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# A revision of the Turkish species of *Geostiba* THOMSON 1858 and Tropimenelytron PACE 1983 (Coleoptera: Staphylinidae, Aleocharinae)

#### V. ASSING

A b s t r a c t : Based on an examination of types and non-type material, the Turkish species of the genus Geostiba are revised. In all, 31 species are recognized and attributed to the subgenera Geostiba s. str. (17 species, including one species dubia), Ditroposipalia SCHEERPELTZ (6 species), and Sipalotricha SCHEERPELTZ (6 species). Two taxa with fused fourth and fifth mesotarsomeres are regarded as species incertae sedis; their phylogenetic affiliations to Paraleptusa PEYERIMHOFF are discussed. Based on a study of morphological characters and on phylogenetic arguments, the subgenus Geostiba s. str. is hypothesized to represent a polyphyletic taxon. 11 new species are described, illustrated, and distinguished from related congeners: Geostiba confusa sp. n., G. (s. str.) sororcula sp. n., G. (s. str.) akceliensis sp. n., G. (s. str.) artvinensis sp. n., G. (s. str.) granulipennis sp. n., G. (s. str.) balkarensis sp. n., G. (s. str.) bilisensis sp. n., G. (s. str.) lunata sp. n., G. (Ditroposipalia) fabaeformis sp. n., G. (Sipalotricha) emirdaghensis sp. n., and G. (S.) itschiliensis sp. n. The remaining species are redescribed, except for some recently revised representatives of Geostiba s. str.; the male of G. medea PACE and the female of G. rizensis PACE are described for the first time. The following synonymies and new combination are established: Geostiba helvetiorum PACE 1983 = G. helvetiorum humicola PACE 1983, syn. n., = G. helvetiorum obscura PACE 1983, syn. n.; G. uhligi PACE 1983 = G. mysia PACE 1983, syn. n.; G. besuchetiana PACE 1983 = G. taurica PACE 1996, syn. n.; G. lucens (BENICK, 1970), comb. n. (transferred from Ousipalia DES GOZIS) = Atheta (Microdota) glaberima BENICK, 1981, syn. n. Geostiba lucens, the third example of wing dimorphism in the genus, and G. circellaris (GRAVENHORST, 1806) are recorded from Turkey for the first time. The (re-)descriptions are supplemented by systematic, bionomic, and biogeographic notes. The distributions of G. oertzeni (EPPELSHEIM), G. uhligi PACE, G. besuchetiana PACE, and G. lucens (BENICK) are mapped. A diagnostic key to the Turkish representatives of Geostiba is provided. Tropimenelytron tuberiventris (EPPELSHEIM) is for the first time recorded from Turkey.

K e y w o r d s : Coleoptera, Staphylinidae, Aleocharinae, *Geostiba, Paraleptusa, Ousipalia, Tropimenelytron,* Palaearctic region, Turkey, taxonomy, revision, new species, new synonyms, new combination, key to species.

#### 1. Introduction

The genus *Geostiba* THOMSON apparently has a Holarctic distribution. Almost all the species described from other biogeographical regions were later moved out of the genus. The few species described from regions outside the Holarctic that have remained in the genus have not been re-examined; it seems most likely that they, too, refer to other genera. Today, *Geostiba* includes approximately 320 valid species, subspecies not consi-

dered. The vast majority of them occur in the Western Palaearctic region, only few species are known from the Eastern Palaearctic and the Nearctic region.

There are various reasons for the current state of taxonomic and systematic confusion in the genus. As stated above, species diversity is considerable. On the other hand, character divergence is generally poor, so that a distinction of species is difficult and usually requires an examination of the genitalia, especially those of the males. A further problem is our unsatisfactory knowledge of the biogeography of the genus. Most species can be assumed to be more or less endemic, but many of them have been recorded only once or very rarely, so that their areas of distribution are poorly known. Finally, the subgeneric concept proposed by SCHEERPELTZ (1951), up to the present the only attempt at clarifying the systematics of the genus, is merely based on typological principles and consequently bound to result in para- and polyphyletic taxa.

Nevertheless, almost all *Geostiba* species have been additively described, an unfortunate, but long-standing tradition that has persisted up to the present. Moreover, many species were described without an examination of the genitalia. As a consequence, an identification of *Geostiba* is often problematic without examining a considerable number of types; an interpretation of those species whose original descriptions are based exclusively on females is often virtually impossible, unless males from the type locality are available. Moreover, this tradition has resulted in a considerable number of synonymies, which is particularly the case for species that have proved to be more widespread than previously believed. The wing-dimorphic *G. oertzeni* (EPPELSHEIM), for instance, was only recently found to have 13 synonyms (ASSING 1999, 2000a), and there may be more in store.

In the Western Palaearctic, comprehensive studies of the *Geostiba* fauna exist only for the Madeiran archipelago and Greece (see ASSING 1999, 2000a, and references therein). Apart from the subgenus *Geostiba* s. str., for which a key was presented recently (ASSING 2000b), the Turkish representatives of the genus have not been comprehensively studied. Before the present study, a total of 20 species were known from Turkey (ASSING 1999, 2000b; PACE 1983a, 1983b, 1996). They were assigned to the subgenera *Geostiba* s. str. (9 species), *Sphenosipalia* SCHEERPELTZ (2 species), *Ditroposipalia* SCHEERPELTZ (5 species, with one of the species represented by three subspecies, and including one widespread species originally described from Greece), *Sipalotricha* SCHEERPELTZ (3 species), originally attributed to the junior synonym *Lioglutosipalia* SCHEERPELTZ (3 species), so that the actual diversity of *Geostiba* in this region could be expected to be much higher, particularly when considering that almost twice as many species are known from Greece.

The present study is based on an examination both of the types of previously described species and on material that has become available mainly from the collections of the Muséum d'Histoire Naturelle Genève and the Naturhistorisches Museum Wien, as well as through recent field trips carried out by several colleagues (Volker Brachat, Heinrich Meybohm, Paul Wunderle) and the author. Since the species of *Geostiba* s. str. have recently been revised (ASSING 2000b), they are only referred to when additional material has become available; they are, however, accounted for in the key. The material examined contained some more species which are very likely to be new to science, but they are not described here, as they are represented only by females.

# 2. Material and measurements

The material examined is deposited in the following collections:

| MCVR  | Museo Civico di Storia Naturale, Verona (L. Latella)             |
|-------|--|
| MHNG  | Muséum d'Histoire Naturelle, Genève (G. Cuccodoro, I. Löbl)      |
| MNHUB | Museum für Naturkunde der Humboldt-Universität Berlin (M. Uhlig) |
| NHMW  | Naturhistorisches Museum Wien (H. Schillhammer)                  |
| cAss  | author's private collection                                      |
| cSch  | private collection Michael Schülke, Berlin                       |
| cWun  | private collection Paul Wunderle, Mönchengladbach                |

Head length was measured from the anterior margin of the clypeus to the posterior margin of the head.

# 3. The Geostiba species of Turkey

# 3.1. Subgenus Geostiba s. str.

As indicated in the introduction, the species of this subgenus are only considered here when new material has become available. For the other species see the recent revision by ASSING (2000b) and the key (section 4). In all the species of this subgenus, the  $\delta$  secondary sexual characters, which are of particular diagnostic significance, are subject to considerable intraspecific variation. In small males, the modifications of the pronotum, the elytra, and the abdominal terga III-V and VII may be (almost) completely absent. A proper identification is usually possible only when larger males with well-developed secondary sexual characters are available.

#### 3.1.1. Geostiba (s. str.) circellaris (GRAVENHORST 1806) (Figs. 1-4)

Material examined: 18, Anatolia, Bolu, Elmalik near Bolu, 950m, 25.V.1967, leg. Besuchet (MHNG).

The vast area of distribution of *G. circellaris* ranges from Western Europe to the Caucasus region and Siberia and includes Central Europe, Northern Europe, and the northern parts of Southern Europe (HORION 1967). The species also occurs in North America, where it has apparently been introduced (LOHSE & SMETANA 1988). Remarkably, it has not been reported from the Balkans. The present record from northwestern Anatolia, at the same time the first record from Turkey, suggests that the species may be a Ponto-Mediterranean element and may in fact be present, but very rare, in the Balkans.

# 3.1.2. Geostiba (s. str.) sororcula sp. n. (Figs. 5-11)

H o l o t y p e  $\delta$ : TURQUIE: Gümüshane, Erzincan-Kelkit, 2100m, 4.VI.1986 / Besuchet-Löbl Burckhardt / Holotypus  $\delta$  Geostiba sororcula sp. n. det. V. Assing 2000 (MHNG). P a r a t y p e s :  $2\delta \delta$ ,  $1_{\varphi}$ : same data as holotype (MHNG, cAss).

D e s c r i p t i o n : Highly similar and obviously closely related to G. circellaris, but distinguished as follows:

Smaller than average G. circellaris, 2.6 - 3.2 mm. Coloration darker: whole body more or less uniformly dark brown to blackish brown, usually the elytra and sometimes also the pronotum somewhat lighter; legs and antennae brown to castaneous.

Head as in *G. circellaris*, dorsally usually with small subcircular median impression. Pronotum relatively more slender, 1.12 - 1.16 times as wide as head; with shallow, but wide impression along midline. Elytra with sexual dimorphism and  $\delta$  modifications similar to *G. circellaris*, also with an anterior tubercle on each  $\delta$  elytron, but puncturation more coarsely granulose.

 $\delta$ : tergum VII with similar modifications as in *G. circellaris*, but tubercle slightly more slender and smaller (Fig. 9); tergum VIII as in *G. circellaris* with pair of posterior tubercles (Fig. 10); posterior margin of sternum VIII obtusely pointed (Fig. 11); aedeagus slightly smaller than in *G. circellaris*; median lobe with base of ventral process in lateral view straight and ventral process in ventral view more slender (Figs. 5-6); apical lobe of paramere of similar shape and chaetotaxy as in *G. circellaris* (Fig. 7).

q: posterior margin of tergum VIII weakly convex, that of sternum VIII weakly pointed; spermatheca with shorter and proximally more slender duct than in *G. circellaris* (Fig. 8).

Derivatio nominis: The name (Lat.: little sister) refers to the fact that this species is probably the sister taxon of the widespread G. circellaris.

C o m p a r a t i v e n o t e s : For separation from the similar G. circellaris see description above; for comparison, illustrations of the genitalia of G. circellaris are presented in Figs. 1-4. From other Turkish species of Geostiba, G. sororcula is readily distinguished especially by the  $\delta$  secondary sexual characters on the elytra, tergum VII, and tergum VIII (see also key in section 4).

D is tribution and bionomics: The types were collected in in the area north of Erzincan, northeastern Anatolia, at an altitude of 2100m.

# 3.1.3. Remarks on the systematic status of the subgenus Geostiba s. str.

The type species of both the genus and the subgenus is *Geostiba circellaris*. After a more thorough examination of this species and its presumed adelphotaxon G. sororcula, there are considerable doubts that the species currently included in Geostiba s. str. (in all, more than 70 species) should represent a monophyletic group. Except for G. circellaris and G. sororcula, all the species are characterized by a synapomorphic cristal process of the aedeagus and a slender apical lobe of the paramere with one long and three very short setae. In addition, the (rather uniform) spermatheca is of characteristic morphology, the pronotum is often sexually dimorphic, the  $\delta$  elytra are usually characterized by sutural carinae near the apex of the scutellum, often by additional modifications (but not subcircular tubercles), and by moderately dense granulose puncturation, and the  $\delta$  tergum VII usually has a more or less spine-like median process at the posterior margin. The monophyly of this large and diverse group of species is very likely. In the monophylum circel*laris+sororcula*, on the other hand, the aedeagus lacks a cristal process (plesiomorphic), the apical lobe of the paramere is much stouter and has longer setae (in this respect similar to some species attributed to other subgenera), the morphology of the spermatheca is different (similar to species of other subgenera), the  $\delta$  tergum VIII has a pair of median

tubercles at its hind margin (apomorphic), the  $\delta$  tergum VII is characterized by a more or less oblong posterior tubercle (not a spine-like process), which may be apomorphic, the  $\delta$ pronotum is not sexually dimorphic, the  $\delta$  elytra are densely and granulosely punctured (apomorphic), and, instead of sutural carinae, each elytron has a subcircular tubercle at some distance from the suture (apomorphic).

It can be inferred from these observations that the subgenus *Geostiba* s. str. is very likely to represent a polyphyletic taxon. In view of the fact that numerous species have not been thoroughly examined, however, a rearrangement of the subgeneric concept proposed by SCHEERPELTZ (1951) and maintained by later authors, and changes in the subgeneric assignments of the species currently attributed to *Geostiba* s. str. seem premature at this stage. For this reason, the traditional - though phylogenetically unsatisfactory - systematic concept his here maintained.

