

Additional records and descriptions of North and Central American Geotrupinae (Coleoptera, Scarabaeidae)

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Three new species, *Bolbelasmus monticolus* from El Salvador, *Geotrupes pecki* from Mexico, and *Geotrupes lobatus* from Mexico, are described. Two new subspecies of *Geotrupes guatemalensis* Bates, *tridentatus* from El Salvador and *unidentatus* from Mexico, are proposed and geographic variants of *Ceratotrupes sturmi* (Jekel) and *Geotrupes sallei* Jekel are discussed. Range extensions for 21 species are listed.

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On donne ici la description de trois nouvelles espèces, *Bolbelasmus monticolus* d'El Salvador, *Geotrupes pecki* et *Geotrupes lobatus* du Mexique. On établit deux nouvelles sous-espèces de *Geotrupes guatemalensis* Bates, *tridentatus* d'El Salvador et *unidentatus* du Mexique; on discute en outre des variantes géographiques de *Ceratotrupes sturmi* (Jekel) et de *Geotrupes sallei* Jekel. On donne enfin des extensions de l'aire de répartition de 21 espèces.

Since my revisions of the Geotrupinae of North and Central America (Howden 1955, 1964), several new species and subspecies have been discovered and a considerable amount of new distributional data has been accumulated. This is not surprising since many of the Mexican-Central American species discussed herein occur in montane areas which, because of difficult access, have been poorly collected. In the tribe Geotrupini, closely related allopatric populations occur in the various Mexican and Central American mountain ranges, and it is sometimes difficult to decide whether rather consistent differences should be considered to be geographic variants of one species or if specific or subspecific names should be applied. It is usually difficult to determine, with any certainty, the relationship of allopatric populations. The large scale destruction of habitats in many parts of Mexico and Central America makes the problem even more difficult, since present disjunctions may be due partly to human activities. Because of these problems, my treatment of the various populations is essentially arbitrary. External differences in color, number of punctures, etc., unless coupled with genitalic differences, are considered geographic variation. Genitalic characters also may change gradually along a cline and these, too, are considered as geographic variation. Only when differences, particularly in the genitalia, appear to be consistent in one geographic area are specific or subspecific names

used. Subspecific names are used to indicate that the related forms are very close and that there is the distinct possibility that intermediate forms may occur.

The list of new records and descriptions follow the order established in my 1964 paper. Records are given mainly in cases where a species has not been previously recorded from a particular political division (country, state or province).

Athyreini

Athyreus championi Bates (Howden 1964, p. 14)
Costa Rica: Puntarenas, San Vito, June 1967, Robertson.

Neoathyreus mixtus Howden (1964, p. 17)
Mexico: Tamaulipas, Ciudad. Mante, 5-8 August 1969, S. and J. Peck.

Neoathyreus quadridentatus Howden (1964, p. 17)
Mexico: Tabasco, Frontera, 23 June 1969, Bright and Campbell. Panama: Coclé Prov., El Valle, 14 June 1967, D. M. DeLong and C. A. Triplehorn.

Neoathyreus fissicornis (Harold) (Howden 1964, p. 20)
Mexico: Chiapas, San Cristobal, 24 July 1969, D. Kritsch; Oaxaca, Juquila Mixes, 4700 ft, July, August, and September 1968, W. S. Miller.

Neoathyreus hamifer (Boucomont) (Howden 1964, p. 25)
Guatemala: Suchitepequez, Finca San Rafael

de Olimpo, Cuyotenango, 21 January 1966, collected in large detritus cavity of *Atta* sp., 6–8 ft deep, J. M. Campbell.

Neoathyreus mexicanus (Klug) (Howden 1964, p. 26)

Mexico: Chiapas, Union Juarez, about 3000 ft, coffee finca, UV light, 29 June–2 July 1972, P. A. Meyer and G. E. Ball.

Bolboceratini

Bolbocerosoma hamatum Brown (Howden 1964, p. 62)

United States: South Carolina, Hilton Head Island, 16–21 July 1965, H. and A. Howden.

Eucanthus mexicanus Howden (1964, p. 75)

Mexico: Hidalgo, Huasca, 22 September 1962, P. Reyes and G. and V. Halfiter.

Bolborhombus sallaei sallaei (Bates) (Howden 1964, p. 33)

Mexico: Coahuila, Saltillo, 19 August 1971, B. C. Ratcliffe.

Bolborhombus parvulus Cartwright (Howden 1964, p. 35)

Mexico: Sinaloa, 34 mi N Los Mochis, 27 August 1963, F. D. Parker and L. A. Stange.

