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On the *Geostiba* fauna of Armenia (Coleoptera: Staphylinidae: Aleocharinae)

Volker ASSING

A b s t r a c t : Three microphthalmous species of the subgenus *Sibiota* CASEY, 1906, genus *Geostiba* THOMSON, 1858, from Armenia are described and illustrated: *Geostiba (Sibiota) tigrani* nov.sp. (North Armenia: mountains to the north of Sevan lake); *G. (S.) kalavanica* nov.sp. (North Armenia: Kalavan mountain near the northwestern tip of Sevan lake); *G. (S.) immutata* nov.sp. (South Armenia: Barkushati range). *Geostiba (Geostiba) sororcula* ASSING, 2001, a species previously known only from Northeast Turkey, is reported from Armenia for the first time. Like its close relative, the widespread *G. circellaris* (GRAVENHORST, 1806), this species is wing-dimorphic. At present, the known *Geostiba* fauna is composed of nine described species in three subgenera; one or two additional species are unnamed (males unavailable). Seven described and the unnamed species, all of them microphthalmous, micropterous, and more or less locally endemic, belong to the subgenus *Sibiota*; they are subject to remarkable intraspecific variation of the male secondary sexual characters. A key to species and distribution maps are provided.

K e y w o r d s : Coleoptera, Staphylinidae, Aleocharinae, Geostibini, *Geostiba*, *Sibiota*, Armenia, taxonomy, zoogeography, new species, new records, key to species, distribution maps, intraspecific variation, wing dimorphism, endemism.

Introduction

In the region including the East Mediterranean (east of Italy), the Caucasus region, and Iran, the speciose genus *Geostiba* THOMSON, 1858 was previously represented by as many as 194 described species (ASSING 2016a, b, 2017). In view of this diversity, it seems remarkable that up until 2015 only a single species had been reported from Armenia: *G. (Tropogastrosipalia) khnzoriani* PACE, 1983. Four additional species, all of them belonging to the subgenus *Sibiota* CASEY, 1906, were added to the Armenian fauna very recently: *G. pambakica* ASSING, 2016, *G. unituber* ASSING, 2016, *G. unicumneata* ASSING, 2016, and *G. meghruica* ASSING, 2016. Thus, prior to the present study, the known *Geostiba* fauna of Armenia was composed of five species in two subgenera.

During two field trips conducted to Armenia in 2016 and 2017 together with Michael Schülke (Berlin), as many as 562 specimens of *Geostiba* were collected. In addition, a few specimens collected by Matúš Kocian in Armenia were examined. The material of the subgenus *Sibiota* from the field trip in 2016 was already reported and described by ASSING (2016b).

Material and methods

The material treated in this study is deposited in the following collections:

cAss..... author's private collection

cKoc..... private collection Matúš Kocian, Prague

MNBMuseum für Naturkunde, Berlin (including the collection of Michael Schülke)

The morphological studies were conducted using a Stemi SV 11 microscope (Zeiss), a Discovery V12 microscope (Zeiss), and a Jenalab compound microscope (Carl Zeiss Jena). The images were created using a digital camera (Nikon Coolpix 995) and AxioCam ERc 5s. The maps were created using MapCreator 2.0 (primap) software.

Body length was measured from the anterior margin of the labrum to the abdominal apex, the length of the forebody from the anterior margin of the labrum to the posterior margin of the elytra, head length along the middle from the anterior margin of the clypeus to the posterior carina of the head, elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, and the length of the median lobe of the aedeagus from the apex of the ventral process to the base of the capsule. The "parameral" side (i.e., the side where the sperm duct enters) is referred to as the ventral, the opposite side as the dorsal aspect.

Results

An examination of the available material revealed that it is composed of at least ten species belonging to three subgenera: *Geostiba* (*Geostiba*) *sororcula* ASSING, 2001, *G.* (*Tropogastrosipalia*) *khzoriani*, the four species of the subgenus *Sibiota* described earlier (ASSING 2016b), and four or five undescribed species of *Sibiota*, three of which are described in the present paper.

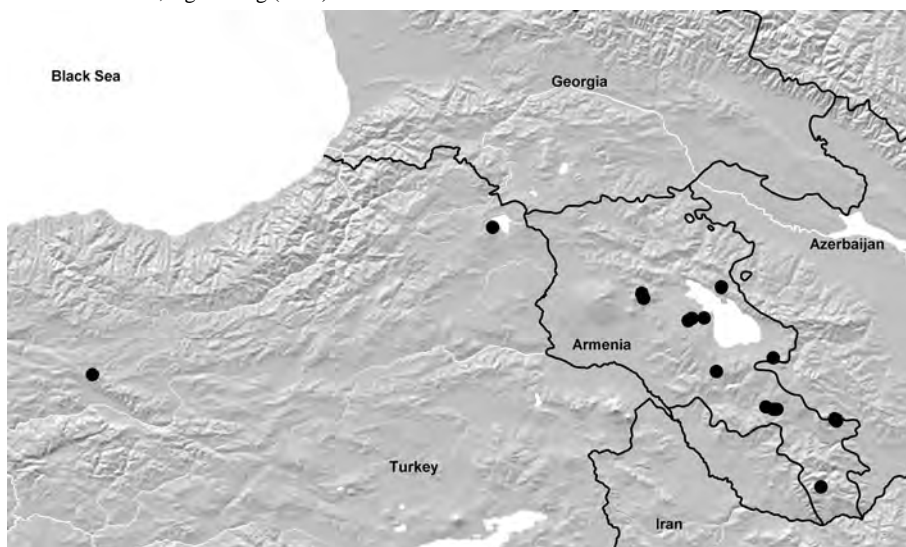
Subgenus *Geostiba* THOMSON, 1858

This subgenus only comprises two species, the widespread and common *G. circellaris* (GRAVENHORST, 1806) - a species also distributed in the Caucasus region, but unknown from Armenia - and *G. sororcula*, whose previously known distribution was confined to northeastern Anatolia.

Geostiba (*Geostiba*) *sororcula* ASSING, 2001 (Map 1)

Material examined: Armenia: 2 exs., N Yerevan, W Hrazdan, 40°32'N, 44°33'E, 2130 m, secondary forest margin, litter and roots sifted, 25.VI.2016, leg. Schülke (MNB); 1 ♂, 4 ♀, 9 exs., N Yerevan, W Hrazdan, 40°30'N, 44°34'E, 1870 m, meadow, roots of grass and herbs sifted, 25.VI.2016, leg. Assing & Schülke (cAss, MNB); 1 ♂, S Martuni, Sulema Pass, 39°58'N, 45°14'E, 2340 m, slope with small stream and scattered bushes, litter and roots near stream sifted, 29.VI.2016, leg. Assing (cAss); 18 ♂♂, 29 ♀♀, 21 exs., 35 km NW Sisian, 39°41'N, 45°47'E, 2070 m, stream valley, litter beneath bushes near stream sifted 3.VII.2016, leg. Assing & Schülke (cAss, MNB); 1 ♀, WSW Kapan, Meghri Pass, 39°07'N, 46°10'E, 2520 m, moist grassy slope with scattered bushes, litter and grass roots sifted, 6.VII.2016, leg. Assing (cAss); 3 ♂♂, 7 ♀♀ [4 ♀♀ macropterous], 15 exs., Gavar, 40°21'N, 45°08'E, 1950 m, old poplar trees near river, litter and roots of herbs sifted, 25.VI.2017, leg. Assing & Schülke (cAss, MNB); 8 ♂♂, 12 ♀♀, 4 exs., mountain range W Gavar, 40°21'N, 45°01'E, 2330 m, grassy slope, litter and roots sifted,