#### 3.1.4. Geostiba (s. str.) turcica (BERNHAUER 1900)

#### Sipalia turcica BERNHAUER 1900: 535f.

A d d i t i o n a l m a t e r i a l e x a m i n e d : 2δδ, l<sub>Q</sub>, Istanbul, "Forêt de Belgrade", 4.VI.1967, leg. Besuchet (MHNG, cAss); 8δδ, 10<sub>Q Q</sub>, Istanbul, "Belgr. Wald", 1.-7.VII.1954, leg. Schubert (NHMW, cAss); 1<sub>Q</sub>, same locality, VIII.1974, leg. Schubert (NHMW); 2δδ, Istanbul, leg. Korb (NHMW); 3δδ, 2<sub>Q Q</sub>, Istanbul, Alem Dagh, leg. Bodemeyer (NHMW, cAss); 2δδ, Istanbul, Belgrat, IV.1959, leg. Schubert (NHMW, cAss).

Previously, the species was known only from the type locality "Belgrader Wald" near Istanbul. The records above show that *G. turcica* is more widespread in the Istanbul province.

#### 3.1.5. Geostiba (s. str.) arganthonia PACE 1983

Additional material examined: 588, 499, Istanbul, Yalova, V.1959, leg. Schubert (NHMW, cAss):

The species is here re-recorded from the type locality.

#### 3.1.6. Geostiba (s. str.) artvinensis sp. n. (Figs. 12-19)

Holot y pe & : TURQUIE: Artvin, s/Artvin, 800m, 7.VI.1986 / Besuchet-Löbl Burckhardt / Holotypus & Geostiba artvinensis sp. n. det. V. Assing 2000 (MHNG).

Paratypes: 4δδ, 3<sub>9</sub> φ: same data as holotype (MHNG, cAss); 2δδ, 1<sub>φ</sub>: Borcka, Asm.NO.1500m, B 6/72 [overleaf], leg. F. Schubert (NHMW, cAss).

D e s c r i p t i o n : In size, proportions, and coloration highly similar to other Turkish species of the subgenus, especially to *G. turcica*. Distinguished by the following character combination:

Head as in *G. turcica*. Pronotum with pronounced sexual dimorphism: in (large!)  $\delta$  oblong, ca. 1.1 x as long as wide, posteriorly distinctly projecting, its hind margin broadly concave, and the lateral margins near posterior angles sinuate (Fig. 14); in  $\varphi$  as wide as long or weakly transverse and with a weakly convex posterior margin.

Elytra distinctly wider than pronotum, shining; in  $\delta$  weakly impressed, near apex of scutellum with pronounced sutural carninae, and with granulose puncturation (Fig. 14); in  $\rho$  unmodified and with inconspicuous puncturation.

Abdomen with shallow microsculpture; puncturation more distinct than in G. turcica.

 $\delta$ : tergum III-V unmodified; tergum VII with wide-based and apically obtuse (anterodorsal view), in lateral view distinctly erect process near posterior margin (Fig. 19); posterior margin of tergum VIII weakly convex, that of sternum VIII indistinctly pointed; median lobe of aedeagus and apical lobe of paramere as in Figs. 12, 13, 15.

q: posterior margins of tergum and sternum VIII weakly convex; spermatheca as in Figs. 16-18.

D e r i v a t i o n o m i n i s : The name is derived from the province where the types were collected.

C o m p a r a t i v e n o t e s : From the similar G. turcica, G. artvinensis is distinguished especially by the slightly more pronounced sexual dimorphism of the pronotum, by the more distinct puncturation of the pronotum, by the more wide-based process of the  $\sigma$  tergum VII, and especially by the distinctly larger cristal process of the aedeagus. In G. kastamonuensis, the  $\sigma$  pronotum is posteriorly more narrowly concave, the process of the  $\sigma$  tergum VII is more slender (antero-dorsal view) and in lateral view more massive, and the cristal process of the aedeagus is of different shape. For separation from other Turkish representatives of the subgenus see the key in section 4.

Distribution and bionomics: The species is known only from two localities near Artvin, northeastern Anatolia, where the types were collected at altitudes of 800 and 1500m.

#### 3.1.7. Geostiba (s. str.) akceliensis sp. n. (Figs. 20-26)

H o l o t y p e  $\delta$ : TR - Mersin, road Silifke -> Gülnar, 1015m, No. 9, 36°20'38N, 33°35'06E, *Quercus* litter, 27.12.2000, V. Assing / Holotypus  $\delta$  Geostiba akceliensis sp. n. det. V. Assing 2001 (cAss).

 $\dot{P}$  a r a t y p e s :  $3\sigma\sigma$ , 8qq, same data as holotype, leg. Assing, Wunderle (cAss, cWun).

Description: In size and coloration similar to G. taseliensis ASSING. 2.4 - 3.2 mm.

Head weakly oblong, 1.05 x as long as wide; integument with distinct microreticulation and reduced shine; eyes and antennae as in *G. taseliensis*.

Pronotum with microsculpture similar to that of head; with distinct sexual dimorphism: in large  $\delta$  1.18 - 1.20 x as long as wide, posterior margin strongly projecting posteriad and covering scutellum, middle of posterior margin pointed and bent ventrad (Fig. 26); in  $\varphi$  approximately as wide as long or even weakly transverse, posterior margin weakly convex, lateral margin near posterior angles sometimes sinuate (in large  $\varphi$ ).

Elytra of similar shape and relative width as in *G. taseliensis*; surface shining, microsculpture shallow; in  $\mathcal{S}$  with distinctly granulose puncturation, with pronounced transverse impression (including suture), without sutural carinae, and near posterior angles with oblong tubercle or fold, which is broader and more distinctly elevated than in *G. taseliensis* (Fig. 26); in  $\varphi$  with weakly granulose puncturation, shallow impression, and weakly elevated lateral margin.

Abdomen with very fine and sparse puncturation; microsculpture distinct, predominantly composed of short transverse meshes.

 $\delta$ : tergum III and IV unmodified; tergum VII (in large  $\delta$ ) with moderately long, relatively slender (antero-dorsal view), and apically rounded process near posterior margin (Figs. 24-25); this process may be almost completely reduced in small  $\delta$ ; tergum VIII

weakly convex posteriorly; hind margin of sternum VIII obtusely pointed; median lobe of aedeagus with slender cristal process (Figs. 20-21); apical lobe of paramere as in Fig. 22.

q: tergum VIII of similar shape and chaetotaxy as in  $\delta$ ; sternum VIII weakly convex; spermatheca as in Fig. 23.

Derivatio nominis: The name is derived from the Akçeli Dağlari, the mountain range where the types were collected.

C o m p a r a t i v e n o t e s : From the similar G. taseliensis from the region north of Anamur, G. akceliensis is readily separated by the more pronounced microreticulation of the head and pronotum, by the modifications of the  $\delta$  elytra (absence of sutural carinae, depressed suture, deeper impression, broader and more elevated folds near posterior angles), by the more slender and apically less acute process on the  $\delta$  tergum VII, and by the slightly different shape of the cristal process of the aedeagus. From the three other Turkish congeners with unmodified  $\delta$  terga III and IV and in which the  $\delta$  pronotum is posteriorly neither concave nor truncate (G. arganthonia PACE, G. simulans PACE, G. lunata sp. n.), the new species differs especially in the much more pronounced sexual dimorphism of the pronotum and in the modifications of the  $\delta$  elytra.

Distribution and bionomics: The types were collected in the Akçeli Dağlari, approximately 40 km W Silifke, Mersin, where they were sifted from oak litter between rocks at an altitude of 1015m.

#### 3.1.8. Geostiba (s. str.) granulipennis sp. n. (Figs. 27-32)

H o l o t y p e & : TR - Mersin, 30km NW Erdemli, N Yağda, 1345m, 36°43'48N, 34°02'12E, *Abies* forest, No. 17, 29.12.2000, P. Wunderle / Holotypus & *Geostiba granulipennis* sp. n. det. V. Assing 2001 (cAss).

P a r a t y p e :  $1_{0}$ , TR - Mersin, 30km NW Erdemli, S Yağda, 1310m, 36°43'46N, 34°03'00E, *Abies* forest, No. 16, 29.12.2000, P. Wunderle (cWun).

D e s c r i p t i o n : In size and coloration similar to G. taseliensis ASSING. 2.4-2.8 mm.

Head weakly oblong,  $1.05 \times as$  long as wide; integument with very shallow microsculpture and shining; eyes and antennae as in *G. taseliensis*.

Pronotum with microsculpture similar to that of head; sexual dimorphism not pronounced: in both sexes approximately as wide as long, posterior margin in  $\delta$  in the middle obtusely pointed and with small granulum (Fig. 32); in  $\varphi$  posterior margin weakly convex.

Elytra in  $\delta$  with very dense and coarsely granulose puncturation, with pronounced impression, and with short and almost merged sutural carinae near apex of scutellum (Fig. 32); in  $\rho$  with dense and distinctly granulose (but less so than in  $\delta$ ) puncturation and with weak impression.

Abdomen with distinct microsculpture and fine puncturation (similar to that in G. *taseliensis*).

 $\delta$ : tergum III at posterior margin with distinctly elevated subcircular tubercle; tergum IV with weaker subcircular tubercle in the middle of tergal surface; tergum V unmodified; tergum VII at posterior margin with distinctly elevated median process with subparallel sides and rounded apex (antero-dorsal view); tergum VIII weakly convex posteriorly; hind margin of sternum VIII obtusely pointed and with rather stout marginal setae (Fig. 31); median lobe of aedeagus relatively small, smaller than in *G. akceliensis* (Figs. 27-28); apical lobe of paramere as in Fig. 29.

q: tergum VIII of similar shape and chaetotaxy as in  $\delta$ ; sternum VIII weakly convex; spermatheca as in Fig. 30.

D e r i v a t i o n o m i n i s : The name (Lat., adj.) refers to the distinctive granulose puncturation of the elytra in both sexes.

C o m p a r a t i v e n o t e s : From G. brachati ASSING and G. pontica PACE, the only Turkish species with modified  $\delta$  abdominal terga III and IV, the new species is easily distinguished especially by the dense and coarsely granulose puncturation of the elytra in both sexes, but also by other characters (shape of  $\delta$  pronotum, deeper elytral impression, primary sexual characters). G. akceliensis, which is known from the same region, differs in the much finer and sparser elytral puncturation, the more distinct microsculpture of the forebody, the much more pronounced sexual dimorphism of the pronotum, the absence of sutural carinae and the presence of posterior carinae on the  $\delta$  elytra, the unmodified  $\delta$ terga III and IV, and by the larger aedeagus. For distinction from other Turkish representatives of the subgenus see the key (section 4).

Distribution and bionomics: The types were collected in the area northwest of Erdemli, Mersin, where they were sifted from *Abies* litter, partly near snow patches, at an altitude of approximately 1300m.

#### 3.1.9. Geostiba (s. str.) balkarensis sp. n. (Figs. 33-39)

Holotype & : Namrun, Anat.m., 11.-26.5.60, leg. F. Schubert / Holotypus & Geostiba balkarensis sp. n. det. V. Assing 2001 (NHMW).

P a r a t y p e s :  $4\delta\delta$ ,  $8\varphi\varphi$ : same data as holotype (NHMW, cAss);  $3\delta\delta$ ,  $2\varphi\varphi$ : same data, but 10.5.-3.6.63 (NHMW, cAss);  $1\varphi$ : same data, but 4/76 (NHMW).

D e s c r i p t i o n : Very similar to G. granulipennis sp. n. 2.0 - 2.8 mm.

Head weakly oblong, 1.05x as long as wide; microsculpture, eyes, and antennae as in G. granulipennis.

Pronotum with microsculpture similar to that of head; sexual dimorphism not pronounced: in  $\mathcal{J}$  as long as wide or weakly oblong, posterior margin in the middle obtusely pointed, without distinct granulum (Fig. 39); in  $\mathcal{Q}$  posterior margin weakly convex.

Elytra on the whole similar to those in G. granulipennis, in  $\delta$  with very dense and granulose puncturation (but less so than in G. granulipennis), with extensive impression (less deep than in G. granulipennis), and with very short (shorter than in G. granulipennis), close sutural carinae near apex of scutellum (Fig. 39); in  $\varphi$  with weakly granulose puncturation and with weak impression.

Abdomen with distinct microsculpture and fine puncturation (similar to that in G. granulipennis).

 $\delta$ : terga III and IV with weakly elevated subcircular tubercle (which may be more or less reduced in small  $\delta \delta$ ) near anterior tergal impression; tergum V unmodified; tergum VII at posterior margin with very erect, long, and slender median process with subparallel sides and rounded apex (antero-dorsal view) (Fig. 38); tergum VIII weakly convex to obtusely pointed posteriorly; hind margin of sternum VIII obtusely pointed and with relatively stout marginal setae; median lobe of aedeagus of similar size as in *G. granulipennis*, but strongly excavate at base of ventral process (lateral view), and with very slender cristal process (Figs. 33-34); apical lobe of paramere as in Fig. 35.

q: tergum VIII of similar shape and chaetotaxy as in  $\delta$ ; sternum VIII weakly convex; spermatheca as in Figs. 36-37.

D e r i v a t i o n o m i n i s : The name is derived from Balkar Dağlari, the mountain range north and northwest of the type locality.

C o m p a r a t i v e n o t e s : For distinction from G. granulipennis, the only other species of Geostiba s. str. from southern Anatolia with a posteriorly pointed pronotum and with modified terga III and IV, see description above.