Male specimens from Sinaloa differ from those from Baja California (type locality) in having the low transverse carina at the juncture of the frons and clypeus essentially straight. Males from Baja California, on the other hand, have this carina arcuate. So few specimens have been seen that the slight differences noted cannot be assessed.

Bolbocerastes serratus (LeConte) (Howden 1964, p. 37)

Mexico: San Luis Potosi, Matehuala, 5 July 1971, B. Dozier.

Bolbocerastes imperialis imperialis Cartwright (Howden 1964, p. 63)

United States: Colorado, Eads, 27 July 1933, H. T. Rodeck and M. T. James.

Bolbelasmus variabilis Howden (1964, p. 41)

Mexico: Morelos, Yautepec, 13 July 1963, F. D. Parker and L. A. Stange; Oaxaca, Juquila Mixes, 4700 ft, July 1968, W. S. Miller; Oaxaca, Oaxaca, 31 July and 15 August 1968, G. Pollard.

Bolbelasmus monticolus n. sp. Figs. 1, 2, 3

Holotype

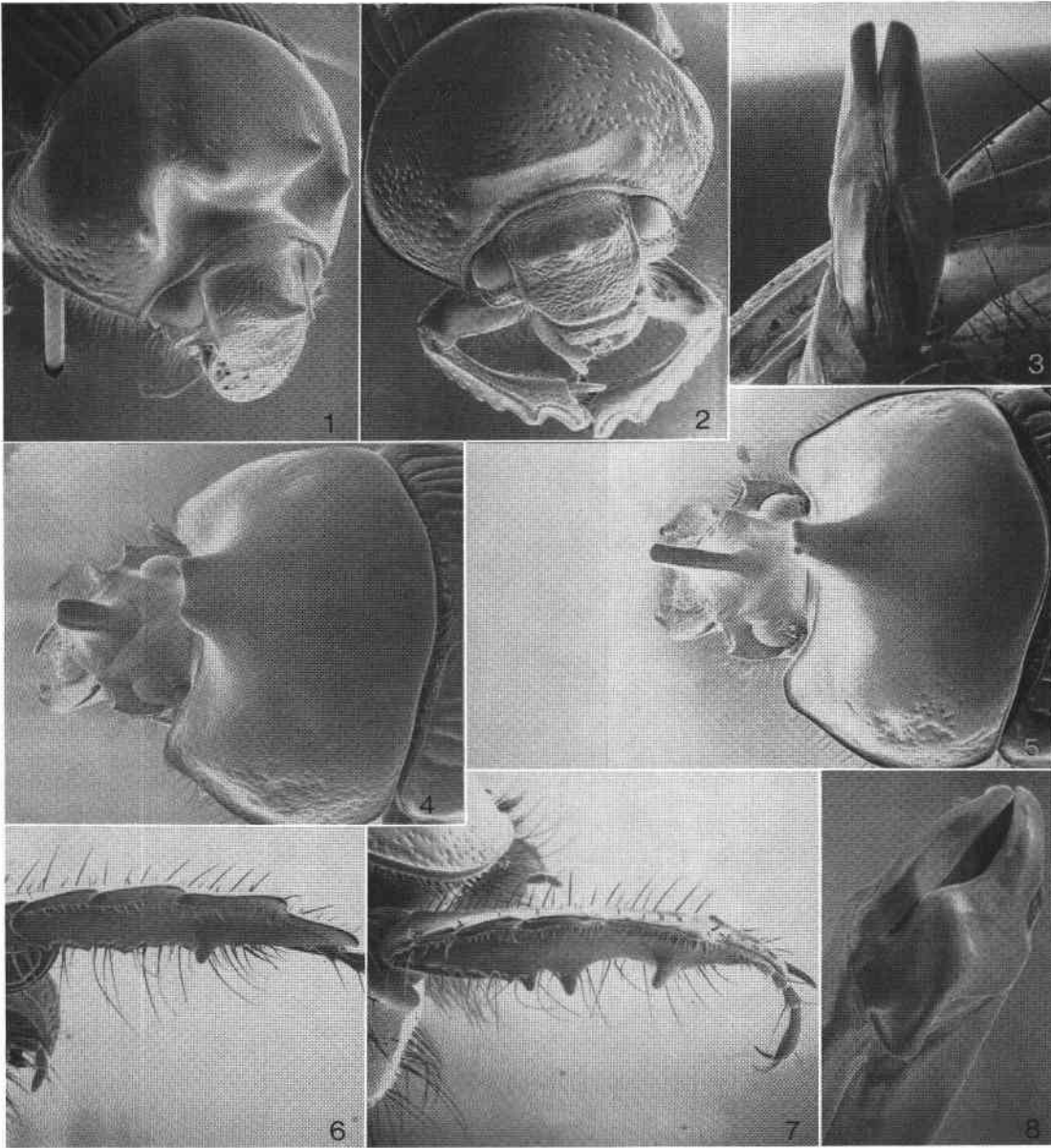
Male, length 11.1 mm, greatest width 7.8 mm. Generally similar in size and form to *Bolbelasmus rotundipennis* Howden. Color reddish-brown. Clypeus closely, confluent punctate, the surface appearing rugose; disc slightly elevated centrally. Frons and vertex around base of horn punctate-rugose; horn long, relatively slender (Fig. 1); vertex posterior to base of horn smooth, largely impunctate or with very fine punctures. Canthus abruptly rounded at anterior, lateral margin; canthus with distinct median, transverse carina extending to rounded anterior angle. Transverse pronotal tumosity (Fig. 1) distinctly bituberculate; lateral concavities pronounced; lateral tumosity on each side of concavity distinctly tuberculate, similar in this respect to *rotundipennis* and the European species *unicornis* Schrank. Anterior face of median pronotal tumosity finely, transversely reticulate and with scattered minute punctures. Pronotum with posterior indented marginal line present medially, indicated laterally by line of punctures; pronotal disc with scattered punctures, as in *arcuatus* Bates; secondary punctures largely lacking, faintly indicated near median tumosity. Elytral striae distinct; striae punctures large, distinct, separated by slightly more than one diameter; elytral intervals convex. Prosternal spine moderate in size, acute, the apex directed ventrally and slightly posteriorly. Fore tibia with eight teeth on outer margin, basal four teeth small; hind tibia with two complete transverse carinae on outer margin above apical carina. Genitalia in dorsal view as in Fig. 3.