26.VI.2017, leg. Assing & Schülke (cAss, MNB); 1 ex., mountain range W Gavar, 40°20'N, 44°59'E, 2490 m, grassy slope, litter and roots sifted, 26.VI.2017, leg. Schülke (MNB); 1 ex., mountain range W Gavar, 40°21'N, 45°01'E, 2250 m, grassy slope, tall herbs and roses, roots and debris sifted, 26.VI.2017, leg. Schülke (MNB); 7 ♂♂, 9 ♀♀, 5 exs., Vardenis mountain range SE Vardenis, 40°05'N, 45°49'E, 2330 m, stream valley with *Salix*, litter and roots beneath *Salix* sifted, 27.VI.2017, leg. Assing (cAss); 7 ♂♂, 11 ♀♀, 1 ex., NE Sevan Lake, Karmir pass, 40°34'N, 45°18'E, 2150 m, debris, grass, and roots beneath scattered *Sorbus* sifted, 30.VI.2017, leg. Assing (cAss); 1 ♂, S Martuni, Sulema Pass, 39°58'N, 45°14'E, 2340 m, slope with small stream and scattered bushes, litter and roots near stream sifted, 8.VII.2017, leg. Assing (cAss); 2 ♂♂, 6 ♀♀, 2 exs., 40 km NW Sisian, Vorotan Pass, 39°42'N, 45°41'E, 2090 m, grassy slope with scattered bushes, litter, debris, and moss sifted, 8.VII.2017, leg. Assing (cAss); 1 ♀, pass N Goris, 39°35'N, 46°20'E, 2110 m, grassy slope with stones, under stones, 9.VII.2017, leg. Assing (cAss); 8 ♂♂, 10 ♀♀, pass N Goris, 39°36'N, 46°19'E, 1990 m, N-slope with small stream valleys with water, litter, debris, and moss sifted, 10.VII.2017, leg. Assing (cAss); 3 ♂♂, 4 ♀♀, 10 exs., 40 km NW Sisian, Vorotan Pass, 39°41'N, 45°45'E, 2140 m, stream valley with *Salix*, litter and roots sifted, 10.VII.2017, leg. Assing (cAss).



Map 1: Distribution of *Geostiba sororcula*.

C o m m e n t : *Geostiba sororcula* was originally described based on four specimens from a locality in the south of Gümüşhane province and subsequently recorded also from a locality in Ardahan province, Northeast Turkey (ASSING 2001, 2003). The currently known distribution is illustrated in Map 1. The above material represents the first records from outside Turkey and from Armenia, where the species appears to be rather common at higher elevations. The altitudes of the Armenian localities range from 1870 to 2730 m. The specimens were usually sifted from litter and roots in forest margins, bush habitats (often near streams), floodplain forests, and various types of montane grassland. Interestingly, like *G. circellaris*, *G. sororcula* is wing-dimorphic: four females collected in Gavar are macropterous, whereas the remaining specimens collected by myself are micropterous. Aside from *G. circellaris* and *G. sororcula*, wing dimorphism has been observed in only three other species of the genus, *G. oertzeni* (EPPELSHEIM, 1888), *G. maxiana* (TIKHOMIROVA, 1973), and *G. lucens* (BENICK, 1970) (ASSING 2009, 2015).

Subgenus *Tropogastrosipalia* SCHEERPELTZ, 1951

In the region including the East Mediterranean, the Caucasus region, and Iran *Tropogastrosipalia* is represented by as many as 99 more or less locally endemic species (ASSING 2016a, 2017) and thus by far the most speciose subgenus of *Geostiba*. Remarkably, only one species is known from Armenia.

Geostiba (Tropogastrosipalia) khnzoriani PACE, 1983 (Map 4)

Material examined: Armenia: 1 ex., 20 km SE Goris, Shurnukh, 39°22'N, 46°25'E, 1720 m, *Quercus* and *Carpinus* forest, litter and dead wood sifted, 5.VII.2016, leg. Schülke (MNB); 1 ♂, 1 ♀, 1 ex., same data, but grassland near forest margin, litter beneath bushes sifted, leg. Schülke (MNB); 1 ♂, Goris env., Khndzoresk, old cemetery, 39.50°N, 46.43°E, 1400 m, macchia, sifted, 26.V.2015, leg. Kocian (cKoc); 1 ♂, 1 ♀, 1 ex., 10 km S Kapan, SE Chakaten, 39°08'N, 46°28'E, 990 m, mixed deciduous forest, litter and debris sifted, 9.VII.2016, leg. Assing & Schülke (MNB); 4 ♂ ♂, 5 ♀ ♀, NW Goris, W Verishen, 39°32'N, 46°19'E, 1670 m, margin of oak forest, litter, moss, and roots beneath *Quercus* and *Rosa* sifted, 12.VII.2017, leg. Assing & Schülke (cAss, MNB); 1 ♀, E Goris, Khndzoresk env., 39°32'N, 46°24'E, 1590 m, ruderal grassy slope with rose bushes and *Rubus*, litter and roots sifted, 9.VII.2017, leg. Schülke (MNB).

Comment: The original description is based on five specimens from "Goris" and "Kafan" (PACE 1983). The type material was revised by ASSING (2005). The known records reveal that, compared to most other *Tropogastrosipalia* species, *G. khnzoriani* is relatively widespread, its distribution ranging from the environs of Goris to the mountains south of Kapan (Map 4).

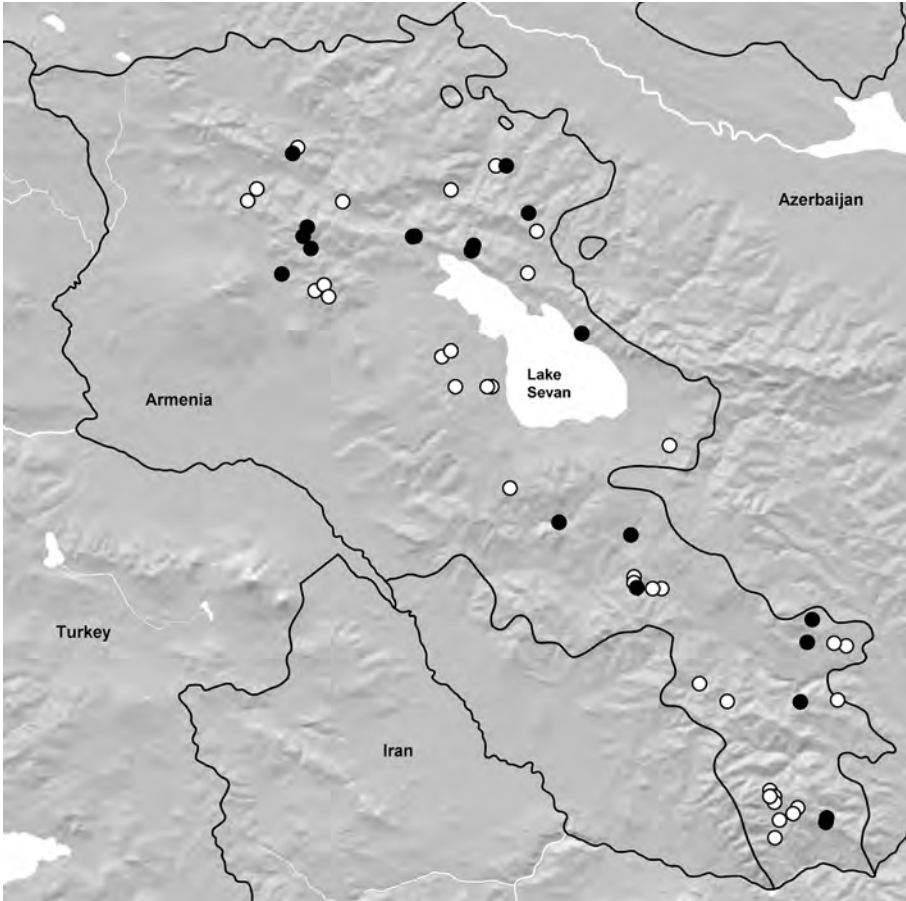
Subgenus *Sibiota* CASEY, 1906 (Map 2)

In Armenia, *Sibiota* is the most speciose staphylinid taxon including exclusively micropterous, microphthalmous, and more or less locally endemic species. Including the species treated below, seven described species and one or two undescribed species are known from Armenian territory at present.

