2): 1179-1215.

Ashing, V., 2007. Four new species and additional records of Geostiba from Turkey and Crete, and a new synonymy (Coleoptera: Staphylinidae, Aleocharinae). Linzer Biologische Beiträge, 39 (2): 777-790.

Ashing, V., 2009. A revision of Geostiba of the Western Palaearctic region. XIX. New species from Turkey and Iran and additional records, with an updated key and catalogue of the species of the Eastern Mediterranean, the Caucasus, and adjacent regions (Coleoptera: Staphylinidae: Aleocharinae). Linzer Biologische Beiträge, 41 (2): 1191-1246.

Ashing, V., 2010. A revision of Geostiba of the Western Palaearctic region. XX. Four new species from Turkey and Albania, and additional records (Coleoptera: Staphylinidae: Aleocharinae). Linzer Biologische Beiträge, 42 (2): 1125-1138.

Ashing, V., 2011. A revision of Geostiba of the West Palaearctic region. XXI. Eight new species from Turkey and the Caucasus, a new synonymy, and additional records (Coleoptera: Staphylinidae: Aleocharinae). Linzer Biologische Beiträge, 43 (2): 1135-1168.

Ashing, V., 2016a. A revision of Geostiba of the West Palaearctic region. XXII. Two new species from Jordan and the Caucasus, and additional records (Coleoptera: Staphylinidae: Aleocharinae). Linzer Biologische Beiträge, 48 (1): 221-228.

Ashing, V., 2016b. A revision of Geostiba of the West Palaearctic region. XXIII. On the Sibita species of the Caucasus region exclusive of Turkey (Coleoptera: Staphylinidae: Aleocharinae). Linzer Biologische Beiträge, 48 (2): 1097-1117.

Ashing, V., 2017a. On the Geostiba fauna of Armenia (Coleoptera: Staphylinidae: Aleocharinae). Linzer Biologische Beiträge, 49 (2): 1075-1092.

Ashing, V., 2017b. A revision of Geostiba of the West Palaearctic region. XXV. New species from Georgia and Greece, and additional records (Coleoptera: Staphylinidae: Aleocharinae). Linzer Biologische Beiträge, 49 (2): 1093-1106.

Ashing, V., 2018. A revision of Geostiba of the West Palaearctic region. XXVI. New species and additional records, primarily from the Caucasus region (Coleoptera: Staphylinidae: Aleocharinae). Linzer Biologische Beiträge, 50 (2): 1033-1054.
Descriptions of *Geostiba dindymosensis* sp. n. and *Geostiba yagmuri* sp. n. (Coleoptera: Staphylinidae: Aleocharinae), and additional records for *Geostiba* Thomson, 1858 from Turkey

Assing, V., 2019. A revision of *Geostiba* of the West Palaearctic region. XXVII. New species from Georgia and Kyrgyzstan, and additional records (Coleoptera, Staphylinidae, Aleocharinae). Linzer Biologische Beiträge, 51 (2): 717-730.

Assing, V., V. Brachat & H. Meybohm, 2019. Monograph of the Staphylinidae of Crete (Greece). Part II. Descriptions of new species (Insecta:Coleoptera). Contributions to Entomology, 69 (2): 239-289.

Hanley, R. S. & J. S. Ashe, 2003. Techniques for dissecting adult aleocharine beetles (Coleoptera: Staphylinidae). Bulletin of Entomological Research, 93 (1): 11-18.

Karaman, C., 2012. *Camponotus ruseni* n. sp. (Hymenoptera: Formicidae) - A putative second parasitic species of the genus *Camponotus* Mayr. Journal of the Kansas Entomological Society, 85 (4): 309-317.

Örgel, S., 2018. *Geostiba (Tropogastrosipalia) honazica* sp. nov. (Coleoptera: Staphylinidae, Aleocharinae) from Turkey. Journal of Insect Biodiversity, 7 (2): 33-37.

Örgel, S. & S. Anlaş, 2020. Description of three new species of *Geostiba* Thomson 1858 (Coleoptera: Staphylinidae, Aleocharinae) from central western Anatolia. Turkish Journal of Zoology, 44 (2): 156-164.

Pace, R., 1983. Specie del genere *Geostiba* Thomson raccolte dal Dr. C. Besuchet e collaborati in Marocco, nella Penisola Iberica e Balcanica, e nel Medio Oriente (Coleoptera: Staphylinidae). Revue suisse de Zoologie, 90 (1): 3-46.

Schüke, M. & A. Smetana, 2015. “Staphylinidae, 304-1134” In: Catalogue of Palaearctic Coleoptera. Volume 2. Hydrophiloidea - Staphylinioidea. Revised and Updated Edition (Eds. I. Löbl & D. Löbl). Brill, Boston, USA, 1702 pp.