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**The Species of the Mexican Genus *Aztecarpalus*, New Genus  
(Coleoptera: Carabidae: Harpalini).<sup>1</sup>**

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The Tribe Harpalini is represented in Mexico by a varied lot of species, most of which are members of wide-ranging genera. In the course of reviewing the taxonomy of the Mexican harpalines, I came upon a small, rather well circumscribed group of species the members of which resembled in appearance members of the genus *Anisotarsus*, subtribe Anisodactylina. The resemblance was so marked, in fact, that I did not realize the beetles belonged to the subtribe Harpalina until I examined them with a microscope. Several of these species had been previously described and assigned to *Harpalus* or *Anisotarsus*. I thought they could be assigned to the genus *Trichotichnus*, but detailed study exposed a multitude of differences between the Mexican species and the members of *Trichotichnus*, especially the North American members. Should the Mexican group be assigned to *Trichotichnus* or not? The title answers this question, and reasons for the decision are presented below.

The Mexican species of this group are themselves a varied lot. Regrettably, the specimens available were too few to conduct a detailed analysis of relationships. However, it seemed clear that a number of species were represented, and study of relevant type material revealed that three of the species were undescribed.

In this paper, all known taxa are described and illustrations of diagnostic characteristics are provided. Brief notice is given to evolutionary implications inherent in the geographical distribution and morphology of the relevant taxa.

This is my initial essay on the Harpalini of Mexico. Subsequently, I hope to treat all of the harpaline species of that country.

## ACKNOWLEDGMENTS

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P. J. Darlington, Jr., Museum of Comparative Zoology, Cambridge, Massachusetts, provided me with specimens of various palaeartic Harpalini to compare with the Mexican material.

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For hospitality extended to me during my visit to the Museum National d'Histoire Naturelle, Paris, I take pleasure in thanking A. Bons and J. Negre.

Technical assistance was received from J. C. Shore, M. Wilkie, and J. S. Scott. My colleagues B. S. Heming, B. Hocking, and D. R. Whitehead read and criticized preliminary versions of the manuscript on which this paper is based.

#### MATERIALS

This study is based on 96 specimens of the genus *Aztecarpalus*, including type material, specimens collected by D. R. Whitehead and myself, and by L. W. Swan.

Because the previously known specimens of this group were placed in *Harpalus* or *Anisotarsus*, I have studied the type material of all known Mexican species of these genera, and am reasonably confident, therefore, that the three species described here as new have not been previously described.

Additional material examined consisted of a few representatives of various groups related to *Aztecarpalus*: the North American *Trichotichnus dichrous* Dejean and *vulpeculus* Say, and the Palaearctic *T. longitarsis* Morawitz (type species of the genus); *Parophonus maculicornis* Duftschmid; *Coleolissus biseriatus* Lesne; *Ophoniscus* species (?); and *Hyparpalus tomentosus* Dejean.

Locality data are recorded for the specimens examined. The following abbreviations are used to indicate the museums in which the material is housed:

BMNH — British Museum (Natural History), London, England.

CAS — California Academy of Sciences, San Francisco, California.

MCZ — Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

MHNP — Museum National d'Histoire Naturelle, Paris, France.

UASM — University of Alberta, Strickland Museum, Edmonton, Alberta, Canada.

USNM — United States National Museum, Washington, D. C.

#### METHODS

Diagnostic characteristics and descriptions. — The characteristics which readily distinguish the members of each species from those of similar species are provided in three keys, based on, respectively, external characteristics, form of the median lobe of the male genitalia, and on details of the internal sac of the male genitalia. The descriptions contain additional details of use in identifying specimens.

Measurements and ratios. — The following measurements were made with an ocular micrometer in a stereoscopic binocular microscope. The length represented by a micrometer scale interval at the magnification 40X was 0.04 mm.

Head length. — straight-line distance from base of mandible to posterior margin of compound eye, on left side of head.

Pronotum length — straight-line distance from apical to basal margin measured along mid-line.

Elytra length — straight-line distance from basal carina to apex of longer elytron.

Total length — the sum of the measurements described above.

Length of antennal scape — maximum linear distance from apex of scape to basal constriction.

Width of second article of male front tarsus — maximum linear transverse distance.

Length of inner (longer) spur of hind tibia — maximum linear distance from base to apex.

Length of articles one (metatarsus), two, and three of hind tarsus — maximum linear distance on dorsal surface, from base to apex of each article.

The following ratios were formed:

Scape-Tarsal Ratio — length of antennal scape/width of second article of male front tarsus. Low values indicate relatively wide tarsal articles.

Scape-Tibial Spur Ratio — length of antennal scape/length of inner spur of hind tibia. Low values indicate relatively long tibial spurs.

Hind Tarsal Ratio — length of articles two plus three/length of metatarsus. Low values indicate a relatively long hind metatarsus.

Illustrations. — Line drawings were prepared with the aid of a camera lucida mounted on a Wild M5 stereoscopic binocular microscope. The photograph illustrating elytral microsculpture of *A. schaefferi* was taken with an ISM U3 Scanning Electron Microscope.

Recognition, grouping and ranking. — The identity of specimens was determined by comparison with type material. Substantial similarity between types and non-typic specimens in details of color, external morphology, and genitalic characteristics was the basis for identification.

The categories used are species, species group, and genus. Because so few specimens are available, it is impossible to be sure that character differences indicate that specimens exhibiting them represent specifically distinct populations. Of seven species recognized, representatives of only three were collected in the same localities. Further, representatives of only four species were found in more than two localities. The sympatric specimens assigned to different species differ in color, form, setation of hind tarsi, and a number of details of the male genitalia. Other groups of specimens judged to be conspecific were regarded as distinct from still other conspecific groups if they differed to a similar degree in several of the same kinds of characteristics as those listed above. The implication of such differences is that the groups so distinguished represent reproductively isolated populations, and as such, are specifically distinct.

Grouping within the genus was based on phylogenetic interpretation of character correlations among species. That is, the groups were based on combinations of structural characters thought the most likely to show phylogene-

tic relationship. This involves weighting, and the criteria for this activity are ably described by Mayr (1969: 217-228).

For example, specimens of *schaefferi* new name and *trochotrichis* new species are similar in that both bear a puncture in elytral interval 3. Males of *schaefferi* and *marmoreus* new species share a sclerotized bar on the internal sac of the male genitalia, a characteristic not shared with *trochotrichis*. In the possession of long hind wings, specimens of *schaefferi* differ from both *marmoreus* and *trochotrichis*.

Because both the characters elytral setae and wing length are known to vary within many carabid genera, they are not regarded as strongly indicative of relationships as is the possession of the sclerotized bar of the internal sac, a character which seems to be unique in this genus. Thus, in grouping these three species, *schaefferi* and *marmoreus* were placed together, and *trochotrichis* was excluded.

The decision to rank the complex of seven species as a genus is discussed below.

#### RELATIONSHIPS, RANKING AND CLASSIFICATION OF *Aztecarpalus*

By applying the criteria listed by Mayr (1969: 233) I attempt to demonstrate that *Aztecarpalus* is a group qualifying for generic rank. First, however, it is necessary to marshal evidence bearing on the question of unity of descent, *i.e.* is the group monophyletic? The members of this taxon share a unique combination of structural characteristics drawn from the head, mouthparts, thorax, legs, and male and female genitalia (see Table 1). It seems most unlikely that this complex combination of characters would arise more than once. In addition, the member taxa occupy a relatively small, well circumscribed, and more or less continuous area of the earth's surface. These circumstances seem to me to provide compelling evidence that this group is monophyletic and is therefore a valid taxon.

To what rank should this taxon be assigned? The characteristics of its members are clearly those of the subtribe Harpalina, and more specifically of the genus group Selenophori. Thus, the taxon cannot be ranked above a genus.

To apply ranking criteria properly, one should be familiar with the limits and composition of not only the group to be ranked, but also of related taxa. This taxon is most like the members of *Trichotichnus* Morawitz, a group very broadly defined by Schauberger (Csiki, 1932: 1210) but more narrowly so by Jeannel (1942: 628), Basilewsky (1950: 86), and Antoine (1959: 433). Lindroth (1968: 817) also adopted a restricted definition of this genus when he excluded from it the species *Episcopellus autumnalis* Say. I have examined a few specimens representing the *Trichotichnus* complex, and am inclined to accept the narrower definition of the genus, *i.e.* to follow those authors who excluded many of the subgenera included by Schauberger.

The members of *Trichotichnus* and those of *Aztecarpalus* differ in 15 recorded characteristics, a gap comparable in size to that which separates other genera of the Selenophori. The amount of structural variation encountered in

TABLE 1.

DIFFERENCES IN CHARACTERISTICS BETWEEN MEMBERS OF *Trichotichnus* AND *Aztecarpalus*.

CHARACTERISTICS	<i>Trichotichnus</i>	<i>Aztecarpalus</i>
Eyes	large	small
Subgena	narrow	broad
Antenna length	longer, articles of flagellum about three times longer than wide.	shorter, articles of flagellum about twice as long as wide.
Mandibles	longer, more slender left, more curved (Fig. 3)	shorter, broader. left, less curved (Fig. 2)
Glossae		
Length	shorter (Fig. 6)	longer (Fig. 5)
Apical width	greater (Fig. 6)	less (Fig. 5)
Paraglossa width	narrower (Fig. 6)	wider (Fig. 5)
Mentum	shorter (Fig. 6)	longer (Fig. 5)
Pronotum, Base	punctate	impunctate
Prosternum	hairy	glabrous
Apical Spur, Anterior		
Tibia	slender (Fig. 16)	broad (Figs. 14 and 15)
Hind Wings	present, membrane not pigmented	absent, or membrane pigmented
Metepisternum	longer than wide	longer than wide or length and width subequal
Male, spines of internal sac	single	six or more
Female, vaginal sclerite	absent	present
Valvifer of Ovipositor	apex rather blunt, with three short spines (Fig. 38)	apex sharper, with very short spines (Fig. 37)

*Aztecarpalus* is comparable to that encompassed by other genera near *Trichotichnus*. Some of the structural characteristics (deplanate body, broad tibial spurs, small eyes) suggest that the members of *Aztecarpalus* occupy an ecological zone (possibly subterranean or in the lower layers of leaf litter) different from that occupied by the members of *Trichotichnus*. The diversity of *Aztecarpalus* is about average for the *Trichotichnus* complex of genera. Thus I think it reasonable to rank *Aztecarpalus* as a genus.

Habu (1968) discusses the classification of the subtribe Harpalina and demonstrates conclusively that some members of *Trichotichnus* (genus-group Selenophori) cannot be distinguished from some members of the genus *Harpalus* (genus-group Harpali) on the basis of the relative length of the hind metatarsus. He concludes that it is inadvisable to segregate as taxa the Selenophori and Harpali. However, it seems to me that, on the average, the two groups can be distinguished by a combination of characteristics: length of hind metatarsus; striae punctures of elytra; microsculpture of elytra; setation of paraglossae; and

form of male genitalia and extent of membrane on the dorsal surface of the median lobe. In other words, there are two "clusters" of the relevant taxa. Because the Harpalini are so diverse, I think it desirable to recognize these clusters as semi-formal taxa, thereby rendering the group as a whole a bit more manageable. These genus groups are clearly polythetic. Members of *Aztecarpalus* as well as those of *Trichotichnus* have a majority of characters of Selenophori, so I assign these genera accordingly.