Allotype

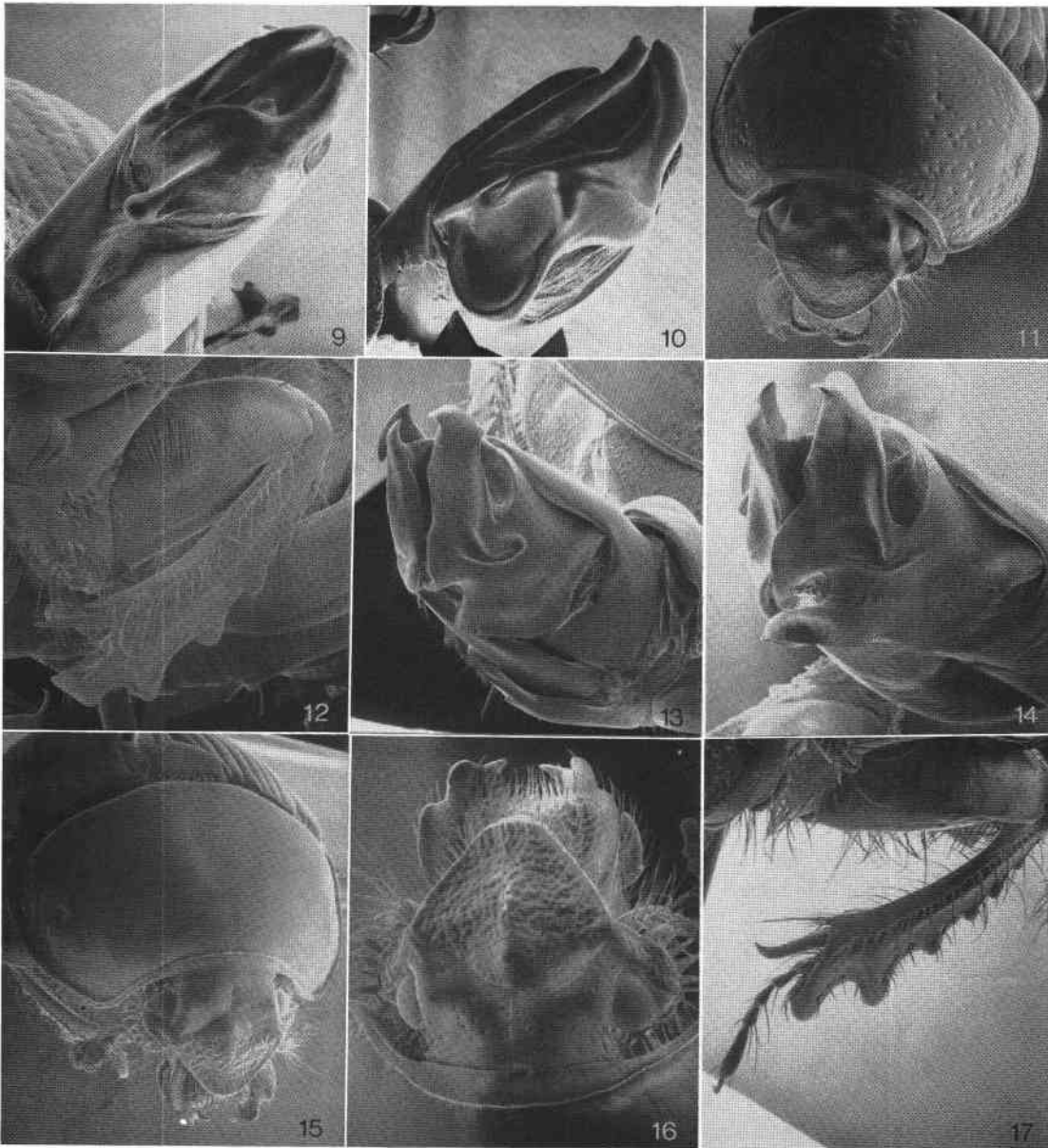
Female, length 10.9 mm, greatest width 7.3 mm. Differing from male in the following respects: clypeus (worn) punctate-rugose, nearly flat (Fig. 2); vertex punctate-rugose, with low transverse, trituberculate carina, the median tubercle most pronounced, lateral ones indistinct; pronotum (Fig. 2) with anterior median transverse carina bordered by a shallow concavity on each side and beyond the concavities by a low, rounded swelling; pronotal surface moderately punctate except with fine secondary punctures in front of transverse carina.