D i s t r i b u t i o n : The type locality, today Çamliyayla, is in the east of Mersin province, some 40 km northwest of Tarsus.

# 3.1.10. Geostiba (s. str.) bitlisensis sp. n. (Figs. 40-44)

H o l o t y p e & : Tatvan, Asm.or., 1900m, 20.5.69, leg. F. Schubert / Holotypus & Geostiba bitlisensis sp. n. det. V. Assing 2001 (NHMW).

P a r a t y p e :  $1\sigma$ : same data as holotype (cAss).

D e s c r i p t i o n : Small species, 2.2 - 2.4 mm.

Head approximately as wide as long (Fig. 44); integument with very shallow microsculpture and shining.

Pronotum with microsculpture similar to that of head. Sexual dimorphism apparently not pronounced: in  $\sigma$  approximately as wide as long, weakly projecting caudad, posterior margin weakly convex to indistinctly concave (Fig. 44).

Elytra in  $\delta$  with shallow impression, relatively dense and granulose puncturation, and with short close sutural carinae near apex of scutellum (Fig. 44).

Abdomen shining, with shallow microsculpture; puncturation fine and relatively sparse.

 $\delta$ : terga III and IV near anterior impression with smooth subcircular median tubercle, that of tergum IV more pronounced than that of tergum III; tergum VII at posterior margin with short, wide-based, and apically acute process (Fig. 43); tergum VIII weakly convex posteriorly; hind margin of sternum VIII convex; aedeagus small, median lobe and apical lobe of paramere as in Figs. 40-42.

q: unknown.

Derivatio nominis: The name is derived from the east Anatolian province Bitlis, where the species was discovered.

C o m p a r a t i v e n o t e s : From other Turkish species with modified anterior terga, G. bitlisensis is distinguished as follows: in G. granulipennis and G. balkarensis, the  $\delta$  pronotum is pointed posteriorly; in G. brachati, the posterior margin of the  $\delta$  pronotum is broadly and distinctly concave; G. pontica has an additional tubercle on the  $\delta$  abdominal tergum V. For additional characters distinguishing G. bitlisensis from other Turkish species of the subgenus see the key in section 4.

D i s t r i b u t i o n : The type locality of the species is in Bitlis, central eastern Anatolia, near Lake Van. The types were collected at an altitude of 1900m.

# 3.1.11. Geostiba (s. str.) lunata sp. n. (Figs. 45-50)

H o l o t y p e 3 : Namrun, Anat.m., 10.5.-3.6.63, leg. F. Schubert / Holotypus 3 Geostiba lunata sp. n. det. V. Assing 2001 (NHMW).

P a r a t y p e s :  $1\sigma$ ,  $2\sigma \sigma$ : same data as holotype (NHMW, cAss);  $1\sigma$ ,  $2\sigma \sigma$ : Osmaniye, Asm., 1000m, 1.-8.5.69, leg. F. Schubert (NHMW, cAss).

D e s c r i p t i o n : 2.3 - 2.9 mm. Head weakly oblong (Fig. 50); integument with very shallow microsculpture and shining.

Pronotum with microsculpture similar to that of head; without appreciable sexual dimorphism, in both sexes 1.05 - 1.10 x as wide as long (Fig. 50).

Elytra in  $\delta$  with enormous crescent-shaped (lateral view) sutural carinae extending from apex of scutellum to posterior elytral margin (or nearly so), with relatively sparse and finely granulose puncturation, and with very shallow and ill-defined impressions (Fig. 50); in  $\rho$  unmodified and with fine puncturation.

Abdomen distinctly shining, with very shallow, barely noticeable microsculpture; puncturation very fine and sparse.

 $\delta$ : terga III - V unmodified; tergum VII at posterior margin with vertically erect, very long and apically acute process (Fig. 49); tergum VIII weakly convex posteriorly; hind margin of sternum VIII convex, with row of relatively thin short marginal and row of long submarginal setae; median lobe of aedeagus and apical lobe of paramere as in Figs. 45-47.

q: tergum VIII of similar shape and chaetotaxy as in  $\sigma$ ; sternum VIII weakly convex; spermatheca as in Fig. 48.

Derivatio nominis: The name (Lat., adj.: crescent-shaped) refers to the distinctive shape of the sutural carinae on the  $\mathcal{S}$  elytra.

C o m p a r a t i v e n o t e s : From all the Turkish species of *Geostiba* s. str., *G. lunata* is readily distinguished by the enormous sutural carinae on the  $\delta$  elytra. From *G. balkarensis*, which occurs in the same region, it is also separated by the shallower microsculpture of the integument, the more transverse pronotum, the absence of a distinct sexual dimorphism of the pronotum, the shallowly impressed and finely punctate  $\delta$  elytra, the longer process of the  $\delta$  tergum VII, and by the stouter cristal process of the median lobe of the aedeagus. For additional characters distinguishing *G. lunata* from other Turkish species of the subgenus see the key in section 4.

D is tribution: G. lunata is apparently rather widespread in central southern Anatolia. One of the localities is in eastern Mersin, northwest of Tarsus in the Taurus range (same locality as the type locality of G. balkarensis), the other apparently in the Nur Dağlari near Osmaniye (eastern Adana or northern Antakya province).

#### 3.2. Subgenus Ditroposipalia SCHEERPELTZ

#### 3.2.1. Geostiba (Ditroposipalia) oertzeni (EPPELSHEIM 1888) (Map 1)

Additional material examined:

Anatolia: 1 o, Istanbul, Yalova, 21.-23.VI.1961, leg. Schubert (NHMW); 1 o, Manisa, S Salihli, 500m, 29.IV.1975, leg. Besuchet & Löbl (MHNG); 1 d, Ordu, Akkus, 3.-5.VI.1961, leg. Schubert (NHMW); 3 d d, 1 o, Zonguldag, Yenice - Karabük, V.1962, leg. Schubert (NHMW, cAss); 11 d d, 5 o o, Gümüşhane, Erzincan-Kelkit, 2100m, 4.VI.1986, leg. Besuchet, Löbl & Burckhardt (MHNG, cAss); 7 d d, 1 o, Kars, 16km SW Göle, 1600m, 16.VI.1986, leg. Besuchet, Löbl & Burckhardt (MHNG, cAss); 1 d, 3 o o, Kars, road to Cumaçay, 1600m, 18.VI.1986, leg. Besuchet, Löbl & Burckhardt (MHNG, cAss); 1 d: Umg. Marmaris, W-Anatolien, leg. H. Franz / HOLOTYPUS Geostiba cnidia m. det. R. PACE 1995 / Geostiba cnidia sp. n. det. R. Pace 1995 (MCSNV); 1 d, 1 o, Muğla, Marmaris, leg. Franz [labelled as paratypes of *Geostiba solitaria knidia* PACE] (cAss).

C o m m e n t s : The species is redescribed and illustrated in detail in ASSING (1999).



Map 1: Geostiba oertzeni (EPPELSHEIM): Distribution based on revised records.

D is tr i b u t i o n : *G. oertzeni*, one of the most widespread species of the genus, is here recorded from northeastern Anatolia for the first time. Its known area of distribution now ranges from Albania, Macedonia, Bulgaria and Greece (including Crete and Ródhos) to eastern Anatolia (Map 1). It would not be surprising if the species were present also in other countries of the Balkans and in the Caucasus region.

#### 3.2.2. Geostiba (Ditroposipalia) rizensis PACE 1983 (Figs. 58-60)

Geostiba (Ditroposipalia) rizensis PACE 1983b: 23.

T y p e s e x a m i n e d : <u>Holotype</u>  $\delta$ : Turquie Rize, Yol Üstü, 600m, 15.V.67, Cl. Besuchet / HOLOTYPUS Geostiba rizensis m. det. R. PACE 1981 / Geostiba rizensis n. sp. det. R. Pace 1981 (MHNG). <u>Paratype</u>  $\delta$ : same data as holotype (MHNG).

Additional material examined:

Anatolia: 23 8, 499, Rize, Ikizdere, 1600m, VI.1973, leg. Schubert (NHMW, cAss); 18, Rize, Iliça/Pazar, VII.1979, leg. Schubert (NHMW).

R e d e s c r i p t i o n : 2.2 - 2.4 mm. Colour of body testaceous to ferrugineous; preapical abdominal terga infuscate. In general appearance similar to the widespread *G. oertzeni*, but distinguished as follows:

Eyes slightly smaller.

 $\delta$ : elytra with sutural carina extending over whole length of suture, anteriorly very wide and strongly elevated, decreasing in width and elevation posteriad, coarsely and granulosely sculptured, and mat; elytral impressions pronounced, rather deep and extensive. Pair of carinae at posterior margin of tergum VII almost straight and parallel, separated by a distance greater than their width (Fig. 59). Posterior margin of tergum VIII convex, in the middle truncate or weakly concave; sternum VIII posteriorly convex; for illustrations of the primary sexual characters see figures in PACE (1983b).

 $\varphi$ : elytra with very shallow impressions and with weakly elevated suture; tergum VIII weakly concave posteriorly; hind margin of sternum VIII almost truncate, in the middle indistinctly concave (Fig. 60); spermatheca as in Fig. 58.

Comments and comparative notes: The  $\varphi$  of this species was previously unknown. From the similar *G. oertzeni*, *G. rizensis* is readily distinguished by

the smaller eyes, the much longer and more elevated elytral carinae and by the more pronounced elytral impressions in the  $\sigma$ , by the different morphology of the aedeagus, and by the completely different shape of the spermatheca. For distinction from the similar *G. fabaeformis* and other Turkish species of *Ditroposipalia* see description below and the key (section 4), respectively.

D is tribution: The species has become known from several localities in Rize province, northern Anatolia.

# 3.2.3. Geostiba (Ditroposipalia) fabaeformis sp. n. (Figs. 51-58)

H o l o t y p e 3 : TURQUIE: Artvin, s/Artvin, 1500m, 9.VI.1986 / Besuchet-Löbl Burckhardt / Holotypus 3 Geostiba fabaeformis sp. n. det. V. Assing 2001 (MHNG). P a r a t y p e s : 433, 599: same data as holotype (MHNG, cAss); 433, 499, TURQUIE: Artvin, SW Artvin, 1900m, 9.VI.1986 / Besuchet-Löbl Burckhardt (MHNG, cAss).

D e s c r i p t i o n : 2.0 - 2.4 mm. Colour of body testaceous to ferrugineous; preapical abdominal terga sometimes weakly infuscate. Highly similar to *G. rizensis* PACE; distinguished only by the primary and secondary sexual characters.

 $\delta$ : elytra with sutural carina extending over whole length of suture, wider and more strongly elevated anteriorly than posteriorly; sutural carina anteriorly not coarsely punctured and sculptured; disc of each elytron with more or less diagonal impression; puncturation weakly granulose. Tergum VII with usually pronounced, though relatively short pair of carinae in the middle of posterior margin, these carinae separated by a distance distinctly less than their width and posteriorly merging (Fig. 56). Posterior margin of tergum VIII truncate to weakly convex, that of sternum VIII weakly convex with marginal setae longer in the middle than at the sides (Fig. 57). Median lobe of aedeagus and apical lobe of paramere as in Figs. 51-53.

 $\varphi$ : elytra at most with very shallow impressions, without sutural carina. Tergum VIII distinctly convex posteriorly; hind margin of sternum VIII weakly convex, in the middle indistinctly concave. Spermatheca as in Figs. 54-55.

D e r i v a t i o n o m i n i s : The name (Lat., adj.: formed like a bean) refers to the characteristic shape of the carinae on the  $\delta$  tergum VII.

C o m p a r a t i v e n o t e s : In the highly similar G. rizensis, which also occurs in northern Anatolia, the elytral impressions in the  $\delta$  are more pronounced, the sutural carinae are - especially anteriorly - more strongly elevated, wider, and coarsely sculptured, the carinae on the  $\delta$  tergum VII are separated by a distance greater than their width and less distinctly elevated (Fig. 59), the median lobe of the aedeagus is apically less acute (ventral view) and more slender (lateral view) (see figures in PACE 1983b), and the spermathecal duct is of slightly different shape (cf. Figs. 54, 55, 58). From the widespread G. oertzeni, which is similar in general appearance (size, coloration, etc.), the new species is readily separated by the slightly smaller eyes, the much longer sutural carinae and more pronounced impressions on the  $\delta$  elytra, the smooth hind margin and different chaetotaxy of the  $\delta$  tergum VIII, by the strongly bent ventral process of the median lobe of the aedeagus, the shorter and stouter apical lobe of the paramere, and by the completely different morphology of the spermatheca. For distinction from other Turkish representatives of *Ditroposipalia* see the key (section 4).

D is tribution and bionomics: The types were collected near Artvin, Artvin province, at altitudes of 1500 and 1900m. Two dissected females had mature eggs in their ovaries.

# 3.2.3. Geostiba (Ditroposipalia) smyrnensis PACE 1983

Geostiba (Ditroposipalia) smyrnensis PACE 1983b: 21.

Types examined: <u>Holotype</u> 3: TURQUIE IZMIR Bozdagh, 1200m, 29-IV-75, BESUCHET LÖBL / HOLOTYPUS Geostiba smyrnensis m. det. R. PACE 1981 / Geostiba smyrnensis n. sp. det. R. Pace 1981 (MHNG). <u>Paratype</u>  $\varphi$ : same data as holotype (MHNG).