#### CLASSIFICATION AND DESCRIPTIONS

##### *Aztecarpalus* new genus

*Harpalus*; Bates, 1882: 57 (in part).

*Anisotarsus*; Bates, 1882: 51 (in part).—van Emden, 1953: 534 (in part).

*Asmerinx* Tschitscherin, 1900: 363 (in part).

*Pteropalus* Casey, 1913: 131 (in part).

*Trichotichnus*; Csiki, 1932: 1210 (in part).—Lindroth, 1968: 817 (in part).

TYPE SPECIES: *Harpalus hebescens* Bates. Here designated.

The members of this genus are distinguished from members of the nearctic harpaline fauna by the characters presented in Table 1, and in the key, below.

DESCRIPTION:—Total length 6.9-11.7 mm. Body deplanate, dorsal surface impunctate and glabrous, except for usual fixed setae.

Color. Body black, elytra black or metallic blue or green. Antennae, mouthparts, and legs black, infuscated, or rufous.

Microsculpture. Labrum, lines coarse, meshes isodiametric to slightly transverse, alveolae beaded. Remainder of dorsal surface with lines fine, meshes isodiametric or slightly to markedly transverse, or lines effaced. Ventral surface with meshes stretched, longitudinally oriented on propleura.

Luster. Subopaque; moderately to strongly shining; iridescent.

Head. Labrum as in *Trichotichnus* (Fig. 1). Frontal impressions rather broad, prolongations toward eyes feebly developed or absent. Eyes small, subgena at least 1.5 times wider than antennal scape. Antennae short, each extended slightly farther (*lectocolus*), or no farther than base of pronotum. Mandibles (Fig. 2) short, broad; in closed position, right mandible overlapped by left. Molar region and ventral groove with short hairs. Left mandible (Figs. 2a and c) with cutting edge formed by retinacular ridge; terebral tooth broad, retinacular tooth prominent ridge; premolar tooth small. Right mandible (Figs. 2b and d) with cutting edge formed by terebral ridge; terebral tooth small; anterior retinacular tooth large, prominent; posterior retinacular tooth large; premolar tooth small. (Cf. Figs. 3a, b, c, d). Maxillae each as in *Trichotichnus* (Fig. 4). Labium as in Fig. 5; mentum with prominent lateral lobes, and well developed median tooth. Ligula with glossal sclerite elongate, narrowed toward truncate apex, or rectangular, but not flared apically, with two terminal setae; paraglossae broad glabrous membranous lobes (cf. Fig. 6).

Prothorax. (Figs. 7-13). Pronotum transverse, weakly convex; anterior margin shallowly concave, posterior margin more or less straight; sides rounded, not sinuate posteriorly, or distinctly sinuate; anterior angles broadly rounded; posterior angles broadly to narrowly obtuse, or rectangular. Anterior and posterior transverse impressions present or absent; median longitudinal impression shallow; posterior lateral impressions shallow basins, broadly isolated from narrow lateral grooves. One pair lateral setae, medial in position. Prosternum glabrous except setae at apex of prosternal spine.

Pterothorax. Metepisternum elongate, with lateral margin longer than anterior margin, or quadrate with lateral and anterior margins subequal in length.

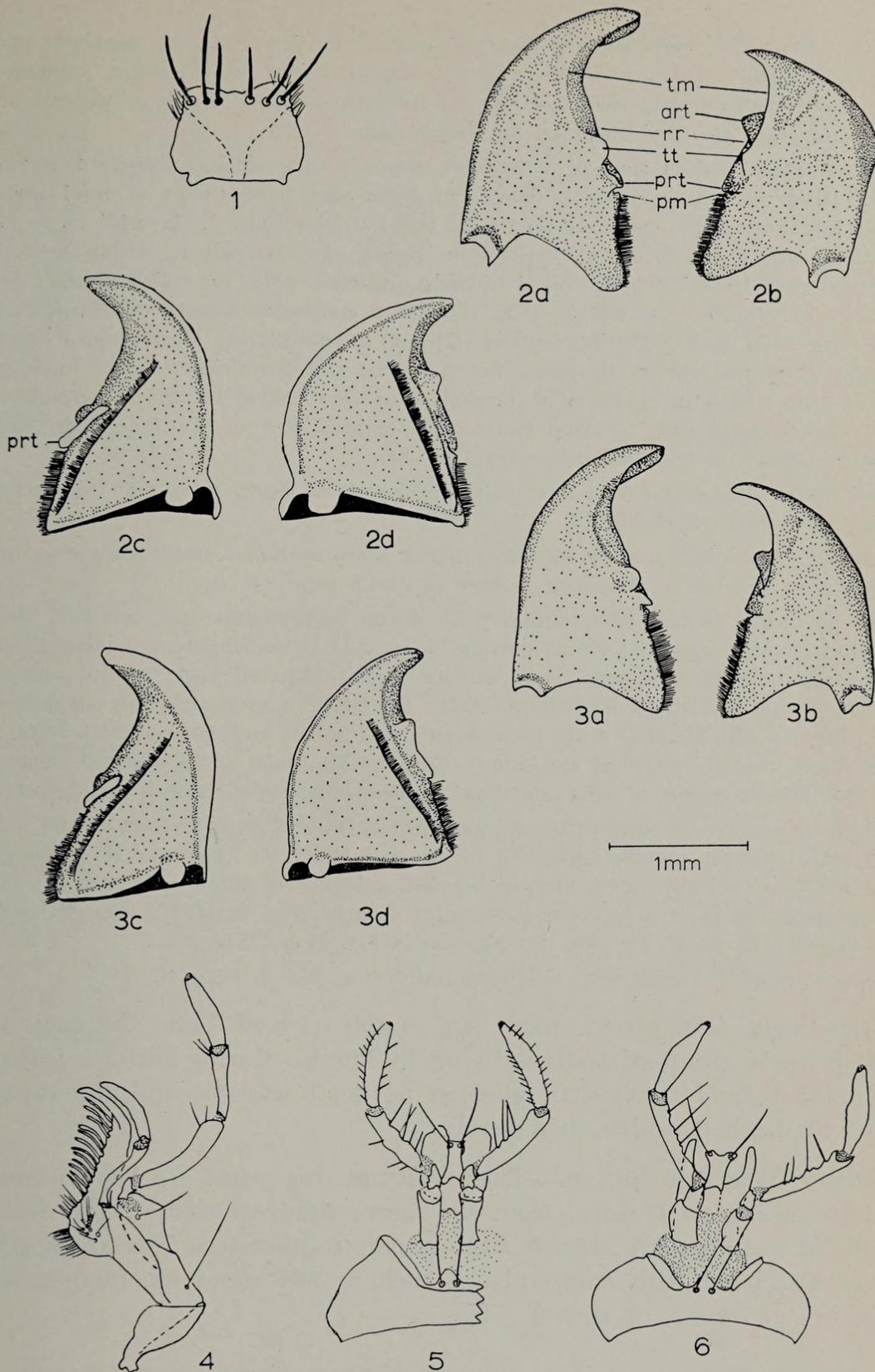


Fig. 1. Labrum, dorsal aspect, of *Trichotichnus longitarsis* Morawitz. Fig. 2. Mandibles of *Aztecarpalus schaefferi* new name

a. Left mandible, dorsal aspect; b. Right mandible, dorsal aspect; c. Left mandible, ventral aspect; d. Right mandible, ventral aspect.

Art—anterior retinacular tooth; pm—premolar tooth; prt—posterior retinacular tooth; rr—retinacular ridge; tm—terebral margin; tt—terebral tooth. Fig. 3. Mandibles of *Trichotichnus dichrous* Dejean

a. Left mandible, dorsal aspect; b. Right mandible, dorsal aspect; c. Left mandible, ventral aspect; d. Right mandible, ventral aspect. Fig. 4. Right maxilla, dorsal aspect, of *Trichotichnus longitarsis* Morawitz. Fig. 5. Labium, ventral aspect, of *Aztecarpalus schaefferi*, new name. Fig. 6. Labium, ventral aspect, of *Trichotichnus longitarsis*, Morawitz.

Elytra. Deplanate, sides slightly rounded, humeri broadly rounded, angulate or feebly denticulate; subapical margins feebly sinuate, without lateral teeth. Striae moderately to shallowly impressed; scutellar stria more or less reduced. Interval 3 with or without a single setigerous puncture on disc; otherwise, disc impunctate.

Legs. Average. Apical spur of front tibia more or less widened (Figs. 14 and 15; cf. Fig. 16). Hind metatarsus elongate (length of hind tibial spur/length of hind metatarsus 1.30-1.87), but shorter than combined lengths of tarsal articles 2 and 3. Anterior tarsus of male with articles broad (as in *Anisodactylus*), or average for Harpalina (Scape-Tarsal Ratio: *Aztecarpalus* 1.38-2.00; *Trichotichnus* 1.80-2.45). Anterior tibia of male average or with crenulations on anteromedial surface (Fig. 17). Hind metatarsus shorter than articles 2 plus 3 (hind tarsal ratio, males 1.05-1.24; females 1.04-1.19) but on average longer than in specimens of subgenus *Harpalus*, and about average for specimens of genus *Trichotichnus*. Inner spur of hind tibia longer than in members of *Trichotichnus* (Scape-Spur Ratio: *Aztecarpalus*—males 0.86-1.38, females 0.90-1.30; *Trichotichnus* (three males, one of *T. longitarsis* Morawitz, *T. dichrous* Dejean, and *T. vulpeculus* Say 1.50-1.83).

Hind wings. Reduced to stubs or fully developed; if latter, membrane pigmented and wedge cell small (Fig. 18; cf. Fig. 19).

Abdomen. Sternum 2 and 3 with fine sparse hairs medially; ambulatory setae present, two or four on sternum 6 (described in text as anal setae).

Male genitalia. Median lobe tubular, with dorsal membranous area extended almost to basal bulb; narrowed apically; apical portion about 0.25 times length of median lobe; apex with or without ventrally directed hook, without dorsally directed hook; ventral surface with or without denticulate projections (Figs. 20-26; cf. Fig. 27); eversion point of internal sac mediad. Internal sac complex, with from seven to 32 spines and microtrichial fields; spines large or small, medial, preapical and apical (Figs. 28-32); basal spine enlarged or not near base of internal sac, on left or right side; basal sclerite on left side (Figs. 31 and 32) or absent.

Ovipositor and associated sclerites. Tergum and sternum 8 as in Figs. 33 and 34. Tergum 10 with apical margin rounded (Fig. 36) or truncate (Fig. 36). Sternum 10 as in Fig. 43. Valvifer falciform apically, apex bluntly pointed, spines very short (Fig. 37; cf. Fig. 38). Coxite elongate with short spines near inner apical margin (Fig. 39, cf. Fig. 40). Stylus falcate, slightly varied (Fig. 30, cf. Fig. 40). Proctiger as in Fig. 41 (cf. Fig. 42).