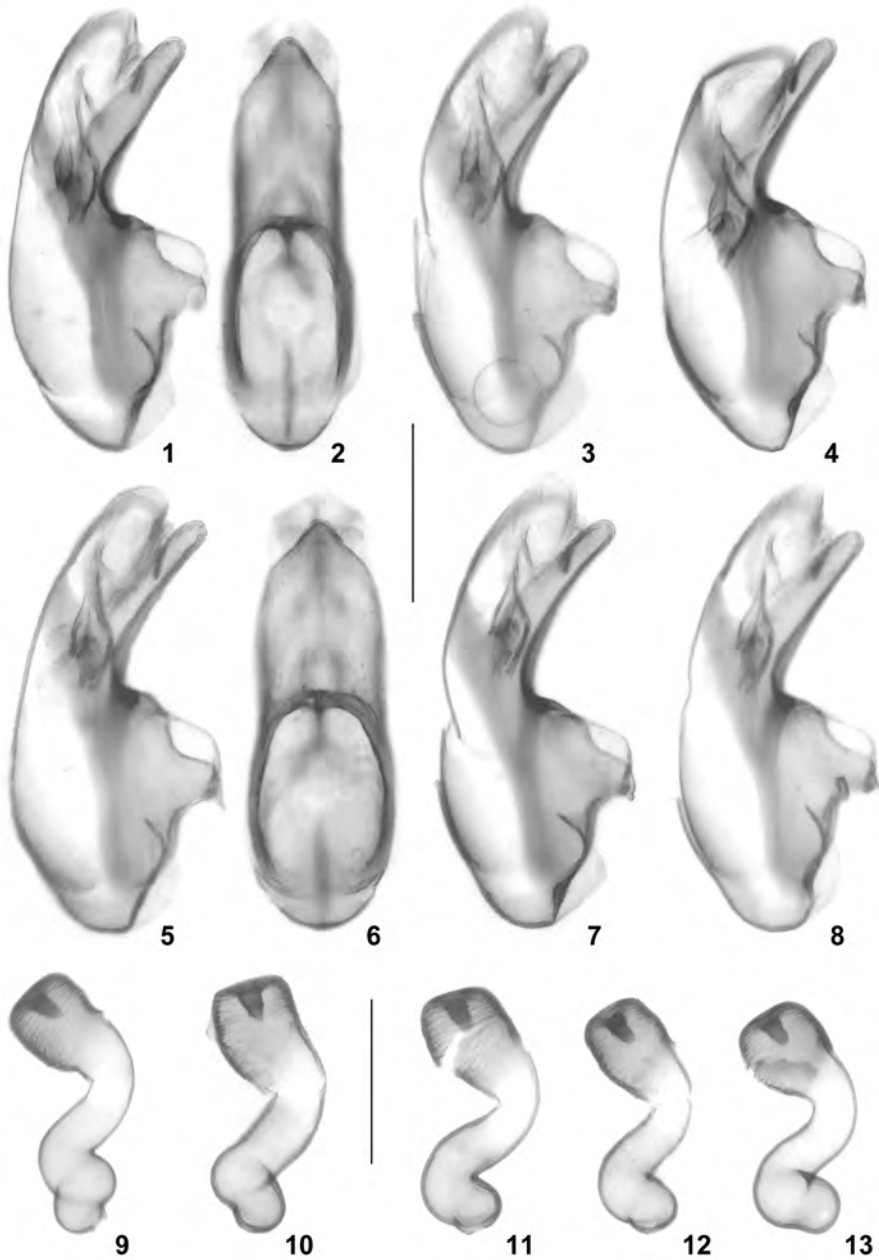
Based on available evidence, the Armenian *Sibiota* species are closely related (ASSING 2016b), and they are inhabitants of the litter layer of montane forest and bush habitats. The altitudes range from 1350 to 2500 m, with the majority of specimens collected between 1700 and approximately 2100 m. *Sibiota* is apparently not evenly distributed in Armenia. Most of the records are from the north and from the southeast, and there are some evident gaps in the region to the west of Sevan lake and in the southwest of Armenia (Map 2). The currently known distribution basically coincides with the regions that have - or had - native forests (GHREJYAN pers. comm.). The distributions of the species from North Armenia largely overlap. However, only on one occasion were two species collected in the same sample plot.

When studying the material available from the field trip in 2016 (ASSING 2016b), a separation and identification of the Armenian *Sibiota* species seemed fairly straightforward. The male secondary sexual characters and the spermatheca appeared to be reliable diagnostic characters. A study of significantly more material collected in numerous additional localities in 2017, however, revealed an enormous extent of intraspecific variation particularly of the male secondary sexual characters, rendering a reliable separation and identification of the species difficult, especially when only few specimens are available. The modifications of the male tergite VII are particularly variable. Not only do they vary

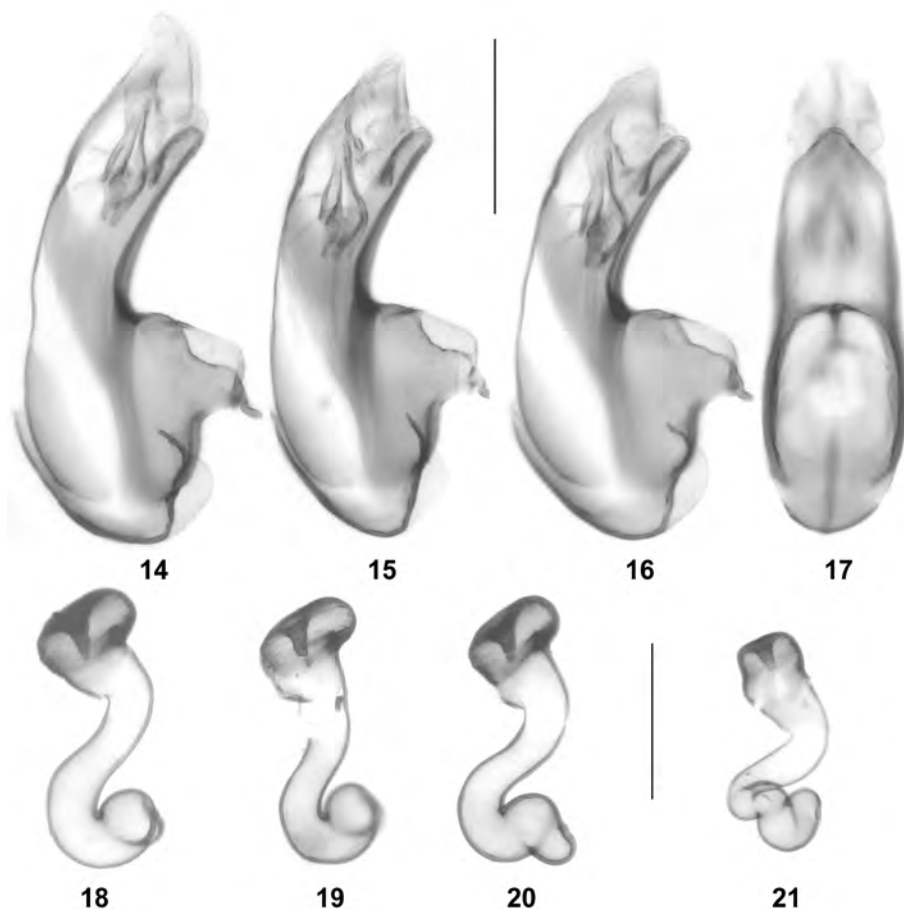
from completely absent (smaller males) to fully pronounced (larger males). In two species (*G. pambakica*, *G. tigrani*), which usually have a pair of carinae on the male tergite VII, these carinae may exceptionally even be completely fused and form a single tubercle similar to the typical condition in other species. Due to enormous intraspecific variability and at the same time considerable interspecific overlap, the modifications of the male elytra are unsuitable for diagnostic purposes. A reliable identification is further impeded by the uniformity and consequently low interspecific variation of the shape of the median lobe of the aedeagus. The only character that seems to be subject to distinct inter- and at the same time little intraspecific variation is the shape of the spermatheca.



Map 2: Distribution of *Sibiotia* species in Armenia (black circles). Sampled localities with suitable habitats where no *Sibiotia* was found are shown as white circles.