R e d e s c r i p t i o n : 1.7 - 2.0 mm. Colour of entire body testaceous; preapical abdominal terga not infuscate.

Eyes very small, but with distinct ommatidia.

 $\delta$ : elytra with narrow, distinctly elevated, anteriorly only weakly wider sutural carina extending over whole length of suture; each elytron with extensive, but rather shallow impression; puncturation denser than in  $\varphi$  and weakly granulose. Tergum VII with very narrow, distinctly elevated, relatively long, straight, and posteriorly weakly converging pair of carinae at hind margin, which are separated (even posteriorly) by a distance greater than their width. Posterior margin of tergum VIII convex, in the middle with distinct emargination. For illustrations of the aedeagus see figures in PACE (1983b).

q: posterior margin of tergum VIII weakly concave. Spermatheca as illustrated in PACE (1983b).

C o m p a r a t i v e n o t e s : From G. oertzeni, G. rizensis, and G. fabaeformis, G. smyrnensis is distinguished especially by its uniformly lighter coloration, smaller size, smaller eyes, and the different sexual characters (see description above). For separation from other Turkish representatives of Ditroposipalia see the descriptions below and the key (section 4).

D is tr i b u t i o n: The species has become known only from the type locality in western Anatolia.

#### 3.2.4. Geostiba (Ditroposipalia) uhligi PACE 1983 (Map 2)

Geostiba (Sphenosipalia) uhligi PACE 1983a: 134ff.

Geostiba (Sphenosipalia) mysia PACE 1983b: 18ff., syn. n.

Sipalia (Ditroposipalia) Bodemeyerorum i. 1.: SCHEERPELTZ 1951: 178.

T y p e s e x a m i n e d : G. uhligi: <u>Holotype</u>  $\delta$ : v Bodemeyer, Asia-minor, Bos-Dagh / 440 / HOLOTYPUS Geostiba uhligi m. det. R. PACE 1981 / Geostiba uhligi n. sp. det. R. Pace 1981 (MNHUB). <u>Paratypes</u>; 1<sub>Q</sub>: same data as holotype, but "Allotypus" (MNHUB); 1 $\delta$ : v. Bodemeyer, Asia minor, Alem Dagh / spec. typ. / Sipalia Bodemeyerorum n. sp. Bernh. / PARATYPUS Geostiba uhligi m. det. R. PACE 1981 (MNHUB); 1 $\delta$ , 3<sub>Q</sub> q: Asia minor, Goek-Dagh, v. Bodemeyer (MNHUB).

*G. mysia*: <u>Holotype</u>  $\delta$ : Turquie Bursa, Uludağ, 22.VII.69, 1200-1300m, Cl. Besuchet / HOLOTYPUS Geostiba mysia det. R. PACE 1981 / Geostiba mysia n. sp. det. R. Pace 1981 (MHNG). <u>Paratypes</u>:  $8 \circ \varphi$ : same data as holotype (MHNG);  $5 \circ \delta$ ,  $11 \circ$ : Turquie Bursa, S/ Bursa, 22.VII.69, Cl. Besuchet (MHNG, cAss);  $2 \circ \delta$ ,  $1 \circ$ : TURQUIE BURSA Uludağ à 10 km de Bursa, 1300m, 12.V.76, Besuchet Löbl (MHNG);  $2 \circ \delta$ ,  $5 \circ \varphi$ : TURQUIE BURSA Uludağ à 20 km de Bursa, 1300m, 12.V.76, Besuchet Löbl (MHNG, cAss);  $5 \circ \delta$ ,  $3 \circ \varphi$ : TURQUIE BURSA Uludağ à 21 km Bursa, 1100m, 13.V.76, Besuchet Löbl (MHNG);  $3 \circ \varphi$ : TURQUIE BURSA Uludağ à 23 km Bursa, 1500m, 13.V.76, Besuchet Löbl (MHNG).

A d d i t i o n a l m a t e r i a l e x a m i n e d : 2δδ, 4<sub>9</sub> q, "Klein-Asien, Goek-Dagh, v. Bodemeyer" [labelled as holo-, allo-, and cotypes of *Sipalia bodemeyerorum* SCHEERPELTZ, respectively] (NHMW, cAss); 1<sub>q</sub>, Bursa (NHMW); 1<sub>q</sub> [identification uncertain], "Turcia" (NHMW).

R e d e s c r i p t i o n : 1.8 - 2.2 mm. Colour of body including appendages entirely

testaceous. Head, pronotum, and abdomen with extremely fine and rather sparse puncturation.

Head weakly oblong, approximately 1.1x as long as wide; eyes very small, but with distinct ommatidia and pigmentation (see figure in PACE 1983a). Pronotum approximately 1.2x as wide as head and 1.00 - 1.05 x as wide as long; in  $\delta$  usually with long shallow impressions on either side of midline, in  $\varphi$  occasionally with very indistinct impressions.

 $\delta$ : elytra with suture forming a narrow, but usually distinctly elevated carina extending over whole length of suture, this carina anteriorly not or only weakly widened; puncturation distinctly granulose and moderately dense. Tergum VII usually with pair of long (in large  $\delta$  extending over more than half the length of tergum) and posteriorly converging (but usually not merging) median carinae; posterior margin of tergum VIII convex, that of sternum VIII strongly convex or pointed; aedeagus with long flagellum; apical lobe of paramere rather long and slender; for illustrations of the primary sexual characters see figures in PACE (1983a).

 $\varphi$ : elytral suture at most forming a weakly elevated carina; puncturation fine, sometimes weakly granulose; posterior margins of tergum and sternum VIII weakly convex; for an illustration of the spermatheca see the figure for *G. mysia* in PACE (1983b).

C o m p a r a t i v e n o t e s a n d s y s t e m a t i c c o m m e n t s: From other Turkish species of the subgenus, G. uhligi is separated by the  $\delta$  secondary sexual characters (elytral suture forming a narrow carina; relatively long and posteriad converging carinae on tergum VII), and by the morphology of the aedeagus, especially the long flagellum.

G. uhligi is here attributed to the subgenus Ditroposipalia based on the  $\delta$  secondary sexual characters, which are most similar to some species from Albania and Macedonia (see ASSING 2000a). It seems most unlikely that the Turkish species previously attributed to Sphenosipalia should represent the adelphotaxon of the Western European species included in that subgenus; for a more detailed discussion see remarks below G. seleucica PACE. The long flagellum in both species groups is probably the result of convergent evolution.

G. uhligi and G. mysia were described in the same year; the publication dates indicated in the articles containing the descriptions are 31 January and March, respectively (PACE 1983a, 1983b). According to the original description of G. uhligi, this species is distinguished from G. mysia by the less pronounced carinae on the male tergum VII, by the weakly concave ventral process of the median lobe of the aedeagus, by the bifid flagellum, and by the larger proximal part of the spermathecal duct. I have been unable to appreciate the differences in the primary sexual characters. The spermatheca is of highly variable shape and not distinctive. The ventral process of the aedeagus was found to be weakly concave in males of both G. mysia and G. uhligi. The notch at the base of the ventral process (lateral view) was found to vary between males from different mountain ranges, but this variation does not coincide with the supposed distributions of G. uhligi and G. mysia. The "bifid flagellum" is clearly based on an artefact caused in the process of dissecting and mounting the aedeagus: the flagellum in Geostiba (and other Athetini) is composed of two lamellae, which, when strained, may become separated. The carinae on the male tergum VII are indeed more pronounced in the type series of G. mysia than is the case in average G. uhligi, but this is not considered sufficient evidence that G. uhligi and G. mysia should represent distinct species. These carinae are very variable not only in the

types and the additional material of *G. uhligi*, but also in other species of *Ditroposipalia*. Finally, there is also biogeographical evidence that both species are conspecific. *G. uhligi* is known from several mountain ranges in the northwest of Anatolia from the Bosporus ("Alem Dagh") to the mountains north of Eskişehir ("Bos Dagh"), not far from the type locality of *G. mysia*. Consequently, *G. mysia* is here placed in the synonymy of the senior name *G. uhligi*.



Map 2: Distribution of *Geostiba uhligi* PACE (open circle: type locality of the synonym *G. mysia* PACE).

D is tr i b u t i o n : The species is known from several mountain ranges in the northwest of Anatolia (Istanbul, Kocaeli, Bursa, Eskişehir) (Map 2).

#### 3.2.5. Geostiba (Ditroposipalia) helvetiorum PACE 1983 (Figs. 61-71)

Geostiba (Ditroposipalia) helvetiorum PACE 1983b: 21.

Geostiba (Ditroposipalia) helvetiorum humicola PACE 1983b: 23; syn. n.

Geostiba (Ditroposipalia) helvetiorum obscura PACE 1983b: 23; syn. n.

T y p e s e x a m i n e d ; G. helvetiorum: <u>Holotype</u>  $\delta$ : Turquie Antakya, 7m E. Yeşilkent, 350-400m, 4.V.78, Besuchet Löbl / HOLOTYPUS Geostiba helvetiorum m. det. R. PACE 1981 / Geostiba helvetiorum n. sp. det. R. Pace 1981 (MHNG). <u>Paratypes</u>:  $1\delta$ ,  $1_{\circ}$ : same data as holotype (MHNG).

*G. helvetiorum humicola*: <u>Holotype</u>  $\delta$ : TURQUIE Antakya, Zorhum - Yaylasi, 7-V-67, 1600m, pied d'hêtre, Besuchet / HOLOTYPUS Geostiba helvetiorum humicola m. det. R. PACE 1981 / Geostiba helvetiorum humicola n. ssp. det. R. Pace 1981 (MHNG). <u>Paratypes</u>:  $10\delta\delta$ ,  $12\phi\phi$ : same data as holotype (MHNG).

*G. helvetiorum obscura*: <u>Holotype</u>  $\delta$ : TURQUIE Antakya, Urabat, 6-V-67, feuilles mortes, Besuchet / HOLOTYPUS Geostiba helvetiorum obscura m. det. R. PACE 1981 / Geostiba helvetiorum obscura n. ssp. det. R. Pace 1981 (MHNG). <u>Paratypes</u>:  $10\delta\delta$ , 6qq: same data as holotype (MHNG). A d d i t i o n a l m a t e r i a l e x a m i n e d : 39δ δ, 26 φ φ, Antakya, Nur Dagl., WSW Yeşilkent, 36°54'59N, 36°18'54E, 990m, mixed deciduous forest, 28.XII.2000, leg. Assing, Wunderle (cAss, cWun); 10 δ δ, 5 φ φ, same data, but 36°54'50N, 36°18'33, 1010m (cAss, cWun); 2 φ φ, Osmaniye, 1000m, 1.-8.V.1969, leg. Schubert (NHMW); 1 δ, 1 φ, E Osmaniye, 1200-1700m, VI.1968, leg. Schubert (NHMW, cAss); 3 δ δ, 3 φ φ, E Osmaniye, 1800m, 18.-27.V.1970, leg. Schubert (NHMW, cAss).

R e d e s c r i p t i o n : 2.0 - 2.5 mm. Colour of body including appendages entirely testaceous; sometimes tergum VI weakly infuscate. Head, pronotum, and abdomen with extremely fine and rather sparse puncturation.

Head weakly oblong or as wide as long; eyes rather small, but with distinct ommatidia and pigmentation (see figures in PACE 1983b). Pronotum 1.1 - 1.2 x as wide as head and approximately 1.10 - 1.15 x as wide as long; without sexual dimorphism.

 $\delta$ : elytra near apex of scutellum with carinae, which are of highly variable length, breadth, and elevation; puncturation moderately granulose and rather dense. Tergum VII with pair of subparallel carinae, in large  $\delta$  extending over posterior 2/5 of tergum and separated by a distance at least equal to their width; tergum VIII posteriorly more or less convex, weakly to distinctly emarginate in the middle, and with pair of indistinct tubercles (Figs. 68-70); hind margin of sternum VIII convex; aedeagus with ventral process of median lobe broadly subtriangular (ventral view) and with weakly pronounced crista apicalis and crista proximalis (Figs. 61-62); apical lobe of paramere with rather short setae (Fig. 63).

 $\varphi$ : elytra unmodified, sometimes weakly granulose, but less so than in  $\delta$ ; tergum VIII posteriorly convex; hind margin of sternum VIII weakly convex; spermatheca highly variable (Figs. 64-67).

Intraspecific variation: Some external characters (size, width of head and pronotum, etc.), especially the male secondary sexual characters, are subject to considerable intraspecific variation both within and between populations. In some males the sutural carinae and the carinae on tergum are weakly developed, whereas in others the former are strongly elevated and bulging and the latter are long and sharply elevated.