Type Material

Holotype, male, El Salvador, Boqueron,



FIGS. 1-8, Figs. 1-3, *Bolbelasmus monticolus* n. sp.: 1, male head and pronotum; 2, female head and pronotum; 3, dorsal view of male genitalia. Figs. 4-5, *Ceratotrupes sturmi* (Jekel): 4, male from Omiltemi, Mexico; 5, male from Juchatengo, Mexico. Figs. 6-8, subspecies of *Geotrupes guatemalensis* Bates: 6, male fore tibia of *g. unidentatus* n. subsp.; 7, male fore tibia of *g. tridentatus* n. subsp.; 8, dorsal view of male genitalia of *g. guatemalensis* Bates.



FIGS. 9-17. *Geotrupes* spp.: 9, dorsal view of male genitalia of *g. unidentatus* n. subsp.; 10, dorsal view of male genitalia of *g. tridentatus* n. subsp.; 11, head and pronotum of *pecki* n. sp.; 12, male fore tibia of *pecki* n. sp.; 13, dorsal view of male genitalia of *pecki* n. sp.; 14, dorsal view of male genitalia of *guerreroensis* Howden; 15, head and pronotum of *lobatus* n. sp.; 16, head of *lobatus* n. sp.; 17, female fore tibia of *lobatus* n. sp.

1800 m, near Santa Tecla, 2 May 1972, black-light, H. Howden and S. Peck (Howden collection). Allotype, female, El Salvador, Cerro Verde National Park, 3 August 1965, P. Spangler, United States National Museum (USNM). Paratype, male, Guatemala, Tepan (=Tecpan, Chimaltenango, 7500 ft, see Selander and Vaurie 1962), Conradt, British Museum (Natural History) (BMNH).

Variation is slight. The single paratype is 11.2 mm in length and 7.6 mm in greatest width. Fine secondary punctures are present behind the median pronotal tumosity but in other respects the paratype is very similar to the holotype.

The "Tepan" paratype also bears the label "*Bolbocerus arcuatus* Bates" and is apparently the specimen referred to from this locality by Bates in his supplement to the *Lamellicornia* volume of the *Biologia Centralia Americana* (1889, p. 395).

In my key (1964) to the Mexican and Central American Bolboceratini, *Bolbelasmus monticolus* will key to couplet 6, where difficulties will be encountered, since the punctures near the apical margins of the elytra are only slightly larger than the discal punctures. However, *monticolus* should be included with the other mainland species (not those from Baja California) and would key to couplet 8 (*B. arcuatus* Bates). It is actually more similar to *rotundipennis* but can be separated from this species in the key by its range. *Bolbelasmus monticolus* can be distinguished from *arcuatus* by its much larger size, by the presence of heavy, confluent punctures on the vertex around the base of the horn (males) or behind the transverse carina (females), and by the size and shape of the male genitalia. *Bolbelasmus monticolus* differs from *rotundipennis* in the following characters: in *monticolus* the carina of the eye canthus is better developed; the posterior half of the vertex is more heavily punctate; the anterior face of the pronotal tumosity is transversely reticulate instead of finely punctate; the basal carina on the hind tibia is better developed; and the apices of the parameres of the male genitalia are much more slender and more abruptly rounded. The known range of *monticolus* will also separate it from all other species of *Bolbelasmus* except *arcuatus*.