Figs 1-13: *Geostiba pambakica* from road Berd – Ijevan (1-2, 9-10) and from pass road E Ijevan (3-8, 11-13; 8: male with single median tubercle on tergite VII): (1-8) median lobe of aedeagus in lateral and in ventral view; (9-13) spermatheca. Scale bars: 0.1 mm.



Figs 14-21: *Geostiba unituber* from Pushkin pass (14-20) and *G. sp.* from Vorotan pass (21): (14-17) median lobe of aedeagus in lateral and in ventral view; (18-21) spermatheca. Scale bars: 0.1 mm.

***Geostiba (Sibiota) pambakica* ASSING, 2016** (Figs 1-13, Map 3)

Material examined: Armenia: 2♂♂ [both with single median tubercle on tergite VII], 4♀♀, road Berd – Ijevan, 40°52'N, 45°18'E, 1350 m, beech forest margin, litter and roots sifted, 30.VI.2017, leg. Assing & Schülke (cAss); 16♂♂ [one of them with single median tubercle on tergite VII], 23♀♀, pass road E Ijevan, 40°52'N, 45°13'E, 1790 m, forest with old *Quercus* and *Carpinus*, litter and roots sifted, 6.VII.2017, leg. Assing & Schülke (cAss, MNB).

Comment: The previously known distribution of *G. pambakica* was confined to three geographically close localities in the Pambaki range. The new records show that the species is distributed northeastwards to the mountains east of Ijevan (Map 3).

An examination of the material listed above revealed a remarkable intraspecific variation of the male secondary sexual characters. The pair of carinae on the male tergite VII may be completely obsolete (in small males), more or less pronounced and separated (most males), more or less distinctly connected posteriorly by a transverse bridge, or (both

males from the former and one from the latter of the above localities) even be completely fused and form a single tubercle (similar to the condition in males of *G. unituber*). Such extreme variation was not observed in the type material. The specimens from the mountains to the east of Ijevan are additionally distinguished from those from the Pambaki range by slightly larger average size, slightly darker coloration, and on average more pronounced sutural carinae on the male elytra. However, significant differences in the primary sexual characters (Figs 1-13) were not observed, suggesting that the – geographically rather distant – populations from the environs of Ijevan and from the Pambaki range are conspecific.

***Geostiba (Sibiota) unituber* ASSING, 2016** (Figs 14-20, Map 4)

Material examined: Armenia: 6♂♂, 9♀♀, N Vanadzor, S Pushkin pass, 40°54'N, 44°26'E, 1780 m, forest margin with *Quercus*, *Fagus*, *Sorbus*, etc., litter and roots near small stream sifted, 1.VII.2017, leg. Assing & Schülke (cAss, MNB); 1♂, N Vanadzor, S Pushkin pass, 40°54'N, 44°26'E, 1850 m, forest with *Quercus*, *Fagus*, *Sorbus*, etc., litter and roots sifted, 1.VII.2017, leg. Schülke (MNB); 2♂♂, 4♀♀, E Dilijan, road Tutjur - Berd 40°44'N, 45°18'E, 1930 m, slope with beech and bushes, litter, roots, and mushrooms sifted, 30.VI.2017, leg. Schülke (MNB, cAss).

Comment: This recently described species was previously known only from the type locality in the Pambaki range. The new records above reveal that *G. unituber* is also present in the Bazumi range to the north of the Pambaki range and in the mountains to the east of Dilijan (Map 4). In the latter locality, *G. unituber* was found together with *G. tigrani*. The primary sexual characters of the material from Pushkin pass are illustrated in Figs 14-20.

***Geostiba (Sibiota) unicumneata* ASSING, 2016** (Map 3)

Material examined: Armenia: 1♂, 1♀, pass N Goris, 39°36'N, 46°19'E, 1990 m, N-slope with small stream valleys with water, litter, debris, and moss sifted, 10.VII.2017, leg. Assing (cAss); 1♀, same data, but 9.VII.2017, leg. Schülke (MNB); 12♂♂, 20♀♀ [partly teneral], NW Goris, W Verishen, 39°32'N, 46°19'E, 1670 m, margin of oak forest, litter, moss, and roots beneath *Quercus* and *Rosa* sifted, 12.VII.2017, leg. Assing & Schülke (cAss, MNB).

Comment: The original description of *G. unicumneata* is based on material from the environs of Jermuk. The above records suggest that the species is widespread in the Qarabag range (Map 3). Some of the specimens are teneral.

***Geostiba (Sibiota) tigrani* nov.sp.** (Figs 22-38, Map 3)

Type material: Holotype ♂: "ARMENIA [10] – Sevani range E Sevan lake, 40°23'51"N, 45°29'53"E, 2025 m, oak forest, 28.VI.2017, V. Assing / Holotypus ♂ *Geostiba tigrani* sp. n. det. V. Assing 2017" (cAss). **Paratypes:** 13♂♂, 23♀♀: same data as holotype (cAss, MNB); 11♂♂, 2♀♀: same data as holotype, but leg. Schülke (MNB); 11♂♂, 14♀♀: "ARMENIA [11] – SSE Dilijan, Semyonovka, 40°40'09"N, 44°52'35"E, 2050 m, *Sorbus* forest, 29.VI.2017, V. Assing" (cAss, MNB); 4♂♂, 3♀♀: same data, but leg. Schülke (MNB); 6♂♂, 3♀♀: "ARMENIA [12] – SSE Dilijan, Semyonovka, 40°40'12"N, 44°53'05"E, 1900 m, stream valley, 29.VI.2017, V. Assing" (cAss); 1♀: same data, but leg. Schülke (MNB); 1♂, 2♀♀: "ARMENIA [17] – E Dilijan, road Tutjur-Berd 40°44'04"N, 45°18'10"E, 1930 m, trees & bushes, 30.VI.2017, V. Assing" (cAss); 5♂♂, 4♀♀: "ARMENIA [28] – WSW Dilijan, Kalavan, 40°37'52"N, 45°05'46"E, 1960 m, forest, sifted, 5.VII.2017, V. Assing" (cAss, MNB); 3♂♂, 3♀♀: same data, but leg. Schülke (MNB); 4♂♂, 11♀♀: "ARMENIA [29] – WSW Dilijan, Kalavan, 40°37'45"N, 45°05'31"E, 2100 m, forest, sifted, 5.VII.2017, V. Assing" (cAss, MNB); 1♀: same data, but leg. Schülke (MNB).

E t y m o l o g y : This species is dedicated to Tigran Ghrejyan, PhD student at the Zoological Institute in Yerevan, an excellent and entertaining field guide in summer 2017. His expertise and guidance significantly contributed to the collecting results of this field trip.