Comments and comparative notes: The three subspecies of G. helvetiorum were all described from the northern part of the Nur Dağlari (PACE 1983b). which is biogeographically not plausible. According to their original descriptions, they are distinguished by the shapes of the ventral process of the aedeagus and of the apical lobe of the paramere, as well as by the morphology of the spermatheca. An examination of the types of all subspecies and of numerous recently collected specimens revealed that the types of G. helvetiorum humicola and G. helvetiorum obscura had evidently been exposed to some chemical affecting their body colour (all the types were blackish brown) and probably also other morphological characters. I have been unable to appreciate the differences in the morphology of the aedeagus indicated in the original descriptions; some of the illustrations given by PACE (1983b) appear to be based on artefacts. Finally, the shape of the spermatheca was found to be remarkably variable, even in material collected in the same locality (see Figs. 64-67). Therefore, it is here concluded that the types and the additional material examined and indicated above represent one and the same species, resulting in the synonymy of G. helvetiorum obscura and G. helvetiorum humicola with G. helvetiorum.

The species is distinguished from other Turkish congeners especially by the modifications of the  $\delta$  elytra, of the  $\delta$  tergum VII, and of the  $\delta$  tergum VIII, as well as by the mor-

phology of the median lobe of the aedeagus, and by the shape and chaetotaxy of the apical lobe of the paramere.

D is tribution and bionomics: G. helvetiorum is apparently widespread in the Nur Dağlari, central southern Anatolia, where it is probably endemic. It has been taken at a wide range of altitudes (350 - 1800m) from leaf litter of deciduous trees. The recently collected material was found in great numbers in a mixed deciduous forest with beech, oak, and other trees on calcareous soil at the end of December.

#### 3.3. Subgenus Sipalotricha SCHEERPELTZ

#### 3.3.1. Geostiba (Sipalotricha) besuchetiana PACE 1983 (Map 3)

Geostiba (Lioglutosipalia) besuchetiana PACE 1983b: 35ff.

Geostiba (Lioglutosipalia) taurica PACE 1996: 38; syn. n.

T y p e s e x a m i n e d : G. besuchetiana: <u>Holotype</u>  $\delta$  [completely teneral]: TURQUIE - ANTALYA, Antalya - Kemer, 4-V-75, Besuchet - Löbl / HOLOTYPUS Geostiba besuchetiana m. det. R Pace 1981 / Geostiba besuchetiana n. sp. det. R. Pace 1981 (MHNG). <u>Paratypes:</u>  $1\delta$  [teneral]: same data as holotype (MHNG);  $3\varphi\varphi$  [ $2\varphi\varphi$  teneral]: TURQUIE - ANTALYA, Yenice, 700m, 3.V.75, Besuchet - Löbl (MHNG).

G. taurica: <u>Paratypes:</u> 1<sub>9</sub>: TR - Antalya, 700m, Umg. Manavgat, 27, 04.I.1991 Assing / PARATYPUS / Geostiba taurica det. R. PACE 91 / Geostiba taurica det. R. Pace 1991 (cAss); 1<sub>9</sub>: TR - Antalya, 900m, Umg. Manavgat, 5, 31.XII.1990, Assing (cAss).

A d d i t i o n a 1 m a t e r i a 1 e x a m i n e d : 2δδ, 2φφ [found together with one of the paratypes of *G. taurica*]: TR - Antalya, 700m, Umg. Manavgat, 27, 04.I.1991 Assing (cAss); 4δ δ, 8φφ, Antalya, road from Antalya to Saklikent, 1000m, pine wood, 11.V.2000, leg. Meybohm & Brachat (cAss); 2δδ, 3φφ, same data, but 500-550m, 10.&11.V.2000, leg. Meybohm & Brachat (cAss); 1δ, 6φφ, Antalya, Termessos near Antalya, 550-800m, 12.V.2000, leg. Meybohm & Brachat (cAss); 3δ δ, 1φ, Antalya, Termessos, 3.IV.1997, leg. Brachat (cSch); 6 exx., Antalya, 26 km W Alanya, Incecum, 16.IV.-2.V.1984, leg. V. & C. Brachat (cSch); 6 exx., Antalya, 18 km SE Gazipaşa, 36°12N, 32°25E, 180m, 16.V.2000, leg. Meybohm (cAss); 3δ δ, 7φφ, Antalya, 18 km SE Gazipaşa, 27.IV.1978, leg. Besuchet & Löbl (MHNG, cAss); 3δ δ, 6φφ, Mersin, N Anamur, 36°12N, 32°55E E, 350m, 7.V.2000, leg. Meybohm (cAss); 1φ, Mersin, road from Silifke to Gülnar, 36°22'43N, 33°49'34E, 475m, roadside, sifted grass, 27.XII.2000, leg. Wunderle (cWun); 1φ, "Lyciae Taurus" (NHMW).

R e d e s c r i p t i o n : 2.0 - 2.8 mm. Highly variable species. Colour of body usually yellowish brown to brown, with the preapical abdominal segments and sometimes the head and the central areas of the anterior abdominal terga darker; legs testaceous. Microsculpture of head and pronotum variable, usually fine and shallow, often more distinct on the latter than on the fomer; abdomen with weak, predominantly transverse microsculpture. Head, pronotum, and abdomen with extremely fine and rather sparse puncturation; punctures on elytra slightly granulose, rather dense, and much more distinct than on remainder of body.

Head weakly (ca. 1.05x) transverse or as wide as long. Eyes relatively large, their diameter subequal to that of antennomere X (see figures 161 and 162 in Pace (1983b) and Pace (1996), respectively). Pronotum 1.10 - 1.15 times as wide as head and 1.10 - 1.15 x as wide as long. Elytra without sexual dimorphism. Abdomen relatively slender, approximately 1.1 x as wide as elytra. For illustrations of the facies see figure 158 in PACE (1983b) and figure 158 in PACE (1996).

 $\delta$ : posterior margin of tergum VIII convex, in the middle with concave emargination of

variable depth; sternum VIII posteriorly convex; aedeagus with ventral process of median lobe rather long and with subparallel lateral margins (ventral view); apical lobe of paramere slender; for illustrations of the male genitalia see figures 159, 160, and 162 in PACE (1983b) and figures 159, 160, and 163 in PACE (1996).

 $\varphi$ : posterior margin of tergum VIII posteriorly weakly convex, rarely with shallow central concavity; sternum VIII posteriorly weakly convex; spermatheca variable, for illustrations see figures 163 and 161 in PACE (1983b) and PACE (1996), respectively.



Map 3: Distribution of Geostiba besuchetiana PACE in southern Anatolia (revised records).

C o m m e n t s a n d c o m p a r a t i v e n o t e s : PACE (1983b) described G. *besuchetiana* based on material collected near Kemer (Antalya). Little more than a decade later, PACE (1996) described G. *taurica* of the same subgenus from the same region, based on material from the surroundings of Finike (ca. 90km SW Antalya), several localities near Manavgat, and from Alanya. There is no reference in the original description of G. *taurica* to G. *besuchetiana*; instead, the species is compared with G. *cyprensis* PACE from Cyprus. An examination of the types of both species and numerous additional specimens from various localities in the provinces of Antalya and Mersin revealed that G. *besuchetiana* and G. *taurica* are in fact conspecific. Consequently, the latter is here placed in the synonymy of the former.

As can be inferred from the primary and secondary sexual characters, especially the morphology of the median lobe of the aedeagus (long ventral process with subparallel lateral margins), the slender shape and the chaetotaxy of the apical lobe of the paramere, as well as the morphology of the spermatheca, *G. besuchetiana* is closely related to the species of *Sipalotricha* occurring in Crete (*G. idaea* PACE, *G. icaria* PACE, *G. exsecta* ASSING, *G. meybohmi* ASSING) and Cyprus (*G. cyprensis*).

From other Turkish representatives of *Sipalotricha*, *G. besuchetiana* is readily distinguished by the central emargination of the  $\mathcal{J}$  tergum VIII, and by the primary sexual characters (morphology of median lobe of aedeagus, slender apical lobe of paramere, shape of spermatheca).

D is tribution and bionomics: The species is apparently widespread in the southwestern Anatolia (Map 3), where it was collected at low to intermediate altitudes (20 - 1000m) in a wide range of habitats (pine forests, fallows, ruderal grassland, etc.). Teneral specimens were observed during the period from March through June.

# 3.3.2. Geostiba (Sipalotricha) euxina PACE 1983

Geostiba (Lioglutosipalia) euxina PACE 1983b: 37ff.

T y p e s e x a m i n e d : <u>Holotype</u>  $\delta$ : Turquie Trabzon, Soumela Meriemana, 12.14.VI.69, 1000-1600 m., leg. Osella / HOLOTYPUS Geostiba euxina m. det. R. PACE 1981 / Geostiba euxina n. sp. det. R. Pace 1981 (MHNG). <u>Paratypes</u>:  $1\delta$ : same data as holotype (MHNG);  $1_{\varphi}$ : Turquie Trabzon, Maçka, 16-V.67, Cl. Besuchet (MHNG).

R e d e s c r i p t i o n : 2.0 - 2.4 mm. Externally similar to G. besuchetiana, but distinguished as follows:

Head and pronotum with more distinct microsculpture and less shine. Elytra with indistinctly granulose puncturation. Eyes small, their diameter subequal to that of antennomere IV; for an illustration see figure 174 in PACE (1983b). Pronotum 1.10 - 1.15 x as wide as head and approximately 1.10 x as wide as long. Abdomen relatively wider, 1.18 -1.25 x as wide as elytra; for an illustration of the habitus see figure 170 in PACE (1983b). Microsculpture on posterior half of tergum VII predominantly isodiametric.

 $\delta$ : tergum VIII posteriorly without central emargination; aedeagus with ventral process of median lobe more distinctly bent (lateral view), its lateral margins not distinctly parallel (ventral view); apical lobe of paramere much stouter; for illustrations of the aedeagus see figures 171, 172, and 175 in PACE (1983b).

q: spermatheca as figured by PACE (1983b).

C o m p a r a t i v e n o t e s : For distinction from the other Turkish congeners of *Sipalotricha*, see the comparative notes below those species and the key (section 4).

D i s t r i b u t i o n : The species is known only from two localities in Trabzon, northeastern Anatolia.

#### 3.3.3. Geostiba (Sipalotricha) medea PACE 1996 (Figs. 72-76)

Geostiba (Ditroposipalia) medea PACE 1996: 28.

M a t e r i a l e x a m i n e d : 13:3 / Asia min. Missis / ex coll. O. Kaiser / ex coll. Scheerpeltz / TYPUS Sipalia asiae-minoris O. Scheerpeltz (NHMW); 10, Adana, N Osmaniye, Karatepe Nat. Park, 200m,  $37^{\circ}17'12N$ ,  $36^{\circ}14'22E$ , Laurisilva with *Quercus suber*, 28.XII.2000, leg. Assing (cAss).

R e d e s c r i p t i o n : 2.0 - 2.5 mm. Coloration as in *G. besuchetiana*. Head and pronotum with extremely fine and rather sparse, abdomen with fine puncturation; punctures on elytra finely granulose, relatively dense, and coarser than on remainder of body; forebody with pronounced microreticulation, head and pronotum only with little shine; microsculpture of abdomen distinct, predominantly composed of transverse meshes of variable length on anterior terga and of distinct isodiametric meshes on tergum VII.

Head weakly transverse or as wide as long; eyes relatively large, almost as large as in G. *besuchetiana*. Pronotum approximately 1.20 x as wide as head and 1.20 x as wide as long. Elytra without sexual dimorphism. Abdomen relatively wide, 1.15 - 1.20 times as wide as elytra.

 $\delta$ : general outline of tergum VIII weakly convex, but in the middle broadly and shallowly concave; sternum VIII moderately convex posteriorly, marginal setae in the middle very long and laterally relatively short; aedeagus with ventral process of median lobe relatively short, in lateral view rather broad and weakly bent; crista apicalis and crista proximalis well-developed (Figs. 72-73); apical lobe of paramere as in Fig. 74.

q: tergum VIII weakly convex posteriorly, chaetotaxy similar to that in  $\delta$ ; posterior margin of sternum VIII weakly concave in the middle, marginal setae rather stout and long (Fig. 76). Spermatheca of highly distinctive shape, somewhat resembling the condition in *G. oertzeni* of the subgenus *Ditroposipalia*, but with capsule of different morphology (Fig. 75).

C o m p a r a t i v e n o t e s: From all Turkish species of *Sipalotricha*, *G. medea* is distinguished by its distinct microsculpture especially of head and pronotum, by the broad and distinctly transverse pronotum, by the morphology of the median lobe of the aedeagus, and especially by the shape of the spermatheca. From all species, except for *G. euxina*, it additionally differs in the relatively wide abdomen. The following two species are smaller and characterized by the modifications of the  $\mathcal{J}$  elytra.

C o m m e n t s : The original description is based on a single female. Nevertheless, it was originally attributed to the *Ditroposipalia*, which is distinguished from other subgenera by the male secondary sexual characters. It was not possible to examine the holotype, since it is deposited in the currently inaccessible collection of H. Franz, Mödling In spite of the assistance of several experienced colleagues, I have been unable to identify the type locality of the species, which, according to the original description, is "Sehellusdag". The female indicated above is here tentatively attributed to *G. medea*, especially based on the spermatheca, whose general morphology (short, wide, and untwisted duct) is quite uncommon among species of *Geostiba*. The locality ("Missis") specified on the label attached to the male from the Scheerpeltz collection is probably identical with Misis (=Yakapinar) near Adana, which is not very far from the place where the female was collected. Both specimens are very similar in external appearance, so that they are hypothesized to be conspecific.