Female genitalia. Vagina with sclerite dorsally (Fig. 43; cf. Fig. 44).

Etymology.—The generic name is a combination of Aztec, the name of the most important group of Indians living in Mexico during historic times, and the generic name *Harpalus*, in allusion to the homeland and the superficial affinities of the beetles described herein.

Geographical distribution.—The species of this genus are known from the mountain systems of Oaxaca, from the Sierra Madre Oriental, and from the lowlands in northeastern Mexico and extreme southeastern Texas. In general, they are associated with damp places, such as wet meadows (man-made), in the vicinity of forests, or stream sides.

#### KEY TO GROUPS OF HARPALINI OF VARIOUS SUPRASPECIFIC RANKS, OCCURRING IN MEXICO.

1. Penultimate article of labial palpus bi- or tri-setose ..... *Pelmatellina*, *Cratocarina*, and *Acupalpina*.  
Penultimate article of labial palpus plurisetose ..... 2.
2. (1) Elytron with setigerous punctures in intervals 2 and 5, or in intervals  
2, 5, and 7 ..... (in part) *Selenophori*.  
Elytron without setigerous punctures as described above ..... 3.

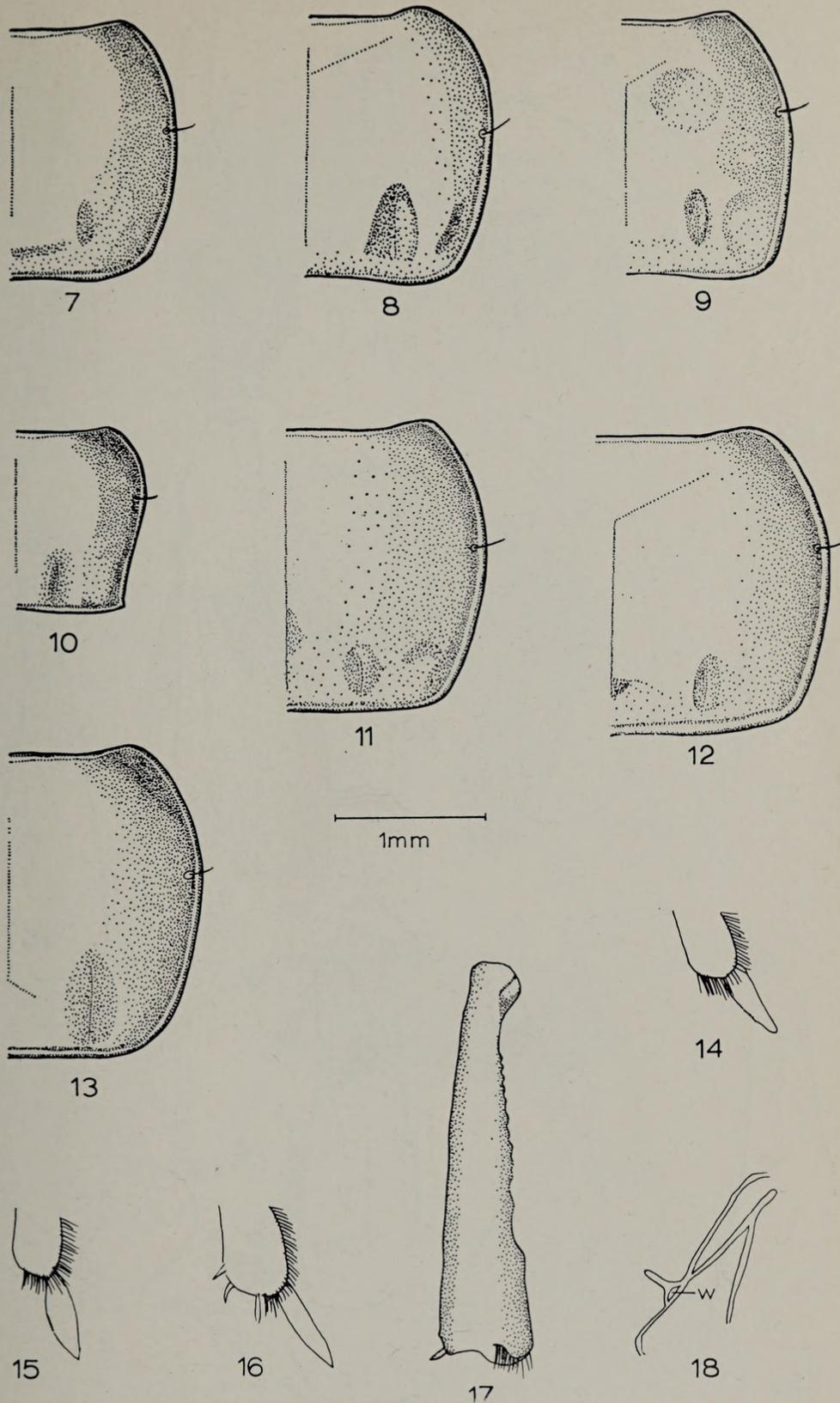


Fig. 7. Pronotum, dorsal aspect, of *Aztecarpalus hebescens* Bates. Fig. 8. Pronotum, dorsal aspect, of *Aztecarpalus platyderus* Bates. Fig. 9. Pronotum, dorsal aspect, of *Aztecarpalus lectocolus* new species. Fig. 10. Pronotum, dorsal aspect, of *Aztecarpalus liolus* Bates. Fig. 11. Pronotum, dorsal aspect, of *Aztecarpalus trochotrachus* new species. Fig. 12. Pronotum, dorsal aspect, of *Aztecarpalus schaefferi*, new name. Fig. 13. Pronotum, dorsal aspect, of *Aztecarpalus marmoreus*, new species. Fig. 14. Right front tibia, apical portion, dorsal aspect, of *Aztecarpalus lectocolus* new species. Fig. 15. Right front tibia, apical portion, dorsal aspect, of *Aztecarpalus trochotrachus* new species. Fig. 16. Right front tibia, apical portion, dorsal aspect, of *Trichotichnus dichrous* Dejean. Fig. 17. Right front tibia, dorsal aspect, of *Aztecarpalus marmoreus* new species. Fig. 18. Wedge cell and associated wing veins of *Aztecarpalus schaefferi* new name. W—wedge cell.

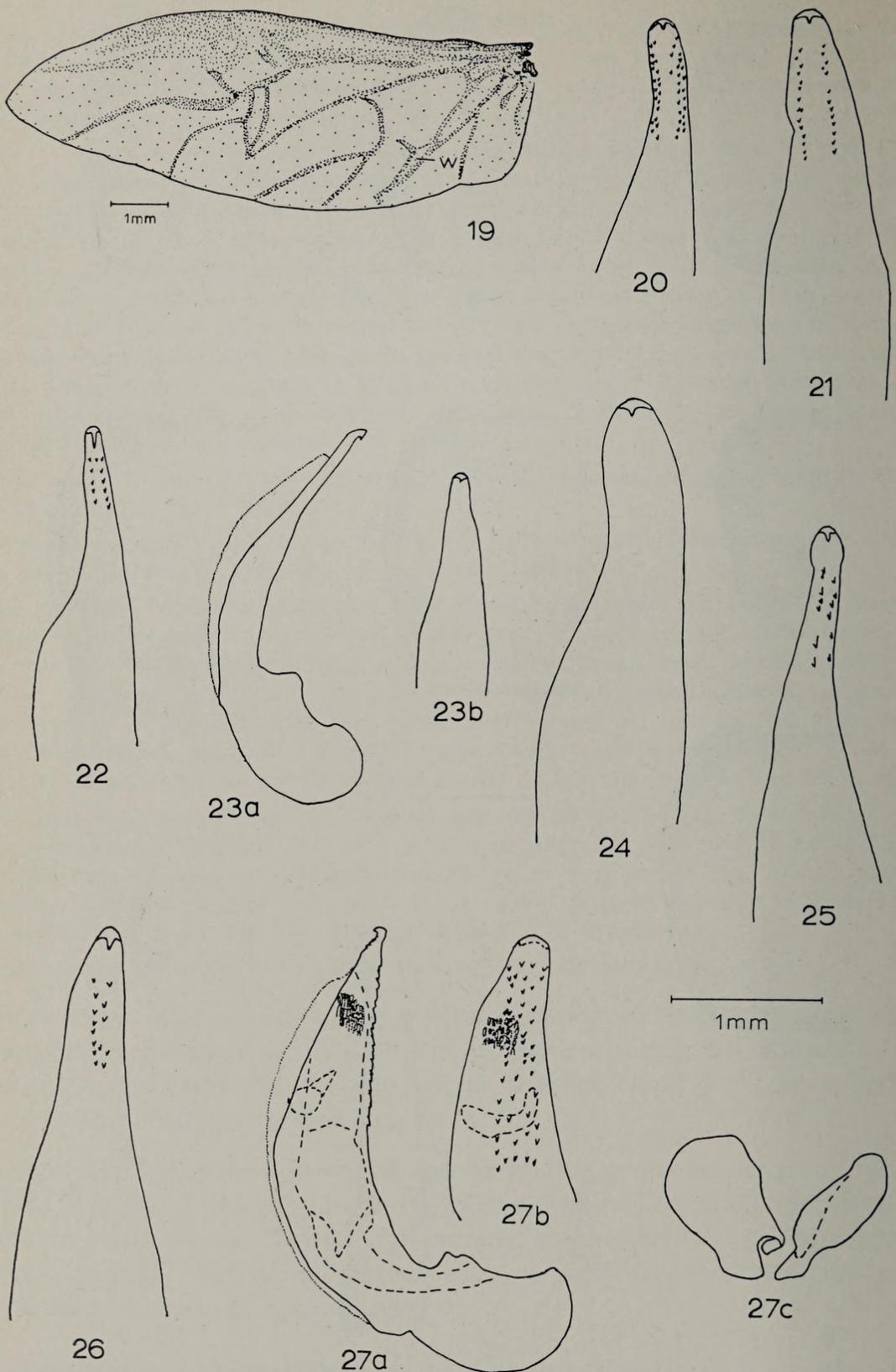


Fig. 19. Left wing of *Trichotichnus longitarsis* Morawitz. W—wedge cell. Fig. 20. Median lobe, apical portion, ventral aspect, of *Aztecarpalus hebescens* Bates. Fig. 21. Same, of *Aztecarpalus platyderus* Bates. Fig. 22. Same of *Aztecarpalus lectocolus* new species. Fig. 23. Median lobe of *Aztecarpalus liolus* Bates.

a. Left lateral aspect; b. Apical portion, ventral aspect. Fig. 24. Median lobe, apical portion, ventral aspect, of *Aztecarpalus trochotrichis* new species. Fig. 25. Same, of *Aztecarpalus schaefferi* new name. Fig. 26. Same, of *Aztecarpalus marmoreus* new species. Fig. 27. Male genitalia of *Trichotichnus longitarsis* Morawitz. a. Median lobe, left lateral aspect; b. Median lobe, apical portion, ventral aspect; c. Parameres, ventral aspect.