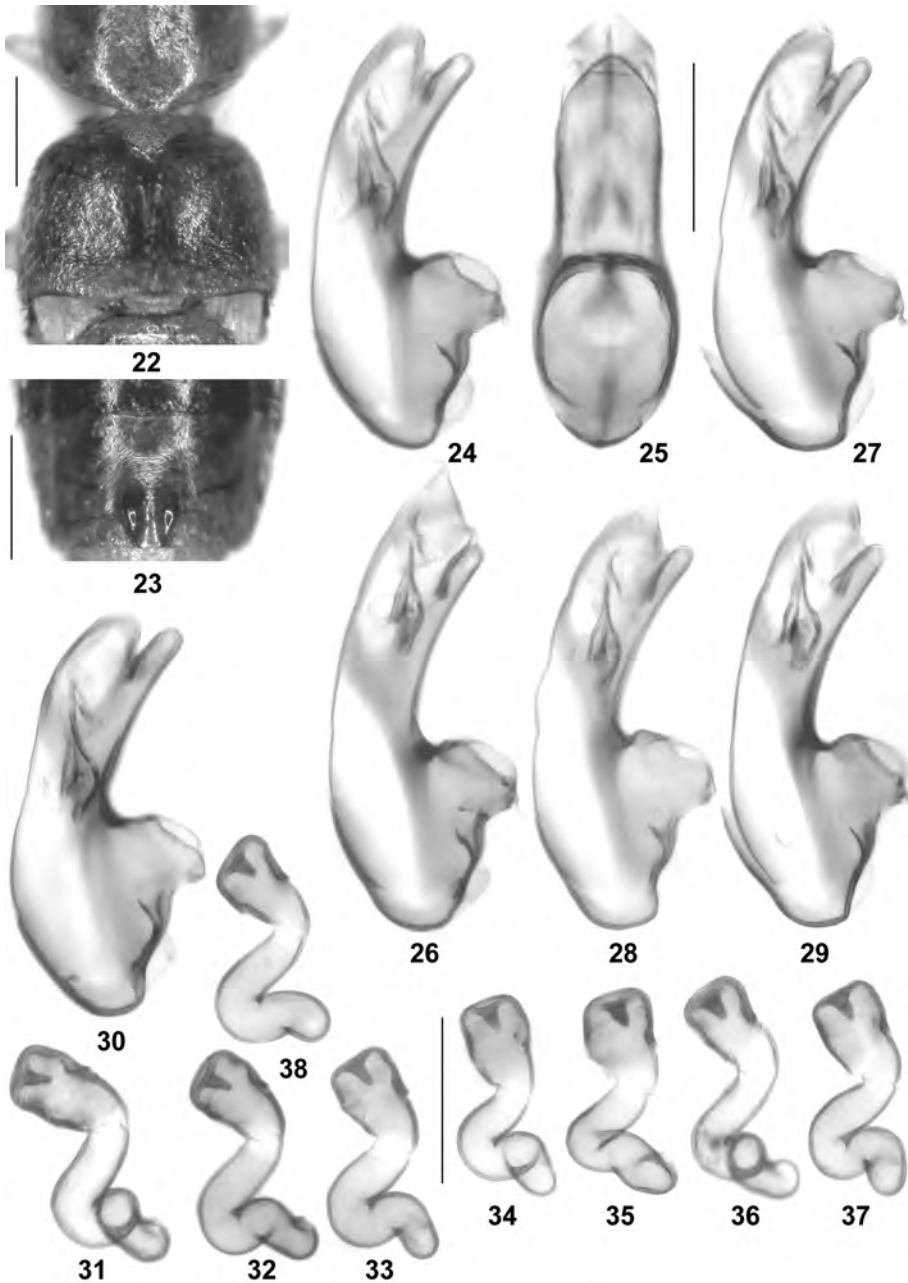
D e s c r i p t i o n : Body length 1.9-2.7 mm; length of forebody 0.8-1.2 mm. Coloration: body dark-yellowish to reddish-brown, with the head and the preapical abdominal segments often slightly darker. Eyes small, larger than antennomere III in cross-section, with pigmentation, and composed of approximately 6-10 ommatidia. Pronotum with or without a shallow longitudinal impression on either side of midline. Hind wings completely reduced.

♂: elytra (Fig. 22) with pronounced, narrow, anteriorly slightly broader carina extending along whole suture, disc with usually extensive and more or less pronounced impression, punctation very fine, non-granulose; abdominal tergite VII (Fig. 23) with a pair of pronounced, rather broad, smooth, and strongly elevated carinae posteriorly; posterior margin of tergite VIII variably shaped, broadly convex to obtusely pointed in the middle; sternite VIII broadly convex; median lobe of aedeagus (Figs 24-30) 0.24-0.25 mm long, without distinct semi-transparent spines in internal sac; ventral process weakly curved in lateral view; paramere not distinctive.

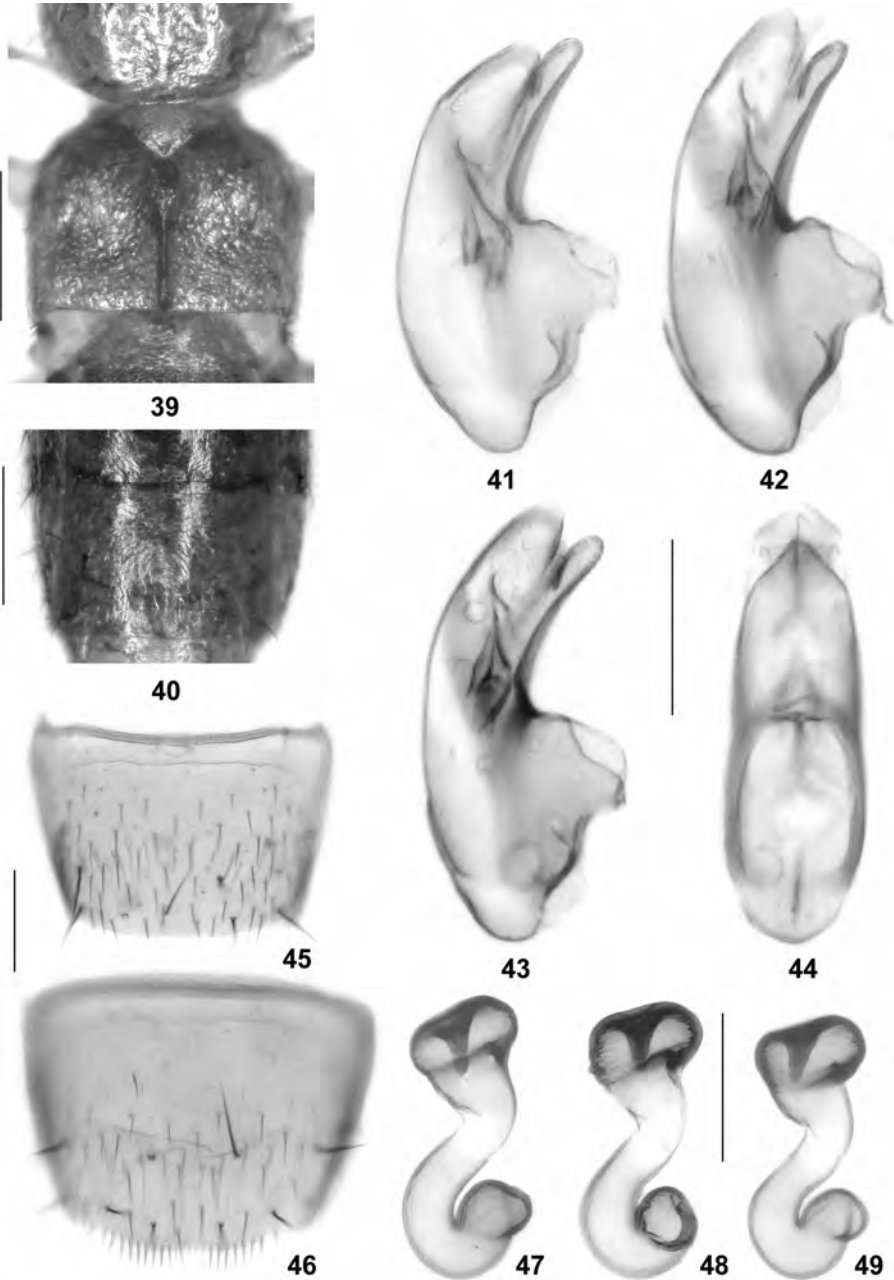
♀: elytra and abdominal tergite VII without modifications; tergite VIII shaped as in male; posterior margin of sternite VIII convex, in the middle usually very shallowly concave; spermathecal capsule (Figs 31-38) with undilated distal portion and moderately long proximal portion.

I n t r a s p e c i f i c v a r i a t i o n : The male secondary sexual characters may be reduced to various degrees in small males. In males at the very low end of the size variation, the pair of carinae on tergite VII is completely obsolete and the elytral carinae are very weakly pronounced. Remarkably, tergite VII of one male from Semyonovka has a single tubercle instead of a pair of carinae. The aedeagus of this specimen (Fig. 28), however, is identical to those of other males of *G. tigrani*, suggesting that they are conspecific. This conclusion is supported by an examination of the spermathecae of syntopic females, which are identical to those of *G. tigrani* from the type locality. This is yet another example of the variability of the modifications of the male tergite VII in Armenian *Sibiota* species (see also the comment in the section on *G. pambakica*).