D is tribution and bionomics: The species is known from two localities in the province of Adana, central southern Anatolia: Yakapinar ("Missis") and Karatepe National Park near Osmaniye. The female was sifted from leaf litter in a laurel forest at an altitude of 200m.

#### 3.3.4. Geostiba (Sipalotricha) emirdaghensis sp. n. (Figs. 77-81)

Sipalia (Trachyglutosipalia) emirdaghensis i. 1.: SCHEERPELTZ 1951: 177.

H o l o t y p e  $\delta$  :  $\delta$  / Emir-Dagh- / Gbg. Asm. c. / Galatien- / Phrygien. / Weirather, / Innsbruck / ex coll. Scheerpeltz / TYPUS Sipalia emirdaghensis O. Scheerpeltz / Holotypus  $\delta$  Geostiba emirdaghensis sp. n. det. V. Assing 2001 (NHMW).

P a r a t y p e s :  $2\delta\delta$  [1 $\delta$  teneral, 1 $\delta$  without aedeagus]: same data as holotype (NHMW, cAss).

D e s c r i p t i o n : 1.8 - 2.2 mm. Colour of body entirely testaceous, abdomen in one paratype slightly darker. Head and pronotum with extremely fine and rather sparse puncturation and with indistinct microsculpture; abdomen with distinct microreticulation, puncturation fine and sparse.

Head approximately as wide as long. Eyes small, about as large as antennomere IV in cross-section. Pronotum approximately 1.15 x as wide as head and 1.15 x as wide as long.

 $\delta$ : elytra with distinctly granulose and dense puncturation; on either side of suture slightly elevated and with coarsely granulose punctures. Tergum VII in posterior half with some distinct granula, the microsculpture similar to that of anterior terga. Posterior margin of tergum VIII convex and with sparse setae (Fig. 80); sternum VIII posteriorly obtusely pointed, with long setae, laterally also with several short setae (Fig. 81). Median lobe of aedeagus and apical lobe of paramere as in Figs. 77-79, internal sac with some large spines.

q: unknown.

Derivatio nominis: The name is derived from the type locality of the species, the Emir Dağlari.

Comparative notes and systematics: From the preceding Turkish species of *Sipalotricha*, this species is readily distinguished by its smaller size, the lighter coloration, the modifications of the male elytra, and by the male sexual characters. For separation from the following species see the description and comparative notes below.

SCHEERPELTZ (1951) listed - but did not describe - the species in the subgenus *Trachy-glutosipalia*, probably because of the presence of granula on the male tergum VII. Based on other morphological characters, especially the male genitalia, however, there is little doubt that *G. emirdaghensis* is more closely related to *G. euxina*, *G. medea*, and the following species of the subgenus *Sipalotricha* than to species currently attributed to *Trachyglutosipalia*, most of which occur in Italy, some also in France and Spain, and only two in the Balkans.

D is tribution: The species is probably endemic in the Emir Dağlari, Afyon, in western central Anatolia.

#### 3.3.5. Geostiba (Sipalotricha) itschiliensis sp. n. (Figs. 82-88)

H o l o t y p e  $\delta$ : TR-Südküste, Str. Anamur/Ermenek, 47 km vor Ermenek; 1450m, 20.5.2000, Meybohm/Brachat / Holotypus  $\delta$  Geostiba itschiliensis sp. n. det. V. Assing 2001 (cAss). P a r a t y p e s :  $2\delta \delta$ , 8 q q: same data as holotype (MHNG, cAss).

D e s c r i p t i o n : 1.9 - 2.3 mm. Colour of body testaceous, with the abdominal terga V-VII darkened to various extents. Head and pronotum with extremely fine and rather sparse puncturation; microreticulation somewhat more distinct on head than on pronotum; abdominal terga III-VI with distinct, but shallow microsculpture predominantly composed of more or less transverse meshes, puncturation fine and sparse.

Head weakly (ca. 1.05x) transverse; eyes distinctly larger than antennomere IV in crosssection. Pronotum approximately 1.10 x as wide as head and 1.15 x as wide as long.

 $\delta$ : elytra with granulose, though not very dense puncturation; on either side of suture with rather dense and coarsely granulose punctures, which (in large  $\delta$ ) are denser and coarser near apex of scutellum than elsewhere. Tergum VII with distinct isodiametric microreticulation, in posterior half without granula; tergum VIII posteriorly weakly convex and with row of moderately sparse marginal setae; hind margin of sternum VIII distinctly convex, laterally with short and relatively stout, and centrally with long and thin marginal setae (Fig. 87). Median lobe of aedeagus and apical lobe of paramere as in Figs. 82-84, internal sac apparently without spines.

q: elytra with suture usually weakly elevated near apex of scutellum; puncturation not granulose. Tergum VII with more or less transverse microsculpture, similar to that of anterior terga; tergum VIII of similar shape and chaetotaxy as in  $\delta$ ; sternum VIII posteriorly weakly concave in the middle and with stout marginal setae (Fig. 88). Spermatheca as in Figs. 85-86.

Derivatio nominis: The name is derived from the ancient name of the mountain range (Itsch-Ili), where the types were found.

C o m p a r a t i v e n o t e s: From G. emirdaghensis, G. itschiliensis is separated by the different coloration, the larger eyes, the relatively more transverse head, the different modifications of the  $\delta$  and  $\varphi$  elytra, the more distinctly marked difference between the microsculpture of the  $\delta$  tergum VII and the anterior terga, the absence of granula on the  $\delta$  tergum VII, the larger median lobe of the aedeagus, the longer and more slender ventral process of the median lobe, and the different shape and chaetotaxy of the apical lobe of the paramere. From all other Turkish congeners of Sipalotricha, the species is distinguished by smaller size, the modifications of the  $\delta$  elytra, and by the primary sexual characters.

Distribution and bionomics: The species was discovered in the Taşeli Yaylasi range, north of Anamur, Mersin, at an altitude of 1450m.

# 3.3.6. Geostiba (Sipalotricha) lucens (BENICK 1970), comb. n. (Figs. 89-97, Map 4)

#### Ousipalia lucens BENICK, 1970: 6f.

Atheta (Microdota) glaberima [sic] BENICK, 1981: 305ff., syn. n.

T y p e s e x a m i n e d : *Ousipalia lucens*: <u>Holotype</u>  $\varphi$ :  $\varphi$  / Mödling Umgebg. A. i. H. Franz / Atheta (Ousip.) lucens G. Bk. TYPUS / Geostiba lucens det. J. Vogel, 1996 / Geostiba lucens (Benick) det. V. Assing 2001 (MHNG). <u>Paratype</u>  $\delta$ :  $\delta$  / Umg. Mödling, Austria inf., lg. H. Franz / Ousipalia lucens G. Benick, Para-TYPUS (MHNG).

Atheta glaberima: <u>Holotype</u>  $\varphi: \varphi$  / GRECE Rhodes, Mt. Profitis Ilias, 600m, 24.IV.73, Cl. Besuchet / Microdota glaberrima G. Bck.  $\varphi$  / Geostiba glaberrima det. J. Vogel, 1996 / Geostiba lucens (Benick) det. V. Assing 2001 (MHNG). <u>Paratype</u>  $\delta: \delta$  / GRECE Rhodes, Petaloudes, 26.IV.73, Cl. Besuchet / Microdota glaberrima  $\delta$  G. Bck. Allotypus (MHNG).

A d d i t i o n a l m a t e r i a l e x a m i n e d :  $2_{QQ}$ , Turkey, Isparta, Beysehir, 7 km S Gedikli, 1000m, 14.V.2000, leg. Meybohm & Brachat (cAss, cWun).; 13, Greece, Pelopónnisos, Panahaiko, above Ano Kastritsi, 38°14'58N, 21°51'32E, 1500m, 28.III.1997, leg. Assing (cAss); 13, Austria, Niederösterreich, Eggendorf, dry grassland and pine forest, sifted from moss and lichens in very dry microhabitat, 25.III.1995, leg. Schuh (cAss).

R e d e s c r i p t i o n : 1.7 - 2.2 mm. Darker than other Turkish species of *Sipalotricha*; body dark brown to blackish brown, with the pronotum and the anterior abdominal segments usually slightly lighter; elytra light brown to brown; legs and antennae light brown. Puncturation of head and pronotum extremely fine and sparse, barely noticeable; punctures on elytra fine and dense, on abdomen fine and sparse. Microsculpture on head and pronotum very fine, shallow, sometimes indistinct; elytra with distinct microreticulation; abdomen with shallow, but distinct transverse microsculpture.

Head 1.0 - 1.1 x as wide as long, behind eyes usually slightly widened; eyes relatively large, their diameter distinctly exceeding that of antennomere X. Pronotum approximately 1.5 x as wide as head and 1.2 x as wide as long. Elytra at suture either distinctly (ca. 0.85x) shorter than or as long as pronotum; hind wings reduced or fully developed. Abdomen in brachypterous specimens approximately as wide as elytra.

 $\delta$ : posterior margin of tergum VIII weakly convex, in the middle truncate or indistinctly concave (Fig. 95); sternum VIII posteriorly obtusely pointed (Fig. 96); aedeagus with median lobe relatively small and with ventral process of median lobe rather short and stout (Figs. 89-90); apical lobe of paramere short and broad, apically abruptly narrowed (Fig. 91).

 $\varphi$ : tergum VIII of similar shape and chaetotaxy as in  $\delta$ ; sternum VIII posteriorly weakly convex and with row of rather long and stout marginal setae (Fig. 97); spermatheca as in Figs. 92-94.

C o m p a r a t i v e n o t e s : The species is separated from all other Turkish species of *Sipalotricha* by the dark coloration, the weak microsculpture of the head and pronotum, and by the sexual characters.

C o m m e n t s : Based on an examination of external characters, the genitalia, and of the mouthparts, as well as on a comparison with *Ousipalia caesula* (ERICHSON), the type species of *Ousipalia* DES GOZIS, *Ousipalia lucens* is here transferred to *Geostiba*. The species is distinguished from *O. caesula* by various characters, especially the different morphology and chaetotaxy of the labrum, the morphology of the labial palpi with an oblong second joint (transverse in *O. caesula*), by the shape and chaetotaxy of the  $\delta$  and  $\varphi$  sternum VIII, and especially by the completely different morphology of the genitalia (median lobe of the aedeagus, shape and chaetotaxy of the apical lobe of the paramere, shape of the spermatheca). On the other hand, no significant differences could be found between this species and *Geostiba* species of the subgenus *Sipalotricha*.

It was Jürgen Vogel, Görlitz, who informed me that the types of *Atheta glaberima* in many ways resembled *Ousipalia lucens*, but had distinctly longer elytra. An ensuing examination of these types indeed yielded no convincing evidence that *A. glaberima* is specifically distinct from *O. lucens*. They are evidently macropterous *O. lucens*, so that *A. glaberima* BENICK is here placed in the synonymy of that species.

Geostiba lucens is the third example of wing-dimorphism in the genus. Previously, wingdimorphism was observed for *G. circellaris* and *G. oertzeni* (ASSING 1999). It seems noteworthy that the presence (and dominance) of the macropterous morph in the island of Rhodes is paralleled by another species of Staphylinidae: Othius lapidicola MÄRKEL & KIESENWETTER (ASSING 1997).



Map 4: Distribution of Geostiba lucens (BENICK) (revised records).

D is tribution: Like the two other wing-dimorphic Geostiba species, G. lucens has a vast area of distribution, which ranges from southern Anatolia in the southeast to southeastern Austria in the northwest (Map 4). Unlike G. circellaris and G. oertzeni, however, it seems to be extremely rare. To my knowledge, apart from the types and additional material listed below, no further specimens have been collected. The few data available suggest that G. lucens preferably occurs in dry and warm habitats, at least these were the conditions where the specimens from the Pelopónnisos, Eggendorf (Austria), and from Turkey were found.

# 3.4. Species incertae sedis

# 3.4.1. Geostiba seleucica PACE 1983 (Fig. 108)

Geostiba (Myoposipalia) seleucica PACE 1983b: 41f.

Type examined: <u>Holotype</u> 3: Turquie Antakya Kişlak-Şenköy, 800-850m, 2.V.74, Besuchet Löbl / HOLOTYPUS Geostiba seleucica m. det. R. PACE 1981 / Geostiba seleucica n. sp. det. R. Pace 1981 (MHNG).

R e d e s c r i p t i o n : 2.3 mm. Colour of body including appendages entirely testaceous. Puncturation of whole body rather sparse and extremely fine, barely noticeable. Microsculpture shallow, integument rather shiny.

Eyes reduced to minute rudiments, without pigmentation and ommatidia. Head indistinctly longer than wide. Pronotum slightly (1.12x) wider than head and 1.05 x as wide as long. Mesotarsi with the fourth and fifth tarsomere indistinctly separated, almost completely fused (Fig. 108).

 $\delta$ : tergum VII unmodified; tergum VIII posteriorly broadly concave; posterior margin of sternum VIII distinctly convex. For illustrations of the aedeagus see figures in PACE (1983b).

q: unknown.