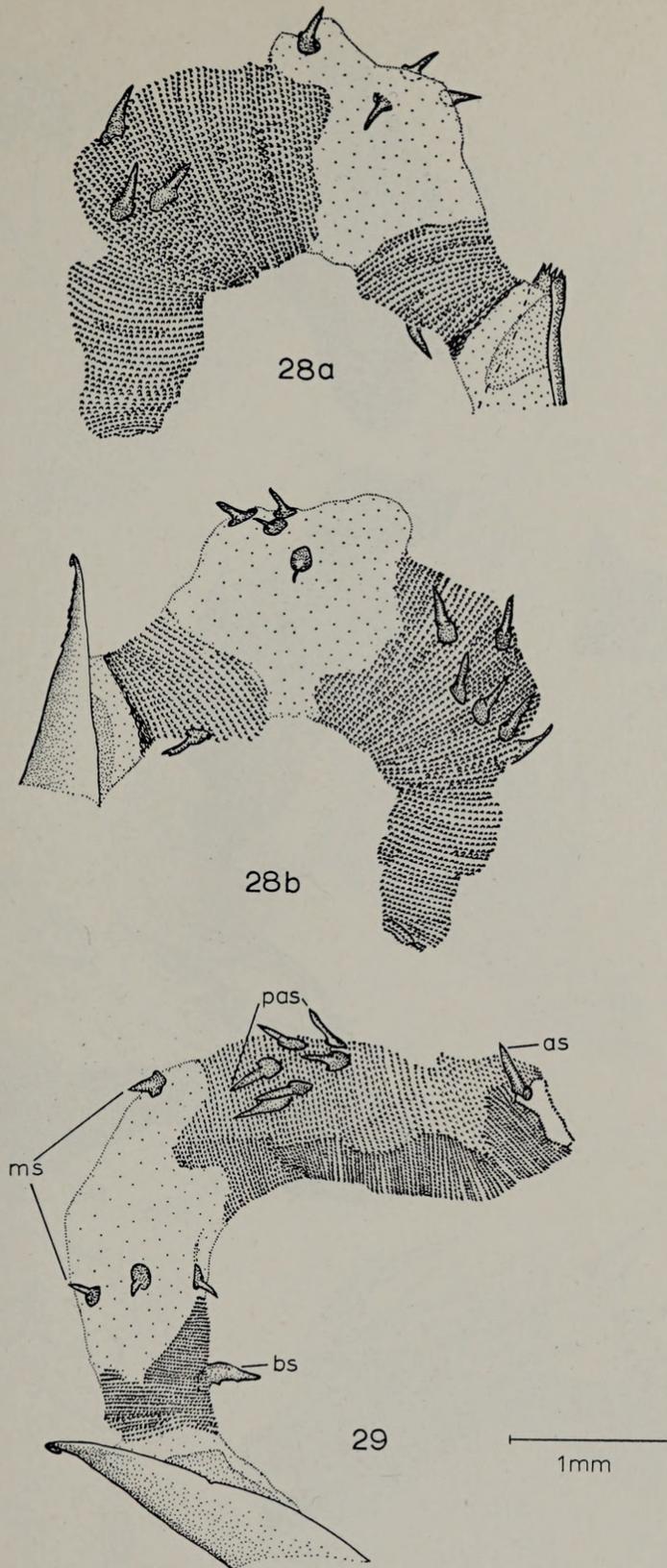


Fig. 28. Internal sac of *Aztecarpalus hebescens* Bates. a. Left lateral aspect; b. Right lateral aspect. Fig. 29. Internal sac, right lateral aspect, of *Aztecarpalus platyderus* Bates. as—apical spine; bs—basal spine; ms—medial spines; pas—pre-apical spines.

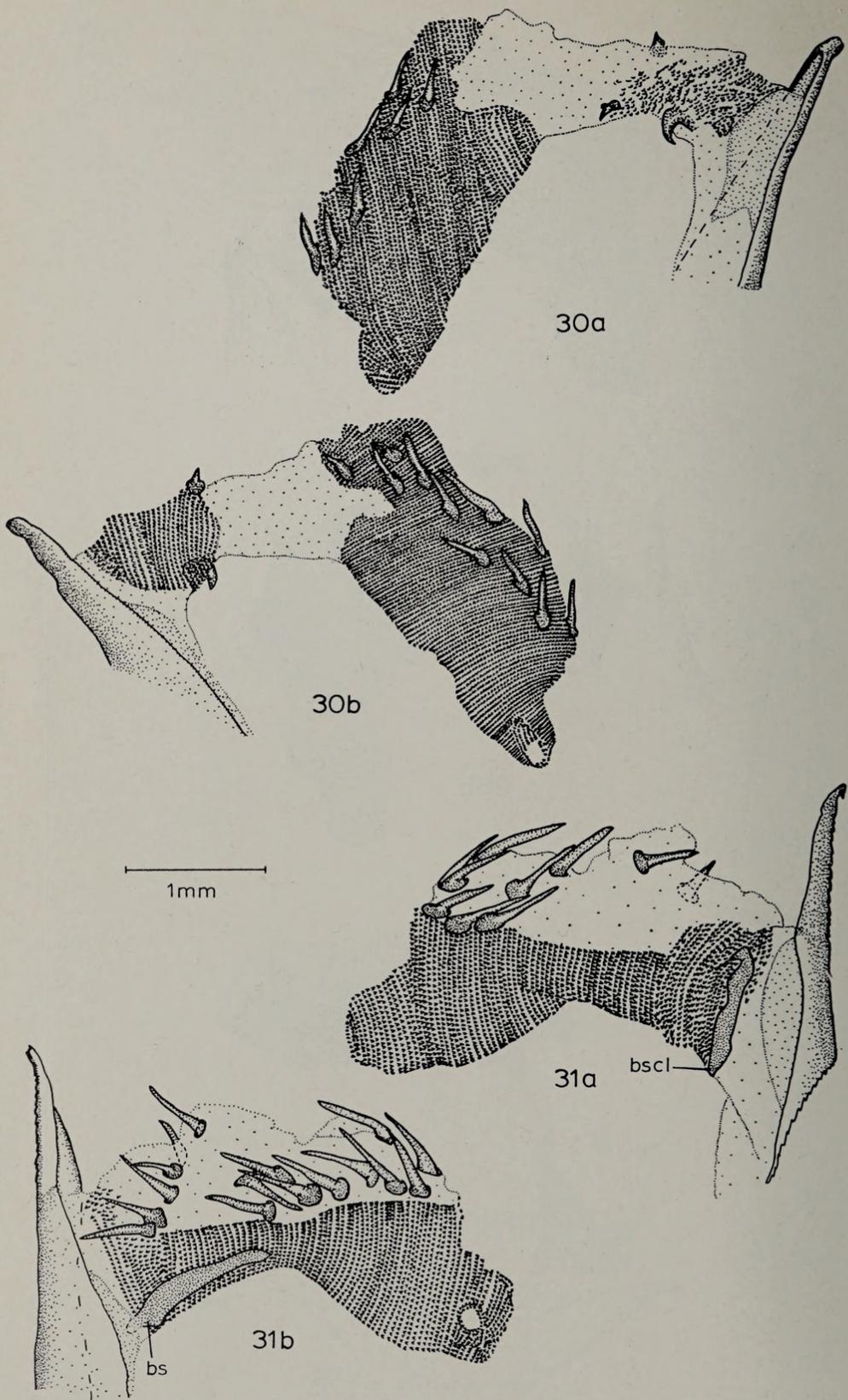


Fig. 30. Same, of *Aztecarpalus trochotrichis* new species. a. Left lateral aspect; b. Right lateral aspect. Fig. 31. Same, of *Aztecarpalus schaefferi* new name. a. Left lateral aspect; b. Right lateral aspect; bs—basal spine; bscl—basal sclerite.

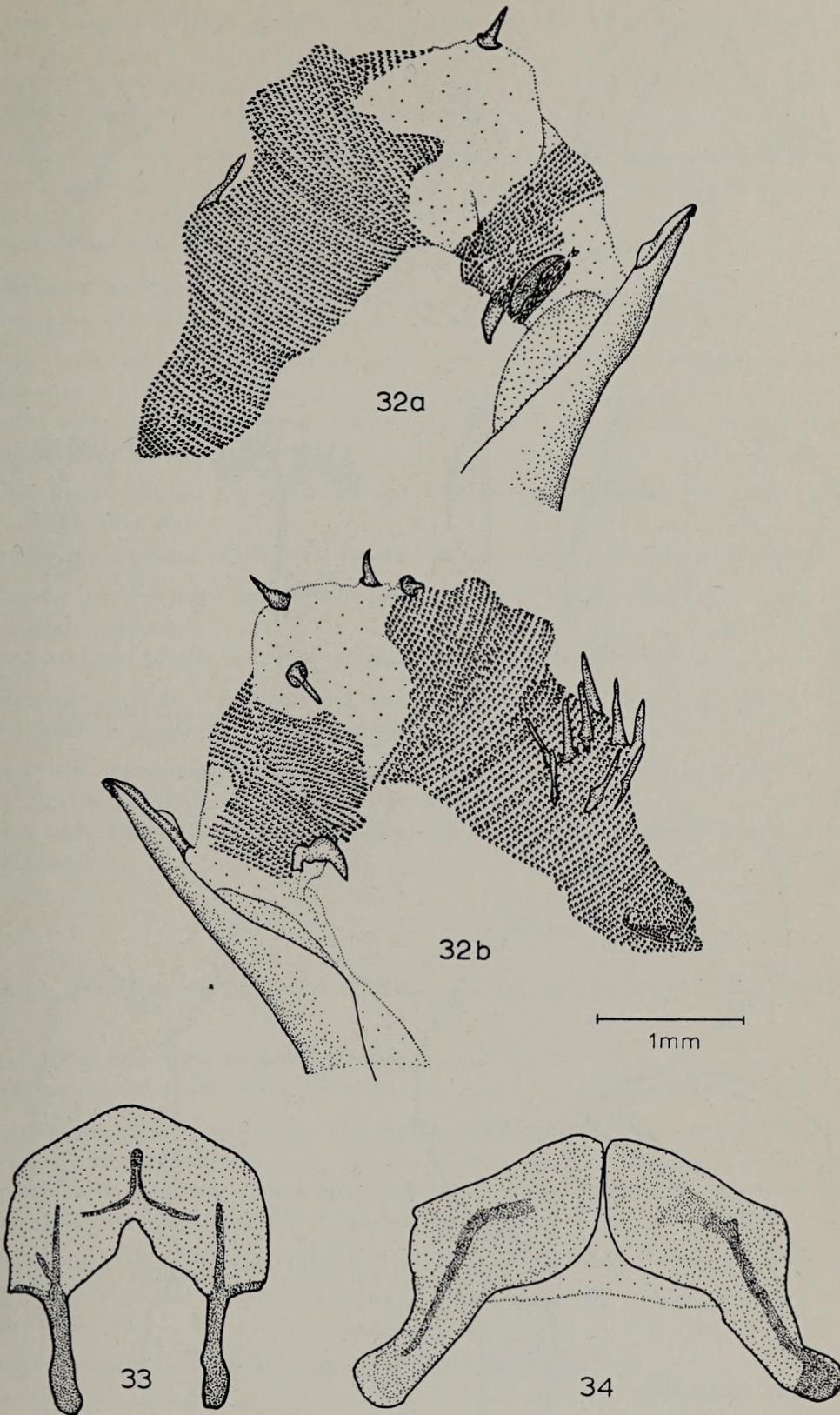


Fig. 32. Same, *Aztecarpalus marmoreus* new species. a. Left lateral aspect; b. Right lateral aspect. Fig. 33. Tergum 8, dorsal aspect, of *Aztecarpalus lectocolus* new species. Fig. 34. Sternum 8, ventral aspect, of *Aztecarpalus schaefferi* new name.