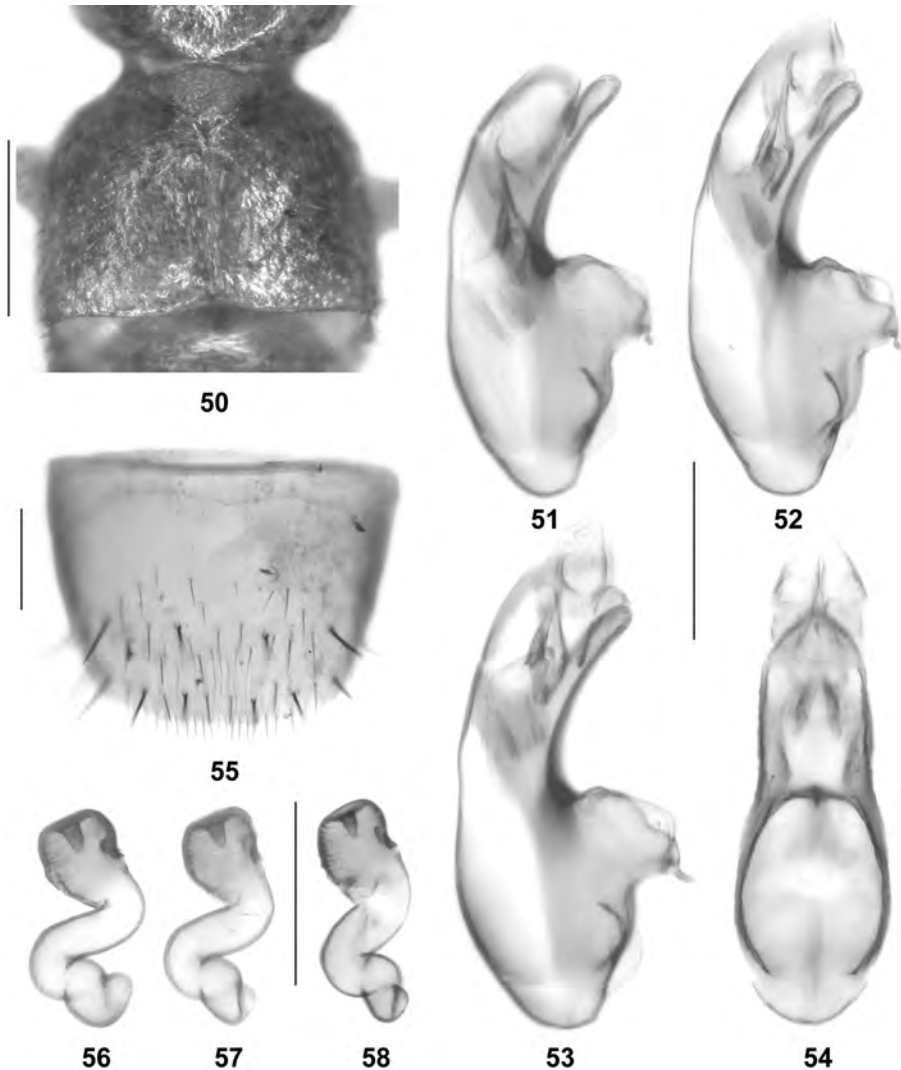
C o m p a r a t i v e n o t e s : Only two *Sibiota* species with a pair of carinae on the male tergite VII were previously known from Armenia, *G. pambakica* ASSING, 2016 from North Armenia and *G. meghruica* ASSING, 2016 from South Armenia. The new species is distinguished from both by darker average coloration and the shape of the spermatheca, from *G. pambakica* additionally by larger eyes with more ommatidia (*G. pambakica*: eyes smaller and composed of approximately five ommatidia), larger average size, less sharp sutural carinae on the male elytra, more pronounced carinae on the male tergite VII, and a slightly larger aedeagus, and from *G. meghruica* by more pronounced sutural carinae and a slightly smaller aedeagus. For illustrations of *G. pambakica* and *G. meghruica* see Figs 1-13 and ASSING (2016).



Figs 22-38: *Geostiba tigrani* from the type locality (22-26, 31-33), Semyonovka (27-28, 34-35; 28: male with median tubercle on tergite VII), E Dilijan (29, 36), and Kalavan (30, 37-38): (22) male elytra; (23) male tergite VII; (24-30) median lobe of aedeagus in lateral and in ventral view; (31-38) spermatheca. Scale bars: 22-23: 0.2 mm; 24-38: 0.1 mm.



Figs 39-49: *Geostiba kalavanica*: (39) male elytra; (40) male tergite VII; (41-44) median lobe of aedeagus in lateral and in ventral view; (45) female tergite VIII; (46) female sternite VIII; (47-49) spermatheca. Scale bars: 39-40: 0.2 mm; 41-49: 0.1 mm.



Figs 50-58: *Geostiba immutata*: (50) male elytra; (51-54) median lobe of aedeagus in lateral and in ventral view; (55) female sternite VIII; (56-58) spermatheca. Scale bars: 50: 0.2 mm; 51-58: 0.1 mm.

Distribution and natural history: The currently known records suggest that *G. tigrani* is distributed in the mountain ranges to the north and northwest of Sevan lake (Map 3). The specimens were sifted from litter and roots in forests or forest margins with dominant oak, whitebeam, hornbeam, beech, and/or birch at altitudes of 1900-2100 m. In one locality to the east of Dilijan (sample locality 17), the species was collected together with *S. unituber*.

***Geostiba (Sibiota) kalavanica* nov.sp.** (Figs 39-49, Map 4)

Type material: Holotype ♂: "ARMENIA [13] – WSW Dilijan, Kalavan, 40°38'40"N, 45°06'04"E, 1700 m, oak forest, 29.VI.2017, V. Assing / Holotypus ♂ *Geostiba kalavanica* sp. n. det. V. Assing 2017" (cAss). Paratypes: 4♂♂, 8♀♀: same data as holotype (cAss).

Etymology: The specific epithet is derived from the name of the mountain where this species was discovered.

Description: Body length 1.9-2.4 mm; length of forebody 0.85-1.00 mm. Coloration: body dark-yellowish to pale-reddish. Eyes small, with pigmentation, and composed of approximately five ommatidia. Pronotum with a shallow longitudinal impression on either side of midline. Hind wings completely reduced.

♂: elytra (Fig. 39) with pronounced, narrow, anteriorly slightly broader and posteriorly sharply edged carina extending along whole suture, disc with usually extensive and more or less pronounced impression; abdominal tergite VII (Fig. 40) with a pair of moderately pronounced carinae posteriorly; posterior margins of tergite and sternite VIII broadly and weakly convex; median lobe of aedeagus (Figs 41-44) 0.24 mm long, without distinct semi-transparent spines in internal sac; ventral process weakly curved in lateral view; paramere not distinctive.

♀: elytra and abdominal tergite VII without modifications; tergite VIII (Fig. 45) shaped as in male; posterior margin of sternite VIII (Fig. 46) convex, in the middle usually very shallowly concave; spermathecal capsule (Figs 47-49) with strongly dilated distal portion and short proximal portion.

Intraspecific variation: As in *G. tigrani*, the male secondary sexual characters may be reduced to various degrees in smaller males.

Comparative notes: In external characters (coloration, body size, eye size, etc.), including the male secondary sexual characters, *G. kalavanica* is highly similar to *G. pambakica*. It is distinguished from this species above all by the strongly dilated distal portion of the spermatheca. Regarding the shape of the spermatheca, *G. kalavanica* is most similar to *G. unituber*, from which it differs by the different modifications of the male tergite VII, a slightly different shape of the median lobe of the aedeagus (lateral view), and a slightly shorter proximal portion of the spermatheca.

Distribution and natural history: The type locality is situated near Kalavan village in Kalavan mountain, to the north of the northwestern tip of Sevan lake (Map 4). The specimens were sifted from litter and roots on a calcareous south slope with oak forest at an altitude of 1700 m. The head of one of the males from the type locality is infested with Laboulbeniales.