C o m p a r a t i v e n o t e s : From all Turkish congeners, except for G. confusa sp. n. (see below), G. seleucica differs in the minute eye rudiments. According to PACE (1983b), it is similar to G. scheerpeltziana (FAGEL) from Lebanon, but distinguished from that species by the less transverse pronotum, the more strongly reduced eyes, its greater body size, and by the morphology of the aedeagus.

Systematic notes: Originally, G. seleucica was attributed to the subgenus Myoposipalia SCHEERPELTZ, which, however, was tentatively synonymized with Sphenosipalia SCHEERPELTZ by PACE (1983a); for a discussion of the systematic status of Myoposipalia see ASSING (2000a). The type species of Sphenosipalia is G. ensifera (GANGLBAUER) from southern France. Six more species have been described in or attributed to Sphenosipalia and Myoposipalia, respectively (PACE 1983a, 1983b), one from France, one from Spain, three from Turkey, and one from Lebanon. For biogeographical and morphological reasons it seems most unlikely that the taxa from Western Europe and those from Asia Minor and the Middle East together should form a monophyletic group. Therefore, the subgenus Sphenosipalia is here proposed to include the Western European taxa (G. ensifera, G. cryptophthalma (SCHEERPELTZ), and G. osellaiana PACE); the Turkish species G. uhligi PACE (including its synynym G. mysia PACE) is attributed to Ditroposipalia SCHEERPELTZ based on the male secondary sexual characters, and G. seleucica, G. scheerpeltziana, and G. confusa sp. n. (see below) are treated as species incertae sedis. A subgeneric assignment of the latter two species would be premature at the current state of knowledge of the phylogenetics of Geostiba.

The morphology of the mesotarsi approaches the condition in *Paraleptusa* PEYERIMHOFF, which is characterized by four-jointed mesotarsi, but otherwise similar to *Geostiba*. (The lower number of mesotarsomeres is apparently a reduction resulting from the fusion of the two apical tarsomeres.) Nevertheless, *G. seleucica* is here attributed to *Geostiba*, because it seems very likely that transferring the species to *Paraleptusa* would render that genus polyphyletic (although this may be the case already). For a more detailed discussion see the comments below the following species.

D is tr i b u t i o n : G. seleucica has become known only from the type locality in Antakya, southern Anatolia.

# 3.4.2. Geostiba confusa sp. n. (Figs. 98-107)

Holotype  $\delta$ : TR - Adana, N Osmaniye, Karatepe Nat. Park, 200m, 37°17'12N, 36°14'22E, Laurisilva, Q. suber, N. 13, 28.12.2000, V. Assing / Holotypus  $\delta$  Geostiba confusa sp. n. det. V. Assing 2001 (cAss).

P a r a t y p e s :  $7\delta \delta$ ,  $1_{Q}$ , same data as holotype, leg. Assing, Wunderle (cAss, cWun).

D e s c r i p t i o n : 1.8 - 2.2 mm. Colour of body including appendages entirely testaceous. Puncturation of head, pronotum, and abdomen rather sparse and very fine. Whole body with microsculpture predominantly composed of isodiametric meshes, that of head very shallow and indistinct, that of pronotum, elytra, and abdomen more distinct.

Eyes reduced to minute rudiments, without pigmentation and ommatidia. Head approximately 1.1 x as long as wide; maxillary palpus as in Fig. 106. Pronotum weakly transverse, approximately 1.05 - 1.10 x as wide as long and 1.1 x as wide as head (Fig. 105). Elytra in both sexes distinctly granulose; in 3 with pair of small and subcircular, but usually distinctly projecting tubercles near apex of scutellum, and in the middle of lateral margin with more or less pronounced carina (Fig. 105). Mesotarsus with fourth and fifth tarsomere almost completely fused (Fig. 107). Abdomen slightly (1.05 - 1.15) wider than elytra.

 $\delta$ : tergum III in the middle with extensive (though rather flat) elevation; tergum VII with long and weakly erect median process at posterior margin (Fig. 104) (somewhat resembling the condition in  $\delta$  *Geostiba* s. str., but less erect and flatter in lateral view); this process may be completely reduced; tergum VIII distinctly convex posteriorly (Fig. 102); hind margin of sternum VIII obtusely pointed (Fig. 103); aedeagus with broadly triangular ventral process, with indistinct crista proximalis and crista apicalis, and with long flagellum in the internal sac (Fig. 98-99); apical lobe of paramere of similar shape and chaetotaxy as in *Geostiba* s. str. (Fig. 100).

q: terga III and VII unmodified; tergum VIII of similar shape and chaetotaxy as in  $\delta$ ; general outline of posterior margin of sternum VIII weakly convex, in the middle weakly concave; spermatheca as in Fig. 101.

D e r i v a t i o n o m i n i s : The name (Lat., adj.: fused, confused) refers to both the fused fourth and fifth mesotarsomere and to the author's state of mind when trying to determine the phylogenetic affiliations and systematic status of this species.

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 are subject to pronounced intraspecific variation. The pair of elytral tubercles near the apex of the scutellum may be weakly projecting and indistinct, and the lateral carinae may be completely obsolete. A remarkable dimorphism was observed for the process of tergum VII, which was present in five of the male types and completely absent in the remaining three specimens.

C o m p a r a t i v e n o t e s : From *G. seleucica*, the only Turkish congener with similarly reduced eyes (without ommatidia and pigmentation), *G. confusa* is distinguished by the lesser size, the more oblong head, the granulose puncturation of the elytra, and especially by the male primary and secondary sexual characters (modifications of elytra, tergum III, and tergum VII; shape of posterior margin of tergum VIII, morphology of median lobe of aedeagus (lateral view), and chaetotaxy of the apical lobe of the paramere).

Systematics and phylogenetics: Based on the four-jointed mesotarsus, the species would have to be attributed to Paraleptusa PEYERIMHOFF. For various reasons, however, it is here placed in the genus Geostiba. Despite the considerable number of differences pointed out above, G. confusa shares various characters with G. seleucica. Apart from the reductions of the eyes and the pigmentation, both species are similar in external characters (facies, proportions, morphology of antenna and maxillary palpus, etc.), in the morphology of the median lobe of the aedeagus (broad ventral process, reduced cristae, long flagellum in internal sac), and in the shape of the apical lobe of the paramere. In addition, the fourth and fifth mesotarsomere are fused in G. seleucica, too, though not as completely as in G. confusa (see Fig. 108), which suggests that this is an evolutionary trend within Geostiba and that fused tarsomeres are either autapomorphic or a synapomorphy of G. seleucica and G. confusa. The latter hypothesis would be supported not only by the morphological evidence indicated above, but also by biogeographical arguments. The type localities of both species are separated by only some 130 km, that of G. seleucica is situated in the southern Nur Dağlari and that of G. confusa in the area north of this mountain range. Apart from the morphology of the mesotarsus, additional characters separating both species from Geostiba were not observed.

The only known representatives of *Paraleptusa* in the eastern Mediterranean are *P. graeca* (BERNHAUER) and *P. wunderlei* ASSING, both from Greece and both with completely fused mesotarsomeres IV and V (even more so than in G. *confusa*). They are distinguished from *G. seleucica* and *G. confusa* by the less reduced eyes (ommatidia and pigmentation present), by the chaetotaxy of tergum and sternum VIII, by the morphology of the aedeagus (short ventral process, pronounced crista proximalis, short flagellum in internal sac, broadly triangular apical lobe of paramere), and - judging from the  $\varphi$  genitalia of *P. wunderlei* and *G. confusa* - also by the morphology of the spermatheca. Consequently, it seems likely that if *G. seleucica* and *G. confusa* were included in *Paraleptusa*, this would render the genus polyphyletic.

The phylogenetic affiliations of G. confusa and G. seleucica within Geostiba are doubtful (see also comments in section 3.4.1.), so that they are here considered species incertae sedis. Remarkably, the  $\delta$  modifications of the elytra, tergum III, and tergum VII as well as the morphology and chaetotaxy of the apical lobe of the paramere in G. confusa somewhat resemble those in many species currently attributed to Geostiba s. str. On the other hand, G. confusa is distinguished from these species by the reduced eyes and pigmentation, the smaller size, the morphology of the mesotarsus, and by sexual characters (absence of a cristal process of the aedeagus, morphology of spermatheca). Moreover, a closer relationship with Geostiba s. str. would be in conflict with the phylogenetic affiliations suggested by the similarities with G. seleucica, which differs from Geostiba s. str. in a great number of characters.

D is tribution and bionomics: The species was collected in the Karatepe National Park, eastern Adana province, in a remarkable laurel wood with *Quercus suber* undergrowth at an altitude of 200m. The reduced eyes and pigmentation suggest that its distribution is restricted to this region.

#### 4. Key to the Turkish species of Geostiba

The following key includes all the known Turkish species of the genus except for G. *attaleensis* Pace (type locality near Alanya), whose original description is based on a single female and whose male primary and secondary characters, which are essential for an unambiguous interpretation, are unknown.

The references to illustrations of distinguishing characters in the literature are abbreviated as follows: A99 = ASSING (1999), A00b = ASSING (2000b), P83a = PACE (1983a), P83b = PACE (1983b), P96 = PACE (1996).

- Larger species (ca. 2.4 mm). Elytra with weakly granulose puncturation. δ: elytra and abdominal terga III and VII unmodified; tergum VIII posteriorly concave; aedeagus with ventral process of median lobe in lateral view distinctly curved, apical lobe of paramere with long apical setae (Figs. P83b). q: unknown. Southern Nur Dağlari (Antakya)......G. seleucica PACE
- Smaller species, 1.8 2.2 mm. Elytra with distinctly granulose puncturation in both sexes. 3: elytra with pair of circular tubercles near apex of scutellum and (mostly) with carina in the middle of lateral margin (Fig. 105); tergum III with more or less extensive median elevation; tergum VII at posterior margin with or without long and acute, weakly erect median process (Fig. 104); tergum VIII posteriorly distinctly convex (Fig. 102); aedeagus with ventral process of median lobe in lateral view almost straight (Figs. 98-99); apical lobe of paramere with short apical setae (Fig. 100). q: spermatheca as in Fig. 101. East of Adana province.

- 5. On average larger species. Coloration of body usually lighter, pronotum and elytra yellowish to reddish brown. S: aedeagus larger, median lobe with base of ventral process in lateral view bulging, and ventral process in ventral view broader (Figs. 1-2). o: spermatheca with longer and proximally wider duct (Fig. 4). Widespread wing-dimorphic species. In Turkey only once recorded from Bolu.

- δ: posterior margin of pronotum broadly truncate or (broadly or narrowly) concave in the middle (large δ δ). (Note that in small δ δ of G. kastamonuensis, a species with a distinctive cristal process of the median lobe of the aedeagus, the pronotal hind margin is smoothly convex.)

- S: abdominal terga III and IV unmodified. Species from northern Turkey (Thrace, northern Anatolia) or from Konya.
- Pronotum shining, microreticulation very shallow; abdomen with denser puncturation.
  δ: posterior margin of pronotum indistinctly concave to smoothly convex (Fig. 44); elytra with distinctly granulose and denser puncturation; aedeagus smaller and with stouter cristal process (Figs. 40-41). Eastern Anatolia (Bitlis).....G. bitlisensis sp. n.
- 9. S: pronotum (in large SS!) distinctly oblong, more or less extensively depressed, strongly projecting posteriorly, and with broadly and distinctly concave hind margin (Fig. P83b); elytra with distinctly elevated (bulging) lateral margins; process of tergum VII wide-based, apically rounded, and in lateral view rather slender; aedeagus: Figs. P83b. Southern Anatolia (Konya)......G. iconiensis PACE

- δ: pronotum in large δδ less strongly projecting posteriorly, lateral margins near posterior angles not distinctly concave, hind margin in the middle truncate or broadly concave; abdomen very finely punctate; process of tergum VII more slender and apically more acute; aedeagus with cristal process of median lobe very short and thin. Thrace (surroundings of Istanbul)......G. turcica (BERNHAUER)
- S: terga III-V unmodified......16
- 13 δ: abdominal tergum III with tubercle at posterior margin and tergum IV with median tubercle; elytra with pronounced impression and with very dense and coarsely granulose puncturation (Fig. 32); aedeagus with stouter cristal process (Figs. 27-28). q: elytra with shallow impression and with dense and distinctly granulose puncturation (but less so than in δ); spermatheca as in Fig. 30. Central southern Anatolia (Mersin)...... G. granulipennis sp. n.
- δ: abdominal tergum IV with median tubercle near anterior impression (additional tubercles may be present on terga III and V); elytra with sparser and less distinctly granulose puncturation; aedeagus with more slender cristal process.