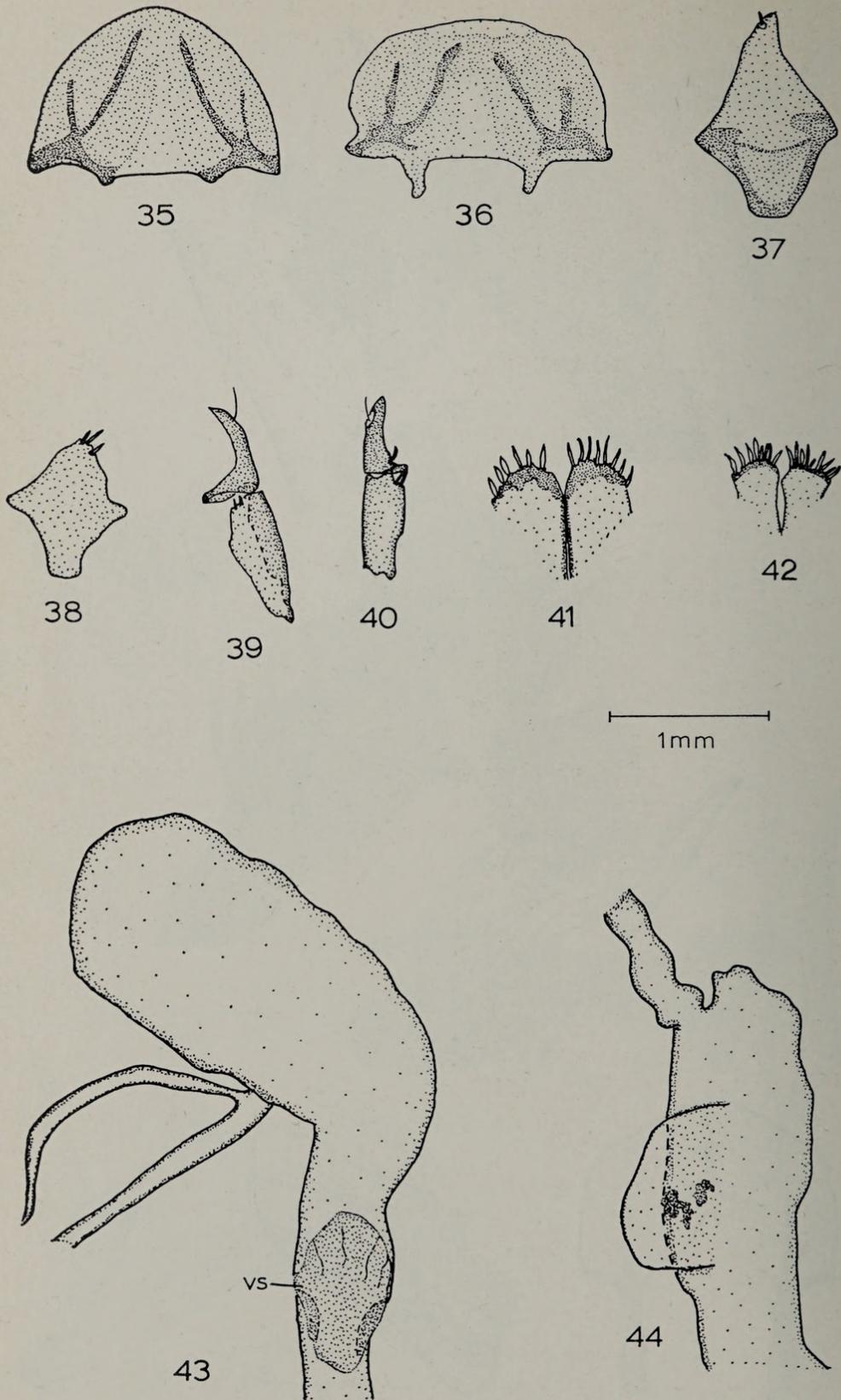


Fig. 35. Tergum 10, dorsal aspect, of *Aztecarpalus hebescens* Bates. Fig. 36. Tergum 10, dorsal aspect, of *Aztecarpalus schaefferi* new name. Fig. 37. Valvifer, ventral aspect, of *Aztecarpalus trochotrichis* new species. Fig. 38. Valvifer, ventral aspect, of *Trichotichnus longitarsis* Morawitz. Fig. 39. Left coxite and stylus, ventral aspect, of *Aztecarpalus schaefferi*, new name. Fig. 40. Right coxite and stylus, ventral aspect, of *Trichotichnus longitarsis* Morawitz. Fig. 41. Sternum 10, ventral aspect, of *Aztecarpalus trochotrichis* new species. Fig. 42. Sternum 10, ventral aspect, of *Trichotichnus longitarsis* Morawitz. Fig. 43. Internal female genitalia, dorsal aspect, of *Aztecarpalus trochotrichis* new species. vs—vaginal sclerite. Fig. 44. Internal female genitalia, dorsal aspect, of *Trichotichnus longitarsis* Morawitz.

3. (2) Head with prominent frontal processes in front of eyes; mentum with tooth cylindrical, sharp pointed, as long as lateral lobes; pronotum with sides markedly sinuate in front of hind angles ..... **Cratacanthus.**  
 Head without frontal processes in front of eyes; mental tooth, if present, shorter than lateral lobes, and flat; pronotum various ..... 4.
4. (3) Anterior tibia with outer apical portion prolonged as broad spine, subequal in length to apical spine; apical spur much broader than preapical spur; elytron with large punctures in at least odd-numbered elytral intervals ..... **Euryderus.**  
 Anterior tibia with apical portion not prolonged as large spine ..... 5.
5. (4) Paraglossae setulose ..... **Harpalus.**  
 Paraglossae glabrous ..... 6.
6. (5) Elytron with umbilicate punctures in anterior and posterior series, without puncture between ..... (in part) **Selenophori**  
 Elytron with umbilicate punctures in continuous series or with a single puncture between anterior and posterior groups. .... 7.
7. (6) Males (tarsal articles 1-4 of front and middle legs expanded, and with specialized vestiture ventrally) ..... 8.  
 Females (tarsal articles of front and middle legs not broader than those of hind legs) ..... 9.
8. (7) Expanded tarsal articles each with numerous rows of adhesive hairs on ventral surface—"spongy pubescence" ..... (in part) **Anisodactylina.**  
 Expanded tarsal articles with two conspicuous rows of scale-like hairs ..... **Aztecarpalus.**
9. (7) Metepisternum wider than long, hind wings absent; antennae short ..... (in part) **Aztecarpalus.**  
 Metepisternum longer than wide, hind wings present or absent ..... 10.
10. (9) Elytra with microsculpture lines transverse, without meshes, surface purplish or metallic blue, strongly iridescent; pronotum with hind angles rounded ..... (in part) **Aztecarpalus.**  
 Elytra with microsculpture meshes isodiametric or weakly transverse, surface not iridescent ..... (in part) **Anisodactylina.**

### Key to the Species of *Aztecarpalus*, Based on External Characteristics

1. Tarsal articles with setae on dorsal surfaces ..... 2.  
 Dorsal surfaces of tarsal articles glabrous ..... 3.
2. (1) Pronotum with sides sinuate posteriorly, hind angles rectangular (Figs. 10 and 45), elytra with microsculpture evanescent ..... **liolus** Bates, p. 116  
 Pronotum with sides not sinuate posteriorly, hind angles obtuse (Fig. 9), elytra with well developed lines of microsculpture, meshes transverse ..... **lectocolus** new species, p. 115
3. (1) Elytra metallic blue or green, interval 3 of at least one elytron with setigerous puncture on disc ..... 4.  
 Elytra black ..... 5.
4. (3) Elytra metallic green; metepisternum wider than long; hind wings absent ..... **trochotrichis** new species, p. 118  
 Elytra metallic blue; metepisternum longer than wide, hind wings fully developed ..... **schaefferi** new name, p. 119
5. (3) Elytron with long scutellar stria ..... **marmoreus** new species, p. 121  
 Scutellar stria of elytron obsolete ..... 6.
6. (5) Pronotum as in Fig. 7; specimen from mountains of Oaxaca ..... **hebescens** Bates, p. 113  
 Pronotum as in Fig. 8; specimens from mountains of Puebla and Veracruz **platyderus** Bates, p. 114

### Key to the Species of *Aztecarpalus* Based on Form of the Median Lobe of the Male Genitalia

1. Median lobe with ventral surface not denticulate ..... 2.  
Median lobe with ventral surface denticulate near apex ..... 3.
2. (1) Apical portion of median lobe broad, curved to left (Fig. 24) ..... **trochotrichis** new species, p. 118  
Apical portion of median lobe narrow, not curved to left (Fig. 23) ..... **liolus** Bates, p. 116
3. (1) Median lobe with dorsal projection on left side, near apex (Fig. 26) ..... **marmoreus** new species, p. 121  
Median lobe without dorsal projection on left side near apex ..... 4.
4. (3) Median lobe with width of apical portion subequal to length (Fig. 21) ..... **platyderus** Bates, p. 114  
Median lobe with apical portion slender, several times longer than wide ..... 5.
5. (4) Median lobe with apical portion straight (Fig. 22) ..... **lectocolus** new species, p. 115  
Median lobe with apical portion curved to left or right (Figs. 20 and 25) ..... 6.
6. (5) Median lobe with apical portion curved to right (Fig. 25) ..... **schaefferi** new name, p. 119  
Median lobe with apical portion curved to left (Fig. 20) ..... **hebescens** Bates, p. 113

### Key to the Species of *Aztecarpalus* Based on Characteristics of the Internal Sac of the Male Genitalia

1. Internal sac with basal spine on left side ..... 2.  
Internal sac with basal spine on right side ..... 3.
2. (1) Internal sac with apical spine (Fig. 29) ..... **platyderus** Bates, p. 114  
Internal sac without apical spines (Fig. 30) ..... **trochotrichis** new species, p. 118
3. (1) Internal sac with basal sclerite (Figs. 31 and 32) ..... 4.  
Internal sac without basal sclerite (Fig. 28) ..... 5.
4. (3) Basal spine very large; preapical area with numerous long spines  
(Fig. 31) ..... **schaefferi** new name, p. 119  
Basal spine shorter; preapical area with few spines (about 5)  
(Fig. 32) ..... **marmoreus** new species, p. 121
5. (3) Spines numerous (more than 15), all short ..... **lectocolus** new species, p. 115  
Spines less than 15, some long, some short ..... 6.
6. (5) Spines of medial group longer than those of preapical group ..... **liolus** Bates, p. 116  
Spines of preapical group longer than those of medial group (Fig. 28) ..... **hebescens** Bates, p. 113

### Species Groups and Descriptions

The seven species of this genus are arranged in four groups: the *hebescens* group; the *liolus* group; the *trochotrichis* group; and the *schaefferi* group. The groups and species are characterized below.