***Geostiba (Sibiota) immutata* nov.sp.** (Figs 50-58, Map 3)

Type material: Holotype ♂: "ARMENIA [49b] – SW Goris, ESE Tatev, 39°21'47"N, 46°16'52"E, 1950 m, forest margin, 14.VII.2017, V. Assing / Holotypus ♂ *Geostiba immutata* sp. n. det. V. Assing 2017" (cAss). Paratypes: 2♂♂, 5♀♀: same data as holotype (cAss); 9♀♀: "ARMENIA [49] – SW Goris, ESE Tatev, 39°21'47"N, 46°16'52"E 1950 m, forest margin, 13.VII.2017, V. Assing" (cAss); 1♀: same data, but leg. Schülke (MNB).

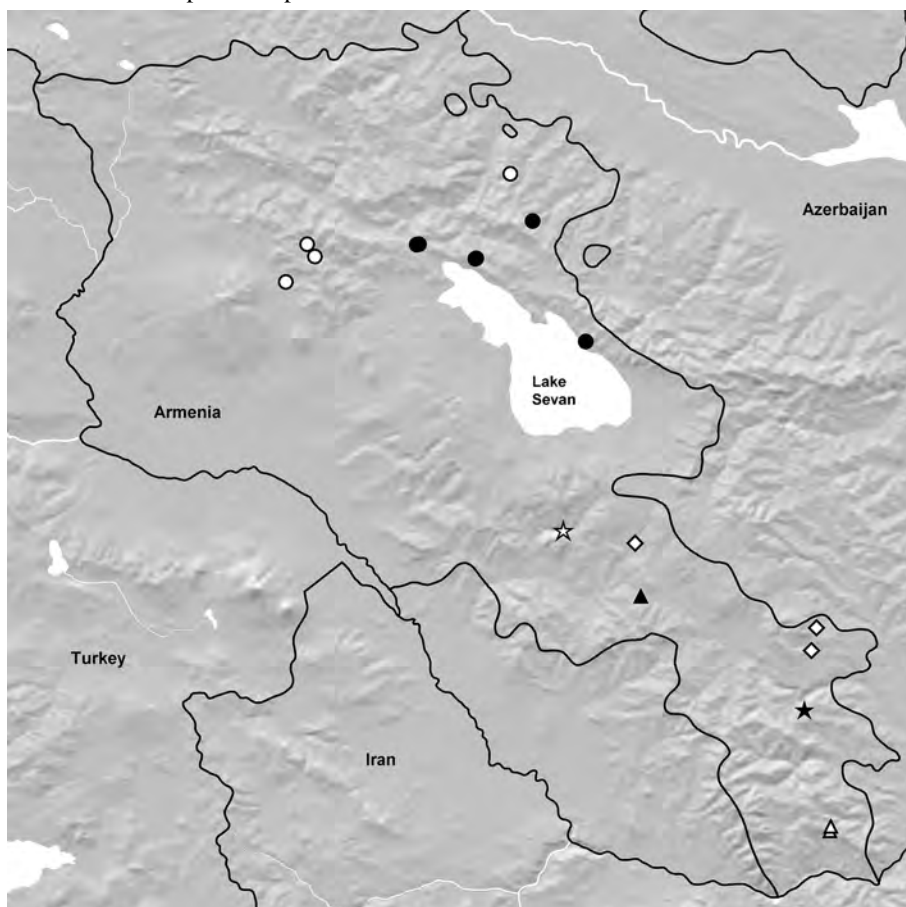
Etymology: The specific epithet (Latin, adjective: unmodified) alludes to the absence of carinae or tubercles on the male sternite VII.

Description: Body length 2.0-2.7 mm; length of forebody 0.9-1.0 mm. Colora-

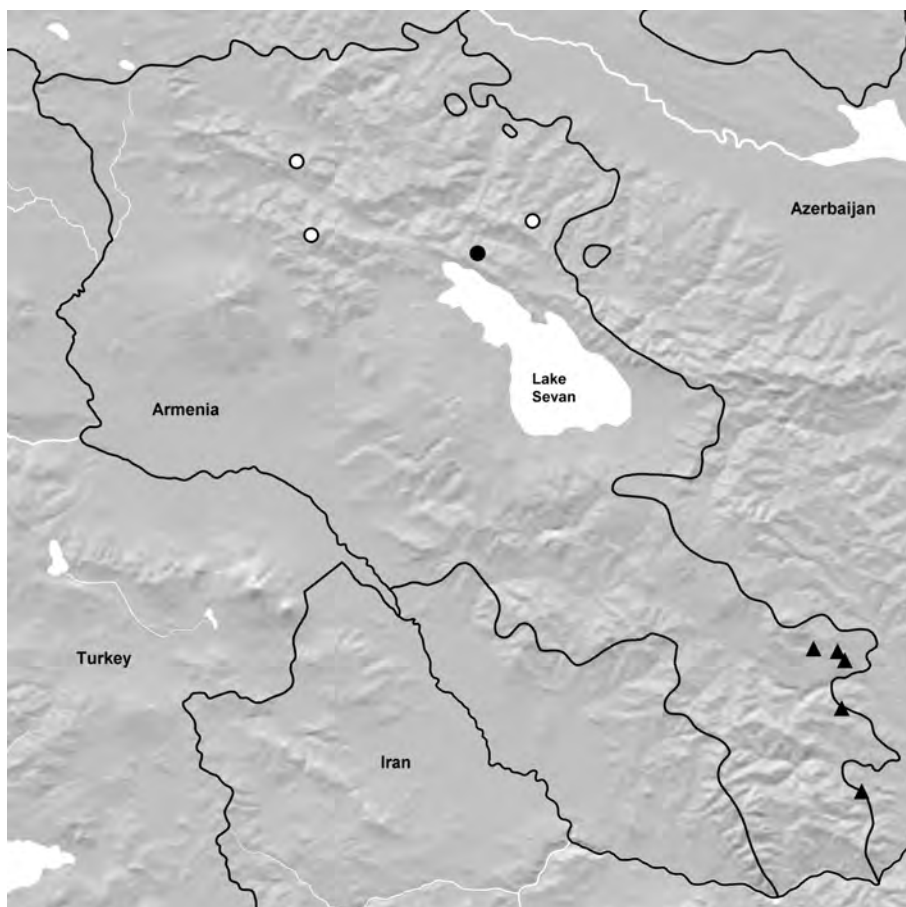
tion: body yellowish-brown to pale reddish-brown. Eyes small, with pigmentation, and composed of approximately five ommatidia. Pronotum without longitudinal impression on either side of midline. Hind wings completely reduced.

♂: elytra (Fig. 50) without sutural carina, with or without some granules along suture; abdominal tergite VII without modifications; posterior margins of tergite and sternite VIII broadly and weakly convex; median lobe of aedeagus (Figs 51-54) 0.24-0.25 mm long, without distinct semi-transparent spines in internal sac; ventral process weakly curved in lateral view; paramere not distinctive.

♀: elytra without modifications; tergite VIII shaped as in male; posterior margin of sternite VIII (Fig. 55) broadly and weakly convex, in the middle usually truncate to very shallowly concave; spermathecal capsule (Figs 56-58) with undilated distal portion and short and twisted proximal portion.



Map 3: Distribution of *Sibiotia* species in Armenia: *G. pambakica* (white circles); *G. tigrani* (black circles); *G. unicumata* (white diamonds), *G. immutata* (black star), *G. meghruica* (white triangles); *G. sp. 1* (black triangle); *G. sp. 2* (white star).



Map 4: Distribution of *Sibiota* and *Tropogastrosipalia* species in Armenia: *G. unituber* (white circles); *G. kalavanica* (black circle); *G. khzoriani* (black triangles).

Comment: The elytra are modified (with granules near suture) only in one of the three males. Since only three males are available, the possibility that there may be males with more pronounced elytral modifications, possibly even with modifications on the abdominal tergite VII, cannot be ruled out.

Based on the similar primary sexual characters, *G. immutata* is clearly closely allied to the other Armenian *Sibiota* species, suggesting that the absence of carinae or tubercles on the male tergite VII is a secondary reduction. Consequently, the species is attributed to the subgenus *Sibiota* and not to *Sipalotricha* SCHEERPELTZ, 1931.