Geotrupini

Ceratotrupes bolivari Halffter and Martinez (Howden 1964, p. 46)

Mexico: Michoacan, 11 mi W Hidalgo, 12 July 1963, F. D. Parker and L. A. Stange; Sinaloa, Puerto Loberas, km 1175, Durango-Mazatlan Road, 7 July 1968, G. and V. Halffter; Veracruz, Perote, 23 August 1973, Joaquin Mateu.

Ceratotrupes sturmi (Jekel) (Howden 1964, p. 47)

Recently I have seen eight males and two females collected in the vicinity of Omiltemi in the state of Guerrero and a single pair with the following data: Mexico, Oaxaca, Route (Rt.) 131, 20 mi S Juchatengo, 6000 ft, 27-30 May 1971, H. Howden and S. Peck. The latter specimens differ from the Omiltemi specimens (Fig. 4) in several respects: the horn on the head of the Juchatengo male (Fig. 5) is more slender, the pronotal angles differ slightly in shape, the elytral intervals lack the distinct secondary punctures present in the Omiltemi specimens, and the male genitalia are moderately different.

These differences could represent geographic variation, but if additional material shows that the differences are constant, the two forms should be separated. Jekel (1865) used pronotal shape and body proportions to separate *sturmi* and its supposed synonym *mniszzechi* Jekel, but since he did not use genitalic characters nor mention the presence of secondary punctures on the elytral intervals, application of the name *mniszzechi* to one of the above two forms would depend on examination of the type. At present it seems best to defer the problem until more material becomes available.

Geotrupes cavicollis Bates (Howden 1964, p. 49)

Mexico: Sinaloa, 38.5 mi NE Concordia, 6200 ft, 29 September 1971, A. Newton No. 440.

Geotrupes fisheri Howden (1967, p. 1004)

Mexico: Michoacan, 70 km E Morelia, Mil Cumbres, 9000 ft, 8-10 September 1969, S. and J. Peck; Michoacan, 12 mi E Zitacuaro, Lengua Vaca, 9000 ft, 8-10 September 1969, S. and J. Peck.

Geotrupes guatemalensis Bates (Howden 1964, p. 51)

There seems to be a complex of forms under the name *guatemalensis* that can be separated

primarily on characters of the male genitalia. External differences exist, but vary enough so that no combination of external characters will consistently separate the various populations. Three populations are recognized, one from El Salvador, one from Guatemala, and one from Mexico. The genitalic differences, while constant, seem to represent a possible clinal condition; but since no intergrades have been found, subspecies names are arbitrarily applied. The sub-

species from Mexico and El Salvador appear to have rather different ecological requirements, the Mexican subspecies being common in high (7–8000 ft) open pine forests, while the subspecies from El Salvador occurs somewhat lower (6000 ft), in areas of cloud forest. The Guatemalan subspecies seems most closely related to the Mexican one, but there appears to be a distinct disjunction in their ranges along the Mexican–Guatemalan border.

KEY TO THE SUBSPECIES OF *Geotrupes guatemalensis* Bates

1. Shallow pronotal concavity posterior to anterior marginal carina approximately as wide as distance between eyes; teeth on undersurface of male fore tibia small, usually a single tooth well developed (Fig. 6).....2
2. Shallow pronotal concavity posterior to anterior marginal carina extending laterally about two-thirds the distance between eyes; three teeth on undersurface of male fore tibia, well developed. (Fig. 7).....*Geotrupes guatemalensis tridentatus* n. subsp.
2. Pronotal concavity longitudinally widest at midline; male genitalia as in Fig. 8.....*Geotrupes guatemalensis guatemalensis* Bates
- Pronotal concavity longitudinally widest and most evident on either side of midline; the concavity slightly shallower and somewhat constricted at midline; male genitalia as in Fig. 9.....*Geotrupes guatemalensis unidentatus* n. subsp.

Geotrupes guatemalensis guatemalensis Bates

Fig. 8

Type locality—Totonicapan, Guatemala (Howden 1964).

For the species description and the separation of *guatemalensis* from other species see reference to Howden (1964, p. 51). Only characters that may assist in differentiating the subspecies are mentioned herein.