- 14. δ: abdominal terga III-V with tubercle; process of tergum VII wide-based and short (Fig. P96); elytra with sparser puncturation; median lobe of aedeagus at base of ventral process not strongly excavate in lateral view; cristal process slightly bent dorsad (Figs. P96). Northeastern Anatolia (Rize)......G. pontica PACE
- 15. δ: posterior margin of pronotum weakly convex to indistinctly concave (Fig. 44); process of tergum VII short and wide-based (Fig. 43); median lobe of aedeagus smaller, at base of ventral process not strongly excavate in lateral view; cristal process of median lobe stouter (Figs. 40-41). Eastern Anatolia (Bitlis).....G. bitlisensis sp. n.
- δ: posterior margin of pronotum pointed (Fig. 39); process of tergum VII long and slender (Fig. 38); median lobe of aedeagus larger, at base of ventral process strongly excavate in lateral view; cristal process very slender (Figs. 33-34). φ: spermatheca as in Figs. 36-37. Central southern Anatolia (Mersin)........G. balkarensis sp. n.

 3: elytra with fold-like elevation or tubercle near posterior angles. Species from southern Anatolia (Mersin).

- δ: elytra without fold-like elevation or tubercle. Species from NW-Turkey or from central southern Anatolia.
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- 3: tergum VII near posterior margin with pair of more or less pronounced carinae; elytra with a carina on either side of suture or with suture forming a narrow carina. Subgenus Ditroposipalia SCHEERPELTZ.
- δ: tergum VII unmodified or with sparse granula in posterior half; elytra unmodified, or on either side of suture weakly elevated and with dense, coarsely granulose puncturation. Subgenus Sipalotricha SCHEERPELTZ.

- 23. ♂: elytra near apex of scutellum and along anterior 2/3 of suture each with more or less strongly elevated carina of variable breadth parallel to suture; tergum VII with pair of subparallel carinae, in large ♂ extending over posterior 2/5 of tergum and separated by a distance approximately equal to their width or greater; tergum VIII posteriorly more or less convex, weakly to distinctly emarginate in the middle, and with pair of flat, sometimes indistinct tubercles (Figs. 68-70); aedeagus as in Figs. 61-62. ♀: spermatheca of highly variable shape (Figs. 64-67). Central southern Anatolia: Nur Dağlari.

- 25. δ: elytral impressions shallower, sutural carinae anteriorly narrower, less strongly elevated, and without coarse puncturation or sculpture; tergum VII with usually pronounced, though relatively short pair of carinae, these carinae separated by a distance distinctly less than their width and posteriorly merging (Fig. 56); median lobe of aedeagus apically more acute (ventral view) and less slender (Figs. 51-52). q: spermatheca as in Figs. 54-55. Northeastern Anatolia: Artvin....................... G. fabaeformis sp. n.
- δ: elytral impressions more pronounced; sutural carinae anteriorly very wide and strongly elevated, decreasing in width and elevation posteriad, coarsely and granulosely sculptured, and mat; pair of carinae at posterior margin of tergum VII almost straight and parallel, separated by a distance greater than their width (Fig. 59); median lobe of aedeagus with ventral process less acute (ventral view) and more slender (lateral view) (Figs. P83b). q: spermatheca as in Fig. 58. Northeastern Anatolia: Rize ...... G. rizensis PACE

- Forebody with weaker microsculpture, head and pronotum with more shine. Pronotum less transverse, 1.10 1.15 x as wide as head and approximately 1.10 x as wide as long.
  δ: aedeagus: Figs. P83b. q: spermathecal duct relatively longer, more slender, and twisted (Figs. P83b). Northeastern Anatolia (Trabzon)......G. euxina PACE

#### 5. The genus Tropimenelytron PACE 1983

#### 5.1. Tropimenelytron tuberiventris (EPPELSHEIM 1880)

Homalota (Geostiba) tuberiventris EPPELSHEIM 1880: 462f.

Material examined: 4δ δ, 9 φ φ, Artvin, Pirnalli, Karkal Daği, 1600m, 11.VI.1986, leg. Besuchet, Löbl & Burckhardt (MHNG, cAss).

The species was previously known only from Italy and the Caucasus region (PACE 1983c). It is here recorded from Turkey for the first time.

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#### Zusammenfassung

Auf der Grundlage von Typenuntersuchungen und der Bearbeitung weiteren Materials werden die türkischen Arten der Gattung Geostiba revidiert. Insgesamt 31 valide Arten werden drei Untergattungen zugeordnet: Geostiba s. str. (17 Arten, davon eine nicht deutbar), Ditroposipalia SCHEERPELTZ (6 Arten), und Sipalotricha SCHEERPELTZ (6 Arten). Zwei Taxa mit verschmolzenen vierten und fünften Mesotarsengliedern werden als Arten incertae sedis betrachtet; ihre phylogenetischen Beziehungen zu Paraleptusa PEYERIMHOFF werden diskutiert. Morphologische Merkmale und phylogenetische Argumente deuten darauf hin, dass es sich bei Geostiba s. str. um ein Polyphylum handelt. 11 neue Arten werden beschrieben und von verwandten Arten unterschieden; Differentialmerkmale werden abgebildet: Geostiba confusa sp. n., G. (s. str.) sororcula sp. n., G. (s. str.) akceliensi sp. n., G. (s. str.) artvinensis sp. n., G. (s. str.) granulipennis sp. n., G. (s. str.) balkarensis sp. n., G. (s. str.) bitlisensis sp. n., G. (s. str.) lunata sp. n., G. (Ditroposipalia) fabaeformis sp. n., G. (Sipalotricha) emirdaghensis sp. n. und G. (S.) itschiliensis sp. n. Abgesehen von einigen erst kürzlich revidierten Vertretern der Untergattung Geostiba s. str. werden die übrigen Arten redeskribiert. Erstmals werden das Männchen von G. medea PACE und das Weibchen von G. rizensis PACE beschrieben. Folgende Arten werden synonymisiert oder neu kombiniert: Geostiba helvetiorum PACE 1983 = G. helvetiorum humicola PACE 1983, syn. n., = G. helvetiorum obscura PACE 1983, syn. n.; G. uhligi PACE 1983 = G. mysia PACE 1983, syn. n.; G. besuchetiana PACE 1983 = G. taurica PACE 1996, syn. n.; G. lucens (BENICK, 1970), comb. n. (vorher Ousipalia DES GOZIS) = Atheta (Microdota) glaberima BENICK, 1981, syn. n. Geostiba lucens, die dritte flügeldimorphe Art der Gattung, und G. circellaris (GRAVENHORST, 1806) werden erstmals für die Türkei nachgewiesen. Die Beschreibungen werden durch systematische, ökologische und biogeographische Anmerkungen sowie durch eine Bestimmungstabelle ergänzt. Für G. oertzeni (EPPELSHEIM), G. uhligi PACE, G. besuchetiana PACE und G. lucens (BENICK) werden Verbreitungskarten vorgelegt. Tropimenelytron tuberiventris (EPPELSHEIM) wird erstmals für die Türkei nachgewiesen.

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Figs. 1-4: Geostiba circellaris (GRAVENHORST): 1, 2 – median lobe of aedeagus in lateral and in ventral view; 3 – apical lobe of paramere; 4 – spermatheca. Scale: 0.1 mm.



Figs. 5-11: Geostiba sororcula sp. n.: 5, 6 – median lobe of aedeagus in lateral and in ventral view; 7 – apical lobe of paramere; 8 – spermatheca; 9 – posterior half of  $\delta$  tergum VII; 10 – posterior margin of  $\delta$  tergum VIII; 11 – posterior margin of  $\delta$  sternum VIII; long setae omitted in 10-11. Scale: 5-8, 10-11: 0.1 mm; 9: 0.2 mm.



Figs. 12-19: Geostiba artvinensis sp. n.: 12, 13 – median lobe of aedeagus in lateral and in ventral view; 14 – outline of  $\delta$  forebody; 15 – apical lobe of paramere; 16-18 – spermathecae of 3 QQ; 19 – posterior margin of  $\delta$  tergum VII in antero-dorsal view (setae omitted). Scale: 12-13, 15-18: 0.1 mm; 19: 0.2 mm; 14: 0.4 mm.



Figs. 20-26: Geostiba akceliensis sp. n.: 20, 21 – median lobe of aedeagus in lateral and in ventral view; 22 – apical lobe of paramere; 23 – spermatheca; 24 – process of  $\sigma$  tergum VII in anterodorsal view; 25 – process of  $\sigma$  tergum VII in lateral view; 26 – outline of  $\sigma$  forebody. Scale: 20-25: 0.1 mm; 26: 0.4 mm.

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Figs. 27-32: Geostiba granulipennis sp. n.: 27, 28 – median lobe of aedeagus in lateral and in ventral view; 29 – apical lobe of paramere; 30 – spermatheca; 31 – posterior margin of  $\eth$  sternum VIII; 32 – outline of  $\eth$  forebody; long setae omitted in 31. Scale: 27-31: 0.1 mm; 32: 0.4 mm.



Figs. 33-39: Geostiba balkarensis sp. n.: 33, 34 – median lobe of aedeagus in lateral and in ventral view; 35 – apical lobe of paramere; 36, 37 – spermathecae of 2  $\circ \circ \circ$ ; 38 – process of  $\circ$  tergum VII in antero-dorsal view; 39 – outline of  $\circ$  forebody. Scale: 33-38: 0.1 mm; 39: 0.4 mm.



Figs. 40-44: Geostiba bitlisensis sp. n.: 40, 41 – median lobe of aedeagus in lateral and in ventral view; 42 – apical lobe of paramere; 43 – process of  $\delta$  tergum VII in antero-dorsal view; 44 – outline of  $\delta$  forebody. Scale: 40-43: 0.1 mm; 44: 0.4 mm.





Figs. 45-50: Geostiba lunata sp. n.: 45, 46 – median lobe of aedeagus in lateral and in ventral view; 47 – apical lobe of paramere; 48 – spermatheca; 49 – process of  $\delta$  tergum VII in antero-dorsal view; 50 – outline of  $\delta$  forebody. Scale: 45-49: 0.1 mm; 50: 0.4 mm.

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Figs. 51-57: Geostiba fabaeformis sp. n.: 51, 52 – median lobe of aedeagus in lateral and in ventral view; 53 – apical lobe of paramere; 54, 55 – spermathecae of 2  $_{QQ}$ ; 56 – posterior half of  $\sigma$  tergum VII; 57 – posterior margin of  $\sigma$  sternum VIII.

Figs. 58-60: Geostiba rizensis PACE: 58 – spermatheca; 59 – posterior half of  $\delta$  tergum VII; 57 – posterior margin of  $\rho$  sternum VIII.

Long setae omitted in 57, 60. Scale: 51-55, 57, 60: 0.1 mm; 56, 59: 0.2 mm.

Figs. 61-71: Geostiba helvetiorum PACE: 61, 62 – median lobe of aedeagus in lateral and in ventral view; 63 – apical lobe of paramere; 64-67 – spermathecae of 4  $_{QQ}$  (65, 66: paratypes of G. helvetiorum humicola PACE; 67: paratype of G. h. obscura PACE); 68-70 – posterior margin of  $_{Q}$  tergum VIII (69: paratype of G. h. obscura; 70: paratype of G. h. humicola); 71 – posterior margin of  $_{Q}$  sternum VIII; long setae omitted in 68-71. Scale: 0.1 mm.



Figs. 72-76: Geostiba medea PACE: 72, 73 – median lobe of aedeagus in lateral and in ventral view; 74 – apical lobe of paramere; 75 – spermatheca; 76 – posterior margin of  $\varphi$  sternum VIII; long setae omitted in 76. Scale: 0.1 mm.



Figs. 77-81: Geostiba emirdaghensis sp. n.: 77, 78 – median lobe of aedeagus in lateral and in ventral view; 79 – apical lobe of paramere; 80 – posterior margin of  $\delta$  tergum VIII; 81 – posterior margin of  $\delta$  sternum VIII; long setae omitted in 80-81. Scale: 0.1 mm.





Figs. 82-88: Geostiba itschiliensis sp. n.: 82, 83 – median lobe of aedeagus in lateral and in ventral view; 84 – apical lobe of paramere; 85, 86 – spermathecae of 2 Q Q; 87 – posterior margin of  $\sigma$  sternum VIII; 88 – posterior margin of  $\rho$  sternum VIII; long setae omitted in 87-88. Scale: 0.1 mm.



Figs. 89-97: Geostiba lucens (BENICK): 89, 90 – median lobe of aedeagus in lateral and in ventral view; 91 – apical lobe of paramere; 92-94 – spermathecae of 3  $_{QQ}$  (94: paratype of Atheta glaberima BENICK); 95 – posterior margin of  $\delta$  tergum VIII; 96 – posterior margin of  $\delta$  sternum VIII; 97 – posterior margin of  $\varphi$  sternum VIII; long setae omitted in 95-97. Scale: 0.1 mm.



Figs. 98-108: Geostiba confusa sp. n. (98-107) and G. seleucica PACE (108): 98, 99 – median lobe of aedeagus in lateral and in ventral view; 100 – apical lobe of paramere; 101 – spermatheca; 102 – posterior margin of  $\delta$  tergum VIII; 103 – posterior margin of  $\delta$  sternum VIII; 104 – posterior margin of  $\delta$  tergum VIII; 105 – outline of  $\delta$  forebody; 106 – maxillary palpus; 107 – mesotarsus; 108 – apical mesotarsomeres; long setae omitted in 102-103. Scale: 98-104, 106: 0.1 mm; 107, 108: 0.08 mm; 105: 0.2 mm.

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