#### The *hebescens* Group

The diagnostic characteristics of this group are: pronotum with hind angles rounded; elytra black, iridescent or not, meshes formed by microsculpture wide, transverse or isodiametric; tarsal articles with dorsal surfaces glabrous; articles of male front tarsus average for genus, inner hind tibial spur of average length; anal setae of males two or four; median lobe of male genitalia with denticles ventroapically; internal sac with basal spine on right or left side; spines of medial group shorter than those of preapical group, both groups with eight or fewer spines, tergum 10 of female with apical margin rounded.

This group includes two species: *hebescens* Bates and *platyderus* Bates. The species are known from the mountains of Puebla, Veracruz and Oaxaca, only.

*Aztecarpalus hebescens* Bates

Figs. 7, 20, 28, 35

*Harpalus hebescens* Bates, 1882; 57. LECTOTYPE (here selected) a male, BMNH, labelled as follows: "SYNTYPE [circular label, white paper trimmed with blue]; TYPE H. T. [circular label, white paper trimmed with red]; Capulalpam; Mexico Salle Coll; BCA Col. I. 1., *Harpalus hebescens* Bates; *Harpalus hebescens* Bates" [handwritten]

NOTES.—A second specimen of this species, also a male and collected at Capulalpam, in the British Museum Collection, is labelled *Harpalus alienus* Bates. A specimen of this species in the Oberthür collection (MHNP) is labelled *Harpalus aequicollis* Chaudoir. This name was not published.

DESCRIPTION.—Total length, males 7.9-8.6 mm, females 8.4-9.8 mm.

Color. Black, except following. Piceous, median portion of venter of thorax and abdomen. Rufous, maxillae, labial appendages and tarsi. Infuscated, antennal articles 4-11, coxae and trochanters. Antennal articles 1-3 rufous or infuscated.

Setae. Middle coxae each with five—10 setae; middle femora of male each with four setae ventro-anteriorly near base, of female, each with three ventro-anterior setae. Elytra each with interval 3 impunctate. Anal setae four in males and females.

Microsculpture. Meshes isodiametric to slightly transverse. Clypeus, meshes fine, transverse. Head, meshes fine, transverse laterally, isodiametric on frons and vertex. Pronotum with fine lines, meshes narrow, transverse, but isodiametric or longitudinally stretched in posterior-lateral impressions. Elytra with meshes relatively wide, slightly transverse to isodiametric, more transverse in males than in females.

Luster. Dorsal surface shining to faintly iridescent.

Head. Frontal impressions broad, circular basins (in lectotype with small prolongations toward compound eyes).

Pronotum. As in Fig. 7. Sides rather strongly rounded, hind angles broadly obtuse. Posterior-lateral impressions shallow, linear.

Legs. Anterior tibia with terminal spur broad, as in Fig. 15. Male front tibia gradually narrowed apically with crenulate antero-medial surface not swollen. Male front tarsi with articles broad (Scape-Tarsal ratio for five specimens, 1.40-1.60). Scape-Tibial Spur Ratio: five males 0.94-1.14; four females 0.94-1.00.

Metepisternum. About 1.5 times wider than long.

Elytra. Humeri angulate, not denticulate. Striae moderately impressed, scutellar stria obsolete.

Hind wings. Absent.

Male genitalia. Median lobe in ventral aspect sinuate, with apical portion curved to left; apical portion slender, long, with denticles in two irregular rows (Fig. 20); apex rounded, with short hook. Internal sac as in Figs. 28a and b. Basal spine on right side, of average size; medial area with two-six short spines; preapical area with three-eight long spines (five specimens examined).

Female abdomen. Tergum 10 with apical margin rounded, as in Fig. 35.

Collecting notes.—Specimens of this species were collected in May and October at altitudes of 7900' and 8300'. They were found under stones and logs in a meadow at the edge of a pine forest, and in an overgrazed pasture at the edge of a pine-oak forest. The areas were damp.

Distribution.—This species is known only from the state of Oaxaca,

Mexico. I have seen six males and four females from the following localities. OAXACA. Capulalpam (BMNH). 53.8 mi. s. Valle Nacional, 8300', V.3.66 (UASM). 54.1 mi. s. Valle Nacional, 8300', VIII.18.65 (UASM). 97.3 mi. s. Valle Nacional, 7900', VIII.19.65.

*Aztecarpalus platyderus* Bates

Figs. 8, 21, 29

*Harpalus platyderus* Bates, 1882: 57. LECTOTYPE (here selected), male, labelled as follows:

Syntype [circular label, white, ringed with lavender color]; Orizaba; Mexico Sallé Coll; [rectangle of green paper]; BCA coll I. 1, *Harpalus platyderus* Bates; *Harpalus platyderus* apud Sallé. (BMNH).—Csiki, 1932: 1184.

NOTES.—Additional specimens in the type series are two females, one collected at Las Vigas, Veracruz, and the other at San Antonio de Arriba. The Las Vigas specimen looks like the male and is probably conspecific with it. The San Antonio de Arriba specimen, on the other hand, seems sufficiently different in form to be included in a separate species. However, no males that I have seen match this specimen, and I do not know the position of the locality in which the specimen was collected. It seems best, therefore, to record the specimen as *incertae sedis*.

DESCRIPTION.—Total length two males, 9.20-10.28 mm; five females, 9.50-10.58 mm.

Color. Black to piceous, except rufous tarsi, maxillae, and labial appendages. Antennae with articles 2-11 rufous to infuscated.

Setae. Middles coxae each with 10 setae. Middle femora of males each with four—six setae antero-ventrally, near base; females with three setae. Elytra each with interval 3 impunctate. Anal setae two in male, four in females.

Microsculpture. Dorsum of head with isodiametric meshes. Pronotum with meshes slightly transverse, more or less isodiametric posteriorly. Elytra, meshes slightly transverse to isodiametric.

Luster. Dorsum of males shining, of females subopaque.

Head. Frontal impressions large, basin-like, grooves in bottom curved toward eyes.

Pronotum. As in Fig. 8; disc flatter than in *hebescens*, otherwise similar.

Legs. Anterior tibia with terminal spur broadened (as in Fig. 15). Male front tibia with crenulate antero-medial face, not swollen. Articles of male front tarsi broad (Scape-Tarsal Ratio, one male 1.38). Scape-Tibial Spur Ratio: male 1.06; three females 0.90-1.13.

Metepisternum. Slightly wider than long.

Elytra. Humeri angulate, not denticulate. Striae moderately impressed, scutellar stria obsolete.

Hind wings. Absent.

Male genitalia. Median lobe in ventral aspect sinuate, apical portion straight, rather short and broad, ventrally with two rows of denticles and short apical hook (Fig. 21). Internal sac as in Fig. 29; basal spine prominent; medial area with two—eight short spines; preapical area with six—seven long spines; apical area with one—two long spines (Fig. 29).

Female abdomen. Tergum 10 with apical margin rounded, as in Fig. 35.

Distribution.—This species is known only from the eastern-most slopes of the Trans-Volcanic Sierras. I have seen six specimens, from the following localities.

VERACRUZ. Orizaba (BMNH). Las Vigas (BMNH). Citlaltepctl, east slope, 9500', L. W. Swan (CAS).

The *liolus* Group

The diagnostic characteristics of this group are: pronotum with hind angles subangulate, elytra piceous or purplish, meshes of microsculpture transverse and narrow, or absent; tarsal articles with dorsal surfaces sparsely setose; articles of male front tarsus narrower than average; inner hind tibial spur shorter than average, especially in males, anal setae two in males; median lobe of male genitalia ventro-apically denticulate or not; internal sac with basal spine on right side, right basal sclerite absent, spines of medial and preapical areas short; tergum 10 of female with apical margin rounded.

This group includes two species the members of which are known from the mountains of Oaxaca, only. These are *liolus* Bates and *lectocolus* new species.

*Aztecarpalus lectocolus* new species

Figs. 9, 14, 22, 30, 33.

The diagnostic characteristics of this species are indicated in the keys.

DESCRIPTION.—Total length, males 8.3-8.4 mm; females 7.6-8.4 mm.

Color. Body black. Legs, tarsi excluded, rufo-piceous. Antennal scape and articles 2-3 black, articles 4-11 rufous laterally, infuscated medially; tarsi, maxillae and labial appendages rufous. Elytra purplish.

Setae. Middle tibiae each with two rows of five to six setae ventro-anteriorly. Middle coxae each with few setae (between five and 10). Elytra each with interval 3 impunctate. Anal setae two in males, four in females.

Microsculpture. Clypeus and dorsum of head with meshes isodiametric to slightly transverse, lines coarser in females than in males. Pronotum with lines fine, meshes transverse, narrow. Elytra with meshes strongly transverse.

Luster. Pronotum and elytra brightly shining, iridescent.

Head. Frontal impressions circular, shallow, broad.

Pronotum. As in Fig. 9. Hind angles narrowly obtuse, areas subtended by hind angles broadly flattened. Posterior-lateral impressions shallow, elongate grooves.

Legs. Anterior tibia with terminal spur rather slender (Fig. 14). Male front tibia with antero-medial surface crenulate, not swollen (Fig. 17). Scape-Tarsal Ratio, two males 1.80-2.00. Scape-Tibial Spur Ratio: males 1.28-1.38, two females 1.08-1.21.

Metepisternum. About 1.25 times wider than long.

Elytra. Humeri angulate, feebly denticulate. Striae moderately deeply impressed, scutellar stria short. Intervals feebly convex.

Hind wings. Absent.

Male genitalia. Median lobe in ventral aspect sinuate, apical portion more or less straight; apex subtruncate, with long hook; apical portion slender, long, with two rows of denticles (Fig. 22). Internal sac as in Figs. 30a and b; basal spine small, on right side; medial area with eight short spines; preapical area with nine short spines (one specimen examined).

Female abdomen. Tergum 10 with apical margin rounded, as in Fig. 35.

Derivation of name.—From Latin, *lectus*, bed or litter; and *colus*, dweller in; alluding to the occurrence of the members of this species in leaf litter.

Material examined.—I have seen four specimens of this species. The holotype (male) and allotype are labelled as follows: Mex. Oaxaca, 22.2 mi. s. Juchatengo, 5800'; VII.21-22.66; G. E. Ball and D. R. Whitehead, collectors. Of the two paratypes, females, one is labelled

as above, and the other as follows: Mex. Oaxaca; 88.5 mi. s. Valle Nacional, 8000', V.2.66; G. E. Ball and D. R. Whitehead, collectors. The holotype and allotype are in the entomological collection of the MCZ. The paratypes are in UASM.

Collecting notes.—These specimens were collected on steep mountain slopes in Mexican cloud forest, in damp leaf litter. Specimens of *A. trochotrichis* new species were also collected 88.5 miles south of Valle Nacional.

Distribution.—This species is known only from the mountains of Oaxaca.