Length 16.8 to 20.2 mm, greatest width 9.1 to 11.8 mm. Color dorsally often greenish. Lateral pronotal margin evenly arcuate; pronotal concavity as described in key; pronotal disc of males often with distinct secondary (fine) punctures in or near concavity; pronotal disc of females with fine secondary punctures often distinct near anterior and lateral margins. Fore tibia of males with three small, often indistinct teeth on inner surface, the distal tooth better developed in large males. Anterior thirds of middle and hind femora with impunctate areas medially. Male genitalia (Fig. 8) with posterior portion of right paramere lobed, the lobe acutely angled posterior to base of left paramere.

Material examined—Fourteen specimens. Guatemala: Chimaltenango, Quezaltenango, San Marcos, Totonicapam.

Geotrupes guatemalensis unidentatus n. subsp.

Figs. 6, 9

Holotype

Male, length 21.0 mm, greatest width 12.5 mm. Color dorsally shining purplish-black. Lateral pronotal margin in anterior half straight; pronotal concavity transversely slightly wider than distance between eyes, more distinctly concave laterally, only shallowly concave medially; secondary pronotal punctures poorly developed, present only near median line of concavity. Fore tibia (Fig. 6) on inner flattened surface with a well-developed distal tooth and two indistinct proximal teeth. Anterior thirds of middle and hind femora with at least half the ventral surface impunctate. Male genitalia (Fig. 9) with posterior portion of right paramere basally produced and elevated into a rounded projection.

Allotype

Female, length 20.0 mm, greatest width 12.0 mm. Similar to male except that sexual characters of the legs lacking (teeth on inner surface of fore tibia and small tooth on posterior basal portion of hind femur) and the secondary punctures of the pronotum pronounced, particularly in concavity and to lesser degree near middle of lateral margin.

Type Material

Holotype, male, Mexico, Chiapas, 7 mi NE San Cristobal de las Casas, 8 May 1969, H. F. Howden (Howden). Allotype, female, Mexico, Chiapas, 11 mi NE San Cristobal de las Casas, 7 May 1969, H. F. Howden (Howden). Paratypes: 111 males, 115 females. All specimens were taken, with two exceptions, in a 20-mi radius of San Cristobal de las Casas, Chiapas, with collection dates between 2 May and 2 September by the following collectors: G. E. Ball, J. M. Campbell, J. Doyen, W. A. Foster, H. F. Howden, J. E. H. Martin, S. and J. Peck, H. J. Teskey, and D. R. Whitehead. Two males bear the following data: Mexico, Chiapas, 10 mi E Teopisca, 11–12 May 1969, H. F. Howden and J. E. H. Martin.

Paratypes are deposited in the following collections: BMNH, California Academy of Science (CAS), Canadian National Collection (CNC), Howden, Halffter, Museum of Comparative Zoology (MCZ), USNM.

Variation in the large series available is considerable. Size in the males varies from 14.0 to 22.3 mm in length and from 8.4 to 12.6 mm in greatest width. In females, size ranges from 14.6 to 22.1 mm in length and from 8.6 to 12.5 mm in greatest width. Color is usually a shining purplish-black, but occasionally is bluish- or greenish-black. The shape of the pronotal concavity (i.e., longitudinally narrowed medially) is quite constant, but the depth and width show considerable variation. The anterior half of the lateral pronotal margin is most frequently straight or slightly sinuate; in an occasional specimen, the lateral margins are arcuate. The external sexual characters of the fore tibiae and hind femora of males may be greatly reduced or absent in very small specimens. The male genitalia may vary in size, but the proportions are fairly constant. The male genitalia and, to a lesser degree, the shape of the pronotal concavity are the best characters for separating *unidentatus* from the other two subspecies of *guatemalensis*.

***Geotrupes guatemalensis tridentatus* n. subsp.**
Figs. 7, 10

Holotype

Male, length 21.0 mm, greatest width 13.0 mm. Color dorsally slightly shining purplish-black. Lateral pronotal margin evenly arcuate; an-

terior pronotal concavity nearly obsolete, represented by a very shallow, median concavity; concavity with four or five poorly defined secondary punctures. Fore tibia (Fig. 7) with three distinct teeth on inner flattened surface. Anterior third of middle femur coarsely punctate; hind femur in anterior third with large impunctate area. Male genitalia (Fig. 10) with posterior portion forming a large, semi-oval, concave lobe.

Allotype

Female, length 20.8 mm, greatest width 12.5 mm. Very similar to male except that sexual characters of legs lacking, the secondary punctures of pronotal concavity slightly more pronounced, and lateral pronotal margins irregularly arcuate.