Comparative notes: *Geostiba immutata* is readily distinguished from other Armenian *Sibiota* species by the absence of sutural carinae on the male elytra, by the unmodified male tergite VII, and by the shape of the spermatheca.

Distribution and natural history: The type locality is situated in the northeastern part of the Barkushati range, to the southeast of Tatev and approxi-

mately 18 km south of Goris (Map 3). The specimens were sifted from litter and roots in a deciduous forest composed of oak, hornbeam, and maple at an altitude of 1950 m.

Geostiba (Sibiota) sp. 1 (Fig. 21, Map 3)

M a t e r i a l e x a m i n e d : Armenia: 3 ♀ ♀, Vorotan pass, 39.6865°N, 45.6933°E, 2160 m, grass and plant litter sifted, 27.V.2015, leg. Kocian (cKoc, cAss).

C o m m e n t : Based on the shape of the spermatheca (Fig. 21), the above females represent an undescribed species, which remains undescribed for want of males. The locality is illustrated in Map 3.

Geostiba (Sibiota) sp. 2 (Map 3)

M a t e r i a l e x a m i n e d : Armenia: 1 ♀, Yeghegis env., 39.871°N, 45.412°E, 1700 m, deciduous forest, sifted, 20.V.2015, leg. Kocian (cKoc).

C o m m e n t : The above female may represent yet another undescribed species. Additional material, in particular males, would be needed to ascertain its identity. The locality is illustrated in Map 3.

Key to the *Geostiba* species of Armenia

Owing to the generally weakly pronounced interspecific variation of external characters, the following key mainly relies on the primary and male secondary sexual characters, as well as on zoogeographic information. Two species with highly variable male secondary sexual characters key out in more than one couplet. A reliable identification may not always be possible when only one sex is available. Note that the male secondary sexual characters may be weakly pronounced or even obsolete in small males. The unidentified species are omitted from the key.

1. Body of darker coloration, reddish-brown to blackish-brown. Eyes of moderate size, composed of > 20 ommatidia. Male elytra either with short sutural carinae anteriorly or without sutural carinae, in the latter case with a subcircular elevation with coarse granules on either side of suture anteriorly..... 2
- Body of paler coloration, yellow to yellowish-brown. Eyes reduced to small rudiments and composed of 5-10 ommatidia. Male elytra with sutural carina extending along whole length of suture or with granules along whole suture. Subgenus *Sibiota*3
2. Wing-dimorphic species (macropterous morph rare). Posterior margin of tergite VII with palisade fringe. Elytra longer, at least approximately 0.7 times as long as pronotum. Male pronotum not elongated posteriorly and with convex posterior margin. Male elytra with a subcircular elevation with coarse granules on either side of suture near scutellum. Male tergite VII with smooth median tubercle at posterior margin. Median lobe of aedeagus shaped as in ASSING (2001: figures 5-6), without cristal process. Spermatheca as in ASSING (2001: figure 8). Subgenus *Geostiba*. Widespread in Armenia and Northeast Turkey (Map 1) *sororcula*
- Micropterous species. Posterior margin of tergite VII without palisade fringe. Elytra shorter, 0.50-0.55 times as long as pronotum. Male pronotum elongated posteriorly, posterior margin concave in the middle. Male elytra with short sutural carinae near scutellum. Male tergite VII with obliquely erect spine-shaped median process at posterior margin (ASSING 2005: figures 72-73). Median lobe with spine-shaped cristal process (PACE 1983: figures 6-7). Subgenus *Tropogastrosipalia*. Distribution confined to South Armenia (Map 4)..... *khnzoriani*

3. Male tergite VII unmodified; male elytra with granules along suture, but without distinct sutural carinae. Median lobe of aedeagus and spermatheca as in Figs 51-54, 56-58. South Armenia: Barkushati range (Map 3)..... *immutata*
 - Male tergite VII with median pair of carinae or with median tubercle near posterior margin; male elytra with pronounced sutural carinae extending from apex of scutellum to posterior margin 4
4. Male tergite VII with one median tubercle or elevation posteriorly 5
 - Male tergite VII with median pair of parallel or posteriorly converging carinae posteriorly 8
5. Elevation on male tergite VII sharply keeled dorsally (ASSING 2016b: figures 65-66). Median lobe of aedeagus and spermatheca as in ASSING (2016b: figures 67-70). South Armenia: Qarabag range (Map 3)..... *unicuneata*
 - Tubercle on male tergite VII of subquadrate, subquadrangular, or oval shape. North Armenia. 6
6. Spermatheca with strongly dilated distal portion (Figs 18-20; ASSING 2016b: figures 39-40). Median lobe of aedeagus as in Figs 14-17 and ASSING (2016b: figures 36-38). Pambaki and Bazumi ranges; mountains east of Dilijan (Map 4)..... *unituber*
 - Distal portion of spermatheca weakly dilated at most. Species with the usual pair of carinae on the male tergite VII exceptionally fused to form a single tubercle 7
7. Spermatheca with longer proximal portion (Figs 31-38. Median lobe of aedeagus as in Figs 24-30. Mountains to the north of Sevan lake (Map 3) *tigrani*
 - Spermatheca with shorter proximal portion (Figs 9-13 and ASSING 2016b: figures 50-52). Median lobe of aedeagus as in Figs 1-8 and ASSING (2016b: figures 45-49). Widespread from the Pambaki range to the mountains east of Ijevan (Map 3) ... *pambakica*
8. Median lobe of aedeagus larger, 0.28-0.30 mm long (ASSING 2016b: figures 56-59). Spermatheca as in ASSING (2016b: figures 60-61). South Armenia: Meghru range. (Map 3)..... *meghruica*
 - Median lobe of aedeagus smaller, 0.25 mm long at most. Spermatheca of different shape. North Armenia. 9
9. Spermatheca with strongly dilated distal portion (Figs 56-58). Median lobe of aedeagus as in Figs 51-54. Kalavan mountain to the north of the northwestern tip of Sevan lake (Map 4)..... *kalavanica*
 - Distal portion of spermatheca weakly dilated at most. 10
10. Spermatheca with longer proximal portion (Figs 31-38). Median lobe of aedeagus as in Figs 24-30. Mountains to the north of Sevan lake (Map 3) *tigrani*
 - Spermatheca with shorter proximal portion (Figs 9-13 and ASSING 2016b: figures 50-52). Median lobe of aedeagus as in Figs 1-8 and ASSING (2016b: figures 45-49). Widespread from the Pambaki range to the mountains east of Ijevan (Map 3) *pambakica*

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Zusammenfassung

Drei mikrophthalme Arten des Subgenus *Sibiota* CASEY, 1906, Gattung *Geostiba* THOMSON, 1858, aus Armenien werden beschrieben und abgebildet: *Geostiba (Sibiota) tigrani* nov.sp. (Nordarmenien: Berge nördlich des Sevansees); *G. (S.) kalavanica* nov.sp. (Nordarmenien: Kalavan nördlich

des nordwestlichen Ufers des Sevansees); *G. (S.) immutata* nov.sp. (Südarmenien: Barkushati-Gebirge). *Geostiba (Geostiba) sororcula* ASSING, 2001, eine zuvor nur aus der nordöstlichen Türkei bekannte Art, wird erstmals aus Armenien nachgewiesen. Wie die nahverwandte und weit verbreitete Schwesterart *G. circellaris* (GRAVENHORST, 1806) ist *G. sororcula* flügeldimorph. Gegenwärtig ist *Geostiba* in Armenien mit mindestens zehn Arten aus drei Untergattungen vertreten. Sieben beschriebene sowie ein oder zwei unbeschriebene Arten, alle mikrophthalm, mikropter und mehr oder weniger lokalendemisch verbreitet, gehören zur Untergattung *Sibiota*; sie zeichnen sich darüber hinaus durch bemerkenswert variable männliche sekundäre Sexualmerkmale aus. Eine Bestimmungstabelle der armenischen *Geostiba*-Arten wird erstellt. Die Verbreitung der einzelnen Arten und die Gesamtverbreitung der Untergattung *Sibiota* in Armenien werden anhand von Karten illustriert.

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