*Aztecarpalus liolus* Bates

Figs. 10, 23, 45

*Harpalus liolus* Bates, 1882: 58. Type material two males, Box No. 225. Oberthür Collection,

MHNP.—Tschitscherin, 1900: 363.

*Trichotichnus liolus*; Csiki, 1932: 1220.

NOTES.—Tschitscherin (1900) suggested that *Harpalus liolus* Bates belonged in the genus *Asmerinx* Tschitscherin, or in a related group. However, he did not make the transfer, formally. Subsequently, *Asmerinx* was combined with *Trichotichnus* and *H. liolus* Bates was placed in the latter genus (Csiki, 1932).

DESCRIPTION.—Total length, male, 6.3 mm., females, 6.7-6.9 mm. Form as in Fig. 45.

Color. Body rufo-piceous. Rufo-testaceous—antennae, maxillae, labial appendages.

Setae. Dorsal surfaces of tarsal articles each with few long setae. Male and female with seven setae antero-ventrally on each middle femur. Middle coxae each with few setae (five). Interval 3 of elytron without setigerous puncture. Anal setae two in males, four in females.

Microsculpture. Head, pronotum, and elytra with lines almost effaced. Meshes, if formed, narrow and transverse.

Luster. Surface shining, head and pronotum feebly iridescent.

Head. Frontal impressions basins, each with shallow groove directed toward compound eye.

Pronotum. As in Fig. 10; sides sinuate posteriorly, hind angles rectangular; areas subtended by hind angles flattened. Posterior-lateral impressions linear, rather shallow. Basal and lateral margins beaded.

Legs. Anterior tibia with terminal spur broadened (as in Fig. 15). Male front tibia with antero-medial surface not crenulate near base, not swollen. Scape-Tarsal Ratio 1.86. Scape-Tibial Spur Ratio: Male and female 1.30.

Metepisternum. About 1.25 times wider than long.

Elytra. Striae moderately impressed, scutellar stria obsolete. Intervals flat except 7 and 8, these subcarinate before apex.

Hind wings absent.

Male genitalia. Median lobe in ventral aspect sinuate on left side, apical portion straight; apical portion narrow, moderately long, without denticles, and with short apical hook (Fig. 23). Internal sac: basal spine not strongly curved, hardly enlarged; medial area with four spines; preapical area with six spines.

Female abdomen. Tergum 10 with apical margin rounded, as in Fig. 35.

Collecting notes.—D. R. Whitehead and I collected specimens in the vicinity of a dried up pond in Mexican cloud forest. The area was wet and densely shaded by oak trees. The leaf litter was shallow. The beetles were under stones, and about four hours were spent to obtain the three specimens.

Distribution.—This species is known from the Atlantic slopes of the

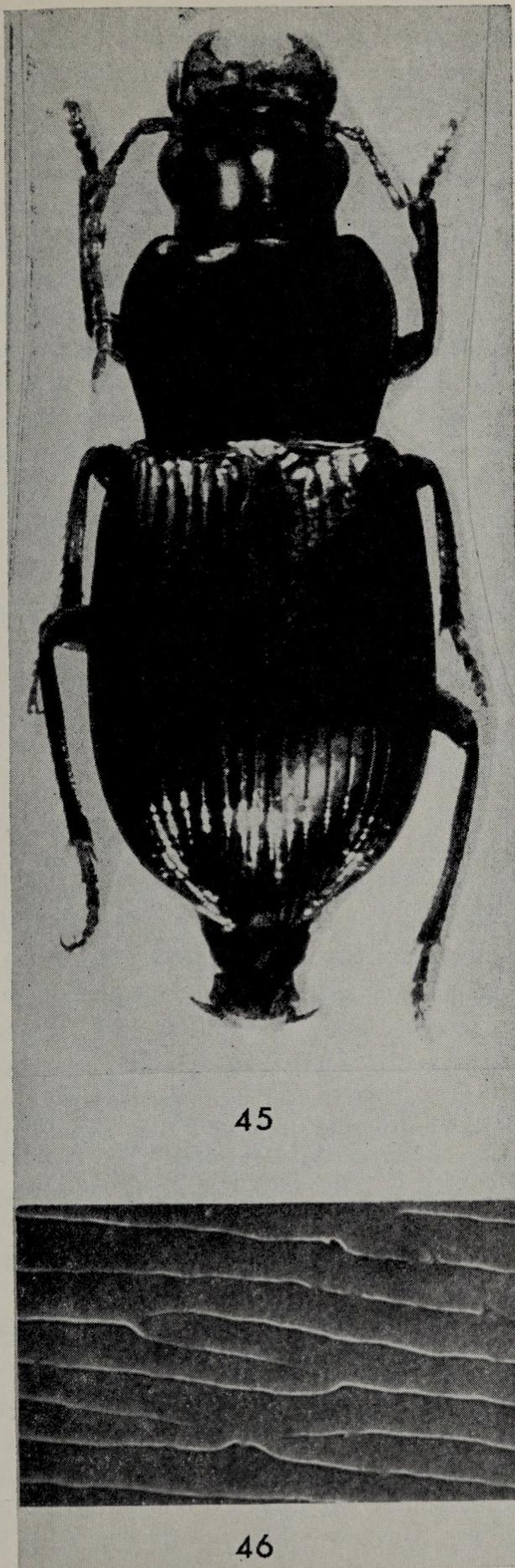


Fig. 45. Photograph, dorsal aspect, of *Aztecarpalus liolus* Bates. Taken by J. S. Scott.  
Fig. 46. Photograph, microsculpture of elytron of *Aztecarpalus schaefferi*, new name, taken at 3000 X.

Oaxacan mountains. I have seen five specimens: the type material, labelled "Mexico" (MHNP), and three specimens collected in Oaxaca, 16.9 mi. s. Valle Nacional, 3600', V.4-5.66 (UASM).

### The *trochotrichis* group

The diagnostic characteristics of this group are: pronotum with hind angles rounded; elytra green with dorsal surface not iridescent, microsculpture meshes transverse or absent from disc, interval 3 with single discal puncture; tarsal articles with dorsal surfaces glabrous; articles of male front tarsus of average width for genus; inner hind tibial spur of average length for genus; anal setae of male four; median lobe of male genitalia without denticles on apical portion of ventral surface, apical portion straight, apex broadly rounded; internal sac with basal spine on left side, basal sclerite absent; spines of medial group few, short, spines of preapical group numerous, long; tergum 10 of female with apical margin rounded.

This group includes a single species, *Aztecarpalus trochotrichis* new species.

### *Aztecarpalus trochotrichis* new species

Figs. 11, 15, 24, 30, 37, 41, 43

*Anisotarsus cyanippus* var. Bates, 1882: 51.

*Anisotarsus hilariolus*; van Emden (in part), 1953: 534.

Notes.—The above synonymy refers to a single specimen labelled "Harpalus agonoderus Chaud. apud Salle", a name that was not published by Chaudoir.

DESCRIPTION.—Total length male 9.4 mm., females 9.1-9.6 mm.

Color. Black, except the following. Rufous, maxillae, labial appendages and tarsi. Metallic green, elytra.

Setae. Average, except male with sparse brush of setae on lower surface of middle femur, and each hind trochanter with about 20 fine setae; female with few extra setae at base of middle femur and two setae on each hind trochanter. Interval 3 of elytron with single seta in apical 1/3. Anal setae four in males, four in females.

Microsculpture. Dorsal surface of head with transverse meshes (female) or lines effaced (male). Pronotum, meshes transverse on disc, almost isodiametric in posterior-lateral impressions. Elytra, in male, lines fine on apices only, in females meshes transverse throughout elytra.

Luster. Dorsal surface shining, head and pronotum in female faintly iridescent.

Head. Frontal impressions broad, rather elongate basins.

Pronotum. As in Fig. 11; moderately flattened, hind angles obtuse; posterior lateral impressions irregular basins separated from lateral depressions.

Legs. Anterior tibia with terminal spur broadened (Fig. 15). Male front tibia with antero-medial surface slightly swollen, crenulations well developed (as in Fig. 17). Scape-Tarsal Ratio 1.63. Scape-Tibial Spur Ratio: male 1.12; two females 1.06-1.13.

Metepisternum. About 1.5 times wider than long.

Elytra. Humeri angulate, not toothed; striae moderately deeply impressed, scutellar stria reduced; intervals feebly convex.

Hind wings. Absent.

Male genitalia. Median lobe sinuate in ventral aspect, apical portion curved to left; apical portion broad, apex broadly rounded, with short apical hook; ventral surface without denticles (Fig. 24). Internal sac as in Fig. 30a and b; basal spine on left side of sac, broad, curved; medial area with two short spines; preapical area with 19 long spines.

Female abdomen. Tergum 10 with apical margin rounded, as in Fig. 35. Sternum 10 as in Fig. 41. Vagina and bursa copulatrix as in Fig. 43.

Derivation of name.—From Greek, *trochis* meaning runner; (a synonym of trochanter) and *trichis* meaning hair; in allusion to the hairs on the male trochanters.

Material examined.—I have seen four specimens of this species. The holotype, allotype, and paratype are labelled as follows: "Mex. Oaxaca. 88.5 mi. s. Valle Nacional, 8000', V.2.1966. G. E. Ball and D. R. Whitehead Collectors". The holotype and allotype are in the MCZ. The paratype is in the UASM. The fourth specimen is a female, collected at Capulalpam, Oaxaca (BMNH) and included by Bates and van Emden in *Anisotarsus* (see "Notes", above).

Collecting notes.—Specimens of this species were collected in damp leaf litter, in Mexican cloud forest, along with specimens of *A. lectocolus*.

Geographical distribution.—This species is known only from the mountain forests of Oaxaca, on the Atlantic slope.

### The *schaefferi* Group

The diagnostic characteristics of this group are: pronotum with hind angles rounded; elytra black or purplish, iridescent, microsculpture meshes of dorsal surface narrow and transverse; male front tarsi average width for genus; inner hind tibial spur various; anal setae of male two or four; median lobe of male genitalia with denticulations ventro-apically; internal sac with basal spine on right side, left side at base with large sclerite; medial and preapical areas with few to many spines; tergum 10 of female with apical margin subtruncate.

This group includes the two species *A. schaefferi* new name and *A. marmoreus*, new species. The members of this species group are known from the eastern portion of the Trans-Volcanic Sierra, the Sierra Madre Oriental, and extreme southeastern Texas.

#### *Aztecarpalus schaefferi* new name

Figs. 2, 5, 12, 18, 25, 31, 34, 36, 39, 46

*Harpalus iripennis* Schaeffer, 1910: 432 (not Say, 1824). LECTOTYPE male, collected on the Esperanza Ranch, Brownsville, Texas (USNM).—Leng, 1920: 71.

*Pteropalus iripennis*; Casey, 1913: 133

*Trichotichnus iripennis*; Csiki, 1932: 1220.—Lindroth, 1968: 820.

NOTES.—I have not seen the lectotype, but I have studied three specimens of this species labelled as Cotype No. 42510, and collected at the type locality.

The names *Harpalus iripennis* Say and *Harpalus iripennis* Schaeffer are primary homonyms, even though the species named by Say was removed from *Harpalus* and placed in the genus *Selenophorus* before Schaeffer used the specific name *H. iripennis*. According to the Code, a junior primary homonym is invalid as the name of a species, so I re-named Schaeffer's species, using his surname as the specific epithet.