Type Material

Holotype, male, El Salvador, Santa Ana, Monte Cristo, 2300 m, 23 km N Metapan, 8–10 May 1971, on horse dung, H. F. Howden (Howden). Allotype, female, same data as holotype (Howden). Paratypes: two males, same data as holotype (Howden).

Variation in the four specimens is slight, except for sexual differences. The smallest specimen measures 20.2 mm in length and one specimen is a darker purplish-black. The three distinct teeth on the underside of the male fore tibia and the shape of the male genitalia will distinguish the subspecies.

The distance separating the range of *tridentatus* from the known range of *g. guatemalensis* is as great as that separating *guatemalensis* from *unidentatus*. However, while *tridentatus* seems to occupy a somewhat different habitat (cloud forest) than the other two (pine-oak forest), I suspect that the distance separating the ranges of *tridentatus* and *guatemalensis* is due largely to a lack of collecting in intervening areas. In the case of the range separation of *guatemalensis* and *unidentatus*, the separation, I suspect, is best explained climatically and is due to intervening low, dry valleys.

Geotrupes nebulorum Howden (1964, p. 53)

Mexico: Hidalgo, 11.1 mi S Tenango de Doria, 2500 m, 24–28 July 1969, open pine forest, carrion and dung traps, S. and J. Peck; Hidalgo, 4 mi E Acaxochitlan, 6900 ft, 7 July 1971, wet oak-pine forest, A. Newton No. 267.

Geotrupes pecki n. sp. Figs. 11, 12, 13*Holotype*

Male, length 16.5 mm, greatest width 9.9 mm. Color dorsally black with a faint tinge of green on elytron. Antennal club reddish-tan, unmodified. Clypeus (Fig. 11) intermediate between U- and V-shaped, margin abruptly rounded anteriorly; disc rugose-punctate, with low, rounded tubercle posteriorly. Edge of eye canthus obtusely angulate near middle. Pronotum (Fig. 11) with marginal groove complete anteriorly and laterally, obsolete posteriorly, represented by a vague indentation and by an irregular row of coarse punctures; pronotal disc lacking anterior concavity, entire surface with scattered groups of deep, very coarse punctures. Scutellum impunctate, the apex broadly V-shaped. Each elytron distinctly striate, striae punctate only near lateral margins; intervals moderately convex and smooth. Fore tibia (Fig. 12) with apical tooth expanded inwardly (a character of the subgenus *Cnemotrupes*); remaining five teeth on outer margin unmodified; flattened ventral or inner surface with two distinct conical teeth, the apical one slightly smaller; a third minute tooth present basad to large middle tooth. Middle tibia with three complete, transverse carinae on outer surface. Hind tibia with four complete, transverse carinae on outer surface; hind femur lacking a distinct tooth near trochanter. Mesosternum longitudinally carinate in front of middle coxae. Genitalia as in Fig. 13.

Allotype

Female, length 15.1 mm, greatest width 9.0 mm. Similar to male except in the following respects: fore tibia with six unmodified teeth on outer edge; ventral surface of fore tibia lacking the two large, conical teeth, a row of four or five minute teeth present; pronotal punctures slightly reduced in size; elytral punctures more pronounced, particularly laterally.

Type Material

Holotype, male, Mexico, Oaxaca, 9500 ft, 3 mi N Suchixtepec, km 144 on Rt. 175 S of Oaxaca, 4-6 June 1971, H. Howden and S. Peck (Howden). Allotype, female, same data as holotype. Paratypes: five males, six females. Four males, six females, same data as holotype; one male, Mexico, Oaxaca, 8000 ft, km 154 on Rt. 175 S of Oaxaca, 2-3 June 1971, H. F. Howden.

Paratypes are deposited in the following collections: CNC, Halffter, and Howden.

Variation, except in size, is slight. In males, length ranges from 14.5 to 17.5 mm and greatest width from 8.5 to 10.0 mm; in females, length ranges from 14.0 to 16.5 mm, and greatest width from 8.7 to 10.5 mm. The number and size of the pronotal punctures vary irrespective of sex, but the punctures are always pronounced. The indented pronotal marginal line posteriorly is occasionally obsolete but is then represented by a scattered line of coarse punctures. Many specimens lack any trace of green, being entirely black dorsally.

Geotrupes pecki will key out in my 1964 work to either *rufoclavata* Jekel or *guerreroensis* Howden (Fig. 14), depending on the development of the indented marginal line on the posterior edge of the pronotum. The heavily punctate pronotum, the dorsal color being black or with a vague trace of green, and shape of the male genitalia will distinguish *pecki* from these and other related species.

The species is named for Dr. Stewart Peck, who has collected and given me many interesting Scarabaeidae.