DESCRIPTION.—Total length (10 males, 10 females, Chipinque Mesa, Monterrey, Nuevo Leon), males 9.6-11.2 mm., mean 10.6 mm; females, 10.1-11.2 mm., mean 10.6 mm.

Color. Black except dark purplish or blue elytra, and rufous apical portions of terminal palpal articles.

Setae. Average, male without special brushes on legs. Elytra each with a setigerous puncture in interval 3, or puncture absent from one elytron. Anal setae four in males, four in females.

Microsculpture. Clypeus and head, lines fine, meshes slightly transverse to isodiametric, lines coarser in males than in females. Pronotum with narrow transverse meshes. Elytra with very fine lines, meshes not formed (Fig. 46).

Luster. Dorsal surface shining, elytra strongly iridescent, head and pronotum less strongly so.

Head. Frontal impressions broad, shallow basins. Mouthparts as in Figs. 2 and 5.

Pronotum. As in Fig. 12; moderately flattened, hind angles obtuse; posterior lateral impressions rather linear, shallow, widely isolated from side grooves.

Legs. Anterior tibia with terminal spur broadened (as in Fig. 15). Male front tibia with crenulations on antero-medial surface as in Fig. 17, not swollen toward base. Scape-Tarsal Ratio, 10 males 0.81-1.12; 10 females 0.95-1.06.

Metepisternum distinctly longer than wide.

Elytra. Humeri angulate, not denticulate. Striae moderately deeply impressed, scutellar stria long. Intervals feebly convex.

Hind wings. Fully developed, as in Fig. 19; membrane with dark pigment; wedge cell as in Fig. 18.

Male genitalia. Median lobe in ventral aspect sinuate, apical portion curved to right; apex narrowly rounded; apical portion slender, long, with short apical hook and two rows of ventral denticles (Fig. 25). Internal sac as in Figs. 31a and b; basal spine on right side, very large; basal sclerite on left side; medial area with seven—18 long spines; preapical area with nine—17 long spines (eight specimens dissected).

Female abdomen. Sternum 8 as in Fig. 34. Tergum 10 with apical margin subtruncate (Fig. 36). Coxite and stylus as in Fig. 39.

COLLECTING NOTES.—Specimens of this species were collected in localities ranging from sea level to 4900'. Excluding the type specimens all of the material I have seen was collected in October. Specimens were found in the vicinity of rather open forests (oak forest in Chipinque Mesa, thorn forest in Tamaulipas), near streams or damp places. They were under stones or in thin litter.

GEOGRAPHICAL DISTRIBUTION.—This species is known from northeastern Mexico and extreme southeastern Texas. I have seen 23 males and 35 females of this species, collected in the following localities.

## MEXICO

NUEVO LEON. Rte. 60, 1.1 mi. e. Iturbide, 4800'. Rte. 60, 1.3 mi. e. Iturbide, 4800'. Rte. 60, 12.0 mi. w. Linares, 2100'. Rte. 60, 14.8 mi. w. Linares, 2400'. Rte. 85, 11.7 mi. n. Montemorelos, 1550'. Rte. 85, Rio Blanquillo, 7.0 mi. n. Montemorelos, 1640'. 32.9 mi. n. Montemorelos, 1700'. Chipinque Mesa, Monterrey, 4000'.

TAMAULIPAS. 27.5 mi. w. Soto la Marina, 1600'. 20.6 mi. e. Villa de Casas, 1500'. 23.1 mi. e. Villa de Casas.

## UNITED STATES

TEXAS. Cameron County: Esperanza Ranch, Brownsville, VI. 14.

*Aztecarpalus marmoreus* new species

Figs. 13, 17, 26, 32

DESCRIPTION.—Total length, male 10.7 mm., females, 10.0-10.3 mm.

Color. Black, or dark piceous, except the following. Rufous—lateral areas of antennal articles 4-11, maxillae, labial appendages and tarsi.

Setae. Tarsi glabrous dorsally; middle coxae each with about 10 setae; middle femora of male each with sparse brush of about 30 setae ventrally, female with three setae ventro-anteriorly. Interval 3 of elytron without setigerous punctures. Anal setae two in male, four in females.

Microsculpture. Clypeus with lines fine, meshes slightly transverse. Head anteriorly and laterally with meshes slightly transverse, vertex with meshes isodiametric, lines fine. Pronotum with meshes narrow, transverse, meshes longitudinally oriented posteriorly in posterior-lateral impressions. Elytra with lines fine, meshes slightly transverse.

Luster. Dorsal surface shining, pronotum feebly iridescent on disc.

Head. Frontal impressions broad, basins shallow.

Pronotum. As in Fig. 13; sides rather strongly constricted posteriorly. Posterior-lateral impressions linear, shallow, well isolated from lateral grooves by convex area.

Legs. Anterior tibia with terminal spur broadened as in Fig. 15. Male front tibia with crenulations, antero-medial surface not swollen (Fig. 17). Scape-Tarsal Ratio 1.66. Scape-Tibial Spur Ratio: male 1.25; two females 0.94-1.12.

Metepisternum about 1.5 times wider than long.

Elytra. Striae shallow, scutellar stria well developed, intervals flat.

Hind wings. Absent.

Male genitalia. Median lobe with prominent projection on left side of apical portion; in ventral aspect sinuate, apical portion straight, long, narrow, with two rows of denticles; apex narrow, with short hook (Fig. 26). Internal sac as in Figs. 32a and b; basal spine on right side curved; basal sclerite on left side; medial area with five short spines; preapical area with 13 long spines.

Female abdomen. Tergum 10 with apical margin subtruncate, as in Fig. 36.

Derivation of name.—From Latin, *marmoreus*, meaning marble. This name alludes to the type locality, Barranca de los Marmoles, which freely translated is "valley of the marbles".

Material examined.—This species is known from one male and three females, labelled as follows: "Mex. Hidalgo. Barranca de los Marmoles, 0.4 mi. s. San Vicente, Rte. 85, 7100'; X.2.65. G. E. Ball and D R. Whitehead, collectors". The holotype (male) and allotype are in the MCZ. Two paratypes are in UASM.

COLLECTING NOTES.—These specimens were collected in an open field, near a wet, oak-pine forest.

#### EVOLUTIONARY CONSIDERATIONS

Although the limited material available requires one to exercise considerable caution in approaching the topic of evolution of *Aztecarpalus*, still some data are sufficiently suggestive to warrant comment.

The general similarities between the members of *Trichotichnus* and *Aztecarpalus* suggest a remote common ancestry. The members of *Aztecarpalus* have some characteristics which might be very primitive among the "trichotichnoids": weakly developed fronto-ocular grooves, and isodiametric microsculpture (females of *hebescens* and *platyderus*). The geographical distribution of this pair of genera (American *Trichotichnus* confined to eastern North America; *Aztecarpalus* confined to eastern Mexico) suggests that time of divergence was pre-Miocene. Their pattern suggests that they are members of the Arcto-Tertiary biota, some of whose members reached Mexico in early Tertiary time, where they became isolated when the grasslands formed in northern Texas (Martin and Harrell, 1957). Savage (1966: 744-745) assigns taxa with similar distribution patterns to the "Old Northern Element" of the Central American biota.

In conclusion, morphological and chronological evidence point to a long-standing residence of *Aztecarpalus* in Mexico—seemingly long enough for the group to have undergone a much more extensive evolution than is shown by present knowledge of its diversity. I think that more species of *Aztecarpalus* are to be found, and that the additional material will make possible a reasonable reconstruction of the evolutionary history of the genus.

#### REFERENCES CITED

- ANTOINE, M. 1959. Coléoptères carabiques du Maroc. Troisième partie. Mémoires de la Société des Sciences naturelles et physiques du Maroc. Zoologie, Nouvelle série: No. 6, pp. 315-465, 96 figs. Rabat.
- BASILEWSKY, P. 1950. Révision générale des Harpalinae d'Afrique et de Madagascar. Première partie. Annales du Musée du Congo Belge, Tervuren, Sciences zoologiques, Vol. 6, 283 pp., 200 figs., Plates 1-9.
- BATES, H. W. 1882. Biologia Centrali-Americana. Insecta, Coleoptera, Carabidae. Vol. 1, Part 1, pp. 40-152, plates iii-v.
- CASEY, T. L. 1914. A revision of the Nearctic Harpalinae. Memoirs on the Coleoptera, Vol. 15, pp. 45-305. Lancaster.
- CSIKI, E. 1932. Coleopterorum Catalogus, Pars 121. Carabidae: Harpalinae VI. W. Junk, Berlin. pp. 1023-1278 (Vol. III).
- EMDEN, F. I. VAN. 1953. The Harpalini genus *Anisotarsus* Dej. (Col. Carab.). Ann Mag. nat. Hist., Ser. 12, 6: 513-547.

- HABU, A. 1968. On the characteristics of the *Selenophorus* genus-group and *Harpalus* genus-group of the subtribe Harpalina. Ent. Rev. Japan, 21 (1): 5-6.
- LINDROTH, C. H. 1968. The ground-beetles (Carabidae excl. Cicindelinae) of Canada and Alaska. Part 5. Opuscula Entomologica, Supplementum 33, pp. 649-944, figs. 329-480.
- MARTIN, P. S., and B. E. HARRELL. 1957. The Pleistocene history of temperate biotas in Mexico and eastern United States. Ecology, 38 (3): 468-480.
- MAYR, E. 1969. Principles of systematic zoology. McGraw-Hill Book Company, New York, Toronto, London, etc., xi + 428 pp., 112 figs.
- SAVAGE, J. M. 1966. The origins and history of the Central American herpetofauna. Copeia, 1966, No. 4: 719-766.
- SCHAEFFER, C. 1910. Additions to the Carabidae of North America with notes on species already known. Sci. Bull., Mus. Brooklyn Inst. Arts and Sci., 1 (17): 391-405.
- TSCHITSCHERIN, T. S. 1900. Mémoire sur la Tribu des Harpalini. Horae soc. ent. Ross., 34: 355-370.
- 3.0020. The Species of the Mexican Genus *Aztecarpalus*, New Genus (Coleoptera: Carabidae: Harpalini).

ABSTRACT—BALL, GEORGE E. (Department of Entomology, University of Alberta, Edmonton, Alberta, Canada). This genus (type species *Harpalus hebescens* Bates) is related to *Trichotichnus* Morawitz, and contains seven species, of which three are new: *lectocolus*; *trochotrichus*; and *marmoreus*. A new name, *schaefferi*, is proposed for the junior primary homonym, *Harpalus iripennis* Schaeffer. Criteria for ranking are discussed. These species are confined to an area including the mountains of Oaxaca, the eastern portion of the trans-volcanic belt, the Sierra Madre Oriental, and the coastal plain in northeastern Mexico and extreme southeastern Texas. It is suggested that this genus is a derivative of a stock which invaded Mexico from the north in pre-Miocene time.

DESCRIPTORS: Coleoptera; Carabidae; *Aztecarpalus*; new genus; keys; new species; Mexico.



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