Geotrupes rufoclavata Jekel (Howden 1964, p. 55)

Mexico: Michoacan, 9000 ft, 12 mi E Zitacuaro, Lengua Vaca, 8-10 September 1969, in pine-oak forest, S. and J. Peck.

Geotrupes herbeus Jekel (Howden 1964, p. 57)

Mexico: Michoacan, 2750 m, Los Azufres, 27 December 1962, in *Abies-Pinus* forest, A. Barrera.

Geotrupes sallei Jekel (Howden 1964, p. 59)

Mexico: Guanajuato, 2620 m, Santa Rosa near Guanajuato, 12 October 1962, Bolivar and Halffter; Jalisco, 7900 ft, 14 mi W Atenquique, 18 September 1971, A. Newton No. 405.

A number of differences are present in the various populations of *sallei*. Specimens from Guanajuato, Hidalgo, and Jalisco are generally dull black, and have small to fine pronotal punctures and the elytral intervals flattened. Specimens from Oaxaca near Suchixtepec are generally shining black and have coarse pronotal punctures, and the elytral intervals are distinctly convex. There are also some differences in the male genitalia. More material is needed to ascertain if the geographic differences are con-

stant. If more than one species name should prove to be applicable to the various populations, a reexamination of the types of *sallei* Jekel and *falsus* Jekel should be made, particularly since the localities where the types were collected are not well documented.

Geotrupes lobatus n. sp. Figs. 15, 16, 17

Holotype

Female, length 13.6 mm, greatest width 8.9 mm. Color black with a distinct greenish-blue cast along margins of the pronotum, and on the legs. Antennal club unmodified, grayish-black. Mandible (Fig. 16) with a large, rounded lobe on outer margin just basal to sharp apical tooth. Clypeus intermediate between U- and V-shaped, disc closely, contiguously punctate; posterior tubercle low. Vertex largely impunctate, a median sulcus present in anterior half. Ocular canthus broadly arcuate. Pronotum (Fig. 15) lacking anterior concavity; posterior marginal line absent; disc smooth and impunctate except along anterior and lateral margins. Scutellum impunctate, slightly indented along midline. Elytral striae distinct, first stria terminated by scutellum; striae not crenate or punctate except for outer five striae which are vaguely punctate. Fore tibia (Fig. 17) with six teeth along outer margin and a row of five or six small teeth on ventral (under) surface; apical spur of fore tibia abruptly, inwardly bent at apex. Middle and hind tibiae each with three complete transverse carinae on outer surface. Mesosternum not carinate in front of middle coxae.

Male, unknown.

Type Material

Holotype, female, Mexico, Oaxaca, 8000 ft, km 154 on Rt. 175 S of Oaxaca, 2-3 June 1971, on feces, H. F. Howden (Howden). Paratypes: two females, same data as holotype (Howden).

The three females exhibit almost no variation, the holotype being 1 mm longer than the smallest paratype. All three specimens were taken under human feces near a stream at the bottom of a small ravine.

Geotrupes lobatus will key in my 1964 work to the Geotrupini couplet 7, which includes *herbeus* Jekel and *onitipides* Bates. The very pronounced

lobe on each mandible will readily separate *lobatus* from either species. The unfortunate lack of males prevents accurate placement of *lobatus*. It does not appear to be closely related to any Mexican species, its closest relative seemingly being *onitipides* Bates. It is similar to *onitipides* in the shape of the pronotum and elytra, and in most of the characters of the legs and mesosternum. However, *lobatus* differs radically in the configuration of the mandibles and the shape of the clypeus.

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- BATES, H. W. 1887-1889. Pectinicornia and Lamellicornia. In *Biologia Centrali-Americana*. Coleoptera. Edited by F. D. Godman and O. Salvin. Vol. 2, Pt. 2. pp. 1-416.
- HOWDEN, H. F. 1955. Biology and taxonomy of North American beetles of the subfamily Geotrupinae with revisions of the genera *Bolbocerosoma*, *Eucanthus*, *Geotrupes* and *Peliotrupes* (Scarabaeidae). Proc. U.S. Natl. Mus. 104: 151-319.
- 1964. The Geotrupinae of North and Central America. Mem. Entomol. Soc. Can. No. 39.
- 1967. Mexican Geotrupinae: a new species of *Geotrupes* and description of the larva of *Ceratotrupes* (Coleoptera: Scarabaeidae). Can. Entomol. 99: 1003-1007.
- SELANDER, R. B., and P. VAURIE. 1962. A gazetteer to accompany the Insecta volumes of the "Biologia Centrali-Americana". Am. Mus. Novitates. No. 2099.